This document was too large to scan as a single document. It has been divided into smaller sections.

Section 1 of 2

Document Information			
Document #	**SD-W314-TI-012**	**Revision**	**4**
Title	REQUIREMENTS ANALYSIS STUDY FOR MASTER PUMP SHUTDOWN SYS PROJECT DEVELOPMENT SPEC		
Date	**09/20/2000**		
Originator	**RR BEVINS**	**Originator Co.**	**CHG**
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Keywords			
Projects	**W-314**		
Other Information	**BEST AVAILABLE COPY**		

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ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN 662875

Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.	4. USQ Required?	5. Date
Supplemental ☐ Direct Revision ☒ Change ECN ☐ Temporary ☐ Standby ☐ Supersedure ☐ Cancel/Void ☐	R.R. Bevins/TFR&SO/R3-25/376-3335	☐ Yes ☒ No	
	6. Project Title/No./Work Order No. Project W-314, Tank Farm Restoration and Safe Operations	7. Bldg./Sys./Fac. No. TF	8. Approval Designator ESQ
	9. Document Numbers Changed by this ECN (includes sheet no. and rev.) HNF-SD-W314-TI-012, Rev. 3	10. Related ECN No(s).	11. Related PO No. N/A

12a. Modification Work	12b. Work Package No.	12c. Modification Work Completed	12d. Restored to Original Condition (Temp. or Standby ECNs only)
☐ Yes (fill out Blk. 12b) ☒ No (NA Blks. 12b, 12c, 12d)	N/A	N/A Design Authority/Cog. Engineer Signature & Date	N/A Design Authority/Cog. Engineer Signature & Date

13a. Description of Change

13b. Design Baseline Document? ☒ Yes ☐ No

Made minor editoral changes throughout the document. Added service water pressure detection to text and appendices tables. Also update appendices tables to reflect B221 drawings.

NOTE: This change will not result in an exposure increase >1 person-REM (whole body) or >10 person-REM (extremities) for the installation, maintenance and operation for the life of the modification. Reference RRP-MD-010 and RPP-5252.

14a. Justification (mark one)	14b. Justification Details
Criteria Change ☒ Design Improvement ☐ Environmental ☐ Facility Deactivation ☐ As-Found ☐ Facilitate Const. ☐ Const. Error/Omission ☐ Design Error/Omission ☐	"This modification will not increase collective dose since it has no impact on radiological sources, contamination control, or shielding." USQ not required per HNF-IP-0842, IV, 5.4, Rev. 12. Any temporary or permanent changes to facilities and procedures covered by the RPP Authorization Basis document will have a USQ evaluation performed prior to initiation of field work activities.

15. Distribution (include name, MSIN, and no. of copies)

See Distribution Sht. attached.

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1. ECN (use no. from pg. 1): 662875

16. Design Verification Required	17. Cost Impact		18. Schedule Impact (days)
	ENGINEERING	CONSTRUCTION	
☒ Yes	Additional ☐ $ N/A	Additional ☐ $ N/A	Improvement ☐ N/A
☐ No	Savings ☐ $	Savings ☐ $	Delay ☐

19. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 13. Enter the affected document number in Block 20.

SDD/DD	☐	Seismic/Stress Analysis	☐	Tank Calibration Manual	☐
Functional Design Criteria	☐	Stress/Design Report	☐	Health Physics Procedure	☐
Operating Specification	☐	Interface Control Drawing	☐	Spares Multiple Unit Listing	☐
Criticality Specification	☐	Calibration Procedure	☐	Test Procedures/Specification	☐
Conceptual Design Report	☐	Installation Procedure	☐	Component Index	☐
Equipment Spec.	☐	Maintenance Procedure	☐	ASME Coded Item	☐
Const. Spec.	☐	Engineering Procedure	☐	Human Factor Consideration	☐
Procurement Spec.	☐	Operating Instruction	☐	Computer Software	☐
Vendor Information	☐	Operating Procedure	☐	Electric Circuit Schedule	☐
OM Manual	☐	Operational Safety Requirement	☐	ICRS Procedure	☐
FSAR/SAR	☐	IEFD Drawing	☐	Process Control Manual/Plan	☐
Safety Equipment List	☐	Cell Arrangement Drawing	☐	Process Flow Chart	☐
Radiation Work Permit	☐	Essential Material Specification	☐	Purchase Requisition	☐
Environmental Impact Statement	☐	Fac. Proc. Samp. Schedule	☐	Tickler File	☐
Environmental Report	☐	Inspection Plan	☐	N/A	☐
Environmental Permit	☐	Inventory Adjustment Request	☐		☐

20. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number/Revision

21. Approvals

	Signature		Date		Signature	Date
Design Authority	D.E. Bowers	S5-13	9/12/00	Design Agent		
Cog. Eng.	R.R. Bevins	R3-25	9-11-00	PE		
Cog. Mgr.	~~J.W. Lentsch~~	R3-25	9-15-00	QA		
QA	T.L. Bennington	R2-89	9-18-00	Safety		
Safety	R.J. Fogg	S5-12	9/12/00	Design		
Environ.	J.D. Guberski	R1-51	9/12/2000	Environ.		
Other	Startup	R2-58	9/12/2000	Other		
	Ops. R.P. Raven	S0-09	9/13/00			
	Maint. T.L. Jennings	S7-83	9/13/00			
	Safety/Lic. J.P. Ha	R1-49	9-12-00	DEPARTMENT OF ENERGY		
	DST Engr. W.D. Ninkelman	S5-05	9-18-2000	Signature or a Control Number that tracks the Approval Signature		
	Rad. Con. S.H. Pearce	S7-75	9/13/2000			
				ADDITIONAL		

DISTRIBUTION SHEET

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Distribution	RR Bevins	Date 9-19-00
Project Title/Work Order		~~EDT~~ No. 662875
Tank Farm Restoration and Safe Operations		ECN No. -7

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
PJ Bedell	G3-12	X			
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Requirements Analysis Study for Master Pump Shutdown System Project Development Specification

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CH2M Hill Hanford Group Inc., Richland, WA 99352
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U.S. Department of Energy Contract DE-AC06-~~96RL13200~~ 99RL14047

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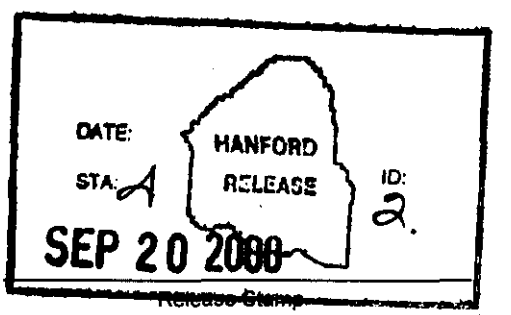
Key Words: Master Pump Shutdown System, Project W-314, Tank Farm Restoration and Safe Operations

Abstract: This study is a requirements document that presents an analysis for the functional description for the master pump shutdown system. This document identifies the sources of the requirements and/or how these were derived.

The requirements in this study apply to the first phase of the W-314 Project.



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A-7320-005 (10/97)

Requirements Analysis Study

for

Master Pump Shutdown System

Project Development Specification

Project W-314
Tank Farm Restoration and Safe Operations

Prepared by Fluor Federal Services
for CH2M HILL Hanford Group, Inc.

September 7, 2000

Approval:	P.J. Bedell, FFS/TFRSO Principal Lead Engineer	9-7-00 Date
Approval:	R.M. Tanner, FFS/TFRSO Project Manager	9-7-00 Date
Approval :	K.N. Jordan, CHG, Project Manager	Date
Approval:	D.E. Bowers, RPP Design Authority	9/12/00 Date RRB 9/12/00
Approval:	R.P. Raven, CHG, Retrieval Operations	9/13/00 Date

CONTENTS

FIGURES

APPENDIXES

Acronym List

ALARA	As Low As Reasonably Achievable
BIO	Basis of Interim Operation
CHG	CH2M Hill Hanford Group, Inc.
CFR	Code of Federal Regulations
CTS	Cross-Site Transfer System
DBA	Design Basis Accident
DBE	Design Basis Earthquake
DCRT	Double Contained Receiver Tank
DOE	U.S. Department of Energy
DRD	Design Requirements Document
DST	Double Shell Tank
FFBD	Function Flow Block Diagram
HLAN	Hanford Local Area Network
HLW	High Level Waste
HMI	Human Machine Interface
LMHC	Lockheed Martin Hanford Company
MPS	Master Pump Shutdown
MPSS	Master Pump Shutdown System
MPSR/CD	MPS Relay Connected Device
NACE	National Association of Corrosion Engineers
PC	Performance Category
PCU	Process Control Unit
PDC	Project Design Concept
PDS	Project Development Specification
PED	Programmable Electronic Device
PGV	Peak Ground Velocity
PLC	Programmable Logic Controller
PICD	Project Interface Control Document
RAS	Resource Allocation Sheet
RTD	Resistance Temperature Detector
SDC	Hanford Site Design Criteria
SL	Line Designation for Slurry Piping
SN	Line Designation for Supernate Piping
SVGA	Super Video Graphic Array
TEDE	Total Effective Dose Equivalent
TFLAN	Tank Farm Local Area Network
TFRSO	Tank Farm Restoration and Safe Operations
TMACS	Tank Monitoring and Control System
WHC	Westinghouse Hanford Company
WTA	Waste Transfer Annunciator

1.0 Scope

This study is a requirements document that presents an analysis for the functional description for the master pump shutdown system. This document identifies the sources of the requirements and/or how these were derived. Each requirement is validated either by quoting the source or an analysis process involving the required functionality, performance characteristics, operations input or engineering judgment.

The requirements in this study apply to the first phase of the W314 Project. This document has been updated during the definitive design portion of the first phase of the W314 Project to capture additional software requirements and is planned to be updated during the second phase of the W314 Project to cover the second phase of the project's scope.

1.1 Classification

This section is not applicable to this specification, since there is no material classifications for the type of equipment this specification covers.

2.0 Applicable Documents

2.1 DOE Documents

DOE 6430.1a, 1989, *General Design Criteria*, U.S. Department of Energy.

DOE 4330.4b, *Maintenance and Repair of Department of Energy Property*, U.S. Department of Energy.

DOE 5480.19, *Conduct of Operations Requirements For DOE Facilities*, U.S. Department of Energy.

DOE 5480.20a, *Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities*, U.S. Department of Energy.

DOE-STD-1073-93, *Guide for Operational Configurational Management Program*, (S/RID), U.S. Department of Energy.

MIL-STD-1472E, *Human Engineering Design Criteria* for Military Systems, *Equipment and Facilities*.

NUREG-0700, *Guidelines for Control Room Design Reviews*, U.S. Nuclear Regulatory Commission.

2.2 Code of Federal Regulations

10 CFR 835, *Occupational Radiation Protection.*

40 CFR 265, *Interim Steps for Owner and Operators of Hazardous Waste Treatment, Storage and Disposal.*

2.3 PHMC Documents

HNF-PRO-097, Rev. 0, *Engineering Design and Evaluation.*

HNF-PRO-081, Rev. 2, *"Hazardous Energy Control, Program"*, Addendum, *"Guide for Controlling Organization Hazardous Energy Control".*

HNF-IP-0842, TWRS Administration, Volume II, Section 6.1, Rev. Oa, *Tank Farm Operations Equipment Labeling and Master Equipment List Control.*

HNF-IP-0842, TWRS Administration, Volume IV, Section 4.25, Rev. Oa, *Engineering Drawings.*

HNF-PRO-224, Rev. 0, *Document Control.*

HNF-PRO-233, Rev. 0, *Review and Approval of Documents.*

HNF-PRO-242, Rev. 0, *Engineering Drawing Requirements.*

RPP-MP-599, Rev. 0, *"Project Hanford Quality Assurance Program Description".*

RPP-PRO-309, Rev. 0, *"Computer Software Quality Assurance Requirements".*

WHC-SD-GN-DGS-30008, Rev. 0, *"Design Loads for New Underground Double-Shell Tanks and Associated Underground Process Piping".*

WHC-SD-GN-DGS-30011, Rev. 0, *"Radiological Design Guide".*

HNF-SD-WM- *SAR-067*, Rev. *2*, *Tank Waste Remediation System Final Safety Analysis Report* (FSAR)

2.4 Project W-314 Documents

WHC-SD-W314-DRD-001, Rev. 2, "*Preliminary Design Requirements Document for Tank Farm Restoration and Safe Operations, Project W-314*".

WHC-SD-W314-RPT-003, Rev. 4, "*Upgrade Project Summary Report for Tank Farm*

Restoration and Safe Operations, Project W-314".

HNF-SD-W314-TI-007, Rev. 1, *"Project Design Concept for Transfer Piping, System Tank Farm Restoration and Safe Operations, Project W-314".*

HNF-SD-W314-TI-008, Rev. 3, *"Project Design Concept for Master Pump Shutdown, System Tank Farm Restoration and Safe Operations, Project W-314".*

HNF-SD-W314-PICD-001, Rev. 1, *"Project Interface Control Document for Project W-314".*

HNF-SD-W314-PDS-001, Rev. 2, *"Project Development Specification for Transfer Piping".*

HNF-SD-W314-PDS-002, Rev. 2, *"Project Development Specification for Valve Pit Manifold".*

HNF-SD-W314-PDS-003, Rev. 2, *"Project Development Specification for Pit Leak Detection".*

HNF-SD-W314-PMP-001, Rev 2, Appendix C, *"Systems Engineering Management Plan Tank Farm Restoration and Safe Operations, Project W-314".*

2.5 Miscellaneous Documents

HSRCM-1, Rev. 2, *"Hanford Site Radiological Control Manual".*

OSD-T-151-00007, Rev. H-17, *"Operating Specifications for the 241-AN, AP, AW, AZ and SY Tank Farms".*

Operating Procedure TO-430-500, Rev. B-1, *"Cross-Site Transfer From TK-102-SY To TK-107-AP Via SNL-3150".*

2.6 Codes and Standards

Factory Mutual (FM), *Approval Guide 1996 Edition.*

Underwriters Laboratories (UL).

UL 508A, 1993, *Outline of Investigation for Industrial Control Panels*, Underwriters Laboratories.

ANSI/ISA-S5.2-1976 (R 1992), *The International Society for Measurement and Control "Binary Logic Diagrams for Process Operations".*

ANSI/ISA-S5.4-1991, *The International Society for Measurement and Control "Instrument Loop Diagram".*

ANSI/NEMA ICS 6-1988, Rev. 1, National Electric Manufacturers Association, *"Enclosures for Industrial Controls and Controls".*

NFPA 70, 1996, National Fire Protection Association, *"National Electric Code".*

ICRP Publication 17, *Cost Benefit Analysis in the Optimizing Radiation Protection.*

3.0 Requirements

3.1 Item Definition

Functionally, the Master Pump Shutdown (MPS) System terminates a waste transfer by automatically shutting down those transfer pumps utilized to pump the waste through a route if the following events occur:

- Any leak detection system monitored by the MPS System and associated with the selected route detects a leak or system malfunction.
- Any waste transfer valve monitored by the MPS System and utilized in the selected transfer route is in an incorrect position.
- Any existing MPS relay monitored by the MPS System and utilized in the selected transfer route is de-energized. The existing MPS relay is connected to leak detection systems, MPS pull-switches, flush valve position switches and flush water pressure switches that are not upgraded by Phase I of Project W-314.
- Any transfer shutdown pull-switches monitored by the MPS System is initiated by an Operator.
- Any leak or incorrect valve position monitored by the Cross-Site Transfer System is detected when the route is a cross-site transfer.

In addition, the MPS System identifies the terminating event as an alarm to Operations.

A total of six different waste transfers between double shelled tanks and 244-S DCRT may take place at any one time (not including single shell tanks which are not currently in Project W-314's scope). This requires that the MPS System be able to discriminate selected equipment associated with each of the six transfers.

Other functions include tracking equipment function verification status as well as executing equipment testing for verification purposes.

The following definitions with Figures 1 and 2 provide a hardware description of the MPS System. Figure 1 shows a typical node of the MPS System and Figure 2 shows the completed network of MPS System nodes.

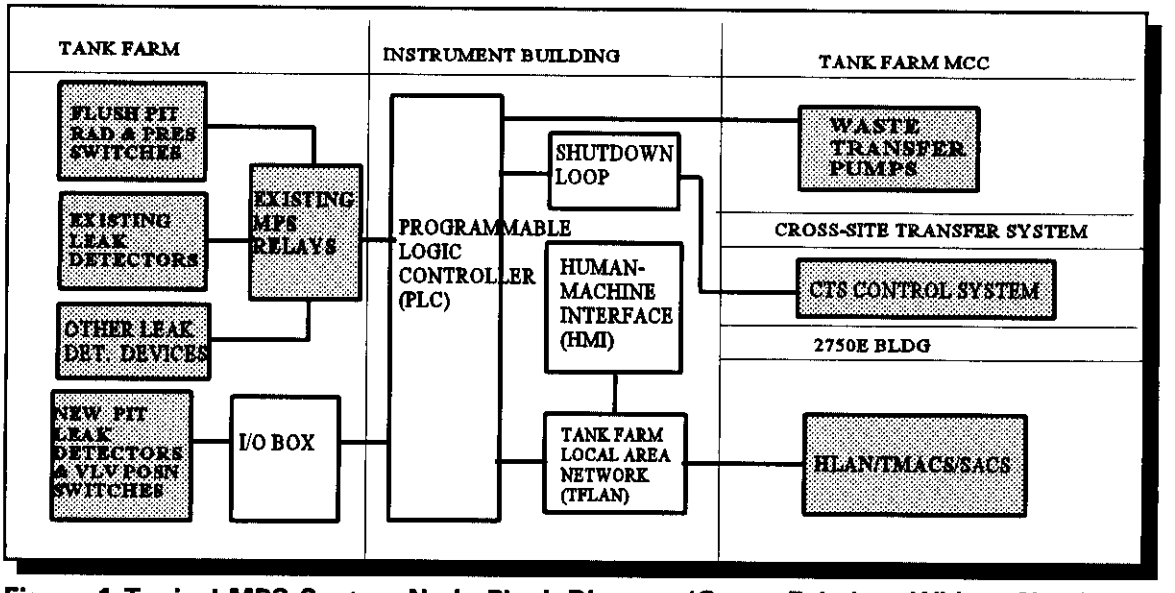


Figure 1 Typical MPS System Node Block Diagram (Grey = Existing, White = New)

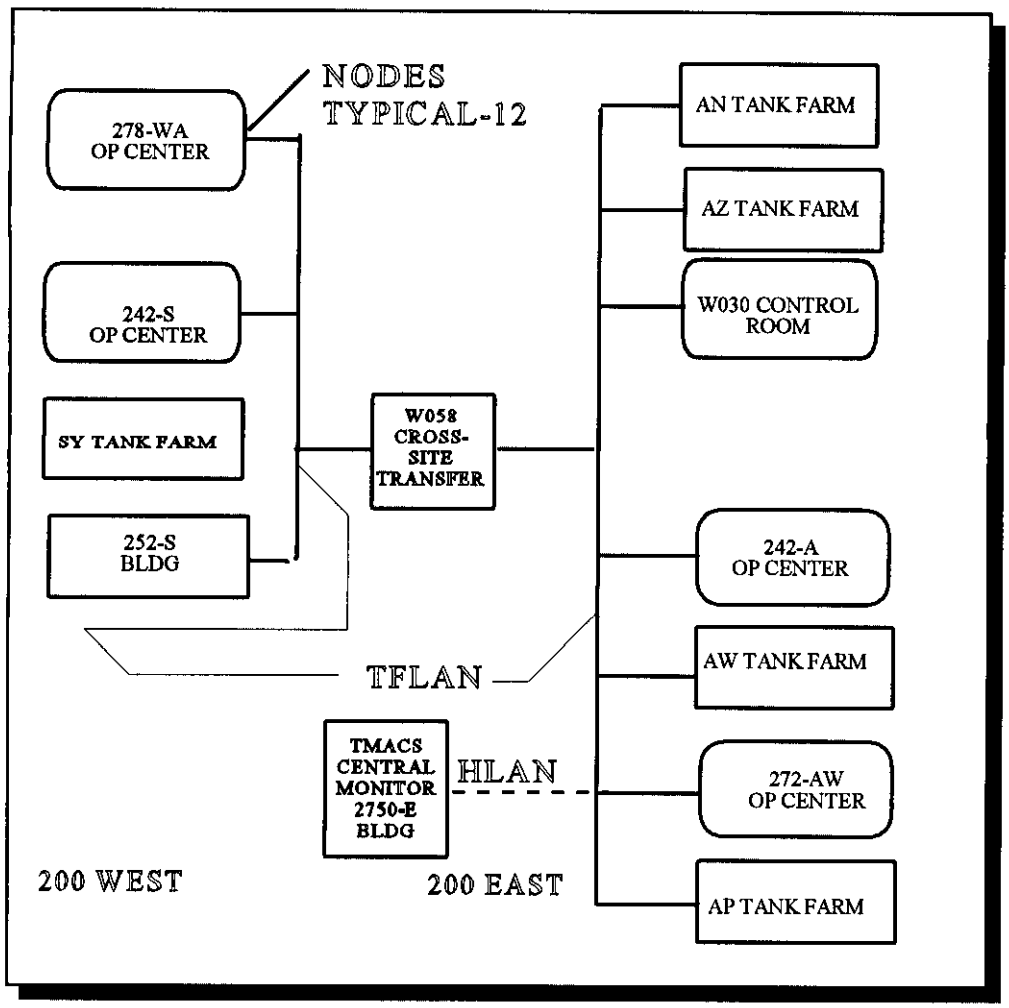


Figure 2 TANK FARM MPS System NETWORK

- Existing MPS Relays

  The existing MPS electromagnetic relays receive signals from existing pit leak detectors, encasement leak detectors, flush pit radiation detectors, flush water pressure switches, area radiation detectors, manual push buttons and other alarmed outputs and are connected together in such a way as to provide a single input to the MPS System PLC (defined in the following). Several of these existing relays will input to the MPS System at any one of the Instrument Buildings. Originally, they were directly connected to shut down all of the waste transfer pump(s) in the event of a detected leak during a waste transfer.

- Tank Monitor and Control System (TMACS)

  TMACS is an existing central surveillance system located at the 2750E building. TMACS is a computerized data acquisition system and provides the input to the Surveillance Analysis Computer System (SACS). Tank farm alarms and instruments are monitored. TMACS is available to properly equipped remote users over the HLAN for viewing only.

- SACS

  Receives and stores tank farm data for long term storage and data analysis capability. SACS is EXCEL based and available to operators and engineers over the HLAN.

- Tank Farm Local Area Network (TFLAN)

  The name given to a new W-314 installed high speed network that communicates information in digital format between tank farms.

- Programmable Logic Controller (PLC)

  The PLC is a digital computer that receives output signals from field devices, communicates with other devices using digital protocols, and produces control output signals based on inputs and user configured programming and stored algorithms.

  The PLC translates analog signals such as current loop (4-20 mA), voltage, thermocouples, RTD's, etc. and discrete signals such as relays, and on/off voltage devices into digital information suitable for electronic storage and transmission.

  The PLC communicates with field located I/O boxes(defined in the following), the HMI(defined in the following), and other PLC's. Communication to the I/O boxes is done by serial digital transmission. Communication with the HMI is done using a Ethernet protocol .

  The PLC uses inputs and programmable functions such as logical operations, averaging, totalizing, timing, and etc. to control PLC outputs. The PLC implements the control portion of the MPS System.

- Human Machine Interface (HMI)

  The HMI is a personal digital computer type work station with a CRT display , limited access capability front panel keypad pointer type input device(mouse),

a hard disk drive for non-volatile memory, and a user configured HMI software package. The HMI receives data from the PLC, performs calculations on and/or stores the data, and communicates the data on demand to TMACS through the existing Hanford Local Area Network (HLAN). The HMI displays alarms and signal data (or for any data that is available on the TFLAN network) on its CRT display in an operator friendly fashion. The HMI is typically installed in a tank farm instrument building with a PLC.

- Input/Output box (I/O box)

  The I/O box is a field located device which functions to extend the PLC input and output capability to field instrumentation. The primary purpose of the I/O box is to reduce conduit and trenching within the tank farm. It contains hardware necessary to convert analog and discrete input and output signals to digital information. Unlike the PLC it is not programmable, and its communications capability is limited to transmitting the digital information to the PLC.

- MPS Shutdown Loop

  The MPS Shutdown Loop is a wiring network interconnecting the MPS System PLCs. The network's function is to communicate a route shutdown signal between PLCs. Each route has a unique shutdown signal. Upon receiving a route shutdown signal from either another PLC or a field device, such as a leak detector, a PLC automatically shuts off all waste transfer pumps controlled by it that are selected for the route. The PLC, then, transmits the route shutdown signal in a fail safe manner to the next PLC. The process is repeated for all PLCs until the PLC originating the route shutdown receives the shutdown signal thereby completing the loop with all of the route's waste transfer pumps being shut down. The primary purpose of the loop is to allow a transfer to continue without the TFLAN or HMIs operating.

3.1.1 Item Diagrams

The functions of the MPS System were developed during the functional analysis of the W-314 Waste Transfer System. The MPS System must meet the requirements of the functions identified as a "FFBD function xxx" in section 3.2.1.

Appendix A contains the Functional Flow Block Diagrams (FFBD) that include diagrammatic presentations of the above functions and their inter-relationship with other applicable functions of the transfer waste system.

3.1.2 Interface Definition

The shaded components in Figure 1 illustrate the typical external interfaces to the MPS

System. Refer to HNF-SD-W314-PICD-001, Rev. 1, *"Project Interface Control Document for Project W-314"*, for the detailed interface requirements of the MPS System.

In addition, the design shall be coordinated with the systems identified in the following Project Development Specifications (PDS):

- HNF-SD-W314-PDS-001 PDS for Transfer Piping
- HNF-SD-W314-PDS-002 PDS for Valve Pit Manifold
- HNF-SD-W314-PDS-003 PDS for Pit Leak Detection

3.1.3 Major Component List

Since there are no separate subsystems, defined as Major Components, within the MPS System; this section is not applicable to this specification.

3.2 Characteristics

3.2.1 Performance

*Note that function numbers as shown in the FFBDs are equal to the following section numbers for the functions, shown **bolded**, less the initial numbers "3.2.1".*

The MPS System shall meet the following performance requirements:

3.2.1.1 **Select Route** (FFBD Function 1.0).

3.2.1.1.1 **Select Pre-Determined Route** (FFBD Function 1.1).

3.2.1.1.1.1 **Initialize System** (FFBD Function 1.1.1). Prior to performing any set of operations identified by an operating mode, the MPS System shall be initialized. The initialization shall consist of executing manufacturer's standard software and hardware diagnostic procedures and performing a dialogue between operators and the MPS System. If a software or hardware problem is diagnosed, the initialization is halted and a System diagnostic is displayed. The initialization is accomplished when the MPS System has determined the following information:

- Operator identification
- Security/Authorization Access Level of the Operator
- Mode of Operation

3.2.1.1.1.1.1 All Operators shall be required to log on and off of the MPS System.

Basis: HNF-SD-W314-TI-008, Rev.3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.

3.2.1.1.1.1.2 The log on process shall include all HMI Operators inputting a password into the MPS System.

Basis: HNF-SD-W314-TI-008, Rev.3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.

3.2.1.1.1.1.3 The MPS System shall allow a HMI Operator to perform only those operations that the Operator is authorized to perform.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.

3.2.1.1.1.1.4 The MPS System shall provide multiple access levels such as Technician, Operator, Shift Supervisor, Engineer and Systems Administrator as defined in the following:

- Technician Level: Access to read all displays but no ability to change parameters other than those negotiated in site specific labor contracts.
- Operator Level: Access to read all displays, adjust the process parameters associated with any waste transfer route, and select a predetermined route.
- Supervisor Level: Access to create and select predetermined transfer routes, read all displays, adjust all process parameters associated with the waste transfer operations, inhibit alarms, invoke a MPS System element bypass, and release approval of administrative hold points within his area of responsibility.
- Engineer Level: Access to create transfer routes, read all displays, and reconfigure PLC logic, MPS System hardware and HMI displays.
- Super User Level: Full access to all MPS System operator, hardware and software functions. Performs the Systems Administrator functions.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.

3.2.1.1.1.1.5 Initializing Systems shall take place at all HMIs associated with the MPS System at the following locations (note 3 HMIs will be installed in the 241-AZ-271 Control Building):

HMI LOCATION	DESCRIPTION
BUILDING 241-AZ-271	702-AZ CONTROL BUILDING
BUILDING 241-AN-271	TANK FARM AN INSTRUMENT BUILDING
BUILDING 241-AW-271	TANK FARM AW INSTRUMENT BUILDING
BUILDING 241-AP-271	TANK FARM AP INSTRUMENT BUILDING
BUILDING 272-AW	200 EAST OPERATING CENTER
BUILDING 242-A	200 EAST EVAPORATOR OPERATING CENTER
BUILDING 242-S	200 WEST EVAPORATOR OPERATING CENTER
BUILDING 278-WA	200 WEST OPERATING CENTER

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.2.3.

3.2.1.1.1.1.6 Manning Levels for operation of the MPS System shall be normally one operator for each waste transfer route. Multiple operators shall be able to select different transfer routes simultaneously with each operator manning a different MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.

3.2.1.1.1.1.7 Each HMI shall operate independently from other HMIs unless specifically stated in subsequent requirements.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.

3.2.1.1.1.1.8 The MPS System equipment shall perform self diagnostics and shall prevent any waste transfers from occurring if an equipment malfunction is detected.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 4.3.2.5.

3.2.1.1.1.2 **Display Source List** (FFBD Function 1.1.2). After The MPS System initializes and

the Operator chooses a HMI command to display all possible sources of a transfer route, the MPS System HMI shall display a list of all possible sources.

3.2.1.1.1.2.1 A route source list identifying all sources that have been previously selected for another route is required.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.1. A route source list identifying all sources that have been previously selected for other routes is needed for the Operator to choose an "appropriate" route source.

3.2.1.1.1.2.2 The list of transfer route sources to be displayed shall include those DSTs presented in Tables 1 of Appendix B as well as the 244-S DCRT, Tk-219-S-102, 242-A Evaporator, 204-AR (Truck) Unloading Facility, and A-350 Drainage Lift Station.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.1.1.3 **Select Route Source** (FFBD 1.1.3). After The MPS System displays a list of all possible sources, the Operator chooses a HMI command that selects the source of a transfer route.

3.2.1.1.1.3.1 One tank farm operator at any MPS HMI may select a source and a destination tank for each simultaneous waste transfer. Based on this input the MPS System presents a list of predetermined waste transfer routes to the Operator on the HMI. The Operator selects the route from this list and assigns it to one of six waste transfers depending on which one is available. In turn, the MPS System selects all MPS inputs and outputs for the route utilizing the predetermined route selection as a basis.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.2.

3.2.1.1.1.4 **Display Destination List** (FFBD 1.1.4). After The MPS System initializes and the Operator chooses a HMI command to display all possible sources of a transfer route, the MPS System HMI shall display a list of all possible sources.

3.2.1.1.1.4.1 A route source list identifying all sources that have been previously selected for other routes is required.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design

Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.1. A route source list identifying all sources that have been previously selected for other routes is needed for the Operator to choose an "appropriate" route source.

3.2.1.1.1.4.2 The list of transfer route destinations to be displayed shall include those DSTs presented in Tables 1 of Appendix B as well as the 244-S DCRT and the 242-A Evaporator.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.1.1.5 **Select Route Destination** (FFBD 1.1.5). After The MPS System displays a list of all possible destinations, the Operator chooses a HMI command that selects the destination of a transfer route.

3.2.1.1.1.5.1 One tank farm operator at any MPS HMI may select a source and a destination tanks for each simultaneous waste transfer. Based on this input the MPS System presents a list of predetermined waste transfer routes to the Operator on the HMI. The Operator selects a route from this list and assigns it to one of six waste transfers depending on which one is available. In turn, the MPS System selects all MPS inputs and outputs for the route utilizing the predetermined route selection as a basis.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.2.

3.2.1.1.1.5.2 Identification names and numbers for each unique waste transfer route shall be assigned by the MPS System.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.1.

3.2.1.1.1.6 **Display List of Pre-Determined Routes** (FFBD Function 1.1.6). After the route source and destination has been selected, the MPS System shall display all possible transfer routes with the same source and destination. If no Pre-Determined routes are available to satisfy the selected source and destination, no route will be displayed and a new (Pre-Determined) route needs to be created.

3.2.1.1.1.6.1 An Operator at the HMI shall be able to select a transfer route from a list of predetermined transfer routes.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.5.

3.2.1.1.1.6.2 The HMI shall have a user friendly graphical interface.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.2.3.

3.2.1.1.1.6.3 One tank farm operator at any MPS System HMI shall be able to select a source and destination for each simultaneous waste transfer. Based on this input the MPS System presents a list of predetermined waste transfer routes to the Operator on the HMI. The Operator selects a route from this list and assigns it to one of six waste transfers depending on which one is available. In turn, the MPS System selects all MPS inputs and outputs for the route utilizing the predetermined route selection as a basis. The operator shall be able to cancel the selection and repeat the route selection process.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.2.

3.2.1.1.1.7 **Pre-Select Pre-Determined Route** (FFBD Function 1.1.7). After the MPS System displays a list of all possible pre-determined waste transfer routes, the Operator chooses a HMI command that selects the predetermined waste transfer route.

3.2.1.1.1.7.1 One tank farm operator at any MPS HMI may select a source and destination tank for each simultaneous waste transfer. Based on this input the MPS System presents a list of predetermined waste transfer routes to the Operator on the HMI. The Operator selects a route from this list and assigns it to one of six waste transfers depending on which one is available. In turn, the MPS System selects all MPS inputs and outputs for the route utilizing the predetermined route selection as a basis.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.2.

3.2.1.1.1.7.2 The MPS System shall be capable of storing 1000 pre-determined routes.

Basis: The maximum number of different active transfer routes necessary over the life of the

facility was determined by engineering judgement.

3.2.1.1.1.7.3 The purpose of this function is to select the appropriate MPS System inputs and outputs for a particular waste transfer route and its associated flush routes.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.5.2.

3.2.1.1.1.7.4 The minimum number of flush routes that can be associated with a particular waste transfer shall be four. These are the pre-transfer flush towards the pump, the pre-transfer flush towards the destination, the post-transfer flush towards the pump, and the post-transfer flush towards the destination.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.

3.2.1.1.1.7.5 The maximum allowable number of simultaneously operating waste transfer routes shall be six. The wiring for the MPS Shutdown Loop shall be designed for eight different routes.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.1. In the engineer's judgement it is appropriate to provide a minimum of 25% future wiring capacity when installing wire in buried conduit.

3.2.1.1.1.7.6 Canceling or de-selecting a pre-determined transfer route shall be accomplished only when the transfer route's assigned transfer pump's motor controls are de-energized by opening the pumps' branch circuit breaker.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.4.

3.2.1.1.1.7.7 MPS System HMI Databases for associating MPS System inputs and outputs to selected waste transfer routes shall be provided.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.3.

3.2.1.1.1.7.8 Computer programs with appropriate configuration control shall allow the adding to, deleting from and changing of the records of all waste transfer route databases.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.3.

3.2.1.1.1.8 **Preview Pre-Determined Route Selection** (FFBD Function 1.1.8). After the transfer route is pre-selected, the MPS System shall display the pre-selected transfer route to the Operator(s).

3.2.1.1.1.8.1 The MPS System shall be able to display graphically on the HMIs the selected transfer routes that are in the Waste Transfer Annunciator mode of operation.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.6.

3.2.1.1.1.8.2 All waste transfer routes selected shall be displayed on the Waste Transfer Annunciator set of MPS HMI graphical screens. (See FFBD Function 4.4.10.)

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.16.2.

3.2.1.1.1.9 **Confirm Pre-Determined Route Selection** (FFBD Function 1.1.9). After the Operator previews the pre-determined route selection, the Operator chooses a HMI command that confirms or does not confirm the pre-selection of the pre-determined transfer route. If the pre-determined route selection is not confirmed, a new pre-determined route must be selected in FFBD Function 1.1.6. If the pre-determined route selection is confirmed, the MPS System accepts the pre-selected pre-determined route as one of the six pre-determined routes selected for operation.

3.2.1.1.1.9.1 The MPS System shall have a double confirmation command sequence for inputting operator control functions.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" For Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.

3.2.1.1.1.10 **Display System Diagnostic** (FFBD Function 1.1.10). If a MPS System malfunction

occurs during the Initialize System function (FFBD Function 1.1.1), the Initialize System function is exited and the system diagnostic is displayed to the Operators to assist system recovery process.

3.2.1.1.1.10.1 The MPS System shall perform self diagnostics and shall prevent any waste transfers from occurring if an equipment malfunction is detected. The initiating self diagnostics are manufacturer specific and depend on the design of the electronic components of the MPS System.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" For Tank Farm Restoration and Safe Operations, Project W-314", Section 4.3.2.5.

3.2.1.1.1.10.2 Each digital or analog output module shall produce a specific output signal, that is configurable, when a system failure is detected by the output module. The output signal shall be configurable as high, low, hold last value, or a specific value within the range of the output signal.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 4.3.2.5.

3.2.1.1.2 **Create Pre-Determined Route** (FFBD Function 1.2).

3.2.1.1.2.1 **Choose Route Creating Mode** (FFBD Function 1.2.1). If it is determined that no pre-determined routes are available that satisfy a waste transfer's source and destination requirements, a new pre-determined route needs to be created. After assigning a name to the new route, an Operator with the appropriate access level chooses a HMI command that selects one of two methods used to create a pre-determined route. The two methods are:

- Create Route By Mechanical Segment.
- Create Route By Modifying an Existing Pre-Determined Route.

3.2.1.1.2.1.1 The MPS System shall assure that identification names and numbers for each unique waste transfer route are not duplicated.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.1.

3.2.1.1.2.1.2 A MPS System Operator with the appropriate access level located at a HMI shall be able to create a predetermined transfer route by selecting mechanical segments of a transfer route such as tanks, pumps, pits,

transfer lines and jumpers.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.5.

3.2.1.1.2.1.3 (Requirement deleted)

3.2.1.1.2.1.4 If no predetermined route has been created for the route source and destination originally selected, a new predetermined route must be created.

Basis: HNF-SD-W314-TI-008, Rev. 3 , Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.2.

3.2.1.1.2.1.5 Only a MPS System Operator with an appropriate access level are allowed to create new routes.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.2.

3.2.1.1.2.1.6 Predetermined routes are created offline at any MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.2.

3.2.1.1.2.1.7 Two methods of route creation are used; selection by mechanical segments, and by modifying an existing predetermined route.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.2.

3.2.1.1.2.2 **Create Route by Segment** (FFBD Function 1.2.2).

3.2.1.1.2.2.1 **Display Route Segments** (FFBD Function 1.2.2.1) After the "Create Route By Segment" method for creating a new predetermined route is chosen by a qualified Operator, the MPS System HMI shall display all possible route segments.

3.2.1.1.2.2.1.1 The MPS System shall be able to display graphically on the HMIs the

selected transfer routes in the Create By Segment mode of operation.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.6.

3.2.1.1.2.2.1.2 Route creation by mechanical segments method includes the use of graphic screens where mechanical segments, such transfer lines, pumps and valves, are selected by the HMI operator.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.2.

3.2.1.1.2.2.1.3 The following mechanical segments listed in Appendix B, Tables 4, 5, 7, 8, 9, 10, 13, 14 and 15 shall be displayed.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.1.2.2.2 **Select Route Segment** (FFBD Function 1.2.2.2). After the MPS System displays all possible route segments, the Operator chooses a HMI command that selects a route segment of a transfer route.

3.2.1.1.2.2.2.1 A shift supervisor or cog engineer located at a HMI shall be able to create a predetermined transfer route by selecting mechanical segments of a transfer route such as pumps and transfer lines . The MPS System inputs and outputs associated with each selected mechanical segment are then automatically selected.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.5.

3.2.1.1.2.2.2.2 The selection by mechanical segments method includes the use of graphic screens that are similar to the WTA set of screens where mechanical segments, such as, transfer lines, pumps and valves, are selected by the HMI operator and all MPS System elements, such as leak detectors, valve positions sensors, existing MPS relays, and pump interlock relays, associated with the selected mechanical segment are selected automatically.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section

3.2.2.

3.2.1.1.2.2.2.3 The mechanical segments shall be selected from those presented in Tables 4, 5, and 15 of Appendix B.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.1.2.2.3 **Add Selected Segment to New Pre-Determined Route** (FFBD Function 1.2.2.3). After a route segment is selected by an Operator for use in a route, the MPS System shall store the information identifying that the route segment as a selected component of the new pre-determined waste transfer route.

3.2.1.1.2.2.3.1 Route creation by mechanical segments method includes the use of graphic screens where mechanical segments, such as transfer lines, pumps and valves, are selected by the HMI operator and all MPS System elements, such as leak detectors, valve positions sensors, existing MPS relays, and pump interlock relays, associated with the selected mechanical segment are selected automatically by the MPS System.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.2.

3.2.1.1.2.2.3.2 MPS System HMI Databases for associating MPS System inputs and outputs to selected waste transfer mechanical segments such as pumps and transfer lines, shall be provided.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.3.

3.2.1.1.2.2.3.3 Computer programs with appropriate configuration control shall allow the adding to, deleting from and changing of the records of all mechanical segment databases.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.3.

3.2.1.1.2.2.3.4 The MPS System inputs and outputs associated with each selected mechanical segment are automatically selected for the new pre-determined waste transfer route.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.5.

3.2.1.1.2.2.3.5 The mechanical segments shall be associated to input and output elements in accordance with the Tables 4, 5, 7, 8, 9, 10, 13, 14 and 15 presented in Appendix B.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.1.2.2.4 **Determine If Route Segment Selection is Complete** (FFBD Function 1.2.2.4). After a route segment selection is completed and the Operator reviews the route segment display, the Operator determines if additional route segment selections are required. If additional selections are required, the route segment selection process is repeated. If not, the route segment selection process is completed.

3.2.1.1.2.2.4.1 Route creation by the mechanical segments method includes the use of graphic screens where all the necessary mechanical segments, such as transfer lines, pumps and valves are selected by the HMI operator to make a complete route.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.2.

3.2.1.1.2.3 (Function deleted)

3.2.1.1.2.4 **Create Route by Modifying a Pre-Determined Route** (FFBD Function 1.2.4).

3.2.1.1.2.4.1 **Assign New Route Name** (FFBD Function 1.2.4.1). After an existing pre-determined route has been selected by an HMI Operator for modification, the MPS System assigns the new route name (created in FFBD Function 1.2.1) to the selected route and then stores the existing pre-determined route as a new route.

3.2.1.1.2.4.1.1 Once a predetermined route is created in the MPS System, a cog engineer or shift manager can store, retrieve, modify or delete the route from the MPS System.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.2.

3.2.1.1.2.4.2 **Determine Route Component Modification** (FFBD Function 1.2.4.2). After an existing pre-determined route has been stored as a new route, the HMI Operator shall determine which route components are to be modified. There are three categories of route components. They are:

- route source. (See FFBD Functions 1.1.2 & 1.1.3)
- route destination. (See FFBD Functions 1.1.4 & 1.1.5).
- route segment(s). (See FFBD Functions 1.2.2).

After the determination, the Operator chooses a HMI command that selects one of the three categories of route components for modification.

3.2.1.1.2.4.2.1 Route modifications are accomplished to a predetermined route either by selection or de-selection of route mechanical segments, including source and destination.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.2.

3.2.1.1.2.4.3 **Determine if Route Modifications are Complete** (FFBD Function 1.2.4.3). After a category of route modifications are completed, the Operator determines whether additional route modifications of a different category are required. If additional modifications of a different category are required, the route modification process is repeated. If not, the route modification process is completed.

3.2.1.1.2.4.3.1 If no predetermined route has been created for the route source and destination originally selected, a new predetermined route must be created.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.2.

3.2.1.1.2.4.4 **Re-store Modified Route as a New Route** (FFBD Function 1.2.4.4). After the route modifications are completed, the MPS System shall re-store the modified route as a new pre-determined route.

3.2.1.1.2.4.4.1 The modified route shall be stored as a new predetermined route.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.2.

3.2.1.1.2.4.4.2 MPS System HMI Databases for associating MPS System inputs and outputs to selected waste transfer routes shall be provided.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.3.

3.2.1.1.2.5 **Determine If Created Pre-Determined Route Is Complete** (FFBD Function 1.2.5). After any of the two methods of creating a pre-determined route are completed, the HMI Operator determines if a different or the same method is needed to complete the route creation. If additional selections or de-selections utilizing the same or different methods are required, the route creation process is repeated. If not, the route creation process is completed.

3.2.1.1.2.5.1 If no predetermined route has been created for the route source and destination originally selected, a new predetermined route shall be created.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.2.

3.2.1.1.2.5.2 Only a shift supervisor or cog engineer are allowed to create new routes.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.2.

3.2.1.1.2.5.3 Predetermined routes are created offline at any MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.2.

3.2.1.1.2.5.4 Two methods, selection by mechanical segments and modifying an existing predetermined route are used.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.2.

3.2.1.1.3 **Add Passive Elements** (FFBD Function 1.3).

3.2.1.1.3.1 **Determine If Transfer Route Meets** FSAR **Requirements** (FFBD Function 1.3.1).

After a transfer route is displayed and the requirements from the most current TWRS Final Safety Analysis Report (FSAR) are determined, the HMI Operator shall compare the route display with the FSAR requirements and determine if the selected route meets the FSAR requirements. If additional passive elements are required to satisfy the FSAR, the passive element selection process is repeated. If not, the passive element selection process is completed.

3.2.1.1.3.1.1 The MPS System shall operate within the TWRS design basis authorized by the DOE. The TWRS FSAR; HNF-SD-WM-SAR- 067, "Tank Waste Remediation System Final Safety Analysis Report"; is a document included in the TWRS Authorization Basis.

Basis: HNF-IP-0842, Volume 4 "Engineering", Section 5.4, Rev. 11C, "Unreviewed Safety Questions", Appendix A.

3.2.1.1.3.1.2 The HMI Operator that determines the need for additional passive elements required to satisfy the FSAR shall have an Engineer or Supervisor Access level to the MPS System.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.8.

3.2.1.1.3.2 **Choose a Passive Element** (FFBD Function 1.3.2). After the it has determined that passive elements are required to be added to the selected pre-determined transfer route satisfy the FSAR, an HMI command is chosen that initiates the create route by segment method used to add a passive element to a pre-determined route.

3.2.1.1.3.2.1 The MPS System shall operate within the TWRS design basis authorized by the DOE. The RPP FSAR; HNF-SD-WM-SAR-067, "Tank Waste Remediation System Final Safety Analysis Report"; is a document included in the RPP Authorization Basis.

Basis: HNF-IP-0842, Volume 4 "Engineering", Section 5.4, Rev.11C, "Unreviewed Safety Questions", Appendix A.

3.2.1.1.3.2.2 A shift supervisor or cog engineer located at a HMI shall be able to create a predetermined transfer route by selecting mechanical segments of a transfer route such as tanks, pumps, pits, transfer lines and jumpers.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.5.

3.2.1.1.3.2.3 (Requirement deleted)

3.2.1.1.3.2.4 Predetermined routes are created offline at any MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.2.

3.2.1.1.4 **Assign Route to Transfer** (FFBD Function 1.4).

3.2.1.1.4.1 **Display Available Transfers** (FFBD Function 1.4.1). After the passive elements have been added to the transfer route, The MPS System shall display which of the six allowable simultaneous transfers are available for use.

3.2.1.1.4.1.1 The Operator on a MPS System HMI assigns the selected predetermined waste transfer route to one of six waste transfers depending on which one is available.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.2.

3.2.1.1.4.1.2 The maximum allowable number of simultaneously operating waste transfers shall be six.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.1.

3.2.1.1.4.2 **Select an Available Transfer** (FFBD Function 1.4.2). After the available simultaneous transfers are displayed, the Operator chooses a HMI command that selects one of the available simultaneous transfers for assignment as a transfer route.

3.2.1.1.4.2.1 The Operator on a MPS System HMI assigns the selected predetermined waste transfer route to one of six waste transfers depending on which one is available.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.2.

3.2.1.1.4.3 **Check Route Equipment Availability** (FFBD Function 1.4.3). After an available transfer is selected for route assignment, the route equipment components of

those transfers in progress as well as those elements that are designated as being "Out of Service" are checked by the MPS System against those components used in the route to be assigned. If the MPS System determines that a route equipment component is not available due to being in use or "Out of Service", then the route is not assigned to the selected transfer and the MPS System shall not allow selection until the component is available or placed back "In Service". Otherwise, the selected route is assigned to the selected transfer.

3.2.1.1.4.3.1 When two or more waste transfer routes are set up for operation, the MPS System shall check the equipment selected for each route for interferences prior to any new waste transfer taking place. An equipment interference is established when equipment is selected for a new route that has already been selected for another route.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.2.

3.2.1.1.4.3.2 In the case of (pit leak detectors, MPS relays, MCD's and pressure switches,), an equipment interference is of no consequence.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.2.

3.2.1.1.4.3.3 In the case of lines, valves and pumps and their associated elements (e.g., encasement leak detectors, interlock relays, etc.), an equipment interference is **not** allowable.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.2.

3.2.1.1.4.3.4 The associated pre-transfer and post-transfer flush route equipment selections shall also be checked for interferences to insure that the route can be flushed before or after the waste transfer.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.2.

3.2.1.1.4.3.5 A local message shall be displayed on the HMI being used for route selection identifying the transfer element(s) in use by other waste transfer routes and shall indicate that the transfer element(s) is unable to be used

in the route being selected.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.2.

3.2.1.1.4.3.6 If an equipment component for a transfer route is identified by the MPS System as being "Out of Service", the route is not assigned to the selected transfer and the MPS System shall not allow selection of the pre-determined route until the placed back "In Service".

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.7.

3.2.1.1.4.3.7 A local message shall be displayed on the HMI being used for route selection identifying the transfer element(s) that is in the "Out of Service" state and shall indicate that the transfer element(s) is unable to be used in the route being selected.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.7.

3.2.1.1.4.3.8 If the route being considered is a cross-site transfer, only one cross-site transfer at a time shall be allowed.

Basis: HNF-SD-W314-TI-008, Rev. 4, PDC, Master Pump Shutdown, Section 2.2.11.

3.2.1.1.4.4 **Re-store Route Equipment Status** (FFBD Function 1.4.4). After the selected route equipment is assigned to a waste transfer, the MPS System shall revise and restore the route equipment status as selected for operation.

3.2.1.1.4.4.1 HMI Databases for associating selected MPS System inputs and outputs to transfer routes shall be provided.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.3.

3.2.1.1.4.4.2 Transfer route equipment and valve positions presented in the Tables 4, 5, 7, 8, 9, 10, 13, 14 and 15, Appendix B, and its route selection status shall be stored in a MPS System Route Database.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.3.

3.2.1.1.4.4.3 MPS System computer programs with appropriate configuration control shall allow the adding to, deleting from and changing of the records of all transfer route and mechanical segment databases.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.3.

3.2.1.1.4.4.4 Equipment selection status of all mechanical segments (such as tanks, pits, lines), and MPS System I/O elements (such as pumps, valves, leak detectors, and existing MPS relays) shall be stored and displayed for a minimum of six transfer routes.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.1.7.

3.2.1.1.4.4.5 The MPS System shall be able to select and store all appropriate MPS System inputs and outputs used for monitoring and control of a particular waste transfer route and its associated flush routes. All MPS System inputs and outputs selected as required for a particular waste transfer and associated flushing shall be reserved for use until the waste transfer and associated flushing is completed.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.

3.2.1.1.4.5 **Manually Enter "In/Out of Service" Element Status** (FFBD Function 1.4.5). After an equipment element is taken out of service, the status of the element is manually entered into the MPS System where it is indicated on HMI displays as "In Service" or "Out of Service". When an equipment element is designated "Out of Service", the equipment element is not selectable for use in a transfer route and its alarm and route shutdown function are inhibited until its status is manually changed back to "In Service".

3.2.1.1.4.5.1 Due to construction work or maintenance activities, waste transfer equipment elements are often taken out of service temporarily. The "Out of Service" status for equipment elements shall be entered manually into the MPS System via a HMI. When the equipment elements are placed

back into service, the "In Service" status is returned to the elements by also manually entering the new status into the MPS System.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.7.

3.2.1.1.4.5.2 The access level for the HMI operator performing the manual entry of the waste transfer equipment element "Out of Service/In Service" status shall be "Supervisor" which shall be authenticated by the MPS System log in process.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.7.

3.2.1.1.4.5.3 The "Out of Service/In Service" state entry shall be accomplished by manually entering the new state, and the name of the Supervisor doing the entry into an MPS System HMI. The time and date the new state is entered shall also be recorded.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.7.

3.2.1.1.4.5.4 When an equipment element state is designated "Out of Service", the MPS System shall prevent the equipment element from being selected for use in a transfer route and shall inhibit its alarm and route shutdown functions until its state is changed manually back to "In Service".

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.7.

3.2.1.1.4.5.5 After an equipment element is selected (assigned) for use in a route, the MPS System shall prevent its state from being "Out of Service". (Note that the Bypass function performs a similar function during the Verification and the Transfer modes of operation.)

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.7.

3.2.1.1.4.5.6 The MPS System shall indicate on the HMI graphic displays the "Out of

Service/In Service" states for the waste transfer equipment elements. The MPS System HMI graphics for each equipment element status shall be color coded per Section 3.3.7.1.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.6.

3.2.1.1.4.5.7 Transfer equipment elements presented in the Tables 5, 7, 8, 9, 10, 13, and 14 and Appendix B, and its "Out of Service/In Service" status shall be stored in a MPS System Route Database.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.2 **Select Transfer Type** (FFBD Function 2.0). After a transfer route has been selected and assigned to a waste transfer or, following a route shutdown, a transfer route re-start has been initiated, the Operator chooses a HMI command that selects one of the three transfer types. The three transfer types are:

- Pre-Transfer Flush
- Transfer Waste
- Post-Transfer Flush

3.2.1.2.0.1 The MPS System shall be able to discriminate which MPS System inputs and outputs have been selected for a particular waste transfer route and all of its associated flush and subsequent drainage routes.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.

3.2.1.2.0.2 The minimum number of flush routes associated with a particular waste transfer shall be eight. These are the pre-transfer flush and subsequent line drainage towards the pump, the pre-transfer flush and subsequent line drainage towards the destination, the post-transfer flush and subsequent line drainage towards the pump, and the post-transfer flush and subsequent line drainage towards the destination.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.

3.2.1.2.0.3 The Operator must complete in the proper sequence the route selection, route

set up, and equipment functional verifications prior to making the waste transfer or flushing out the lines and their subsequent drainage. The MPS System shall be able to insure that a proper sequence of operations occurs. The sequence shall be selectable by the Operator. At the end of each operating step, the MPS System shall log Operator specified data that document the completion of that operating step.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.

3.2.1.3 **Pre-Transfer Flush** (FFBD Function 3.0).

3.2.1.3.1 **Verify Flush Route** (FFBD Function 3.1).

3.2.1.3.1.1 **Supervisor Approves Flush** (FFBD Function 3.1.1). After all of the flush route component verifications are completed, the responsible shift supervisor chooses a HMI command that inputs the approval of the flush route verification which allows the route flush to proceed.

3.2.1.3.1.1.1 The Shift Supervisor shall be able to manually enter an approval into the MPS System HMI once all the required components of the flush route are verified.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.11.1.

3.2.1 3.1.1.2 The Shift Supervisor approval shall be accomplished by recording the time and date of approval, and the name of the supervisor into an MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.11.1.

3.2.1.3.1.1.3 The MPS System HMI shall display a local message indicating that the selected flush route is approved as operational.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.11.1.

3.2.1.3.1.1.4 The Supervisor's name shall be authenticated by the log in process.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.11.2.

3.2.1.3.2 **Flush Route** (FFBD Function 3.2).

Requirements either not in project W-314 scope or duplicated under other functions.

3.2.1.3.3 **Drain Flush Route** (FFBD Function 3.3).

3.2.1.3.3.1 **Verify Drain Route** (FFBD Function 3.3.1).

Requirements either not in project W-314 scope or duplicated under other functions.

3.2.1.3.3.2 **Allow Route Drainage** (FFBD 3.3.2)

3.2.1.3.3.2.1 **Time Out Drain Period** (FFBD 3.3.2.1). After the route has been flushed and the route's transfer, drain and vent valves have been positioned for line drainage and the positions verified as correct,the MPS System shall allow a period of time for draining the lines.

3.2.1.3.3.2.1.1 The MPS System shall monitor the minimum amount of time allowed for flush line drainage.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.2.1.

3.2.1.3.3.2.1.2 The flush line drain period shall be set at a MPS System HMI during the activity when the route is created.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.2.1.

3.2.1.3.3.2.1.3 The flush line drain period time range shall be from 0 to 24 hours and shall be set in hours and 0 to 60 minutes.

Basis: Derived from Operating Procedure TO-430-500, Rev. B-1, "Cross-Site Transfer From TK-102-SY To TK-107-AP Via SNL-3150", Section 5.6.

3.2.1.3.3.2.1.4 During the flush draining period if a drain route valve position change or

failure is detected by the MPS System, the event shall be alarmed at a MPS System HMI. This event shall also stop the drain period timer.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.2.1.

3.2.1.3.3.2.1.5 During the flush draining period if a leak or leak detector failure is detected by the MPS System, the event shall be alarmed at a MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.2.1.

3.2.1.3.3.2.1.6 A flush line drain period shall be set at a MPS System HMI for each flush route created.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.2.1.

3.2.1.4 **Transfer Waste Through Route** (FFBD Function 4.0).

3.2.1.4.1 *Function number 4.1 not used.*

3.2.1.4.2 **Check Route Parameters** (FFBD Function 4.2).

Requirements not in project W-314 scope.

3.2.1.4.3 **Verify Route** (FFBD Function 4.3).

3.2.1.4.3.1 **Remotely Verify Valve Positions** (FFBD Function 4.3.1).

3.2.1.4.3.1.1 **Remotely Monitor Valve Position** (FFBD Function 4.3.1.1). After the transfer valves have been manually positioned in the field, the MPS System shall remotely monitor the position of the valves for those valves that are directly connected to it.

3.2.1.4.3.1.1.1 For those transfer valves that have position monitors connected to the MPS System, the MPS System shall be able to display graphically valve position.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design

Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.3.2.

3.2.1.4.3.1.1.2 For a three-way valve with three valve positions A, B, & C; Position A Indication is displayed on the HMI if the "A" valve position sensor is activated. Likewise, Position B or C Indications are displayed if the valve "B" or "C" position sensor is activated.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.3.2. *Logic diagram in Figure 17, Appendix D, "Valve Position Verification Mode Logic", shows functional requirements.*

3.2.1.4.3.1.1.3 For a three-way valve, a valve position failure alarm is activated on the HMI when, after 5 minutes, either the valve positions are not sensed or any two valve positions of the three are sensed simultaneously by the MPS System.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.14.3. *Logic diagrams for three way valves presented in Figure 3, Appendix D, "Generic Three Way Valve Position Logic", show functional requirements.*

3.2.1.4.3.1.1.4 For a two way valve with two positions open & closed, open position indication shall be displayed on the HMI whenever the open position sensor is actuated. Likewise, closed position indication is displayed on the HMI whenever the closed position sensor is actuated.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.3.2. *Logic diagram in Figure 17, Appendix D, "Valve Position Verification Mode Logic", shows functional requirements.*

3.2.1.4.3.1.1.5 For a two way valve, a valve failure alarm is activated after 5 minutes when neither or both of the open or closed position sensors are actuated simultaneously.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.14.4. *Logic diagrams for two way valves located in Figures 4, Appendix D, "Generic Two Way Valve Position Logic", show functional requirements.*

3.2.1.4.3.1.2 **Alarm Valve Position Failure** (FFBD Function 4.3.1.2). After the transfer valve positions have been monitored and it has been established that

there is a valve position sensing failure, the MPS System shall provide a HMI valve position failure alarm to the Operators.

3.2.1.4.3.1.2.1 For those transfer valves that have position monitors connected to the MPS System, the MPS System shall be able to display graphically valve position.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.3.2.

3.2.1.4.3.1.2.2 For a three-way valve, a valve failure alarm is activated on the HMI when, after 5 minutes, either the valve positions are not sensed or any two valve positions of the three are sensed simultaneously by the MPS System.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.14.3. *Logic diagrams for three way valves presented in Figure 3, Appendix D, "Generic Three Way Valve Position Logic", show functional requirements.*

3.2.1.4.3.1.2.3 For a two way valve, a valve failure alarm is activated after 5 minutes when neither or both of the open or closed position sensors are actuated simultaneously.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.14.4. *Logic diagrams for two way valves located in Figures 4, Appendix D, "Generic Two Way Valve Position Logic", show functional requirements.*

3.2.1.4.3.1.2.4 For those transfer valves that have position monitors connected to the MPS System, the MPS System HMI graphics for each valve shall be color coded per Section 3.3.7.1.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.3.1.

3.2.1.4.3.1.2.5 The MPS System HMI alarms shall be handled in accordance with Section 3.3.7.4.

Basis: Standardized alarm handling procedures reduce operational complexity of the MPS System HMI.

3.2.1.4.3.1.2.6 The MPS System valve position failure alarms shall be provided for those transfer valves presented in Tables 9 and 10 of Appendix B.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.4.3.1.3 **Indicate Valve Position** (FFBD Function 4.3.1.3). After the position of the valves manifolds have been monitored or entered into the MPS System database, the MPS System HMI shall indicate the position of those valves. The MPS System HMI shall display the valve positions to the operator(s).

3.2.1.4.3.1.3.1 The MPS System HMI shall be able to graphically display valve positions.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.3.2.

3.2.1.4.3.1.3.2 For those transfer valves that have position monitors connected to the MPS System, the MPS System HMI graphic color coding for each 2 and 3-way valve shall follow that as given in Section 3.3.7.1.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.3.1.

3.2.1.4.3.1.3.3 The MPS System HMIs shall indicate the status of all valve positions associated with the MPS System including:

- transfer and flush valves whose position sensors are directly connected to MPS System PLCs.
- transfer, drain and flush valves whose position sensors are not connected to the MPS System and are monitored manually in the field with its status being manually entered into a MPS System HMI after every valve position change.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.1.2.

3.2.1.4.3.1.3.4 For a three-way valve with three valve positions A, B, & C; Position A Indication is displayed on the HMI if the "A" valve position sensor is activated. Likewise, Position B or C Indications are displayed if the valve "B" or "C" position sensor is activated.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.3.2. Logic diagram in Figure 17, Appendix D, "Valve Position Verification Mode Logic", shows functional requirements.

3.2.1.4.3.1.3.5 For a two way valve with two positions open & closed, open position Indication shall be displayed on the HMI whenever the open position sensor is actuated. Likewise, closed position indication is displayed on the HMI whenever the closed position sensor is actuated.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.3.2. Logic diagram in Figure 17, Appendix D, "Valve Position Verification Mode Logic", shows functional requirements.

3.2.1.4.3.1.3.6 The MPS System valve position indication shall be provided for those transfer valves presented in Tables 9 and 10 of Appendix B.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.4.3.1.4 **Compare Selected Valve Position to Indicated Valve Position** (FFBD Function 4.3.1.4). After the valve positions have been indicated, the MPS System shall compare the indicated valve positions to the required valve positions for the selected transfer. The MPS System shall notify the operator(s) if the valves are in the correct positions or not.

3.2.1.4.3.1.4.1 One tank farm operator at any MPS HMI shall be able to verify the functional operation or setup of all components of the MPS System equipment for each particular transfer route prior to performing a transfer.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.1.4.2 A verified valve position indication occurs, if the valve and its position which are selected for service in a particular route matches valve position detected by the MPS System.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.6. Logic diagram in Figure 17, Appendix D, "Valve Position Verification Mode Logic", shows functional requirements.

3.2.1.4.3.1.4.3 A valve position shall be able to be verified for any of the six routes in which it is selected for service.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.6. Logic diagram in Figure 17, Appendix D, "Valve Position Verification Mode Logic", shows functional requirements.

3.2.1.4.3.1.4.4 The MPS System valve position verification shall be provided for those transfer valves presented in Tables 9, 10 13, and 14 of Appendix B.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.4.3.1.5 **Indicate Valve Positions "Not Verified"** (FFBD Function 4.3.1.5). After the valve positions selected for a route have been compared to the indicated valve positions and it is determined that they do not match, the MPS System shall indicate the valve position status as "Out of Required Position".

3.2.1.4.3.1.5.1 A flashing valve symbol in the MPS System graphic screen shall indicate that a valve is in an incorrect position.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.3.2.

3.2.1.4.3.1.5.2 The MPS System alarms caused by functional tests shall be handled in accordance with Section 3.3.7.4.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.3.1.

3.2.1.4.3.1.5.3 The MPS System HMI graphic color coding for each 2 and 3-way valve shall be as stated in Section 3.3.7.1.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.3.1.

3.2.1.4.3.1.6 **Update Valve Position Status to "Verified"** (FFBD Function 4.3.1.6). After the valve positions selected for a route have been compared to the indicated valve positions and it is determined that they match, the MPS

System shall update the valve position status as "Verified".

3.2.1.4.3.1.6.1 A report of all transfer valve verifications shall be displayed, (and/or printed) at the HMI and/or be available to external systems such as TMACS.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.2.2.

3.2.1.4.3.1.6.2 The MPS System HMI shall display a local message/indicator showing that all transfer valves in the selected transfer route are verified.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.3.2.

3.2.1.4.3.1.6.3 The MPS System HMI graphic color coding for each 2 and 3-way valve shall follow that as given in Section 3.3.7.1.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.3.1.

3.2.1.4.3.2 **Manually Verify Valve Positions** (FFBD Function 4.3.2).

3.2.1.4.3.2.1 **Display List of Manual Valves Selected for Route** (FFBD Function 4.3.2.1). After the transfer route is set up or if there are additional manual valves to be verified, the MPS System shall display on an HMI to an Operator a list of manual valves, for which valve positions are not monitored, that have been selected as components for a particular route. The list shall include transfer valves in the CTS.

3.2.1.4.3.2.1.1 The Operator shall be able to select a single manual valve from a list of manual valves presented on that MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.2.1.2 The list of manual valves displayed shall only contain the valves that have been selected for the chosen transfer route. If a cross-site transfer, the list shall include CTS valves for the chosen transfer route that are not connected to the MPS System.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4 and 2.3.4.

3.2.1.4.3.2.2 **Choose Manual Valve to be Verified** (FFBD Function 4.3.2.2). After the MPS System displays a list of MPS manual valves that have been selected as components for a particular route, the Operator chooses a MPS System HMI command that chooses a selected manual transfer valve for verification.

3.2.1.4.3.2.2.1 The Operator shall be able to select a single manual valve from a list of manual valves presented on that MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.2.3 **Enter Manual Valve Position into MPS System** (FFBD Function 4.3.2.3). After a transfer valve position, which is not remotely monitored, is determined by an Operator in the field; the valve position shall be manually entered by an Operator into the MPS System at a HMI.

3.2.1.4.3.2.3.1 The MPS System shall be able to display graphically valve positions for those transfer valves not connected to the MPS System where the valve positions displayed are the last position manually entered by an Operator into the MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.4.1.

3.2.1.4.3.2.3.2 For those transfer valves that do not have position monitors connected to the MPS System, verification shall be accomplished by recording the manual valve position, the time and date of the input event, and the name of the Operator entering the input into the MPS System.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.4.1.

3.2.1.4.3.2.4 **Determine If Manual Valve Verifications Complete** (FFBD Function 4.3.2.4). After a manual valve verification is completed, the Operator determines if an additional manual valve verification are required. If additional selections are required, the manual valve verification process is

repeated. If not, the manual valve verification process is completed.

3.2.1.4.3.2.4.1 The Operator shall be able to select another manual valve from the manual valve list displayed by the MPS System HMI for the chosen route and repeat the verification process until all the displayed manual valves are verified.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.3 **Field Operator, Independent Verifier, and Supervisor Verify Valve Lineup** (FFBD Function 4.3.3).

3.2.1.4.3.3.1 **Update Valve Position Status to "Positioner Verified"** (FFBD Function 4.3.3.1). After all the valve positions selected for a route have been verified by the Operator performing the valve positioning for the transfer route, the MPS System shall update the valve position status as "Field Operator Verified".

3.2.1.4.3.3.1.1 The MPS System shall be able to insure that a proper sequence of operations occurs.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.

3.2.1.4.3.3.1.2 Field Operator verification shall be accomplished by inputting the valve positions, the time and date of the input event, and the name of the Operator doing the valve positioning and verification.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.4.1.

3.2.1.4.3.3.1.3 The MPS System shall allow only "Operators" access for verifying valve position by a Field Operator performing a field walkdown.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.4.4.

3.2.1.4.3.3.1.4 After the selected valve positions are verified, the MPS System shall display a message via a HMI that the route's valve positions are "Field Operator Verified" and update each of the route's valve position status to

"Field Operator Verified".

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.4.1.

3.2.1.4.3.3.2 **Update Valve Position Status to "Independently Verified"** (FFBD Function 4.3.3.2). After all the "Field Operator Verified" valve positions selected for a route have been verified by an Independent Verifier performing a field walkdown of the transfer route, the MPS System shall update the valve position status as "Independently Verified".

3.2.1.4.3.3.2.1 The MPS System shall be able to insure that a proper sequence of operations occurs.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.

3.2.1.4.3.3.2.2 Independent Verifier verification shall be accomplished by inputting the valve positions, the time and date of the input event, and the name of the Independent Verifier doing the verification.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.4.1.

3.2.1.4.3.3.2.3 The MPS System shall update a route's valve position status to "Independently Verified" only when the MPS System receives input that the route valve position status has been verified by a field walkdown by both the Field Operator and the Independent Verifier.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.4.5.

3.2.1.4.3.3.2.4 The MPS System shall allow only Qualified Operators access for verifying valve position by an Independent Verifier performing a field walkdown.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.4.4.

3.2.1.4.3.3.2.5 After the selected valve positions are verified, the MPS System shall display a message via a HMI that the route's valve positions are

"Independently Verified" and update each of the route's valve position status to "Independently Verified".

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.4.1.

3.2.1.4.3.3.3 **Update Valve Position Status to "Supervisor Verified"** (FFBD Function 4.3.3.3). After all the "Independently Verified" valve positions selected for a route have been verified by a Supervisor performing a field walkdown of the transfer route, the MPS System shall update the valve position status as " Supervisor Verified".

3.2.1.4.3.3.3.1 The MPS System shall be able to insure that a proper sequence of operations occurs.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.

3.2.1.4.3.3.3.2 Supervisor verification shall be accomplished by inputting the valve positions, the time and date of the input event, and the name of the Supervisor doing the verification.

Basis: Minimum information needed to satisfy requirement per Section 3.2.1.46.1.

3.2.1.4.3.3.3.3 The MPS System shall update a route's valve position status to "Supervisor Verified" only when the MPS System receives input that the route valve position status has been verified by a field walkdown by the Field Operator, Independent Verifier and the Supervisor.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.4.5.

3.2.1.4.3.3.3.4 The MPS System shall allow only "Supervisor" access for verifying valve position by a Supervisor performing a field walkdown.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.4.4.

3.2.1.4.3.3.3.5 After the selected valve positions are verified, the MPS System shall display a message via a HMI that the route's valve positions are "Supervisor Verified" and update each of the route's valve position status

to "Supervisor Verified".

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.4.1.

3.2.1.4.3.4 **Verify MPSS PLC Operation** (FFBD Function 4.3.4). After the MPS System PLC operation is selected for verification and all selected elements for the transfer route have been verified, the MPS System shall verify automatically the PLC operation for a transfer route.

3.2.1.4.3.4.1 For each PLC input which is de-energized during a route shutdown by equipment selected tor service in the route, the MPS System shall be able to initiate a test that de-energizes the input.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.5.1.

3.2.1.4.3.4.2 Once a PLC input test is initiated, the MPS System shall verify that the PLC provides all required PLC outputs logically related to that input. The PLC outputs shall include all alarm initiations, Route Shutdown Loop initiation and all Pump Interlock de-energized.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.5.1.

3.2.1.4.3.4.3 For all PLC outputs connected to external equipment such as pump interlock relays, the equipment shall provide a feedback signal to the PLC that indicates the state of the equipment. This feedback is used for PLC verification.

Basis: The requirement is necessary to accomplish 3.2.1.48.2.

3.2.1.4.3.4.4 The MPS System shall identify to the Operator via the HMI the particular PLC input or output failure which prevented the verification of PLC operation.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.5.1.

3.2.1.4.3.4.5 For each PLC input and output verification a specific period of time shall be permitted to allow for the response times of the MPS System

electronics. If the time period is exceeded with the PLC not verified, the MPS System shall indicate to the Operator via a HMI that the PLC is not verified.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.5.1.

3.2.1.4.3.4.6 After the PLC is verified, the MPS System shall indicate to the Operator via a HMI that the PLC is verified and update the PLC status message/indicator to show verification is complete.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.5.1.

3.2.1.4.3.4.7 The MPS System shall not allow a PLC Verification to proceed if a motor controller for a waste transfer pump which has been selected for use in the route being verified is energized. If a transfer route has **not** been verified as ready for a transfer, the MPS System shall **not** allow the pump interlock relay to be energized unless the transfer pump motor controller is **not** energized. Note that if a transfer pump interlock relay is not energized, the pump is interlocked and prevented from operating.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.5.1.

3.2.1.4.3.5 **Remotely Verify Existing MPS Relay Input Operation** (FFBD Function 4.3.5).

3.2.1.4.3.5.1 **Determine if Existing MPS Relay Input Verifications are Complete** (FFBD Function 4.3.5.1). After a existing MPS Relay Input has been verified, the Operator chooses a MPS System HMI command that determines whether another existing MPS Relay Input is to be verified or a different category of equipment is to be verified.

3.2.1.4.3.5.1.1 The Operator shall be able to select another existing MPS Relay Input from the existing MPS relay list displayed by the MPS System HMI for the chosen route and repeat the verification process until all the displayed existing MPS Relay Inputs are verified.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.5.1.2 The MPS System HMI shall display a local message indicating that all existing MPS relay inputs in the selected transfer route are verified as operational.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.7.1.

3.2.1.4.3.5.1.3 A report of all existing MPS relay input verifications shall be displayed (and/or printed) at the local MPS System HMI, and/or be available to external systems such as TMACS.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.7.1.

3.2.1.4.3.5.1.4 The existing MPS System Relay Input operation verification shall be typical for all relay inputs.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.4. Logic diagram in Figure 14, Appendix D, "Route No. 1 Relay Input Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.5.1.5 The MPS System existing MPS relay verification shall be provided for those existing MPS relay inputs presented in Table 7 of Appendix B.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.4.3.5.1.6 CTS Control System shall control the cross-site transfer pumps and interface with the MPS System via relays which convert 24v dc MPS shutdown loop signals to 120 v ac signals compatible with the CTS.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.2.5.

3.2.1.4.3.5.2 **Display List of Existing MPS Relays Selected for Route** (FFBD Function 4.3.5.2). After the existing MPS Relay Input Verification Mode of operation has been selected, the MPS System shall display on an HMI to an Operator a list of existing MPS relays that have been selected as components for a particular route.

3.2.1.4.3.5.2.1 The Operator shall be able to select a single existing MPS Relay Input from a list of existing MPS Relay Inputs presented on that MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.5.2.2 The list of existing MPS Relay Inputs displayed shall only contain the existing MPS Relays that have been selected for the chosen transfer route.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.5.2.3 This existing MPS Relay Input operation Verification is typical for all relay inputs selected for service in a particular route.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.4. Logic diagram in Figure 14, Appendix D, "Route No. 1 Relay Input Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.5.2.4 The existing MPS Relay input operation verification shall be provided for those existing MPS Relay inputs presented in table 7 of Appendix B that have been selected for service in a particular route.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.4.3.5.3 **Choose Existing MPS Relay Input to be Verified** (FFBD Function 4.3.5.3). After the existing MPS System displays a list of existing MPS relay inputs that have been selected as components for a particular route, the Operator chooses a MPS System HMI command that chooses a selected existing MPS relay input for verification.

3.2.1.4.3.5.3.1 The Operator shall be able to select a single MPS relay input from a list of MPS relay inputs presented on that MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.5.3.2 This existing MPS Relay Input operation is typical for all relay inputs selected for service in a particular route.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.4. Logic diagram in Figure 14, Appendix D, "Route No. 1 Relay Input Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.5.4 **Initiate Existing MPS Relay Input Test** (FFBD Function 4.3.5.4). After a selected existing MPS relay is chosen for verification, the Operator chooses a MPS System HMI command that initiates the existing MPS relay input operation verification test.

3.2.1.4.3.5.4.1 The Operator shall be able to initiate a functional test for a existing MPS relay input through MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.5.4.2 The existing MPS relay input operation verification test is started when a specific command is chosen by the Operator at an HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.4. Logic diagram in Figure 14, Appendix D, "Route No. 1 Relay Input Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.5.4.3 The existing MPS Relay circuit shall be de-energized by the MPS System for a maximum of 11 seconds when its verification test is started.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.4. Logic diagram in Figure 14, Appendix D, "Route No. 1 Relay Input Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.5.4.4 An existing MPS relay functional test shall not shut down a waste transfer.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.7.1.

3.2.1.4.3.5.4.5 The route shutdown command shall be inhibited for a maximum of 11

seconds after the existing MPS relay input operation verification test is started or until the end of the test.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.4. Logic diagram in Figure 14, Appendix D, "Route No. 1 Relay Input Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.5.5 **Monitor and Alarm Existing MPS Relay Input Status** (FFBD Function 4.3.5.5). After the existing MPS relay input operation verification test has been started, the MPS System shall monitor the status of the discrete input connected to the chosen existing MPS relay and shall initiate an alarm upon sensing the input de-energized.

3.2.1.4.3.5.5.1 The existing MPS Relay's discrete Input shall be allowed a maximum of 3 seconds to de-energize and stabilize after the existing MPS relay input operation verification test has been started.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.4. Logic diagram in Figure 14, Appendix D, "Route No. 1 Relay Input Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.5.5.2 After the existing MPS Relay Input has been de-energized, an existing Relay Input Alarm shall be activated.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.4. Logic diagram in Figure 14, Appendix D, "Route No. 1 Relay Input Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.5.5.3 After the existing MPS Relay Input operation verification test is started, any route shut down caused by this test is inhibited for a maximum of 11 seconds.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.4. Logic diagram in Figure 14, Appendix D, "Route No. 1 Relay Input Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.5.5.4 The MPS System HMI graphics for each existing MPS Relay Input Alarm shall be color coded per Section 3.3.7.1.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design

Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix S, "SCREEN COLOR CODING".

3.2.1.4.3.5.5.5 The MPS System HMI alarms shall be handled in accordance with Section 3.3.7.4.

Basis: Standardized alarm handling procedures reduces operational complexity of the MPS System HMI.

3.2.1.4.3.5.5.6 The MPS System existing MPS Relay Input alarms shall be provided for those existing MPS Relay Inputs presented in Table 7 of Appendix B.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.4.3.5.6 **Confirm that Existing MPS Relay Input Operated Within Time Limit** (FFBD Function 4.3.5.6). After the status of the discrete input connected to the chosen existing MPS relay is monitored by the MPS System, an activated existing MPS Relay Input Alarm with an Operator acknowledgment of the alarm confirms the verification test. If the existing MPS Relay Input Alarm is not acknowledged by the Operator within 10 seconds, then the verification test is not confirmed and a recovery process is initiated.

3.2.1.4.3.5.6.1 After the Operator initiation of the existing MPS relay input operation verification test and if the existing MPS Relay Input Alarm activates, the Operator chooses a MPS System HMI command that acknowledges the alarm. The alarm acknowledgment confirms the verification test.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.4. Logic diagram in Figure 14, Appendix D, "Route No. 1 Relay Input Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.5.6.2 If the existing MPS Relay Input Alarm does not activate or if the existing MPS Relay Input Alarm is not acknowledged by the Operator within 10 seconds, then the verification test is not confirmed.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.4. Logic diagram in Figure 14, Appendix D, "Route No. 1 Relay Input Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.5.7 **Indicate Existing MPS Relay Input Not Verified** (FFBD Function 4.3.5.7). After it is determined that the verification test is not confirmed, the MPS

System shall indicate to the Operator on a local HMI that the existing MPS Relay Input is not verified and requires recovery.

3.2.1.4.3.5.7.1 If the existing MPS Relay Input Alarm does not activate or the alarm is not acknowledged by the Operator within 10 seconds, then MPS System indicates on a local HMI that the relay input verification test has failed.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.4. Logic diagram in Figure 14, Appendix D, "Route No. 1 Relay Input Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.5.7.2 The Route Existing MPS Relay Input Verification Test (including timer functions) shall be halted and reset after the relay input test has been indicated by the MPS System as failing verification.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.4. Logic diagram in Figure 14, Appendix D, "Route No. 1 Relay Input Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.5.8 **Update Existing MPS Relay Input Status to "Verified"** (FFBD Function 4.3.5.8). After it is determined that the verification test is confirmed, the MPS System shall indicate to the Operator that the existing MPS Relay Input is verified and shall update the existing MPS Relay Input status as "Verified".

3.2.1.4.3.5.8.1 If the existing MPS Relay Input functional test is performed successfully and acknowledged by the HMI Operator within a specified time period, the existing MPS Relay Input is then indicated by the MPS System as verified.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.5.8.2 When the existing MPS Relay Input Alarm is Acknowledged by an Operator located at the HMI with the existing MPS Relay Input Alarm activated, the existing MPS Relay Input operation is indicated "verified" by the MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.4. Logic diagram in Figure 14, Appendix D, "Route No. 1 Relay Input Operation

Verification Mode Logic", shows functional requirements.

3.2.1.4.3.5.8.3 When the existing MPS Relay Input operation is indicated "verified" by the MPS System HMI, the Route Existing MPS Relay Input Verification Test (including timer functions) shall be reset (stopped).

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.4. Logic diagram in Figure 14, Appendix D, "Route No. 1 Relay Input Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.6 **Verify Pump Interlock Operation** (FFBD Function 4.3.6).

3.2.1.4.3.6.1 **Determine if Pump Interlock Verifications are Complete** (FFBD Function 4.3.6.1). After a transfer pump interlock relay has been verified, the Operator chooses a MPS System HMI command that determines whether another interlock relay is to be verified or a different category of equipment is to be verified.

3.2.1.4.3.6.1.1 The Operator shall be able to select another pump interlock relay from the pump interlock relay list displayed by the MPS System HMI for the chosen route and repeat the verification process until all the displayed pump interlock relays are verified.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.6.1.2 The MPS System HMI shall display a local message/indicat or showing that all existing transfer pump interlock relays in the selected transfer route are verified as operational.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.6.1.

3.2.1.4.3.6.1.3 A report of all existing transfer pump interlock relay verifications shall be displayed (and/or printed) at the local MPS System HMI, and/or be available to external systems such as TMACS.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.6.1.

3.2.1.4.3.6.1.4 The MPS System transfer pump interlock operation verification shall be typical for all transfer pump interlocks including the CTS interlocking relays.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.5. Logic diagram in Figure 16, Appendix D, "Route No. 1 Transfer Pump Interlock Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.6.1.5 The MPS System transfer pump interlock verification shall be provided for those pump interlock relays presented in Table 5 of Appendix B.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.4.3.6.1.6 CTS interlock relays shall control the cross-site transfer pumps and convert 24v dc MPS shutdown loop signals to 120 v ac signals compatible with the CTS Control System.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.2.5.

3.2.1.4.3.6.2 **Display List of Interlocks Selected for Route** (FFBD Function 4.3.6.2). After the transfer pump interlock equipment category has been selected or if an additional transfer pump interlock verification is determined by the Operator, the MPS System shall display on an HMI to the Operator a list of pump interlock relays that have been selected as components for a particular route.

3.2.1.4.3.6.2.1 The Operator shall be able to select a single transfer pump interlock from a list of transfer pump interlock relays presented on the MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.6.2.2 The list of transfer pump interlocks displayed shall only contain the pump interlock relays that have been selected for the chosen transfer route. If a Cross-Site transfer, the list shall include the CTS interlocking relays.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section

3.2.4.

3.2.1.4.3.6.2.3 The transfer pump interlock relay operation verification is typical for all interlock relays selected for service for a particular route.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.5. Logic diagram in Figure 16, Appendix D, "Route No. 1 Transfer Pump Interlock Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.6.2.4 The list of transfer pump interlock relays to be verified shall be provided for those interlock relays presented in Table 5 of Appendix B that have been selected for service in a particular route.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.4.3.6.3 **Choose Pump Interlock to be Verified** (FFBD Function 4.3.6.3). After the MPS System displays a list of transfer pump interlock relays that have been selected as components for a particular route, the Operator chooses a MPS System HMI command that selects a transfer pump interlock relay for verification.

3.2.1.4.3.6.3.1 The Operator shall be able to select a single transfer pump interlock from a list of transfer pump interlock relays presented on the MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.6.3.2 This transfer pump interlock relay operation is typical for all interlock relays selected for service in a particular route.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.5. Logic diagram in Figure 16, Appendix D, "Route No. 1 Transfer Pump Interlock Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.6.3.3 For a particular waste transfer route, an Operator shall be able to perform a MPS System functional test by initiating a command signal from the MPS System HMI to the transfer pump interlock relay. The Operator shall be able to determine whether or not the functional test was successful by monitoring and displaying on the MPS System HMI the status of the

interlock relay.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.6.1.

3.2.1.4.3.6.4 **Initiate Route Shutdown Signal** (FFBD Function 4.3.6.4). After the transfer pump interlock relay has been selected for verification, the Operator chooses a MPS System HMI command that initiates a Route Shutdown signal that de-energizes the route's chosen pump interlock relay.

3.2.1.4.3.6.4.1 The MPS System shall output a shutdown command to the transfer pump motor controller interlock relay which, during a transfer, opens the existing motor control circuit, de-energizing the transfer pump's existing motor contactor. A de-energized contactor disconnects the transfer pump motor from its power supply.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314, Section 2.3.6.1.

3.2.1.4.3.6.4.2 The Operator shall be able to initiate a functional test for a transfer pump interlock relay through MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.6.4.3 The MPS System shall not allow the transfer pump interlock relay verification to proceed if the pump's motor controller is energized. If a transfer route has **not** been verified as ready for a transfer, the MPS System shall **not** allow the pump interlock relay to be energized unless the transfer pump motor controller is **not** energized. Note that if a transfer pump interlock relay is not energized, the pump is interlocked and prevented from operating.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.6.1.

3.2.1.4.3.6.4.4 If remote indication of a pumps power status is not available, the MPS System HMI Operator shall determine and manually input into the MPS System the pumps power status.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.6.1.

3.2.1.4.3.6.5 **Monitor and Display Pump Interlock Status** (FFBD Function 4.3.6.5). After the route shutdown signal has been initiated, the MPS System shall monitor the status of the discrete input connected to a set of pump Interlock relay auxiliary contacts and shall display the transfer pump Interlock relay status to the Operator via a MPS System HMI.

3.2.1.4.3.6.5.1 The pump interlock relay discrete Input shall be allowed a maximum of 3 seconds to de-energize and stabilize after the pump interlock relay input operation verification test has been started.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.5. Logic diagram in Figure 16, Appendix D, "Route No. 1 Transfer Pump Interlock Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.6.5.2 After the transfer pump interlock relay has been de-energized, a pump interlock status display shall be activated.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.5. Logic diagram in Figure 16, Appendix D, "Route No. 1 Transfer Pump Interlock Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.6.6 **Confirm That Pump Interlock Operated within Time Limit** (FFBD Function 4.3.6.6). Within a time period of 11 seconds following the Route Shutdown Signal initiation, the Operator shall acknowledge at a MPS System HMI the de-energized status of the transfer pump interlock relay to confirm a pump interlock operation. If the transfer pump interlock relay is not acknowledged by the Operator within 11 seconds, then the verification test is not confirmed and a recovery process is initiated.

3.2.1.4.3.6.6.1 The time limit allowed for confirming a pump interlock operation shall be 11 seconds.

Basis: Compliance with NUREG-0700, Guidelines for Control Room Design Reviews, Section 6.7.1.7, which is the required response time for an error feedback following the completion of an operator input. This will allow a maximum of: 3 seconds for the MPS System scan time and the de-energizing of the pump MCC interlock, 3 seconds for the MPS System scan to detect and display the status of the interlock relay, 3 seconds for Operator to acknowledge the interlock relay status and 2 seconds for the MPS System

to respond to the acknowledgment.

3.2.1.4.3.6.6.2 After the Operator initiation of the transfer pump interlock operation verification test and if the pump interlock relay de-energized status activates, the Operator chooses a MPS System HMI command that acknowledges the status display. The status acknowledgment confirms the verification test.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.5. Logic diagram in Figure 16, Appendix D, "Route No. 1 Transfer Pump Interlock Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.6.6.3 If the pump interlock relay de-energized status display does not activate or if the pump interlock relay de-energized status is not acknowledged by the Operator within 11 seconds, then the verification test is not confirmed.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.5. Logic diagram in Figure 16, Appendix D, "Route No. 1 Transfer Pump Interlock Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.6.7 **Indicate that Pump Interlock Not Verified** (FFBD Function 4.3.6.7). After a transfer pump interlock relay operation is not confirmed, the MPS System shall indicate at a local HMI that the interlock relay verification test has failed.

3.2.1.4.3.6.7.1 The local MPS System HMI shall display that the transfer pump interlock failed verification; if, after a specific time period elapses, the pump interlock confirmation by an Operator is not received by the MPS System.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.5. Logic diagram in Figure 16, Appendix D, "Route No. 1 Transfer Pump Interlock Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.6.7.2 The Route MPS Transfer Pump Interlock Verification Test (including timer functions) shall be halted and reset after the pump interlock relay test has been indicated by the MPS System as failing verification.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.5. Logic diagram in Figure 16, Appendix D, "Route No. 1 Transfer Pump Interlock

Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.6.8 **Update MPSS Interlock to "Verified" Status** (FFBD Function 4.3.6.8). After it is determined that the verification test is confirmed, the MPS System shall indicate to the Operator via the HMI that the MPS System Interlock Relay is verified and shall update the Interlock Relay status as "Verified".

3.2.1.4.3.6.8.1 If the MPS System Interlock Relay functional test is performed successfully and acknowledged by the HMI Operator within a specified time period, the MPS System Interlock Relay is then indicated by the MPS System as verified.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1 4.3.6.8.2 When the MPS System Interlock Relay status display is acknowledged by an Operator located at the HMI with the relay status display activated, the interlock relay operation is indicated "verified" by the MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.5. Logic diagram in Figure 16, Appendix D, "Route No. 1 Transfer Pump Interlock Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.6.8.3 When the Interlock Relay operation is indicated "verified" by the MPS System HMI, the Interlock Relay Verification Test (including timer functions) shall be reset (stopped).

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.5. Logic diagram in Figure 16, Appendix D, "Route No. 1 Transfer Pump Interlock Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.7 **Manually Verify Existing MPS Relay Connected Device Operation** (FFBD Function 4.3.7).

3.2.1.4.3.7.1 **Determine if Existing MPS Relay Connected Device Verifications are Complete** (FFBD Function 4.3.7.1). After a device that de-energizes a existing MPS Relay or, if applicable, a CTS interposing relay has been verified either by the PM/S records or a functional test, the Operator chooses a MPS System HMI command that determines whether another

existing MPS Relay connected device is to be verified or a different category of equipment is to be verified.

3.2.1.4.3.7.1.1 The Operator shall be able to select another existing MPS Relay connected device from a list displayed by the MPS System HMI and repeat the verification process until all the displayed existing MPS Relay connected devices are verified.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.7.1.2 The MPS System HMI shall display a local message/indicat or showing that all existing MPS Relay connected devices in the selected transfer route are verified .

Basis: HNF-SD-W314-TI-008, Rev. 3 , Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.10.1.

3.2.1.4.3.7.1.3 A report of all existing MPS Relay connected device verifications shall be displayed (and/or printed) at the local MPS System HMI, and/or be available to external systems such as TMACS.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.10.1.

3.2.1.4.3.7.1.4 The MPS System existing MPS Relay connected device operation verification shall be typical for all existing MPS relay connected devices and for all devices connected to the CTS interposing relays.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.2. Logic diagram in Figure 20, Appendix D, "Route No. 1 Manual Leak Detector Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.7.1.5 The existing MPS Relay connected device verification shall be provided for those leak detectors, flush pit pressure switches, flush pit radiation detectors and in-service area radiation monitors presented in Table 7 for input relays, Appendix B.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.4.3.7.2 **Display List of Existing MPS Relay Connected Devices Selected for Route** (FFBD Function 4.3.7.2). After the existing MPS Relay Connected Device equipment category has been selected or if an additional existing MPS Relay Connected Device verification is determined by the Operator or after a MPS Relay system recovery, the MPS System shall display on an HMI to the Operator a list of existing MPS Relay Connected Devices that have been selected as components for a particular route. The existing MPS Relay Connected Devices include:

- leak detectors.
- flush pit pressure switches.
- flush pit radiation detectors.
- in-service area radiation monitors.

3.2.1.4.3.7.2.1 The Operator shall be able to select a single existing MPS Relay Connected Device from a list of leak detectors presented on that MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.7.2.2 The list of leak detectors displayed shall only contain the existing MPS Relay Connected Devices that have been selected for the chosen transfer route. If a cross-site transfer, the list shall also include all CTS devices connected to the CTS interposing relays.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.7.2.3 The existing MPS Relay Connected Device operation verification is typical for all leak detectors selected for service for a particular route.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.2. Logic diagram in Figure 20, Appendix D, "Route No.1 Manual Leak Detector Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.7.2.4 The list of existing MPS Relay Connected Devices to be verified shall be provided for those leak detectors, flush pit pressure switches, flush pit radiation detectors and in-service area radiation monitors presented in Tables 7, Appendix B, for input relays that have been selected for service in a particular route.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.4.3.7.3 **Choose Existing MPS Relay Connected Device to be Verified** (FFBD Function 4.3.7.3). After the MPS System displays a list of existing MPS Relay Connected Devices that have been selected as components for a particular route, the Operator chooses a MPS System HMI command that selects an existing MPS Relay Connected Device for verification.

3.2.1.4.3.7.3.1 The Operator shall be able to select a single device which can de-energize an existing MPS Relay from a list of MPS Relay Connected Devices presented on that MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.7.3.2 An existing MPS Relay Connected Device operation is typical for all existing MPS Relay Connected Devices selected for service in a particular route.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.2. Logic diagram in Figure 20, Appendix D, "Route No. 1 Manual Leak Detector Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.7.3.3 For a particular waste transfer route, an Operator shall be able to perform a verification by field testing the operation of an existing MPS Relay Connected Device in combination with an existing MPS System relay. The MPS System shall display a successful test result within an allowed period of time as an existing MPS Relay Input alarm.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.10.1.

3.2.1.4.3.7.3.4 The route shutdown command initiated by the existing MPS Relay Connected Device shall be inhibited for a maximum of 4 minutes after the existing MPS Relay Connected Device operation verification test is started or until the end of the test.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.2. Logic diagram in Figure 20, Appendix D, "Route No. 1 Manual Leak Detector

Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.7.4 **Check PM/S to Determine if Field Functional Test Required** (FFBD Function 4.3.7.4). After a MPSR/CD is chosen for verification, the Tank Farm Preventive Maintenance/Surveillance (PM/S) records are checked to see if a MPSR/CD functional test is required for the verification. If the date of the last verification indicated by PM/S records and the planned date of the transfer is within a specific time period, a functional test is not required and the MPSR/CD shall be considered verified.

3.2.1. 4.3.7.4.1 A Supervisor (or Cog Engineer) shall be able to determine whether or not a functional test is required by reviewing the PM/S records to determine when the last time the device was operationally verified. If the date of the last verification and the planned date of the transfer is within a specific time period, a functional test is not required .

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.10.1.

3.2.1.4.3.7.4.2 When it is determined by review of the PM/S record that the MPSR/CD does not require a functional test, it shall be verified by recording in an MPS System HMI:

- The time and date of PM/S verification.
- The name of the verifier.
- "Verification by PM/S record".

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.10.1.1.

3.2.1.4.3.7.4.3 The MPS System shall allow only "Supervisor" access for performing a MPSR/CD verification by PM/S record.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.10.1.1.

3.2.1.4.3.7.5 **Monitor and Display Alarm for the Associated Existing MPS Relay** (FFBD Function 4.3.7.5). After a MPS Relay Connected Device operation verification test has been started, the MPS System shall monitor the status of the discrete input connected to the chosen MPS Relay and shall initiate an alarm upon sensing the input de-energized.

3.2.1.4.3.7.5.1 After the existing MPS Relay has been de-energized by the Device being tested, a corresponding existing MPS Relay Input alarm shall be activated.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.2. Logic diagram in Figure 20, Appendix D, "Route No. 1 Manual Leak Detector Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.7.5.2 After the MPS/CD operation verification test is started, any route shut down caused by this test is inhibited for a maximum of 4 minutes.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.2. Logic diagram in Figure 20, Appendix D, "Route No. 1 Manual Leak Detector Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.7.5.3 The MPS System HMI graphics for each existing MPS Relay Connected Device Alarm shall be color coded per Section 3.3.7.1.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix S, "SCREEN COLOR CODING".

3.2.1.4.3.7.5.4 The MPS System HMI alarms shall be handled in accordance with Section 3.3.7.4.

Basis: Standardized alarm handling procedures reduces operational complexity of the MPS System HMI.

3.2.1.4.3.7.5.5 The existing MPS Relay Connected Device alarms shall be provided for those Devices presented in table 7 of Appendix B.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.4.3.7.6 **Confirm that Existing MPS Relay Operated within Time Limit** (FFBD Function 4.3.7.6). After an existing MPS Relay Connected Device verification test is initiated, an existing MPS Relay Input alarm is activated, and the existing MPS Relay Input alarm is acknowledged by the Operator within the required time limit of 4 minutes; then the verification test is confirmed. If the existing MPS Relay Input alarm is not acknowledged by the Operator within 4 minutes, then the verification test is not confirmed and a recovery process is initiated.

3.2.1.4.3.7.6.1 After the Operator initiation of the existing MPS Relay Connected Device operation verification test and if the associated existing MPS Relay Input alarm activates, the Operator chooses a MPS System HMI command that acknowledges the alarm. The alarm acknowledgment shall confirm the verification test.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.2. Logic diagram in Figure 20, Appendix D, "Route No. 1 Manual Leak Detector Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.7.6.2 If the existing MPS Relay Input alarm does not activate or if the alarm is not acknowledged by the Operator within 4 minutes, then the verification test is not confirmed.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.2. Logic diagram in Figure 20, Appendix D, "Route No. 1 Manual Leak Detector Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.7.6.3 The time limit allowed for confirming a existing MPS Relay functional test shall be 4 minutes.

Basis: Compliance with NUREG-0700, Guidelines for Control Room Design Reviews, Section 6.7.1.7, which is the required response time for an error feedback query following the completion of an operator input. This will allow a maximum of 3 seconds for the MPS System scan time for detecting test initialization by the Operator, 2 minutes and 30 seconds to allow the Operators to communicate between the HMI and the Field to apply the abnormal condition to the MPS Relay Connected Device (which is based on engineering judgement), 19 seconds to allow for the MPSR/CD and MPS relay response, 3 seconds for the MPS System scan time for detecting the MPS Relay output, 3 seconds for the Operator acknowledgment response, and 2 seconds for the MPS System to respond to the acknowledgment.

3.2.1.4.3.7.7 **Indicate that Existing MPS Relay Connected Device is "Not Verified"** (FFBD Function 4.3.7.7). After an existing MPS Relay Connected Device is not confirmed, the MPS System shall indicate to the Operator that the existing MPS Relay Connected Device verification test failed.

3.2.1.4.3.7.7.1 If an existing MPS Relay Connected Device fails a verification test; the verification failure shall be indicated via a HMI to the Operator(s) responsible for other selected transfer routes that are currently utilizing that MPS/CD as a MPS System input.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.8.3. It is intended that all leak detection devices satisfy this requirement.

3.2.1.4.3.7.7.2 The MPS System HMI shall display a local message that the existing MPS Relay Connected Device failed verification; if, after a specific time period elapses, the existing MPS relay alarm and Operator confirmation is not received by the MPS System.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.2. Logic diagram in Figure 20, Appendix D, "Route No. 1 Manual Leak Detector Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.7.7.3 The existing MPS Relay Connected Device Verification Test (including timer functions) shall be halted and reset after the MPS relay connected device test has been indicated by the MPS System as failing verification.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.2. Logic diagram in Figure 20, Appendix D, "Route No. 1 Manual Leak Detector Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.7.8 **Update Existing MPS Relay Connected Device Status to "Verified"** (FFBD Function 4.3.7.8). After the verification test is confirmed, the MPS System shall indicate to the Operator that the existing MPS Relay Connected Device is verified and shall update the Device status as "Verified".

3.2.1.4.3.7.8.1 If existing MPS Relay Connected Device functional test is performed successfully and acknowledged by the HMI Operator within a specified time period, the device is then indicated by the MPS System as "Verified".

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.7.8.2 When the existing MPS Relay Input Alarm is Acknowledged by an Operator located at the HMI with the Alarm activated, the existing MPS Relay Connected Device operation is indicated "verified" by the MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section

3.2.4.2. Logic diagram in Figure 20, Appendix D, "Route No. 1 Manual Leak Detector Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.7.8.3 When the existing MPS Relay Connected Device operation is indicated "verified" by the MPS System HMI, the Device Verification Test (including timer functions) shall be reset (stopped).

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.2. Logic diagram in Figure 20, Appendix D, "Route No. 1 Manual Leak Detector Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.8 **Verify Non-MPS Leak Detection Operation** (FFBD Function 4.3.8).

3.2.1.4.3.8.1 **Determine if Non-MPS Leak Detector Verifications are Complete** (FFBD Function 4.3.8.1). After a Non-MPS leak detector, which is a leak detector that is not connected to the MPS System, has been verified; the Operator chooses a MPS System HMI command that determines whether another Non-MPS leak detector is to be verified or a different category of equipment is to be verified.

3.2.1.4.3.8.1.1 The Operator shall be able to select any Non-MPS leak detector from a list displayed by the MPS System HMI and repeat the verification process until all the displayed Non-MPS leak detectors are verified.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.8.1.2 The MPS System HMI shall display a local message indicating that all existing Non-MPS leak detectors in the selected transfer route are verified.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.9.1.

3.2.1.4.3.8.1.3 A report of all existing Non-MPS leak detector verifications shall be displayed (and/or printed) at the local MPS System HMI, and/or be available to external systems such as TMACS.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.9.1.

3.2.1.4.3.8.1.4 The MPS System Non-MPS leak detector operation verification shall be typical for all Non-MPS leak detectors.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.3.

3.2.1.4.3.8.1.5 The MPS System Non-MPS leak detector verification shall be provided for those leak detectors including the leak detector probe voltage relays presented in tables 8 of Appendix B indicated as not connected to the MPS System.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.4.3.8.2 **Display List of Non-MPS Leak Detectors Selected for Route** (FFBD Function 4.3.8.2). After the Non-MPS leak detector equipment category has been selected or if an additional Non-MPS leak detector verification is determined by the Operator or after a Non-MPS leak detection system recovery, the MPS System shall display on an HMI to the Operator a list of Non-MPS leak detectors that have been selected as components for a particular route.

3.2.1.4.3.8.2.1 The Operator shall be able to select a single Non-MPS leak detector from a list of Non-MPS leak detectors presented on that MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.8.2.2 The list of Non-MPS leak detectors displayed shall only contain the Non-MPS leak detectors that have been selected for the previously chosen transfer route.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.8.2.3 The Non-MPS leak detector & probe low voltage sensing relay operation verification is typical for all Non-MPS leak detectors selected for service for a particular route.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section

3.2.4.3.

3.2.1.4.3.8.2.4 The list of Non-MPS leak detector relays & probe low voltage sensing relays to be displayed shall be provided for those leak detectors relays & probe voltage relays presented in Table 8 of Appendix B indicated as not connected to the MPS System.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.4.3.8.3 **Choose Non-MPS Leak Detector to be Verified** (FFBD Function 4.3.8.3). After the MPS System displays a list of Non-MPS leak detectors relays & probe low voltage sensing relays that have been selected as components for a particular route, the Operator chooses a MPS System HMI command that selects a Non-MPS leak detector or probe voltage relay for verification. Once the relay is selected, field testing of the leak detector is manually initiated.

3.2.1.4.3.8.3.1 The Operator shall be able to select a single Non-MPS leak detector relay or probe low voltage sensing relay from a list of Non-MPS leak detectors & probe voltage relays presented on that MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.8.3.2 The Non-MPS leak detector relay & probe low voltage sensing relay operation is typical for all Non-MPS leak detectors.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.3.

3.2.1.4.3.8.4 **Enter Local Leak Detector Alarm State into MPSS** (FFBD Function 4.3.8.4). After a leak detector relay or a probe low voltage sensing relay operation verification field test has occurred resulting in the activation or non-activation of the local leak detector alarm, the Operator shall enter the state of the local alarm into the MPS System at a HMI. An activated local leak detector alarm indicates that the field test verification was successful. The MPS System shall monitor the manually entered status of the leak detector relay or probe low voltage sensing relay and shall initiate a MPS System alarm if an activated local alarm state was entered.

3.2.1.4.3.8.4.1 Verification shall be accomplished by successfully field testing the leak

detector; and then recording, the time and date of verification, and the name of the verifier into an MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.9.1.

3.2.1.4.3.8.4.2 The MPS System HMI graphics for each Leak Detector Alarm shall be color coded per Section 3.3.7.1.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix S, "SCREEN COLOR CODING" and Section 2.3.9.2.

3.2.1.4.3.8.4.3 The MPS System HMI alarms shall be handled in accordance with Section 3.3.7.4.

Basis: Standardized alarm handling procedures reduces operational complexity of the MPS System HMI.

3.2.1.4.3.8.4.4 The Manual Leak Detector alarms shall be provided for those Leak Detectors presented in Table 8 of Appendix B as not connected to the MPS System.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.4.3.8.5 **Indicate Non-MPS Leak Detector "Not Verified"** (FFBD Function 4.3.8.5). After a Non-MPS leak detector relay or a probe low voltage sensing relay operation verification is not confirmed, the MPS System shall indicate to the Operator that the leak detector is "Not Verified".

3.2.1.4.3.8.5.1 If a leak detector or probe voltage relay fails a verification test; the verification failure shall be indicated via a HMI to the Operator(s) responsible for other selected transfer routes that are currently utilizing that leak detector as a MPS System input.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.9.1.

3.2.1.4.3.8.5.2 The MPS System HMI shall display a local message that the Non-MPS leak detection system is not operational; if, after a specific time period elapses, the Non-MPS leak detection system confirmation by the Operator

is not received by the MPS System.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.9.3. Logic diagram in Figure 15, Appendix D, "Route No. 1 Leak Detector Operation Verification Mode Logic", shows functional requirements for a remote verification of a Leak Detector. All operations of a Non-MPS leak detector shall be made identical to the operations of a remote leak detector, where it is possible, in order to standardize and simplify tank farm operations.

3.2.1.4.3.8.6 **Update Non-MPS Leak Detector Status to "Verified"** (FFBD Function 4.3.8.6). After it is determined that the verification test is confirmed, the MPS System shall indicate to the Operator that the Non-MPS leak detector is verified and shall update the Non-MPS leak detector status as "Verified".

3.2.1.4.3.8.6.1 If the Non-MPS leak detector functional field tests are successfully performed, the Non-MPS leak detector shall be recorded in the MPS System as verified.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.9 **Remotely Verify Leak Detector Operation** (FFBD Function 4.3.9).

3.2.1.4.3.9.1 **Determine if Remote Verifications of Leak Detectors are Complete** (FFBD Function 4.3.9.1). After a leak detector has been verified, the Operator chooses a MPS System HMI command that determines whether another leak detector is to be verified or a different category of equipment is to be verified.

3.2.1.4.3.9.1.1 The Operator shall be able to select another leak detector from a list displayed by the MPS System HMI and repeat the verification process until all the displayed leak detectors are verified.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.9.1.2 The MPS System HMI shall display a local message/indicat or showing that all existing leak detectors in the selected transfer route are verified as operational.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.8.1.

3.2.1.4.3.9.1.3 A report of all leak detector verifications shall be displayed (and/or printed) at the local MPS System HMI, and/or be available to external systems such as TMACS.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.8.1.

3.2.1.4.3.9.1.4 The MPS System leak detector operation verification shall be typical for all leak detectors.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.1. Logic diagram in Figure 15, Appendix D, "Route No. 1 Leak Detector Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.9.1.5 The MPS System leak detector verification shall be provided for those leak detectors including the leak detector probe voltage relays presented in Tables 2 and 4 of Appendix B that are shown as directly connected to MPS System.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.4.3.9.2 **Display List of Leak Detectors Selected for Route** (FFBD Function 4.3.9.2). After the transfer leak detector equipment category has been selected or if an additional leak detector verification is determined by the Operator or after a leak detection system recovery, the MPS System shall display on an HMI to the Operator a list of leak detectors that have been selected as components for a particular route.

3.2.1.4.3.9.2.1 The Operator shall be able to select a single leak detector from a list of leak detectors presented on that MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.9.2.2 The list of leak detectors displayed shall only contain the leak detectors that have been selected for the chosen transfer route.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.9.2.3 The leak detector operation verification is typical for all leak detectors selected for service for a particular route.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.1. Logic diagram in Figure 15, Appendix D, "Route No. 1 Leak Detector Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.9.2.4 The list of leak detectors to be verified shall be provided for those leak detectors relays presented in Tables 2 and 4 of Appendix B that have been selected for service in a particular route.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.4.3.9.3 **Choose Leak Detectors to be Verified** (FFBD Function 4.3.9.3). After the MPS System displays a list of leak detectors that have been selected as components for a particular route, the Operator chooses a MPS System HMI command that selects a leak detector or probe voltage relay for verification.

3.2.1.4.3.9.3.1 The Operator shall be able to select a single leak detector from a list of leak detectors presented on that MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.9.3.2 This leak detector operation is typical for all leak detectors selected for service in a particular route.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.1. Logic diagram in Figure 15, Appendix D, "Route No. 1 Leak Detector Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.9.3.3 For a particular waste transfer route, an Operator shall be able to perform a MPS System functional test by initiating a command signal from the MPS System HMI to the leak detectors relays and probe low voltage sensing relays. The Operator shall be able to determine whether or not

the functional test was successful by monitoring and displaying on the MPS System HMI the leak detector and probe low voltage alarm.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.8.1.

3.2.1.4.3.9.4 **Initiate Leak Detector Test Condition** (FFBD Function 4.3.9.4). After a leak detector is selected for verification, the Operator chooses a MPS System HMI command that shall initiate a simulated leak (increase in conductance) for the leak detector relay or a low voltage for the probe low voltage relay.

3.2.1.4.3.9.4.1 For a particular waste transfer operation, an Operator shall be able to perform a leak detection system functional test by initiating a command signal from the MPS System HMI to a leak detection system.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.1. Logic diagram in Figure 15, Appendix D, "Route No. 1 Leak Detector Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.9.4.2 A leak detection system or probe low voltage relay functional test shall not shut down a waste transfer.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.8.1.

3.2.1.4.3.9.4.3 The Operator shall be able to initiate a functional test for a leak detector through MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.9.4.4 The simulated leak and low probe voltage conditions shall be activated by the MPS System for a maximum of 25 seconds when either the leak detector or probe low voltage verification test is started.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.1. Logic diagram in Figure 15, Appendix D, "Route No. 1 Leak Detector Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.9.4.5 The route shutdown command shall be inhibited for a maximum of 25 seconds after the Leak Detector operation verification test is started or until the end of the test.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.1. Logic diagram in Figure 15, Appendix D, "Route No. 1 Leak Detector Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.9.5 **Monitor and Alarm Leak Detector or Probe Voltage Status** (FFBD Function 4.3.9.5). After a leak detector operation verification test has been started, the MPS System shall monitor the status of the discrete input connected to the chosen leak detector relay and probe low voltage sensing relay and shall initiate an alarm upon sensing either input as de-energized.

3.2.1.4.3.9.5.1 The leak detector relay's and probe low voltage sensing relay's discrete inputs shall be allowed a maximum of 3 seconds to de-energize and stabilize after the leak detector operation verification test has been started.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.1. Logic diagram in Figure 15, Appendix D, "Route No. 1 Leak Detector Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.9.5.2 After the leak detector relay has been de-energized, a corresponding leak detection alarm shall be activated. After the leak detector alarm has been acknowledged, the probe low voltage sensing relay is de-energized and a corresponding probe low voltage alarm shall be activated.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.1. Logic diagram in Figure 15, Appendix D, "Route No. 1 Leak Detector Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.9.5.3 After the Leak Detector operation verification test is started, any route shut down caused by this test is inhibited for a maximum of 25 seconds.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.1. Logic diagram in Figure 15, Appendix D, "Route No. 1 Leak Detector Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.9.5.4 The MPS System HMI graphics for each Leak Detector Alarm shall be color coded per Section 3.3.7.1.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix S, "SCREEN COLOR CODING".

3.2.1.4.3.9.5.5 The MPS System HMI alarms shall be handled in accordance with Section 3.3.7.4.

Basis: Standardized alarm handling procedures reduces operational complexity of the MPS System HMI.

3.2.1.4.3.9.5.6 The MPS System Leak Detector alarms shall be provided for those Leak Detectors presented in Tables 2 and 4 of Appendix B that are shown directly connected to the MPS System.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.4.3.9.6 **Confirm that Leak Detector Operated within Time Limit** (FFBD Function 4.3.9.6). After a simulated leak condition is initiated and the leak detector malfunction alarm is acknowledged by the Operator within the required time limit of 25 seconds; the verification test is confirmed. If the leak detector malfunction alarm is not acknowledged by the Operator within 25 seconds, then the verification test is not confirmed and a recovery process is initiated.

3.2.1.4.3.9.6.1 After the Operator initiation of the leak detector verification test and if the leak detector and probe low voltage alarm activates, the Operator chooses a MPS System HMI command that acknowledges each alarm. The alarm acknowledgments shall confirm the verification test.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.1. Logic diagram in Figure 15, Appendix D, "Route No. 1 Leak Detector Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.9.6.2 If the leak detector or probe low voltage alarm does not activate or if the leak detector and probe low voltage alarm are not acknowledged by the Operator within 25 seconds, then the verification test is not confirmed.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section

3.2.4.1. Logic diagram in Figure 15, Appendix D, "Route No. 1 Leak Detector Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.9.6.3 The time limit allowed for confirming a leak detection system functional test shall be 24 seconds.

Basis: Compliance with NUREG-0700, Guidelines for Control Room Design Reviews, Section 6.7.1.7, which is the required response time for an error feedback query following the completion of an operator input. This will allow 3 second for applying simulated leak to a leak detection system, 3 seconds for the leak detector relay response, 3 seconds for MPS System scan time for detecting leak detector output signal, 3 seconds for the Operator acknowledgment response, 3 second for applying simulated probe low voltage signal, 3 seconds for the probe low voltage relay response, 3 seconds for MPS System scan time for detecting the probe low voltage relay output signal, and 3 seconds for the Operator acknowledgment response.

3.2.1.4.3.9.7 **Indicate Leak Detector or Probe Voltage Relay "Not Verified"** (FFBD Function 4.3.9.7). After a simulated leak is not confirmed, the MPS System shall indicate to the Operator that the leak detector is "not verified". The MPS System shall indicate on a local HMI the "not detected" status until acknowledged by the Operator.

3.2.1.4.3.9.7.1 If a leak detector or probe voltage relay fails a verification test; the verification failure shall be indicated via a HMI to the Operator(s) responsible for other selected transfer routes that are currently utilizing that leak detector as a MPS System input.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.7.3.

3.2.1.4.3.9.7.2 The MPS System HMI shall display a local message that the leak detection system is not operational; if, after a specific time period elapses, the leak detection system confirmation by the Operator is not received by the MPS System.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.1. Logic diagram in Figure 15, Appendix D, "Route No. 1 Leak Detector Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.9.7.3 The Leak Detector Verification Test (including timer functions) shall be halted and reset after the leak detector test has been indicated by the MPS System as "Not Verified".

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.1. Logic diagram in Figure 15, Appendix D, "Route No. 1 Leak Detector Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.9.8 **Update Leak Detector Status to "Verified"** (FFBD Function 4.3.9.8). After it is determined that the verification test is confirmed, the MPS System shall indicate to the Operator that the leak detector is verified and shall update the leak detector status as "Verified".

3.2.1.4.3.9.8.1 If both the leak detector and the probe voltage relay functional tests are performed successfully and acknowledged by the HMI Operator within a specified time period, the leak detector is then indicated by the MPS System as verified.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.9.8.2 When the Leak Detection and the Low Probe Voltage Alarm is Acknowledged by an Operator located at the HMI with the Leak Detection Alarm activated, the leak detector operation is indicated "verified" by the MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.1. Logic diagram in Figure 15, Appendix D, "Route No. 1 Leak Detector Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.9.8.3 When the Leak Detector operation is indicated "verified" by the MPS System HMI, the Leak Detector Verification Test (including timer functions) shall be reset (stopped).

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.1. Logic diagram in Figure 15, Appendix D, "Route No. 1 Leak Detector Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.10 **Determine Category of Equipment to be Verified** (FFBD Function 4.3.10). After a route has been set up, the Operator shall choose a HMI command that selects one of the eleven different categories of equipment whose status and/or operation are to be verified. The equipment categories are:

- Manually Monitored Pipe Jumper Positions. (*Not in Project W-*

314's scope.)

- Remotely Monitored Valve Positions.
- Manually Monitored Valve Positions.
- Existing MPS Relay Inputs.
- MPS System Interlock Relays.
- Remotely Monitored Leak Detectors.
- Manually Monitored Leak Detectors.
- Manually Monitored Leak and Service Water Pressure Detection Systems Connected to Existing MPS Relays.
- MPS System PLCs.
- Backflow Preventers. (*Not in Project W-314's scope.*)
- Heat Tracing Systems. (*Not in Project W-314's scope.*)

3.2.1.4.3.10.1 One tank farm operator at any MPS HMI shall be able to verify the functional operation or setup of all components of the MPS System equipment for each particular transfer route prior to performing a transfer.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.10.2 Transfer route equipment selection is required to be completed prior to starting the route verification mode.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.10.3 The Operator shall have selected one of the six transfer routes for verification prior to selecting an equipment category for verification.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.10.4 A MPS System HMI Display presents a menu for selecting a particular MPS System equipment category for verification.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.10.5 The MPS System HMI equipment category selection display also displays whether or not all the equipment in that category has been verified.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.10.6 The equipment category verification mode is initiated when a category selection for a particular route is made by an Operator at a MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.10.7 The Operator shall be able to select a different category of equipment and verify all the equipment in that category and repeat this process until all equipment of all the categories for a selected transfer route are verified.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.10.8 The following shall be the different categories of equipment that are verified prior to a waste transfer:

- Manually Monitored Pipe Jumper Positions. (*Not in Project W-314's scope.*)
- Remotely Monitored Valve Positions.
- Manually Monitored Valve Positions.
- Existing MPS Relay Inputs.
- MPS System Interlock Relays.
- Remotely Monitored Leak Detectors.
- Manually Monitored Leak Detectors.
- Manually Monitored Leak and Service Water Pressure Detection Systems Connected to Existing MPS Relays.
- MPS System PLCs.
- Backflow Preventers. (*Not in Project W-314's scope.*)
- Heat Tracing Systems. (*Not in Project W-314's scope.*)

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.10.9 Once all the equipment verifications of all the categories for a selected transfer route are completed and the pit cover blocks are verified as installed, the shift supervisors administrative approval is required to

complete the route verification mode of operation.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.11 **Determine If Equipment Verifications are Complete** (FFBD Function 4.3.11). After the verifications of all the components of a route that reside in a specific category of equipment are completed, the Operator determines if verification of additional components residing in a different category of equipment are required. If additional verifications are required, a different category of equipment needs to be selected (see FFBD Function 4.3.10) and the verification process for that equipment category is repeated. If not; subject to Supervisor's approval, the route verification process is completed.

3.2.1.4.3.11.1 The Operator shall be able to select a different category of equipment and verify all the equipment in that category and repeat this process until all equipment of all the categories for a selected transfer route are verified.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.12 **Supervisor Approves Transfer** (FFBD Function 4.3.12). Once all the equipment verifications of all the categories for a selected transfer route are completed and the pit cover blocks are verified as installed, the shift supervisors administrative approval is required to complete the route verification mode of operation.

3.2.1.4.3.12.1 The shift supervisors administrative approval is required to complete the route verification mode of operation.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.12.2 The Shift Supervisor approval shall be accomplished by recording the transfer route identification, the time and date of approval, and the name of the supervisor into an MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.11.1.

3.2.1.4.3.12.3 The MPS System HMI shall display a local message indicating that the

selected transfer route is approved as operational, after the "commit to PLC" function has been performed.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.11.1.

3.2.1.4.3.12.4 The Supervisor's name shall be authenticated by the log in process.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.11.2.

3.2.1.4.3.13 **Verify Service Water Pressure Detection System (FFBD Function 4.3.13)**

3.2.1.4.3.13.1 **Determine if Service Water Pressure Detector System Verifications are Complete** (FFBD Function 4.3.13.1). After Service Water Pressure Detector System has been verified, the Operator chooses a MPS System HMI command that determines whether another Service Water Pressure Detector System is to be verified or a different category of equipment is to be verified.

3.2.1.4.3.13.1.1 The Operator shall be able to select another Service Water Pressure Detector System from the list displayed by the MPS System HMI for the chosen route and repeat the verification process until all the displayed Service Water Pressure Detector Systems are verified.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.13.1.2 The MPS System HMI shall display a local message indicating that all existing Service Water Pressure Detectors Systems in the selected transfer route are verified as operational.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.7.1.

3.2.1.4.3.13.1.3 A report of all Service Water Pressure Detector verifications shall be displayed (and/or printed) at the local MPS System HMI, and/or be available to external systems such as TMACS.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design

Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.7.1.

3.2.1.4.3.13.1.4 The Service Water Pressure Detector System operation verification shall be typical for all Service Water Pressure Detectors.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.4. Logic diagram in Figure 14, Appendix D, "Route No. 1 Relay Input Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.13.1.5 The Service Water Pressure Detectors verification shall be provided for those Service Water Pressure Detectors presented in Table 7 of Appendix B.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix B.

3.2.1.4.3.13.2 **Display List of Service Water Pressure Detectors Selected for Route** (FFBD Function 4.3.13.2). After the Service Water Pressure Detector Mode of Operation has been selected, the MPS System shall display on an HMI to an Operator a list of Service Water Pressure Detectors that have been selected as components for a particular route.

3.2.1.4.3.13.2.1 The Operator shall be able to select a single Service Water Pressure Detector from a list of Service Water Pressure Detectors System presented on that MPS HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.13.2.2 The list of Service Water Pressure Detectors displayed shall only contain the Service Water Pressure Detectors that have been selected for the chosen transfer route.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.13.2.3 The Service Water Pressure Detector operation Verification is typical for all Service Water Pressure Detectors selected for service in a particular route.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.4. Logic diagram in Figure 14, Appendix D, "Route No. 1 Relay Input Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.13.2.4 The Service Water Pressure Detector operation verification shall be provided for those Service Water Pressure Detectors System presented in Table 7 of Appendix B that have been selected for service in a particular route.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix B.

3.2.1.4.3.13.3 **Choose Service Water Pressure Detector System Input to be Verified** (FFBD Function 4.3.13.3). After the MPS System displays a list of Service Water Pressure Detectors that have been selected as components for a particular route, the Operator chooses a MPS System HMI command that chooses a selected Service Water Pressure Detector for verification.

3.2.1.4.3.13.3.1 The Operator shall be able to select a single Service Water Pressure Detector from a list of Service Water Pressure Detectors presented on that MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.13.3.2 This Service Water Pressure Detector operation shall be typical for all new Service Water Pressure Detectors selected for service in a particular route.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.4. Logic diagram in Figure 14, Appendix D, "Route No. 1 Relay Input Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.13.4 **Initiate Service Water Pressure Detector Test** (FFBD Function 4.3.13.4). After a selected Service Water Pressure Detector is chosen for verification, the Operator chooses a MPS System HMI command that initiates the Service Water Pressure Detector operational verification test.

3.2.1.4.13.4.1 The Operator shall be able to initiate a functional test for a Service Water Pressure Detector through MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.13.4.2 The Service Water Pressure Detector operation verification test is started when a specific command is chosen by the Operator at an HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.4. Logic diagram in Figure 14, Appendix D, "Route No. 1 Relay Input Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.13.4.3 The Service Water Pressure Detector circuit shall be de-energized by the MPS System for a maximum of 11 seconds when its verification test is started.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.4. Logic diagram in Figure 14, Appendix D, "Route No. 1 Relay Input Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.13.4.4 An Service Water Pressure Detector functional test shall not shut down a waste transfer.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.7.1.

3.2.1.4.3.13.4.5 The route shutdown command shall be inhibited for a maximum of 11 seconds after the Service Water Pressure Detector operation verification test is started or until the end of the test.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.4. Logic diagram in Figure 14, Appendix D, "Route No. 1 Relay Input Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.13.5 **Monitor and Alarm Service Water Pressure Detector Status** (FFBD Function 4.3.13.5). After the Service Water Pressure Detector operation verification test has been started, the MPS System shall monitor the status of the discrete input connected tot he chosen Service Water Pressure Detector and shall initiate an alarm upon sensing the input de-energized.

3.2.1.4.3.13.5.1 The Service Water Pressure Detector discrete input shall be allowed a maximum of 3 seconds to de-energize and stabilize after the Service Water Pressure Detector operation verification test has been started.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.4. Logic diagram in Figure 14, Appendix D, "Route No. 1 Relay Input Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.13.5.2 After the Service Water Pressure Detector has been de-energized, an Service Water Pressure Detector Alarm shall be activated.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.4. Logic diagram in Figure 14, Appendix D, "Route No. 1 Relay Input Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.13.5.3 After the Service Water Pressure Detector operation verification test is started, any route shut down caused by this test is inhibited for a maximum of 11 seconds.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.4. Logic diagram in Figure 14, Appendix D, "Route No. 1 Relay Input Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.13.5.4 The MPS System HMI graphics for each Service Water Pressure Detector Alarm shall be color coded per Section 3.3.7.1.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix S, "SCREEN COLOR CODING".

3.2.1.4.3.13.5.5 The MPS System HMI alarms shall be handled in accordance with Section 3.3.7.4.

Basis: Standarized alarm handling procedures reduces operational complexity of the MPS System HMI.

3.2.1.4.3.13.5.6 The Service Water Pressure Detector alarms shall be provided for those Service Water Pressure Detectors presented in Table 7 of Appendix B.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design

Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix B.

3.2.1.4.3.13.6 **Confirm that Service Water Pressure Detector Operated Within Time Limit** (FFBD Function 4.3.13.6). After the status of the discrete input connected tot he chosen Service Water Pressure Detector is monitored by the MPS System, an activated Service Water Pressure Detector Alarm with an Operator acknowledgment of the alarm confirms the verification test. If the Service Water Pressure Detector Alarm is not acknowledged by the Operator within 10 seconds, then the verification test is not confirmed and a recovery process is initiated.

3.2.1.4.3.13.6.1 After the Operator initiation of the Service Water Pressure Detector operation verification test and if the Service Water Pressure Detector Alarm activates the Operator chooses a MPS System HMI command that acknowledges the alarm. The alarm acknowledgment confirms the verification test.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.4. Logic diagram in Figure 14, Appendix D, "Route No. 1 Relay Input Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.13.6.2 If the Service Water Pressure Detector Alarm does not activate or if the Service Water Pressure Detector Alarm is not acknowledged by the Operator within 10 seconds, then the verification test is not confirmed.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.4. Logic diagram in Figure 14, Appendix D, "Route No. 1 Relay Input Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.13.7 **Indicate Service Water Pressure Detector Not Verified** (FFBD Function 4.3.13.7). After it is determined that the verification test is not confirmed, the MPS System shall indicate to the Operator on a local HMI that the Service Water Pressure Detector is not verified and requires recovery.

3.2.1.4.3.13.7.1 If the Service Water Pressure Detector Alarm does not activate or the alarm is acknowledged by the Operator within 10 seconds, then MPS System indicates on a local HMI that the relay input is "Not Verified".

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.4. Logic diagram in Figure 14, Appendix D, "Route No. 1 Relay Input Operation

Verification Mode Logic", shows functional requirements.

3.2.1.4.3.13.7.2 The Route Service Water Pressure Detector Verification Test (including timer functions) shall be halted and reset after the Service Water Pressure Detector test has been indicated by the MPS System as "Not Verified".

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.4. Logic diagram in Figure 14, Appendix D, "Route No. 1 Relay Input Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.13.8 **Update Service Water Pressure Detector Status to "Verified"** (FFBD Function 4.3.13.8). After it is determined that the verification test is confirmed, the MPS System shall indicate to the Operator that the Service Water Pressure Detector is verified and shall update the Service Water Pressure Detector status as "Verified".

3.2.1.4.3.13.8.1 If the Service Water Pressure Detector functional test is performed successfully and acknowledged by the HMI Operator within a specified time period, the Service Water Pressure Detector is then indicated by the MPS System as verified.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.

3.2.1.4.3.13.8.2 When the Service Water Pressure Detector Alarm is acknowledged by an Operator located at the HMI with the Service Water Pressure Detector alarm activated, the Service Water Pressure Detector operation is indicated "verified" by the MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.4. Logic diagram in Figure 14, Appendix D, "Route No. 1 Relay Input Operation Verification Mode Logic", shows functional requirements.

3.2.1.4.3.13.8.3 When the Service Water Pressure Detector operation is indicated "verified" by the MPS System HMI, the Route Service Water Pressure Detector Verification Test (including timer functions) shall be reset (stopped).

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.4. Logic diagram in Figure 14, Appendix D, "Route No. 1 Relay Input Operation

Verification Mode Logic", shows functional requirements.

3.2.1.4.4 **Perform Transfer** (FFBD Function 4.4).

3.2.1.4.4.1 **Monitor Incorrect Manual Valve Positions** (FFBD Function 4.4.1).

3.2.1.4.4.1.1 **Manually Enter Valve Position Into MPSS** (FFBD Function 4.4.1.1). After it has been determined that a transfer valve, which is not connected to the MPS System, has been re-positioned; the new valve position shall be manually entered into the MPS System at a HMI.

3.2.1.4.4.1.1.1 When a field Operator stationed at a waste transfer valve that is not connected to the MPS System alerts a control room Operator that there is a misrouting or valve in an incorrect position, the control room Operator will manually shutdown that transfer route.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.5.2.

3.2.1.4.4.1.1.2 Manual Valve Position entry shall be accomplished by the transfer valve's last position, the time and date of entry, and the name of the Operator doing the entry into an MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.14.5.

3.2.1 4.4.1.1.3 The MPS System HMI graphics for each Incorrect Valve Position Alarm shall be color coded per Section 3.3.7.1.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix S, "SCREEN COLOR CODING".

3.2.1.4.4.1.1.4 The Manual Valve Position Indication shall be provided for those transfer valves presented in Tables 9, 10, 13, and 14 of Appendix B as not connected to the MPS System.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.4.4.2 **Monitor Non-MPS Leak Detection Devices** (FFBD Function 4.4.2).

3.2.1.4.4.2.1 **Manually Enter Alarm State into MPSS** (FFBD Function 4.4.2.1). After a leak detection device that is **not** connected to the MPS System is field monitored with a leak observed, the alarm state shall be manually entered into the MPS System. The manually entered alarm state shall initiate a MPS System Non-MPS Leak Detection alarm alerting all Operators at different HMI stations. The Non-MPS Leak Detection alarm may be used as a basis by the Operator to initiate a route shut down.

3.2.1.4.4.2.1.1 When a field Operator stationed at a leak detection device that is not connected to the MPS System alerts a control room Operator that there is a leak, the control room Operator will manually shutdown that transfer route. After the shutdown, the control room operator will enter the leak detector state change into the HMI to communicate and document the cause of the route shutdown.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.5.1.

3.2.1.4.4.2.1.2 Alarm state entry shall be accomplished by recording the leak detector's last state, the time and date of entry, and the name of the Operator doing the entry into an MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.9.1.

3.2.1.4.4.2.1.3 The MPS System HMI graphics for each Leak Detector Alarm shall be color coded per Section 3.3.7.1.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix S, "SCREEN COLOR CODING".

3.2.1.4.4.2.1.4 The MPS System HMI alarms shall be handled in accordance with Section 3.3.7.4.

Basis: Standardized alarm handling procedures reduces operational complexity of the MPS System HMI.

3.2.1.4.4.2.1.5 The Non-MPS Leak Detector alarms shall be provided for those Leak Detection devices presented in Table 8 of Appendix B as not connected to the MPS System.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.4.4.3 **Monitor MPSS Leak Detectors** (FFBD Function 4.4.3)

3.2.1.4.4.3.1 Monitor leak detector signals (FFBD Function 4.4.3.1). After a leak detector signal representing a leak being detected or a leak detector malfunction is transmitted to the MPS System, the MPS System shall monitor such transmitted signals and utilize the signal as an input.

3.2.1.4.4.3.1.1 When the leak detector that transmits a signal to the MPS System, representing either a leak is detected or a leak detector malfunction, is identified as safety class, the MPS System components performing the monitoring function shall be identified as Safety Class and shall meet the requirements presented in Section 3.3.6.3.1.

Basis: The MPS System as defined by Project W-314 is a functional component of the Pit Leak Detection System. The pit leak detection system as defined by FSAR, HNF-SD-WM-SAR-067, Section 4.3.17, is a S.C. The above function is derived as a S.C. of the pit leak detection system in Calculation W314-I-078, which is a MPS Failure Mode Analysis Study for SC instrumentation.

3.2.1.4.4.3.2 **MPSS Leak Detected Alarm** (FFBD Function 4.4.3.2). After a Leak Detected signal is monitored, the MPS System shall alarm that a leak has been detected. The MPS System shall alarm that a leak has been detected until acknowledged by the Operator(s).

3.2.1.4.4.3.2.1 Immediate identification of the source of a master pump shutdown command signal will be available in the form of an alarm at any HMI and will be available to be communicated as data to the TMACS central station via HLAN.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.2.4.

3.2.1.4.4.3.2.2 The MPS System shall be able to alarm and identify which MPS System input (e.g., leak detectors, manual push button, existing MPS relay inputs, etc.) caused a master pump shutdown.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.13.2.

3.2.1.4.4.3.2.3 Any tank farm Operator at any MPS HMI shall be able to monitor the real-time status of the MPS System utilizing the WTA mode of operation described above.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.5.

3.2.1.4.4.3.2.4 The MPS System HMI alarms shall be handled in accordance with Section 3.3.7.4.

Basis: Standardized alarm handling procedures reduces operational complexity of the MPS System HMI.

3.2.1.4.4.3.2.5 The MPS System HMI graphics for each Leak Detector Alarm shall be color coded per Section 3.3.7.1.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix S, "SCREEN COLOR CODING".

3.2.1.4.4.3.2.6 The Leak Detector alarms shall be provided for those Leak Detection devices presented in Tables 2 and 4 of Appendix B as directly connected to the MPS System.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.4.4.3.2.7 Leak detection system/MPS System interfaces shall be failsafe, that is, upon loss of signal, a leak detection signal shall be initiated.

Basis: Compliance with failsafe requirement stated in OSD-T-151-00007, Rev. H-17, Operating Specifications for the 241-AN, AP, AW, AZ and SY Tank Farms, Section 7.2.10.

3.2.1.4.4.3.3 Reserved

3.2.1.4.4.3.4 **MPSS Leak Detector Malfunction Alarm** (FFBD Function 4.4.3.4). After a low leak detector probe voltage condition is monitored, the MPS System shall alarm a leak detector malfunction. The MPS System shall alarm the leak detection malfunction until acknowledged by the Operator(s).

3.2.1.4.4.3.4.1 Immediate identification of the source of a master pump shutdown command signal will be available in the form of an alarm at any HMI and will be available to be communicated as data to the TMACS central

station via HLAN.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.2.4.

3.2.1.4.4.3.4.2 The MPS System shall be able to alarm and identify which MPS System input (leak detectors, manual push button, existing MPS relay input, etc.) caused a master pump shutdown.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.13.2.

3.2.1.4.4.3.4.3 A detected failure of the Leak Detection System shall cause an output signal to be transmitted to the MPS System.

Basis: Compliance with OSD-T-151-00007, Rev. H-17, Operating Specifications for the 241-AN, AP, AW, AZ and SY Tank Farms, Section 7.2.10.

3.2.1.4.4.3.4.4 The MPS System HMI alarms shall be handled in accordance with Section 3.3.7.4.

Basis: Standardized alarm handling procedures reduces operational complexity of the MPS System HMI.

3.2.1.4.4.3.4.5 The MPS System HMI graphics for each Leak Detector Malfunction Alarm shall be color coded per Section 3.3.7.1.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix S, "SCREEN COLOR CODING".

3.2.1.4.4.3.4.6 The Leak Detector Malfunction alarms shall be provided for those Leak Detection devices presented in Tables 2 and 4 of Appendix B as directly connected to the MPS System and as including a low probe voltage relay.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.4.4.3.4.7 Leak detection system/MPS System interfaces shall be failsafe, that is, upon loss of signal, a leak detection signal shall be initiated.

Basis: Compliance with failsafe requirement stated in OSD-T-151-00007, Rev. H-17, Operating

Specifications for the 241-AN, AP, AW, AZ and SY Tank Farms, Section 7.2.10.

3.2.1.4.4.4 **Monitor Incorrect Valve Positions** (FFBD Function 4.4.4).

3.2.1.4.4.4.1 **Alarm Incorrect Valve Position** (FFBD Function 4.4.4.1). After correct valve positions have been compared to actual valve positions and the valve positions have been verified, a change in valve position during a waste transfer from the correct position shall initiate an automatic route shutdown and an Incorrect Valve Position alarm. An Incorrect Valve Position alarm shall indicate the identification of the particular valve which is in the incorrect position.

3.2.1.4.4.4.1.1 For each transfer the MPS System shall be able to interlock the appropriate transfer pump so as to be able to shut it down if an incorrect transfer valve position is detected. The MPS System shall not shutdown other transfer pumps not associated with the incorrect transfer valve position if simultaneous waste transfers are taking place. The transfer valve position monitoring mode of operation shall be operational whenever the motor control circuit(s) and the feeder of the waste transfer pump(s) are energized. This mode of operation shall operate concurrently with other modes of operation during a waste transfer.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.14.2.

3.2.1.4.4.4.1.2 The MPS System shall monitor correct transfer valve position for six simultaneous waste transfers.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.14.1.

3.2.1.4.4.4.1.3 For each transfer the MPS System shall alarm and identify which incorrectly positioned valve caused a master pump shutdown.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.14.2.

3.2.1.4.4.4.1.4 The MPS System HMI alarms shall be handled in accordance with Section 3.3.7.4.

Basis: Standardized alarm handling procedures reduces operational complexity of the MPS

System HMI.

3.2.1.4.4.5 **Initiate Manual Route Shutdown** (FFBD Function 4.4.5.1).

3.2.1.4.4.5.1 **Manually Initiate Route Shutdown** (FFBD Function 4.4.5.1). After an Operator establishes a basis for a transfer route shutdown, the Operator chooses a MPS System HMI command or pulls a route shutdown pull-switch that initiates a route shutdown.

3.2.1.4.4.5.1.1 The Operator shall be able to manually shutdown one of six routes if any of the following events occur:

- Manual Leak Detection

  When a field Operator stationed at a leak detector that is not connected to the MPS System alerts a control room Operator located at a control building that there is a leak, the control room Operator shall be able to shutdown that route by pulling a route specific pull switch located at the PLC panel. Otherwise, if the alerted Operator is located at any of the MPS HMIs, the Operator, utilizing a HMI shall be able to shutdown the specific transfer route that the leak detector is associated with.

- Incorrect Valve Position Detection

  When a field Operator reports that a valve, which is not connected to the MPS System, is in an incorrect position during a transfer, the control room Operator shall be able to shutdown that route by pulling a route specific pull switch located at the PLC panel. Otherwise, if the alerted Operator is located at any of the MPS HMIs, the Operator, utilizing a HMI shall be able to shutdown the specific transfer route that the valve is associated with.

- Misrouting Detection

  When a HMI Operator determines that there is a waste transfer misrouting utilizing HMI screen monitoring a totalized flow difference and/or monitoring waste tank levels between the source and destination tanks, the control room Operator shall be able to shutdown that route by pulling a route specific pull switch located at the PLC panel. Otherwise, if the alerted Operator is located at any of the MPS HMIs, the Operator, utilizing a HMI shall be able to shutdown the specific transfer route that the misrouting detection is associated with.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design

Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.5.

3.2.1.4.4.5.1.2 The Route Shutdown pull-switches for the six simultaneously operating transfers shall be located at the 241-AZ-271 Control Room.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.5.

3.2.1.4.4.5.1.3 For each transfer route in operation, there shall be a manual push button located on each MPS System HMI that initiates a manual master pump shutdown for that route.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.13.2.

3.2.1.4.4.5.1.4 The manual shutdown pull switches shall be designed as Safety Class.

Basis: Safety Class Identified Manual Leak detectors (that are not connected to the MPS System), require an operator action to perform the safety class function of shutting down the transfer pump. The manual pull-buttons accomplish this function and therefore, need to be identified as Safety Class.

3.2.1.4.4.5.2 **Alarm Route Manual Shutdown** (FFBD Function 4.4.5.2). After a route shutdown has been initiated by an Operator, the Route Manual Shutdown event shall be alarmed. The MPS System shall alarm the Manual Shutdown until acknowledged by the Operator(s).

3.2.1.4.4.5.2.1 The MPS System shall be able to alarm and identify which MPS System input (leak detectors, manual push-button, existing MPS relay inputs, etc.) That caused a master pump shutdown.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.13.2.

3.2.1.4.4.5.2.2 The MPS System HMI graphics for each Route Manual Shutdown Alarm shall be color coded per Section 3.3.7.1.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix S, "SCREEN COLOR CODING".

3.2.1.4.4.5.2.3 The MPS System HMI alarms shall be handled in accordance with section 3.3.7.4.

Basis: Standardized alarm handling procedures reduces operational complexity of the MPS System HMI.

3.2.1.4.4.5.2.4 The Route Manual Shutdown alarms shall be provided for those Route Manual Shutdown pull-switches for the six simultaneously operating transfers located at the 241-AZ-271 Control Room.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.4.4.5.3 **Manually Initiate All-Route Shutdown** (FFBD Function 4.4.5.3). After an Operator establishes a basis for an all-route shutdown, the Operator chooses a MPS System HMI command or pulls a route shutdown pull-button that, when pulled, initiates a shutdown of every simultaneously operating transfer pump. The all-route shutdown pull-switch is the same as the "panic button" where the basis of operation may be an unforeseen event.

3.2.1.4.4.5.3.1 If an All-Route Shutdown pull-switch is pulled by an Operator located in 200 East, all transfer pumps in 200 East and; if and only if, a cross-site transfer is in progress; 200 West are shut down. If an All-Route Shutdown pull-switch is pulled by an Operator located in 200 West, all transfer pumps in 200 West and, if and only if a cross-site transfer is in progress, 200 East are shut down.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.13.3. Logic diagram in Figure 12, Appendix D, "All Route Manual MPS Logic", shows functional requirements.

3.2.1.4.4.5.3.2 The All-Route Shutdown pull-switches shall be located at the AN, AZ, AW & AP instrument buildings and at the 242-S Evaporator control room.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.13.3. Logic diagram in Figure 12, Appendix D, "All Route Manual MPS Logic", shows functional requirements.

3.2.1.4.4.5.3.3 The manual shutdown pull switches shall be designed as Safety Class.

Basis: Safety Class Identified Manual Leak detectors (that are not connected to the

MPSSystem), require an operator action to perform the safety class function of shutting down the transfer pump. The manual pull-buttons accomplish this function and therefore, need to be identified as Safety Class.

3.2.1.4.4.5.4 **Alarm All-Route Manual Shutdown** (FFBD Function 4.4.5.4). After an all-route shutdown has been initiated by an Operator, the All-Route Manual Shutdown event shall be alarmed. The MPS System shall alarm the Manual Shutdown until acknowledged by the Operator(s).

3.2.1.4.4.5.4.1 The MPS System shall be able to alarm and identify which MPS System input (leak detectors, manual push-button, existing MPS relay inputs, etc.) That caused a master pump shutdown.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.13.2.

3.2.1.4.4.5.4.2 An All-Route Shutdown Alarm shall be displayed on the MPS System HMI's.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.13.3. Logic diagram in Figure 12, Appendix D, "All Route Manual MPS Logic", shows functional requirements.

3.2.1.4.4.5.4.3 The MPS System HMI graphics for each All-Route Manual Shutdown Alarm shall be color coded per Section 3.3.7.1.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix S, "SCREEN COLOR CODING".

3.2.1.4.4.5.4.4 The MPS System HMI alarms shall be handled in accordance with Section 3.3.7.4.

Basis: Standardized alarm handling procedures reduces operational complexity of the MPS System HMI.

3.2.1.4.4.5.4.5 The All-Route Manual Shutdown alarms shall be provided for those All-Route Manual Shutdown pull-switches shall be located at the AN, AZ, AW & AP instrument buildings and at the 242-S Evaporator control room.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.4.4.6 **Initiate Automatic Route Shutdown** (FFBD Function 4.4.6).

3.2.1.4.4.6.1 **Compare MPS Elements to MPS Elements Selected for a Transfer Route** (FFBD Function 4.4.6.1). After a leak detection, MPS relay de-energized, manual shutdown, or incorrect valve position detection occurs, the MPS System shall compare the initiating MPS element to those MPS elements selected for each simultaneously operating transfer. The MPS System shall initiate a route shutdown command if any initialized MPS element is selected for a particular transfer route.

3.2.1.4.4.6.1.1 The MPS System shall be programmed to allow MPS System inputs to be associated with six simultaneously operating waste transfers .

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.13.1.

3.2.1.4.4.6.1.2 The MPS System shall be able to interlock the appropriate transfer pump so as to be able to shut it down if a MPS System input selected for a transfer route is detected. The MPS System shall not shutdown other transfer pumps not selected for a waste transfer route if simultaneous waste transfers are taking place. This mode of operation shall operate concurrently with other modes of operation during a waste transfer.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.13.2.

3.2.1.4.4.6.1.3 The MPS System shall use existing relays as input signals that reflect an existing master pump shutdown command.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.2.1.

3.2.1.4.4.6.1.4 The function of initiating an automatic route shutdown (FFBD 4.4.6) shall be identified as Safety Class and meet the requirements of Section 3.3.6.3.1 if the initiating event is identified as Safety Class.

Basis: The MPS System as defined by Project W-314 is a functional component of the Pit Leak Detection System . The Pit Leak Detection System is identified as a SSC in RPP FSAR, HNF-SD-WM-SAR-067, Section 4.3.17. The above function is derived as a SSC in Calculation W314-I-078, MPS Failure Mode Analysis Study

3.2.1.4.4.6.2 **Manually Initiate Element Bypass** (FFBD Function 4.4.6.2). If , during a waste transfer, it is decided to bypass any of the MPS System inputs due to a malfunctioning MPS System input element, the Operator shall be able to choose an HMI command that initiates an individual element bypass. The element bypass operation shall allow the waste transfer to continue even though the malfunctioning element has initiated a route shutdown.

3.2.1.4.4.6.2.1 During a transfer, the Route Shutdown function shall be able to be bypassed by an Operator located at a MPS System HMI allowing the waste transfer to continue operation. The Bypass is required when it is determined that the Route Shutdown function is impaired and when the function is replaced with operator surveillance.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.1.2.2.

3.2.1.4.4.6.2.2 The shift supervisors administrative approval is required to perform an element bypass operation.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.14.4.

3.2.1.4.4.6.2.3 The element bypass operation shall be accomplished by recording in an MPS System HMI the MPS System element identification, the time and date when the bypass is enabled/disabled, and the name of the Supervisor sanctioning the element bypass operation.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.14.4.

3.2.1.4.4.6.2.4 The Supervisor's name shall be authenticated by the MPS System log in process.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.14.4.

3.2.1.4.4.6.3 **Update MPS System Input Element Status to "Bypassed"** (FFBD Function 4.4.6.3). After an MPS System Input Element Bypass is initiated by an Operator, the MPS System HMI shall indicate to the Operator that the

MPS System Input Element is verified and shall update the MPS System Input Element status as "Bypassed".

3.2.1.4.4.6.3.1 The MPS System shall identify any MPS System input that has been bypassed.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.13.2.

3.2.1.4.4.6.3.2 The MPS System shall identify any MPS System input that is bypassed that is in an alarm state.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.13.2.

3.2.1.4.4.6.3.3 Every MPS System Input Element shall be capable of being manually bypassed. A bypassed element shall be inhibited from automatically causing a route shutdown.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.13.3.

3.2.1.4.4.6.4 **Compare MPS System Selected Elements to Bypassed Elements** (FFBD Function 4.4.6.4). After a MPS System Input element , which is selected for a route, initiates an automatic route shutdown, the element shall be compared to those elements which have been manually bypassed. If the element is bypassed the automatic route shutdown shall be inhibited.

3.2.1.4.4.6.4.1 The MPS System shall have the ability to identify any MPS System input that has been bypassed.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.13.2.

3.2.1.4.4.6.4.2 Every MPS System Input Element shall be capable of being manually bypassed. A bypassed element shall be inhibited from automatically causing a route shutdown.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section

2.3.13.3.

3.2.1.4.4.7 **Transfer Pump Shutdown** (FFBD Function 4.4.7).

3.2.1.4.4.7.1 **De-Energize Route Shutdown Loop** (FFBD Function 4.4.7.1). After an automatic or manual initiation of a Route shutdown, the route shutdown loop shall be de-energized. A de-energized route shutdown loop signals all of the MPS System PLCs associated with the route that a route shutdown is required.

3.2.1.4.4.7.1.1 Part of the MPS System shall be designed as failsafe. If the power supply to the MPS Route Shutdown Loop fails (or is intentionally de-energized to initiate a route shutdown), the transfer pumps for the particular route affected shall be shut down. The transfer pumps shall continue to run if the HMI or the TFLAN communications fail.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.2.9.

3.2.1.4.4.7.1.2 A Route Shutdown command is initiated by a MPS System PLC if either a leak is detected, an existing MPS relay is de-energized, an incorrect valve position is sensed, an Operator pulls a Manual Shutdown pull-switch, or the PLC receives a Route Shutdown command via a de-energized route shutdown loop from another MPS System PLC or CTS PCU.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.1.2.2, item 2.

3.2.1.4.4.7.1.3 A Route Shutdown Loop shall connect all the MPS PLCs in the 200 East Area. Another Route Shutdown Loop shall connect all the MPS PLCs in the 200 West Area. If a cross site transfer line is selected as part of the route, then it connects the 200 East and the 200 West route Shutdown loops creating a site wide Route Shutdown Loop.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.1.2.2, Items 2, 4. and 5. summarized.

3.2.1.4.4.7.1.4 The function of de-energizing the route shutdown loop (FFBD 4.4.7.1) shall be identified as Safety Class and meet the requirements of Section 3.3.6.3.1 if the initiating event is identified as Safety Class.

Basis: The MPS System as defined by Project W-314 is a functional component of the Pit Leak Detection System . The Pit Leak Detection System is identified as a SSC in RPP FSAR, HNF-SD-WM-SAR-067, Rev 0, Section 4.3.17. The above function was derived as a SC function in Calculation, W314-I-078, "MPS Failure Mode Analysis Study".

3.2.1.4.4.7.2 **Alarm Route Shutdown** (FFBD Function 4.4.7.2). After an automatic or manual initiation of a route shutdown, the route shutdown alarm shall be activated. The MPS System shall present the alarm until acknowledged by the Operator(s).

3.2.1.4.4.7.2.1 An Alarm shall be activated immediately after a route shutdown is initiated to identify to the Operator(s) what route is being shut down.

Basis: HNF-SD-W314-TI-008, , Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.1.2.2, *item 3.*

3.2.1.4.4.7.2.2 A MPS alarm message shall be displayed at all MPS System HMIs in all modes of operation.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.

3.2.1.4.4.7.2.3 The MPS System shall present a route shutdown alarm for each route.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.1.2.2, *item 3.*

3.2.1.4.4.7.3 **Compare Pump Interlocks to Interlocks Selected For Transfer Route** (FFBD Function 4.4.7.3). After a Route Shutdown Loop is de-energized, which communicates a route shutdown command to the MPS System PLCs and, if a cross-site transfer, the CTS PCUs; each MPS PLC shall compare all the transfer pump interlocks to which it is connected to those pump interlocks selected for service in the route being shut down. If it is determined that a selected interlock is connected to the PLC, then the PLC de-energizes the interlock.

3.2.1.4.4.7.3.1 The MPS System shall be able to interlock the appropriate transfer pump and CTS slurry pump so as to be able to shut it down if a selected MPS System Input is detected.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.13.2.

3.2.1.4.4.7.3.2 The MPS System shall not be able to shut down other transfer pumps or the CTS slurry booster pumps that are not associated or selected with the detected MPS System Inputs.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.13.2.

3.2.1.4.4.7.3.3 The function of comparing pump interlocks selected for a transfer route (FFBD 4.4.7.3) shall be identified as Safety Class.

Basis: The MPS System as defined by Project W-314 is a functional component of the Pit Leak Detection System . The Pit Leak Detection System is identified as a SSC in RPP FSAR, HNF-SD-WM-SAR-067, Rev 0, Section 4.3.17. The above function was derived as a SC function in Calculation, W314-I-078, "MPS Failure Mode Analysis Study".

3.2.1.4.4.7.4 **De-energize Selected Pump Interlock(s)** (FFBD Function 4.4.7.4). After a selected MPS route shutdown signal is detected, the MPS System PLCs shall de-energize the transfer pump Interlock causing the transfer pump motor starter to open disconnecting power from the pump motor.

3.2.1.4.4.7.4.1 For each waste transfer route, the MPS System shall interlock the appropriate transfer pump(s) so as to be able to shut it down automatically if a MPS System Input selected for that route is detected. If a cross-site transfer, the MPS System shall be able to provide a signal that causes the CTS control system to automatically shut down the appropriate slurry booster pump.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.13.2.

3.2.1.4.4.7.4.2 The MPS System outputs shall switch the pump interlock relay(s) to accomplish an automatic shutdown with the waste appropriate transfer pumps motor control centers (MCCs). In the case of a cross-site transfer, input a signal to the CTS PCUs and/or variable frequency drives.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.2.1.

3.2.1.4.4.7.4.3 The transfer pump interlocks shall be provided for those transfer pumps presented in Table 5 of Appendix B.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.4.4.7.4.4 The MPS System HMI shall display the actual waste transfer pump running status changes as alarms. The operator shall be able to confirm that the pump(s) has shut down and acknowledge the pump status change(s).

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.6.

3.2.1.4.4.7.4.5 The function of de-energized selected pump interlock(s) (FFBD 4.4.7.5) shall be identified as Safety Class and meet the requirements of Section 3.3.6.3.1 if the initiating event is Safety Class.

Basis: The MPS System as defined by Project W-314 is a functional component of the Pit Leak Detection System . The Pit Leak Detection System is identified as a SSC in RPP FSAR, HNF-SD-WM-SAR-067, Rev 0, Section 4.3.17. The above function was derived as a SC function in Calculation, W314-I-078, "MPS Failure Mode Analysis Study".

3.2.1.4.4.7.5 **Verify Transfer Pump Shutdown** (FFBD Function 4.4.7.5). After the route transfer pump interlocks have been de-energized, the Operator shall verify that the route's transfer pumps have been shut down. The MPS System shall indicate on the HMI the transfer pump running status.

3.2.1.4.4.7.5.1 The MPS System shall present transfer pump running status determined by auxiliary contacts on the motor starter or the motor current monitor to provide a pump stopped confirmation to the Operator after a route shut down.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.13.3 and Logic Diagram" Generic Pump Interlock Logic", Figure 13, Appendix D.

3.2.1.4.4.7.5.2 The MPS System HMI graphics for each transfer pump running status shall be color coded per Section 3.3.7.1.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix S, "SCREEN COLOR CODING".

3.2.1.4.4.7.5.3 The transfer pump running status shall be provided for those transfer pumps presented in table 5 of Appendix B.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.4.4.7.5.4 For the following pumps, the pump run status shall be manually determined and entered into the MPS System via a HMI. The MPS System shall prompt the Operator to contact the following facility control centers for determining the pump run status.

Facility	Pump
204-AR	P-1A
204-AR	P-1B
219-S	P-1

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.13.2.

3.2.1.4.4.8 **Monitor Existing MPS System** (FFBD Function 4.4.8).

3.2.1.4.4.8.1 **Monitor and Alarm Existing MPS Relay** (FFBD Function 4.4.8.1). After a MPS Relay Connected Device (MPS/CD) has been initiated which trips its connected MPS Relay, the MPS System shall monitor the status of the discrete input connected to the MPS Relay and shall initiate an alarm upon sensing that the discrete input has de-energized.

3.2.1.4.4.8.1.1 A Route Shutdown command shall be initiated if an existing MPS relay input or CTS interposing relay is de-energized.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.1.2.2, item 2.

3.2.1.4.4.8.1.2 An alarm shall be activated on the MPS System HMI immediately after a Route Shutdown command is initiated to identify the source of the command activation.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.1.2.2, item 3.

3.2.1.4.4.8.1.3 The existing MPS System consists of leak detection systems and other devices which are connected in series to interposing electromagnetic relays. The MPS System shall use the existing relays which are located in instrument buildings and CTS PCUs to select existing master pump

shutdown command (input) signals.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.2.1.

3.2.1.4.4.8.1.4 During a waste transfer the MPS System shall have the ability to alarm and identify which MPS System input (existing MPS relay inputs, etc.) caused a route shutdown for every simultaneously operating transfer.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.13.2.

3.2.1.4.4.8.1.5 The MPS System HMI graphics for each MPS Relay Input Alarm shall be color coded per Section 3.3.7.1.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix S, "SCREEN COLOR CODING".

3.2.1.4.4.8.1.6 The MPS System HMI alarms shall be handled in accordance with section 3.3.7.4.

Basis: Standardized alarm handling procedures reduces operational complexity of the MPS System HMI.

3.2.1.4.4.8.1.7 The MPS Relay Input alarms shall be provided for those MPS Relays presented in Table 7 of Appendix B.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.4.4.8.1.8 The function of monitoring existing MPS relay status (FFBD 4.4.8.1) shall be identified as Safety Class and meet the requirements of Section 3.3.6.3.1 if the initiating MPS relay is Safety Class.

Basis: The MPS System as defined by Project W-314 is a functional component of the Pit Leak Detection System . The Pit Leak Detection System is identified as a S.C. in RPP FSAR, HNF-SD-WM-SAR-067, Rev 0, Section 4.3.17. The above function was derived as a SC function in Calculation, W314-I-078, "MPS Failure Mode Analysis Study".

3.2.1.4.4.8.2 **Manually Enter Alarm Source into MPSS** (FFBD Function 4.4.8.2). After a device that is connected to an existing MPS Relay is field identified as the

source of a route shutdown, the alarm state for the device shall be manually entered into the MPS System by the Operator. The manually entered alarm state shall initiate a MPS System alarm alerting all Operators at different HMI stations of the source of the Route Shutdown as well as documenting the event.

3.2.1.4.4.8.2.1 After a device that is connected to the MPS System via an existing MPS relay is identified as the source of a Route Shutdown, the control room operator will enter the device state change into the MPS System HMI to communicate and document the cause of the route shutdown.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.5.1.

3.2.1.4.4.8.2.2 Alarm state entry shall be accomplished by recording the last state of the existing MPS Relay Connected Device, the time and date of entry, and the name of the Operator doing the entry into an MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.9.1.

3.2.1.4.4.8.2.3 The MPS System HMI graphics for each MPS/CD Alarm shall be color coded per Section 3.3.7.1.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix S, "SCREEN COLOR CODING".

3.2.1.4.4.8.2.4 The MPS System HMI alarms shall be handled in accordance with Section 3.3.7.4.

Basis: Standardized alarm handling procedures reduces operational complexity of the MPS System HMI.

3.2.1.4.4.8.2.5 The MPS System alarms shall be provided for those devices presented in Table 7 of Appendix B as connected to an existing MPS Relay and include those devices connected to the CTS interposing relays.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix B.

3.2.1.4.4.9 **De-Energize Route Transfer Pumps** (FFBD Function 4.4.9).

3.2.1.4.4.9.1 **Verify Transfer Pump(s) De-Energized** (FFBD Function 4.4.9.1). After the route transfer pump circuit breakers have been manually opened, the Operator shall verify that the route's transfer pumps have been de-energized. The MPS System shall indicate on the HMI the transfer pump motor circuit breaker status.

3.2.1.4.4.9.1.1 The MPS System shall present transfer pump circuit breaker status to the Operator determined by the sensing of the pump motor starter control power.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.15.3 and Logic Diagram "Transfer Pump MCC Circuit Breaker Interlock", Figure 19, Appendix D.

3.2.1.4.4.9.1.2 The MPS System HMI graphics for each transfer pump energization status shall be color coded per Section 3.3.7.1.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix S, "SCREEN COLOR CODING".

3.2.1.4.4.9.1.3 The transfer pump energization status shall be provided for those transfer pumps presented in Table 5 of Appendix B. The energization status for the following pumps shall be manually determined and entered into the MPS System via a HMI. It is intended that the MPS System Operator contact the following facility control centers for determining the pump energization status.

Facility	Pump
204-AR	P-1A
204-AR	P-1B
219-S	P-1

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix A.

3.2.1.4.4.9.2 **Reset Route Shutdown Loop** (FFBD Function 4.4.9.2). After a route's transfer pump(s) are verified de-energized, the Operator shall choose a MPS System HMI command that shall reset the Route Shutdown Loop.

3.2.1.4.4.9.2.1 A Route Shutdown event requires acknowledgment by an Operator actuating the Route Shutdown Reset command on a MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.13.3 and Logic Diagram "Route No. 1 MPS Logic", Figure 6, Appendix D.

3.2.1.4.4.10 **Annunciate Waste Transfer Alarms** (FFBD Function 4.4.10). After a waste transfer has started, the MPS System shall display graphically the following information on the Waste Transfer Annunciator set of HMI screens for Operators to monitor during a Transfer. The information is as follows:

- MPS System Alarm Identification.
- Transfer Route Illustration and Equipment Identification.
- Transfer Valve Position Illustration and Status.
- Transfer Pump Running Status.

3.2.1.4.4.10.1 All MPS System alarms shall be displayed in a set of MPS HMI graphical screens that simplify the presentation of approximately 200 alarms.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.16.1.

3.2.1.4.4.10.2 All simultaneously operating waste transfer routes shall be displayed on the Waste Transfer Annunciator set of MPS HMI graphical screens.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.16.2.

3.2.1.4.4.10.3 The running status of all waste transfer pumps shall be displayed on the Waste Transfer Annunciator set of MPS HMI graphical screens.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.16.3.

3.2.1.4.4.10.4 The dynamic analog data associated with all waste transfer routes shall be displayed on the Waste Transfer Annunciator set of MPS HMI graphical screens. This includes waste flows, tank levels, tank temperatures, tank vapor space pressures implemented after phase 2 of W-314 begins.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.16.4.

3.2.1.4.4.10.5 All MPS alarms shall be identified on the Waste Transfer Annunciator set of MPS HMI graphical screens as to whether or not they are associated with a transfer route utilizing an alarm prioritizing scheme. First priority alarms shall be MPS alarms associated with any selected transfer route. All other alarms shall be second priority.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.16.5.

3.2.1.4.4.10.6 An alarm for each transfer pump shall be provided indicating that the pump's circuit breaker is closed when the pump has not been selected for service in any transfer route.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.16.7.

3.2.1.4.4.10.7 All MPS System alarms and parameters shall be available to TMACS and other authorized users via HLAN connections. The HMI shall be capable of Remote Access Server (RAS) functionality.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.16.17.

3.2.1.4.4.10.8 Process lines on the MPS System HMI displays shall be color-coded as specified in Section 3.3.7.1.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.16.18.

3.2.1.4.4.10.9 Pump operation indication shall be color-coded on the MPS System HMI graphic displays as specified in Section 3.3.7.1.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.16.19.

3.2.1.4.4.10.10 By clicking an alarm on the HMI, an Operator shall be automatically taken from the active alarm summary list screen to the graphic screen displaying the alarm.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.16.20.

3.2.1.4.4.11 **Monitor and Alarm Service Water Pressure Detector** (FFBD Function 4.4.11). After a Service Water Pressure Detector has been initiated, the MPS System shall monitor the status of the discrete input connected to the Service Water Pressure Detector and shall initiate an alarm upon sensing that the discrete input has de-energized.

3.2.1.4.4.11.1 A Route Shutdown command shall be initiated if an Service Water Pressure Detector System is de-energized.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.1.2.2, item 2.

3.2.1.4.4.11.2 An alarm shall be activated on the MPS System HMI immediately after a Route Shutdown command is initiated to identify the source of the command activation.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.1.2.2, item 3.

3.2.1.4.4.11.3 During a waste transfer the MPS System shall have the ability to alarm and identify which MPS System input (Service Water Pressure Detector System, etc.) caused a route shutdown for every simultaneously operating transfer.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.13.2.

3.2.1.4.4.11.4 The MPS System HMI graphics for each Service Water Pressure Detector Alarm shall be color coded per Section 3.3.7.1.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix S, "SCREEN COLOR CODING".

3.2.1.4.4.11.5 The MPS System HMI alarms shall be handled in accordance with Section 3.3.7.4.

Basis: Standardized alarm handling procedures reduces operational complexity of the MPS System HMI.

3.2.1.4.4.11.6 The Service Water Pressure Detector alarms shall be provided for those Service Water Pressure Detectors presented in Table 7 of Appendix B.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Appendix B.

3.2.1.4.4.11.7 The function of monitoring Service Water Pressure Detector status (FFBD 4.4.11) shall be identified as Safety Class and meet the requirements of Section 3.3.6.3.1.

Basis: The MPS System as defined by Project W-314 is a functional component of the Pit Leak Detection System. The Pit Leak Detection System is identified as a S.C. in RPP FSAR, HNF-SD-WM-SAR-067, Rev 0, Section 4.3.17. The above function was derived as a SC function in Calculation, W314-I-078, "MPS Failure Mode Analysis Study".

3.2.1.5 **Post-Transfer Flush** (FFBD Function 5.0).

Functions and Requirements under this heading are duplicated or not in Project W-314's scope.

3.2.1.6 **Post-Transfer Valve Line-Up** (FFBD Function 6.0). After the post-transfer flush is drained, the route's transfer valves are re-positioned to their assigned post-transfer position.

Functions and Requirements under this heading are duplicated or not in Project W-314's scope.

3.2.1.7 **Supervisor's Approval** (FFBD Function 7.0). After the final material balance for the waste transfer and the flushing of the route is performed and the transfer valves are set to their post-transfer positions, a Supervisor's approval is required prior to releasing the equipment in the route for use in other transfers.

3.2.1.7.1 An Administrative approval shall be required prior to releasing the route for use by other transfers.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.15.4.

3.2.1.7.2 Supervisor approval shall be accomplished by inputting the waste transfer identification, the time and date of the approval, and the name of the Supervisor doing the approval. The MPS System shall authenticate the Supervisor's authority during the log in process.

Basis: Minimum information needed to satisfy requirement per Section 3.2.1.110.1.

3.2.1.8 **Reset Transfer Route** (FFBD Function 8.0). After the Supervisor's approval for releasing the route has been obtained, the Operator chooses a MPS System Command that resets the transfer route. Resetting the transfer route is equivalent to de-selecting all of the particular route's equipment components.

3.2.1.8.1 The Operator shall be able to reset each of the six simultaneous waste transfer routes independently.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.15.1.

3.2.1.8.2 The MPS System shall prevent a transfer route reset if any of the selected transfer pump circuit breakers are closed (energizing the pump motor).

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.15.2 and logic diagram "Transfer Pump MCC Circuit Breaker Interlock", Fig. 19, Appendix D.

3.2.1.8.3 Transfer Route Reset shall be initiated by the Operator via a MPS System HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.15.2.

3.2.1.9 **Choose Post-Transfer Flush Mode** (FFBD Function 9.0). After a Route Shutdown, the Operator shall choose a MPS System HMI command that selects the Post-Transfer Flush Mode or not based on the type of waste and an initial assessment of the problem that caused the shutdown.

3.2.1.9.1 After a Route Shutdown, the Operator shall either select the Post-Transfer Flush Mode or not.

Basis: The selection function provides operational flexibility to continue with the transfer or to halt it and flush the lines.

3.2.2 Physical Characteristics

3.2.2.1 Weight limit: Not applicable to this specification.

Basis: Electronic components of the MPS System do not require any special or non-standard

transport and storage based on weight.

3.2.2.2 Access for Maintenance:

3.2.2.2.1 The MPS System indoor components shall be able to fit and be accessible for all required maintenance inside the instrument buildings and operating centers listed in section 3.2.1.1.5 and as shown on drawings referenced in the PICD, HNF-SD-W314-PICD-001.

Basis: The MPS System must fit within existing structures.

3.2.2.2.2 The MPS System outdoor components shall be located to not obstruct vehicle access to pits and tanks while remaining accessible for all required maintenance.

Basis: The MPS System must fit within existing tank farms while not obstructing safety and maintenance vehicular traffic..

3.2.2.3 Requirements for transport and storage: Not applicable to this specification.

Basis: Electronic components of the MPS System do not require any special or non-standard transport and storage.

3.2.2.4 Durability factors: Not applicable to this specification.

Basis: Electronic components of the MPS System do not require any special or non-standard Durability factors.

3.2.2.5 Health and Safety Criteria:

3.2.2.5.1 The MPS System outdoor components shall be located outside of any pits and shielded from radiation from the pits cover block.

Basis: HSRCM-1 Rev. 2, Hanford Site Radiological Control Manual, Chapter 1, which contains guidelines to minimize risk of radiation exposure through the process of ALARA.

3.2.2.6 Security criteria: Software security requirements are found in Section 3.2.1.1.

3.2.2.6.1 The MPS System components shall be lockable to prevent unauthorized access to the systems electronics.

Basis: Prevents unauthorized operation of the MPS System while allowing entry to the Instrument buildings.

3.2.2.7 Vulnerability factors: Not applicable to this specification.

Table 3-3 - Response Spectra

Horizontal Response Spectra "g"						
Frequency (Hertz)	Damping					
	0.50%	2%	5%	7%	10%	12%
100	0.26	0.26	0.26	0.26	0.26	0.26
33.3	0.26	0.26	0.26	0.26	0.26	0.26
13.3	0.57	0.48	0.41	0.38	0.36	0.35
10	0.77	0.59	0.47	0.43	0.38	0.36
5	1.04	0.76	0.58	0.52	0.45	0.42
3.3	0.98	0.72	0.54	0.48	0.42	0.39
2	0.74	0.55	0.41	0.37	0.33	0.30
1	0.45	0.34	0.26	0.23	0.21	0.19
0.5	0.22	0.17	0.13	0.12	0.11	0.10
0.25	0.08	0.06	0.05	0.05	0.04	0.04
Vertical Response Spectra "g"						
Frequency (Hertz)	Damping					
	0.50%	2%	5%	7%	10%	12%
100	0.18	0.18	0.18	0.18	0.18	0.18
33.3	0.18	0.18	0.18	0.18	0.18	0.18
13.3	0.60	0.46	0.37	0.33	0.30	0.28
10	0.66	0.49	0.37	0.33	0.29	0.27
5	0.60	0.44	0.33	0.30	0.26	0.24
3.3	0.48	0.36	0.27	0.24	0.21	0.19
2	0.32	0.24	0.18	0.16	0.14	0.13
1	0.19	0.14	0.11	0.10	0.09	0.08
0.5	0.14	0.11	0.08	0.07	0.07	0.06
0.25	0.06	0.05	0.04	0.03	0.03	0.03

Table 3-4 - Response Level

	Damping (% of critical)
	Response Level
Demand/capacity ratio	~0.5 to 1.0
Welded and friction bolted metal structures	4
Bearing-bolted metal structures	7
Prestressed concrete structures without complete loss of prestress	5
Reinforced concrete structures	7
Masonry shear walls	7
Wood structures with nailed joints	10
Distribution systems	5
Massive low stressed components (pumps, motors, etc.)	3
Light welded instrument racks	3
Electrical cabinets and other equipment	4
Liquid containing metal tanks Implusive mode	3
Liquid containing metal tanks Sloshing mode	0.5

Basis: Electronic components of the MPS System do not require any special or non-standard Vulnerability factors.

3.2.3 Reliability

3.2.3.1 The Master Pump Shutdown system shall have a design life of 35 years.

Basis: WHC-SD-W314-DRD-001, Rev. 2, "Preliminary Design Requirements Document for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.3.1.

3.2.3.2 Fault Detection/Fault Isolation

Designs shall provide for the detection and isolation of faults to systems,

structures, and components as necessary in order to minimize the risks associated with faulty operation to plant, personnel and environment. Protection systems and associated instrumentation and controls shall be designed in accordance with DOE 6430.1a, Section 1660-99.02.

Basis: WHC-SD-W314-DRD-001, Rev. 2, "Preliminary Design Requirements Document for Project W-314, Tank Farm Restoration and Safe Operations", Section 3.2.3.3.

3.2.3.3 Mission time and System Availability

For a mission time of 7 days, the required system availability shall be 288 days/year.

Basis: The numbers and duration of the transfers quoted are the result of cc:mail messages between J.D. Galbraith, T.W. Crawford and P.F. Kison and R.R. Bevins. The duration of the above is contained in attachment 1 of CHG Memo #7C500-00-005.

3.2.3.4 Overall System Reliability

The system shall have, at the minimum, a 90% chance of completing a seven day (168 hr) transfer.

Basis: HNF-SD-W314-TI-008, Rev. 3 , Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.0.

3.2.4 Maintainability

3.2.4.1 Mean time to Repair:

The MPS System shall have a mean time of four hours to repair.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 4.3.2.4.

3.2.5 Environmental Conditions

The systems and components covered by this specification shall be compatible with the environmental conditions listed below, as applicable. Performance Category (PC) 3 is assigned to safety class systems and PC1 is assigned to general service systems. The design and analysis of loads associated with existing systems shall, as a minimum, be performed to the design requirements of the existing system.

3.2.5.1 Natural Environments

3.2.5.1.1 Ambient Air Temperature

The ambient air temperature range is 48.9°C (120°F) to -35.5°C (-32°F), and with a maximum 24 hour differential of 28.9°C (52°F).

Basis: WHC-SD-W314-DRD-001, Rev. 2, Preliminary Design Requirements Document Tank Farm Upgrade System, Project W-314, Section 3.2.4.1.1.

3.2.5.1.2 Soil Temperature

The minimum soil temperatures below ground surface is:

1.3 cm (0.5 in):	-19.5°C (-3.0°F)
38 cm (15 in):	-8.8°C (16.1°F)
92 cm (36 in):	0.8°C (33.5°F)

Basis: WHC-SD-W314-DRD-001, Rev. 2, Preliminary Design Requirements Document Tank Farm Upgrade System, Project W-314, Section 3.2.4.1.1 for the minimum temperatures.

3.2.5.1.3 Seismic Loads

PC1 structures, systems, and components

Earthquake load design of PC1 SSCs shall comply with the UBC, Seismic Zone 2B, for standard occupancy facilities.

PC3 structures, systems, and components

Earthquake load design of PC3 SSCs shall comply with DOE-STD-1020 by using dynamic analysis and site-specific design response spectra listed in Table 3-3.

Calculate elastic seismic response, D_S, by dynamic analysis using Response Level 2 damping values from Table 3-4.

Basis: HNF-PRO-097, Rev. 2, Engineering Design and Evaluation, Section 5.1.5.

3.2.5.1.4 Wind Loads

For PC3 systems:

"Fastest Mile" wind velocity:	36 m/s (80 mi/h)
"Three Second Gust" wind velocity:	44 m/s (100 mi/h)
Missile (horizontal):	44 m/s (2 x 4 in.) Timber plank weighing 7 kg (15 lb) @ 22 m/s (50 mi/h). Maximum trajectory height = 9 m (30 ft).

For PC1 systems:

"Fastest Mile" wind velocity:	31 m/s (70 mi/h)
"Three Second Gust" wind velocity:	38 m/s (85 mi/h)

Basis: HNF-PRO-097, Rev. 0, Engineering Design and Evaluation, Section 5.1.3.

3.2.5.1.5 Snow Loads

The ground snow loads are: 720 Pa (15 lb/ft^2)

Basis: HNF-PRO-097, Rev. 0, Engineering Design and Evaluation, Section 5.1.3

3.2.5.1.6 Relative Humidity

The relative humidity range is 0 to 100% (Rate of change is negligible).

Basis: WHC-SD-W314-DRD-001, Rev. 2, Preliminary Design Requirements Document Tank Farm Upgrade System, Project W-314, Sections 3.2.4.1.2.

3.2.5.1.7 Surface Precipitation

The surface precipitation is 4 cm (1.56 in) in a 24 hour period.

Basis: WHC-SD-W314-DRD-001, Rev. 2, Preliminary Design Requirements Document Tank Farm Upgrade System, Project W-314, Sections 3.2.4.1.3.

3.2.5.1.8 Hail Events

The hail diameter is less than or equal to 1.9 cm (0.75 in).

Basis: WHC-SD-W314-DRD-001, Rev. 2, Preliminary Design Requirements Document Tank Farm Upgrade System, Project W-314, Sections 3.2.4.1.3.

3.2.5.1.9 Sand and Dust

The sand/dust concentration is 0.177 gm/m^3 with a typical size of 350 μm.

Basis: WHC-SD-W314-DRD-001, Rev. 2, Preliminary Design Requirements Document Tank Farm Upgrade System, Project W-314, Sections 3.2.4.1.4.

3.2.5.1.10 Solar Radiation

The solar radiation range is between 4 Watts/m^2 and 406 Watts/m^2.

Basis: WHC-SD-W314-DRD-001, Rev. 2, Preliminary Design Requirements Document Tank Farm Upgrade System, Project W-314, Sections 3.2.4.1.6.

3.2.5.1.11 Glaze (See definition in Section 5.1)

The glaze is 2.54 cm (1 in.).

Basis: The basis for this requirement is based on engineering judgement from years of experience in the area.

3.2.5.1.12 Ashfall Events

A total combination load of snow fall and ash fall of 960 Pa (20 lb/ft^2) shall be used.

Basis: HNF-PRO-097, Rev. 0, Engineering Design and Evaluation, section 5.1.6.

3.2.5.1.13 Dead loads

Dead loads include the weights of all permanent materials and equipment, including the structure's own weight. Design dead loads shall include the weight of all permanent service equipment. Load calculations shall include an allowance for any loadings anticipated to be added at a later date. Initially assumed loads shall be revised so that the final design reflects the configuration shown on the drawings.

The unit weights of materials and construction assemblies for buildings and other structures shall be those given in ASCE 7-95. Where unit weights are neither established in that standard nor determined by test or analysis, the weights shall be determined from data in manufacturer drawings or catalogs.

Basis: HNF-PRO-097, Rev. 0, Engineering Design and Evaluation, section 5.1.1.

3.2.5.1.14 Thermal Forces

The design of structures shall include the effects of stresses and movements resulting from variations in temperature. Structures shall be designed for movements resulting from the maximum seasonal temperature change. The design shall provide for the lags between air temperatures and the interior temperatures of massive concrete members or structures. Consideration shall be given to passive soil loading resulting from thermal growth of subgrade structures.

Basis: HNF-PRO-097, Rev. 0, Engineering Design and Evaluation, section 5.1.9.

3.2.5.1.15 Creep and Shrinkage Forces

Concrete and masonry structures shall be investigated for stresses and deformations induced by creep and shrinkage. For concrete and masonry structures, the minimum linear coefficient of shrinkage shall be assumed to be

0.0002 mm/mm, unless a detailed analysis is undertaken. The theoretical shrinkage displacement shall be computed as the product of the linear coefficient and the length of the member.

Basis: HNF-PRO-097, Rev. 0, Engineering Design and Evaluation, section 5.1.10.

3.2.5.1.16 Load Combinations and Allowable Stresses

Load combinations, allowable stresses, and strength requirements for load conditions that include live load, dead load, snow load, and normal operating loads for all SSCs shall comply with the UBC or applicable system national codes and standards.

Load combinations, allowable stresses, and strength requirements for load conditions that include live load; dead load ; snow load; normal operating loads; and NPH loads of extreme wind, earthquake, flood, and ashfall for all SSCs shall comply with DOE-STD-1020.

Load factors and load combinations for PC1 structures, systems, and components

Combine response from various loadings to determine the structural demand by using the UBC-specified load combination rules (e.g., load factors for ultimate strength design and unit load factors for allowable stress design).

Where:

DL	=	DEAD LOAD
LL	=	LIVE LOAD
RL	=	ROOF LIVE LOAD
S	=	SNOW LOAD
W	=	WIND LOAD
E	=	EARTHQUAKE
T	=	THERMAL
C	=	CREEP/SHRINKAGE

Allowable Stress (AS) Design: All Construction

AS	=	DL + LL + RL(or S)
AS	=	0.75 [DL + LL + W(or E)]
AS	=	0.75 [DL + LL + W + S/2]
AS	=	0.75 [DL + LL + S + W/2]

Ultimate Strength (U) Design: Reinforced Concrete

U	=	1.4DL + 1.7LL + 1.7RL(or 1.7S)
U	=	0.75 [1.4DL + 1.7LL + 1.7W]
U	=	1.05 [DL + LL + E]
U	=	0.9DL + 1.3W(or 1.4E)

U = 1.4 [DL + T(or C)]
U = 0.75 [1.4DL + 1.7LL + 1.4T(or 1.4C)]

Strength (S) Design: Steel (Load & Resistance Factor Design)
S = 1.4DL
S = 1.2DL + 1.6LL + 0.5(RL or S)
S = 1.2DL + 0.5LL(or 0.8W) + 1.6(RL or S)
S = 1.2DL + 1.3W + 0.5LL + 0.5(RL or S)
S = 1.2DL + 1.5E + 0.5LL(or .2S)
S = 0.9DL - 1.3W(or 1.5E)

Load factors and load combination for PC3 structures, systems, and components

Combine response from various loadings to determine structural demand as follows.

Where:
DL = DEAD LOAD
LL = LIVE LOAD
RL = ROOF LIVE LOAD
S = SNOW LOAD
W = WIND LOAD
E = EARTHQUAKE
A = ASHFALL
T = THERMAL
C = CREEP/SHRINKAGE

Allowable Stress (AS) Design:
AS = DL + LL + RL(or S)
AS = 0.62 [DL + LL + RL(or S) + W + T(or C)]

for shear stress
AS = 0.71 [DL + LL + RL(or S) + E(or A) + T(or C)]

for all stress other than shear stress
AS = 0.59 [DL + LL + RL(or S) + E(or A) + T(or C)]

Ultimate Strength (U) Design:
U = 1.4DL + 1.7LL + 1.7RL(or 1.7S)
U = 1.4 [DL + T(or C)]
U = DL + LL + RL(or S) + W(or E or A) + T(or C)

Strength (S) Design: Steel (Load & Resistance Factor Design)
S = 1.4DL
S = 1.2DL + 1.6LL + 0.5(RL or S)
S = 1.2DL + 0.5LL + 1.6(RL or S)

$$S = DL + LL + RL(\text{or } S) + W(\text{or } E \text{ or } A) + T$$

Basis: HNF-PRO-097, Rev. 0, Engineering Design and Evaluation, Section 5.1.12.

3.2.5.2 Induced Environments

3.2.5.2.1 Waste Properties

Materials used that come in contact with the waste be capable of safely handling waste with the following properties:

Specific Gravity	1 to 1.5
Viscosity	1 to 30 centipoise (Newtonian)
Miller Number	100 maximum
pH	7 to 14
Temperature	10 to 93°C (50 to 200°F)
Solids Content	30 Vol.%
Particle Size	0.5 to 4000 microns

Note: 95% of total particles 0 to 50 microns
<5 percent of total particles 50 to 500 microns
<1 percent of total particles 500 to 4000 microns

Basis: The waste properties (except particle size and Specific Gravity) are from the Tank Farm Pump Critical Characteristic and Specification Guide, WHC-SD-WM-DGS-006, Table 4-1. The particle size requirement is from the cross-site transfer system, Project W-058, design requirements document, WHC-SD-W058-FDC-001, Section 3.2.6.5. The transfer system piping components must be compatible with transferring liquid waste with a SpG of 1.5 based on receipt of waste from Privatization per TWRS Privatization Contract No. DE-RP06-96RL13308, Part 1, Section C, Table TS-9.1 "Physical Requirements for Liquids or Slurries Transferred to DOE".

3.2.5.2.2 Radiation Tolerance

3.2.5.2.2.1 Inside Pit Radiation Level

Materials used that are located inside a pit shall be capable of operating in the following radiation environment:

total accumulated dose:	1×10^7 rads
dose rate:	1×10^7 mr/hr

Basis: The dose rate for new components in contact with HLW is 1×10^7 mr/hr. Total accumulated dose for components in contact with HLW is 2×10^{11} mrad in 40 years. The prorated accumulated dose for the design life of 12 years is 6×10^{10} mrad = 6×10^7 rads for components in contact with the waste of the 12 years. Since the components will not be in contact with the waste continuously for the 12 years, a total accumulated dose of 1×10^7 rads is selected for this requirement. Both basis HLW requirements are

consistent with project W-058 Cross-site Transfer System, Letter No. W-058-076, dated May 13, 1996.

3.2.5.2.2.2 Background Radiation Level

Materials used that are located outside a pit shall be capable of operating in the following radiation environment:

total accumulated dose:	0.5 rad/year
dose rate:	0.25 mr/hr

Basis: The accumulated dose outside comes from "Radiological Design Guide, WHC-SD-GN-DGS-30011, Rev. 0", Table 7.1 and section 2.4 for the rate.

3.2.5.3 MPS System HMI and PLC Location Environments

3.2.5.3.1 Temperature

The range shall be between 0 °C (32 °F) and 40°C (104°F).

Basis: The requirement comes from Operations.

3.2.5.3.2 Relative Humidity

The nominal design values for relative humidity are 20% to 85% with short-term excursions of 10% to 90%. The design values are predicted values inside the unmanned instrument buildings housing the programmable logic controller PLC cabinets.

Basis: Historical Hanford climatological data indicate the average low relative humidity is 20% (PNL-4622) and occasionally reaching low values of 10% for brief periods of time. The same historical data indicate the extreme average high relative humidity is 90% (PNL-4622) with extremes reaching 100% for brief periods of time. The climatological figures quoted are for outside conditions. The PLC cabinets will be installed in unmanned instrument buildings. The instrument buildings are equipped with air-conditioning units. The air conditioning units are not routinely verified operational so failures may go undetected for an unspecified period of time.

3.2.5.3.3 Earthquake Loads: same as Section 3.2.5.1.3.

3.2.5.3.4 Induced Environments

Vibration requirement: Equipment supports shall be designed to avoid resonance resulting from the harmony between the natural frequency of the structure and the operating frequency of reciprocating or rotating equipment supported on the structure. The operating frequency of supported equipment shall be determined from manufacturers data prior to completion of structural design. Resonance shall be prevented by designing equipment isolation supports to reduce the

dynamic transmission of the applied load.

Basis: *The requirement comes from WHC-SD-W314-DRD-001, Rev. 2, "Preliminary Design Requirements Document for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.4.2.2.*

3.2.5.4 Insects, Rodents, and Vermin Protection

MPS indoor and outdoor instrument and electrical enclosures will be sealed as required to prevent inhabitation by vermin to include spiders, scorpions, snakes, mice and other animals, insects and rodents.

Basis: Operations experience. Unsealed enclosures become homes for noxious animals such as black widow spiders, scorpions, beetles, snakes and mice. These vermin create a health hazard to workers, who must reach into these enclosures, for serious bites and stings and for exposure to mice and animal feces and urine contaminated with Hanta virus and radioactive contamination. Additionally, damage to equipment can occur by animals chewing on wire insulation and other components as well as electrical shorts and damage caused by urine, animal carcasses and other debris. Cleaning animal infested enclosures also becomes problematic because of radioactive contamination and the need to wet feces and urine with disinfectant liquids.

3.2.6 Transportability

This section is not applicable to this specification.

Basis: Electronic components of the MPS System do not require any special or non-standard transportability.

3.2.7 Flexibility and Expansion

Each system design shall, to the maximum extent practable, provide sufficient flexibility to accommodate for programmatic changes or operation modifications.

Basis: WHC-SD-W314-DRD-001, Rev. 2, Preliminary Design Requirements Document for Project W-314, Tank Farm Restoration and Safe Operations, Sections 3.2.5.

3.3 Design and Construction

3.3.1 Materials, Processes and Parts

3.3.1.1 Electrical equipment enclosures for outdoor locations shall have a minimum rating of NEMA ICS 6, Type 4.

Basis: Equipment located in or around valve pits and pump pits is subject to contamination. A common decontamination procedure is to hose down the contaminated area with water. A NEMA 4 enclosure protects equipment against treatment.

3.3.1.2 All electrical systems shall comply with NFPA 70, UL 508A and DOE Order 6430.1a, Div. 16 as applicable. If there are any conflicts between this specification and 6430.1a, this specification shall take precedence.

Basis: Compliance with DOE Manual 6430.1A, Section 1600.

3.3.1.3 Electrical materials and equipment shall be UL or FM tested, with label attached, for the purpose intended, whenever such products are available. Whenever UL or FM tested products are unavailable, the electrical materials and equipment shall be tested by a qualified testing agency.

Basis: *Compliance with DOE Manual 6430.1A, Section 1600.*

3.3.1.4 On-site acceptance testing shall be required for each major system. Tests shall be specified to demonstrate that each function and important parameter is implemented.

Basis: *Compliance with DOE Manual 6430.1A, Section 1600.*

3.3.1.5 The following list of operational support equipment shall be required:

- Workstation furniture to support MPS System HMI.
- Mouse, 21" video display, keyboard to support Operator manipulation of the MPS System HMIs.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.5.2.

3.3.1.6 MPS System electronics shall be modular and plug-in to facilitate repairs by replacing failed parts with uninstalled plug-in spares that shall be stored onsite.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 4.2.2.

3.3.1.7 The TFLAN communication media shall be capable of supporting closed circuit television (CCTV) signals and voice transmission signals.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.5.4.

3.3.1.8 During the design of facilities, optimization principles, as discussed in ICRP Publication 37, shall be utilized in developing and justifying facility design and

physical controls.

Basis: Requirement is derived from DOE Order 5480.11, 9.j (1) (a).

3.3.2 Electromagnetic Radiation

Hand held radio and cell phone operations shall not interfere with MPS System components when the devices are located at a distance of one meter or greater from each other.

Basis: Operational experience with electrical interference.

3.3.3 Identification and Marking

3.3.3.1 New equipment and/or modifications to existing equipment shall be labeled in a standardized format in accordance with the tank farm labeling program procedure 6-TF-100 and as specified in HNF-IP-0842, Volume II, Section 6.1, Rev. Oa.

Basis: The applicable requirements of the DOE Orders 4330.4B and 5480.19 regarding configuration control using labeling are set forth in HNF-IP-0842, Volume II, Section 6.1, Rev. Oa.

3.3.3.2 A master equipment list consisting of electronic data base for structures, systems, and components shall be generated in accordance with HNF-IP-0842, volume IV, Section 4.14, Rev.2b. The list contains such information as: unique equipment label, drawing reference, procedures, vendor information, safety classification, nameplate data etc.

Basis: The applicable requirements of the DOE Orders 4330.4B and 5480.19 regarding configuration control using master equipment list are set forth in HNF-IP-0842, Volume II, Section 6.1, Rev. Oa.

3.3.3.3 Operations and Maintenance Drawings (As-built H-14 essential drawings) shall be prepared as the system master drawings showing as built configuration changes in accordance with HNF-IP-0842, Volume IV, Section 4.25, Rev. Oa.

Basis: The applicable requirements of the DOE-SDT-1073-92 regarding configuration control using as-built drawings are set forth in HNF-IP-0842, Volume IV, Section 4.25, Rev. Oa.

3.3.4 Workmanship

This section is not applicable to this specification.

Basis: WHC-SD-W314- PMP-001, Appendix C, states that this section applies to development models. There are no development models required for the MPSS.

3.3.5 Interchangeability

All like equipment (PLCs, HMIs, etc.) shall have interchangeable parts.

Basis: This requirement is derived from HNF-SD-W314-TI-007, Section 4.0.

3.3.6 Safety

3.3.6.1 The MPS System shall shutdown a waste transfer upon detection of a leak.

Basis: The requirement comes from compliance with 40CFR 265.193, Interim Steps for Owner and Operators of Hazardous Waste Treatment, Storage and Disposal.

3.3.6.2 The MPS System shall have a failsafe interlock to shutdown any waste transfer operation.

Basis: Compliance with failsafe requirement stated in OSD-T-151-00007, Rev. H-17, Operating Specifications for the 241-AN, AP, AW, AZ and SY Tank Farms, Section 7.2.10.

3.3.6.3 Nuclear Safety

3.3.6.3.1 Safety Classification

The MPS System is identified as a Safety Class item for the safety structures, systems, and components (SSCs). All of the MPS System components used to perform the Safety Class identified functions shall also be identified as Safety Class.

Basis: The MPS System as defined by Project W-314 is a functional component of the Pit Leak Detection System. The Pit Leak Detection System is identified as a S.C. in the Final Safety Analysis Report (FSAR), HNF-SD-WM-SAR-067, Rev. 0, Section 4.3.17. The Safety Class Function being performed by the MPS System is the shutdown of a transfer pump when a Safety Class input is applied to the MPS System. A Safety Class input example is a pit leak detector. Functions that contribute to the performance of the safety class function are identified in other sections. All such functions shall be identified as Safety Class. These functions are derived as SC in Calculation W314-I-078. MPSS Failure Modes Analysis.

3.3.6.3.1.1 The MPS System components are not required to operate during or after a seismic event. No seismic qualification of components is required. The design of structures should be limited to UBC for performance category (PC) 1.

Basis: LMHC - 9955.488 letter dated 8/10/99, J. W. Lentsch to M. A. Lane, attachment 2, defines the criteria for cost estimate study. LMHC letter 9956476 directs implementation of the criteria. The requirements in the previous letter are derived from interpretation of FSAR Section 3.3.2.3.5, Planned Design and Operational Safety Improvements. Seismic event vulnerability is an ongoing FSAR activity.

3.3.6.3.1.2 The MPS System shall be fail safe on loss of power.

Basis: LMHC - 9955.488 letter dated 8/10/99, J. W. Lentsch to M. A. Lane, attachment 2, defines the criteria for cost estimate study. LMHC letter 9956476 directs implementation of the criteria.

3.3.6.3.1.3 No single component of the MPS System shall prevent the MPS System from performing it's intended Safety Function.

Basis: DOE 6430.1a General Design Criteria section 1300-3.3.

3.3.6.3.1.4 The MPS System redundant wiring shall be separated unless one of the following conditions is met. 1) The failure of the wiring results in a fail-safe condition (i.e. the failure is detectable), or 2) the failure can be shown by analysis to occur less that 1 X 10-6 times per year.

Basis: LMHC - 9955.488 letter dated 8/10/99, J. W. Lentsch to M. A. Lane, attachment 2, defines the criteria for cost estimate study. LMHC letter 995647 directs implementation of the criteria.

3.3.6.3.1.5 The MPS System safety class wiring shall be isolated from the non-safety class wiring unless one of the following conditions is met. 1) The failure of the wiring results in a fail-safe condition (i.e. the failure is detectable), or 2) the failure can be shown by analysis to occur less that 1 X 10-6 times per year.

Basis: LMHC - 9955.488 letter dated 8/10/99, J. W. Lentsch to M. A. Lane, attachment 2, defines the criteria for cost estimate study. LMHC letter 995647 directs implementation of the criteria.

3.3.6.3.1.6 Commercial grade components used for Safety Class service shall be procured from a qualified vendor or be dedicated using the commercial grade dedication process.

Basis: Use of commercial grade components in a safety class system require the component be procured from a vendor on the Evaluated Suppliers List (ESL) or the component be dedicated in accordance with Tank Farm Administrative Procedure HNF-IP-0842, Volume IV, Section 3.11 or a comparable design agent process.

3.3.6.3.2 Flammable Gas Hazardous Environment

The components of the MPS System installed in the ex-tank intrusive locations, shall be designed to meet NFPA 70 Class I, Division 1, Group B criteria for hazardous locations.

Basis: Since Project W-314 is intended to be operated under the current authorization basis, then the environment classification is specified in the FSAR, "HNF-SD-WM-SAR-067", Rev. 1, Appendix K, Section K4.3.1.

3.3.7 Human Performance/Human Engineering

3.3.7.1 Graphic Screen Color Coding

3.3.7.1.1 Process pipe lines on the MPS System HMI displays shall be color-coded as follows:

Pipe lines shall be dark grey when selected and white when not. The pipe shall turn green with white diamonds embedded to show it is selected for a transfer route and has actual flow. Pipe alarm shall be activated when associated encasement or COB leak detector alarm(s) is activated. When pipe alarm is activated: entire pipe segment symbol shall flash red for unacknowledged and shall be steady red for acknowledged.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.16.18.

3.3.7.1.2 Transfer Pump Operation Indication on the MPS System HMI displays shall be color-coded as follows:

Pump shall be dark grey when selected for transfer and white if not selected. Pump shall be green with the test "RUNNING" below the pump symbol, when the pump is running. When pump alarm is activated: pump symbol shall flash red for unacknowledged and shall be steady red for acknowledged. Pump alarm shall be activated if pump power breaker is on and the pump has not been selected for an active transfer or if the pump stops before the transfer is complete.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.16.19.

3.3.7.1.3 Transfer Valve Position Indication on the MPS System HMI displays shall be color-coded as follows:

For all valve ports in any state: open shall be green and closed shall be white. When valve is in transition, all ports shall be flashing yellow. When valve alarm is activated, valve symbol shall flash red until acknowledged at which time it shall go to a steady red for an acknowledged, active alarm. Color-challenged operators, or any user for that matter, shall be able to determine via the HMI display the current status of the following valve parameters: In-Service/Out-of Service, Bypassed/Not-ByPassed, Alarm Enabled/Disabled, operator verification, independent verification, supervisor verification, valve type (manual or connected to PLC) and selection status (whether selected or not for the current active route). If the valve is bypassed, it will have a white border, otherwise it will

have a black border.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.3.1.

3.3.7.1.4 Leak Detector Operation Indication on the MPS System HMI displays shall be color-coded as follows:

All leak detectors shall be shown as a round button with the leak detector instrument number adjacent. If it is a system leak detector (connected to PLC I/O): on (true input) or not bypassed shall be green, while off (false input) or bypassed shall be white. If it is a manual leak detector (not connected to PLC I/O) it shall be green with a "M" in the middle. Any user shall be able to determine via the HMI display the current status of the following leak detector parameter: In-Service/Out-of Service, Bypassed/Not-ByPassed, Alarm Enabled/Disabled, operator verification and leak detector type (manual or connected to PLC) and selection status (whether selected or not for the current active route). If the leak detector is bypassed, the button border will have a white border, otherwise it will have a black border. When a leak detector alarm is activated, the leak detector symbol shall flash red for unacknowledged and shall be steady red for acknowledged.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.10.2.

3.3.7.1.5 Existing MPS Relay Operation Indication on the MPS System HMI displays shall be color-coded as follows:

All MPS Relays shall be shown as a round button, with the MPS input relay instrument number adjacent. If it is a manual MPS input relay, (not connect to the PLC) it shall have a black "M' in the middle. Any user shall be able to determine via the HMI display the current status of the following MPS Relay parameters: Input Signal, In-Service/Out-of-Service, Bypassed/Not-By Passed, Alarm Enabled/Disabled, operator verification and leak detector type (manual or connected to PLC) and selection status (whether selected or not for the current active route). If it is a system MPS relay (connected to the PLC): on (true input) shall be green. If the relay is bypassed, it will have a white border, otherwise it will have a black border. A MPS input relay shall be verified if all leak detectors and other relays connected to it are tested and actuate the MPS input relay. When a MPS input relay alarm is activated its symbol shall flash red for unacknowledged and shall be steady red for acknowledged.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.1.

3.3.7.2 The MPS System shall have a double confirmation command sequence for inputting all operator commands.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.2.

3.3.7.3 Waste transfer manual shutdown parameters:

A red button with pull to shutdown operation shall be required. The button shall have a red indicating light which shall flash when it has been pulled and shall remain lit when not pulled. No light shall indicate a failed light bulb.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.13.2.

3.3.7.4 Alarm Handling

3.3.7.4.1 Alarm condition shall produce red flashing alarm indication on the MPS System HMI displays along with audible beeps originating from the HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.16.8.

3.3.7.4.2 Alarm history shall displayed on the MPS System HMIs in organized groups and prioritized.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.16.9.

3.3.7.4.3 The MPS System shall print alarm messages in the sequence as it occurs with time and date on MPS System printers located at all operations centers.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.16.10.

3.3.7.4.4 The MPS System shall log alarms to computer disk in the sequence as it occurs with time and date.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.16.11.

3.3.7.4.5 The MPS System shall log the operator acknowledgment of each alarm to computer disk and print a message recording the alarm acknowledgment.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.16.12.

3.3.7.4.6 A MPS System HMI alarm summary display shall show the alarm function status (enabled or disabled) for all alarms.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.16.13.

3.3.7.4.7 Enabled and disabled of alarms shall be accomplished automatically by the MPS System software program or manually at a shift supervisor or systems administrator security level only.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.16.14.

3.3.7.4.8 The MPS System shall log the enabling and disabling of alarms with the user designator time and date of action.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.16.15.

3.3.7.4.9 All MPS System alarms shall have re-alarm time delay capability and all analog alarms shall have dead band capability.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.16.16.

3.3.7.4.10 All MPS System alarms and parameters shall be available to TMACS and other authorized users via HLAN connections. The HMI shall be capable of Remote Access Server (RAS) functionality.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.16.17.

3.3.7.4.11 All MPS System alarms shall be displayed in a set of MPS System HMI graphical displays that simplify the presentation of approximately 200 alarms.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.16.1.

3.3.7.4.12 All MPS System alarms shall be handled at each MPS System HMI as follows:

EVENT	HMI ALARM (1)	TANK FARM AUDIBLE ALARM (L)	LOCAL VISIBLE ALARM (3)
MPS Event Initiates an Enabled Alarm	Flashing Symbol	On	Flashing
MPS Event Initiates a Disabled Alarm	Off	Off	Flashing
Operator Acknowledges Alarm	Steady On	Off	Flashing
MPS System Alarm Recovery Prior to Acknowledge	Flashing Symbol	On	Flashing
MPS System Alarm Recovery After Acknowledge	Off	Off	Off
Test Button On	n/a	n/a	Flashing
Test Button Off	n/a	n/a	Off
MPS System Alarm Initiated @ Tank Farm Op Center or Tank Farm HMI **not** responsible for alarm recovery	Flashing Symbol	Off	Flashing

(1) Where HMI Alarm is an alarm symbol displayed on the HMI screen with audible beeps originating from HMI.

(2) Where Tank Farm Audible Alarm is a horn or similar device located on the tank farm instrument building. The audible alarm actuates when a route shutdown alarm occurs in that particular farm. It is silenced by an operator clicking on the "silence horn" for that particular farm.

(3) Where Local Visible Alarm is a light or similar device located at or near the location of the device initiating the alarm (usually located inside a tank farm).

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 2.3.16.6.

3.3.7.5 Each control device shall be in accordance with NUREG 0700, Section 6.4 and MIL-STD-1472E, Section 5.4 in accordance with DOE 6430.1a, Section 1300-12.4.7.

Basis: Project Hanford Management Contract (PHMC) No. DE-AC06-96RL13200 specified DOE Order 6430.1A as an applicable document for Hanford Site work activities.

3.3.7.6 Each display device shall be in accordance with NUREG 0700, Section 6.5 and 6.7, and MIL-STD-1472E, Section 5.2 in accordance with DOE 6430.1a, Section 1300-12.4.6.

Basis: Project Hanford Management Contract (PHMC) No. DE-AC06-96RL13200 specified DOE Order 6430.1A as an applicable document for Hanford Site work activities.

3.3.7.7 Each warning and annunciator system shall be in accordance with NUREG 0700, Section 6.2 and 6.3, and MIL-STD-1472E, Section 5.3 in accordance with DOE 6430.1a, Section 1300-12.4.8.

Basis: Project Hanford Management Contract (PHMC) No. DE-AC06-96RL13200 specified DOE Order 6430.1A as an applicable document for Hanford Site work activities.

3.3.7.8 The MPS System HMI shall be able to be operated by color blind operators.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.3.1.

3.3.7.9 Project W-314 HMIs shall integrate seamlessly with Project W-211 HMIs. HMI screen symbology, legends and color coding shall be identical for each project to enable the same Operators to operate each projects HMI.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 3.3.2.

3.3.7.9.1 Human-Machine Interface (HMI) software shall be the same for all current TWRS Projects (W-211, W-314 and W-320).

Basis: Notes Of Meeting, 2/4/97, "TWRS Integration", Tank Farm Restoration and Safe Operations, Project W-314, Current Integration Efforts, Section 1.0.

3.3.7.9.2 HMI standards document shall be generated for use with the common HMI application software.

Basis: Notes Of Meeting, 2/4/97, "TWRS Integration", Tank Farm Restoration and Safe Operations, Project W-314, Current Integration Efforts, Section 2.0.

3.3.7.9.3 PLC programming software shall be the same for the W-211, W-521, and W-314 projects.

Basis: Notes Of Meeting, 2/4/97, "TWRS Integration", Tank Farm Restoration and Safe Operations, Project W-314, Current Integration Efforts, Section 3.0. Project W-521 was originally project W-211B, and therefore covered under same notes of meeting.

3.3.7.9.4 PLC manufacturer and model shall be the same for the W-211, W-521, and W-314 projects.

Basis: Notes Of Meeting, 2/4/97, "TWRS Integration", Tank Farm Restoration and Safe Operations, Project W-314, Current Integration Efforts, Section 4.0. Project W-521 was originally project W-211B, and therefore covered under same notes of meeting.

3.3.7.9.5 A Software Control Matrix which explains for the W-211 and W-314 projects how the control system software is being configured, documented and controlled shall be developed.

Basis: Notes Of Meeting, 2/4/97, "TWRS Integration", Tank Farm Restoration and Safe Operations, Project W-314, Current Integration Efforts, Section 5.0.

3.3.7.9.6 HMI applications for different projects in the same tank farms shall be combined through the use of the Citect "include" function (or equal).

Basis: Notes Of Meeting, 2/4/97, "TWRS Integration", Tank Farm Restoration and Safe Operations, Project W-314, Future Integration Efforts, Section 1.0.

3.4 Documentation

3.4.1 Records, documents, and document control pertinent to design functions shall be in accordance with HNF-PRO-224 and HNF-PRO-233.

Basis: HNF-PRO-224, Rev. 0, Document Control, HNF-PRO-233, Rev. 0, Review and Approval of Documents, and HNF-PRO-242, Rev. 0, Engineering Drawing Requirements, are site standards that must be adhered to. HNF-PRO-242, Rev. 0, is to be adhered to for

documents produced prior to June 15, 1999. HNF-PRO-709, Rev. 1, is to be adhered to for documents produced after June 15, 1999 as the site standard.

3.4.2 Drawings shall be prepared according to the formats set forth in HNF-PRO-242, Rev. 0, *"Engineering Drawing Requirements"*, for documents produced prior to June 15, 1999 and HNF-PRO-709, Rev. 1 preparation and control standard for Engineering Drawings", for documents produced after June 15, 1999.

Basis: HNF-PRO-224, Rev. 0, Document Control, HNF-PRO-233, Rev. 0, Review and Approval of Documents, and HNF-PRO-242, Rev. 0, Engineering Drawing Requirements, are site standards that must be adhered to. HNF-PRO-242, Rev. 0, is to be adhered to for documents produced prior to June 15, 1999. HNF-PRO-709, Rev. 1, is to be adhered to for documents produced after June 15, 1999 as the site standard.

3.4.3 Loop diagrams in accordance with ANSI/ISA-S5.4 shall be provided for each input and output connected to the MPS System.

Basis: Compliance with industry standard which in the judgement of the design agent will furnish the best representation of the MPS System functionality.

3.4.4 Logic Diagrams in accordance with ANSI/ISA-S5.2 or equivalent (e.g., Control Plus) shall be provided for each MPS System controlled device (pump, valve, etc.) and for each HMI alarm.

Basis: Compliance with industry standard which in the judgement of the design agent will furnish the best representation of the MPS System functionality.

3.4.5 Software documentation shall be prepared, released, and revised in accordance with RPP-PRO-309.

Basis: Compliance with RPP-MP-599, Rev. 0, and Section 6.0, "Project Hanford Quality Assurance Program Description", Part 2, Section 3.5, Section 3.6, Section 5.0, and Section 6.0.

3.5 Logistics

3.5.1 Maintenance

3.5.1.1 The MPS System maintenance support system shall be existing onsite maintenance and procurement organizations which currently serves the Hanford Tank Farms. Existing Hanford shops, labs, warehouses shall be utilized to support the MPS System. No new maintenance buildings are planned.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 4.1.

3.5.1.2 Electrical MPS System wiring materials shall be readily available from

commercial suppliers in bulk quantities.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 4.2.1.

3.5.1.3 MPS System electronics shall be modular and plug-in to facilitate repairs by replacing failed parts with uninstalled plug-in spares that are stored onsite. Maintenance shall be at the level of modular and plug-in parts replacement.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 4.2.2.

3.5.1.4 A MPS System operator trainer shall assist System Administrators in the updating of MPS System software, maintaining software configuration and the diagnosing of software bugs.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 4.2.3.

3.5.1.5 MPS System network maintenance which includes the TFLAN communication network and the TMACS interface shall be performed onsite. Spare cable materials shall be stored onsite.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 4.2.4.

3.5.1.6 Fully Remote Maintenance and Operation. Each system or portion of a system having radiation levels greater than 50 mrem/hr contact exposure shall be designed to be remotely maintained and operated or designed to require no maintenance and be remotely operated.

Basis: WHC-SD-W314-DRD-001, Rev. 2, "*Preliminary Design Requirements Document for Tank Farm Restoration and Safe Operations, Project W-314*", section 3.5.1.1.

3.5.1.7 Limited Contacted Maintenance and Operation. Each system or portion of a system having radiation levels greater than 0.1 mrem/hr to less than or equal to 50 mrem/hr shall be designed for limited contact maintenance and operation.

Basis: WHC-SD-W314-DRD-001, Rev. 2, "*Preliminary Design Requirements Document for Tank Farm Restoration and Safe Operations, Project W-314*", section 3.5.1.1.

3.5.1.8 Full Contact Maintenance and Operation. Each system or portion of a system having radiation levels less than or equal to 0.1 mrem/hr shall be designed for

full contact maintenance and operation.

Basis: WHC-SD-W314-DRD-001, Rev. 2, "*Preliminary Design Requirements Document for Tank Farm Restoration and Safe Operations, Project W-314*", section 3.5.1.1.

3.5.1.9 Isolating devices shall be provided for each MPS System power supply. The locking device shall be designed to accept a lockout device.

Basis: Requirement is from HNF-PRO-081, Rev. 2, "Hazardous Energy Control, Program", Addendum, "Guide for Controlling Organization Hazardous Energy Control", section 3.6.

3.5.2 Supply

3.5.2.1 The system design shall, to the greatest extent practible, use readily available parts and components.

Basis: Requirement per WHC-SD-W314-DRD-001, section 3.5.5.

3.5.3 Facilities and Facility Equipment

3.5.3.1 The following new diagnostic equipment shall be required.

- MPS System Operator Trainer

Basis: Requirement comes from WHC-SD-W314-TI-008, Rev. 3, Section 4.5

3.5.3.2 Space in an existing air conditioned facility shall be made available for housing the MPS System operator trainer.

Basis: Requirement comes from engineering judgment.

3.6 Personnel and Training

3.6.1 Personnel

The MPS System shall be designed for operation by personnel possessing qualifications in accordance with DOE 5480.20a, Chapter IV, and trained in accordance with Chapter 1.

Basis: DOE 5480.20a is a required document. No additional personnel and/or training requirements are expected.

3.6.1.1 MPS System shall require qualified tank farm operators.

Basis: The requirement comes from operations. The tank farm operator operates the MPS System during the start-up, shutdown and the transfer operation.

3.6.1.2 Electrical MPS System maintenance shall be performed by qualified electricians.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 4.2.1.

3.6.1.3 Electronic Maintenance shall be performed by certified onsite Instrument/computer technicians.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 4.2.2.

3.6.1.4 Software maintenance shall be performed by qualified onsite Systems Administrators. The Systems Administrators shall program the MPS System. The systems Administrators shall be only authorities to do programming of MPS System.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 4.2.3.

3.6.1.5 MPS System network maintenance which includes the TFLAN communication network and the TMACS interface shall be performed by qualified onsite telecommunications technicians.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 4.2.4.

3.6.2 Training

3.6.2.1 An Operator Training System (OTS) shall be provided as described below to assist on-the-job training for the MPS System. Utilizing the OTS and close personal supervision during the initial introduction of a new operator to the MPS System will provide rapid training for Tank Farm Operators.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 5.3.

3.6.2.2.1 OTS General Requirements

3.6.2.2.1.1 The OTS shall be off line and independent of the MPS System.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 5.3.1.1.

3.6.2.2.1.2 The OTS shall be portable. The OTS's environment shall be indoors.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 5.3.1.2.

3.6.2.2.1.3 The OTS shall consist of four Human-Machine Interface (HMI) desk-top PC's: three operator stations and one instructor station and four PLCs mounted in a Nema 12 enclosure. The HMIs and the PLCs shall be networked together via a separate Ethernet hub.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 5.3.1.3.

3.6.2.2.1.4 Each of the three operator stations shall provide the same human machine interface as an actual MPS System operator station as described in Section 3.2.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 5.3.1.4.

3.6.2.2.1.5 The Instructor's station shall have the capability of simulating each of the field inputs to the MPS System and monitoring each of the MPS Systems outputs.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 5.3.1.5.

3.6.2.2.1.6 In addition to all of the operations functionality provided by the MPS System hardware and software, the OTS shall provide a sample of each MPS System field device for maintenance personnel training and software development purposes. These field devices shall include a single leak detector system with a relay panel and sensors and a couple of pump interlock relays. The leak detector sensors shall be mounted in a container to which water can be added for simulating a leak.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 5.3.1.6.

3.6.2.2.2 OTS PLC Requirements

There shall be four PLCs of identical configuration mounted in the same Nema 12 enclosure with a window in the door to display the I/O module status LED's. Each PLC shall have identical equipment including I/O racks and modules. Each PLC shall have an Ethernet communications module which will allow the

controller cards to talk directly to the HMIs over the 8 node control LAN (4 HMIs and 4 PLCs). The PLCs shall also be wired together directly through the I/O modules in order to simulate the field hard-wired shutdown PLC-PLC link (MPS Shutdown Loop). The PLC panel shall also house the auxiliary devices such as the Manual Shutdown Switches, the Ethernet hub and the 24VDC power supply.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 5.3.2.

3.6.2.2.3 OTS HMI Requirements

There shall be four HMIs: three operator stations and one instructor station. The operator station HMIs shall be display clients and the instructor station shall be a full license I/O server. The I/O server communicates with the PLCs for direct monitoring and control. The display clients exert monitoring and control functions via the I/O server. The display clients shall have the same screens and functionality as the tank farm HMIs.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 5.3.3.

3.6.2.2.4 OTS Simulation Requirements

The operator stations will be used by the Operator to select routes via two methods of selecting a transfer: selecting a predetermined route and create the transfer by mechanical segment . Once this is done the instructor shall be able to simulate various field conditions by manipulating control bits and registers in the PLCs. The instructor station shall act as the field in reference to the MPS System. The instructor shall be able to control or manipulate each individual input to the MPS System. For manual operations, which are the majority of operations, the instructor will act as the field operator by positioning valves, performing verifications, etc. Simulation shall also include the automatic stopping of the appropriate transfer pump when leaks are detected or other shutdown conditions occur.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 5.3.4.

3.6.2.2.5 OTS Integration Requirements

The four HMIs and the four PLCs shall be networked together on an Ethernet LAN as five separate nodes. This requires the setup of the Ethernet hub with the hardware address for each of the eight nodes. Once this is done, it will allow the instructor HMI acting as the I/O server to directly monitor and control

the PLCs. The operator HMIs will then be able to access the PLC data via the I/O server.

The PLCs shall be programmed with the additional logic necessary to simulate the five field PLCs.

Basis: HNF-SD-W314-TI-008, Rev. 3, Master Pump Shutdown System "Project Design Concept" for Tank Farm Restoration and Safe Operations, Project W-314", Section 5.3.5.

3.6.2.3 Mock-up training on actual MPS System components shall be required.

Basis: The requirement comes from Maintenance and Repair of Department of Energy Property DOE 4330.4B Section 4.2.

3.7 Major Component Characteristics

This section is not applicable to this specification.

Basis: There are no separate subsystems or components within the MPS System.

4.0 Quality Assurance Provisions

4.1 General

Inspections as defined in 4.2 shall be conducted during the design and development of each system to provide assurance of compliance with the requirements of this PDS.

4.1.1 Responsibility for Inspections

The design contractor shall be responsible for the performance of all inspections for each system developed in accordance with this PDS. Inspections shall be conducted at the contractor facilities or the facilities of his choice with the approval of the procuring authority. The procuring authority reserves the right to witness or perform the specified inspections.

4.1.2 Special Tests and Examinations

Verification of the Master Pump Shutdown System by the design contractor shall be accomplished with the use of a mock-up of the system. The mock-up shall include: PLCS, HMIS, Power Supplies and simulated inputs, outputs and TFLAN Circuitry. The mock-up shall demonstrate that the design of the Master Pump Shutdown system is capable of meeting the requirements of the Master Pump Shutdown system.

4.2 Quality Conformance Verification

Qualification shall be performed on System hardware representative of the approved

production design. Qualification of the System to assure compliance with the requirements of Section 3 shall be by examination, demonstration, test, and/or analysis, as defined herein. Test program data may be used to assure compliance with requirements.

a. Examination is an element of inspection consisting of investigation, without the use of special laboratory appliances or procedures to determine compliance with requirements.

b. Demonstration is an element of inspection that is limited to readily observable functional operation to determine compliance with requirements. This method is intended to be utilized for any mock-up demonstration.

c. Test is an element of inspection that employs technical means including (but not limited to) the evaluation of functional characteristics by use of special equipment or instrumentation, simulation techniques, and the application of established principles and procedures to determine compliance with requirements. The analysis of data derived from test is an integral part of this inspection. This method is intended to be utilized for any acceptance testing in the field.

d. Analysis is an element of inspection, taking the form of the processing of accumulated results and conclusions, intended to provide proof that verification of a requirement(s) has been accomplished. The analytical results may be comprised of a compilation of interpretation of existing information or derived from lower level examinations, tests, demonstrations, or analyses.

The environmental capability of equipment shall be demonstrated by appropriate testing, analysis, and operating experience, or other methods that can be supported by auditable documentation, or a combination of these methods.

Basis: WHC-SD-W314-DRD-001, Rev. *2, "Preliminary Design Requirements Document for Tank Farm Restoration and Safe Operations, Project W-314", Section 4.2.1.*

Table 4.2.1 Quality Conformance Inspection Matrix

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2	**Characteristics**						X
3.2.1	**Performance**						X
3.2.1.1	**Select Route**						X
3.2.1.1.1	**Select Pre-Determined Route**						X
3.2.1.1.1.1	**Initialize System**						X
3.2.1.1.1.1.1	All Operators shall be required to log on and off of the MPS System.			X		X	
3.2.1.1.1.1.2	The log on process shall include all HMI Operators inputting a password into the MPS System.			X		X	
3.2.1.1.1.1.3	The MPS System shall allow a HMI Operator to perform only those operations that the Operator is authorized to perform.			X		X	
3.2.1.1.1.1.4	The MPS System shall provide multiple access levels such as Technician, Operator, Shift Supervisor, Engineer and Systems Administrator as defined in the following:			X		X	
3.2.1.1.1.1.5	Initializing Systems shall take place at all HMIs associated with the MPS System at the following locations (note 3 HMIs will be installed in the 241-AZ-271Control Building):			X	X	X	
3.2.1.1.1.1.6	Manning Levels for operation of the MPS System shall be one to three operators for each waste transfer route.					X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.1.1.7	Each HMI shall operate independently from other HMIs unless otherwise required in the following.			X	X	X	
3.2.1.1.1.1.8	The MPS System equipment shall perform self diagnostics and shall prevent any waste transfers			X		X	
3.2.1.1.1.2	**Display Source List**						X
3.2.1.1.1.2.1	A route source list identifying all sources that have been previously selected for another route is required.			X		X	
3.2.1.1.1.2.2	The list of transfer route sources to be displayed shall include those tanks presented in Tables 1 of Appendix B.			X		X	
3.2.1.1.1.3	**Select Route Source**						X
3.2.1.1.1.3.1	One tank farm operator at any MPS HMI may select a source and destination tank for each simultaneous waste transfer.			X		X	
3.2.1.1.1.4	**Display Destination List**						X
3.2.1.1.1.4.1	A route source list identifying all sources that have been previously selected for another route is required.			X		X	
3.2.1.1.1.4.2	The list of transfer route destinations to be displayed shall include those tanks presented in Tables 1, of Appendix B.			X		X	
3.2.1.1.1.5	**Select Route Destination**						X

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.1.1.5.1	One tank farm operator at any MPS HMI may select a source and destination tank for each simultaneous waste transfer.			X	X	X	
3.2.1.1.1.5.2	Identification names and numbers for each unique waste transfer route shall be assigned by the MPS System.			X		X	
3.2.1.1.1.6	**Display List of Pre-Determined Routes**						X
3.2.1.1.1.6.1	An Operator at the HMI shall be able to select a transfer route from a list of predetermined transfer routes.			X		X	
3.2.1.1.1.6.2	The HMI shall have a user friendly graphical interface.					X	
3.2.1.1.1.6.3	One tank farm operator at any MPS System HMI shall be able to select a source and destination tank for each simultaneous waste transfer.			X		X	
3.2.1.1.1.7	**Pre-Select Pre-Determined Route**						X
3.2.1.1.1.7.1	One tank farm operator at any MPS HMI may select a source and destination tank for each simultaneous waste transfer.			X		X	
3.2.1.1.1.7.2	The MPS System shall be capable of storing 1000 pre-determined routes.					X	

	Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
				EXAM	DEMO	TEST	ANLY	N/A
†	3.2.1.1.1.7.3	The purpose of this function is to select the appropriate MPS System inputs and outputs for a particular waste transfer route and its associated flush routes.			X		X	
†	3.2.1.1.1.7.4	The minimum number of flush routes that can be associated with a particular waste transfer shall be four.			X		X	
†	3.2.1.1.1.7.5	The maximum allowable number of simultaneously operating waste transfer routes shall be six.			X		X	
	3.2.1.1.1.7.6	Canceling or de-selecting a pre-determined transfer route shall be accomplished only when the transfer route's assigned transfer pump's motor controls are de-energized by opening the pumps' branch circuit breaker.			X	X	X	
	3.2.1.1.1.7.7	MPS System HMI Databases for associating MPS System inputs and outputs to selected waste transfer routes shall be provided.			X		X	
†	3.2.1.1.1.7.8	Computer programs with appropriate configuration control shall allow the adding to, deleting from and changing of the records of all waste transfer route databases.			X		X	
†	3.2.1.1.1.8	**Preview Pre-Determined Route Selection**						X

	Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
				EXAM	DEMO	TEST	ANLY	N/A
†	3.2.1.1.1.8.1	The MPS System shall be able to display graphically on the HMIs the selected transfer routes that are in the Waste Transfer Annunciator mode of operation.			X		X	
†	3.2.1.1.1.8.2	All waste transfer routes selected shall be displayed on the Waste Transfer Annunciator set of MPS HMI graphical screens.			X		X	
†	3.2.1.1.1.9	**Confirm Pre-Determined Route Selection**						X
†	3.2.1.1.1.9.1	The MPS System shall have a double confirmation command sequence for inputting operator control functions.			X		X	
†	3.2.1.1.1.10	**Display System Diagnostic**						X
†	3.2.1.1.1.10.1	The MPS System shall perform self diagnostics and shall prevent any waste transfers from occurring if an equipment malfunction is detected.			X		X	
†	3.2.1.1.1.10.2	Each digital or analog output module shall produce a specific output signal, that is configurable, when a system failure is detected by the output module.			X		X	
†	3.2.1.1.2	**Create Pre-Determined Route**						X
†	3.2.1.1.2.1	**Choose Route Creating Mode**						X
†	3.2.1.1.2.1.1	Identification names and numbers for each unique waste transfer route are not duplicated.			X		X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
† 3.2.1.1.2.1.2	An HMI Operator with appropriate access level located at a HMI shall be able to create a predetermined transfer route by selecting mechanical segments of a transfer route such as tanks, pumps, pits, transfer lines and jumpers.			X		X	
† 3.2.1.1.2.1.3	Requirement Deleted						
† 3.2.1.1.2.1.4	If no predetermined route has been created for the route source and destination originally selected, a new predetermined route must be created.			X		X	
3.2.1.1.2.1.5	Only an HMI Operator with the appropriate access level are allowed to create new routes.			X		X	
3.2.1.1.2.1.6	Predetermined routes are created offline at any MPS System HMI.			X		X	
3.2.1.1.2.1.7	Two methods of route creation are used; selection by mechanical segments and modifying an existing predetermined route			X		X	
3.2.1.1.2.2	**Create Route by Segment**						X
3.2.1.1.2.2.1	**Display Route Segments**						X
3.2.1.1.2.2.1.1	The MPS System shall be able to display graphically on the HMIs the selected transfer routes in the Create By Segment mode of operation.			X	X	X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.1.2.2.1.2	Route creation by mechanical segments method includes the use of graphic screens where mechanical segments, such as transfer lines, pumps and valves, are selected by the HMI operator.			X		X	
3.2.1.1.2.2.1.3	The following mechanical segments listed in Appendix B, Tables 4, 5, 7, 8, 9, 10, 13, 14 and 15 shall be displayed.			X		X	
3.2.1.1.2.2.2	**Select Route Segment**						X
3.2.1.1.2.2.2.1	A shift supervisor or cog engineer located at a HMI shall be able to create a predetermined transfer route such as pumps, and transfer lines .			X		X	
3.2.1.1.2.2.2.2	The selection by mechanical segments method includes the use of graphic screens that are similar to the WTA set of screens where mechanical segments, such as transfer lines, pumps and valves, are selected by the HMI operator and all MPS System elements, such as leak detectors, valve positions sensors, existing MPS relays, and pump interlock relays, associated with the selected mechanical segment are selected automatically.			X		X	
3.2.1.1.2.2.2.3	The mechanical segments shall be selected from those presented in tables 4, 5, and 15 of Appendix B.			X		X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.1.2.2.3	**Add Selected Segment to New Pre-Determined Route**						X
† 3.2.1.1.2.2.3.1	Route creation by mechanical segments method includes the use of graphic screens where mechanical segments, such as transfer lines, pumps and valves, are selected by the HMI operator and all MPS System elements, such as leak detectors, valve positions sensors, existing MPS relays, and pump interlock relays, associated with the selected mechanical segment are selected automatically by the MPS System.			X		X	
† 3.2.1.1.2.2.3.2	MPS System HMI Databases for associating MPS System inputs and outputs to selected waste transfer mechanical segments such as pumps, and transfer lines, shall be provided.			X		X	
† 3.2.1.1.2.2.3.3	Computer programs with appropriate configuration control shall allow the adding to, deleting from and changing of the records of all mechanical segment databases.			X		X	
† 3.2.1.1.2.2.3.4	The MPS System inputs and outputs associated with each selected mechanical segment are automatically selected for the new pre-determined waste transfer route.			X		X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
† 3.2.1.1.2.2.3.5	The mechanical segments shall be associated to input and output elements in accordance with the Tables 4, 5, 7, 8, 9, 10, 13, 14 and 15 presented in Appendix B.			X		X	
† 3.2.1.1.2.2.4	**Determine If Route Segment Selection is Complete**						X
† 3.2.1.1.2.2.4.1	Route creation by the mechanical segments method includes the use of graphic screens where all the necessary mechanical segments, such as transfer lines, pumps and valves are selected by the HMI operator to make a complete route.			X		X	
3.2.1.1.2.3	Function Deleted						
3.2.1.1.2.4	**Create Route by Modifying a Pre-Determined Route**						X
3.2.1.1.2.4.1	**Assign New Route Name**						X
3.2.1.1.2.4.1.1	Once a predetermined route is created in the MPS System, a cog engineer or shift manager can store, retrieve, modify or delete the route from the MPS System.			X	X	X	
3.2.1.1.2.4.2	**Determine Route Component Modification**						X
† 3.2.1.1.2.4.2.1	Route modifications are accomplished to a predetermined route either by selection or de-selection of route mechanical segments, including sources and destinations.			X		X	

	Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
				EXAM	DEMO	TEST	ANLY	N/A
†	3.2.1.1.2.4.3	**Determine if Route Modifications are Complete**						X
†	3.2.1.1.2.4.3.1	If no predetermined route has been created for the route source and destination originally selected, a new predetermined route must be created.			X		X	
†	3.2.1.1.2.4.4	**Re-store Modified Route as a New Route**						X
†	3.2.1.1.2.4.4.1	The modified route shall be stored as a new predetermined route.			X		X	
†	3.2.1.1.2.4.4.2	MPS System HMI Databases for associating MPS System inputs and outputs to selected waste transfer routes shall be provided.			X		X	
†	3.2.1.1.2.5	**Determine If Created Pre-Determined Route Is Complete**						X
†	3.2.1.1.2.5.1	If no predetermined route has been created for the route source and destination originally selected, a new predetermined route shall be created.			X		X	
†	3.2.1.1.2.5.2	Only a shift supervisor or cog engineer are allowed to create new routes.			X		X	
†	3.2.1.1.2.5.3	Predetermined routes are created offline at any MPS System HMI.			X		X	
†	3.2.1.1.2.5.4	Two methods, selection by mechanical segments and modifying an existing predetermined route are used.			X		X	
†	3.2.1.1.3	**Add Passive Elements**						X

	Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
				EXAM	DEMO	TEST	ANLY	N/A
†	3.2.1.1.3.1	**Determine If Transfer Route Meets FSAR Requirements**						X
†	3.2.1.1.3.1.1	The MPS System shall operate within the TWRS design basis authorized by the DOE.					X	
†	3.2.1.1.3.1.2	The HMI Operator that determines the need for additional passive elements required to satisfy the FSAR shall have a Engineer or Supervisor Access level to the MPS System.			X		X	
†	3.2.1.1.3.2	**Choose a Passive Element**						X
	3.2.1.1.3.2.1	The MPS System shall operate within the TWRS design basis authorized by the DOE.					X	
	3.2.1.1.3.2.2	A shift supervisor or cog engineer located at a HMI shall be able to create a predetermined transfer route by selecting mechanical segments of a transfer route such as tanks, pumps, pits, transfer lines and jumpers.			X		X	
	3.2.1.1.3.2.3	Requirement Deleted						
	3.2.1.1.3.2.4	Predetermined routes are created offline at any MPS System HMI.			X	X	X	
	3.2.1.1.4	**Assign Route to Transfer**						X
	3.2.1.1.4.1	**Display Available Transfers**						X

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.1.4.1.1	The Operator on a MPS System HMI assigns the selected predetermined waste transfer route to one of six waste transfers depending on which one is available.			X		X	
3.2.1.1.4.1.2	The maximum allowable number of simultaneously operating waste transfers shall be six.			X		X	
3.2.1.1.4.2	**Select an Available Transfer**						X
3.2.1.1.4.2.1	The Operator on a MPS System HMI assigns the selected predetermined waste transfer route to one of six waste transfers depending on which one is available.			X		X	
3.2.1.1.4.3	**Check Route Equipment Availability**						X
3.2.1.1.4.3.1	When two or more waste transfer routes are set up for operation, the MPS System shall check the equipment selected for each route for interferences prior to any new waste transfer taking place.			X		X	
3.2.1.1.4.3.2	In the case of (pit leak detectors, MPS relays, MCD's and pressure switches), an equipment interference is of no consequence.			X		X	
3.2.1.1.4.3.3	In the case of lines, valves and pumps and their associated elements (e.g., encasement leak detectors, interlock relays, etc.), an equipment interference is **not** allowable.			X		X	

	Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
				EXAM	DEMO	TEST	ANLY	N/A
†	3.2.1.1.4.3.4	The associated pre-transfer and post-transfer flush route equipment selections shall also be checked for interferences to insure that the route can be flushed before or after the waste transfer.			X		X	
†	3.2.1.1.4.3.5	A local message shall be displayed on the HMI being used for route selection identifying the transfer element(s) in use by other waste transfer routes and shall indicate that the transfer element(s) is unable to be used in the route being selected.			X		X	
†	3.2.1.1.4.3.6	If an equipment component for a transfer route is identified by the MPS System as being "Out of Service", the route is not assigned to the selected transfer and the MPS System shall not allow selection of the pre-determined route until the placed back "In Service".			X		X	
†	3.2.1.1.4.3.7	A local message shall be displayed on the HMI being used for route selection identifying the transfer element(s) that is in the "Out of Service" state and shall indicate that the transfer element(s) is unable to be used in the route being selected.			X		X	
	3.2.1.1.4.3.8	If the route being considered is a cross-site transfer, only one cross-site transfer at a time shall be allowed.			X		X	
	3.2.1.1.4.4	**Re-store Route Equipment Status**						X

	Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
				EXAM	DEMO	TEST	ANLY	N/A
	3.2.1.1.4.4.1	HMI Databases for associating selected MPS System inputs and outputs to transfer routes shall be provided.					X	
†	3.2.1.1.4.4.2	Transfer route equipment and valve positions presented in the tables 4, 5, 7, 8, 9, 10, 13, 14 and 15, Appendix B, and its route selection status shall be stored in a MPS System Route Database.			X		X	
†	3.2.1.1.4.4.3	MPS System computer programs with appropriate configuration control shall allow the adding to, deleting from and changing of the records of all transfer route and mechanical segment databases.			X		X	
†	3.2.1.1.4.4.4	Equipment selection status of all mechanical segments (such as tanks, pits, lines), and MPS System I/O elements (such as pumps, valves, leak detectors, and existing MPS relays) shall be stored and displayed for a minimum of six transfer routes.			X		X	
†	3.2.1.1.4.4.5	The MPS System shall be able to select and store all appropriate MPS System inputs and outputs used for monitoring and control of a particular waste transfer route and its associated flush routes.			X		X	
	3.2.1.1.4.5	**Manually Enter "In/Out of Service" Element Status**						X

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
† 3.2.1.1.4.5.1	The "Out of Service" status for equipment elements shall be entered manually into the MPS System via a HMI.			X		X	
† 3.2.1.1.4.5.2	The access level for the HMI operator performing the manual entry of the waste transfer equipment element "Out of Service/In Service" status shall be "Supervisor" which shall be authenticated by the MPS System log in process.			X		X	
† 3.2.1.1.4.5.3	The "Out of Service/In Service" state entry shall be accomplished by manually entering the new state, and the name of the Supervisor doing the entry into an MPS System HMI.			X		X	
† 3.2.1.1.4.5.4	When an equipment element state is designated "Out of Service", the MPS System shall prevent the equipment element from being selected for use in a transfer route and shall inhibit its alarm and route shutdown functions until its state is changed manually back to "In Service".			X		X	
† 3.2.1.1.4.5.5	After an equipment element is selected (assigned) for use in a route, the MPS System shall prevent its state from being "Out of Service".			X		X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.1.4.5.6	The MPS System shall indicate on the HMI graphic displays the "Out of Service/In Service" states for the waste transfer equipment elements.			X	X	X	
3.2.1.1.4.5.7	Transfer equipment elements presented in the tables 5, 7, 8, 9, 10, 13 and 14 Appendix B, and its "Out of Service/In Service" status shall be stored in a MPS System Route Database.			X		X	
3.2.1.2.	**Select Transfer Type**						X
3.2.1.2..1	The MPS System shall be able to discriminate which MPS System inputs and outputs have been selected for a particular waste transfer route and all of its associated flush and subsequent drainage routes.			X		X	
3.2.1.2..2	The minimum number of flush routes associated with a particular waste transfer shall be eight.			X		X	
3.2.1.2..3	The Operator must complete in the proper sequence the route selection, route set up, and equipment functional verifications prior to making the waste transfer or flushing out the lines and their subsequent drainage.			X		X	
3.2.1.3	**Pre-Transfer Flush**						X
3.2.1.3.1	**Verify Flush Route**						X
3.2.1.3.1.1	**Supervisor Approves Flush**						X

	Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
				EXAM	DEMO	TEST	ANLY	N/A
†	3.2.1.3.1.1.1	The Shift Supervisor shall be able to manually enter an approval into the MPS System HMI once all the required components of the flush route are verified.			X		X	
†	3.2.1.3.1.1.2	The Shift Supervisor approval shall be accomplished by recording the time and date of approval, and the name of the supervisor into an MPS System HMI.			X		X	
†	3.2.1.3.1.1.3	The MPS System HMI shall display a local message indicating that the selected flush route is approved as operational.			X		X	
†	3.2.1.3.1.1.4	The Supervisor's name shall be authenticated by the log in process.			X		X	
†	3.2.1.3.2	**Flush Route**						X
†	3.2.1.3.3	**Drain Flush Route**						X
†	3.2.1.3.3.1	**Verify Drain Route**						X
†	3.2.1.3.3.2	**Allow Route Drainage**						X
†	3.2.1.3.3.2.1	**Time Out Drain Period**						X
†	3.2.1.3.3.2.1.1	The MPS System shall monitor the minimum amount of time allowed for flush line drainage.			X		X	
†	3.2.1.3.3.2.1.2	The flush line drain period shall be set at a MPS System HMI during the activity when the route is created.			X		X	

	Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
				EXAM	DEMO	TEST	ANLY	N/A
†	3.2.1.3.3.2.1.3	The flush line drain period time range shall be from 0 to 24 hours shall be set in hours and 0 to 60 minutes.			X		X	
†	3.2.1.3.3.2.1.4	During the flush draining period if a drain route valve position change or failure is detected by the MPS System, the event shall be alarmed at a MPS System HMI.			X		X	
†	3.2.1.3.3.2.1.5	During the flush draining period if a leak or leak detector failure is detected by the MPS System, the event shall be alarmed at a MPS System HMI.			X		X	
†	3.2.1.3.3.2.1.6	A flush line drain period shall be set at a MPS System HMI for each flush route created.			X		X	
	3.2.1.4	**Transfer Waste Through Route**						X
	3.2.1.4.1	Function number 4.1 not used.						X
	3.2.1.4.2	**Check Route Parameters**						X
	3.2.1.4.3	**Verify Route**						X
	3.2.1.4.3.1	**Remotely Verify Valve Positions**						X
	3.2.1.4.3.1.1	**Remotely Monitor Valve Position**						X
†	3.2.1.4.3.1.1.1	For those transfer valves that have position monitors connected to the MPS System, the MPS System shall be able to display graphically valve position.			X		X	

	Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
				EXAM	DEMO	TEST	ANLY	N/A
†	3.2.1.4.3.1.1.2	For a three-way valve with three valve positions A, B, & C; Position A Indication is displayed on the HMI if the "A" valve position sensor is activated.			X		X	
†	3.2.1.4.3.1.1.3	For a three-way valve, a valve failure alarm is activated on the HMI when, after 5 minutes, either the valve positions are not sensed or any two valve positions of the three are sensed simultaneously by the MPS System.			X		X	
†	3.2.1.4.3.1.1.4	For a two way valve with two positions open & closed, open position Indication shall be displayed on the HMI whenever the open position sensor is actuated.			X		X	
†	3.2.1.4.3.1.1.5	For a two way valve, a valve failure alarm is activated after 5 minutes when neither or both of the open or closed position sensors are actuated simultaneously.			X		X	
	3.2.1.4.3.1.2	**Alarm Valve Position Failure**						X
	3.2.1.4.3.1.2.1	For those transfer valves that have position monitors connected to the MPS System, the MPS System shall be able to display graphically valve position.			X	X	X	

	Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
				EXAM	DEMO	TEST	ANLY	N/A
†	3.2.1.4.3.1.2.2	For a three-way valve, a valve failure alarm is activated on the HMI when, after 5 minutes, either the valve positions are not sensed or any two valve positions of the three are sensed simultaneously by the MPS System.			X		X	
†	3.2.1.4.3.1.2.3	For a two way valve, a valve failure alarm is activated after 5 minutes when neither or both of the open or closed position sensors are actuated simultaneously.			X		X	
†	3.2.1.4.3.1.2.4	For those transfer valves that have position monitors connected to the MPS System, the MPS System HMI graphics for each valve shall be color coded per Section 3.3.7.1.			X		X	
†	3.2.1.4.3.1.2.5	The MPS System HMI alarms shall be handled in accordance with section 3.3.7.4.			X		X	
†	3.2.1.4.3.1.2.6	The MPS System valve position failure alarms shall be provided for those transfer valves presented in Tables 9 and 10 of Appendix B.			X		X	
	3.2.1.4.3.1.3	**Indicate Valve Position**						X
†	3.2.1.4.3.1.3.1	The MPS System HMI shall be able to display graphically valve positions.			X		X	

	Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
				EXAM	DEMO	TEST	ANLY	N/A
†	3.2.1.4.3.1.3.2	For those transfer valves that have position monitors connected to the MPS System, the MPS System HMI graphic color coding for each 2 and 3-way valve shall follow that as given in Section 3.3.7.1.			X		X	
	3.2.1.4.3.1.3.3	The MPS System HMIs shall indicate the status of all valve positions associated with the MPS System including:			X	X	X	
†	3.2.1.4.3.1.3.4	For a three-way valve with three valve positions A, B, & C; Position A Indication is displayed on the HMI if the "A" valve position sensor is activated.			X		X	
†	3.2.1.4.3.1.3.5	For a two way valve with two positions open & closed, open position Indication shall be displayed on the HMI whenever the open position sensor is actuated.			X		X	
†	3.2.1.4.3.1.3.6	The MPS System valve position indication shall be provided for those transfer valves presented in Tables 9 and 10 of Appendix B.			X		X	
	3.2.1.4.3.1.4	**Compare Selected Valve Position to Indicated Valve Position**						X
	3.2.1.4.3.1.4.1	One tank farm operator at any MPS HMI shall be able to verify the functional operation or setup of all components of the MPS System equipment for each particular transfer route prior to performing a transfer.			X	X	X	

	Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
				EXAM	DEMO	TEST	ANLY	N/A
	3.2.1.4.3.1.4.2	A verified valve position indication occurs, if the valve and its position which are selected for service in a particular route matches valve position detected by the MPS System.			X		X	
†	3.2.1.4.3.1.4.3	A valve position shall be able to be verified for any of the six routes in which it is selected for service.			X		X	
†	3.2.1.4.3.1.4.4	The MPS System valve position verification shall be provided for those transfer valves presented in Tables 9, 10 13, and 14 of Appendix B.			X		X	
†	3.2.1.4.3.1.5	**Indicate Valve Positions "Not Verified"**						X
†	3.2.1.4.3.1.5.1	A flashing valve symbol in the MPS System graphic screen shall indicate that a valve is in an incorrect position.			X		X	
†	3.2.1.4.3.1.5.2	The MPS System alarms caused by functional tests shall be handled in accordance with Section 3.3.7.4.			X		X	
†	3.2.1.4.3.1.5.3	The MPS System HMI graphic color coding for each 2 and 3-way valve shall follow that as given in Section 3.3.7.1.			X		X	
†	3.2.1.4.3.1.6	**Update Valve Position Status to "Verified"**						X
†	3.2.1.4.3.1.6.1	A report of all transfer valve verifications shall be displayed, (and/or printed) at the HMI and/or be available to external systems such as TMACS.			X		X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.3.1.6.2	The MPS System HMI shall display a local message/indicator showing that all transfer valves in the selected transfer route are .			X		X	
3.2.1.4.3.1.6.3	The MPS System HMI graphic color coding for each 2 and 3-way valve shall follow that as given in Section 3.3.7.1.			X		X	
3.2.1.4.3.2	**Manually Verify Valve Positions**						X
3.2.1.4.3.2.1	**Display List of Manual Valves Selected for Route**						X
3.2.1.4.3.2.1.1	The Operator shall be able to select a single manual valve from a list of manual valves presented on that MPS System HMI.			X		X	
3.2.1.4.3.2.1.2	The list of manual valves displayed shall only contain the valves that have been selected for the chosen transfer route.			X		X	
3.2.1.4.3.2.2	**Choose Manual Valve to be Verified**						X
3.2.1.4.3.2.2.1	The Operator shall be able to select a single manual valve from a list of manual valves presented on that MPS System HMI.			X		X	
3.2.1.4.3.2.3	**Enter Manual Valve Position into MPS System**						X

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.3.2.3.1	The MPS System shall be able to display graphically valve positions for those transfer valves not connected to the MPS System where the valve positions displayed are the last position manually entered by an Operator into the MPS System HMI.			X	X	X	
3.2.1.4.3.2.3.2	For those transfer valves that do not have position monitors connected to the MPS System, verification shall be accomplished by recording the manual valve position, the time and date of the input event, and the name of the Operator entering the input into the MPS System.			X		X	
3.2.1.4.3.2.4	**Determine If Manual Valve Verifications Complete**						X
3.2.1.4.3.2.4.1	The Operator shall be able to select another manual valve from the manual valve list displayed by the MPS System HMI for the chosen route and repeat the verification process until all the displayed manual valves are verified.			X		X	
3.2.1.4.3.3	**Field Operator, Independent Verifier, Supervisor Verify Valve Lineup**						X
3.2.1.4.3.3.1	**Update Valve Position Status to " Field Operator Verified"**						X
3.2.1.4.3.3.1.1	The MPS System shall be able to insure that a proper sequence of operations occurs.			X		X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.3.3.1.2	Field Operator verification shall be accomplished by inputting the valve positions, the time and date of the input event, and the name of the Operator doing the positioning and verification.			X		X	
3.2.1.4.3.3.1.3	The MPS System shall allow only "Operators" access for verifying valve position by a Field Operator performing a field walkdown.			X		X	
3.2.1.4.3.3.1.4	After the selected valve positions are verified, the MPS System shall display a message via a HMI that the route's valve positions are "Field Operator Verified" and update each of the route's valve position status to "Field Operator Verified".			X		X	
3.2.1.4.3.3.2	**Update Valve Position Status to " Field Operator Verified"**						X
3.2.1.4.3.3.2.1	The MPS System shall be able to insure that a proper sequence of operations occurs.			X		X	
3.2.1.4.3.3.2.2	Independent Verifier verification shall be accomplished by inputting the valve positions, the time and date of the input event, and the name of the Independent Verifier doing the verification.			X		X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.3.3.2.3	The MPS System shall update a route's valve position status to " Independent Verified" only when the MPS System receives input that the route valve position status has been verified by a field walkdown by both the Field Operator and the Independent Verified.			X		X	
3.2.1.4.3.3.2.4	The MPS System shall allow only " Qualified Operators" access for verifying valve position by an Independent Verifier performing a field walkdown.			X		X	
3.2.1.4.3.3.2.5	After the selected valve positions are verified, the MPS System shall display a message via a HMI that the route's valve positions are "Independently Verified" and update each of the route's valve position status to "Independently Verified".			X		X	
3.2.1.4.3.3.3	**Update Valve Position Status to "Supervisor Verified"**						X
3.2.1.4.3.3.3.1	The MPS System shall be able to insure that a proper sequence of operations occurs.			X		X	
3.2.1.4.3.3.3.2	Supervisor verification shall be accomplished by inputting the valve positions, the time and date of the input event, and the name of the Supervisor doing the verification.			X		X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
† 3.2.1.4.3.3.3.3	The MPS System shall update a route's valve position status to "Supervisor Verified" only when the MPS System receives input that the route valve position status has been verified by a field walkdown by the Field Operator, Independent Verifier and the Supervisor.			X		X	
† 3.2.1.4.3.3.3.4	The MPS System shall allow only "Supervisor" access for verifying valve position by a Supervisor performing a field walkdown.			X		X	
† 3.2.1.4.3.3.3.5	After the selected valve positions are verified, the MPS System shall display a message via a HMI that the route's valve positions are "Supervisor Verified" and update each of the route's valve position status to "Supervisor Verified".			X		X	
3.2.1.4.3.4	**Verify MPSS PLC Operation**						X
3.2.1.4.3.4.1	For each PLC input which is de-energized during a route shutdown by equipment selected tor service in the route, the MPS System shall be able to initiate a test that de-energizes the input.			X	X	X	
3.2.1.4.3.4.2	Once a PLC input test is initiated, the MPS System shall verify that the PLC provides all required PLC outputs logically related to that input.			X	X	X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.3.4.3	For all PLC outputs connected to external equipment such as pump interlock relays, the equipment shall provide a feedback signal to the PLC that indicates the state of the equipment.			X	X	X	
3.2.1.4.3.4.4	The MPS System shall identify to the Operator via the HMI the particular PLC input or output failure which prevented the verification of PLC operation.			X	X	X	
3.2.1.4.3.4.5	For each PLC input and output verification a specific period of time shall be permitted to allow for the response times of the MPS System electronics.			X	X	X	
3.2.1.4.3.4.6	After the PLC is verified, the MPS System shall indicate to the Operator via a HMI that the PLC is verified and update the PLC status message/indicator to show verification is complete.			X	X	X	
3.2.1.4.3.4.7	The MPS System shall not allow a PLC Verification to proceed if a motor controller for a waste transfer pump which has been selected for use in the route being verified is energized.			X		X	
3.2.1.4.3.5	**Remotely Verify Existing MPS Relay Input Operation**						X
3.2.1.4.3.5.1	**Determine if Existing MPS Relay Input Verifications are Complete**						X

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.3.5.1.1	The Operator shall be able to select another existing MPS Relay Input from the existing MPS relay list displayed by the MPS System HMI for the chosen route and repeat the verification process until all the displayed existing MPS Relay Inputs are verified.			X	X	X	
† 3.2.1.4.3.5.1.2	The MPS System HMI shall display a local message indicating that all existing MPS relay inputs in the selected transfer route are verified as operational.			X		X	
† 3.2.1.4.3.5.1.3	A report of all existing MPS relay input verifications shall be displayed (and/or printed) at the local MPS System HMI, and/or be available to external systems such as TMACS.			X		X	
† 3.2.1.4.3.5.1.4	The existing MPS System Relay Input operation verification shall be typical for all relay inputs.			X		X	
3.2.1.4.3.5.1.5	The MPS System existing MPS relay verification shall be provided for those MPS relay inputs presented in Table 7 of Appendix B.			X		X	
3.2.1.4.3.5.1.6	CTS Control System shall control the cross-site transfer pumps and interface with the MPS System via relays which convert 24v dc MPS shutdown loop signals to 120 v ac signals compatible with the CTS.			X	X	X	
3.2.1.4.3.5.2	**Display List of Existing MPS Relays Selected for Route**						X

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.3.5.2.1	The Operator shall be able to select a single Existing MPS Relay Input from a list of existing MPS Relay Inputs presented on that MPS System HMI.			X		X	
3.2.1.4.3.5.2.2	The list of existing MPS Relay Inputs displayed shall only contain the existing MPS Relays that have been selected for the chosen transfer route.			X	X	X	
3.2.1.4.3.5.2.3	This existing Relay Input operation Verification is typical for all relay inputs selected for service in a particular route.			X		X	
† 3.2.1.4.3.5.2.4	The existing MPS Relay input operation verification shall be provided for those existing MPS Relay inputs presented in Table 7 of Appendix B that have been selected for service in a particular route.			X		X	
† 3.2.1.4.3.5.3	**Choose Existing MPS Relay Input to be Verified**						X
† 3.2.1.4.3.5.3.1	The Operator shall be able to select a single single MPS relay input from a list of MPS relay inputs presented on that MPS System HMI.			X		X	
† 3.2.1.4.3.5.3.2	This existing MPS Relay Input operation is typical for all relay inputs selected for service in a particular route.			X		X	
† 3.2.1.4.3.5.4	**Initiate Existing MPS Relay Input Test**						X

	Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
				EXAM	DEMO	TEST	ANLY	N/A
†	3.2.1.4.3.5.4.1	The Operator shall be able to initiate a functional test for an existing MPS relay input through MPS System HMI.			X		X	
†	3.2.1.4.3.5.4.2	The existing MPS relay input operation verification test is started when a specific command is chosen by the Operator at an HMI.			X		X	
†	3.2.1.4.3.5.4.3	The existing MPS Relay circuit shall be de-energized by the MPS System for a maximum of 11 seconds when its verification test is started.			X		X	
†	3.2.1.4.3.5.4.4	An existing MPS relay functional test shall not shut down a waste transfer.			X		X	
†	3.2.1.4.3.5.4.5	The route shutdown command shall be inhibited for a maximum of 11 seconds after the existing MPS relay input operation verification test is started or until the end of the test.			X		X	
†	3.2.1.4.3.5.5	**Monitor and Alarm Existing MPS Relay Input Status**						X
†	3.2.1.4.3.5.5.1	The existing MPS Relay's discrete Input shall be allowed a maximum of 3 seconds to de-energize and stabilize after the existing MPS relay input operation verification test has been started.			X		X	
†	3.2.1.4.3.5.5.2	After the existing MPS Relay Input has been de-energized, a Relay Input Alarm shall be activated.			X		X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.3.5.5.3	After the existing MPS Relay Input operation verification test is started, any route shut down caused by this test is inhibited for a maximum of 11 seconds.			X		X	
3.2.1.4.3.5.5.4	The MPS System HMI graphics for each existing MPS Relay Input Alarm shall be color coded per Section 3.3.7.1.			X		X	
3.2.1.4.3.5.5.5	The MPS System HMI alarms shall be handled in accordance with Section 3.3.7.4.			X		X	
3.2.1.4.3.5.5.6	The MPS System existing MPS Relay Input alarms shall be provided for those existing MPS Relay Inputs presented in Table 7 of Appendix B.			X		X	
3.2.1.4.3.5.6	**Confirm that Existing MPS Relay Input Operated Within Time Limit**						X
3.2.1.4.3.5.6.1	After the Operator initiation of the existing MPS relay input operation verification test and if the existing MPS Relay Input Alarm activates, the Operator chooses a MPS System HMI command that acknowledges the alarm.			X		X	
3.2.1.4.3.5.6.2	If the existing Relay Input Alarm does not activate or if the existing MPS Relay Input Alarm is not acknowledged by the Operator within 10 seconds, then the verification test is not confirmed.			X		X	
3.2.1.4.3.5.7	**Indicate Existing MPS Relay Input Not Verified**						X

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.3.5.7.1	If the existing MPS Relay Input Alarm does not activate or the alarm is not acknowledged by the Operator within 10 seconds, then MPS System indicates on a local HMI that the relay input verification test has failed.			X		X	
3.2.1.4.3.5.7.2	The Route Existing MPS Relay Input Verification Test (including timer functions) shall be halted and reset after the relay input test has been indicated by the MPS System as failing verification.			X		X	
3.2.1.4.3.5.8	**Update Existing MPS Relay Input Status to "Verified"**						X
3.2.1.4.3.5.8.1	If the existing MPS Relay Input functional test is performed successfully and acknowledged by the HMI Operator within a specified time period, the existing MPS Relay Input is then indicated by the MPS System as verified.			X		X	
3.2.1.4.3.5.8.2	When the existing MPS Relay Input Alarm is Acknowledged by an Operator located at the HMI with the existing MPS Relay Input Alarm activated, the existing MPS Relay Input operation is indicated "verified" by the MPS System HMI.			X		X	
3.2.1.4.3.5.8.3	When the existing MPS Relay Input operation is indicated "verified" by the MPS System HMI, the Route Existing MPS Relay Input Verification Test (including timer functions) shall be reset (stopped).			X		X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.3.6	**Verify Pump Interlock Operation**						X
3.2.1.4.3.6.1	**Determine if Pump Interlock Verifications are Complete**						X
3.2.1.4.3.6.1.1	The Operator shall be able to select another pump interlock relay from the pump interlock relay list displayed by the MPS System HMI for the chosen route and repeat the verification process until all the displayed pump interlock relays are verified.			X	X	X	
† 3.2.1.4.3.6.1.2	The MPS System HMI shall display a local message/indicat or showing that all existing transfer pump interlock relays in the selected transfer route are verified as operational.			X		X	
† 3.2.1.4.3.6.1.3	A report of all existing transfer pump interlock relay verifications shall be displayed (and/or printed) at the local MPS System HMI, and/or be available to external systems such as TMACS.			X		X	
† 3.2.1.4.3.6.1.4	The MPS System transfer pump interlock operation verification shall be typical for all transfer pump interlocks.					X	
3.2.1.4.3.6.1.5	The MPS System transfer pump interlock verification shall be provided for those pump interlock relays presented in Table 5 of Appendix B.			X		X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.3.6.1.6	CTS interlock relays shall control the cross-site transfer pumps and convert 24v dc MPS shutdown loop signals to 120 v ac signals compatible with the CTS Control System.			X	X	X	
3.2.1.4.3.6.2	**Display List of Interlocks Selected for Route**						X
3.2.1.4.3.6.2.1	The Operator shall be able to select a single transfer pump interlock from a list of transfer pump interlock relays presented on the MPS System HMI.			X	X	X	
3.2.1.4.3.6.2.2	The list of transfer pump interlocks displayed shall only contain the pump interlock relays that have been selected for the chosen transfer route.			X		X	
† 3.2.1.4.3.6.2.3	The transfer pump interlock relay operation verification is typical for all interlock relays selected for service for a particular route.					X	
3.2.1.4.3.6.2.4	The list of transfer pump interlock relays to be verified shall be provided for those interlock relays presented in Table 5 of Appendix B that have been selected for service in a particular route.			X		X	
3.2.1.4.3.6.3	**Choose Pump Interlock to be Verified**						X

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.3.6.3.1	The Operator shall be able to select a single transfer pump interlock from a list of transfer pump interlock relays presented on the MPS System HMI.			X	X	X	
3.2.1.4.3.6.3.2	This transfer pump interlock relay operation is typical for all interlock relays selected for service in a particular route.					X	
3.2.1.4.3.6.3.3	For a particular waste transfer route, an Operator shall be able to perform a MPS System functional test by initiating a command signal from the MPS System HMI to the transfer pump interlock relay.			X		X	
3.2.1.4.3.6.4	**Initiate Route Shutdown Signal**						X
3.2.1.4.3.6.4.1	The MPS System shall output a shutdown command to the transfer pump motor controller interlock relay which opens the existing motor control circuit, de-energizing the transfer pump's existing motor contactor.			X	X	X	
3.2.1.4.3.6.4.2	The Operator shall be able to initiate a functional test for a transfer pump interlock relay through MPS System HMI.			X		X	
3.2.1.4.3.6.4.3	The MPS System shall not allow the transfer pump interlock relay verification to proceed if the pump's motor controller is energized.			X	X	X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.3.6.4.4	If remote indication of a pumps power status is not available, the MPS System HMI Operator shall determine and manually input into the MPS System the pumps power status.			X	X	X	
3.2.1.4.3.6.5	**Monitor and Display Pump Interlock Status**						X
3.2.1.4.3.6.5.1	The pump interlock relay discrete Input shall be allowed a maximum of 3 seconds to de-energize and stabilize after the pump interlock relay input operation verification test has been started.			X	X	X	
† 3.2.1.4.3.6.5.2	After the transfer pump interlock relay has been de-energized, a pump interlock status display shall be activated.			X		X	
3.2.1.4.3.6.6	**Confirm That Pump Interlock Operated within Time Limit**						X
† 3.2.1.4.3.6.6.1	The time limit allowed for confirming a pump interlock operation shall be 11 seconds.			X		X	
† 3.2.1.4.3.6.6.2	After the Operator initiation of the transfer pump interlock operation verification test and if the pump interlock relay de-energized status activates, the Operator chooses a MPS System HMI command that acknowledges the status display.			X		X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.3.6.6.3	If the pump interlock relay de-energized status display does not activate or if the pump interlock relay de-energized status is not acknowledged by the Operator within 11 seconds, then the verification test is not confirmed.			X		X	
3.2.1.4.3.6.7	**Indicate that Pump Interlock Not Verified**						X
3.2.1.4.3.6.7.1	The local MPS System HMI shall display that the transfer pump interlock failed verification; if, after a specific time period elapses, the pump interlock confirmation by an Operator is not received by the MPS System.			X	X	X	
3.2.1.4.3.6.7.2	The Route MPS Transfer Pump Interlock Verification Test (including timer functions) shall be halted and reset after the pump interlock relay test has been indicated by the MPS System as failing verification.			X		X	
3.2.1.4.3.6.8	**Update MPSS Interlock to "Verified" Status**						X
3.2.1.4.3.6.8.1	If the MPS System Interlock Relay functional test is performed successfully and acknowledged by the HMI Operator within a specified time period, the MPS System Interlock Relay is then indicated by the MPS System as verified.			X		X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.3.6.8.2	When the MPS System Interlock Relay status display is acknowledged by an Operator located at the HMI with the relay status display activated, the interlock relay operation is indicated "verified" by the MPS System HMI.			X		X	
3.2.1.4.3.6.8.3	When the Interlock Relay operation is indicated "verified" by the MPS System HMI, the Interlock Relay Verification Test (including timer functions) shall be reset (stopped).			X		X	
3.2.1.4.3.7	**Manually Verify Existing MPS Relay Connected Device Operation**						X
3.2.1.4.3.7.1	**Determine if Existing MPS Relay Connected Device Verifications are Complete**						X
3.2.1.4.3.7.1.1	The Operator shall be able to select another existing MPS Relay connected device from a list displayed by the MPS System HMI and repeat the verification process until all the displayed existing MPS Relay connected devices are verified.			X		X	
3.2.1.4.3.7.1.2	The MPS System HMI shall display a local message/indicat or showing that all existing MPS Relay connected devices in the selected transfer route are verified .			X		X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.3.7.1.3	A report of all existing MPS Relay connected device verifications shall be displayed (and/or printed) at the local MPS System HMI, and/or be available to external systems such as TMACS.			X		X	
3.2.1.4.3.7.1.4	The MPS System existing MPS Relay connected device operation verification shall be typical for all existing MPS relay connected devices and for all devices connected to the CTS interposing relays.					X	
3.2.1.4.3.7.1.5	The existing MPS Relay connected device verification shall be provided for those leak detectors, flush pit pressure switches, flush pit radiation detectors and in-service area radiation monitors presented in Table 7 for input relays, Appendix B.			X		X	
3.2.1.4.3.7.2	**Display List of Existing MPS Relay Connected Devices Selected for Route**						X
3.2.1.4.3.7.2.1	The Operator shall be able to select a single existing MPS Relay Connected Device from a list of leak detectors presented on that MPS System HMI.			X		X	
3.2.1.4.3.7.2.2	The list of leak detectors displayed shall only contain the existing MPS Relay Connected Devices that have been selected for the chosen transfer route.			X		X	

	Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
				EXAM	DEMO	TEST	ANLY	N/A
	3.2.1.4.3.7.2.3	The existing MPS Relay Connected Device operation verification is typical for all leak detectors selected for service for a particular route.					X	
†	3.2.1.4.3.7.2.4	The list of existing MPS Relay Connected Devices to be verified shall be provided for those leak detectors, flush pit pressure switches, flush pit radiation detectors and in-service area radiation monitors presented in Tables 7, Appendix B, for input relays that have been selected for service in a particular route.			X		X	
†	3.2.1.4.3.7.3	**Choose Existing MPS Relay Connected Device to be Verified**						X
†	3.2.1.4.3.7.3.1	The Operator shall be able to select a single device which can de-energize an existing MPS Relay from a list of MPS Relay Connected Devices presented on that MPS System HMI.			X		X	
†	3.2.1.4.3.7.3.2	An existing MPS Relay Connected Device operation is typical for all existing MPS Relay Connected Devices selected for service in a particular route.					X	
†	3.2.1.4.3.7.3.3	For a particular waste transfer route, an Operator shall be able to perform a verification by field testing the operation of an existing MPS Relay Connected Device in combination with an existing MPS System relay.			X		X	

	Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
				EXAM	DEMO	TEST	ANLY	N/A
†	3.2.1.4.3.7.3.4	The route shutdown command initiated by the existing MPS Relay Connected Device shall be inhibited for a maximum of 4 minutes after the existing MPS Relay Connected Device operation verification test is started or until the end of the test.			X		X	
†	3.2.1.4.3.7.4	**Check PM/S to Determine if Field Functional Test Required**						X
†	3.2.1. 4.3.7.4.1	A Supervisor (or Cog Engineer) shall be able to determine whether or not a functional test is required by reviewing the PM/S records to determine when the last time the device was operationally verified.			X		X	
†	3.2.1.4.3.7.4.2	When it is determined by review of the PM/S record that the existing MPSR/CD does not require a functional test, it shall be verified by recording in an MPS System HMI:			X		X	
†	3.2.1.4.3.7.4.3	The MPS System shall allow only "Supervisor" access for performing a MPSR/CD verification by PM/S record.			X		X	
	3.2.1.4.3.7.5	**Monitor and Display Alarm for the Associated Existing MPS Relay**						X
†	3.2.1.4.3.7.5.1	After the existing MPS Relay has been de-energized by the Device being tested, a corresponding existing MPS Relay Input alarm shall be activated.			X		X	

	Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
				EXAM	DEMO	TEST	ANLY	N/A
†	3.2.1.4.3.7.5.2	After the MPS/CD operation verification test is started, any route shut down caused by this test is inhibited for a maximum of 4 minutes.			X		X	
†	3.2.1.4.3.7.5.3	The MPS System HMI graphics for each existing MPS Relay Connected Device Alarm shall be color coded per Section 3.3.7.1.			X		X	
†	3.2.1.4.3.7.5.4	The MPS System HMI alarms shall be handled in accordance with Section 3.3.7.4.			X		X	
†	3.2.1.4.3.7.5.5	The existing MPS Relay Connected Device alarms shall be provided for those Devices presented in Tables 7 of Appendix B.			X		X	
†	3.2.1.4.3.7.6	**Confirm that Existing MPS Relay Operated within Time Limit**						X
†	3.2.1.4.3.7.6.1	After the Operator initiation of the existing MPS Relay Connected Device operation verification test and if the associated existing MPS Relay Input alarm activates, the Operator chooses a MPS System HMI command that acknowledges the alarm.			X		X	
†	3.2.1.4.3.7.6.2	If the existing MPS Relay Input alarm does not activate or if the alarm is not acknowledged by the Operator within 4 minutes, then the verification test is not confirmed.			X		X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.3.7.6.3	The time limit allowed for confirming a existing MPS Relay functional test shall be 4 minutes.			X		X	
3.2.1.4.3.7.7	**Indicate that Existing MPS Relay Connected Device is "Not Verified"**						X
3.2.1.4.3.7.7.1	If an existing MPS Relay Connected Device fails a verification test; the verification failure shall be indicated via a HMI to the Operator(s) responsible for other selected transfer routes that are currently utilizing that MPS/CD as a MPS System input.			X		X	
3.2.1.4.3.7.7.2	The MPS System HMI shall display a local message that the existing MPS Relay Connected Device failed verification; if, after a specific time period elapses, the existing MPS relay alarm and Operator confirmation is not received by the MPS System.			X		X	
3.2.1.4.3.7.7.3	The existing MPS Relay Connected Device Verification Test (including timer functions) shall be halted and reset after the MPS Relay Connected Device test has been indicated by the MPS System as failing verification.			X		X	
3.2.1.4.3.7.8	**Update Existing MPS Relay Connected Device Status to "Verified"**						X

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
† 3.2.1.4.3.7.8.1	If existing MPS Relay Connected Device functional test is performed successfully and acknowledged by the HMI Operator within a specified time period, the device is then indicated by the MPS System as "Verified".			X		X	
† 3.2.1.4.3.7.8.2	When the existing MPS Relay Input Alarm is Acknowledged by an Operator located at the HMI with the Alarm activated, the existing MPS Relay Connected Device operation is indicated "verified" by the MPS System HMI.			X		X	
† 3.2.1.4.3.7.8.3	When the existing MPS Relay Connected Device operation is indicated "verified" by the MPS System HMI, the Device Verification Test (including timer functions) shall be reset (stopped).			X		X	
3.2.1.4.3.8	**Verify Non-MPS Leak Detection Operation**						X
3.2.1.4.3.8.1	**Determine if Non-MPS Leak Detector Verifications are Complete**						X
† 3.2.1.4.3.8.1.1	The Operator shall be able to select any Non-MPS leak detector from a list displayed by the MPS System HMI and repeat the verification process until all the displayed Non-MPS leak detectors are verified.			X		X	

	Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
				EXAM	DEMO	TEST	ANLY	N/A
†	3.2.1.4.3.8.1.2	The MPS System HMI shall display a local message indicating that all existing Non-MPS leak detectors in the selected transfer route are verified .			X		X	
†	3.2.1.4.3.8.1.3	A report of all existing Non-MPS leak detector verifications shall be displayed (and/or printed) at the local MPS System HMI, and/or be available to external systems such as TMACS.			X		X	
†	3.2.1.4.3.8.1.4	The MPS System Non-MPS leak detector operation verification shall be typical for all Non-MPS leak detectors.					X	
†	3.2.1.4.3.8.1.5	The MPS System Non-MPS leak detector verification shall be provided for those leak detectors including the leak detector probe voltage relays presented in Tables 8 of Appendix B indicated as not connected to the MPS System.			X		X	
	3.2.1.4.3.8.2	**Display List of Non-MPS Leak Detectors Selected for Route**						X
†	3.2.1.4.3.8.2.1	The Operator shall be able to select a single Non-MPS leak detector from a list of Non-MPS leak detectors presented on that MPS System HMI.			X		X	
†	3.2.1.4.3.8.2.2	The list of Non-MPS leak detectors displayed shall only contain the Non-MPS leak detectors that have been selected for the previously chosen transfer route.			X		X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.3.8.2.3	The Non-MPS leak detector & probe low voltage sensing relay operation verification is typical for all Non-MPS leak detectors selected for service for a particular route.					X	
3.2.1.4.3.8.2.4	The list of Non-MPS leak detector relays & probe low voltage sensing relays to be displayed shall be provided for those leak detectors relays & probe voltage relays presented in Table 8 of Appendix B indicated as not connected to the MPS System.			X		X	
3.2.1.4.3.8.3	**Choose Non-MPS Leak Detector to be Verified**						X
3.2.1.4.3.8.3.1	The Operator shall be able to select a single Non-MPS leak detector relay or probe low voltage sensing relay from a list of Non-MPS leak detectors & probe voltage relays presented on that MPS System HMI.			X		X	
3.2.1.4.3.8.3.2	The Non-MPS leak detector relay & probe low voltage sensing relay operation is typical for all Non-MPS leak detectors.					X	
3.2.1.4.3.8.4	**Enter Local Leak Detector Alarm State into MPSS**						X
3.2.1.4.3.8.4.1	Verification shall be accomplished by successfully field testing the leak detector; and then recording the time and date of verification, and the name of the verifier into an MPS System HMI.			X		X	

	Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
				EXAM	DEMO	TEST	ANLY	N/A
†	3.2.1.4.3.8.4.2	The MPS System HMI graphics for each Leak Detector Alarm shall be color coded per Section 3.3.7.1.			X		X	
†	3.2.1.4.3.8.4.3	The MPS System HMI alarms shall be handled in accordance with Section 3.3.7.4.			X		X	
†	3.2.1.4.3.8.4.4	The Manual Leak Detector alarms shall be provided for those Leak Detectors presented in Table 8 of Appendix B as not connected to the MPS System.			X		X	
†	3.2.1.4.3.8.5	**Indicate Non-MPS Leak Detector "Not Verified"**						X
†	3.2.1.4.3.8.5.1	If a leak detector or probe voltage relay fails a verification test; the verification failure shall be indicated via a HMI to the Operator(s) responsible for other selected transfer routes that are currently utilizing that leak detector as a MPS System input.			X		X	
†	3.2.1.4.3.8.5.2	The MPS System HMI shall display a local message that the Non-MPS leak detection system is not operational; if, after a specific time period elapses, the Non-MPS leak detection system confirmation by the Operator is not received by the MPS System.			X		X	
†	3.2.1.4.3.8.6	**Update Non-MPS Leak Detector Status to "Verified"**						X

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.3.8.6.1	If the Non-MPS leak detector functional field tests are successfully performed, the Non-MPS leak detector shall be recorded in the MPS System as verified.			X		X	
3.2.1.4.3.9	**Remotely Verify Leak Detector Operation**						X
3.2.1.4.3.9.1	**Determine if Remote Verifications of Leak Detectors are Complete**						X
3.2.1.4.3.9.1.1	The Operator shall be able to select another leak detector from a list displayed by the MPS System HMI and repeat the verification process until all the displayed leak detectors are verified.			X		X	
3.2.1.4.3.9.1.2	The MPS System HMI shall display a local message/indicat or showing that all existing leak detectors in the selected transfer route are verified .			X		X	
3.2.1.4.3.9.1.3	A report of all leak detector verifications shall be displayed (and/or printed) at the local MPS System HMI, and/or be available to external systems such as TMACS.			X		X	
3.2.1.4.3.9.1.4	The MPS System leak detector operation verification shall be typical for all leak detectors.					X	

	Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
				EXAM	DEMO	TEST	ANLY	N/A
†	3.2.1.4.3.9.1.5	The MPS System leak detector verification shall be provided for those leak detectors including the leak detector probe voltage relays presented in Tables 2 and 4 of Appendix B that are shown as directly connected to MPS System.			X		X	
†	3.2.1.4.3.9.2	**Display List of Leak Detectors Selected for Route**						X
†	3.2.1.4.3.9.2.1	The Operator shall be able to select a single leak detector from a list of leak detectors presented on that MPS System HMI.			X		X	
†	3.2.1.4.3.9.2.2	The list of leak detectors displayed shall only contain the leak detectors that have been selected for the chosen transfer route.			X		X	
†	3.2.1.4.3.9.2.3	The leak detector operation verification is typical for all leak detectors selected for service for a particular route.					X	
†	3.2.1.4.3.9.2.4	The list of leak detectors to be verified shall be provided for those leak detectors relays presented in Tables 2 and 4 of Appendix B that have been selected for service in a particular route.			X		X	
	3.2.1.4.3.9.3	**Choose Leak Detectors to be Verified**						X
	3.2.1.4.3.9.3.1	The Operator shall be able to select a single leak detector from a list of leak detectors presented on that MPS System HMI.			X	X	X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.3.9.3.2	This leak detector operation is typical for all leak detectors selected for service in a particular route.					X	
† 3.2.1.4.3.9.3.3	For a particular waste transfer route, an Operator shall be able to perform a MPS System functional test by initiating a command signal from the MPS System HMI to the leak detectors relays and probe low voltage sensing relays.			X		X	
† 3.2.1.4.3.9.4	**Initiate Leak Detector Test Condition**						X
† 3.2.1.4.3.9.4.1	For a particular waste transfer operation, an Operator shall be able to perform a leak detection system functional test by initiating a command signal from the MPS System HMI to a leak detection system.			X		X	
3.2.1.4.3.9.4.2	A leak detection system or probe low voltage relay functional test shall not shut down a waste transfer.			X	X	X	
† 3.2.1.4.3.9.4.3	The Operator shall be able to initiate a functional test for a leak detector through MPS System HMI.			X		X	
† 3.2.1.4.3.9.4.4	The simulated leak and low probe voltage conditions shall be activated by the MPS System for a maximum of 25 seconds when either the leak detector or probe low voltage verification test is started.			X		X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.3.9.4.5	The route shutdown command shall be inhibited for a maximum of 25 seconds after the Leak Detector operation verification test is started or until the end of the test.			X		X	
3.2.1.4.3.9.5	**Monitor and Alarm Leak Detector or Probe Voltage Status**						X
3.2.1.4.3.9.5.1	The leak detector relay's and probe low voltage sensing relay's discrete Inputs shall be allowed a maximum of 3 seconds to de-energize and stabilize after the leak detector operation verification test has been started.			X		X	
3.2.1.4.3.9.5.2	After the leak detector relay has been de-energized, a corresponding leak detection alarm shall be activated.			X		X	
3.2.1.4.3.9.5.3	After the Leak Detector operation verification test is started, any route shut down caused by this test is inhibited for a maximum of 25 seconds.			X		X	
3.2.1.4.3.9.5.4	The MPS System HMI graphics for each Leak Detector Alarm shall be color coded per Section 3.3.7.1.			X		X	
3.2.1.4.3.9.5.5	The MPS System HMI alarms shall be handled in accordance with Section 3.3.7.4.			X		X	

	Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
				EXAM	DEMO	TEST	ANLY	N/A
†	3.2.1.4.3.9.5.6	The MPS System Leak Detector alarms shall be provided for those Leak Detectors presented in Tables 2 and 4 of Appendix B that are shown directly connected to the MPS System.			X		X	
†	3.2.1.4.3.9.6	**Confirm that Leak Detector Operated within Time Limit**						X
†	3.2.1.4.3.9.6.1	After the Operator initiation of the leak detector verification test and if the leak detector and probe low voltage alarm activates, the Operator chooses a MPS System HMI command that acknowledges each alarm.			X		X	
†	3.2.1.4.3.9.6.2	If the leak detector or probe low voltage alarm does not activate or if the leak detector and probe low voltage alarm are not acknowledged by the Operator within 25 seconds, then the verification test is not confirmed.			X		X	
†	3.2.1.4.3.9.6.3	The time limit allowed for confirming a leak detection system functional test shall be 24 seconds.			X		X	
	3.2.1.4.3.9.7	**Indicate Leak Detector or Probe Voltage Relay "Not Verified"**						X

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.3.9.7.1	If a leak detector or probe voltage relay fails a verification test; the verification failure shall be indicated via a HMI to the Operator(s) responsible for other selected transfer routes that are currently utilizing that leak detector as a MPS System input.			X	X	X	
† 3.2.1.4.3.9.7.2	The MPS System HMI shall display a local message that the leak detection system is not operational; if, after a specific time period elapses, the leak detection system confirmation by the Operator is not received by the MPS System.			X		X	
† 3.2.1.4.3.9.7.3	The Leak Detector Verification Test (including timer functions) shall be halted and reset after the leak detector test has been indicated by the MPS System as "Not Verified".			X		X	
3.2.1.4.3.9.8	**Update Leak Detector Status to "Verified"**						X
3.2.1.4.3.9.8.1	If both the leak detector and the probe voltage relay functional tests are performed successfully and acknowledged by the HMI Operator within a specified time period, the leak detector is then indicated by the MPS System as verified.			X	X	X	

	Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
				EXAM	DEMO	TEST	ANLY	N/A
†	3.2.1.4.3.9.8.2	When the Leak Detection and the Low Probe Voltage Alarm is Acknowledged by an Operator located at the HMI with the Leak Detection Alarm activated, the leak detector operation is indicated "verified" by the MPS System HMI.			X		X	
†	3.2.1.4.3.9.8.3	When the Leak Detector operation is indicated "verified" by the MPS System HMI, the Leak Detector Verification Test (including timer functions) shall be reset (stopped).			X		X	
†	3.2.1.4.3.10	**Determine Category of Equipment to be Verified**						X
†	3.2.1.4.3.10.1	One tank farm operator at any MPS HMI shall be able to verify the functional operation or setup of all components of the MPS System equipment for each particular transfer route prior to performing a transfer.			X		X	
†	3.2.1.4.3.10.2	Transfer route equipment selection is required to be completed prior to starting the route verification mode.			X		X	
†	3.2.1.4.3.10.3	The Operator shall have selected one of the six transfer routes for verification prior to selecting an equipment category for verification.			X		X	
†	3.2.1.4.3.10.4	A MPS System HMI Display presents a menu for selecting a particular MPS System equipment category for verification.			X		X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.3.10.5	The MPS System HMI equipment category selection display also displays whether or not all the equipment in that category has been verified.			X		X	
3.2.1.4.3.10.6	The equipment category verification mode is initiated when a category selection for a particular route is made by an Operator at a MPS System HMI.			X		X	
3.2.1.4.3.10.7	The Operator shall be able to select a different category of equipment and verify all the equipment in that category and repeat this process until all equipment of all the categories for a selected transfer route are verified.			X		X	
3.2.1.4.3.10.8	The following shall be the different categories of equipment that are verified prior to a waste transfer:			X		X	
3.2.1.4.3.10.9	Once all the equipment verifications of all the categories for a selected transfer route are completed and the pit cover blocks are verified as installed, the shift supervisors administrative approval is required to complete the route verification mode of operation.			X		X	
3.2.1.4.3.11	**Determine If Equipment Verifications are Complete**						X

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.3.11.1	The Operator shall be able to select a different category of equipment and verify all the equipment in that category and repeat this process until all equipment of all the categories for a selected transfer route are verified.			X		X	
3.2.1.4.3.12	**Supervisor Approves Transfer**						X
3.2.1.4.3.12.1	The shift supervisors administrative approval is required to complete the route verification mode of operation.			X		X	
3.2.1.4.3.12.2	The Shift Supervisor approval shall be accomplished by recording the transfer route identification, the time and date of approval, and the name of the supervisor into an MPS System HMI.			X		X	
3.2.1.4.3.12.3	The MPS System HMI shall display a local message indicating that the selected transfer route is approved as operational, after the "Commit to PLC" function has been performed.			X		X	
3.2.1.4.3.12.4	The Supervisor's name shall be authenticated by the log in process.			X		X	
3.2.1.4.3.13	**Verify Service Water Pressure Detection System**						X
3.2.1.4.3.13.1	**Determine if Service Water Pressure Detector System Verifications are Complete**						X

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.3.13.1.1	The Operator shall be able to select another Service Water Pressure Detector from the list displayed by the MPS System HMI for the chosen route and repeat the verification process until all the displayed Service Water Pressure Detectors are verified.			X		X	
3.2.1.4.3.13.1.2	The MPS System HMI shall display a local message indicating that all existing Service Water Pressure Detectors in the selected transfer route are verified as operational.			X		X	
3.2.1.4.3.13.1.3	A report of all Service Water Pressure Detector verifications shall be displayed (and/or printed) at the local MPS System HMI, and/or be available to external systems such as TMACS.			X		X	
3.2.1.4.3.13.1.4	The Service Water Pressure Detector operation verification shall be typical for all Service Water Pressure Detectors System.			X		X	
3.2.1.4.3.13.1.5	The Service Water Pressure Detectors System verification shall be provided for those Service Water Pressure Detectors presented in Table 7 of Appendix B.			X		X	
3.2.1.4.3.13.2	**Display List of Service Water Pressure Detectors System Selected for Route**						X

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.3.13.2.1	The Operator shall be able to select a single Service Water Pressure Detector from a list of Service Water Pressure Detectors presented on that MPS System HMI.			X		X	
3.2.1.4.3.13.2.2	The list of Service Water Pressure Detectors displayed shall only contain the Service Water Pressure Detectors that have been selected for the chosen transfer route.			X		X	
3.2.1.4.3.13.2.3	The Service Water Pressure Detector operation Verification is typical for all Service Water Pressure Detectors selected for service in a particular route.			X		X	
3.2.1.4.3.13.2.4	The Service Water Pressure Detector operation verification shall be provided for those Service Water Pressure Detectors presented in Table 7 of Appendix B that have been selected for service in a particular route.			X		X	
3.2.1.4.3.13.3	**Choose Service Water Pressure Detector System Input to be Verified**						X
3.2.1.4.3.13.3.1	The Operator shall be able to select a single Service Water Pressure Detector from a list of Service Water Pressure Detectors presented on that MPS System HMI.			X		X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.13.3.2	This Service Water Pressure Detector operation is typical for all Service Water Pressure Detectors selected for service in a particular route.			X		X	
3.2.1.4.13.4	**Initiate Service Water Pressure Detector System Test**			X		X	
3.2.1.4.13.4.1	The Operator shall be able to initiate a functional test for a Service Water Pressure Detector through MPS System HMI.			X		X	
3.2.1.4.13.4.2	The Service Water Pressure Detector operation verification test is started when a specific command is chosen by the Operator at an HMI.			X		X	
3.2.1.4.3.13.4.3	The Service Water Pressure Detector circuit shall be de-energized by the MPS System for a maximum of 11 seconds when its verification test is started.			X		X	
3.2.1.4.3.13.4.4	An Service Water Pressure Detector functional test shall not shut down a waste transfer.			X		X	
3.2.1.4.3.13.4.5	The route shutdown command shall be inhibited for a maximum of 11 seconds after the Service Water Pressure Detector operation verification test is started or until the end of the test.			X		X	
3.2.1.4.3.13.5	**Monitor and Alarm Service Water Pressure Detector System Status**						X

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.3.13.5.1	The Service Water Pressure Detector discrete input shall be allowed a maximum of 3 seconds to de-energize and stabilize after the Service Water Pressure Detector operation verification test has been started.			X		X	
3.2.1.4.3.13.5.2	After the Service Water Pressure Detector has been de-energized, an Service Water Pressure Detector Alarm shall be activated.			X		X	
3.2.1.4.3.13.5.3	After the Service Water Pressure Detector operation verification test is started, any route shut down caused by this test is inhibited for a maximum of 11 seconds.			X		X	
3.2.1.4.3.13.5.4	The MPS System HMI graphics for each Service Water Pressure Detector Alarm shall be color coded per Section 3.3.7.1.			X		X	
3.2.1.4.3.13.5.5	The MPS System HMI alarms shall be handled in accordance with Section 3.3.7.4.						
3.2.1.4.3.13.5.6	The Service Water Pressure Detector alarms shall be provided for those Service Water Pressure Detectors presented in Table 7 of Appendix B.			X		X	
3.2.1.4.3.13.6	**Confirm that Service Water Pressure Detector System Operated Within Time Limit**						X

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.3.13.6.1	After the Operator initiation of the Service Water Pressure Detector operation verification test and if the Service Water Pressure Detector Alarm activates the Operator chooses a MPS System HMI command that acknowledges the alarm. The alarm acknowledgment confirms the verification test.			X		X	
3.2.1.4.3.13.6.2	If the Service Water Pressure Detector System Alarm does not activate or if the Service Water Pressure Detector System Alarm is not acknowledged by the Operator within 10 seconds, then the verification test is not confirmed.						
3.2.1.4.3.13.7	**Indicate Service Water Pressure Detector System Not Verified**						X
3.2.1.4.3.13.7.1	If the Service Water Pressure Detector Alarm does not activate or the alarm is acknowledged by the Operator within 10 seconds, then MPS System indicates on a local HMI that the relay input is "Not Verified".			X		X	
3.2.1.4.3.13.7.2	The Route Service Water Pressure Detector Verification Test (including timer functions) shall be halted and reset after the Service Water Pressure Detector test has been indicated by the MPS System as "Not Verified".			X		X	
3.2.1.4.3.13.8	**Update Service Water Pressure Detector System Status to "Verified"**						X

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.3.13.8.1	If the Service Water Pressure Detector functional test is performed successfully and acknowledged by the HMI Operator within a specified time period, the Service Water Pressure Detector is then indicated by the MPS System as verified.			X		X	
3.2.1.4.3.13.8.2	When the Service Water Pressure Detector Alarm is acknowledged by an Operator located at the HMI with the Service Water Pressure Detector alarm activated, the Service Water Pressure Detector operation is indicated "verified" by the MPS System HMI.			X		X	
3.2.1.4.3.13.8.3	When the Service Water Pressure Detector operation is indicated "verified" by the MPS System HMI, the Route Service Water Pressure Detector Verification Test (including timer functions) shall be reset (stopped).			X		X	
3.2.1.4.4	**Perform Transfer**						X
3.2.1.4.4.1	**Monitor Incorrect Manual Valve Positions**						X
3.2.1.4.4.1.1	**Manually Enter Valve Position Into MPSS**						X

	Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
				EXAM	DEMO	TEST	ANLY	N/A
†	3.2.1.4.4.1.1.1	When a field Operator stationed at a waste transfer valve that is not connected to the MPS System alerts a control room Operator that there is a misrouting or valve in an incorrect position, the control room Operator will manually shutdown that transfer route.			X		X	
†	3.2.1.4.4.1.1.2	Manual Valve Position entry shall be accomplished by recording the transfer valve's last position, the time and date of entry, and the name of the Operator doing the entry into an MPS System HMI.			X		X	
†	3.2.1 4.4.1.1.3	The MPS System HMI graphics for each Incorrect Valve Position Alarm shall be color coded per Section 3.3.7.1.			X		X	
†	3.2.1.4.4.1.1.4	The Manual Valve Position Indication shall be provided for those transfer valves presented in Tables 9, 10, 13, and 14 of Appendix B as not connected to the MPS System.			X		X	
†	3.2.1.4.4.2	**Monitor Non-MPS Leak Detection Devices**						X
†	3.2.1.4.4.2.1	**Manually Enter Alarm State into MPSS**						X
†	3.2.1.4.4.2.1.1	When a field Operator stationed at a leak detection device that is not connected to the MPS System alerts a control room Operator that there is a leak, the control room Operator will manually shutdown that transfer route.			X		X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
† 3.2.1.4.4.2.1.2	Alarm state entry shall be accomplished by recording the leak detector's last state, the time and date of entry, and the name of the Operator doing the entry into an MPS System HMI.			X		X	
† 3.2.1.4.4.2.1.3	The MPS System HMI graphics for each Leak Detector Alarm shall be color coded per Section 3.3.7.1.			X		X	
† 3.2.1.4.4.2.1.4	The MPS System HMI alarms shall be handled in accordance with Section 3.3.7.4.			X		X	
3.2.1.4.4.2.1.5	The Non-MPS Leak Detector alarms shall be provided for those Leak Detection devices presented in Table 8 of Appendix B as not connected to the MPS System.			X		X	
3.2.1.4.4.3	**Monitor MPSS Leak Detectors**						X
3.2.1.4.4.3.1	**Monitor Leak Detection Signals**					X	
3.2.1.4.4.3.1.1	When leak detector is Safety class then MPS System S.C. is Safety Class					X	
3.2.1.4.4.3.2	**MPSS Leak Detected Alarm**						X
3.2.1.4.4.3.2.1	Immediate identification of the source of a master pump shutdown command signal will be available in the form of an alarm at any HMI and will be available to be communicated as data to the TMACS central station via HLAN.			X	X	X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.4.3.2.2	The MPS System shall be able to alarm and identify which MPS System input (e.g., leak detectors, manual push button, existing MPS relay inputs, etc.) caused a master pump shutdown.			X	X	X	
3.2.1.4.4.3.2.3	Any tank farm Operator at any MPS HMI shall be able to monitor the real-time status of the MPS System utilizing the WTA mode of operation described above.			X	X	X	
† 3.2.1.4.4.3.2.4	The MPS System HMI alarms shall be handled in accordance with Section 3.3.7.4.			X		X	
† 3.2.1.4.4.3.2.5	The MPS System HMI graphics for each Leak Detector Alarm shall be color coded per Section 3.3.7.1.			X		X	
† 3.2.1.4.4.3.2.6	The Leak Detector alarms shall be provided for those Leak Detection devices presented in Tables 2 and 4 of Appendix B as directly connected to the MPS System.			X		X	
3.2.1.4.4.3.2.7	Leak detection system/MPS System interfaces shall be failsafe, that is, upon loss of signal, a leak detection signal shall be initiated.					X	
3.2.1.4.3.3	Reserved						
3.2.1.4.4.3.4	**MPSS Leak Detector Malfunction Alarm**						X

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.4.3.4.1	Immediate identification of the source of a master pump shutdown command signal will be available in the form of an alarm at any HMI and will be available to be communicated as data to the TMACS central station via HLAN			X	X	X	
3.2.1.4.4.3.4.2	The MPS System shall be able to alarm and identify which MPS System input (leak detectors, manual push button, existing MPS relay input, etc.) caused a master pump shutdown.			X	X	X	
3.2.1.4.4.3.4.3	A detected failure of the Leak Detection System shall cause an output signal to be transmitted to the MPS System.			X	X	X	
† 3.2.1.4.4.3.4.4	The MPS System HMI alarms shall be handled in accordance with Section 3.3.7.4.			X		X	
† 3.2.1.4.4.3.4.5	The MPS System HMI graphics for each Leak Detector Malfunction Alarm shall be color coded per Section 3.3.7.1.			X		X	
† 3.2.1.4.4.3.4.6	The Leak Detector Malfunction alarms shall be provided for those Leak Detection devices presented in Tables 2 and 4 of Appendix B as directly connected to the MPS System and as including a low probe voltage relay.			X		X	
3.2.1.4.4.3.4.7	Leak detection system/MPS System interfaces shall be failsafe, that is, upon loss of signal, a leak detection signal shall be initiated.					X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.4.4	**Monitor Incorrect Valve Positions**						X
3.2.1.4.4.4.1	**Alarm Incorrect Valve Position**						X
3.2.1.4.4.4.1.1	For each transfer the MPS System shall be able to interlock the appropriate transfer pump so as to be able to shut it down if an incorrect transfer valve position is detected.			X	X	X	
3.2.1.4.4.4.1.2	The MPS System shall monitor correct transfer valve position for six simultaneous waste transfers.			X		X	
3.2.1.4.4.4.1.3	For each transfer the MPS System shall alarm and identify which incorrectly positioned valve caused a master pump shutdown.			X	X	X	
3.2.1.4.4.4.1.4	The MPS System HMI alarms shall be handled in accordance with Section 3.3.7.4.			X		X	
3.2.1.4.4.5	**Initiate Manual Route Shutdown**						X
3.2.1.4.4.5.1	**Manually Initiate Route Shutdown**						X
3.2.1.4.4.5.1.1	The Operator shall be able to manually shutdown one of six routes if any of the following events occur:			X	X	X	
3.2.1.4.4.5.1.2	The Route Shutdown pull-switches for the six simultaneously operating transfers shall be located at the 241-AZ-271 Control Room.					X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.4.5.1.3	For each transfer route in operation, there shall be a manual push button located on each MPS System HMI that initiates a manual master pump shutdown for that route.			X		X	
3.2.1.4.4.5.1.4	The manual pull-switches shall be designated as Safety Class					X	
3.2.1.4.4.5.2	**Alarm Route Manual Shutdown**						X
3.2.1.4.4.5.2.1	The MPS System shall be able to alarm and identify which MPS System input (leak detectors, manual push-button, existing MPS relay inputs, etc.) That caused a master pump shutdown.			X	X	X	
3.2.1.4.4.5.2.2	The MPS System HMI graphics for each Route Manual Shutdown Alarm shall be color coded per Section 3.3.7.1.			X		X	
3.2.1.4.4.5.2.3	The MPS System HMI alarms shall be handled in accordance with Section 3.3.7.4.			X		X	
3.2.1.4.4.5.2.4	The Route Manual Shutdown alarms shall be provided for those Route Manual Shutdown pull-switches for the six simultaneously operating transfers located at the 241-AZ-271 Control Room.			X	X	X	
3.2.1.4.4.5.3	**Manually Initiate All-Route Shutdown**						X

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.4.5.3.1	If an All-Route Shutdown pull-switch is pulled by an Operator located in 200 East, all transfer pumps in 200 East and; if and only if, a cross-site transfer is in progress; 200 West are shut down.			X	X	X	
3.2.1.4.4.5.3.2	The All-Route Shutdown pull-switches shall be located at the AN, AZ, AW & AP instrument buildings and at the 242-S Evaporator control room.			X	X	X	
3.2.1.4.4.5.3.3	The manual pull-switches shall be designated as Safety Class.					X	
3.2.1.4.4.5.4	**Alarm All-Route Manual Shutdown**						X
3.2.1.4.4.5.4.1	The MPS System shall be able to alarm and identify which MPS System input (leak detectors, manual push-button, existing MPS relay inputs, etc.) That caused a master pump shutdown.			X	X	X	
3.2.1.4.4.5.4.2	An All-Route Shutdown Alarm shall be displayed on the MPS System HMI's.			X	X	X	
† 3.2.1.4.4.5.4.3	The MPS System HMI graphics for each All-Route Manual Shutdown Alarm shall be color coded per Section 3.3.7.1.			X		X	
† 3.2.1.4.4.5.4.4	The MPS System HMI alarms shall be handled in accordance with Section 3.3.7.4.			X		X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.4.5.4.5	The All-Route Manual Shutdown alarms shall be provided for those All-Route Manual Shutdown pull-switches shall be located at the AN, AZ, AW & AP instrument buildings and at the 242-S Evaporator control room.			X	X	X	
3.2.1.4.4.6	**Initiate Automatic Route Shutdown**						X
3.2.1.4.4.6.1	**Compare MPS Elements to MPS Elements Selected for a Transfer Route**						X
3.2.1.4.4.6.1.1	The MPS System shall be programmed to allow MPS System inputs to be associated with six simultaneously operating waste transfers.					X	
3.2.1.4.4.6.1.2	The MPS System shall be able to interlock the appropriate transfer pump so as to be able to shut it down if a MPS System input selected for a transfer route is detected.			X	X	X	
3.2.1.4.4.6.1.3	The MPS System shall use existing relays as input signals that reflect an existing master pump shutdown command.			X	X	X	
3.2.1.4.4.6.1.4	The function (FFBD 4.4.6) shall be identified as Safety Class					X	
3.2.1.4.4.6.2	**Manually Initiate Element Bypass**						X

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.4.6.2.1	During a transfer, the Route Shutdown function shall be able to be bypassed by an Operator located at a MPS System HMI allowing the waste transfer to continue operation.			X		X	
† 3.2.1.4.4.6.2.2	The shift supervisors administrative approval is required to perform an element bypass operation.			X		X	
† 3.2.1.4.4.6.2.3	The element bypass operation shall be accomplished by recording in an MPS System HMI the MPS System element identification, the time and date when the bypass is enabled/disabled, and the name of the Supervisor sanctioning the element bypass operation.			X		X	
† 3.2.1.4.4.6.2.4	The Supervisor's name shall be authenticated by the MPS System log in process.			X		X	
† 3.2.1.4.4.6.3	**Update MPS System Input Element Status to "Bypassed"**						X
† 3.2.1.4.4.6.3.1	The MPS System shall identify any MPS System input that has been bypassed.			X		X	
3.2.1.4.4.6.3.2	The MPS System shall identify any MPS System input that is bypassed that is in an alarm state.			X	X	X	
3.2.1.4.4.6.3.3	Every MPS System Input Element shall be capable of being manually bypassed.			X	X	X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.4.6.4	**Compare MPS System Selected Elements to Bypassed Elements**						X
3.2.1.4.4.6.4.1	The MPS System shall have the ability to identify any MPS System input that has been bypassed.			X	X	X	
3.2.1.4.4.6.4.2	Every MPS System Input Element shall be capable of being manually bypassed.			X	X	X	
3.2.1.4.4.7	**Transfer Pump Shutdown**						X
3.2.1.4.4.7.1	**De-Energize Route Shutdown Loop**						X
3.2.1.4.4.7.1.1	Part of the MPS System shall be designed as failsafe.					X	
3.2.1.4.4.7.1.2	A Route Shutdown command is initiated by a MPS System PLC if either a leak is detected, an existing MPS relay is de-energized, an incorrect valve position is sensed, an Operator pulls a Manual Shutdown pull-switch, or the PLC receives a Route Shutdown command via a de-energized route shutdown loop from another MPS System PLC or CTS PCU.			X	X	X	
3.2.1.4.4.7.1.3	A Route Shutdown Loop shall connect all the MPS PLCs in the 200 East Area.			X	X	X	
3.2.1.4.4.7.1.4	The function FFBD 4.4.7.1 shall be identified as Safety Class					X	
3.2.1.4.4.7.2	**Alarm Route Shutdown**						X

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
† 3.2.1.4.4.7.2.1	An Alarm shall be activated immediately after a route shutdown is initiated to identify to the Operator(s) what route is being shut down.			X		X	
† 3.2.1.4.4.7.2.2	A MPS alarm message shall be displayed at all MPS System HMIs in all modes of operation.			X		X	
† 3.2.1.4.4.7.2.3	The MPS System shall present a route shutdown alarm for each route.			X		X	
3.2.1.4.4.7.3	**Compare Pump Interlocks to Interlocks Selected For Transfer Route**						X
3.2.1.4.4.7.3.1	The MPS System shall be able to interlock the appropriate transfer pump so as to be able to shut it down if a selected MPS System Input is detected.			X	X	X	
3.2.1.4.4.7.3.2	The MPS System shall not be able to shut down other transfer pumps that are not associated or selected with the detected MPS System Inputs.			X		X	
3.2.1.4.4.7.3.3	The function FFBD 4.4.7.3 shall be identified as Safety Class					X	
3.2.1.4.4.7.4	**De-energize Selected Pump Interlock(s)**						X

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.4.7.4.1	For each waste transfer route, the MPS System shall interlock the appropriate transfer pump(s) so as to be able to shut it down automatically if a MPS System Input selected for that route is detected.			X	X	X	
3.2.1.4.4.7.4.2	The MPS System outputs shall switch the pump interlock relay(s) to accomplish an automatic shutdown with the waste appropriate transfer pumps motor control centers (MCCs).			X	X	X	
3.2.1.4.4.7.4.3	The transfer pump interlocks shall be provided for those transfer pumps presented in Table 5 of Appendix B.			X		X	
3.2.1.4.4.7.4.4	The MPS System HMI shall display the actual waste transfer pump running status changes as alarms.			X	X	X	
3.2.1.4.4.7.4.5	The function of de-energized selected pump interlock(s) shall be identified as SC and meet the requirements of Section 3.3.6.3.1.						
3.2.1.4.4.7.5	**Verify Transfer Pump Shutdown**						X
3.2.1.4.4.7.5.1	The MPS System shall present transfer pump running status determined by auxiliary contacts on the motor starter to provide a pump stopped confirmation to the Operator after a route shut down.			X	X	X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.4.7.5.2	The MPS System HMI graphics for each transfer pump running status shall be color coded per Section 3.3.7.1.			X		X	
3.2.1.4.4.7.5.3	The transfer pump running status shall be provided for those transfer pumps presented in Table 5 of Appendix B.			X		X	
3.2.1.4.4.7.5.4	For the following pumps, the pump run status shall be manually determined and entered into the MPS System via a HMI.			X	X	X	
3.2.1.4.4.7.5.5	The function FFBD 4.7.7.4 shall be identified as Safety Class					X	
3.2.1.4.4.8	**Monitor Existing MPS System**						X
3.2.1.4.4.8.1	**Monitor and Alarm Existing MPS Relay**						X
3.2.1.4.4.8.1.1	A Route Shutdown command shall be initiated if an existing MPS relay input is de-energized.			X	X	X	
3.2.1.4.4.8.1.2	An alarm shall be activated on the MPS System HMI immediately after a Route Shutdown command is initiated to identify the source of the command activation.			X	X	X	
3.2.1.4.4.8.1.3	The existing MPS System consists of leak detection systems and other devices which are connected in series to interposing electromagnetic relays.			X		X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.4.8.1.4	During a waste transfer the MPS System shall have the ability to alarm and identify which MPS System input (existing MPS relay inputs, etc.) caused a route shutdown for every simultaneously operating transfer.			X	X	X	
3.2.1.4.4.8.1.5	The MPS System HMI graphics for each MPS Relay Input Alarm shall be color coded per Section 3.3.7.1.			X	X	X	
3.2.1.4.4.8.1.6	The MPS System HMI alarms shall be handled in accordance with Section 3.3.7.4.			X	X	X	
3.2.1.4.4.8.1.7	The MPS Relay Input alarms shall be provided for those MPS Relays presented in Table 7 of Appendix B.			X	X	X	
3.2.1.4.4.8.1.8	The function 4.4.8.1 shall be identified as Safety Class					X	
3.2.1.4.4.8.2	**Manually Enter Alarm Source into MPSS**					X	X
3.2.1.4.4.8.2.1	After a device that is connected to the MPS System via an existing MPS relay is identified as the source of a Route Shutdown, the control room operator will enter the device state change into the MPS System HMI to communicate and document the cause of the route shutdown.			X		X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.4.8.2.2	Alarm state entry shall be accomplished by recording the last state of the MPS Relay Connected Device, the time and date of entry, and the name of the Operator doing the entry into an MPS System HMI.			X		X	
3.2.1.4.4.8.2.3	The MPS System HMI graphics for each MPS/CD Alarm shall be color coded per Section 3.3.7.1.			X		X	
3.2.1.4.4.8.2.4	The MPS System HMI alarms shall be handled in accordance with Section 3.3.7.4.			X		X	
3.2.1.4.4.8.2.5	The MPS System alarms shall be provided for those devices presented in Table 7 of Appendix B as connected to an existing MPS Relay.			X		X	
3.2.1.4.4.9	**De-Energize Route Transfer Pumps**						X
3.2.1.4.4.9.1	**Verify Transfer Pump(s) De-Energized**						X
3.2.1.4.4.9.1.1	The MPS System shall present transfer pump circuit breaker status to the Operator determined by the sensing of the pump motor starter control power.			X	X	X	
3.2.1.4.4.9.1.2	The MPS System HMI graphics for each transfer pump running status shall be color coded per Section 3.3.7.1.			X		X	
3.2.1.4.4.9.1.3	The transfer pump running status shall be provided for those transfer pumps presented in Table 5 of Appendix B.			X		X	

	Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
				EXAM	DEMO	TEST	ANLY	N/A
†	3.2.1.4.4.9.2	**Reset Route Shutdown Loop**						X
†	3.2.1.4.4.9.2.1	A Route Shutdown event requires acknowledgment by an Operator actuating the Route Shutdown Reset command on a MPS System HMI.			X		X	
†	3.2.1.4.4.10	**Annunciate Waste Transfer Alarms**						X
†	3.2.1.4.4.10.1	All MPS System alarms shall be displayed in a set of MPS HMI graphical screens that simplify the presentation of approximately 200 alarms.			X		X	
†	3.2.1.4.4.10.2	All simultaneously operating waste transfer routes shall be displayed on the Waste Transfer Annunciator set of MPS HMI graphical screens.			X		X	
†	3.2.1.4.4.10.3	The running status of all waste transfer pumps shall be displayed on the Waste Transfer Annunciator set of MPS HMI graphical screens.			X		X	
	3.2.1.4.4.10.4	The dynamic analog data associated with all waste transfer routes shall be displayed on the Waste Transfer Annunciator set of MPS HMI graphical screens.					X	
†	3.2.1.4.4.10.5	All MPS alarms shall be identified on the Waste Transfer Annunciator set of MPS HMI graphical screens as to whether or not they are associated with a transfer route utilizing an alarm prioritizing scheme.			X		X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.4.10.6	An alarm for each transfer pump shall be provided indicating that the pump's circuit breaker is closed when the pump has not been selected for service in any transfer route.			X		X	
3.2.1.4.4.10.7	All MPS System alarms and parameters shall be available to TMACS and other authorized users via HLAN connections.			X		X	
3.2.1.4.4.10.8	Process lines on the MPS System HMI displays shall be color-coded as specified in Section 3.3.7.1.			X		X	
3.2.1.4.4.10.9	Pump operation indication shall be color-coded on the MPS System HMI graphic displays as specified in Section 3.3.7.1.			X		X	
3.2.1.4.4.10.10	By clicking an alarm on the HMI, an Operator shall be automatically taken from the active alarm summary list screen to the graphic screen displaying the alarm.			X		X	
3.2.1.4.4.11	**Monitor and Alarm Service Water Pressure Detector**						X
3.2.1.4.4.11.1	A Route Shutdown command shall be initiated if an Service Water Pressure Detector is de-energized.			X		X	
3.2.1.4.4.11.2	An alarm shall be activated on the MPS System HMI immediately after a Route Shutdown command is initiated to identify the source of the command activation.			X		X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.1.4.4.11.3	During a waste transfer the MPS System shall have the ability to alarm and identify which MPS System input (Service Water Pressure Detector etc.) caused a route shutdown for every simultaneously operating transfer.			X		X	
3.2.1.4.4.11.4	The MPS System HMI graphics for each Service Water Pressure Detector Alarm shall be color coded per Section 3.3.7.1.			X		X	
3.2.1.4.4.11.5	The MPS System HMI alarms shall be handled in accordance with Section 3.3.7.4.			X		X	
3.2.1.4.4.11.6	The Service Water Pressure Detector alarms shall be provided for those Service Water Pressure Detector presented in Table 7 of Appendix B.			X		X	
3.2.1.4.4.11.7	The function of monitoring Service Water Pressure Detector status (FFBD 4.4.11) shall be identified as Safety Class and meet the requirements of Section 3.3.6.3.1.			X		X	
3.2.1.5	**Post-Transfer Flush**						X
3.2.1.6	**Post-Transfer Valve Line-Up**						X
3.2.1.7	**Supervisor's Approval**						X
3.2.1.7.1	An Administrative approval shall be required prior to releasing the route for use by other transfers.					X	

	Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
				EXAM	DEMO	TEST	ANLY	N/A
†	3.2.1.7.2	Supervisor approval shall be accomplished by inputting the waste transfer identification, the time and date of the approval, and the name of the Supervisor doing the approval.			X		X	
†	3.2.1.8.	**Reset Transfer Route**						X
†	3.2.1.8.1	The Operator shall be able to reset each of the six simultaneous waste transfer routes independently.			X		X	
†	3.2.1.8.2	The MPS System shall prevent a transfer route reset if any of the selected transfer pump circuit breakers are closed (energizing the pump motor).			X		X	
†	3.2.1.8.3	Transfer Route Reset shall be initiated by the Operator via a MPS System HMI.			X		X	
	3.2.1.9	**Choose Post-Transfer Flush Mode**						X
	3.2.1.9.1	After a Route Shutdown, the Operator shall either select the Post-Transfer Flush Mode or not.			X		X	
	3.2.2	**Physical Characteristics**						X
	3.2.2.1	Weight limit: Not applicable to this specification.						X
	3.2.2.2	**Access for Maintenance:**						X

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.2.2.1	The MPS System indoor components shall be able to fit and be accessible for all required maintenance inside the instrument buildings and operating centers listed in section 3.2.1.1.5 and as shown on drawings referenced in the PICD, HNF-SD-W314-PICD-001.					X	
3.2.2.2.2	The MPS System outdoor components shall be located to not obstruct vehicle access to pits and tanks while remaining accessible for all required maintenance.					X	
3.2.2.3	Requirements for transport and storage: Not applicable to this specification.					X	
3.2.2.4	Durability factors: Not applicable to this specification.					X	
3.2.2.5	Health and Safety Criteria:					X	
3.2.2.5.1	The MPS System outdoor components shall be located outside of any pits and shielded from radiation from the pits cover block.					X	
3.2.2.6	Security criteria: Software security requirements are found in section 3.2.1.1.					X	
3.2.2.6.1	The MPS System components shall be lockable to prevent unauthorized access to the systems electronics.					X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.2.7	Vulnerability factors: Not applicable to this specification.					X	
3.2.3	**Reliability**						X
3.2.3.1	The Master Pump Shutdown system shall have a design life of 35 years.					X	
3.2.3.2	Fault Detection/Fault Isolation					X	
3.2.3.3	Mission Time & System Availability					X	
3.2.3.4	Overall System Reliability					X	
3.2.4	**Maintainability**						X
3.2.4.1	Mean time to Repair:					X	
3.2.5	**Environmental Conditions**						X
3.2.5.1	Natural Environments					X	
3.2.5.1.1	Ambient Air Temperature					X	
3.2.5.1.2	Soil Temperature					X	
3.2.5.1.3	Seismic Loads					X	
3.2.5.1.4	Wind Loads					X	
3.2.5.1.5	Snow Loads					X	
3.2.5.1.6	Relative Humidity					X	
3.2.5.1.7	Surface Precipitation					X	
3.2.5.1.8	Hail Events					X	
3.2.5.1.9	Sand and Dust					X	
3.2.5.10	Solar Radiation					X	
3.5.2.1.11	Glaze					X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.2.5.1.12	Ashfall Events					X	
3.2.5.1.13	Dead Loads					X	
3.2.5.1.14	Thermal Forces					X	
3.2.5.1.15	Creep and Shrinkage Forces					X	
3.2.5.1.16	Load Combinations and Allowable Stresses					X	
3.2.5.2	Induced Environment.						X
3.2.5.2.1	Waste Properties					X	
3.2.5.2.2	Radiation Tolerance					X	
3.2.5.2.2.1	Inside Pit Radiation Level						X
3.2.5.2.2.2	Background Radiation Level					X	
3.2.5.3	MPS System HMI Location Environments						X
3.2.5.3.1	Temperature					X	
3.2.5.3.2	Relative Humidity					X	
3.2.5.3.3	Earthquake Loads					X	
3.2.5.3.4	Induced Environments					X	
3.2.5.4	Insects, Rodents, and Vermin Protection						
3.2.6	**Transportability**						X
3.2.7	**Flexibility and Expansion**					X	
3.3	**Design and Construction**						X
3.3.1	**Materials, Processes and Parts**						X

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.3.1.1	Electrical equipment enclosures for outdoor locations shall have a minimum rating of NEMA ICS 6, Type 4.					X	
3.3.1.2	All electrical systems shall comply with NFPA 70, UL 508A and DOE Order 6480.1a, Div. 16 as applicable.					X	
3.3.1.3	Electrical materials and equipment shall be UL or FM tested.					X	
3.3.1.4	Onsite acceptance testing shall be required for each major system.					X	
3.3.1.5	The following list of operational support equipment shall be required:					X	
3.3.1.6	MPS System electronics shall be modular and plug in to facilitate repairs by replacing failed parts with uninstalled plug-in spares that shall be stored onsite.					X	
3.3.1.7	The TFLAN communication media shall be capable of supporting closed circuit television (CCTV) signals and voice transmission signals.					X	
3.3.1.8	During the design of facilities, optimization principles, as discussed in ICRP Publication 37, shall be utilized in developing and justifying facility design and physical controls.					X	
3.3.2	**Electromagnetic Radiation**				X	X	
3.3.3	**Identification and Marking**						X

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.3.3.1	New equipment and/or modifications to existing equipment shall be labeled in a standardized format in accordance with the tank farm labeling program procedure 6-TF-100 as specified in HNF-IP-0842, Volume II, Section 6.1, Rev. Oa.					X	
3.3.3.2	A master equipment list consisting of electronic database for structures, systems, and components shall be generated in accordance with HNF-IP-0842, Volume II, Section 4.14, Rev. 2b.					X	
3.3.3.3	Operations and Maintenance Drawings (as-built H-14 essential drawings) shall be prepared as the system master drawings showing as-built configuration changes in accordance with HNF-IP-0842, Volume IV, Section 4.25, Rev. Oa.					X	
3.3.4	**Workmanship**						X
3.3.5	**Interchangeability**					X	
3.3.6	**Safety**						X
3.3.6.1	The MPS System shall shut down a waste transfer upon detection of a leak.					X	
3.3.6.2	The MPS System shall have a failsafe interlock to shut down any waste transfer operation.					X	
3.3.6.3	Nuclear Safety						X
3.3.6.3.1	Safety Classification					X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.3.6.3.1.1	No Components of the MPS System are required to survive or operate during a seismic event.					X	
3.3.6.3.1.2	No safety Class power shall be required if MPS System is failsafe.					X	
3.3.6.3.1.3	No single component of the MPS System shall prevent the MPS System to perform its Safety Class function.					X	
3.3.6.3.1.4	Physical separation of redundant wiring shall not be necessary.					X	
3.3.6.3.1.5	Isolation between MPS System Safety Class Signals and non Safety Class signals shall not be required,					X	
3.3.6.3.1.6	Commercial grade components used for Safety Class service shall be tested to ensure that they will perform the intended safety function.					X	
3.3.6.3.2	Flammable Gas Hazardous Environment					X	
3.3.7	Human Performance/Human Engineering.						X
3.3.7.1	Graph Screen Color Coding.						X
† 3.3.7.1.1	Process pipe Lines on the screens are color-coded.			X		X	
† 3.3.7.1.2	Transfer Pump Operation Indication on the MPS System HMI displays shall be color-coded as follows:			X		X	

	Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
				EXAM	DEMO	TEST	ANLY	N/A
†	3.3.7.1.3	Transfer Valve Position Indication on the MPS System HMI displays shall be color-coded as follows:			X		X	
†	3.3.7.1.4	Leak Detector Operation Indication on the MPS System HMI displays shall be color-coded as follows:			X		X	
†	3.3.7.1.5	Existing MPS Relay Operation Indication on the MPS System HMI displays shall be color-coded as follows:			X		X	
†	3.3.7.2	The MPS System shall have a double confirmation command sequence for inputting all operator commands.			X		X	
†	3.3.7.3	Shutdown Parameters					X	
†	3.3.7.4	Alarm Handling						X
†	3.3.7.4.1	Alarm conditions shall produce red flashing alarm indication on the MPS System HMI displays, along with audible beeps originating from the HMI.			X		X	
†	3.3.7.4.2	Alarm history shall be displayed on the MPS System HMIs in organized groups and prioritized.			X		X	
†	3.3.7.4.3	The MPS System shall print alarm messages in the sequence as it occurs with time and date on MPS System printers located at all operations centers.			X		X	
†	3.3.7.4.4	The MPS System shall log alarms to computer disk in the sequence as it occurs with time and date.			X		X	

	Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
				EXAM	DEMO	TEST	ANLY	N/A
†	3.3.7.4.5	The MPS System shall log the operator acknowledgment of each alarm to computer disk and print a message recording the alarm acknowledgment.			X		X	
†	3.3.7.4.6	An MPS System HMI alarm summary display shall show the alarm function status (enabled or disabled) for all alarms.			X		X	
†	3.3.7.4.7	Enabling/disabling of alarms shall be accomplished automatically by the MPS System software program or manually at a shift supervisor or systems administrator security level only.			X		X	
†	3.3.7.4.8	The MPS System shall log the enabling and disabling of alarms with the user designator, time, and date of action.			X		X	
	3.3.7.4.9	All MPS System alarms shall have re-alarm time delay capability and all analog alarms shall have dead band capability.					X	
	3.3.7.4.10	All MPS System alarms and parameters shall be available to TMACS and other authorized users via HLAN connections.			X		X	
†	3.3.7.4.11	All MPS System alarms shall be displayed in a set of MPS System HMI graphical displays that simplify the presentation of approximately 200 alarms.			X		X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.3.7.4.12	All MPS System alarms shall be handled at each MPS System HMI as follows:			X		X	
3.3.7.5	Each control device shall be in accordance with NUREG 0700, Section 6.4, and MIL-STD-1472E, Section 5.4, in accordance with DOE 6430.1a, Section 1300-12.4.7.					X	
3.3.7.6	Each display device shall be in accordance with NUREG 0700, Sections 6.5 and 6.7, and MIL-STD-1472E, Section 5.2, in accordance with DOE 6430.1a, Section 1300-12.4.6.					X	
3.3.7.7	Each warning and annunciator shall be in accordance with NUREG 0700, Sections 6.2 and 6.3, and MIL-STD-1472E, Section 5.3, in accordance with DOE 6430.1a, Section 1300-12.4.8.					X	
3.3.7.8	The MPS System HMI shall be able to be operated by color blind operators.					X	
3.3.7.9	Project W-314 HMIs shall integrate seamlessly with Project W-211 HMIs.					X	
3.3.7.9.1	Human-Machine Interface (HMI) software shall be the same for all current RPP projects (W-211, W-314 and W-320).					X	
3.3.7.9.2	HMI standards document shall be generated for use with the common HMI application software.					X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.3.7.9.3	PLC programming software shall be the same for the W-211, W-521, and W-314 projects.					X	
3.3.7.9.4	PLC manufacturer and model shall be the same for the W-211, W-521, and W-314 projects.					X	
3.3.7.9.5	A Software Control Matrix which explains for the W-211 and W-314 projects how the control system software is being configured, documented and controlled shall be developed.					X	
3.3.7.9.6	HMI applications for different projects in the same tank farms shall be combined through the use of the Citect "include" function (or equal).					X	
3.4	**Documentation**						X
3.4.1	Records, documents, and document control pertinent to design functions shall be in accordance with HNF-PRO-224 and HNF-PRO-233.		X			X	
3.4.2	Drawings shall be prepared according to the formats set forth in HNF-PRO-242 Rev.0, "Engineering Drawing Requirements."		X			X	
3.4.3	Loop diagrams in accordance with ANSI/ISA-55.4 shall be provided for each input and output connected to the MPS System.		X			X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.4.4	Logic diagrams in accordance with ANSI/ISA-55.2 or equivalent (e.g., Control Plus) shall be provided for each MPS System controlled device (pump, valve, etc.) and for each HMI alarm.		X			X	
3.4.5	Software documentation shall be prepared, released, and revised in accordance with RPP-PRO-309.		X			X	
3.5	**Logistics**						X
3.5.1	**Maintenance**						X
3.5.1.1	The MPS System maintenance support environment shall be existing onsite maintenance and procurement organizations which currently serve the Hanford tank farms.					X	
3.5.1.2	Electrical MPS System wiring materials shall be readily available from local commercial suppliers in bulk quantities.					X	
3.5.1.3	MPS System electronics shall be modular and plug-in to facilitate repairs by replacing failed parts with uninstalled plug-in spares that are stored onsite.					X	
3.5.1.4	An MPS System operator trainer shall assist systems administrators in the updating of MPS System software, maintaining software configuration and the diagnosing of software bugs.					X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.5.1.5	MPS System network maintenance which includes the TFLAN communication network and the TMACS interface shall be performed onsite.					X	
3.5.1.6	Fully Remote Maintenance and Operation.					X	
3.5.1.7	Limited Contact Maintenance and Operation.					X	
3.5.1.8	Full Contact Maintenance and Operation.					X	
3.5.1.9	Isolating devices shall be provided for each MPS System power supply. The locking device shall be designed to accept a lockout device.					X	
3.5.2	**Supply**						X
3.5.2.1	The system design shall , to the greatest extent practible, use readily available parts and components.					X	
3.5.3	**Facility and Facility Equipment**						X
3.5.3.1	The following new diagnostic equipment shall be required.					X	
3. 5.3.2	Space in an existing air-conditioned facility shall be made available for housing the MPS System operator trainer.					X	
3.6	**Personnel and Training**						X
3.6.1	**Personnel**						X

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.6.1.1	MPS System shall require qualified tank farm operators.					X	
3.6.1.2	Electrical MPS System maintenance shall be performed by qualified electricians.					X	
3.6.1.3	Electronic maintenance shall be performed by Certified onsite instrument/computer technicians.					X	
3.6.1.4	Software maintenance shall be performed by qualified onsite systems administrators.					X	
3.6.1.5	MPS System network maintenance, which includes the TFLAN communications network and the TMACS interface shall be performed by qualified onsite telecommunications technicians.					X	
3.6.2	**Training**						X
3.6.2.1	An Operator Training System (OTS) shall be provided as described below to assist on-the-job training for the MPS System.					X	
3.6.2.2.1	OTS General Requirements						X
3.6.2.2.1.1	The OTS shall be off line and independent of the MPS System.					X	
3.6.2.2.1.2	The OTS shall be portable.					X	
3.6.2.2.1.3	The OTS shall consist of four Human-Machine Interface (HMI) desk-top PC's: three operator stations and one instructor station and four PLCs mounted in a Nema 12 enclosure.					X	

Section Paragraph Number	Title	Level of Assembly	Inspection of Element				
			EXAM	DEMO	TEST	ANLY	N/A
3.6.2.2.1.4	Each of the three operator stations shall provide the same human machine interface as an actual MPS System operator station as described in Section 3.2.					X	
3.6.2.2.1.5	The Instructor's station shall have the capability of simulating each of the field inputs to the MPS System and monitoring each of the MPS Systems outputs.					X	
3.6.2.2.1.6	In addition to all of the operations functionality provided by the MPS System hardware and software, the OTS shall provide a sample of each MPS System field device for maintenance personnel training and software development purposes.					X	
3.6.2.2.2	OTS PLC Requirements					X	
3.6.2.2.3	OTS HMI Requirements					X	
3.6.2.2.4	OTS Simulation Requirements					X	
3.6.2.2.5	OTS Integration Requirements					X	
3.6.2.3	Mock-up training on actual MPS System components shall be required.					X	
3.7	**Major Component Characteristics**						X

5.0 Notes

5.1 Definitions

5.1.1 Simultaneous Waste Transfers

Simultaneous waste transfers is defined as two or more independent transfer routes are

being used at the same time where independent is defined as the waste in each route is isolated from the waste in the other routes. A simultaneous transfer can have the same sources, pits, or destinations but they cannot use the same lines, pumps, jumpers and valves.

5.1.2 Transfer Route Interference(s)

A transfer route interference is when two or more transfer routes use the same line, valve, jumper or pump and their associated leak detectors, MPS relays, etc..

5.1.3 MPS System Mean Time To Repair

The MPS System Mean Time To Repair is defined as the mean time to repair any component of the MPS System and does not include any site driven time requirements such as tank farm entry planning, dressing up in special clothing, or assembling life support equipment.

5.1.4 MPS System Operator Trainer

The Operator Trainer shall consist of identical components as described in section 3.1 for one MPS System node per figure 1 plus one additional PLC and a simulator. The Operator Trainer HMI functions identically to the MPS System as described in section 3.2. The simulator shall be able to generate an input signal at any input point on the MPS System Operator Trainer, and it shall be able to monitor all output signals generated by the MPS System Operator Trainer. The simulator output signals shall be programmable utilizing monitored output signals received from the MPS System Operator Trainer as well as manual input signals received from a simulator HMI.

This document was too large to scan as a single document. It has been divided into smaller sections.

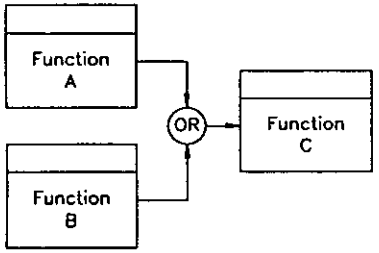
Section 2 of 2

Document Information			
Document #	**SD-W314-TI-012**	**Revision**	**4**
Title	REQUIREMENTS ANALYSIS STUDY FOR MASTER PUMP SHUTDOWN SYS PROJECT DEVELOPMENT SPEC		
Date	**09/20/2000**		
Originator	**RR BEVINS**	**Originator Co.**	**CHG**
Recipient		**Recipient Co.**	
References	**ECN-662875**		
Keywords			
Projects	**W-314**		
Other Information	**BEST AVAILABLE COPY**		

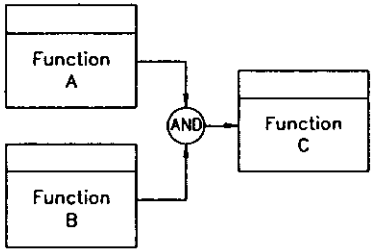
APPENDIX A

FUNCTIONAL FLOW BLOCK DIAGRAMS (FFBDs)

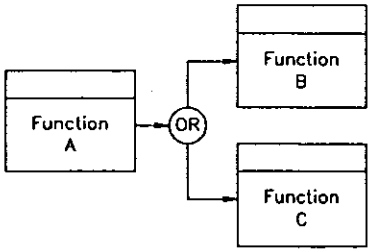
FFBD Legend



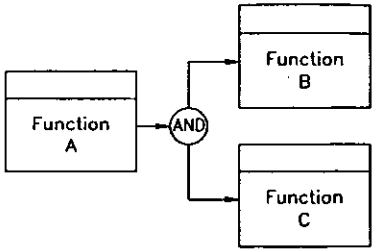
Function A OR B must be Completed Before Function C can Start



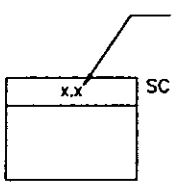
Function A AND B must be Completed Before Function C can Start



After Function A is Completed, Function B "OR" C "OR" both can Start



After Function A is Completed, Function B "AND" C must Start



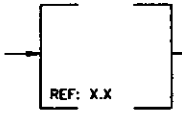
= Function No.

SC = Indicates Safety Class Function

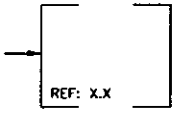
= W-314 Phase I Function Block

= Indicates Function Block is Decomposed further into Function Blocks.

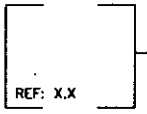
= Function Block not owned by W-314 Phase I



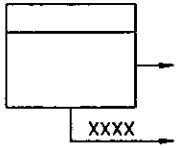
= An Identical Function as indicated by the Function Number in the Reference (Ref:)



= Same Function as indicated by the Function Number in the Reference (Ref:). Block is used as a Termination of a Set of Decomposed Function Blocks.



= Same Function as indicated by the Function Number in the Reference (Ref:). Block is used as a Initiator of a Set of Decomposed Function Blocks.

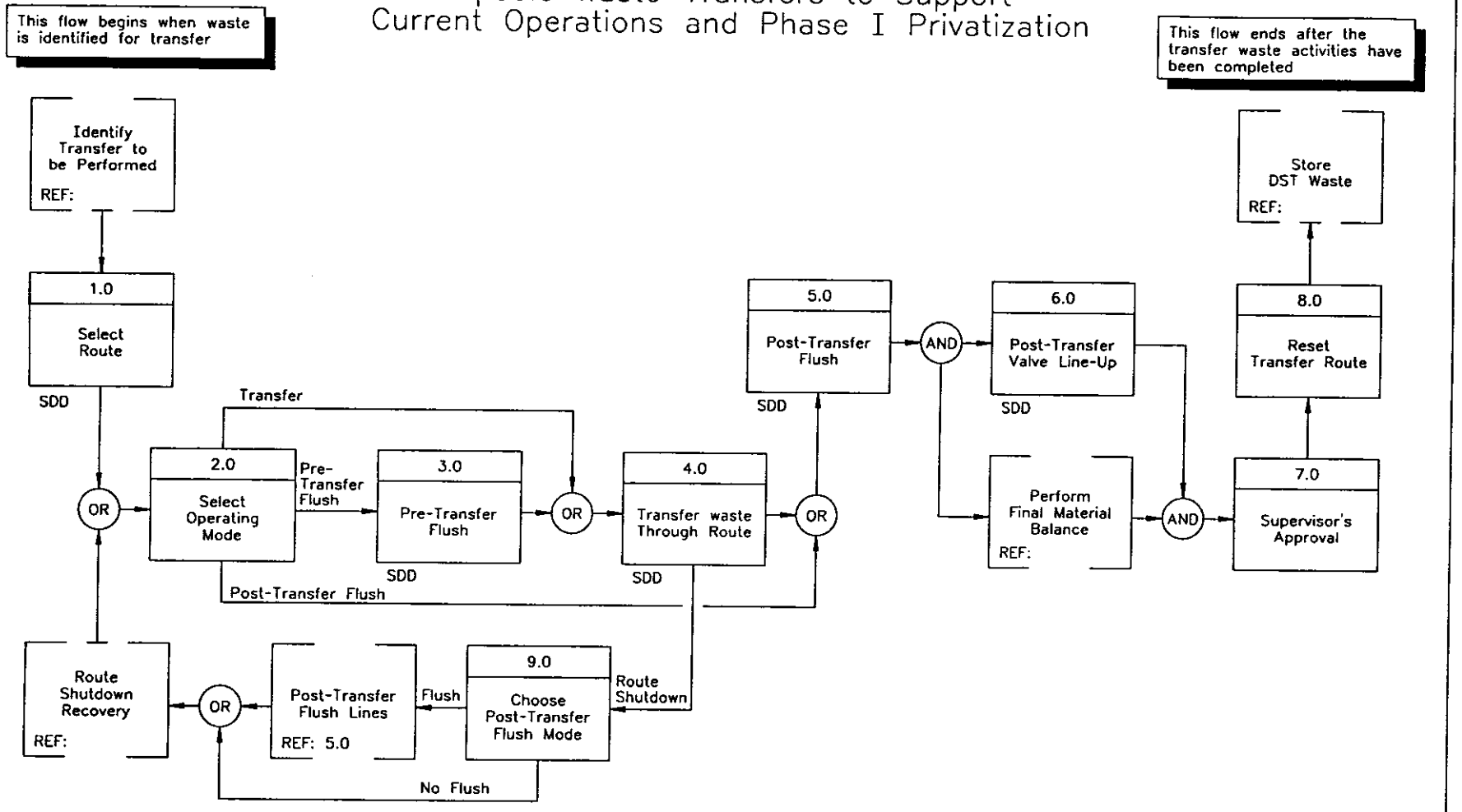


= Function Block with two or more Exit Paths. XXXX defines the condition that is required for the use of the XXXX Path. The unmarked Exit Path defines the Function Blocks normal Exit Path.

SYSTEM: Transfer Waste	NUMBER: N/A	DATE: August 28, 2000
ORIGINATED BY: Project W-314 Phase I	FLOW TITLE: FFBD Legend	

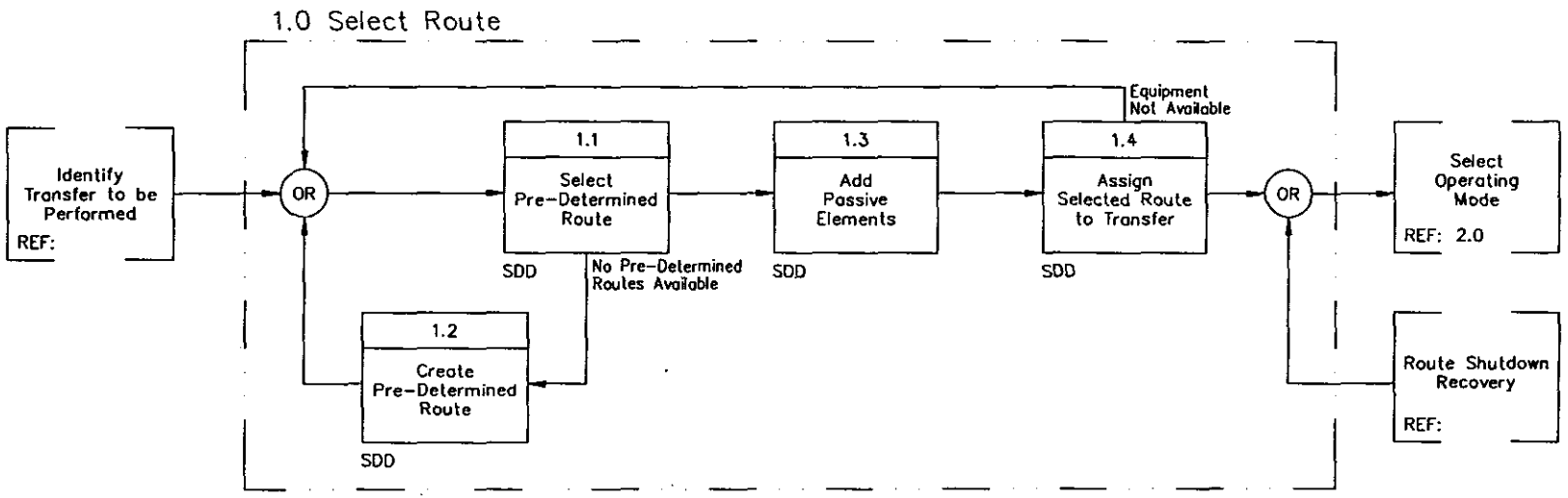
CADFILE: block4ar1.dwg

Pumpable Waste Transfers to Support Current Operations and Phase I Privatization



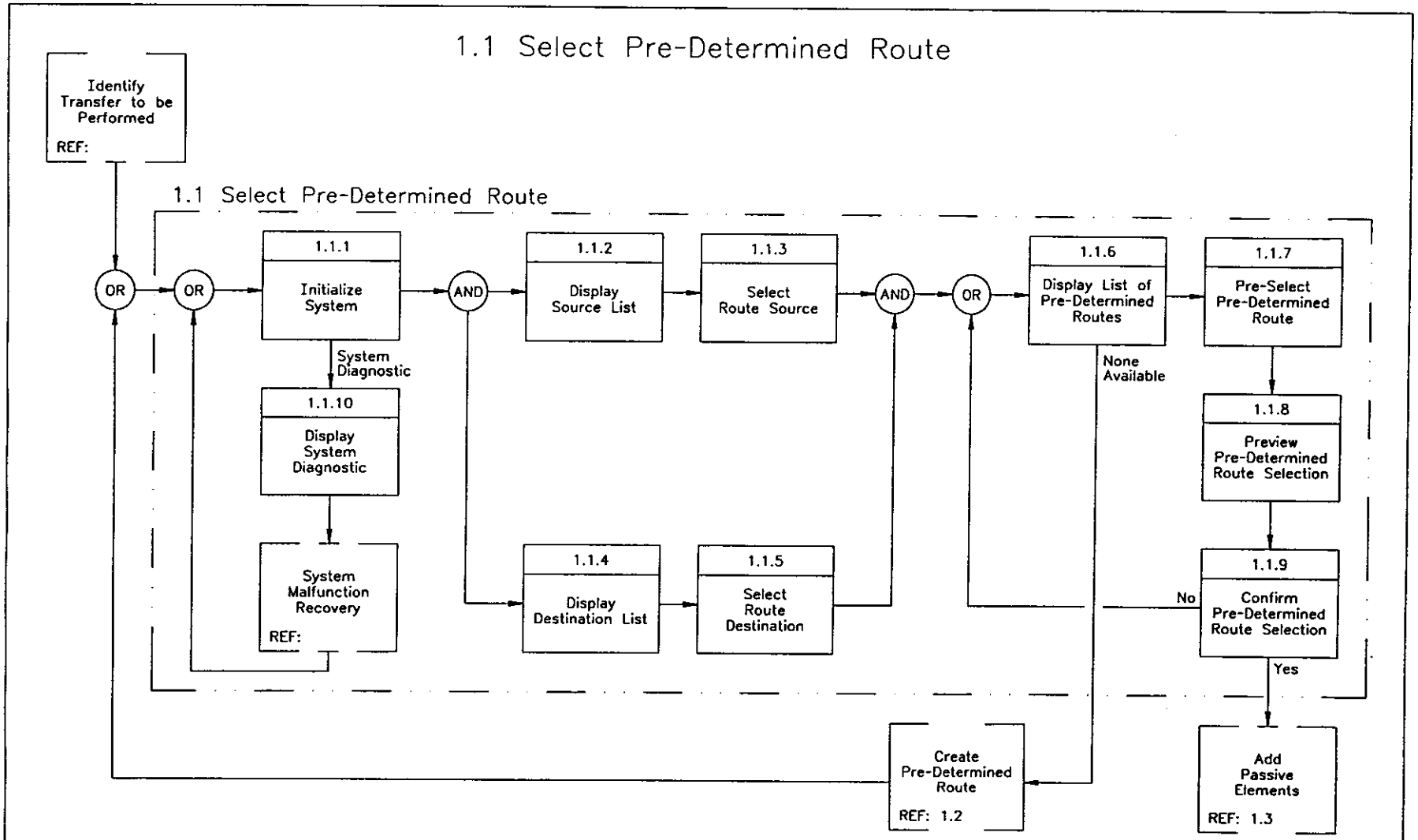
SYSTEM: Transfer Waste	NUMBER: N/A	DATE: August 28, 2000
ORIGINATED BY: Project W-314 Phase I	FLOW TITLE: Pumpable Waste Transfers	

1.0 Select Route



SYSTEM: Transfer Waste	NUMBER: 1.0	DATE: August 28, 2000
ORIGINATED BY: Project W-314 Phase I	FLOW TITLE: Select Route	

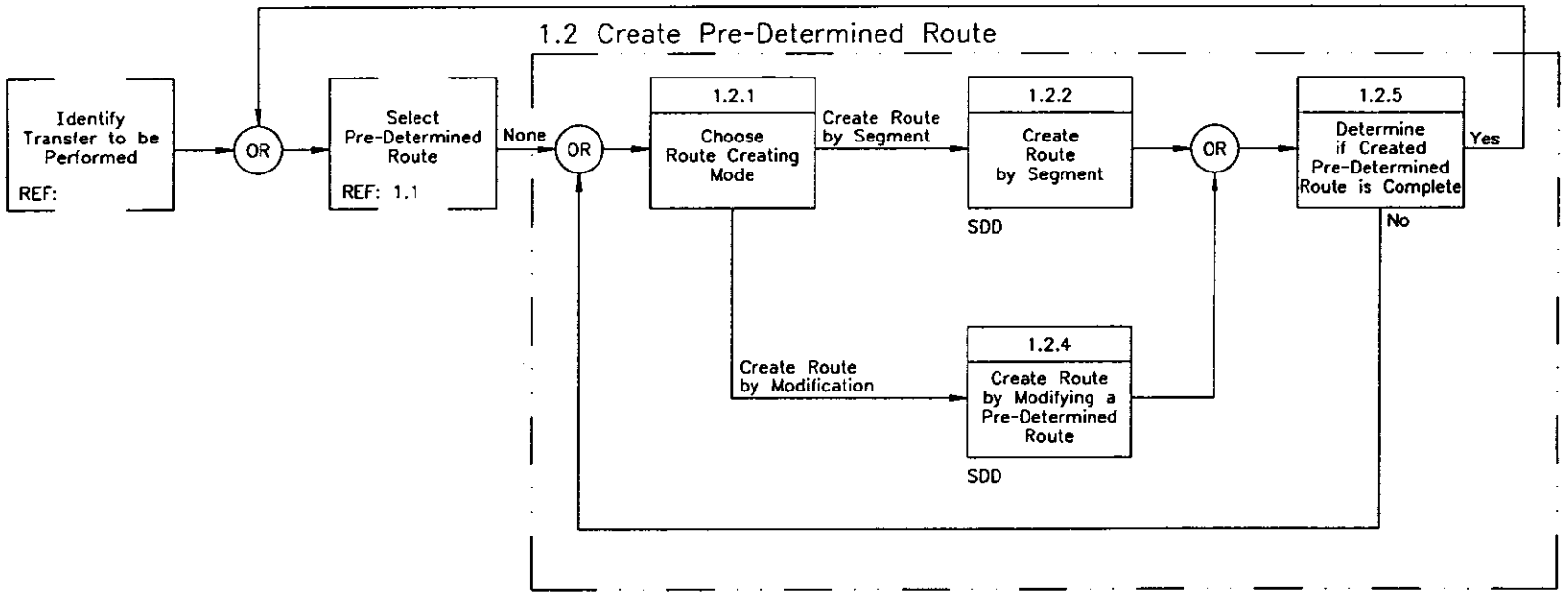
CADFILE: block4c1.dwg



SYSTEM: Transfer Waste	NUMBER: 1.1	DATE: August 28, 2000
ORIGINATED BY: Project W-314 Phase I	FLOW TITLE: Select Pre-Determined Route	

CADFILE: block4h1.dwg

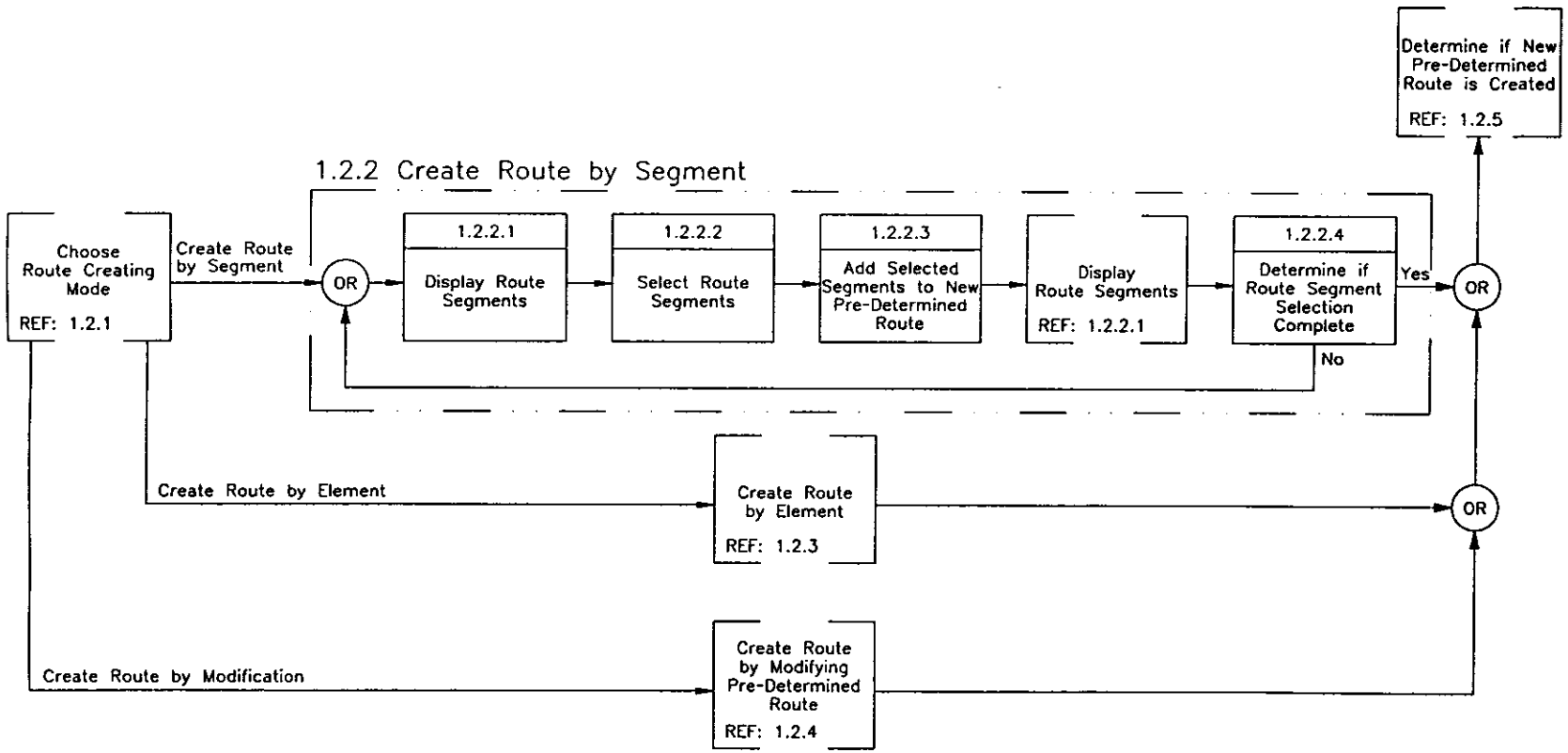
1.2 Create Pre-Determined Route



SYSTEM: Transfer Waste	NUMBER: 1.2	DATE: August 28, 2000
ORIGINATED BY: Project W-314 Phase I	FLOW TITLE: Create Pre-Determined Route	

CADFILE: block4d1.dwg

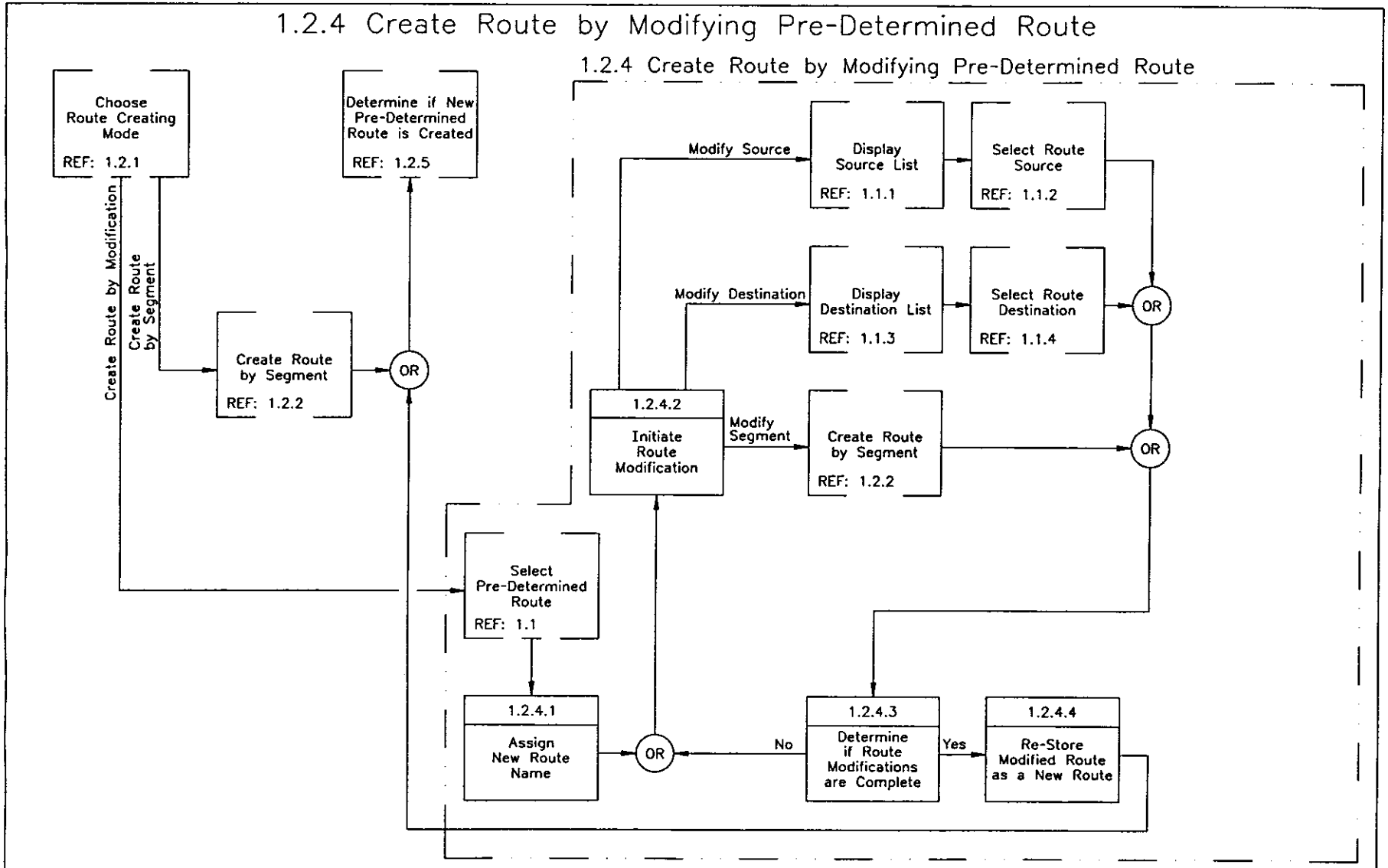
1.2.2 Create Route by Segment



SYSTEM: Transfer Waste	NUMBER: 1.2.2	DATE: April 8, 1998
ORIGINATED BY: Project W-314 Phase I	FLOW TITLE: Create Route by Segment	

CADFILE: block4i.dwg

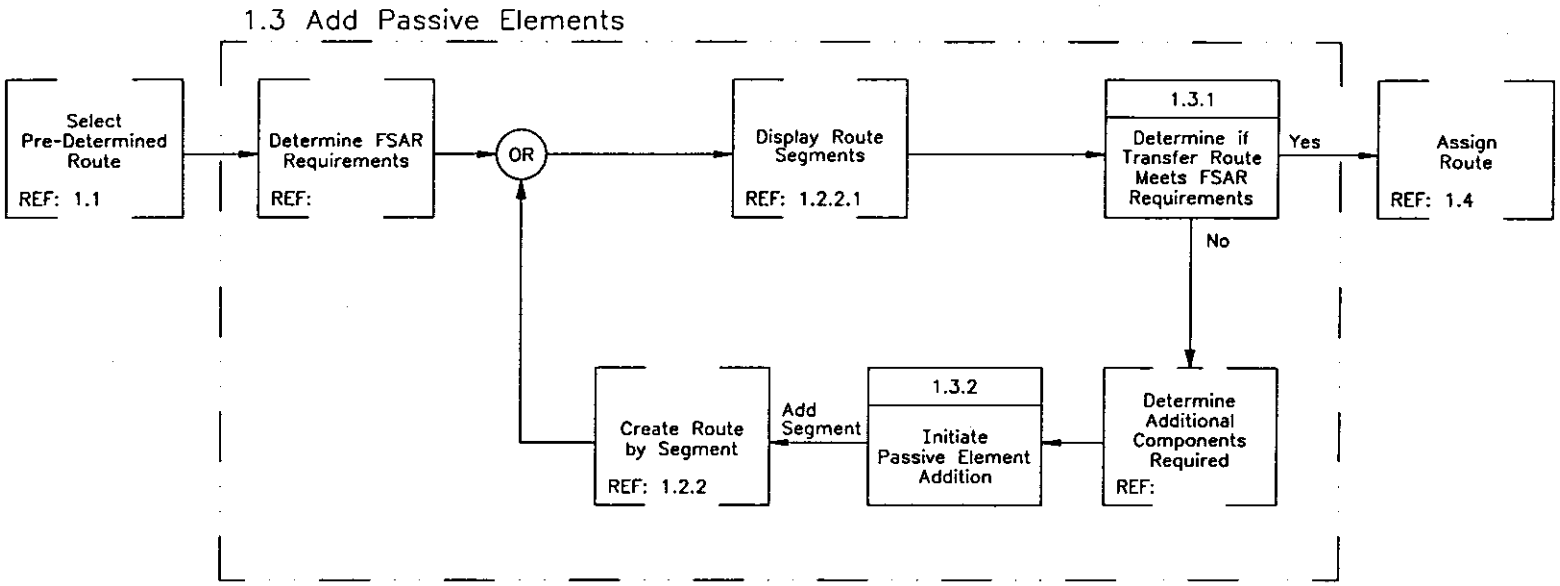
1.2.4 Create Route by Modifying Pre-Determined Route



SYSTEM:	NUMBER:	DATE:
Transfer Waste	1.2.4	August 28, 2000
ORIGINATED BY:	**FLOW TITLE:**	
Project W-314 Phase I	Create Route by Modifying a Pre-Determined Route	

CADFILE: block4k1.dwg

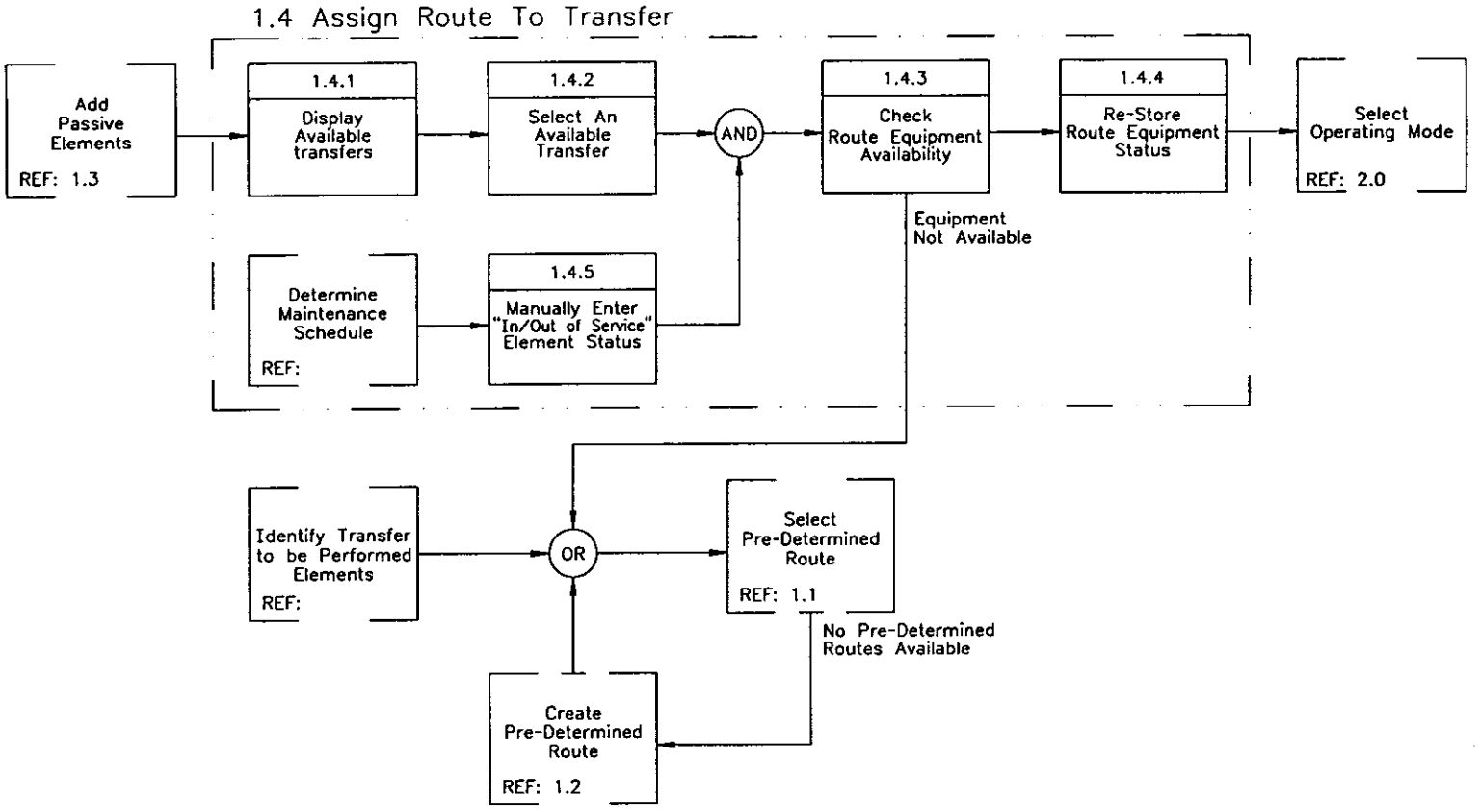
1.3 Add Passive Elements



SYSTEM: Transfer Waste	NUMBER: 1.3	DATE: August 28, 2000
ORIGINATED BY: Project W-314 Phase I	FLOW TITLE: Add Passive Elements	

CADFILE: block41.dwg

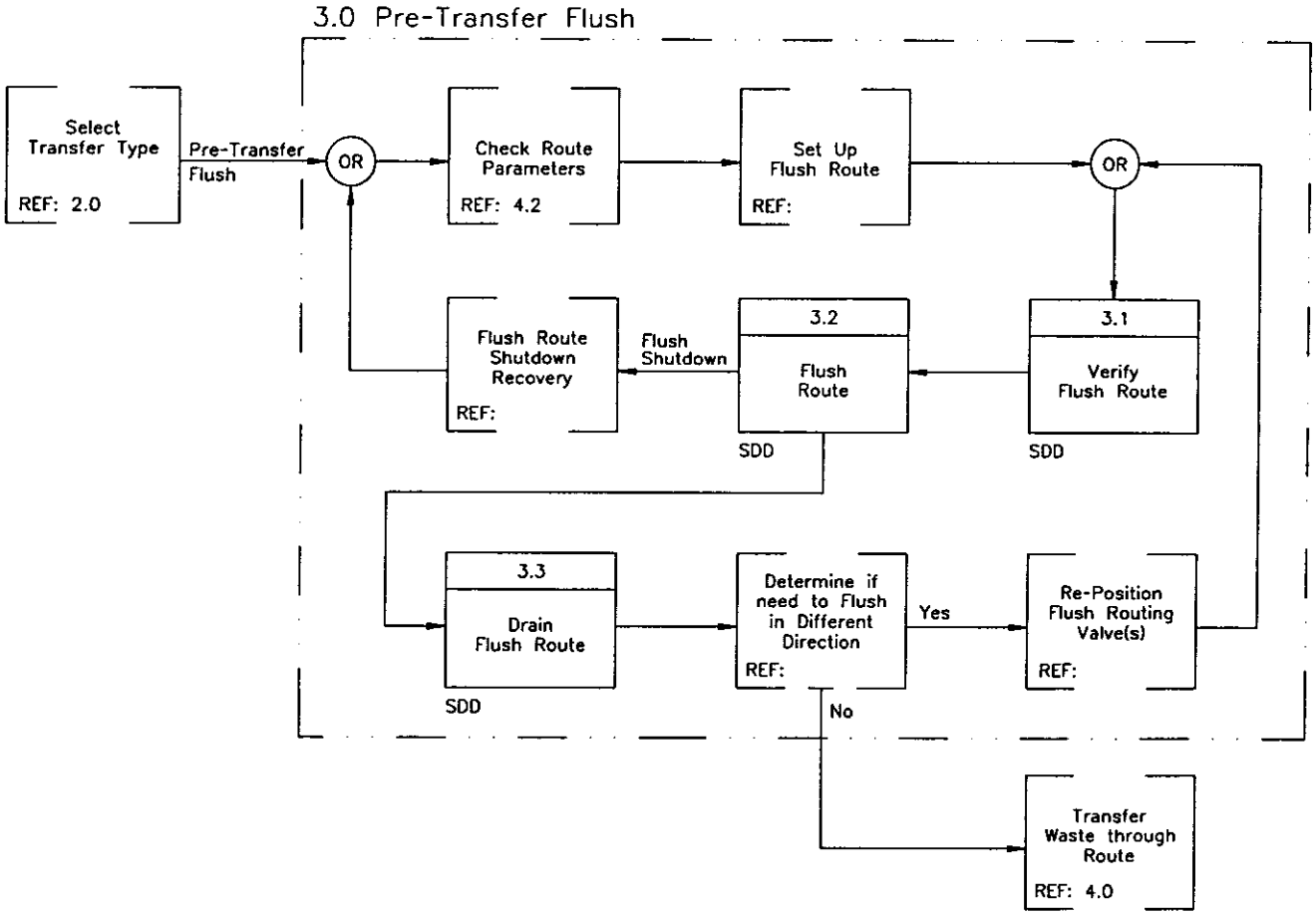
1.4 Assign Route To Transfer



SYSTEM: Transfer Waste	NUMBER: 1.4	DATE: August 28, 2000
ORIGINATED BY: Project W-314 Phase I	FLOW TITLE: Assign Route to Transfer	

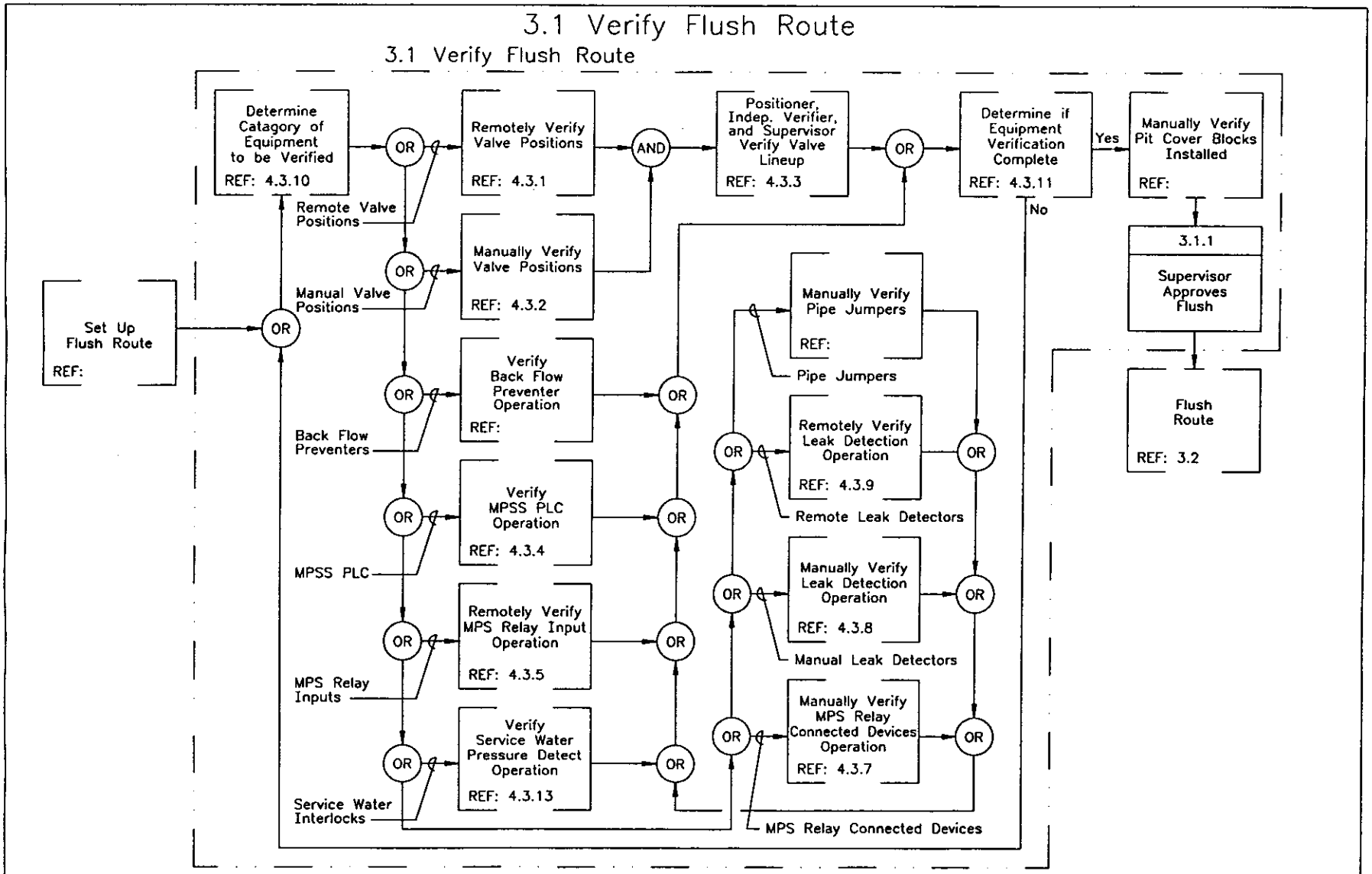
CADFILE: block4m1.dwg

3.0 Pre-Transfer Flush



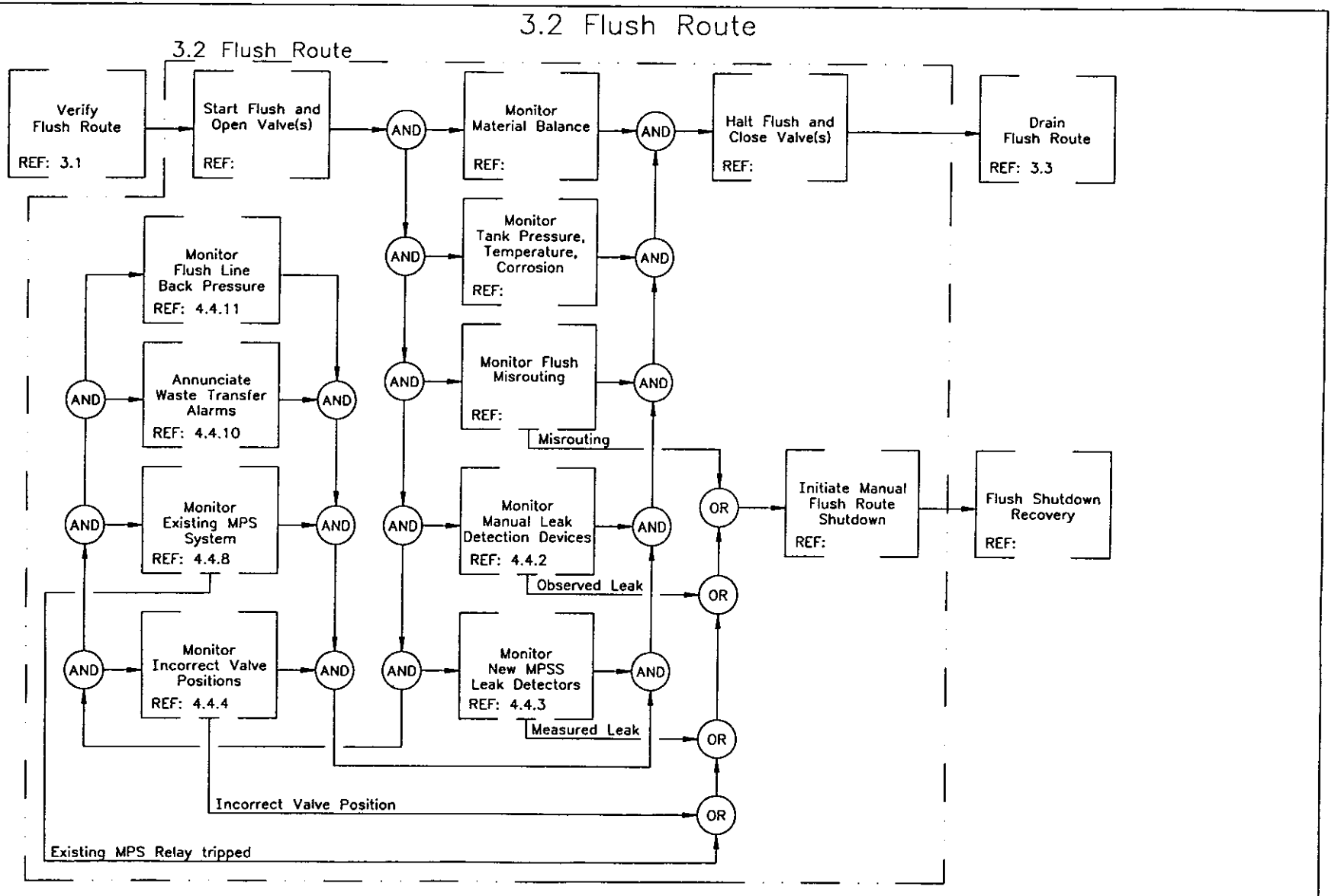
SYSTEM: Transfer Waste	NUMBER: 3.0	DATE: August 28, 2000
ORIGINATED BY: Project W-314 Phase I	FLOW TITLE: Pre-Transfer Flush	

CADFILE: block4f1.dwg



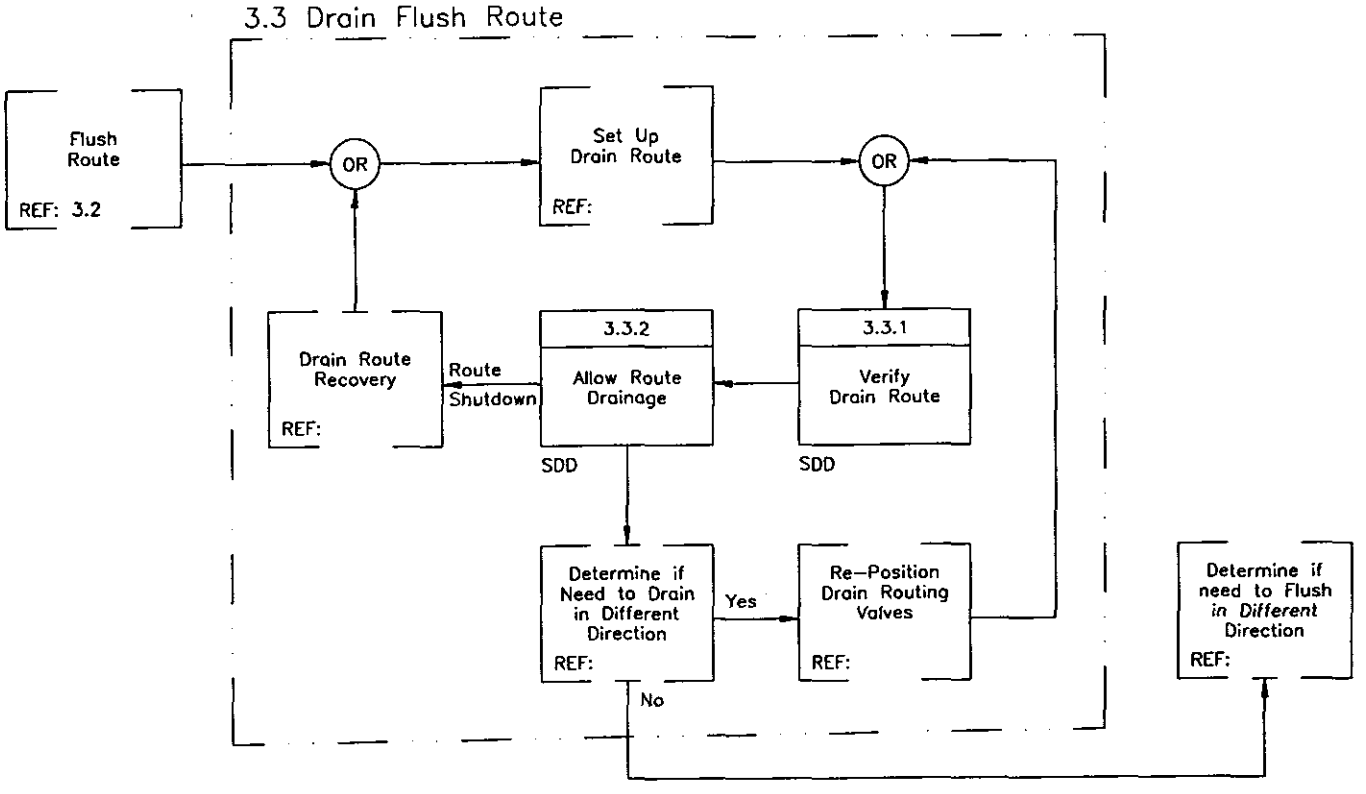
SYSTEM:	NUMBER:	DATE:
Transfer Waste	3.1	August 28, 2000
ORIGINATED BY:	FLOW TITLE:	
Project W-314 Phase I	Verify Flush Route	

CADFILE: block4an1.dwg



SYSTEM:	NUMBER:	DATE:
Transfer Waste	3.2	August 28, 2000
ORIGINATED BY: Project W-314 Phase I	FLOW TITLE: Flush Route	

3.3 Drain Flush Route

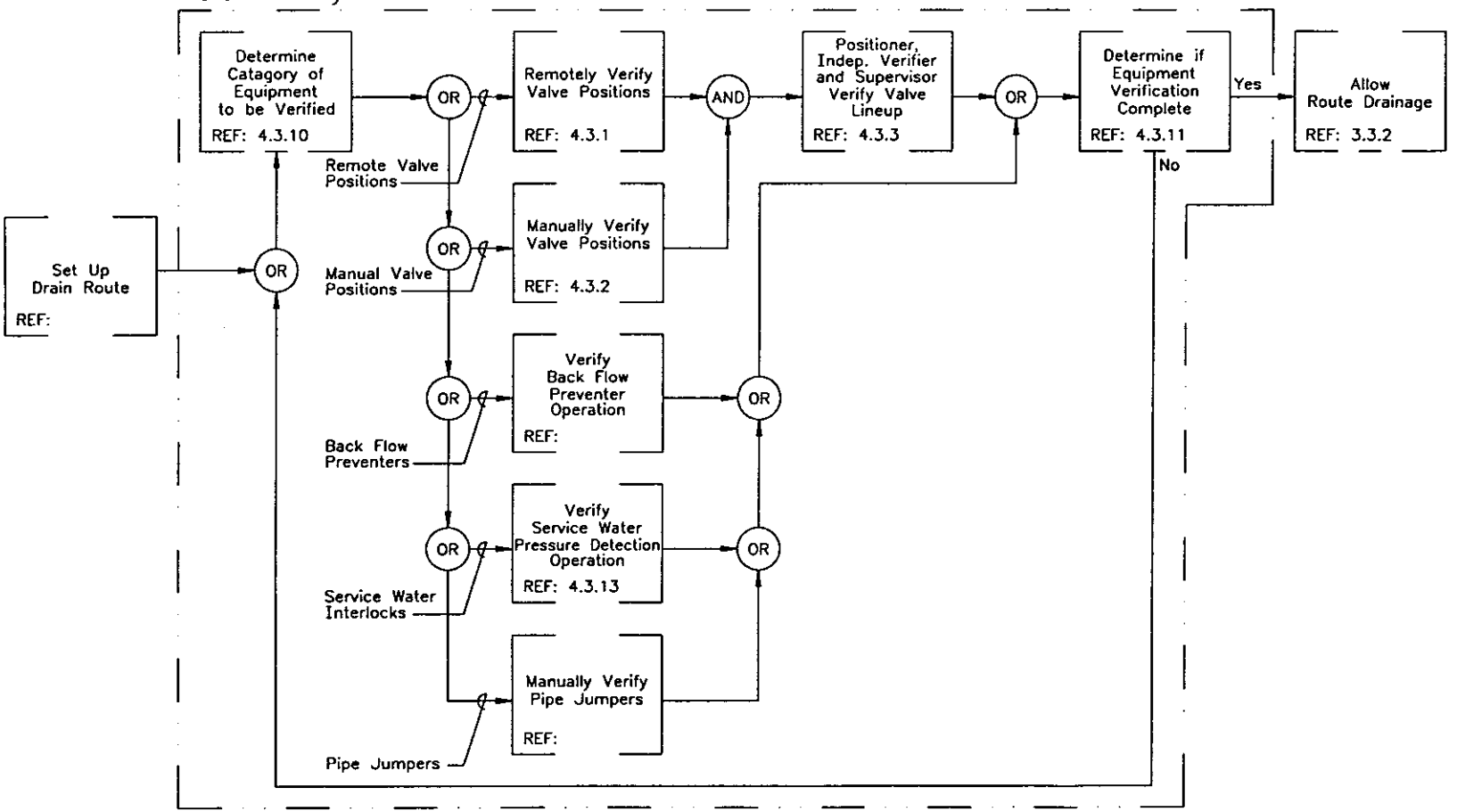


SYSTEM: Transfer Waste	NUMBER: 3.3	DATE: August 28, 2000
ORIGINATED BY: Project W-314 Phase I	FLOW TITLE: Drain Flush Route	

CADFILE: block3b1.dwg

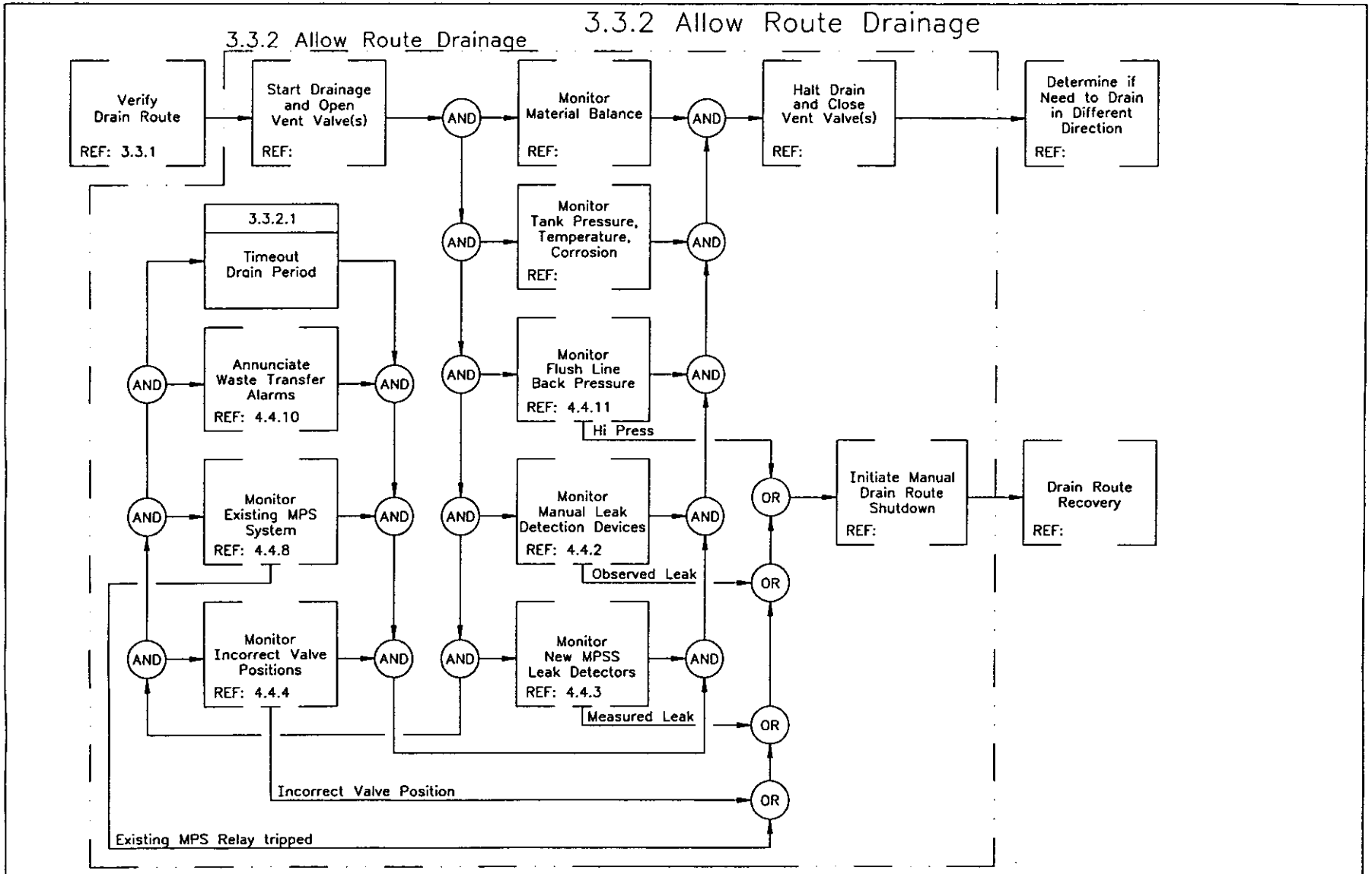
3.3.1 Verify Drain Route

3.3.1 Verify Drain Route



SYSTEM: Transfer Waste	NUMBER: 3.3.1	DATE: August 28, 2000
ORIGINATED BY: Project W-314 Phase I	FLOW TITLE: Verify Drain Route	

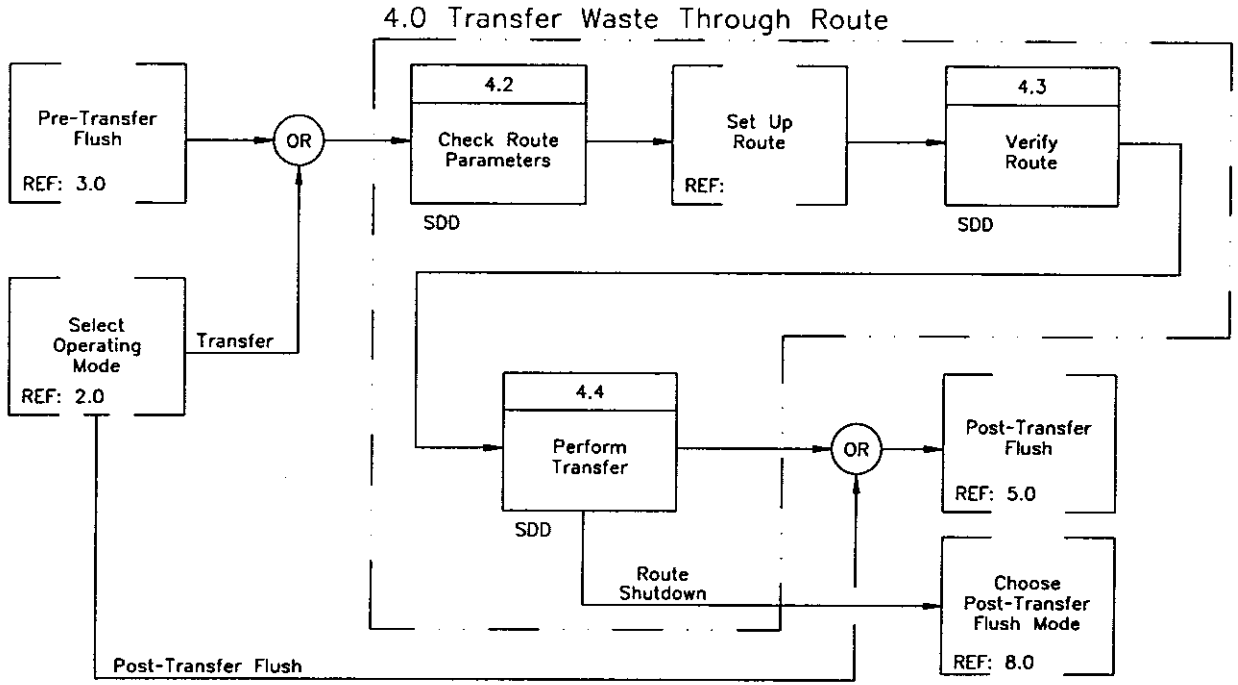
CADFILE: block3c1.dwg



SYSTEM:	NUMBER:	DATE:
Transfer Waste	3.3.2	August 28, 2000
ORIGINATED BY:	FLOW TITLE:	
Project W-314 Phase I	Allow Route Drainage	

CADFILE: block3d1.dwg

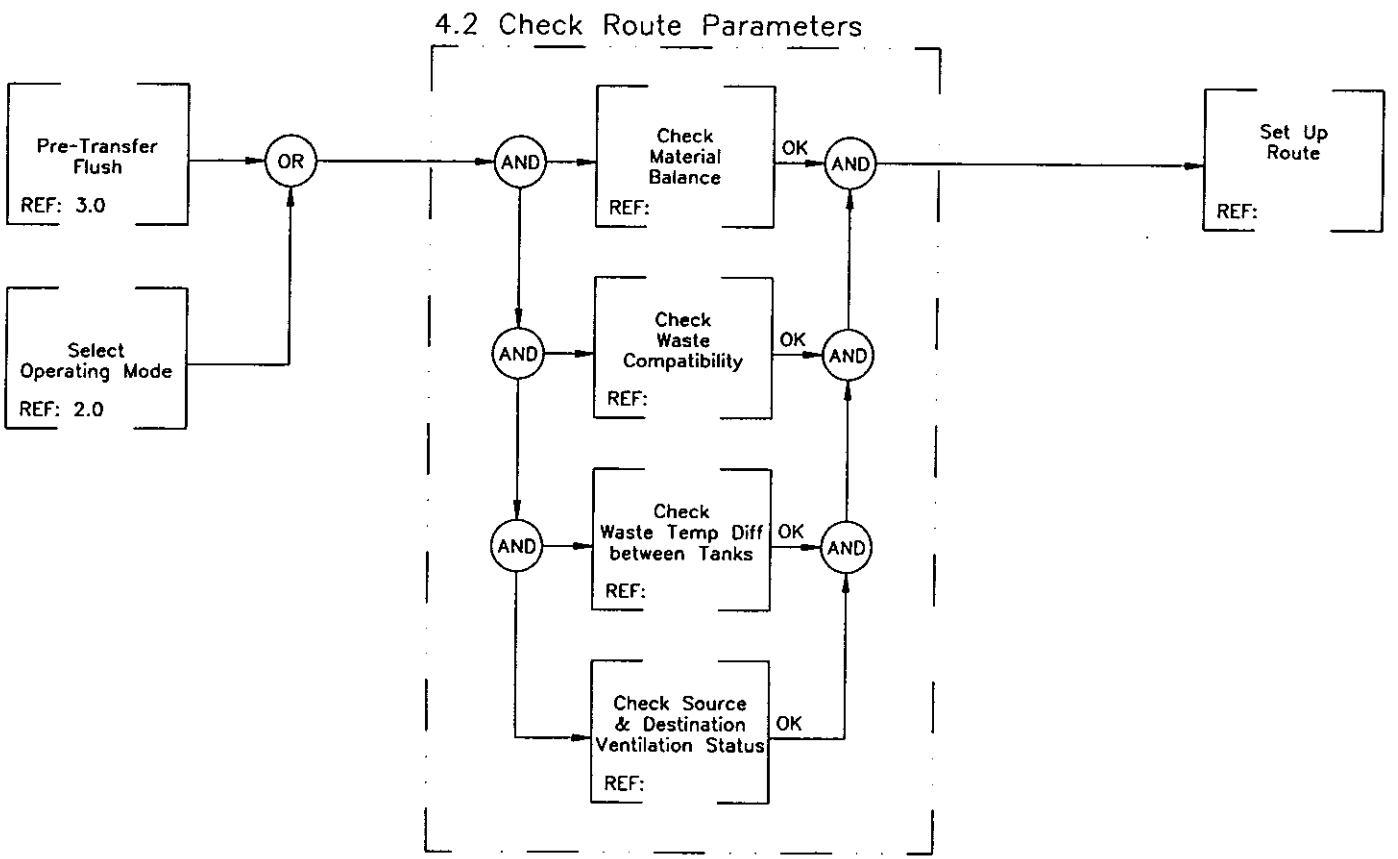
4.0 Transfer Waste Through Route



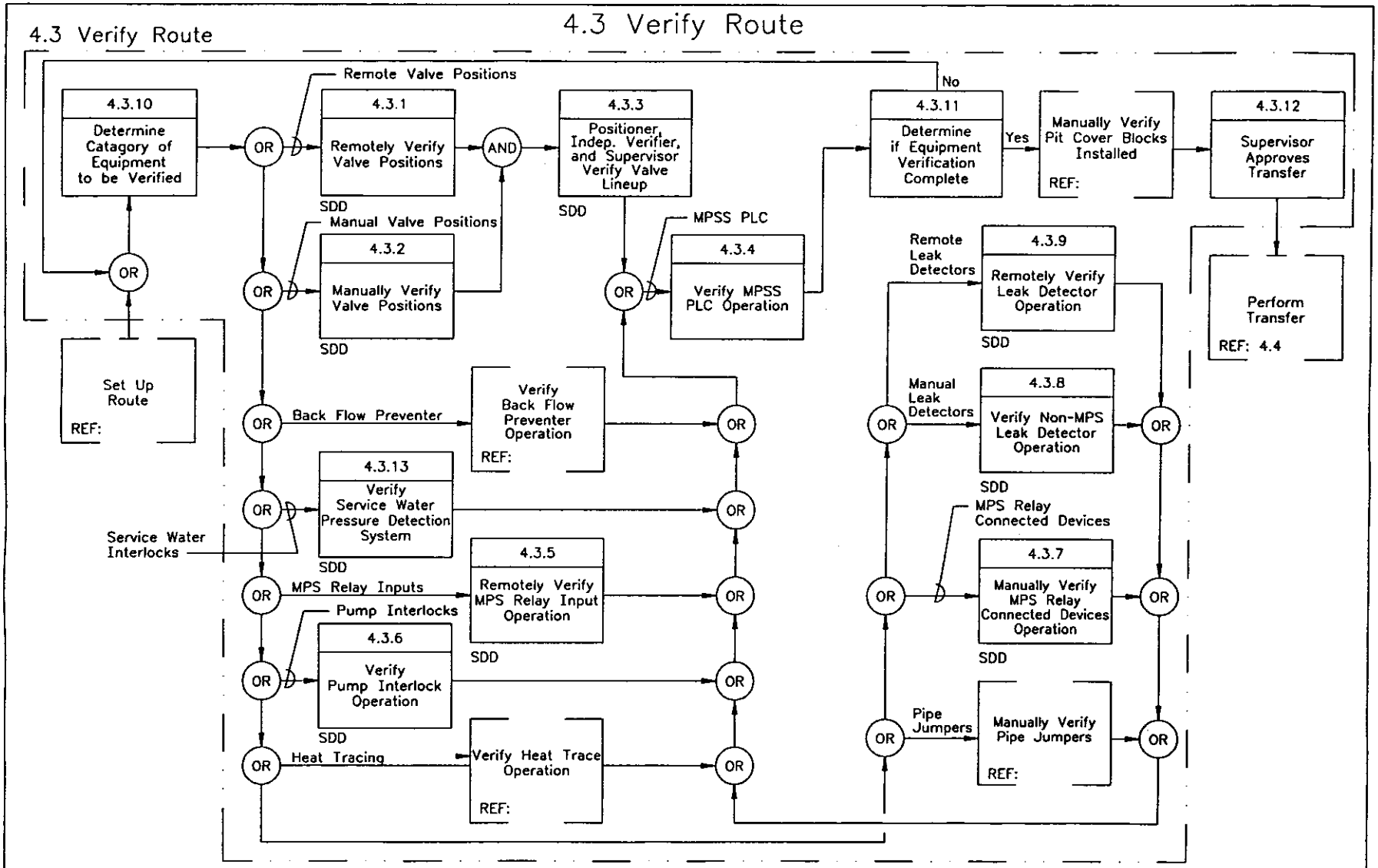
SYSTEM: Transfer Waste	NUMBER: 4.0	DATE: August 28, 2000
ORIGINATED BY: Project W-314 Phase I	FLOW TITLE: Transfer Waste Through Route	

CADFILE: block4b1.dwg

4.2 Check Route Parameters



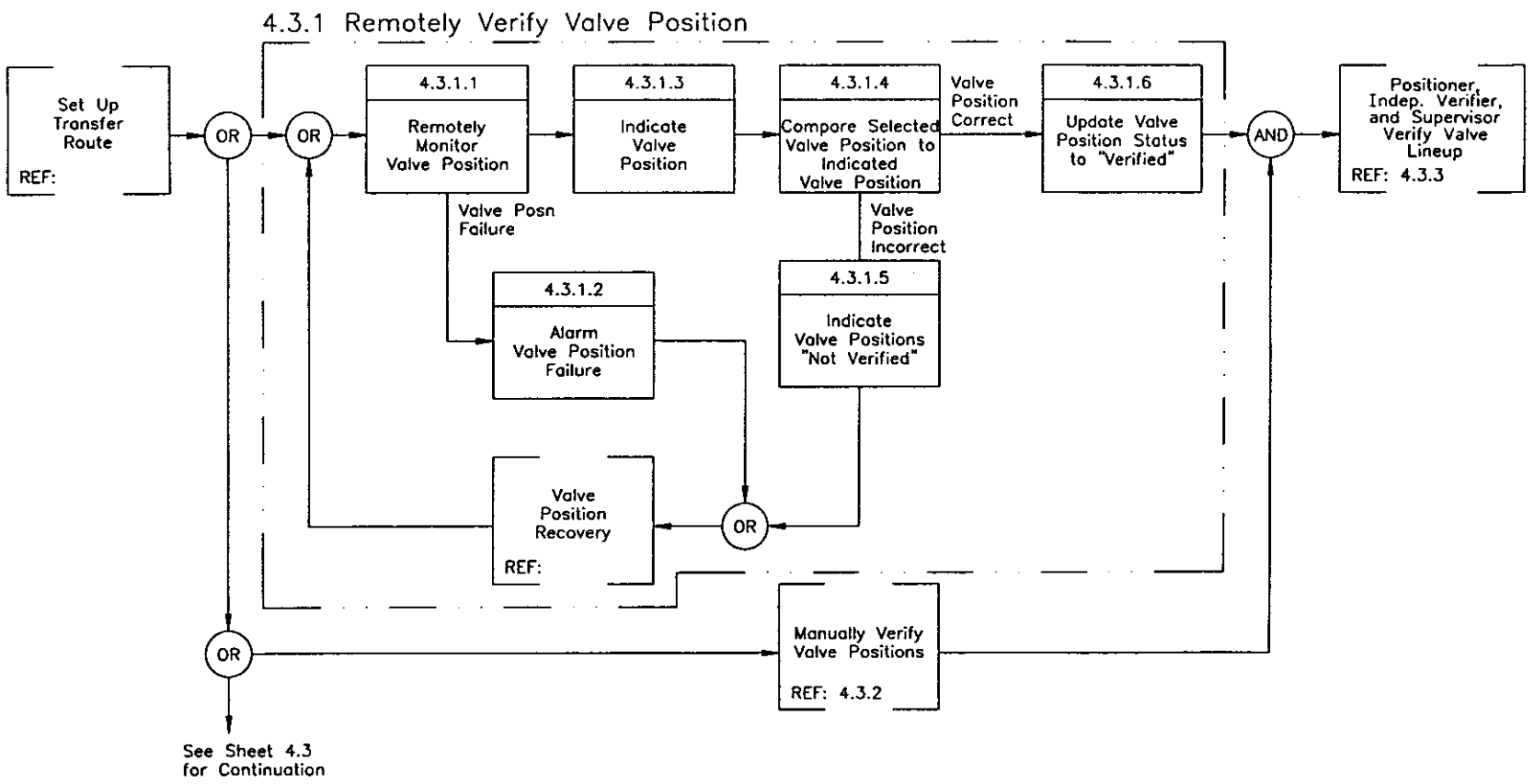
SYSTEM: Transfer Waste	NUMBER: 4.2	DATE: August 28, 2000
ORIGINATED BY: Project W-314 Phase I	FLOW TITLE: Check Route Parameters	



SYSTEM:	NUMBER:	DATE:
Transfer Waste	4.3	August 28, 2000
ORIGINATED BY:	FLOW TITLE:	
Project W-314 Phase I	Verify Route	

CADFILE: block4s1.dwg

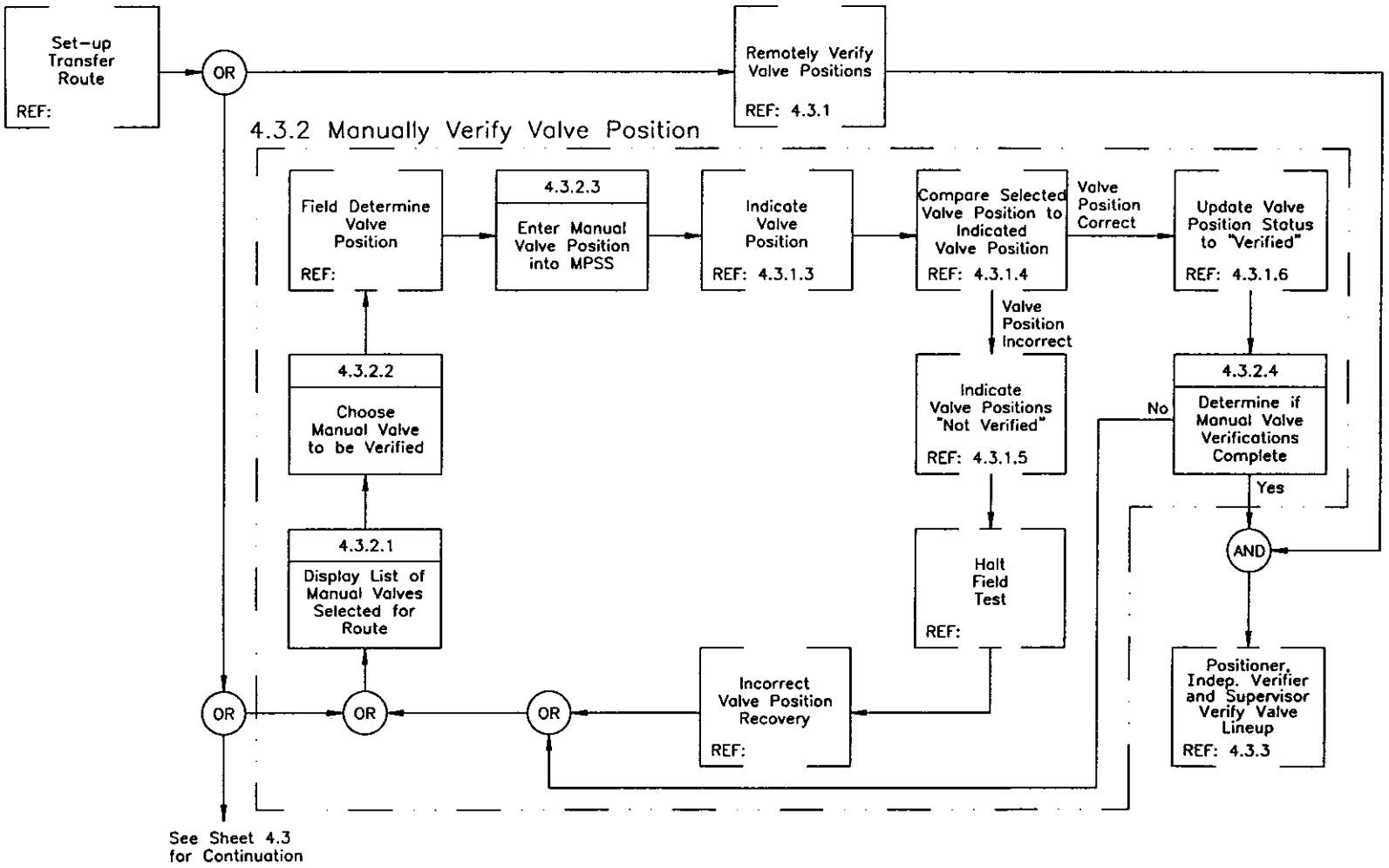
4.3.1 Remotely Verify Valve Position



SYSTEM: Transfer Waste	NUMBER: 4.3.1	DATE: August 28, 2000
ORIGINATED BY: Project W-314 Phase 1	FLOW TITLE: Remotely Verify Valve Position	

CADFILE: block411.dwg

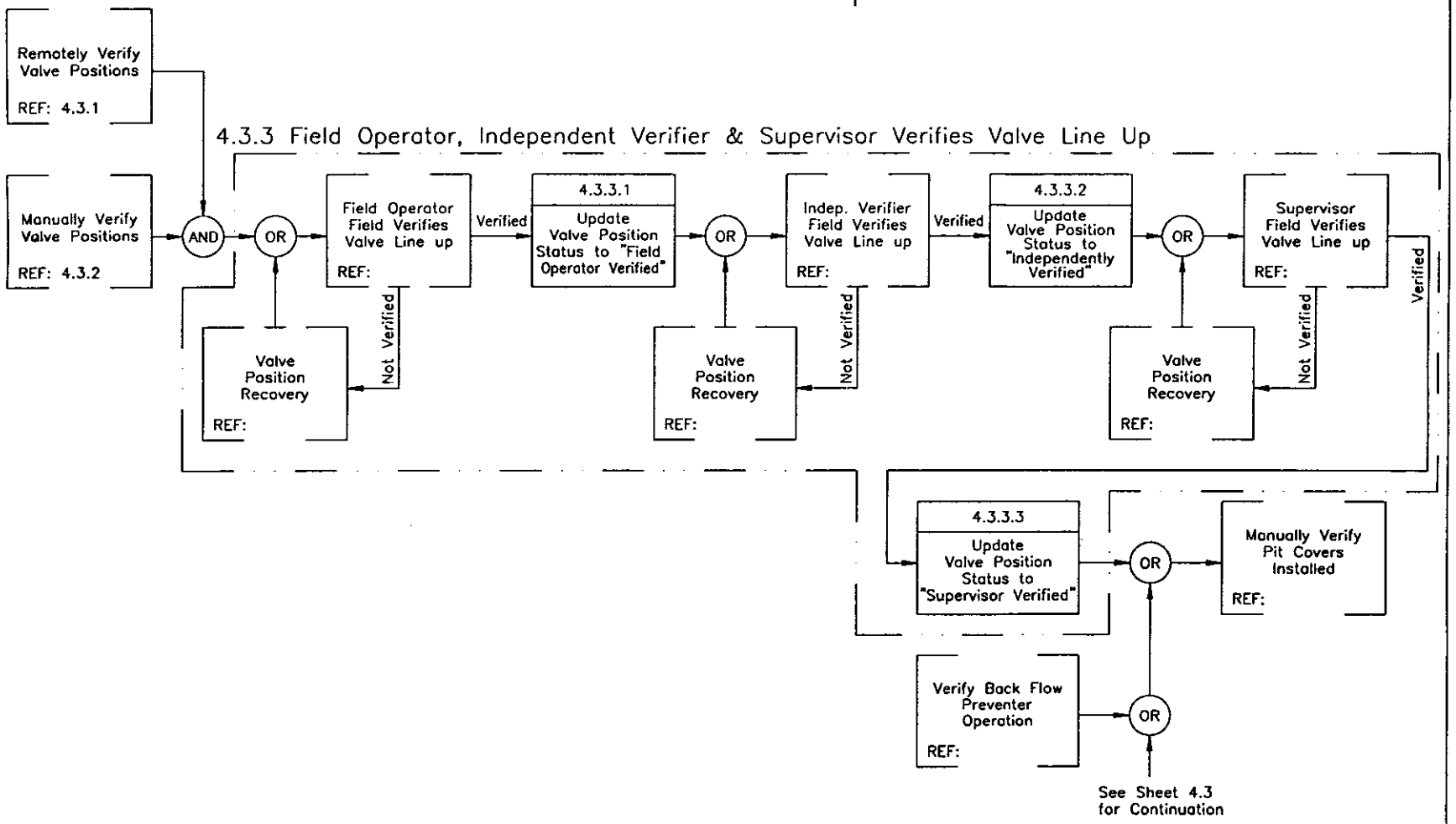
4.3.2 Manually Verify Valve Position



SYSTEM:	NUMBER:	DATE:
Transfer Waste	4.3.2	August 28, 2000
ORIGINATED BY:	FLOW TITLE:	
Project W-314 Phase I	Manually Verify Valve Position	

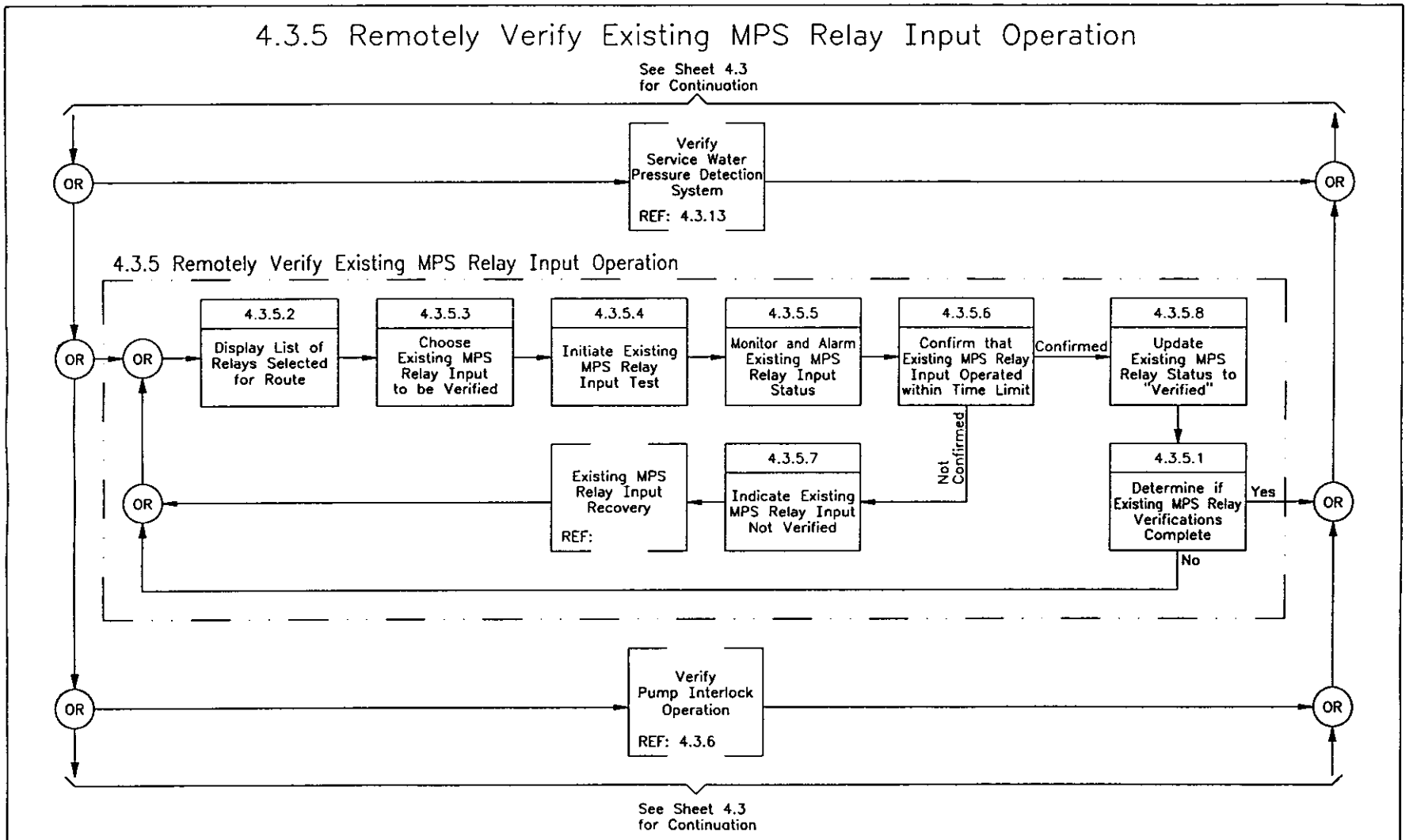
CADFILE: block4u1.dwg

4.3.3 Field Operator, Independent Verifier, and Supervisor Verifies Valve Line Up



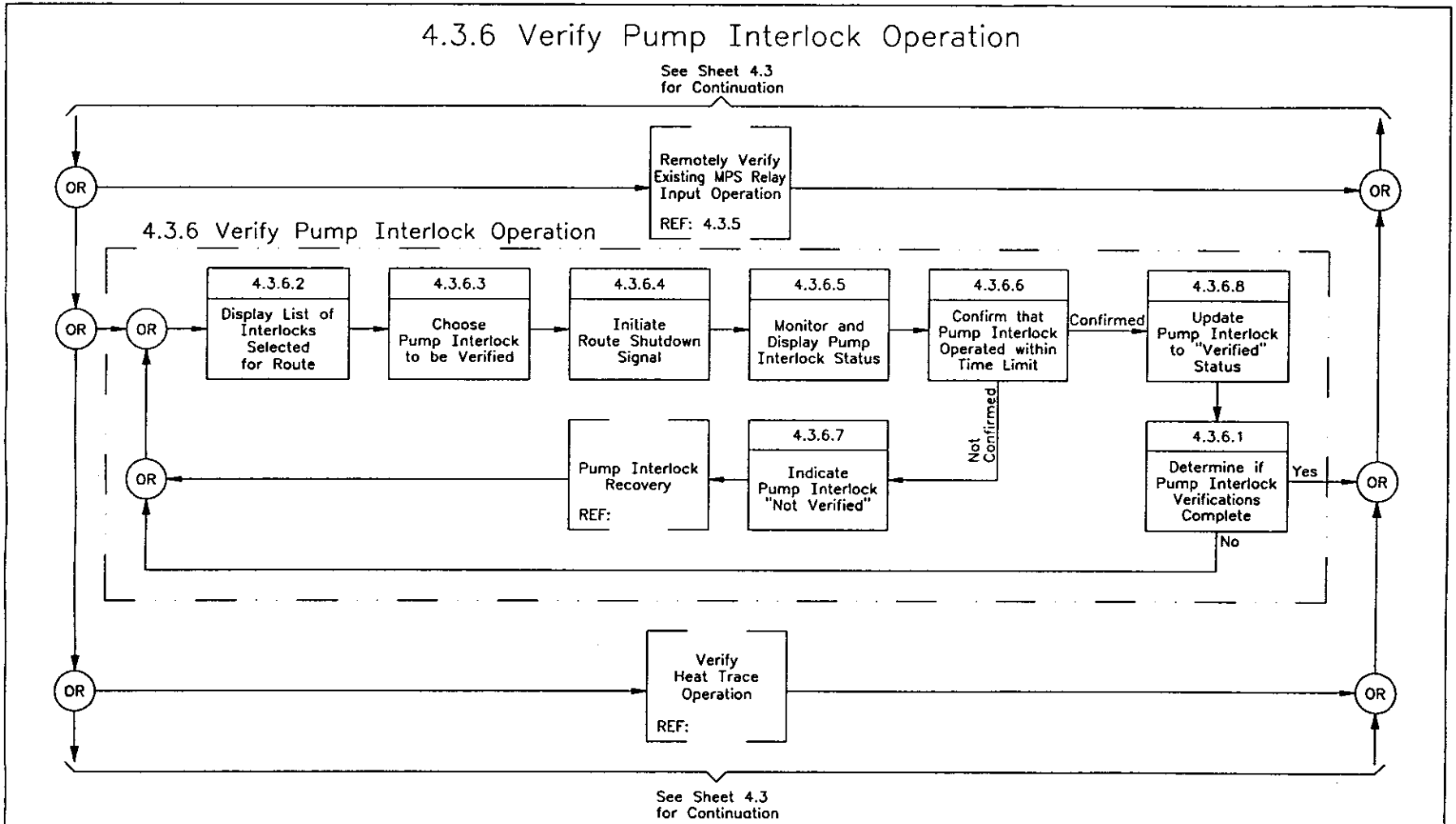
SYSTEM:	NUMBER:	DATE:
Transfer Waste	4.3.3	August 28, 2000
ORIGINATED BY:	**FLOW TITLE:**	
Project W-314 Phase I	Field Operator, Independent Verifier, and Supervisor Verifies Valve Line Up	

CADFILE: block4w1.dwg



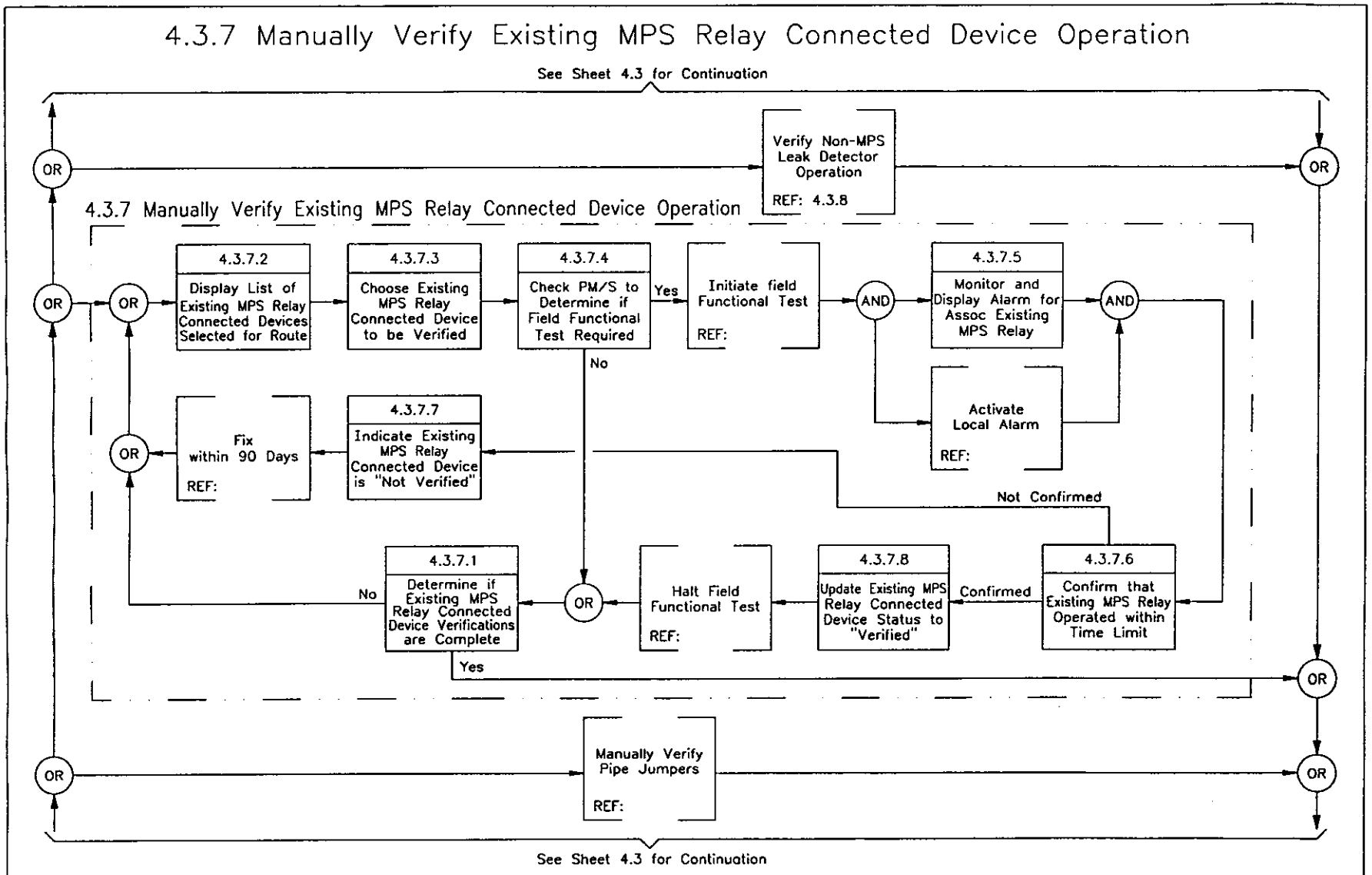
SYSTEM: Transfer Waste	NUMBER: 4.3.5	DATE: August 28, 2000
ORIGINATED BY: Project W-314 Phase I	FLOW TITLE: Remotely Verify Existing MPS Relay Input Operation	

CADFILE: block4y1.dwg



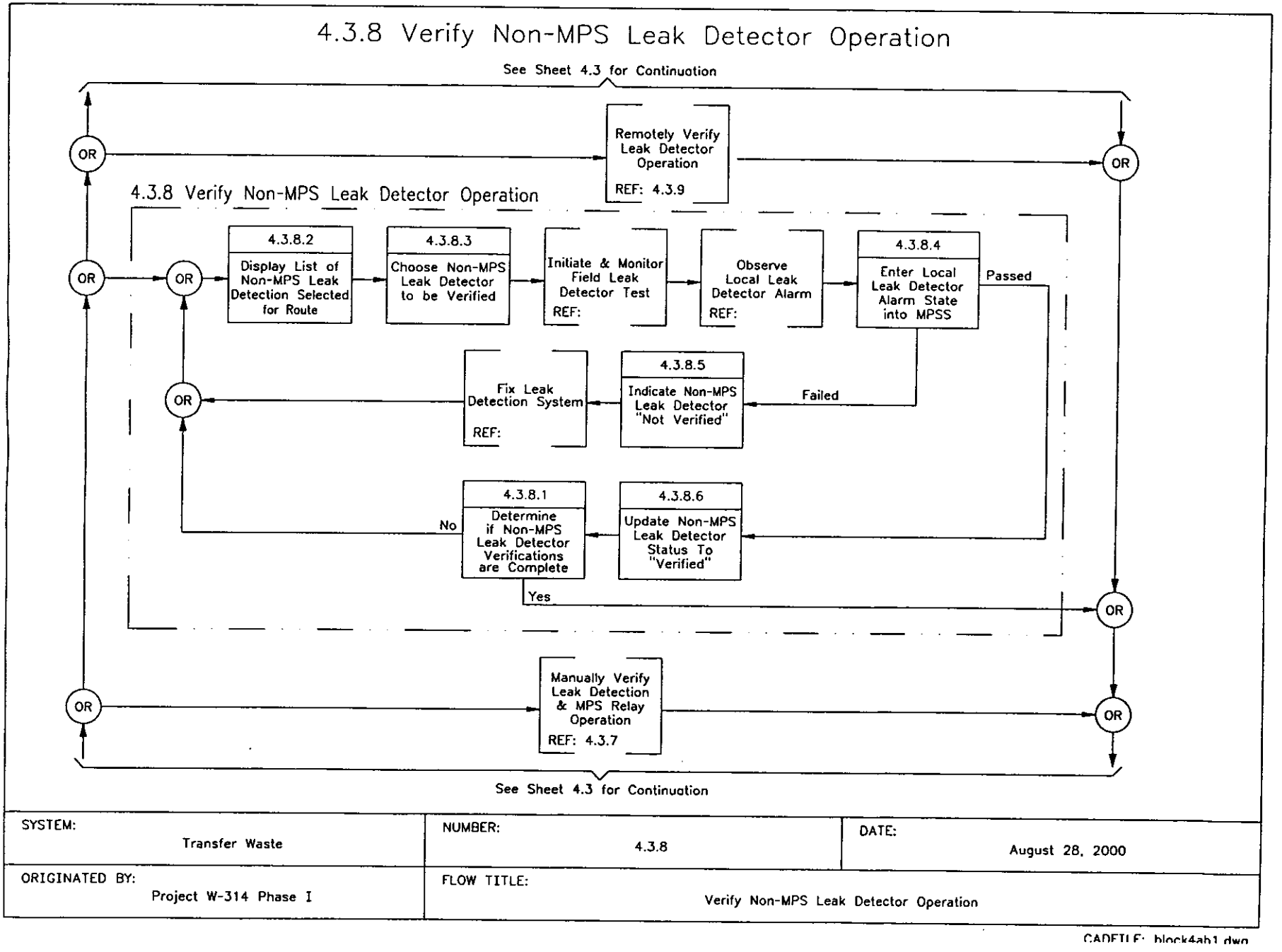
SYSTEM:	NUMBER:	DATE:
Transfer Waste	4.3.6	August 28, 2000
ORIGINATED BY:	FLOW TITLE:	
Project W-314 Phase I	Verify Pump Interlock Operation	

CADFILE: block4z1.dwg



SYSTEM: Transfer Waste	NUMBER: 4.3.7	DATE: August 28, 2000
ORIGINATED BY: Project W-314 Phase I	FLOW TITLE: Manually Verify Existing MPS Relay Connected Device Operation	

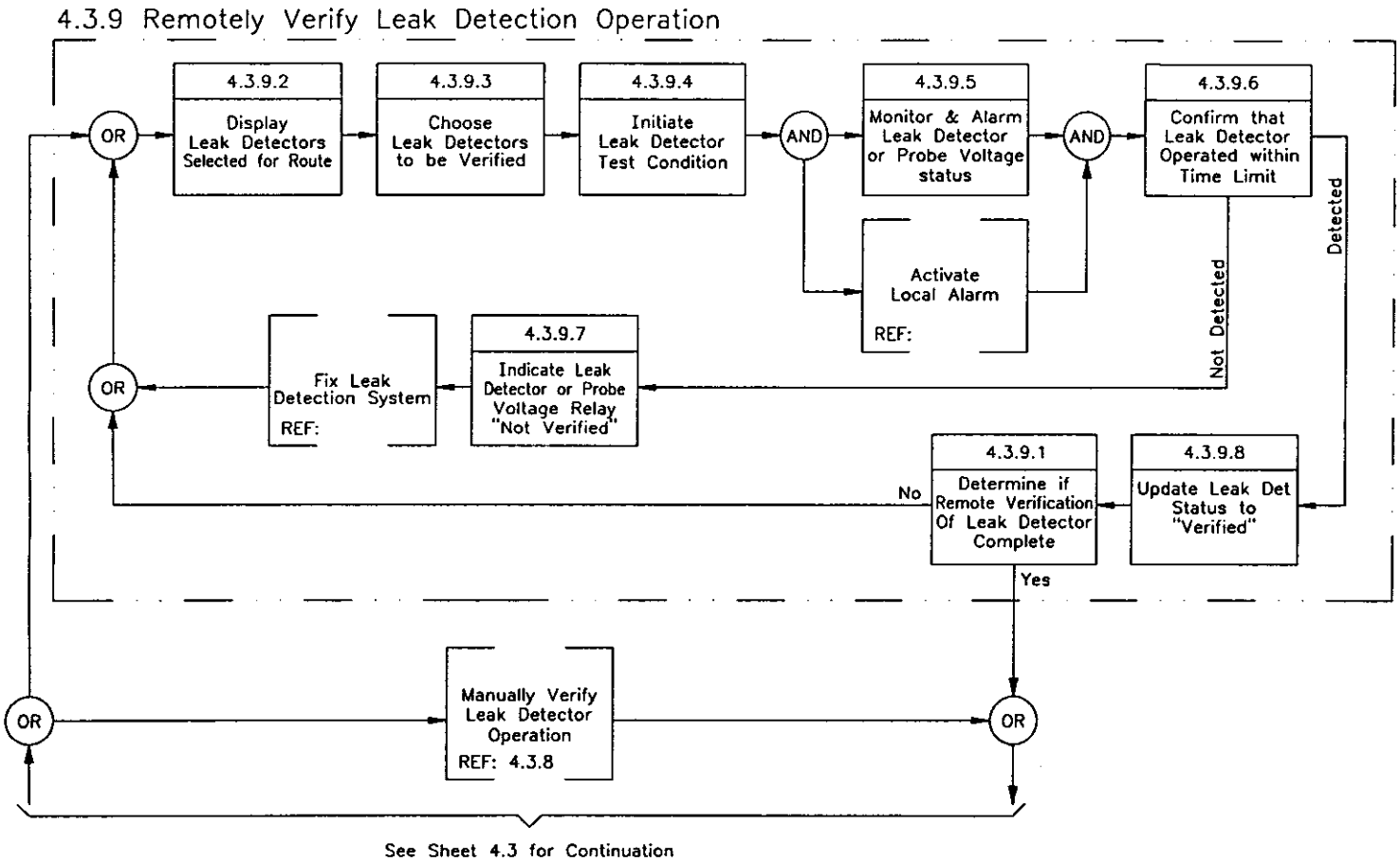
CADFILE: block4aa1.dwg



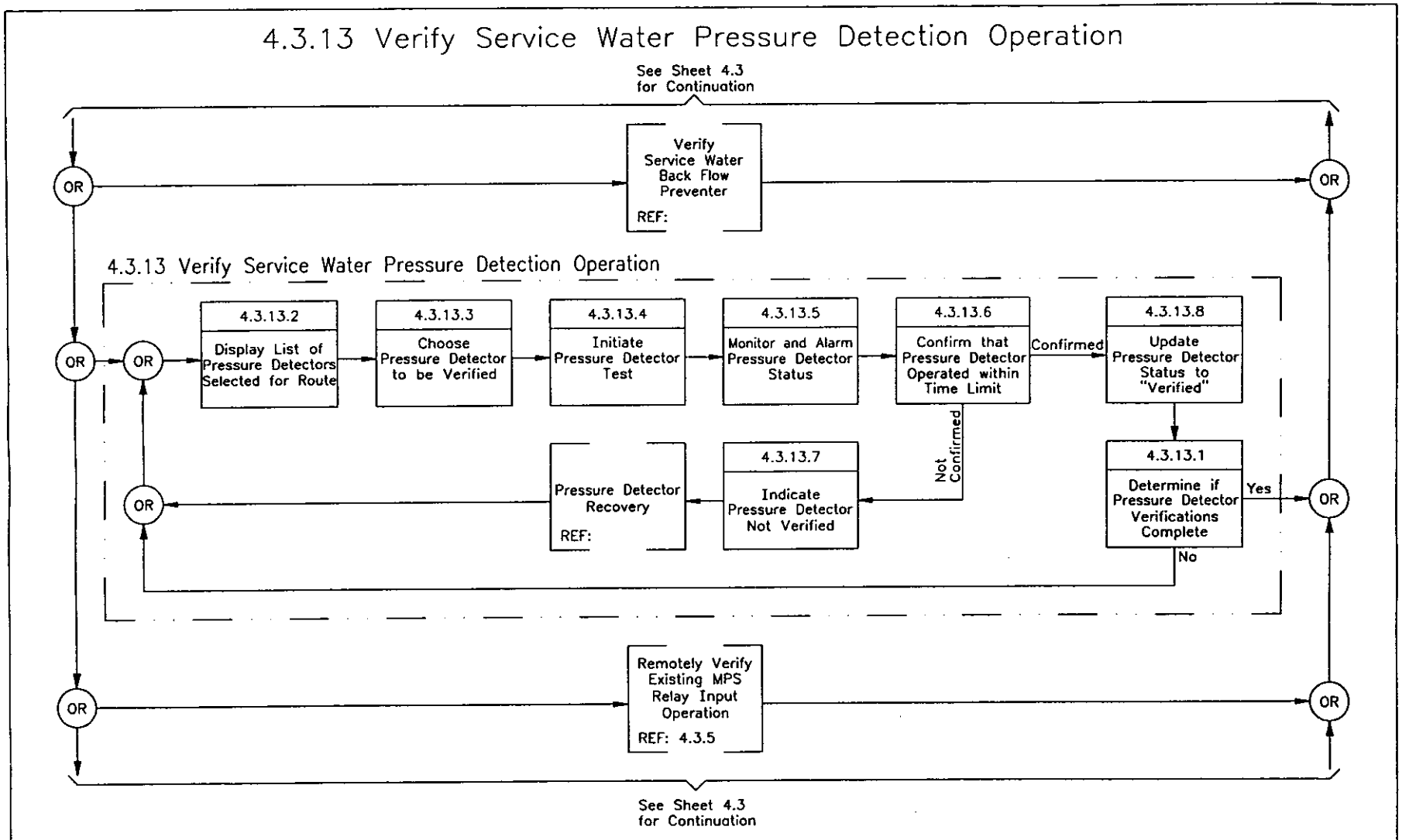
SYSTEM: Transfer Waste	NUMBER: 4.3.8	DATE: August 28, 2000
ORIGINATED BY: Project W-314 Phase I	FLOW TITLE: Verify Non-MPS Leak Detector Operation	

CADFILE: block4ab1.dwg

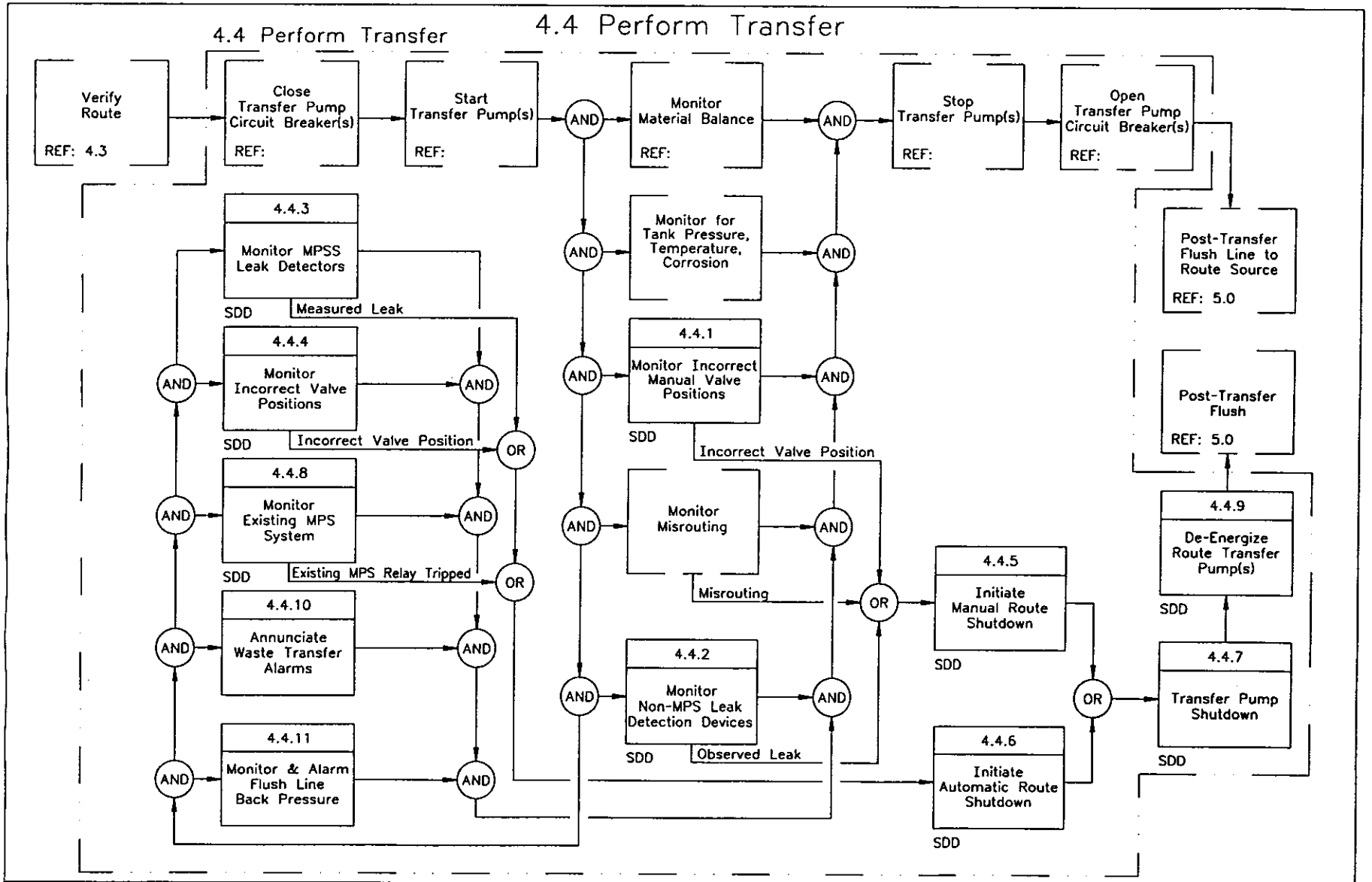
4.3.9 Remotely Verify Leak Detector Operation



SYSTEM:	NUMBER:	DATE:
Transfer Waste	4.3.9	August 28, 2000
ORIGINATED BY:	FLOW TITLE:	
Project W-314 Phase I	Remotely Verify Leak Detector Operation	



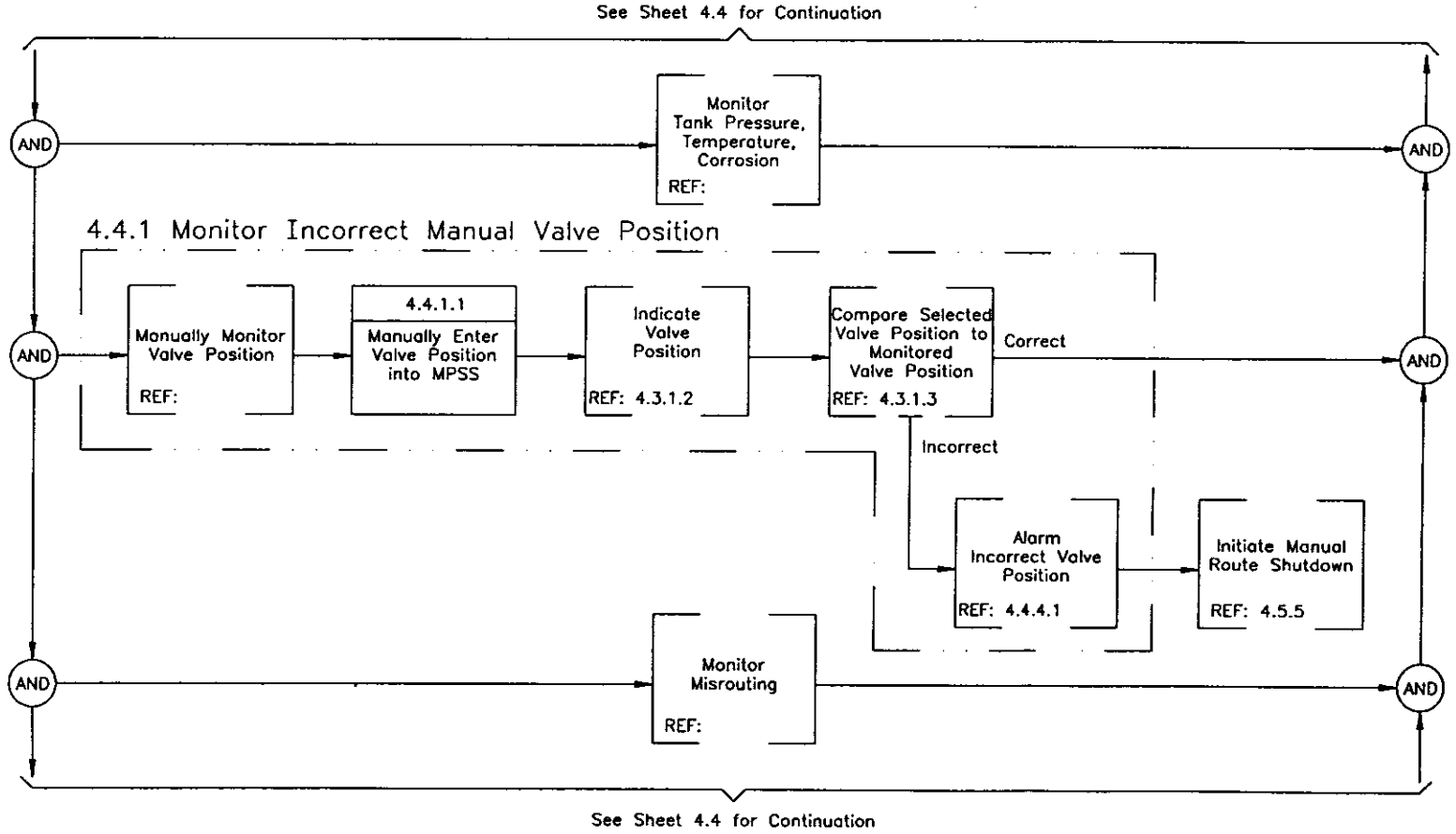
SYSTEM: Transfer Waste	NUMBER: 4.3.13	DATE: August 28, 2000
ORIGINATED BY: Project W-314 Phase I	FLOW TITLE: Verify Service Water Pressure Detection Operation	



SYSTEM:	NUMBER:	DATE:
Transfer Waste	4.4	August 28, 2000
ORIGINATED BY: Project W-314 Phase i	FLOW TITLE: Perform Transfer	

CADFILE: block4v1.dwg

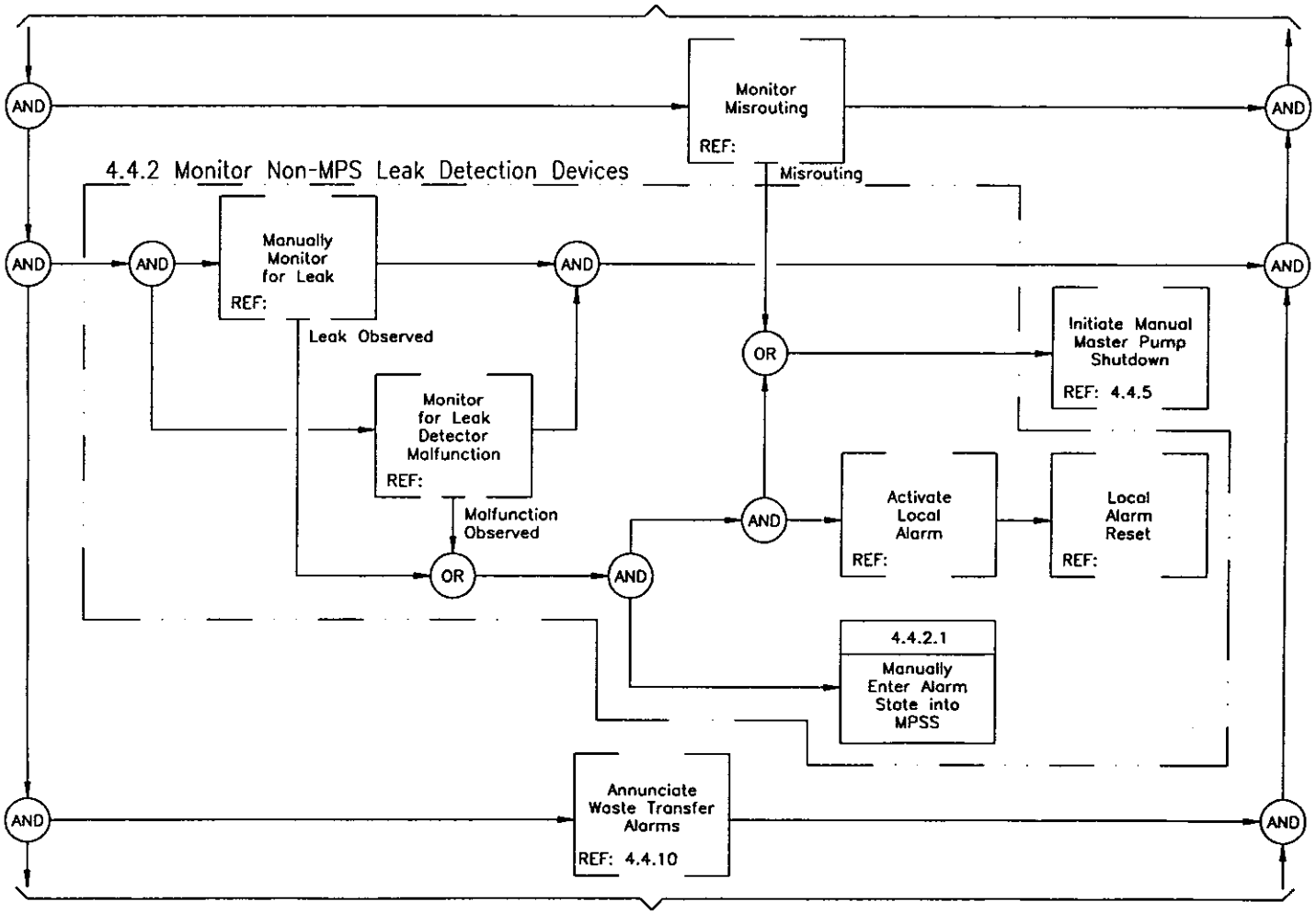
4.4.1 Monitor Incorrect Manual Valve Position



SYSTEM:	NUMBER:	DATE:
Transfer Waste	4.4.1	August 28, 2000
ORIGINATED BY:	FLOW TITLE:	
Project W-314	Monitor Incorrect Manual Valve Position	

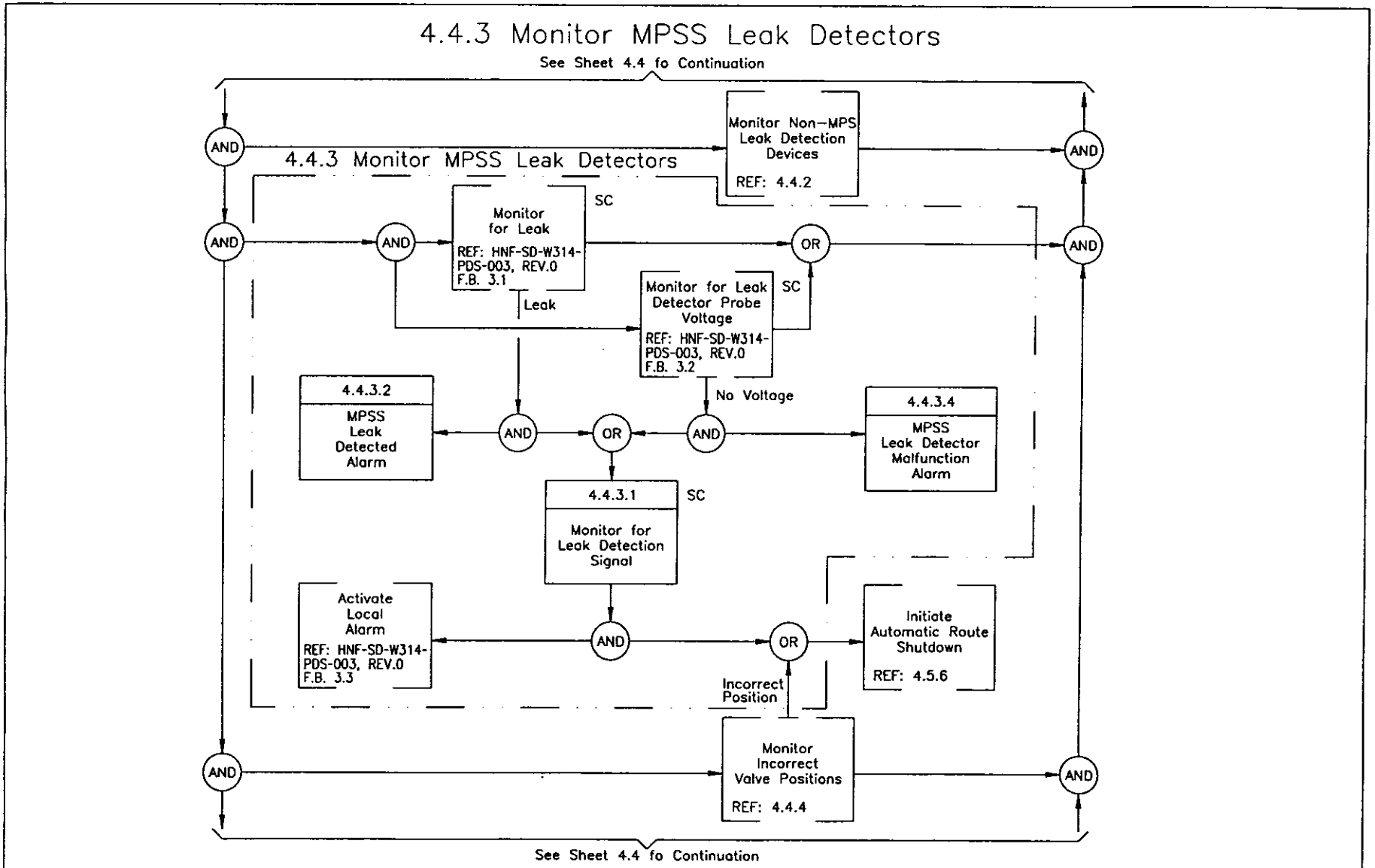
CADFILE: block4af1.dwg

4.4.2 Monitor Non-MPS Leak Detection Devices



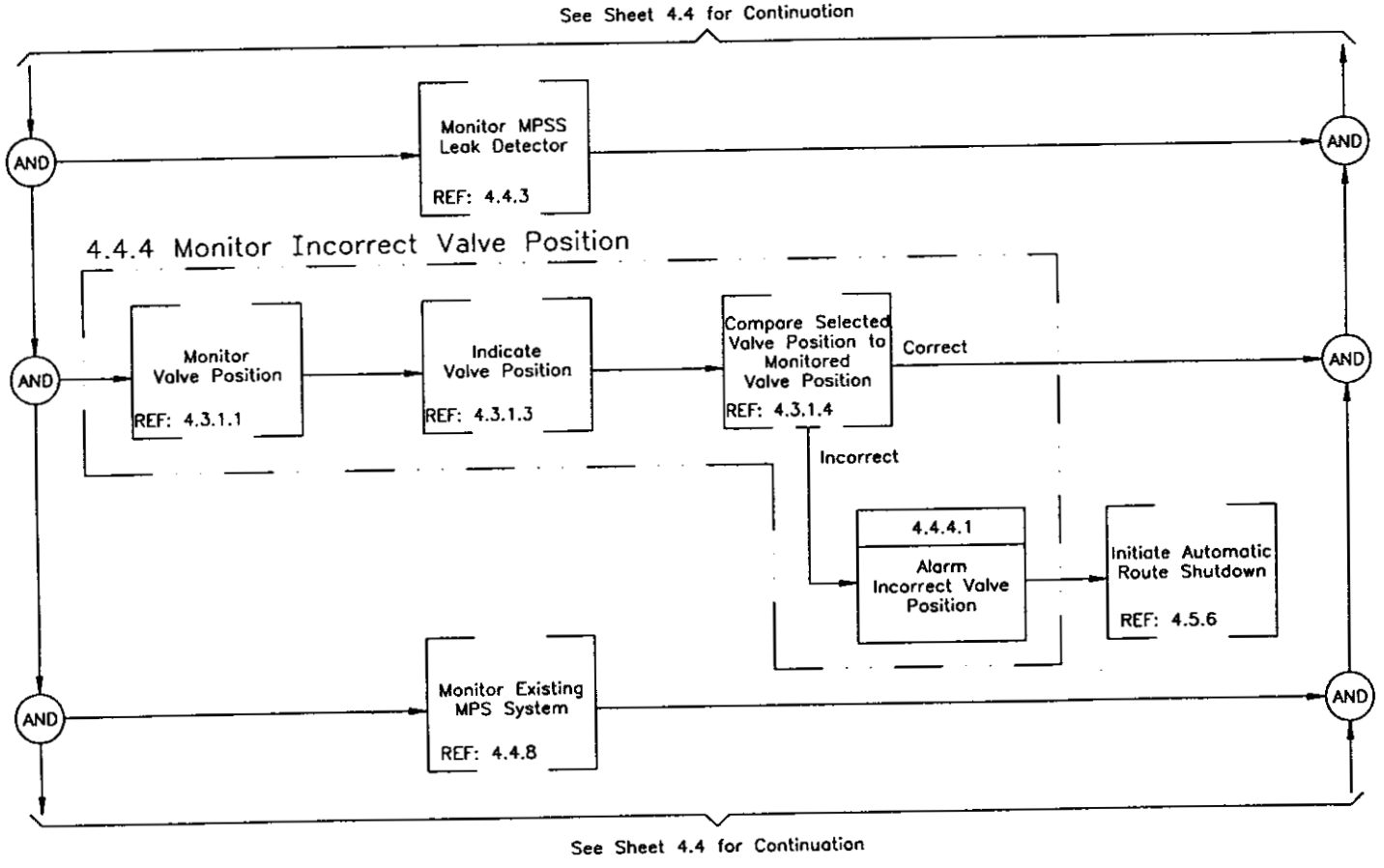
SYSTEM:	NUMBER:	DATE:
Transfer Waste	4.4.2	August 28, 2000
ORIGINATED BY:	FLOW TITLE:	
Project W-314 Phase I	Monitor Non-MPS Leak Detection Devices	

CADFILE: block4ad1.dwg



SYSTEM:	NUMBER:	DATE:
Transfer Waste	4.4.3	August 28, 2000
ORIGINATED BY:	FLOW TITLE:	
Project W-314 Phase I	Monitor MPSS Leak Detectors	

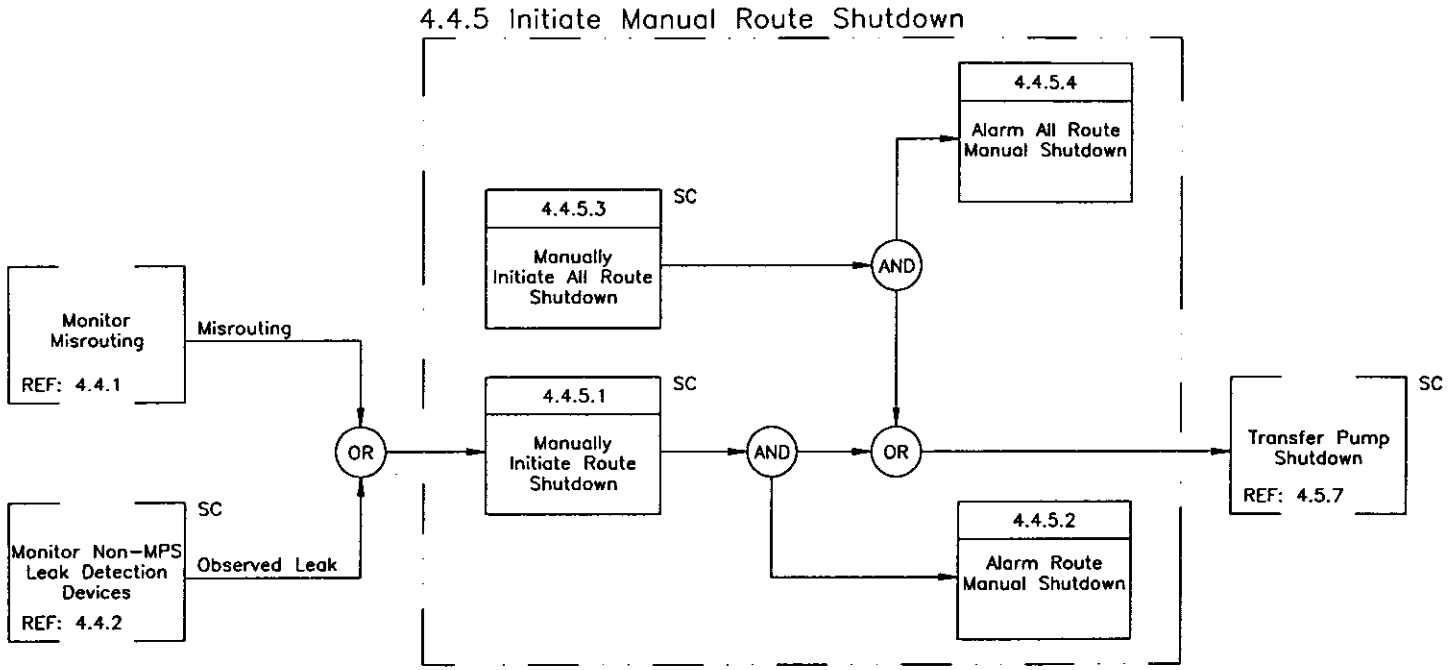
4.4.4 Monitor Incorrect Valve Position



SYSTEM: Transfer Waste	NUMBER: 4.4.4	DATE: August 28, 2000
ORIGINATED BY: Project W-314 Phase I	FLOW TITLE: Monitor Incorrect Valve Position	

CADFILE: block4aa1.dwg

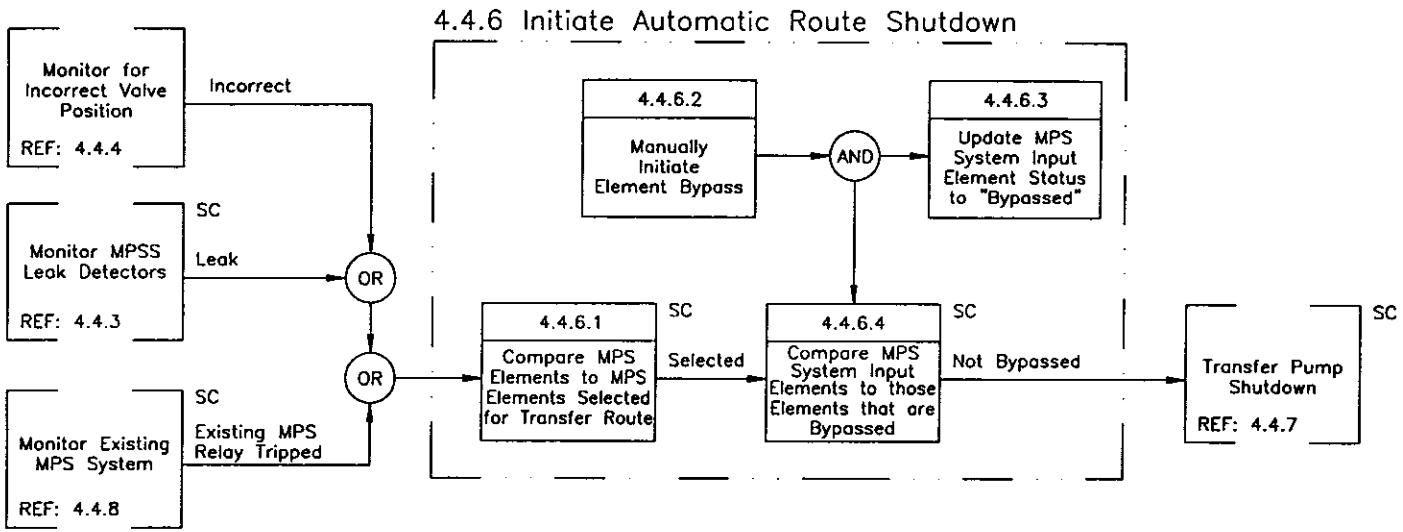
4.4.5 Initiate Manual Route Shutdown



SYSTEM: Transfer Waste	NUMBER: 4.4.5	DATE: August 28, 2000
ORIGINATED BY: Project W-314 Phase 1	FLOW TITLE: Initiate Manual Route Shutdown	

CADFILE: block4ak1.dwg

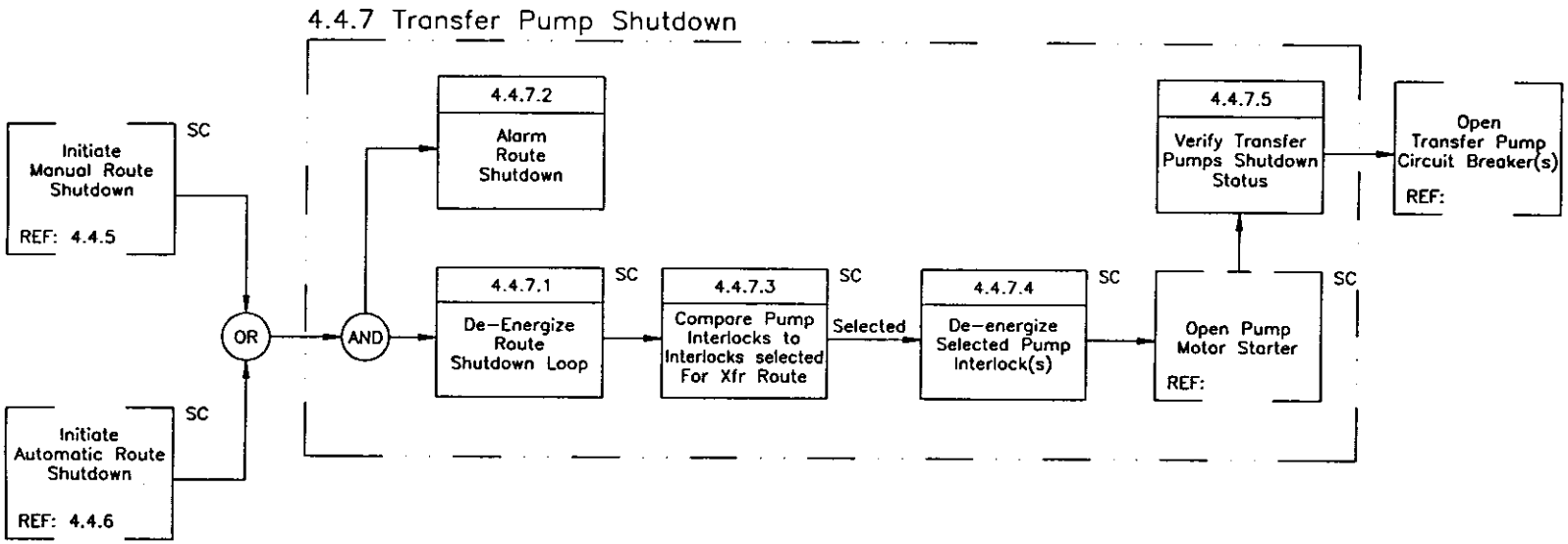
4.4.6 Initiate Automatic Route Shutdown



SYSTEM: Transfer Waste	NUMBER: 4.4.6	DATE: August 28, 2000
ORIGINATED BY: Project W-314 Phase I	FLOW TITLE: Initiate Automatic Route Shutdown	

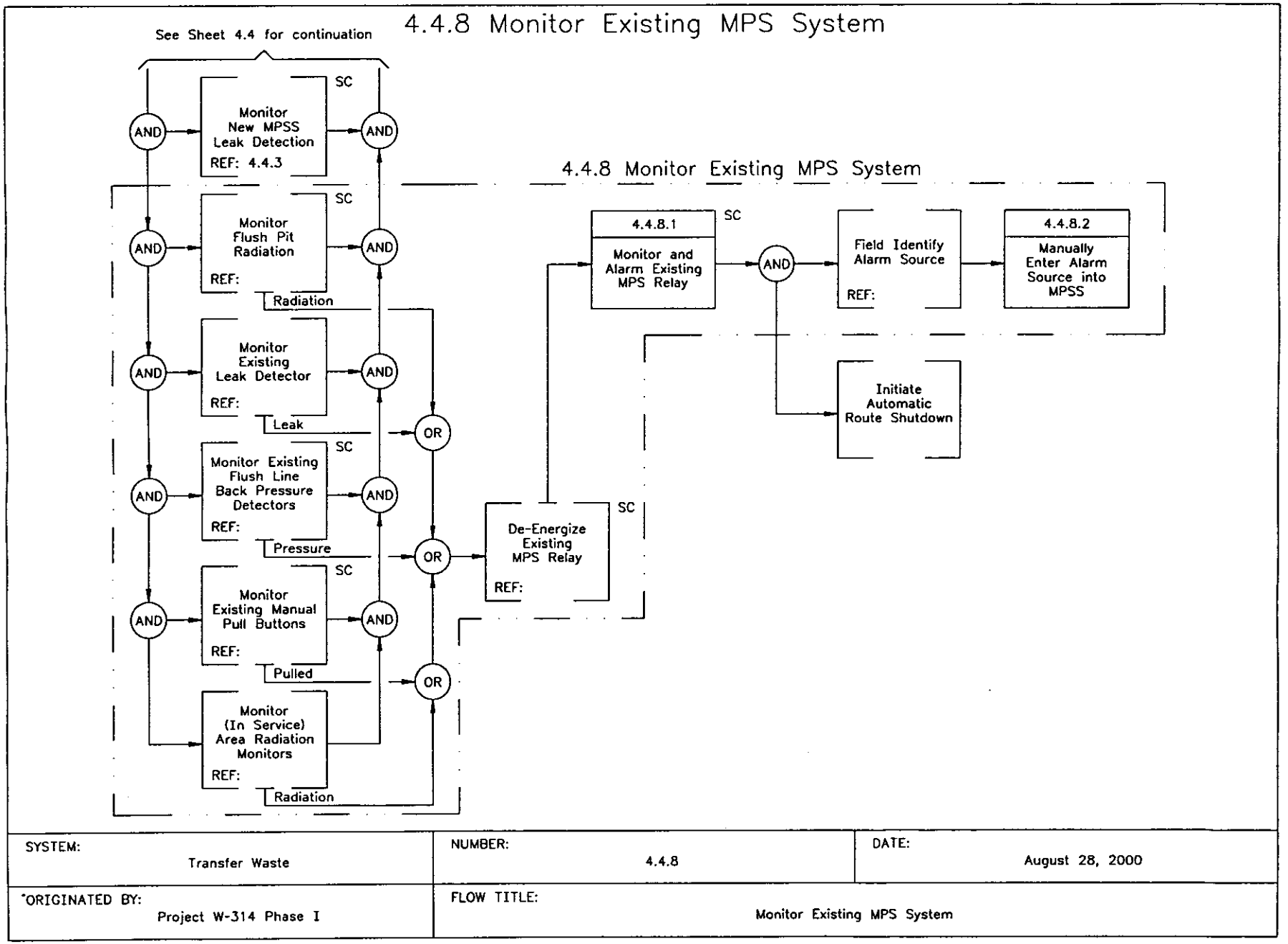
CADFILF: block4ai1.dwg

4.4.7 Transfer Pump Shutdown



SYSTEM: Transfer Waste	NUMBER: 4.4.7	DATE: August 28, 2000
ORIGINATED BY: Project W-314 Phase I	FLOW TITLE: Transfer Pump Shutdown	

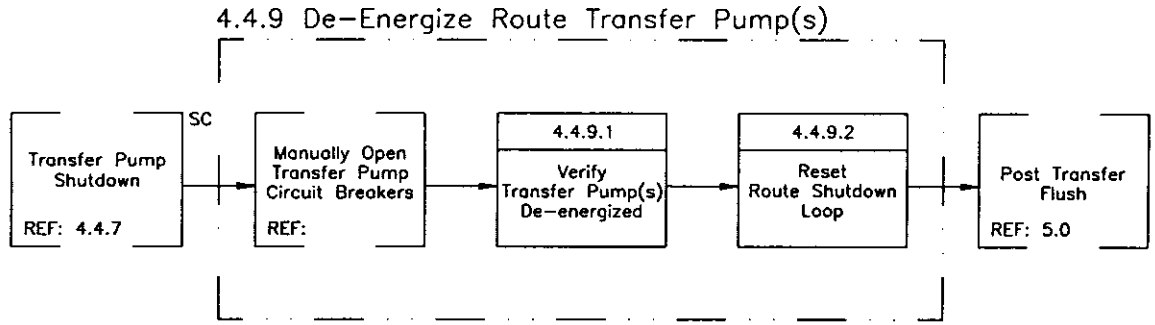
CADFILE: block4al1.dwg



SYSTEM: Transfer Waste	NUMBER: 4.4.8	DATE: August 28, 2000
*ORIGINATED BY: Project W-314 Phase I	FLOW TITLE: Monitor Existing MPS System	

CADFILE: block4am1.dwg

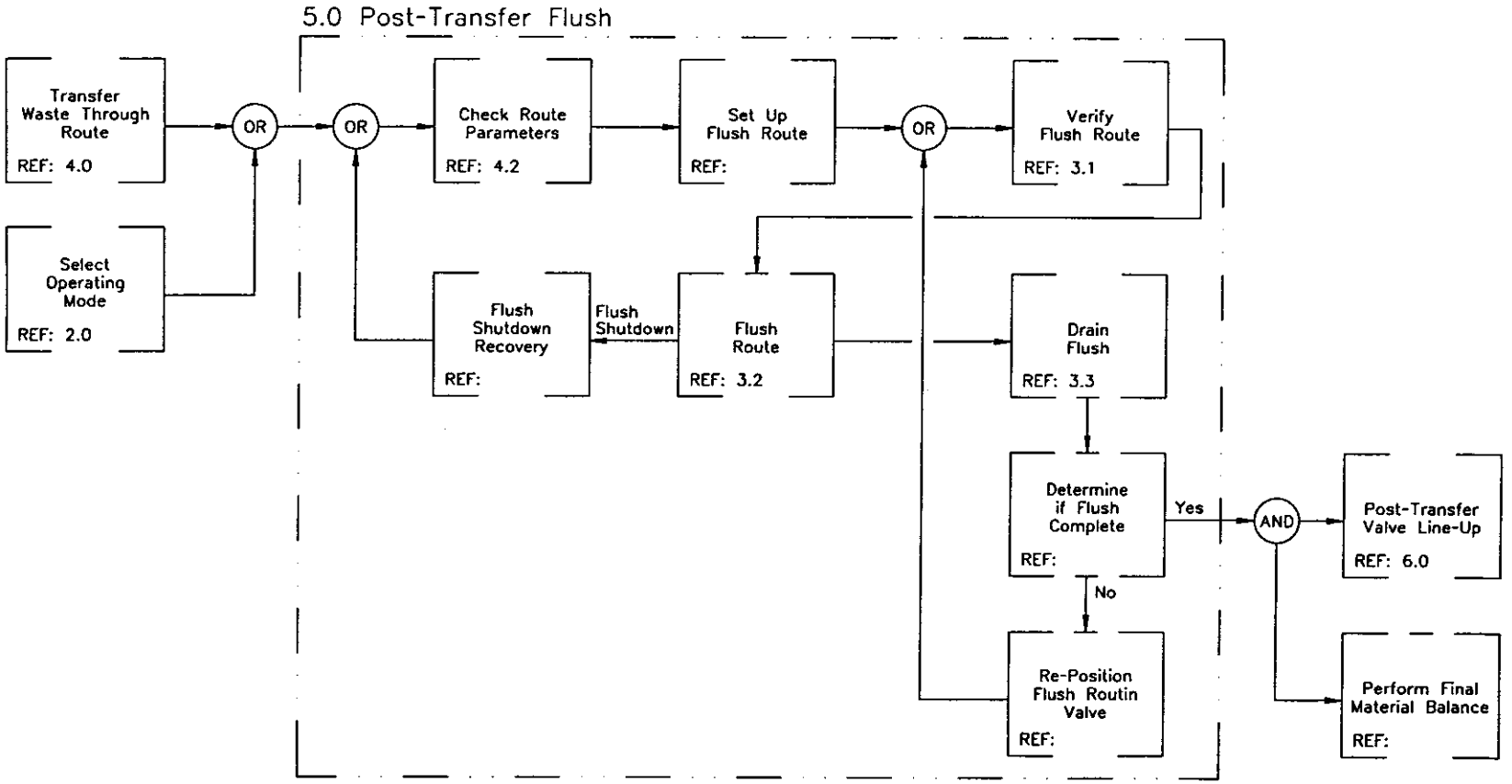
4.4.9 De-Energize Route Transfer Pump(s)



SYSTEM: Transfer Waste	NUMBER: 4.4.9	DATE: August 28, 2000
ORIGINATED BY: Project W-314 Phase I	FLOW TITLE: De-Energize Route Transfer Pump(s)	

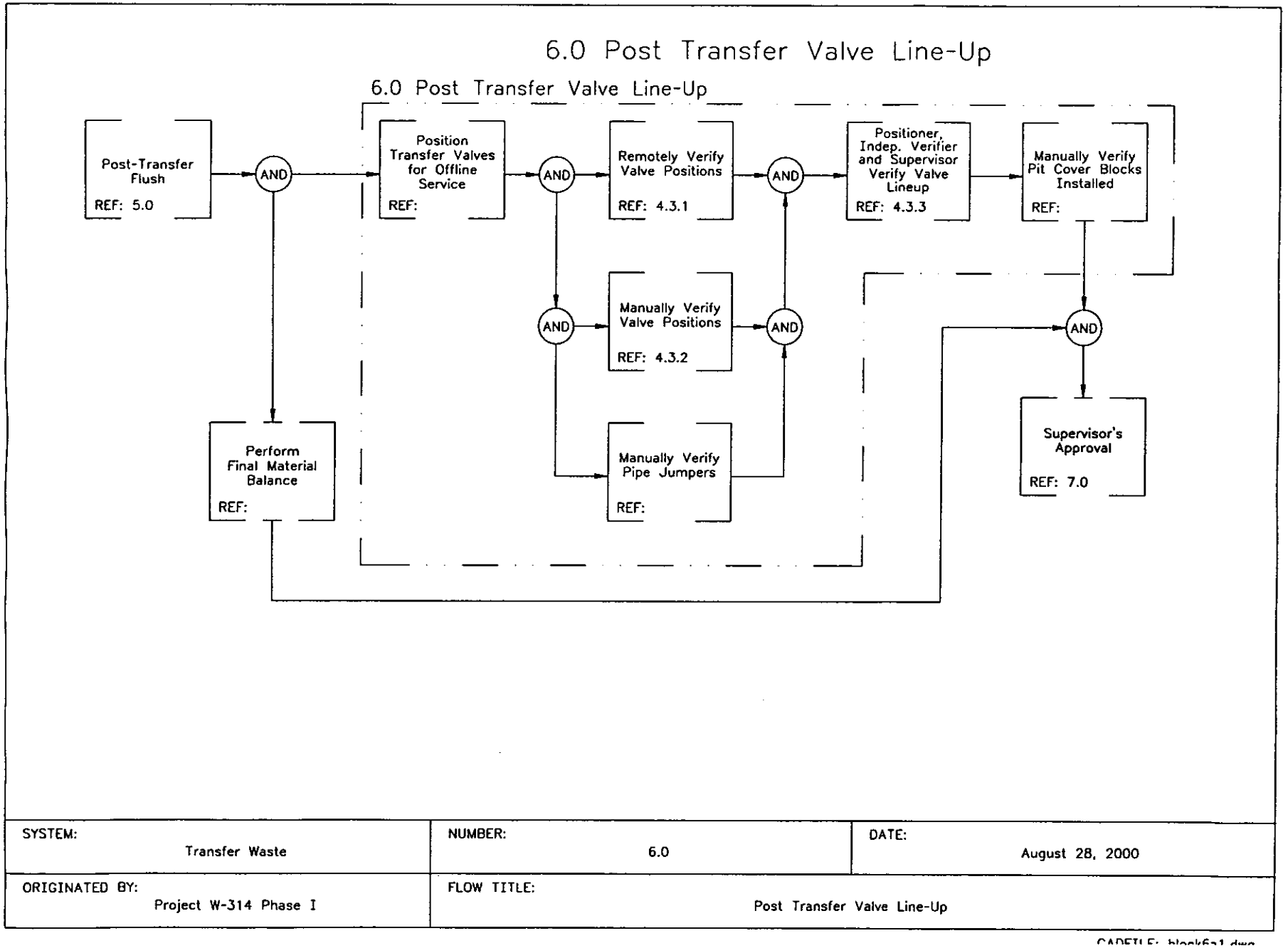
CADFILE: block4ac1.dwg

5.0 Post–Transfer Flush



SYSTEM: Transfer Waste	NUMBER: 5.0	DATE: August 28, 2000
ORIGINATED BY: Project W-314 Phase I	FLOW TITLE: Post-Transfer Flush	

CADFILE: block4ah1.dwg



SYSTEM: Transfer Waste	NUMBER: 6.0	DATE: August 28, 2000
ORIGINATED BY: Project W-314 Phase I	FLOW TITLE: Post Transfer Valve Line-Up	

CADFILE: block6a1.dwg

APPENDIX B

Master Pump Shutdown System

Route Selection Database

INTRODUCTION

The following tables were prepared utilizing the Microsoft Excel spreadsheet program. A summary description of each column in a table is presented at the beginning of each of the tables listed below.

TABLE	TITLE	PURPOSE
1.	Tank List	Associates each doubled shelled tank with a tank farm and an inlet flow meter.
2.	Pit List	Associates each pit located in a doubled shelled tank farm with a tank farm, tank, and a pit leak detector.
3.	Tank Farm List	Associates each doubled shelled tank farm with a Hanford Area designation.
4.	Transfer Line List	Associates each transfer line interconnecting the doubled shelled tank farms with the line's source pit, source connector head, destination pit, destination connector head, and encasement leak detector.
5.	Pump List	Associates each transfer pump located in the doubled shelled tank farms with the pump's source, pit, destination connector head, outlet flow meter, MCC, and MPS system interlocks.
6.	Table Deleted	
7.	Leak Detector List	Associates existing leak detectors with existing MPS System relay inputs that are connected to the new project W-314 MPS System.
8.	Clean-Out-Box List	Associates existing Clean-Out-Box leak

		detectors with Clean-Out-Box, transfer line, and existing MPS System relays.
9.	3-Way Valve List	Associates each 3-way transfer valve located in the doubled shelled tank farm pits with each valve's farm location; pit location; positions A, B, and C inlet connections (such as nozzle number or valve number); positions A, B, and C outlet connections; and positions A, B, and C switch tag numbers.
10.	2-Way Valve List	Associates each 2-way transfer valve located in the doubled shelled tank farm pits with each valve's farm location; pit location; inlet connections (such as nozzle number or valve number); outlet connections; and open and closed position switch tag numbers.
11.	Table Deleted	
12.	Table Deleted	
13.	Encasement Drain Valve	Associates each encasement drain valve located in the doubled shelled tank farm pits with each valve's farm location; pit location; inlet connections (such as transfer line number of the encasement being drained); outlet connections; and open and closed position switch tag numbers (if applicable).
14.	Drain Valve List	Associates each pit drain plug or valve located in the doubled shelled tank farm pits with each valve's farm location; pit location; inlet connections; outlet connections; (such as the tank into which the pit is being drained) and open and closed position switch tag numbers (if applicable).
15.	Drain Line List	Associates each pit drain line located in the doubled shelled tank farms with the line's source

pit, source connection, destination pit, and destination connection.

TABLE 1

Tank List

Table 1 - Tank List Use and Description

The columns shown on TABLE 1 are defined as follows:

- **Tank-** (Key Field) An equipment number that identifies the specific double shell tank (DST) which is being examined.
- **Farm-** Identifies the tank farm in which the tank resides.
- **Inlet Flowmeter-** Identifies the inlet flowmeter that is associated with the specific tank inlet.
- **Reference Dwg-** Source reference drawing that shows the source of the existing tank, flowmeter, and its respective farm.

Table 1 - Tank List

TANK	FARM/LOCATION	INLET FLOWMETER	REF DWG
241-AN-101	241-AN	TBD	H-2-71901
241-AN-102	241-AN	TBD	H-2-71901
241-AN-103	241-AN	TBD	H-2-71901
241-AN-104	241-AN	TBD	H-2-71901
241-AN-105	241-AN	TBD	H-2-71901
241-AN-106	241-AN	TBD	H-2-71901
241-AN-107	241-AN	TBD	H-2-71901
241-AP-101	241-AP	TBD	H-2-77443
241-AP-102	241-AP	TBD	H-2-77443
241-AP-103	241-AP	TBD	H-2-77443
241-AP-104	241-AP	TBD	H-2-77443
241-AP-105	241-AP	TBD	H-2-77443
241-AP-106	241-AP	TBD	H-2-77443
241-AP-107	241-AP	TBD	H-2-77443
241-AP-108	241-AP	TBD	H-2-77443
241-AW-101	241-AW	TBD	H-2-70302
241-AW-102	241-AW	TBD	H-2-70302
241-AW-103	241-AW	TBD	H-2-70302
241-AW-104	241-AW	TBD	H-2-70302
241-AW-105	241-AW	TBD	H-2-70302

Table 1 - Tank List			
241-AW-106	241-AW	TBD	H-2-70302
241-AY-101	241-AY	TBD	H-2-13100
241-AY-102	241-AY	FE-0621 (Phase 2)	H-2-818560 H-2-64400
241-AZ-101	241-AZ	TBD	H-2-131009
241-AZ-102	241-AZ	TBD	H-2-131009
241-SY-101	241-SY	TBD	H-2-824328
241-SY-102	241-SY	TBD	H-2-824328
241-SY-103	241-SY	TBD	H-2-824328
241A-350 CATCH TANK	241-A	TBD	H-14-020808-4r2
TK-1	204-AR	TBD	H-2-70703
244-S CATCH TANK	244-S	TBD	H-2-820836 H-2-73801
TK-219-S-102	219-S	TBD	H-2-71085
TK-219-S-101	219-S	TBD	
TK-219-S-103	219-S	TBD	

TABLE 2

Pit List

Table 2 - Pits Use and Description

The columns shown on TABLE 2 are defined as follows:

- **Old Pit Name-** (Key field) Identifies the pit name by its common name.
- **Farm-** Identifies the Tank farm that the pit is located in or services.
- **Tank-** Identifies the individual tank that the pit is associated with, if applicable.
- **LDK-** Identifies the leak detector relay associated with the pit or line leak detection systems.
- **LDX(EY)-** Identifies the voltage relay (EY) associated with the sensing of LDK or probe malfunction.
- **LDE TEST** Identifes the relay associated with the leak detector relay (LDK) test.
- **LDX Test** Identifes the relay associated with the voltage relay (EY) test.
- **SERVICE-** Identifies the pit function or service.
- **Reference Dwg-** Identifies the source drawing or drawings referenced for line information.
- **Misc Notes-** Design notes to assist or otherwise clarify information.

Table 2 - Pit List

PIT NAME	FARM	TANK	LDK	LDX (EY)	LDE Test	LDX Test	SERVICE	REF DWG.	MISC NOTES
241-AN-A	241-AN		AN-A-WT-LDK-331	AN-A-WTK-331C	ANA-WT-K-331A	ANA-WT-K-331B	VALVE PIT	H-14-100991-4 H-14-020801-5,r1	H-14-020801-LDE-146
241-AN-B	241-AN		AN-B-WT-LDK-231	AN-B-WTK-231C	ANB-WT-K-231A	ANB-WT-K-231B	VALVE PIT	H-14-100991-1 H-14-020801-6,r2	H-14-020801-LDE-149
241-AN-01A	241-AN	241-AN-101	AN01A-WT-LDK-201	AN01A-WT-LDK-201C	AN01A-WT-K-201A	AN01A-WT-K-201B	CENTRAL PUMP PIT	H-14-020801-1r2 H-2-71931	WAS LDE-01A-1 LDK-121
241-AN-02A	241-AN	241-AN-102	AN02A-WT-LDK-128	AN02A-WT-LDK-128			CENTRAL PUMP PIT	H-14-020801-2,r5 H-2-71931	WAS LD1-02A-1
241-AN-03A	241-AN	241-AN-103	AN-03A-WT-LDK-131	AN-03A-WT-LDK-131			CENTRAL PUMP PIT	H-14-020801-2.r5 H-2-71931	WAS LD1-03A-1 LD2-03A-1
241-AN-04A	241-AN	241-AN-104	AN-04A-WT-LDK-134	AN-04A-WT-LDK-134			CENTRAL PUMP PIT	H-14-020801-3.r5 H-2-71931	WAS LD1-04A-1 LD2-04A-1
241-AN-04D	241-AN	241-AN-104	AN04D-WT-LDK-152	AN04D-WT-K-152C	AN04D-WT-K-152A	AN04D-WT-K-152B	Slurry Receiver Pit	H-14-102638 H-14-1033331	New Pit
241-AN-05A	241-AN	241-AN-105	AN-05A-WT-LDK-137	AN-05A-WT-LDK-137			CENTRAL PUMP PIT	H-14-020801-3r5 H-2-71931	WAS LD1-05A-1 LD2-05A-1
241-AN-06A	241-AN	241-AN-106	AN06A-WT-LDK-140	AN06A-WT-LDK-140			CENTRAL PUMP PIT	H-2-71116 H-2-71931 H-14-020801-4r1	WAS LD1-06A-1 LD2-06A-1
241-AN-07A	241-AN	241-AN-107	AN07A-WT-LDK-143	AN07A-WT-LDK-143			CENTRAL PUMP PIT	H-2-71116 H-2-71931 H-14-020801-1r4	WAS LD1-07A-1 LD2-07A-1

Table 2 - Pit List

PIT NAME	FARM	TANK	LDK	LDX (EY)	LDE Test	LDX Test	SERVICE	REF DWG.	MISC NOTES
241-AZ-02A	241-AZ	241-AZ-102	AZ02A-WT-LDK-306	AZ02A-WT-K-306C	AZ02A-WT-K-306A	AZ02A-WT-K-306B	CENTRAL PUMP PIT	H-2-68335. H-2-74600. H-14-102404. H-14-102638. H-14-102689	WAS LDK-102-20A
241-AZ-01A	241-AZ	241-AZ-101	AZ01A-WT-LDK-309	AZ01A-WT-K-309C	AZ01A-WT-K-309A	AZ01A-WT-K-309B	CENTRAL PUMP PIT	H-2-68335 H-14-102638 H-14-102689 *H-14-020807-1r0*	WAS LDK-101-20A
241-AZVP	241-AZ		AZVP-WT-LDK-221	AZVP-WT-K-221C	AZVP-WT-K-221A	AZVP-WT-K-221B	VALVE PIT	H-14-102638 H-14-103248-*1r1* H-14-103274	
241-A-350	241-A		K-LDK-350-1A				CATCH TANK PUMP PIT	H-2-70387 S-2 H-2-99085 S-8 H-14-020808-4r1	
241-AY-01A	241-AY	241-AY-101	AY01A-WT-LDK-310	AY01A-WT-K-310C	AY01A-WT-K-310A	AY01A-WT-K-310B	CENTRAL PUMP PIT	H-2-74600 H-2-99085 H-14-102638 H-2-64400-8r5 H-14-102644	LDK-101-22A
241-AY-02A	241-AY	241-AY-102	AY02A-WT-LDK-301	AY02A-WT-K-301C	AY02A-WT-K-301A	AY02A-WT-K-301B	CENTRAL PUMP PIT	H-2-64400-6 H-2-64400-14r1 H-14-102638 H-14-102644	MPS replaced LDK-102-22A
241-AW-01A	241-AW	241-AW-101	WT-LDK-201A	WT-LDK-201A			CENTRAL PUMP PIT	H-14-020802-1r3	LDX WAS LD2-01A-1
241-AW-02A	241-AW	241-AW-102	WT-LDK-202A	WT-LDK-202A			CENTRAL PUMP PIT	H-14-020802-2r5	WAS KLD-02A-1 AND LD2-02A-1

Table 2 - Pit List

PIT NAME	FARM	TANK	LDK	LDX (EY)	LDE Test	LDX Test	SERVICE	REF DWG.	MISC NOTES
241-AW-02D	241-AW	241-AW-102	WT-WT-LDK-202D	WT-LDK-202A			DRAIN PIT	H-14-020802-2r5	WAS LD1-02D-1 LD2-02D-1
241-AW-02E	241-AW	241-AW-102	WT-LDK-202E	WT-LDK-202E			FEED PUMP PIT	H-14-020802-2r5	WAS LD1-02E-1 LD2-02E-1
241-AW-03A	241-AW	241-AW-103	WT-LDK-203A	WT-LDK-203A			CENTRAL PUMP PIT	H-14-020802-1r3	WAS KLD-03A
241-AW-04A	241-AW	241-AW-104	WT-LDK-204A	WT-LDK-204A			CENTRAL PUMP PIT	H-14-020802-1r3	
241-AW-05A	241-AW	241-AW-105	WT-LDK-205A	WT-LDK-205A			CENTRAL PUMP PIT	H-14-020802-1r3	
241-AW-06A	241-AW	241-AW-106	WT-LDK-206A	WT-LDK-206A			CENTRAL PUMP PIT	H-14-020802-2r3	
241-AW-FLUSH PIT	241-AW		WT-LD1-FP	WT-LD2-FP			FLUSH PIT	H-14-020802-6r2	H-2-70329
241-AW-A	241-AW		AW-A-WT-LDK-207	AW-A-WT-K-207C	AWA-WT-K-207A	AWA-WT-K-207B	VALVE PIT	H-2-70348 H-14-020802-4r2	WAS LDE-VP-AW-A KLD-VP-A
241-AW-B	241-AW		AW-B-WT-LDK-208	AW-B-WT-K-208C	AWB-WT-K-208A	WB-WT-K-208B	VALVE PIT	H-2-70348 H-14-020802-5r2	WAS LDE-VP-AW-B1 LD2-VP-B
241-AP-01A	241-AP	241-AP-101	AP01A-WT-LDK-201	AP01A-WT-LDK-201C			CENTRAL PUMP PIT	H-2-90553 H-2-90476 H-14-020803-1r1	
241-AP-02A	241-AP	241-AP-102	AP02A-WT-LDK-201	AP02A-WT-LDX-201			CENTRAL PUMP PIT	H-2-90554 H-14-020803-3r1	
241-AP-02D	241-AP	241-AP-102	AP02D-WT-LDK-205	AP02D-WT-LDX-205			PUMP PIT	H-2-90554 H-2-81187 H-14-020803-3r1	

Table 2 - Pit List

PIT NAME	FARM	TANK	LDK	LDX (EY)	LDE Test	LDX Test	SERVICE	REF DWG.	MISC NOTES
241-AP-03A	241-AP	241-AP-103	AP03A-WT-LDK-201	AP03A-WT-LDX-201			CENTRAL PUMP PIT	H-2-90555 H-14-020803-1r1	
241-AP-03D	241-AP	241-AP-103	AP03D-WT-LDK-210	AP03D-WT-LDK-210			DRAIN PIT	H-14-020803-1r1	
241-AP-04A	241-AP	241-AP-104	AP04A-WT-LDK-201	AP04A-WT-LDX-201			CENTRAL PUMP PIT	H-2-90556 H-14-020803-3r1	
241-AP-05A	241-AP	241-AP-105	AP05A-WT-LDK-201	AP05A-WT-LDX-201			CENTRAL PUMP PIT	H-2-90557 H-14-020803-2r1	
241-AP-06A	241-AP	241-AP-106	AP06A-WT-LDK-201	AP06A-WT-LDX-201			CENTRAL PUMP PIT	H-2-90558 H-14-020803-4r1	
241-AP-07A	241-AP	241-AP-107	AP07A-WT-LDK-201	AP07A-WT-LDX-201			CENTRAL PUMP PIT	H-2-90559 H-14-020803-2r1	
241-AP-08A	241-AP	241-AP-108	AP08A-WT-LDK-201	AP08A-WT-LDX-201			CENTRAL PUMP PIT	H-2-90560 H-14-020803-4r1	
241-AP VALVE PIT	241-AP	241-AP-TANKS	AP-WT-LDK-224	AP-WT-K-224C	AP-WT-K-224A	AP-WT-K-224B	VALVE PIT	H-2-90526-2	
241-AP FLUSH PIT	241-AP	241-AP-TANKS	AP-WT-LDK-701	AP-WT-LXK-701			FLUSH PIT	H-2-90476 H-14-021803-1r1	
NEW 241-AP VALVE PIT	241-AP	241-AP TANKS	AP-WT-LDK-101t	AP-WT-K-101tC	AP-WT-K-101tA	AP-WT-K-101tB	VALVE PIT	TEMP. TAG	Project W-521
241-SY-01A	241-SY	241-SY-101	SY01A-WT-LDK-130	SY01A-WT-LDX-130			CENTRAL PUMP PIT	H-2-37778 H-2-37735 H-14-020830-1r0	PUMP PIT
241-SY-02A	241-SY	241-SY-102	SY02A-WT-LDK-133	SY02A-WT-LDX-133			CENTRAL PUMP PIT	H-2-37778 H-2-37768 H-14-020831-2r1	PUMP PIT

Table 2 - Pit List

PIT NAME	FARM	TANK	LDK	LDX (EY)	LDE Test	LDX Test	SERVICE	REF DWG.	MISC NOTES
241-SY-02D	241-SY	241-SY-102	SY02D-WT-LDK-136	SY02D-WT-LDX-136			DRAIN PIT	H-2-37778 H-2-37768 H-14-020831-2r1	
241-SY-02E	241-SY	241-SY-102	LDE-FP-SY-02E				FEED PUMP PIT	H-2-37778 H-2-37768 H-14-020831-2r1	LDE-137
241-SY-03A	241-SY	241-SY-103	SY03A-WT-LDK-139	SY03A-WT-LDX-139			CENTRAL PUMP PIT	H-2-37778 H-2-37769 H-14-020831-3r1	PUMP PIT
VALVE PIT 241-SY-A	241-SY		LD1-VP-SY-A	LD2-VP-SY-A			VALVE PIT	H-2-37778 H-14-020831-4r3	VALVE PIT LDE-144
VALVE PIT 241-SY-B	241-SY		LD1-VP-SY-B	LD2-VP-SY-B			VALVE PIT	H-2-37778 H-14-020831-4r3	VALVE PIT LDE-145
FLUSH PIT 241-SY-FP-A	241-SY		SYFPA-WT-LDK-141	SYFPA-WT-LDK-141			FLUSH PIT	H-2-37778 H-14-020831-1r3	FLUSH PIT
FLUSH PIT 241-SY-FP-B	241-SY		SYFPB-WT-LDK-114142	SYFPB-WT-LDX-142			FLUSH PIT	H-2-37778 H-14-020831-2r0	FLUSH PIT
DIV BOX 6241-A	CROSS SITE		LDK-3150	LDK-3150A			DIVERSION BOX	H-2-822403-1r4	
VENT STA 6241-V	CROSS SITE		LDK-3151	LDK-3151A			VENT STATION	H-2-822404-1r4	
241-A-A VALVE PIT	241-A		LD1-VP-A-1	LD2-VP-A-1			VALVE PIT	H-2-69157 H-2-69181	
219-S	241-S	TK-219-S-102					222S CATCH TANK	H-2-820836-3	
SY-FP-E	241-SY		LDK-143	LDX-143			FLUSH PIT	H-14-021831	

Table 2 - Pit List

PIT NAME	FARM	TANK	LDK	LDX (EY)	LDE Test	LDX Test	SERVICE	REF DWG.	MISC NOTES
SY-SP	241-SY		TBD					H-14-021831	
244-S	S Farm		LLE-PP-1	LDE-PP-2			244-S PUMP PIT	H-2-73801 H-2-71085 H-2-71050 H-2-820836	
204-AR		TK-1	LDK-SMP				WST UNLD STAT	H-2-70703	
241-A-B VALVE PIT	241-A		LDK-VP-B-1	LDX-VP-B-1			VALVE PIT	H-2-69157 H-2-69181	

TABLE 3

Tank Farm List

Table 3 - Farm List Use and Description

The columns shown on TABLE 3 are defined as follows:

- **Farm-** (Key field) Designation identifies the tank farm which is being examined.
- **Area-** Designation identifies the area in which the tank farm is located.
- **Reference Dwg-** Reference source drawing that shows the existing areas and their respective farms.

Table 3 - Tank Farm List

FARM	AREA	REF DWG
241-SY	200 WEST	H-2-90327
241-AN	200 EAST	H-2-90326
241-AP	200 EAST	H-2-90326
241-AW	200 EAST	H-2-90326
241-AY	200 EAST	H-2-90326
241-AZ	200 EAST	H-2-90326
241-A	200 EAST	H-2-90326

TABLE 4

Transfer Line List

Table 4 - Transfer lines Use and Description

The columns shown on TABLE 4 are defined as follows:

- Line- (Key field) Identifies the waste transfer line by its identification number.
- Source Pit- Identifies the pit that the line starts from. (Generally the higher elevation end of the line, or if a one way line, the pump end.)
- Source Connection- Identifies the pit nozzle that the line begins at.
- Destination Pit- Identifies the pit that the line ends at.
- Destination Connection- Identifies the pit nozzle that the line ends at.
- LDK- Identifies the leak detector relay associated with the pit or line leak detection systems.
- LDX- Identifies the voltage relay (EY) associated with the sensing of LDK or probe malfunction.
- LDE TEST- Identifies the relay associated with the leak detector relay (EY) test.
- LDX TEST- Identifies the relay associated with the voltage relay (LDX) test.
- Reference Dwg- Identifies the source drawing or drawings referenced for line information.
- Misc Notes- Design notes to assist or otherwise clarify information.

Table 4 - Transfer Line List

LINE	SOURCE PIT	SOURCE CONNEC-TION	DESTINA-TION	DESTINA-TION CONNEC-TION	LDK	LDX	LDE TEST	LDX TEST	REF DWG
SN-268	241-AN-A	L19	241-AN-B	R19	AN-A-WT-LDK-335	AN-A-WT-K-335C	AN-A-WT-K-335A	AN-A-WT-K-335B	H-14-100990 H-14-100941 H-14-020801-5r1
SL-168	241-AN-A	L18	241-AN-B	R18	AN-A-WT-LDK-334				H-14-100991-4 H-14-100941 H-14-020801-5r1
SN-267	107A	A	241-AN-A	L1	AN-A-WT-LDK-143				H-2-72039 H-14-020801-5r1
SL-167	241-AN-A	L3	241-AN-07A	B	AN-A-WT-LDK-143				H-2-72039 H-14-020801-4r1
SL-164	241-AN-A	L5	241-AN-04A	B	AN04A-WT-LDK-203	AN04A-WT-K-203C	AN04A-WT-K-203A	AN04A-WT-K-203B	H-2-71994 H-14-020801-4r1 H14-103329
SL-165	241-AN-A	L7	241-AN-05A	B	AN-A-WT-LDK-137				H-2-71995 H-14-020801-3r2
SL-166	241-AN-A	L9	241-AN-06A	B	AN-A-WT-LDK-140				H-2-71996 H-14-020801-4r1
SN-266	241-AN-06A	A	241-AN-A	L14	AN-A-WT-LDK-140				H-2-71996 H-14-020801-4r1
SN-264	241-AN-04A	A	241-AN-A	L15	AN04A-WT-LDK-203	AN04A-WT-K-203C	AN04A-WT-K-203A	AN04A-WT-K-203B	H-2-71994 H-14-020801-3r2 H-14-103329
SN-265	241-AN-05A	A	241-AN-A	L16	AN-A-WT-LDK-137				H-2-71995 H-14-020801-3r2
SL-163	241-AN-B	R9	241-AN-03A	B	AN-A-WT-LDK-131				H-2-71993 H-14-020801-2r4

Table 4 - Transfer Line List

LINE	SOURCE PIT	SOURCE CONNEC-TION	DESTINA-TION	DESTINA-TION CONNEC-TION	LDK	LDX	LDE TEST	LDX TEST	REF DWG
SL-162	241-AN-B	R7	241-AN-02A	B	AN-A-WT-LDK-128				H-2-71992 H-14-020801-2r4
SL-161	241-AN-B	R5	241-AN-01A	B	AN01A-WT-LDK-201	AN01A-WT-LDK-201C	AN01A-WT-LDK-201A	AN01A-WT-LDK-201B	H-2-71991 H-14-020801-1r5 H-14-103327
DR-368	241-AN-A	FLOOR DRAIN	241-AN-101	WST RISER 020	AN-A-WT-LDK-124				H-2-71978 H-14-020801-1r5
DR-369	241-AN-B	FLOOR DRAIN	DR-368		AN-A-WT-LDK-124				H-2-71978 H-14-020801-1r5
SN-262	241-AN-02A	A	241-AN-B	R16	LDK-128				H-2-71992 H-14-020801-2r4
SN-261	241-AN-01A	A	241-AN-B	R15	AN01A-WT-LDK-201	AN01A-WT-LDK-201C	AN01A-WT-LDK-201A	AN01A-WT-LDK-201B	H-14-100942 H-14-103327 H-14-020801-1r5
SN-263	241-AN-03A	A	241-AN-B	R14	LDK-131				H-14-100942 H-14-020801-2r4
SL-168	242-A PMP RM	18	241-AW-A	L3	AW-A-WT-LDK-215				H-2-70401 H-14-020802-4r2 H-14-100800
SL-509	241-AW-B	R4	241-AP VALVE PIT	1	AP-WT-LDK-225	AP-WT-K-225			H-2-76471 H-2-70399 H-14-100800 H-14-020803-5r2
SL-510	241-AW-A	L4	241-AP VALVE PIT	2	AP-WT-LDK-226	AP-WT-K-226			H-2-70401 H-2-76471 H-14-020802-4r2 H-14-100800

Table 4 - Transfer Line List

LINE	SOURCE PIT	SOURCE CONNEC-TION	DESTINA-TION	DESTINA-TION CONNEC-TION	LDK	LDX	LDE TEST	LDX TEST	REF DWG
SN-609	241-AW-02A	V	241-AP VALVE PIT	14	AP-WT-LDK-227	AP-WT-K-227			H-2-76471 H-2-90476-8 H-14-020803-2r5
SN-610	241-AW-02A	U	241-AP VALVE PIT	13	AP-WT-LDK-228	AP-WT-K-228			H-2-76471 H-2-90476 H-14-020803-5r1
SL-167	242-A PMP RM	19	241-AW-B	R3	AW-B-WT-LDK-216				H-14-020802--5r2 H-14-100800
SN-267	241-AW-A	L1	241-AW-02A	J	LD1-241-AW-SN-267	LD2-241-AW-SN-267			H-14-020802-2r5 H-2-70429 H-2-70329
SN-268	241-AW-B	R1	241-AW-02A	H	LD1-241-AW-SN-268	LD2-241-AW-SN-268			H-2-70329 H-14-020802-5r2
SN-271	241-AW-A	L19	241-AW-B	R19	LDK-208				H-2-70401 H-14-020802-5r2
SL-169	241-AW-A	L18	241-AW-B	R18	LDK-208				H-2-70401 H-14-020802-4r2
SN-269	241-AW-02E	B	242-A (EVAP)	13	LD1-241-AW-SN-269	LD2-241-AW-SN-269			H-2-70399 H-2-70398
SN-261	241-AW-A	L16	241-AW-01A	A	LDK-201A				H-2-70401 H-14-020802-4r2
SL-163	241-AW-A	L7	241-AW-03A	B	LDK-203A				H-2-70399 H-14-020802-4r2
SN-263	241-AW-A	L14	241-AW-03A	A	LDK-203A				H-2-70399 H-14-020802-4r2
SL-165	241-AW-A	L9	241-AW-05A	B	LDK-205A				H-2-70399 H-2-70401 H-14-020802-4r2
SN-265	241-AW-A	L15	241-AW-05A	A	LDK-205A				H-2-70399 H-14-020802-4r2

Table 4 - Transfer Line List

LINE	SOURCE PIT	SOURCE CONNEC-TION	DESTINA-TION	DESTINA-TION CONNEC-TION	LDK	LDX	LDE TEST	LDX TEST	REF DWG
DR-334	242-A		241-AW-02D		LDK-235	LD2-241-AW-DR-334			H-14-020802-2r5 H-2-70329
DR-335	242-A		241-AW-02D		LD1-241-AW-DR-335 LDK-233	LD2-241-AW-DR-335			H-14-020802-2r5 H-2-70329
DR-343	242-A		241-AW-02D		LDK-235				H-2-70399
DR-361	241-AW-A	DRAIN	241-AW-02D		LDK-234 LDK-207 (?)	LD2-241-AW-DR-361			H-14-020802 H-2-70329
DR-369	241-AW-B	DR-361	241-AW-02D	F	LDK-208				H-14-020802-2 H-14-020802-3
SN-220	241-AW-A	L2	241-A-A	L2	TBD	TBD			H-14-101079 H-14-100800
SN-270	242-A	34	241-AW-02E	A	LD1-241-AW-SN-270 LDK-229	LD2-241-AW-SN-270			H-14-020802-4r2 H-2-70329 H-2-70387
SL-162	241-AW-B	R5	241-AW-02A	B	LDK-202A				H-2-70399 H-14-020802-5r2
SN-262	241-AW-B	R16	241-AW-02A	A	LDK-202A				H-2-70401 H-14-020802-5r2
SN-272	241-AW-02A	K	241-AW-02E	D	TBD	TBD			H-14-020802-2r5
SN-274	241-AW-B	R20	241-AW-04A	L	LD1-241-AW-SN-274 LDK-236	LD2-241-AW-SN-274			H-14-020802-5r2 H-2-70329
SL-164	241-AW-B	R7	241-AW-04A	B	LDK-204A				H-2-70399 H-14-028002-3r3
SN-264	241-AW-B	R14	241-AW-04A	A	LDK-204A				H-2-70399 H-14-028002-3r3

Table 4 - Transfer Line List

LINE	SOURCE PIT	SOURCE CONNEC-TION	DESTINA-TION	DESTINA-TION CONNEC-TION	LDK	LDX	LDE TEST	LDX TEST	REF DWG
SL-166	241-AW-B	R9	241-AW-06A	B	LDK-206A				H-2-70399 H-2-70400 H-14-028002-3r3
SN-266	241-AW-B	R15	241-AW-06A	A	LDK-206A				H-2-70399 H-14-028002-3r3
SL-511	241-AP-VLV PIT	11	241-AP-01A	B	WT-LDK-201				H-2-90562 H-2-90551 H-2-90528 H-14-020803-1r1
SN-611	241-AP-01A	A	241-AP-VALVE PIT	18	WT-LDK-201				H-2-90551 H-2-90526-2 H-14-020803-1r1
SL-512	241-AP-VLV PIT	10	241-AP-02A	B	WT-LDK-203				H-2-90529 H-14-020803-3r1
FL	241-AP-FP		241-AP	M25					
SN-612	241-AP-02A	A	241-AP-VALVE PIT	19	WT-LDK-203				H-2-90526-2 H-14-020803-3r1
SL-513	241-AP-VLV PIT	12	241-AP-03A	B	WT-LDK-207				H-2-90530 H-14-020803-1r1
SN-613	241-AP-03A	A	241-AP-VALVE PIT	17	WT-LDK-207				H-2-90526-2 H-14-020803-1r1
SL-514	241-AP-VLV PIT	9	241-AP-04A	B	WT-LDK-211				H-2-90531 H-14-020803-3r1
SN-614	241-AP-04A	A	241-AP-VALVE PIT	20	WT-LDK-211				H-2-90526-2 H-14-020803-3r1
SL-515	241-AP-VLV PIT	5	241-AP-05A	B	WT-LDK-213				H-2-90532 H-14-020803-2r1

Table 4 - Transfer Line List

LINE	SOURCE PIT	SOURCE CONNEC-TION	DESTINA-TION	DESTINA-TION CONNEC-TION	LDK	LDX	LDE TEST	LDX TEST	REF DWG
SN-615	241-AP-05A	A	241-AP-VALVE PIT	24	WT-LDK-213				H-2-90526-2 H-14-020803-2r1
SL-516	241-AP-VLV PIT	8	241-AP-06A	B	WT-LDK-216				H-2-90533 H-14-020803-4r1
SN-216	244-U RCVR TNK	N	SY-B	R2					H-2-73798 H-14-020831 VIA SN-282
SN-282	SY-B	R2	SN-216						H-2-73798 H-14-020831 VIA SN-282 (CONNECTS TO U-FARM)
SN-616	241-AP-06A	A	241-AP-VALVE PIT	21	WT-LDK-216				H-2-90526-2 H-14-020803-4r1
SL-517	241-AP-VLV PIT	6	241-AP-07A	B	WT-LDK-218				H-2-90540 H-14-020803-2r1
SN-617	241-AP-07A	A	241-AP-VALVE PIT	23	WT-LDK-218				H-2-90526-2 H-14-020803-2r1
SL-518	241-AP-VLV PIT	7	241-AP-08A	B	WT-LDK-220				H-2-90541 H-14-020803-4r1
SN-618	241-AP-08A	A	241-AP-VALVE PIT	22	WT-LDK-220				H-2-90526-2 H-14-020803-4r1
DR-712	241-AP-VLV PIT	30	TK 241-AP-03D		WT-LDK-210				H-14-020803-1r1
DR-713	241-AP-VLV PIT	FD V-131	241-AP-03D		WT-LDK-210				H-14-020803-1r1
DR-714	DR-715	FD V-132	241-AP-03D						H-14-020803 H-14-021803

Table 4 - Transfer Line List

LINE	SOURCE PIT	SOURCE CONNEC-TION	DESTINA-TION	DESTINA-TION CONNEC-TION	LDK	LDX	LDE TEST	LDX TEST	REF DWG
DR-715	241-AP-FP		DR-714		TBD				H-14-021803-1r1
SL-175	SL-138	N/A	241-SY-A	L3	WT-COB				H-14-020831
SL-138	242-S	TBD	SL-175		WT-TBD				H-14-020831
SL-178	241-SY-B	R9	241-SY-01A	B	WT-LDK-130				H-2-37770 H-14-020831 H-2-822402
SN-278	241-SY-01A	A	241-SY-B	R16	WT-LDK-130				H-2-37770 H-14-020831 H-2-822402
SL-177	241-SY-A	L9	241-SY-02A	B	WT-LDK-133				H-2-37778 H-14-020831-2r0
SN-277	241-SY-A	L16	241-SY-02A	A	WT-LDK-133				H-2-37778 H-14-020831-2r0
SN-285	241-SY-A	L11	241-SY-02A	J	WT-LDK-133				H-2-37778 H-14-020831-2r0
SN-286	241-SY-B	R11	241-SY-02A	H	WT-LDK-133				H-2-37780 H-14-020831-2r0
SN-279	241-SY-03A	A	241-SY-B	R14	WT-LDK-139				H-2-37780 H-2 37770-2 H-14-020831-3r0
SL-179	241-SY-B	R5	241-SY-03A	B	WT-LDK-139				H-2-37778 H-14-020831-3r0
SL-180	241-SY-A	L18	241-SY-B	R18					H-2-37780 H-14-020831-4r4
SN-280	241-SY-A	L19	241-SY-B	R19					H-2-37780 H-14-020831-4r4
V562	241-SY-A	L15	244-S PUMP PIT	3	LDK-V562-1	LDK-V562-1A			H-2-71091/Phase2

Table 4 - Transfer Line List

LINE	SOURCE PIT	SOURCE CONNEC-TION	DESTINA-TION	DESTINA-TION CONNEC-TION	LDK	LDX	LDE TEST	LDX TEST	REF DWG
V560	241-S-151	C2	244-S PUMP PIT	7	LDK-V560-1	LDK-V560-1A			H-2-71091/Phase2
V522	241-S-151	C1	244-S PUMP PIT	5	LDK-V522-1	LDK-V522-1A			H-2-71091/Phase2
V456	241-U-151	L7	244-S PUMP PIT	6	LDK-V456-1	LDK-V456-1A			H-2-71091/Phase2
V561	244-S PUMP PIT	4	241-SY-B	R15	LDK-V561-1	LDK-V561-1A			H-2-71091/Phase2
WT-SLL-3160	6241-V VENT STATION		241-AN-104	RISER 10					
WT-SLL-3160	241-SY-B	R12	6241-A DIV BOX		LDK-3160				H-2-822403
WT-SLL-3160	6241-A DIV BOX		6241-V VENT STATION		LDK-3160 LDK-3161				H-2-822403 H-2-822404 H-14-020831-4r0
WT-SNL-3150	241-SY-A	L12	6241-A DIV BOX		LDK-3160				H-2-822403
WT-SNL-3150	6241-A DIV BOX		6241-V VENT STATION		LDK-3160 LDK-3161				H-2-822403 H-2-822404
WT-SNL-3150	6241-V VENT STATION		241-AN-01A	H	LDK-3161A				H-2-822404, H-14-103327
WT-SLL-3160	6241-V VENT STATION		Slurry RCVR Pit 241-AN-04D	Tank AN-104 Riser-10	LDK-3162B, AN271-WT-YS-103		AN271-WT-YS-103		H-2-822405 H-14-103331

Table 4 - Transfer Line List

LINE	SOURCE PIT	SOURCE CONNEC-TION	DESTINA-TION	DESTINA-TION CONNEC-TION	LDK	LDX	LDE TEST	LDX TEST	REF DWG
SN-633	241-AY-02A	U5	AZ Valve PIT 241-AZVP	F	AZVP-WT-LDK-222	AZVP-WT-K-222C	AZVP-WT-K-222A	AZVP-WT-K-222B	H-14-103248 H-14-102644
SN-635	241-AY-02A	U12	241-AY-01A	U13	AY02A-WT-LDK-311	AY02A-WT-K-311C	AY02A-WT-K-TBD311A	AY02A-WT-K-TBD 311B	H-14-102644
SN-632	241-AZ-01A	U12	AZ Valve PIT 241-AZVP	H	AZ02A-WT-LDK-308	AZ02A-WT-LDK-308C	AZ02A-WT-LDK-410T 308A	AZ02A-WT-LDK-410T 308 B	H-14-102689 H-14-102348
SN-631	241-AZ-02A	U13	241-AZ-01A	U11	AZ01A-WT-LDK-307	AZ01A-WT-K-307C	AZ01A-WT-K-307A	AZ01A-WT-K-307B	H-14-102689 H-14-102348
SN-634	NEW AP VALVE PIT	B	AZ VALVE PIT 241-AZVP	E	AZ-WT-LDK-233	AZ-WT-K- 233C	AZ-WT-K-223A	AZ-WT-K-223 B	H-14-102348 Letter 7C500-99-013
SN-636	241-AN-04A	D	New AP VALVE PIT	C	AZ-WT-LDK-204	AZ-WT K-204C	AZ-WT-K-204A	AZ-WT-K-204B	H-14-103329/Proj W-521 H-14-020801-3r2 Letter 7C500-99-013
SN-637	VALVE PIT 241-AZVP	C	NEW AP VALVE PIT	D	AZ-WT-LDK-224	AZ-WT-224C	AZ-WT-K-224 A	AZ-WT-K-224 B	H-14-103327/Proj W-521 Letter 7C500-99-013
SN-630	241-AN-01A	D	VALVE PIT 241-AZVP	A	AN01A-WT-LDK-202	AN01A-WTK-202C	AN01A-WT-K-202A	AN01A-WT-K-202B	H-14-103327 H-14-020801-1r5
DR-100	AZ VALVE Pit 241-AZVP	WT-V-229	241-AZ-01A	Riser 15D	AZ01A-WT-LDK-310	AZ01A-WT-K-310C	AZ01A-WT-K-310A	AZ01A-WT-K-310B	H-14-103248 H-14-102689

Table 4 - Transfer Line List

LINE	SOURCE PIT	SOURCE CONNEC-TION	DESTINA-TION	DESTINA-TION CONNEC-TION	LDK	LDX	LDE TEST	LDX TEST	REF DWG
PW-481	241-A-350	*B*	242-A PUMP ROOM	14	K-LDK-PW-481				H-2-70387 H-2-69322 H-2-99085 S8
Drain Line	241-A-A	FD	241-A-350	C	WT-LDK-350				H-2-70387
Drain Line	241-A-B	FD	241-A-350	C	WT-LDK-350				
SNL-5350	TK-219-S-102	P-1	244-S CATCH TANK	M	WT-LDK-306				H-2-820836 S3
SNL-5351	TK-219-S		244-S CATCH TANK						H-2-820836 S3
LIQW-702	204-AR	MOV-17	241-A-A	L-11	LDK-LD3A				H-2-70703 /Phase 2
SN-641	AP VALVE PIT	16	NEW AP VALVE PIT	A	APVP-WT-LDK-401t	APVP-WT-K-401tC	APVP-WT-K-401tA	APVP-WT-K-401tB	H-14-102348 Letter 7C500-99-013 TEMP. TAGNAMES
SN-640	AP VALVE PIT	15	NEW AP VALVE PIT	K	APVP-WT-LDK-402t	APVP-WT-K-402tC	APVP-WT-K-402tA	APVP-WT-K-402tB	H-14-102348 Letter 7C500-99-013 TEMP. TAGNAMES
HLW-700	NEW AP VALVE PIT	E	PRIV. CONTR.						H-14-102348 Letter 7C500-99-013 TEMP. TAGNAMES
HLW-701	NEW AP VALVE PIT	F	PRIV. CONTR.						H-14-102348 Letter 7C500-99-013 TEMP. TAGNAMES

Table 4 - Transfer Line List

LINE	SOURCE PIT	SOURCE CONNEC-TION	DESTINA-TION	DESTINA-TION CONNEC-TION	LDK	LDX	LDE TEST	LDX TEST	REF DWG
LAW-702	NEW AP VALVE PIT	G	PRIV. CONTR.						H-14-102348 Letter 7C500-99-013 TEMP. TAGNAMES
LAW-703	NEW AP VALVE PIT	H	PRIV. CONTR.						H-14-102348 Letter 7C500-99-013 TEMP. TAGNAMES
DR-801	NEW AP VALVE PIT	FLOOR DRAIN	241-AP-101	RISER 023					H-14-102348 Letter 7C500-99-013 TEMP. TAGNAMES

TABLE 5

Pump List

Table 5 - Pumps Use and Description

The columns shown on TABLE 5 are defined as follows:

- Farm- Identifies the Tank farm that the pump is located in or services.
- Pump- (Key field) Identifies the pump name.
- Pit Name- Identifies the pit name by its common name.
- MCC #- Identifies the individual motor control center (MCC) that powers the pump.
- Cubicle #- Identifies the location of the cube or bucket within the MCC that powers the pump.
- CB Closed Input- Identifies the relay associated with indicating if the pump circuit breaker is closed.
- Pump Stop Output- Identifies the interlock relay that initiates a master pump shutdown.
- Pump Run Status- Identifies the relay that indicates the pumps running status.
- Pump Interlock Status Input- Identifies the relay status of the master pump shutdown interlock relay.
- Outlet Flow Meter- If applicable identifies the pump outlet flow meter identification number.
- Inlet Source- Identifies the source of waste from which the pump is pumping from, generally a tank.

- Outlet- Identifies the pit nozzle and/or the line that the pump discharge is connected to.
- Reference Dwg- Identifies the source drawing or drawings referenced for pump information.
- Misc Notes- Design notes to assist or otherwise clarify information/Alternate pump name.

Table 5 - Pump List

FARM	PUMP	PIT NAME	MCC #	CUBI-CLE #	CB CLOSED INPUT	PUMP STOP INTLK RELAY	PUMP RUN STATUS (M-AUX)	PUMP INTLK RELAY STATUS	OUT-LET FLOWME TER	INLET SOURCE	OUTLET	REF DWG	MISC NOTES
241-AN	AN01A-WT-P-001	241-AN-01A	AN271-EDS-MCC-001	B3	AN01A-WT-K-P001-D	AN01A-WT-K-P001-A	AN01A-WT-K-P001-C	AN01A-WT-K-P001-A		AN-101	A / SN-261	H-14-020801 H-14-030001	P-101-1. WT-P-101A 202P-TX1. (3 WAY VALVE V-151 AFTER PUMP)
241-AN	AN02A-WT-P-004	241-AN-02A	AN271-EDS-MCC-001	B4	AN241-WT-K-P004-D	AN241-WT-K-P004-A	AN241-WT-K-P004-C	AN241-WT-K-P004-A		AN-102	A / SN-262	H-14-020801-2r4 H-14-030001	P-102-1. WT-P-102A. 65P-TX4. (3 WAY VALVE V-152 AFTER PUMP)
241-AN	AN03A-WT-P-007	241-AN-03A	AN271-EDS-MCC-001	C2	AN241-WT-K-P007-D	AN241-WT-K-P007-A	AN241-WT-K-P007-C	AN241-WT-K-P007-A		AN-103	NOT SHOWN	H-14-020801-2r4 H-14-030001	P-103-1. WT-P-103A. 211P-TX1
241-AN	AN04A-WT-P-010	241-AN-04A	AN271-EDS-MCC-001	C3	AN241-WT-K-P010-D	AN241-WT-K-P010-A	AN241-WT-K-P010-C	AN241-WT-K-P010-A		AN-104	NOT SHOWN	H-14-020801-3r4 H-14-030001	P-104-1. 64P-TX4 WT-P-104A
241-AN	AN05A-WT-P-013	241-AN-05A	AN271-EDS-MCC-001	C4	AN241-WT-K-P013-D	AN241-WT-K-P013-A	AN241-WT-K-P013-C	AN241-WT-K-P013-A		AN-105	NOT SHOWN	H-14-020801-3r4 H-14-030001	P-105-1. 84P-TX/SW. WT-P-105A
241-AN	AN06A-WT-P-016	241-AN-06A	AN271-EDS-MCC-001	D4	AN241-WT-K-P016-D	AN241-WT-K-P016-A	AN241-WT-K-P016-C	AN241-WT-K-P016-A		AN-106	A / SN-266	H-14-020801-4r1 H-14-030001	P-106-1. WT-P-106A. 2P-TX1-XCF
241-AW	AW01A-WT-P-001	241-AW-01A	AW271-EDS-MCC-001	A3	AW241-WT-K-P001-D	AW241-WT-K-P001-A	AW241-WT-K-P001-C	AW241-WT-K-P001-A		241-AW-101	SN-261	H-2-70348 H-2-70325 H-14-020802-1r3	P-101-1. WT-P-201A. 85P-TX4 K-241-AW-2
241-AW		241-AW-02E	MCC-1	C5	IY-AW-102-1	AW241-WT-K-P007E-A	IY-AW-102-1	AW241-WT-K-P007E-A		241-AW-102	SN-272 / SN-269	H-14-020802-2r5	78-TX4/5P-TX5. EVAP FEED PUMP. MCC IS IN EVAP BLDG

Table 5 - Pump List

FARM	PUMP	PIT NAME	MCC #	CUBI-CLE #	CB CLOSED INPUT	PUMP STOP INTLK RELAY	PUMP RUN STATUS (M-AUX)	PUMP INTLK RELAY STATUS	OUT-LET FLOWME TER	INLET SOURCE	OUTLET	REF DWG	MISC NOTES
241-AW	AW03A-WT-P-008	241-AW-03A	AW271-EDS-MCC-001	A4	AW241-WT-K-P008-D	AW241-WT-K-P008A-A	AW241-WT-K-P008- C	AW241-WT-K-P008-A		241-AW-103	SN-263	H-2-70348 H-14-020802-1r3	P-103-1. WT-P-203A . 86P-TX4 K-241-AW-2
241-AW	AW04A-WT-P-011	241-AW-04A	AW271-EDS-MCC-001	B4	AW241-WT-K-P011-D	AW241-WT-K-P011-A	AW241-WT-K-P011-C	AW241-WT-K-P011-A		241-AW-104	SN-264	H-2-70348 H-14-020802-3r3	P-104-1. WT-P-204A. 80P-TX4 K-241-AW-2
241-AW	AW05A-WT-P-014	241-AW-05A	AW271-EDS-MCC-001	C4	AW241-WT-K-P014-D	AW241-WT-K-P014-A	AW241-WT-K-P014- C	AW241-WT-K-P014-A		241-AW-105	A / SN-265	H-2-70400 H-14-020802-1r3	P-105-1. WT-P-205A. 1P-TX1 K-241-AW-2
241-AW	AW06A-WT-P-017	241-AW-06A	AW271-EDS-MCC-001	C3	AW241-WT-K-P017-D	AW241-WT-K-P017-A	AW241-WT-K-P017- C	AW241-WT-K-P017-A		241-AW-106	SN-266	H-2-70400 H-14-020802-3r3	P-106-1. WT-P-206A. 1P-TX1-XCR-1 K-241-AW-2
241-A	P-350-1	241-A-350	MCC-A3	C3	IY-350-1	241-AWT-K-P350-1-A	IY-350-1	241-AWT-K-P350-1-A	FT-350-1	LIFT STA TANK	B / PW-481	H-2-70387 H-14-020800-4r2	P-020 ON H-14-020808
241-A	P-350-2	241-A-350	MCC-A1	A4	241-A-WT-K-P350-2-D	241-A-WT-K-P350-2-A	241-A-WT-K-P350-2-C	241-A-WT-K-P350-2-A		LIFT STA ANNULUS	B	H-14-30008-2 H-14-70387-2 H-14-020800-4r2	P-021 ON H-14-020808
241-AP	AP01A-WT-P-001	241-AP-01A	EDS-MCC-001	C1	AP241-WT-K-P001-D	AP241-WT-K-P001-A	AP241-WT-K-P001-C	AP241-WT-K-P001-A		241-AP-101	A	H-2-90528 H-2-90599 H-2-90474 H-14-020803-1r1	SN-611 K-241-AP-4. 1P-AP-4. WT-P-301A
241-AP	AP03A-WT-P-003	241-AP-03A	EDS-MCC-001	C3	AP241-WT-K-P003-D	AP241-WT-K-P003-A	AP241-WT-K-P003-C	AP241-WT-K-P003-A		241-AP-103	A	H-2-90530 H-2-90599 H-2-90474 H-14-020803-1r1	SN-613. 2P-AP-3. WT-P-303A

Table 5 - Pump List

FARM	PUMP	PIT NAME	MCC #	CUBICLE #	CB CLOSED INPUT	PUMP STOP INTLK RELAY	PUMP RUN STATUS (M-AUX)	PUMP INTLK RELAY STATUS	OUTLET FLOWMETER	INLET SOURCE	OUTLET	REF DWG	MISC NOTES
241-AP	AP04A-WT-P-004	241-AP-04A	EDS-MCC-001	D1	AP241-WT-K-P004-D	AP241-WT-K-P004-A	AP241-WT-K-P004-C	AP241-WT-K-P004-A		241-AP-104	A	H-2-90531 H-2-90599 H-2-90474 H-14-020803-3r3	SN-614, 4P-AP-3
241-AP	AP05A-WT-P-005	241-AP-05A	EDS-MCC-001	D2	AP241-WT-K-P005-D	AP241-WT-K-P005-A	AP241-WT-K-P005-C	AP241-WT-K-P005-A		241-AP-105	A	H-2-90532 H-2-90599 H-2-90474 H-14-020803-2r1	SN-615, 1P-AP-3, WT-P-304A
241-AP	AP06A-WT-P-006	241-AP-06A	EDS-MCC-001	D3	AP241-WT-K-P006-D	AP241-WT-K-P006-A	AP241-WT-K-P006-C	AP241-WT-K-P006-A		241-AP-106	A	H-2-90533 H-2-90599 H-2-90474 H-14-020803-4r1	SN-616, 2P-AP-4, WT-P-306A
241-AP	AP07A-WT-P-007	241-AP-07A	EDS-MCC-001	E1	AP241-WT-K-P007-D	AP241-WT-K-P007-A	AP241-WT-K-P007-C	AP241-WT-K-P007-A		241-AP-107	A	H-2-90540 H-2-90599 H-2-90474 H-14-020803-3r3	SN-617. DOC WHC-SD-WM-RPT-025 SAYS NO PUMP HERE . WT-P-307A
241-AP	AP08A-WT-P-008	241-AP-08A	EDS-MCC-001	E2	AP241-WT-K-P008-D	AP241-WT-K-P008-A	AP241-WT-K-P008-C	AP241-WT-K-P008-A		241-AP-108	A	H-2-90541 H-2-90599 H-2-90474 H-14-020803-4r1	SN-618. DOC WHC-SD-WM-RPT-025 SAYS NO PUMP HERE . WT-P-308A
241-SY	SY02A-WT-P-002	241-SY-02A	SY271-EDS-MCC-001	A3	SY241-WT-K-P002-D	SY241-WT-K-P002-A	SY241-WT-K-P002-C	SY241-WT-K-P002-A		241-SY-102		H-2-822401 H-2-46424 H-14-020831 H-14-030031-2r3	CROSS SITE TRANS PUMP SY-02A-3, P-102-SY-02A

Table 5 - Pump List

FARM	PUMP	PIT NAME	MCC #	CUBI-CLE #	CB CLOSED INPUT	PUMP STOP INTLK RELAY	PUMP RUN STATUS (M-AUX)	PUMP INTLK RELAY STATUS	OUT-LET FLOWME TER	INLET SOURCE	OUTLET	REF DWG	MISC NOTES
241-SY	SY03A-WT-P-003	241-SY-03A	241-SY-271	A3	SY241-WT-K-P002-D	SY241-WT-K-P002-A	SY241-WT-K-P002-C	SY241-WT-K-P002-A		241-SY-103		H-14-020831-3r0	SHARES MCC BUCKET W/P-002 BUT IS DISCONNECTED. P-103-SY-03A
241-SY	P-3125A	DIV BOX 6241-A	SWBD SB-1	1-3	Relay TBD	TBD	Relay TBD	Relay TBD	FE-3125	241-SY-B VALVE PIT	VENT STA 6241-V	H-2-822403 H-2-822505	IN BLDG 6241-A (CROSS SITE) VARIABLE SPEED DRIVE
241-SY	P-3125B	DIV BOX 6241-A	SWBD SB-1	1-2	Relay TBD	TBD	Relay TBD	Relay TBD	FE-3125	241-SY-B VALVE PIT	VENT STA 6241-V	H-2-822403 H-2-822505	PARALLEL PUMPS VARIABLE SPEED DRIVE
241-SY	P-3115	DIV BOX 6241-A										H-2-822403	SUMP PUMP
241-SY	P-3116	VENT STA 6241-V										H-2-822403	SUMP PUMP
219-S/222-S	P-1	219-S	NA	NA	HS-1A	HS-1B	Y2-P1B	HS-1B		TK-219-S-102	244-S DCRT	H-2-820836	Diaphram Pump (air)
244-S DCRT	P-244-S-1	244-S CATCH STATION	TBD	TBD	TBD	K-3	TBD	TBD	FM 1	244-S CATCH TANK	J	H-2-71085	
† 241-AZ		241-AZ-01A	EDS-MCC-701	D5	AZ241-WT-K-P101AZ-D	AZ241-WT-K-P101AZ-A	AZ241-WT-K-P101AZ-C	AZ241-WT-K-P101AZ-A		AZ-101 XFER	U5	H-2-68406 H-2-70796 H-2-76575 H-2-94850 H-14-020807-1r0	PUMP NAMES PER H-2-70796 H-2-821436 CALLS THIS P-101-AZ. VIDEO SHOWS NO PUMP OR DIST

Table 5 - Pump List

FARM	PUMP	PIT NAME	MCC #	CUBI-CLE #	CB CLOSED INPUT	PUMP STOP INTLK RELAY	PUMP RUN STATUS (H-AUX)	PUMP INTLK RELAY STATUS	OUT-LET FLOWME TER	INLET SOURCE	OUTLET	REF DWG	MISC NOTES
241-AZ		241-AZ-02A	EDS-MCC-701	D6	AZ241-WT-K-P102AZ-D	AZ241-WT-K-P102AZ-A	AZ241-WT-K-P102AZ-C	AZ241-WT-K-P102AZ-A		AZ-102 XFER		H-2-76575 H-2-70796 H-14-020807-2r1	CANNOT CONFIRM THIS PUMP H-2-821436 CALLS THIS P-102-AZ
241-AZ		241-AZ-01C	EDS-MCC-701	A1	AZ241-WT-K-P101-D	AZ241-WT-K-P101-A	AZ241-WT-K-P101- C	AZ241-WT-K-P101-A		AZ-101 XFER		WHC-SD-WM-RPT-025 H-2-68406 H-2-76578 H-14-020807-1r0 H-2-68335: NO PUMP SHOWN	DOC WHC-SD-WM-RPT-025 SAYS THIS IS TRANSFER PUMP (74-TX4/1P-TX5
241-AZ		241-AZ-02B	EDS-MCC-701	A3	AZ241-WT-K-P102-D	AZ241-WT-K-P102-A	AZ241-WT-K-P102-C	AZ241-WT-K-P102-A		AZ-102 XFER		H-2-76578 H-14-020807-2r1	A-102 TRANSFER
242-A	P-B-1	Pump Room											Graphic symbol only no functionality
242-A	P-B-2	PUMP ROOM	OUTDOOR SUBSTATION	3B	A242-WT-K-PB2-D	A242-WT-K-PB2-A	CR4	A242-WT-K-PB2-A		C of 28" RECIRC LINE	18, 19	H-2-98989 H-2-100096 H-2-98988-2	THREE WAY VALVE BEFORE 18 & 19
204-AR	P-1A		MCC-204-AR	B3B	TBD	204-AR-WT-K-P1A-A	TBD	TBD	FE-28	LIQW-709	LIQW-702	H-2-70703 H-2-85195	MANUAL PUMP
204-AR	P-1B		MCC-204-AR	B3A	TBD	204-AR-WT-K-P1B-A	TBD	TBD	FE-28	LIQW-710	LIQW-702	H-2-70703 H-2-85195	MANUAL PUMP

TABLE 7

Leak Detector List

Table 7 - Leak Dectector List Use and Description

The columns shown on TABLE 7 are defined as follows:

- Farm- Designation identifies the tank farm where the relay is located.
- LDE #- (Key field) The H-14 instrument tag number of the leak detection element under examination.
- LDK IN- Identifies the H-14 instrument tag number of the leak detection relay.
- LDX IN- Identifies the H-14 instrument tag number of the leak detection malfunction relay.
- PLC Input Relay #- The instrument tag number of the input relay used as an input to the PLC. This may be the same as the LDE number if the relay is brought into the MPS system, or it may be the number of the relay to which a chain of LDEs are attached.
- Reference Dwg- Reference source drawing that shows the existing input relay's connections.
- Old LDE #- Identifies the old tag number of the leak detection element before being renamed through the H-14 process.
- Old LDK IN- Identifies the old tag number of the leak detection relay before being renamed through the H-14 process.
- Old LDX IN- Identifies the old tag number of the leak detection malfunction relay before being renamed through the H-14 process.
- LDE Description- Identifies the service of the leak detection element.
- Misc Notes- Design notes to assist or otherwise clarify.

TABLE 7 - Leak Detector List

FARM	LDE #	LDK IN	LDX IN	PLC INPUT RELAY/SW #	REF DWG	OLD LDE #	OLD LDK IN	OLD LDX IN	LDE DESCRIPTION	MISC. NOTES
241-A	LDE-VP-B-1	LD1-VP-B-1	LD2-VP-B-1	K-241-A-PPA	H-2-69181 H-2-99085-15				VALVE PIT 241-A-B	SHOWN AS LD1-241-A-B-1 AND LD2-241-A-B-1 ON H-2-99085
241-A	LDE-SMP-1								204-AR	Manual input to MPS
241-A	LDE-FP-B-1	LD1-FP-B-1	LD2-FP-B-1	K-241-A-PPA	H-2-69181 H-2-99085-15				FLUSH PIT 241-A-B	SHOWN AS LD1-241-A-B-1 AND LD2-241-A-B-1 ON H-2-99085
241-A	LDE-LIQW-702	LD1-LD3A	LD2-LD3A	K-241-A-PPA	H-2-69181 H-2-99085-15 H-2-70703 H-2-70695-2				LINE LIQW-702	LOC NEAR VP 241-A-A
241-A	LDE-VP-A-1	LD1-LD3	LD2-LD3	K-241-A-PPA	H-2-69162 H-2-99085-1 H-2-70703 H-2-70695-2	LDE-VP-A-1	LD1-241-A-A-1	LD2-241-A-A-1	VALVE PIT 241-A-A	69162 SHOWS 241-A-A-1
241-A	LDE-PW-481	LDE-122		K-LDK-PW-481	H-2-99085-8 (836)				ENC LINE PW-481	RELAY AT 242-A
241-A	LE-350-1	LDE-120		K-LK-350-1A	H-2-99085-8 (838) H-2-70325-1				LEVEL HIGH IN TANK A-350-1	RELAY AT 242-A
241-A	LDE-350-2	LDE-121		K-LDK-350-2	H-2-99085-8 (837) H-2-70325-1				SUMP FOR TANK A-350-1	RELAY AT 242-A
241-AN	ANA-WT-LDE-331A/B	ANA-WT-LDK-331	ANA-WT-K-331C		H-14-100989 H-14-100941 H-14-020801-5	ANA-WT-LDE-146, WT-LDE-113, LDE-VP-A	ANA-WT-LDK-146, WT-LDK-113, LD1-VP-A	ANA-WT-LDX-146, WT-LDX-113, LD2-VP-A	VALVE PIT 241-AN-A	WAS LDE-146 ON 020801

TABLE 7 - Leak Detector List

FARM	LDE #	LDK IN	LDX IN	PLC INPUT RELAY/SW #	REF DWG	OLD LDE #	OLD LDK IN	OLD LDX IN	LDE DESCRIPTION	MISC. NOTES
241-AN	ANA-WT-LDE-335	ANA-WT-LDK-335	ANA-WT-K-335C		H-14-100990 H-14-100941 H-14-020801-5r1	ANA-WT-LDE-148, WT-LDE-112	ANA-WT-LDK-148, WT-LDK-112	ANA-WT-LDX-148, WT-LDX-112	LINE SN-268	WAS LDE-148 ON 020801
241-AN	ANB-WT-LDE-231A/B	ANB-WT-LDK-231	ANB-WT-K-231C		H-14-100989 H-14-100942 H-14-020801-6r2	ANB-WT-LDE-149, WT-LDE-114, LDE-VP-B	ANB-WT-LDK-149, WT-LDK-114, LD1-VP-B	ANB-WT-LDX-149, WT-LDX-114, LD2-VP-B	VALVE PIT 241-AN-B	WAS LDE-149 ON 020801
241-AN	AN01A-WT-LDE-201A/B	AN01A-WT-LDK-201	AN01A-WT-K-201C		H-14-102637 H-14-103327	LDE-01A-1, LDE-115, LDE-121	LD1-01A-1, LDK-115, LDK-121	LD2-01A-1, LDK-115, LDK-121	PP 241-AN-01A	Was LDE-121
241-AN	AN01A-WT-LDE-202	AN01A-WT-LDK-202	AN01A-WT-LDK-202C		H-14-102638 H-14-103327				LINE SN-630	
241-AN	AN04A-WT-LDE-204	AN04A-WT-LDK-204	AN04A-WT-K-204C		H-14-102638 H-14-103329				LINE SN-636	
241-AN	AN02A-WT-LDE-128	AN02A-WT-LDK-128	AN02A-WT-LDK-128	K-241-AN-PP	H-2-71930 H-2-71931 H-14-020801	LDE-02A-1, LDE-116	LD1-02A-1, LDK-116	LD2-02A-1, LDK-116	CENT PUMP PIT-02A	LDSTA-128
241-AN	AN-03A-WT-LDE-131	AN-03A-WT-LDK-131	AN-03A-WT-LDK-131	K-241-AN-PP	H-2-71930 H-2-71931 H-14-020801	LDE-03A-1, LDE-117	LD1-03A-1, LDK-117	LD2-03A-1, LDK-117	CENT PUMP PIT-03A	LDSTA-131
241-AN	AN04A-WT-LDE-203	AN04A-WT-LDK-203	AN04A-WT-K-203C		H-2-71930 H-2-71931 H-14-020801 H-14-103329	LDE-04A-1, LDE-118	LD1-04A-1, LDK-118, LDK-134	LD2-04A-1, LDK-118	CENT PUMP PIT-04A	Was LDE-134
241-AN	AN05A-WT-LDE-137	AN05A-WT-LDK-137	AN05A-WT-LDK-137	K-241-AN-PP	H-2-71930 H-2-71931 H-14-020801	LDE-05A-1, LDE-119	LD1-05A-1, LDK-119	LD2-05A-1, LDK-119	CENT PUMP PIT-05A	LDSTA-137

TABLE 7 - Leak Detector List

FARM	LDE #	LDK IN	LDX IN	PLC INPUT RELAY/SW #	REF DWG	OLD LDE #	OLD LDK IN	OLD LDX IN	LDE DESCRIPTION	MISC. NOTES
241-AN	AN06A-WT-LDE-140	AN06A-WT-LDK-140	AN06A-WT-LDK-140	K-241-AN-PP	H-2-71930 H-2-71931 H-14-020801	LDE-06A-1, LDE-120	LD1-06A-1, LDK-120	LD2-06A-1, LDK-120	CENT PUMP PIT-06A	LDSTA-140
241-AN	AN07A-WT-LDE-143	AN07A-WT-LDK-143	AN07A-WT-LDK-143	K-241-AN-PP	H-2-71930 H-2-71931 H-14-020801	LDE-07A-1, LDE-121	LD1-07A-1, LDK-121	LD2-07A-1, LDK-121	CENT PUMP PIT-07A	LDSTA-143
241-AN	AN101-WT-LDE-124	AN101-WT-LDK-124	AN101-WT-LDK-124	K-241-AN-DRP	H-2-71927-3 H-2-71931-2 H-14-020801-6	LDE-241-AN-DR-368	LD1-241-AN-DR-368	LD2-241-AN-DR-368	LINE DR-368	
241-AN	ANA-WT-LDE-334	ANA-WT-LDK-334	ANA-WT-LDK-334	K-241-AN-SLP	H-2-71931-2 H-14-020801-5	LDE-241-AN-SL-168	LD1-241-AN-SL-168	LD2-241-AN-SL-168	LINE SL-168	WAS LDE-147 ON 020801 H-14-100941
241-AN	AN104-WT-LDE-152A/B	AN-104-LDK-152	AN-1-4-K-152C		H-14-103331				SLURRY RCVR PIT AN-04D	AN104-WT-LDSTA-152
241-AN	AN104A-PASTA-101	AN-104-PSHL-101	AN-104-PSHL-101		H-14-103331				SLURRY RCVR PIT AN-04D	AN104-WT-PASTA-101
241-AN	AN104-PASTA-102	AN-104-PSHL-102	AN-104-PSHL-102		H-14-103331				SLURRY RCVR PIT AN-04D	AN104-WT-PASTA-102
241-AN	AN104-PSE-103	AN271-WT-YS-103			H-14-103331				SLURRY RCVR PIT AN-04D	AN104-WT-PSE-103 RUPTURE DISK
241-AP	AP01A-WT-LDE-201	AP01A-WT-LDK-201		KLD-PP-1	H-2-90476-6 H-2-90476-8 H-2-90528 H-2-90487 H-14-020803-1	LDE-01A-1	LDK-01A-1	LDK-01A-1	CENT PUMP PIT 241-AP-01A ALARM	SHOWN AS LDE-01A AND LD1-01A ON H-2-90476
241-AP	AP02A-WT-LDE-203	AP02A-WT-LDK-203		KLD-PP-1	H-2-90476-6 H-2-90476-8 H-2-90529 H-2-90487 H-14-020803-3	LDE-02A-1	LDK-02A-1	LDK-02A-1	CENT PUMP PIT 241-AP-02A ALARM	SHOWN AS LDE-02A AND LD1-02A ON H-2-90476

TABLE 7 - Leak Detector List

FARM	LDE #	LDK IN	LDX IN	PLC INPUT RELAY/SW #	REF DWG	OLD LDE #	OLD LDK IN	OLD LDX IN	LDE DESCRIPTION	MISC. NOTES
241-AP	AP03A-WT-LDE-207	AP03A-WT-LDK-207		KLD-PP-1	H-2-90476-6 H-2-90476-8 H-2-90530 H-2-90487 H-14-020803-1	LDE-03A-1	LDK-03A-1	LDK-03A-1	CENT PUMP PIT 241-AP-03AALARM	SHOWN AS LDE-03A AND LD1-03A ON H-2-90476
241-AP	AP04A-WT-LDE-211	AP04A-WT-LDK-211		KLD-PP-1	H-2-90476-6 H-2-90476-8 H-2-90531 H-2-90487 H-14-020803-3	LDE-04A-1	LDK-04A-1	LDK-04A-1	CENT PUMP PIT 241-AP-04A ALARM	SHOWN AS LDE-04A AND LD1-04A ON H-2-90476
241-AP	AP05A-WT-LDE-213	AP05A-WT-LDK-213		KLD-PP-1	H-2-90476-6 H-2-90476-8 H-2-90532 H-2-90487 H-14-020803-2	LDE-05A-1	LDK-05A-1	LDK-05A-1	CENT PUMP PIT 241-AP-05A ALARM	SHOWN AS LDE-05A AND LD1-05A ON H-2-90476
241-AP	AP06A-WT-LDE-216	AP06A-WT-LDK-216		KLD-PP-1	H-2-90476-6 H-2-90476-8 H-2-90533 H-2-90487 H-14-020803-4	LDE-06A-1	LDK-06A-1	LDK-06A-1	CENT PUMP PIT 241-AP-06A ALARM	SHOWN AS LDE-06A AND LD1-06A ON H-2-90476
241-AP	AP07A-WT-LDE-218	AP07A-WT-LDK-218		KLD-PP-1	H-2-90476-6 H-2-90476-8 H-2-90540 H-2-90487 H-14-020803-2	LDE-07A-1	LDK-07A-1	LDK-07A-1	CENT PUMP PIT 241-AP-07A ALARM	SHOWN AS LDE-07A AND LD1-07A ON H-2-90476
241-AP	AP08A-WT-LDE-220	AP08A-WT-LDK-220		KLD-PP-1	H-2-90476-6 H-2-90476-8 H-2-90541 H-2-90487 H-14-020803-4	LDE-08A-1	LDK-08A-1	LDK-08A-1	CENT PUMP PIT 241-AP-08A ALARM	SHOWN AS LDE-08A AND LD1-08A ON H-2-90476

TABLE 7 - Leak Detector List

FARM	LDE #	LDK IN	LDX IN	PLC INPUT RELAY/SW #	REF DWG	OLD LDE #	OLD LDK IN	OLD LDX IN	LDE DESCRIPTION	MISC. NOTES
241-AP	AP01A-WT-LDE-201		AP01A-WT-LDX-201	KLD-PP-2	H-2-90476-6 H-2-90476-8 H-2-90528 H-2-90487 H-14-020803-1	LDE-01A-1	LDK-01A-1	LDK-01A-1	CENT PUMP PIT 241-AP-01A FAILURE	SHOWN AS LDE-01A AND LD1-01A ON H-2-90476
241-AP	AP02A-WT-LDE-203		AP02A-WT-LDX-203	KLD-PP-2	H-2-90476-6 H-2-90476-8 H-2-90529 H-2-90487 H-14-020803-3	LDE-02A-1	LDK-02A-1	LDK-02A-1	CENT PUMP PIT 241-AP-02A FAILURE	SHOWN AS LDE-02A AND LD1-02A ON H-2-90476
241-AP	AP03A-WT-LDE-207		AP03A-WT-LDX-207	KLD-PP-2	H-2-90476-6 H-2-90476-8 H-2-90530 H-2-90487 H-14-020803-1	LDE-03A-1	LDK-03A-1	LDK-03A-1	CENT PUMP PIT 241-AP-03A FAILURE	SHOWN AS LDE-03A AND LD1-03A ON H-2-90476
241-AP	AP04A-WT-LDE-211		AP04A-WT-LDX-211	KLD-PP-2	H-2-90476-6 H-2-90476-8 H-2-90531 H-2-90487 H-14-020803-3	LDE-04A-1	LDK-04A-1	LDK-04A-1	CENT PUMP PIT 241-AP-04A FAILURE	SHOWN AS LDE-04A AND LD1-04A ON H-2-90476
241-AP	AP05A-WT-LDE-213		AP05A-WT-LDX-213	KLD-PP-2	H-2-90476-6 H-2-90476-8 H-2-90532 H-2-90487 H-14-020803-2	LDE-05A-1	LDK-05A-1	LDK-05A-1	CENT PUMP PIT 241-AP-05A FAILURE	SHOWN AS LDE-05A AND LD1-05A ON H-2-90476
241-AP	AP06A-WT-LDE-216		AP06A-WT-LDX-216	KLD-PP-2	H-2-90476-6 H-2-90476-8 H-2-90533 H-2-90487 H-14-020803-4	LDE-06A-1	LDK-06A-1	LDK-06A-1	CENT PUMP PIT 241-AP-06A FAILURE	SHOWN AS LDE-06A AND LD1-06A ON H-2-90476

TABLE 7 - Leak Detector List

FARM	LDE #	LDK IN	LDX IN	PLC INPUT RELAY/SW #	REF DWG	OLD LDE #	OLD LDK IN	OLD LDX IN	LDE DESCRIPTION	MISC. NOTES
241-AP	AP07A-WT-LDE-218		AP07A-WT-LDX-218	KLD-PP-2	H-2-90476-6 H-2-90476-8 H-2-90540 H-2-90487 H-14-020803-2	LDE-07A-1	LDK-07A-1	LDK-07A-1	CENT PUMP PIT 241-AP-07A FAILURE	SHOWN AS LDE-07A AND LD1-07A ON H-2-90476
241-AP	AP08A-WT-LDE-220		AP08A-WT-LDX-220	KLD-PP-2	H-2-90476-6 H-2-90476-8 H-2-90541 H-2-90487 H-14-020803-4	LDE-08A-1	LDK-08A-1	LDK-08A-1	CENT PUMP PIT 241-AP-08A FAILURE	SHOWN AS LDE-08A AND LD1-08A ON H-2-90476
241-AP	AP02D-WT-LDE-205	AP02D-WT-LDK-205								
241-AP	AP03D-WT-LDE-210		AP03D-WT-LDX-210	KLD-PP-1 KLD-PP-2	H-14-020803-1				DRAIN PIT 241-AP-03D	
241-AP	AP-WT-LDE-701	AP-WT-LDK-701	AP-WT-LDX-701	KLD-FP	H-2-90476-5 H-2-90476-8 H-2-90526-1 H-14-021803-4	LDE-FP, LDE-302	LDK-FP, LDK-302		FLUSH PIT 241-AP	
241-AP	LDE-225			KLD-SL-ENC-1	H-2-90476-8 (6044)	LDE-509	LD1-509		LINE SL-509 ALARM	
241-AP	LDE-226			KLD-SL-ENC-1	H-2-90476-8 (6044)	LDE-510	LD1-510		LINE SL-510 ALARM	
241-AP	LDX-225			KLD-SL-ENC-2	H-2-90476-8 (6058)	LDE-509		LD2-509	LINE SL-509 FAILURE	
241-AP	LDX-226			KLD-SL-ENC-2	H-2-90476-8 (6058)	LDE-510		LD2-510	LINE SL-510 FAILURE	
241-AP	LDE-227	LD1-609		KLD-SN-ENC-1	H-2-90476-8 (6045)	LDE-227			LINE SN-609 ALARM	
241-AP	LDE-228	LD1-610		KLD-SN-ENC-1	H-2-90476-8 (6045)	LDE-228			LINE SN-610 ALARM	

TABLE 7 - Leak Detector List

FARM	LDE #	LDK IN	LDX IN	PLC INPUT RELAY/SW #	REF DWG	OLD LDE #	OLD LDK IN	OLD LDX IN	LDE DESCRIPTION	MISC. NOTES
241-AP	LDX-227		LD2-609	KLD-SN-ENC-2	H-2-90476-8 (6059)	LDE-227			LINE SN-609 FAILURE	
241-AP	LDX-228		LD2-610	KLD-SN-ENC-2	H-2-90476-8 (6059)	LDE-228			LINE SN-610 FAILURE	
241-AP	APFP-RW-PS-201			KFP-1	H-2-90476-11 (11017)	LS-FP-1			AP FLUSH PIT VALVE POSN CLOSED	RELAY AT 242-A
241-AP	APFP-RW-PSH-205			KFP-2	H-2-90476-11 (11018)	PS-FP-1			AP FLUSH PIT PRESS SW	RELAY AT 242-A
241-AP	AP-WT-LDE-224A/B	AP-WT-LDK-224	AP-WT-K-224		H-14-020803-5 H-2-90476-6 H-2-90476-8 (8022)	LDE-VP. LDE-300	LD1-VP. LDK-300	LD2-VP. LDK-300	AP VALVE PIT LD	SHOWN AS LD1/LD2-VP ON 90476. TEMP TAG
241-AP	AP-WT-LDE-101tA/B	AP-WT-LDK-101t	AP-WT-K-101t						New AP Valve pit LD	TEMP. TAG
241-AP	AP-WT-LDE-401t	AP-WT-LDK-401t	AP-WT-K-401t						New AP: SN LD [Noz L]	TEMP. TAG
241-AP	AP-WT-LDE-402t	AP-WT-LDK-402t	AP-WT-K-402t						New AP: SN LD [Noz J]	TEMP. TAG
241-AP	AP02D-WT-LDE-205			KLD-PP-1					Pump Pit AP-020	
241-AP	AP02D-WT-LDK-205			KLD-PP-2					Pump Pit AP-020	
241-AW	AW01A-WT-LDE-161	AW01A-WT-LDK-161	AW01A-WT-LDK-161	K-241-AW-PP	H-2-70329 H-2-90276 H-14-020802	LDE-01A-1. WT-LDE-201A	KLD-01A-1. WT-LDK-201A	LD2-01A-1. WT-LDK-201A	CENT PUMP PIT 241-AW-01A	
241-AW	AW02A-WT-LDE-164	AW02A-WT-LDK-164	AW02A-WT-LDK-164	K-241-AW-PP	H-2-70329 H-2-90276 H-14-020802	LDE-02A-1. WT-LDE-202A	KLD-02A-1. WT-LDK-202A	LD2-02A-1. WT-LDK-202A	CENT PUMP PIT 241-AW-02A	

TABLE 7 - Leak Detector List

FARM	LDE #	LDK IN	LDX IN	PLC INPUT RELAY/SW #	REF DWG	OLD LDE #	OLD LDK IN	OLD LDX IN	LDE DESCRIPTION	MISC. NOTES
241-AW	AW02D-WT-LDE-167	AW02D-WT-LDE-167	AW02D-WT-LDE-167	K-241-AW-PP	H-2-70329 H-2-90276 H-14-020802	LDE-02D-1, WT-LDE-202D	LD1-02D-1, WT-LDK-202D	LD2-02D-1, WT-LDK-202D	DRAIN PIT 241-AW-02D	
241-AW	AW02E-WT-LDE-168	AW02E-WT-LDK-168	AW02E-WT-LDK-168	K-241-AW-PP	H-2-70329 H-2-90276 H-14-020802	LDE-02E-1, WT-LDE-202E	LD1-02E-1, WT-LDK-202E	LD2-02E-1, WT-LDK-202E	FEED PUMP PIT 241-AW-02E	
241-AW	AW03A-WT-LDE-169	AW03A-WT-LDK-169	AW03A-WT-LDK-169	K-241-AW-PP	H-2-70329 H-2-90276 H-14-020802	LDE-03A-1, WT-LDE-203A	LD1-03A-1, WT-LDK-203A	LD2-03A-1, WT-LDK-203A	CENT PUMP PIT 241-AW-03A	
241-AW	AW04A-WT-LDE-172	AW04A-WT-LDK-172	AW04A-WT-LDE-172	K-241-AW-PP	H-2-70329 H-2-90276 H-14-020802	LDE-04A-1, WT-LDE-204A	LD1-04A-1, WT-LDK-204A	LD2-04A-1, WT-LDK-204A	CENT PUMP PIT 241-AW-04A	
241-AW	AW05A-WT-LDE-176	AW05A-WT-LDK-176	AW05A-WT-LDK-176	K-241-AW-PP	H-2-70329 H-2-90276 H-14-020802	LDE-05A-1, WT-LDE-205A	LD1-05A-1, WT-LDK-205A	LD1-05A-1, WT-LDK-205A	CENT PUMP PIT 241-AW-05A	
241-AW	AW06A-WT-LDE-179	AW06A-WT-LDK-179	AW06A-WT-LDK-179	K-241-AW-PP	H-2-70329 H-2-90276 H-14-020802	LDE-06A-1, WT-LDE-206A	LD1-06A-1, WT-LDK-206A	LD2-06A-1, WT-LDK-206A	CENT PUMP PIT 241-AW-06A	
241-AW	AWA-WT-LDE-207	AW-A-WT-LDK-207	AW-A-WT-K-207C		H-2-70329 H-2-90276 H-14-100800 H-14-020802	LDE-VP-AW-A, AWA-WT-LDE-311	LD1-VP-A, AWA-WT-LDK-311	LD2-VP-A, AWA-WT-LDK-311	VALVE PIT 241-AW-A	H-2-70329, 90276 DIFFER IN OLD LDK/LDX; TEMP TAG--LDX
241-AW	AWB-WT-LDE-208	AW-B-WT-LDK-208	AW-B-WT-K-208C		H-2-70329 H-2-90276 H-14-100800 H-14-020802	LDE-VP-AW-B, AWB-WT-LDE-211	KLD-VP-B1, AWB-WT-LKD-211	LD2-VP-B, AWB-WT-LDK-211	VALVE PIT 241-AW-B	H-2-70329, 90276 DIFFER IN OLD LDK/LDX; TEMP TAG--LDX

TABLE 7 - Leak Detector List

FARM	LDE #	LDK IN	LDX IN	PLC INPUT RELAY/SW #	REF DWG	OLD LDE #	OLD LDK IN	OLD LDX IN	LDE DESCRIPTION	MISC. NOTES
241-AW	AW102-WT-LDE-187	AW102-WT-LDK-187	AW102-WT-LDK-187	K-241-AW-DRP	H-2-70329 H-14-020802-2	LDE-241-AW-DR-334	LD1-241-AW-DR-334	LD2-241-AW-DR-334	LINE 241-AW-DR-334	
241-AW	AW102-WT-LDE-186	AW102-WT-LDK-186	AW102-WT-LDK-186	K-241-AW-DRP	H-2-70329 H-14-020802-2	LDE-241-AW-DR-335	LD1-241-AW-DR-335	LD2-241-AW-DR-335	LINE 241-AW-DR-335	
241-AW	AW102-WT-LDE-188	AW102-WT-LDK-188	AW102-WT-LDK-188	K-241-AW-DRP	H-2-70329 H-14-020802-2	LDE-241-AW-DR-361	LD1-241-AW-DR-361	LD2-241-AW-DR-361	LINE 241-AW-DR-361	
241-AW	AWA-WT-LDE-213	AWA-WT-LDK-213	AWA-WT-LDK-213	K-241-AW-SNP	H-2-70329 H-14-020802-4	LDE-241-AW-SN-220	LD1-241-AW-SN-220	LD2-241-AW-SN-220	LINE 241-AW-SN-220	Phase 2
241-AW	AW102-WT-LDE-182	AW102-WT-LDK-182	AW102-WT-LDK-182	K-241-AW-SNP	H-2-70329 H-14-020802-2	LDE-241-AW-SN-267	LD1-241-AW-SN-267	LD2-241-AW-SN-267	LINE 241-AW-SN-267	
241-AW	AW-WT-LDE-183	AW102-WT-LDK-183	AW102-WT-LDK-183	K-241-AW-SNP	H-2-70329	LDE-241-AW-SN-268	LD1-241-AW-SN-268	LD2-241-AW-SN-268	LINE 241-AW-SN-268	
241-AW	AW104-WT-LDE-175	AW104-WT-LDK-175	AW104-WT-LDK-175	K-241-AW-SNP	H-2-70329	LDE-241-AW-SN-274	LD1-241-AW-SN-274	LD2-241-AW-SN-274	LINE 241-AW-SN-274	
241-AW	AW102-WT-LDE-184	AW102-WT-LDK-184	AW102-WT-LDK-184	K-241-AW-SN-269	H-2-70329 H-14-020802-2	LDE-241-AW-SN-269	LD1-241-AW-SN-269	LD2-241-AW-SN-269	LINE 241-AW-SN-269 TO EVAP	
241-AW	AW102-WT-LDE-185	AW102-WT-LDK-185	AW102-WT-LDK-185	K-241-AW-SN-270	H-2-70329 H-14-020802-2	LDE-241-AW-SN-270	LD1-241-AW-SN-270	LD2-241-AW-SN-270	LINE 241-AW-SN-270 TO EVAP	
241-AW	AWFP-WT-LDE-701	AWFP-WT-LDK-701	AWFP-WT-LDK-701	K-241-AW-PP	H-2-70329 H-2-90276 H-2-21802 H-14-021802	LDE-FP (LDE-202)	LD1-FP	LD2-FP	FLUSH PIT 241-AW	SHOWN AS LDE-FP-AN ON H-2-70329

TABLE 7 - Leak Detector List

FARM	LDE #	LDK IN	LDX IN	PLC INPUT RELAY/SW #	REF DWG	OLD LDE #	OLD LDK IN	OLD LDX IN	LDE DESCRIPTION	MISC. NOTES
241-AW	AWA-WT-LDE-215	AWA-WT-LDE-215	AWA-WT-LDK-215	TBD	H-14-020802 H-14-100800	LDE-215	LDK-215	LDX-215	LINE 2"SL-168	LD-312 on H-14-020802
241-AW	AWB-WT-LDE-216	AWB-WT-LDE-216	AWB-WT-LDK-216	K-241-AW-SLP	H-14-100800	LDE-216	LDK-216	LDX-216	AW-B VP (LINE SL-167)	ON SL-167 (TO EVAP)
241-AW	PS-220			K-241-AW-1	H-14-021802 H-2-70325-1	PS-FP-1			SW PRESSURE SWITCH	SN PUMP SHUTDOWN
241-AW	PS-221			K-241-AW-1	H-14-021802 H-2-70325-1	PS-FP-2			SW PRESSURE SWITCH	SN PUMP SHUTDOWN
241-AW	PS-222			K-241-AW-1	H-14-021802 H-2-70325-1				AWFP PRESSURE SWITCH	SN PUMP SHUTDOWN
241-AY	AY01A-WT-LDE-310	AY01A-WT-LDK-310	AY01A-WT-LDK-310C		H-2-74600-3 H-2-99085-15 H-2-94028 H-14-102644	LDE-101-22	LDK-101-22A		PUMP PIT 241-AY-01A	
241-AY	AY02A-WT-LDE-301	AY02A-WT-LDK-301	AY02A-WT-K-301C		H-2-74600-3r8 H-2-99085 H-2-94028r2 H-2-94029 H-14-102644	LDE-102-22	LDK-102-22A		PUMP PIT 241-AY-02A	
241-AY	AY01A-WT-LDE-311	AY01A-WT-LDK-311	AY01A-WT-K-311C		H-14-102644				Line SN-635	
241-AZ	AZ01A-WT-LDE-307	AZ01A-WT-LDK307	AZ01A-WT-K 307C		H-14-102689				NEW LINE SN-631	AZ-01A TO AZ-01A
241-AZ	AZ01A-WT-LDE-309 A/B	AZ01A-WT-LDK-309	AZ01A-WT-K-309C		H-14-102689	LDE-101-20A	LDK-101-20A	K-101-20A-C	PIT AZ-01A	
241-AZ	AZ01A-WT-LDE-308	AZ01A-WT-LDK-308	AZ01A-WT-K-308C		H-14-102689				SN-632	LINE TO AZ VP

TABLE 7 - Leak Detector List

FARM	LDE #	LDK IN	LDX IN	PLC INPUT RELAY/SW #	REF DWG	OLD LDE #	OLD LDK IN	OLD LDX IN	LDE DESCRIPTION	MISC. NOTES
241-AZ	AZ02A-WT-LDE-306 A/B	AZ02A-WT-LDK-306	AZ02A-K-WT-LDK-306C		H-2-74600-3r8 H-2-99085 H-2-68335-3 H-14-102404 H-14-102689	LDE-102-20A	LDK-102-20A		PIT AZ-02A	
241-AZ	AZ-WT-LDE-221A/B	AZ-WT-LDK-221	AZ-WT-K-221C		H-14-103248				AZ VALVE PIT	
241-AZ	AZ-WT-LDE-222	AZ-WT-LDK-222	AZ-WT-K-222C		H-14-103248				LINE SN-633	
241-AZ	AZ-WT-LDE-223	AZ-WT-LDK-223	AZ-WT-K-223C		H-14-103248				LINE SN-634	
241-AZ	AZ-WT-LDE-224	AZ-WT-LDK-224	AZ-WT-K-224C		H-14-103248				LINE SN-637	
241-AZ	AZ01A-WT-LDE-310A/B	AZ01A-WT-LDK-310	AZ01A-WT-K-310C		H-14-102689				LINE DR-100	AZVP DRAIN LINE
219-S/ 222-S	LDE-306A	LD-306A		K-241-SY-306	H-2-820836				LINE SNL-5350	RELAY K-LD306A HAS NO SPARE
219-S/ 222-S	LDE-306B	LD-306B		K-241-SY-306	H-2-820836				LINE SNL-5350	RELAY K-LD306B HAS NO SPARE
219-S/ 222-S	LDE-306C	LD-306C		K-241-SY-306	H-2-820836				LINE SNL-5350	RELAY K-LD306C HAS NO SPARE
244-S	LDE-PP-2	LDK-PP-2	LDK-PP-2A	K-3	H-2-71091 H-2-71050 H-2-71085				244-S CATCH TANK	
244-S	LDE-V456	LDK-V456-1	LDK-V456-1A	K-3	H-2-71091 H-2-71050 H-2-71085				LINE V456	

TABLE 7 - Leak Detector List

FARM	LDE #	LDK IN	LDX IN	PLC INPUT RELAY/SW #	REF DWG	OLD LDE #	OLD LDK IN	OLD LDX IN	LDE DESCRIPTION	MISC. NOTES
244-S	LDE-V522	LDK-V522-1	LDK-V522-1A	K-3	H-2-71091 H-2-71050 H-2-71085				LINE V522	
244-S	LDE-V560	LDK-V560-1	LDK-V560-1A	K-3	H-2-71091 H-2-71050 H-2-71085				LINE V560	
244-S	LDE-V561	LDK-V561-1	LDK-V561-1A	K-3	H-2-71091 H-2-71050 H-2-71085				LINE V561	
244-S	LDE-V562	LDK-V562-1	LDK-V562-1A	K-3	H-2-71091 H-2-71050 H-2-71085				LINE V562	SHOWN AS LDK-V462-1 ON H-2-71091
244-S	LLE-PP-1	LLK-PP-1		K-3	H-2-71091 H-2-71050 H-2-71085				244-S CATCH TANK	SHOWN AS LDK-PP-1 ON H-2-71091
241-SY	SY02D-WT-LDE-136	SY02D-WT-LDK-136	SY02D-WT-LDX-136	K-241-SY-PPB	H-2-37735 H-2-37757 H-14-020831	LDE-02D-1	LD1-02D-1	LD2-02D-1	DRAIN PIT 241-SY-02D	LDSTA-136 SHOWN AS LD1-DP-02D-1 AND LD2-DP-02D-1 ON H-2-37735
241-SY	SYFPA-WT-LDE-141	SYFPA-WT-LDK-141	SYFPA-WT-LDX-141	K-241-SY-PPB	H-2-37735 H-2-37770-2 H-14-020831	LDE-FP-SY-A	LD1-FP-SY-A	LD2-FP-SY-A	FLUSH PIT FP-SY-A	LDSTA-141
241-SY	SYFPB-WT-LDE-142	SYFPB-WT-LDK-142	SYFPB-WT-LDX-142	K-241-SY-PPB	H-2-37735 H-2-37770-2 H-14-020831-4r3	LDE-FP-SY-B	LD1-FP-SY-B	LD2-FP-SY-B	FLUSH PIT FP-SY-B	LDSTA-142
241-SY	SY01A-WT-LDE-130	SY01A-WT-LDK-130	SY01A-WT-LDX-130	K-241-SY-PPB	H-2-37735 H-14-020831-1r0	LDE-PP-01A-1	LD1-PP-01A-1	LD2-PP-01A-1	PUMP PIT 241-SY-01A	LDSTA-130
241-SY	SY02A-WT-LDE-133	SY02A-WT-LDK-133	SY02A-WT-LDX-133	K-241-SY-PPB	H-2-37735 H-14-020831-2r1	LDE-PP-02A-1	LD1-PP-02A-1	LD2-PP-02A-1	PUMP PIT 241-SY-02A	LDSTA-133

TABLE 7 - Leak Detector List

FARM	LDE #	LDK IN	LDX IN	PLC INPUT RELAY/SW #	REF DWG	OLD LDE #	OLD LDK IN	OLD LDX IN	LDE DESCRIPTION	MISC. NOTES
241-SY	SY03A-WT-LDE-139	SY03A-WT-LDK-139	SY03A-WT-LDX-139	K-241-SY-PPB	H-2-37735 H-14-020831-3r0	LDE-PP-03A-1	LD1-PP-03A-1	LD2-PP-03A-1	PUMP PIT 241-SY-03A	LDSTA-139
241-SY	LDE-VP-SY-A	LD1-VP-SY-A	LD2-VP-SY-A	K-241-SY-PPB	H-2-37735 H-2-37770-2 H-2-822402 H-14-020831-2r7	SYVPA-WT-LDE-144	SYVPA-WT-LDK-144	SYVPA-WT-LDK-144	VALVE PIT VP-SY-A; LDSTA-144	W-058 P&ID HAS NEWEST NUMBER
241-SY	LDE-VP-SY-B	LD1-VP-SY-B	LD2-VP-SY-B	K-241-SY-PPB	H-2-37735 H-2-37770-2 H-2-822402 H-14-020831-2r7	LDE-VP-SY-B, SYVPA-WT-LDE-145	LD1-VP-SY-B, SYVPA-WT-LDK-145	LD2-VP-SY-B, SYVPA-WT-LDK-145	VALVE PIT VP-SY-B; LDSTA-145	W-058 P&ID HAS NEWEST NUMBER
241-SY	PS FP-A-1			K-241-SY-1	H-2-37735-2(ZN D8) H-2-46788r1				PRESSURE SWITCH	
241-SY	PS FP-B-1			K-241-SY-1	H-2-37735-2				PRESSURE SWITCH	
241-SY	PS-241-SY-SN-282			K-241-SY-SN-282	H-2-37735-2 (56B)				PRESSURE SWITCH	FEEDS U FARM
241-SY	SY-026-WT-137			K-241-SY-PPB	H-14-020831				FEED PUMP PIT SY-02E	LDSTA-137 H-14-020831
241-SY	LDE-143	LDE-143		K-241-SY-PPB	H-14-021831 H-14-020831				FLUSH PIT SY-FP-E	LDSTA-143 H-14-021831 H-14-020831
6241-A	LDE-3150	LDK-3150		DB-1	H-2-822403				DIV BOX 6241-A	
6241-V	LDE-3151	LDK-3151		DB-1A	H-2-822404				VENT STA 6241-V	
6241-A	LDE-3150A	LDK-3150A		VS-1	H-2-822403				DIV BOX 6241-A	
6241-V	LDE-3151A	LDK-3151A		VS-1A	H-2-822404				VENT STA 6241-V	

TABLE 8

Clean-Out-Box List

Table 8 · Clean-Out-Box List Use and Description

The columns shown on TABLE 8 are defined as follows:

- Farm- Designation identifies the tank farm where the relay is located.
- COB #- (Key field) The tag number of the clean-out box under examination.
- Line #- Identifies the line number in which the COB is located.
- LDE #- Provides the instrument tag number of leak detection element for the clean-out box.
- LDK #- Identifies the instrument tag number of the leak detection relay.
- LDX #- Identifies the instrument tag number of the leak detection malfunction relay.
- PLC Input Relay #- The instrument tag number of the input relay used as an input to the PLC. This may be the same as the LDE number if the relay is brought into the MPS system, or it may be the number of the relay to which a chain of LDEs are attached.
- Misc Notes- Design notes to assist or otherwise clarify.
- Reference Dwg- Reference source drawing that shows the existing input relays.

TABLE 8 - Clean-Out-Box List

FARM	COB #	LINE #	LDE #	LDK #	LDX #	PLC INPUT RELAY #	REF DWG	MISC NOTES
241-AN	COB-AN-507	SL-161	WT-LDE-507	WT-LDK-507	WT-LDK-507		H-14-020801-6r2 H-2-71930 H-2-71931	MPS MANUAL LD's (PHASE 2)
241-AN	COB-AN-508	SL-164	WT-LDE-508	WT-LDK-508	WT-LDK-508		H-14-020801-5r1 H-2-71930 H-2-71931	MPS MANUAL LD's (PHASE 2)
241-AN	COB-AN-509	SL-167	WT-LDE-509	WT-LDK-509	WT-LDK-509		H-14-020801-5r1 H-2-71930 H-2-71931	MPS MANUAL LD's (PHASE 2)
241-AW	COB-501	SL-168	WT-LDE-221	WT-LDK-221	WT-LDK-221		H-14-020802 H-2-70329 H-2-70387	MPS MANUAL LD's (PHASE 2)
241-AW	COB-502	SL-167	WT-LDE-222	WT-LDK-222	WT-LDK-222		H-14-020802 H-2-70329 H-2-70387	MPS MANUAL LD's (PHASE 2)
241-AW	COB-503	SL-168	WT-LDE-223	WT-LDK-223	WT-LDK-223		H-14-020802 H-2-70329 H-2-70387	MPS MANUAL LD's (PHASE 2)
241-AW	COB-504	SL-167	WT-LDE-224	WT-LDK-224	WT-LDK-224		H-14-020802 H-2-70329 H-2-70387	MPS MANUAL LD's (PHASE 2)
241-AW	COB-505	SL-168	WT-LDE-225	WT-LDK-225	WT-LDK-225		H-14-020802 H-2-70329 H-2-70387	MPS MANUAL LD's (PHASE 2)
241-AW	COB-506	SL-167	WT-LDE-226	WT-LDK-226	WT-LDK-226		H-14-020802/ H-2-70329 H-2-70387	MPS MANUAL LD's (PHASE 2)

TABLE 8 - Clean-Out-Box List

FARM	COB #	LINE #	LDE #	LDK #	LDX #	PLC INPUT RELAY #	REF DWG	MISC NOTES
241-AW	COB-507	SL-168	WT-LDE-227	WT-LDK-227	WT-LDK-227		H-14-020802 H-2-70329 H-2-70387	MPS MANUAL LD's (PHASE 2)
241-AW	COB-508	SL-167	WT-LDE-228	WT-LDK-228	WT-LDK-228		H-14-020802 H-2-70329 H-2-70387	MPS MANUAL LD's (PHASE 2)
241-AW	COB-AW-509	SL-165	WT-LDE-209	WT-LDK-209	WT-LDK-209		H-14-020802-4r2 H-2-70329 H-2-70387	MPS MANUAL LD's (PHASE 2)
241-AW	COB-510	SL-166	WT-LDE-210	WT-LDK-210	WT-LDK-210		H-14-020802 H-2-70329 H-2-70387	MPS MANUAL LD's (PHASE 2)
241-AW	COB-511	DR-334 DR-335						
241-AW	COB-512	DR-334 DR-335						

TABLE 9

3-Way Valve List

Table 9 3-Way Valve List - Use and Description

The columns shown on TABLE 9 are defined as follows:

- Farm- Identifies the tank farm where valve is located.
- Valve No.- Identifies the valve identification number.
- Pit No.- Identifies the Valve Pit where valve is located.
- Pos A Inlet- Identifies the nearest identifiable device (valve, connector or instrument) to the inlet of the valve in position A. (See FIGURE 1 for valve configurations). In general, the direction of flow may be in either direction.
- Pos A Outlet- Identifies the nearest identifiable device (valve, connector or instrument) to the outlet of the valve in position A. (See FIGURE 1 for valve configurations). In general, the direction of flow may be in either direction.
- Pos B Inlet- Identifies the nearest identifiable device (valve, connector or instrument) to the inlet of the valve in position B. (See FIGURE 1 for valve configurations). In general, the direction of flow may be in either direction.
- Pos B Outlet- Identifies the nearest identifiable device (valve, connector or instrument) to the outlet of the valve in position B. (See FIGURE 1 for valve configurations). In general, the direction of flow may be in either direction.

- Pos C Inlet- Identifies the nearest identifiable device (valve, connector or instrument) to the inlet of the valve in position C. (See FIGURE 1 for valve configurations). In general, the direction of flow may be in either direction.

- Pos C Outlet- Identifies the nearest identifiable device (valve, connector or instrument) to the outlet of the valve in position C. (See FIGURE 1 for valve configurations). In general, the direction of flow may be in either direction.

- Pos A Tag- Identifies the instrument tag number of the limit switch which indicates the valve is in position A.

- Pos B Tag- Identifies the instrument tag number of the limit switch which indicates the valve is in position B.

- Pos C Tag- Identifies the instrument tag number of the limit switch which indicates the valve is in position C.

- DWG# - References the P&ID drawing where valve and/or limit switches are shown.

Figure 1. VALVE POSITION CONFIGURATIONS

TABLE 9 - 3-Way Valves

Farm	Valve No.	Pit No.	Pos A Inlet	Pos A Outlet	Pos B Inlet	Pos B Outlet	Pos C Inlet	Pos C Outlet	Pos A Tag	Pos B Tag	Pos C Tag	DWG #	Comment
AN	AN-A-WT-V-302	241-AN-A	A	AN-A-WT-V-303	AN-A-WT-V-301	AN-A-WT-V-303	A	AN-A-WT-V-301	AN-A-WT-ZS-302A	AN-A-WT-ZS-302B	AN-A-WT-ZS-302C	H-14-020801-5r1	W-314
AN	ANA-WT-V-303	241-AN-A	ANA-WT-V-304	ANA-WT-V-302	ANA-WT-V-302	ANA-WT-V-305	ANA-WT-V-304	ANA-WT-V-305	ANA-WT-ZS-303A	ANA-WT-ZS-303B	ANA-WT-ZS-303C	H-14-020801-5r1	W-314
AN	ANA-WT-V-305	241-AN-A	ANA-WT-V-306	B	B	ANA-WT-V-307	ANA-WT-V-306	ANA-WT-V-307	ANA-WT-ZS-305A	ANA-WT-ZS-305B	ANA-WT-ZS-305C	H-14-020801-5r1	W-314
AN	ANA-WT-V-307	241-AN-A	ANA-WT-V-305	ANA-WT-V-309	ANA-WT-V-309	ANA-WT-V-308	ANA-WT-V-305	ANA-WT-V-308	ANA-WT-ZS-307A	ANA-WT-ZS-307B	ANA-WT-ZS-307C	H-14-020801-5r1	W-314
AN	ANA-WT-V-314	241-AN-A	ANA-WT-V-315	ANA-WT-V-313	ANA-WT-V-313	ANA-WT-V-316	ANA-WT-V-315	ANA-WT-V-316	ANA-WT-ZS-314A	ANA-WT-ZS-314B	ANA-WT-ZS-314C	H-14-020801-5r1	W-314
AN	ANA-WT-V-316	241-AN-A	ANA-WT-V-314	E	E	ANA-WT-V-317	ANA-WT-V-314	ANA-WT-V-317	ANA-WT-ZS-316A	ANA-WT-ZS-316B	ANA-WT-ZS-316C	H-14-020801-5r1	W-314
AN	ANA-WT-V-318	241-AN-A	D	ANA-WT-V-319	ANA-WT-V-319	E	D	E	ANA-WT-ZS-318A	ANA-WT-ZS-318B	ANA-WT-ZS-318C	H-14-020801-5r1	W-314
AN	ANA-WT-V-319	241-AN-A	ANA-WT-V-318	ANA-WT-V-321	ANA-WT-V-321	ANA-WT-V-320	ANA-WT-V-318	ANA-WT-V-320	ANA-WT-ZS-319A	ANA-WT-ZS-319B	ANA-WT-ZS-319C	H-14-020801-5r1	W-314
AN	ANA-WT-V-802	241-AN-A	F	D	L21	F	L21	D	ANA-WT-ZS-802A	ANA-WT-ZS-802B	ANA-WT-ZS-802C		
AN	ANA-WT-V-321	241-AN-A	ANA-WT-V-322	H	H	ANA-WT-V-319	ANA-WT-V-322	ANA-WT-V-319	ANA-WT-ZS-321A	ANA-WT-ZS-321B	ANA-WT-ZS-321C	H-14-020801-5r1	W-314
AN	ANB-WT-V-203	241-AN-B	ANB-WT-V-204	B	B	ANB-WT-V-803	ANB-WT-V-204	ANB-WT-V-803	ANB-WT-ZS-203A	ANB-WT-ZS-203B	ANB-WT-ZS-203C	H-14-020801-6r2	W-314

TABLE 9 - 3-Way Valves

Farm	Valve No.	Pit No.	Pos A Inlet	Pos A Outlet	Pos B Inlet	Pos B Outlet	Pos C Inlet	Pos C Outlet	Pos A Tag	Pos B Tag	Pos C Tag	DWG #	Comment
AN	ANB-WT-V-205	241-AN-B	ANB-WT-V-206	ANB-WT-V-207	ANB-WT-V-207	B	ANB-WT-V-206	B	ANB-WT-ZS-205A	ANB-WT-ZS-205B	ANB-WT-ZS-205C	H-14-020801-6r2	W-314
AN	ANB-WT-V-207	241-AN-B	ANB-WT-V-205	ANB-WT-V-208	ANB-WT-V-208	ANB-WT-V-209	ANB-WT-V-205	ANB-WT-V-209	ANB-WT-ZS-207A	ANB-WT-ZS-207B	ANB-WT-ZS-207C	H-14-020801-6r2	W-314
AN	ANB-WT-V-214	241-AN-B	ANB-WT-V-215	ANB-WT-V-216	ANB-WT-V-216	ANB-WT-V-213	ANB-WT-V-215	ANB-WT-V-213	ANB-WT-ZS-214A	ANB-WT-ZS-214B	ANB-WT-ZS-214C	H-14-020801-6r2	W-314
AN	ANB-WT-V-216	241-AN-B	ANB-WT-V-217	F	F	ANB-WT-V-214	ANB-WT-V-217	ANB-WT-V-214	ANB-WT-ZS-216A	ANB-WT-ZS-216B	ANB-WT-ZS-216C	H-14-020801-6r2	W-314
AN	AN01A-t-2	241-AN-02A	B	AN01A-t-3	B	10	AN01A-t-3	10					W-314
AN	AN01A-t-1	241-AN-01A	AN01A-5-7	A	AN01A-t-4	AN01A-t-7	A	AN01A-t-4					W-314
AN	AN01A-t-3	241-AN-01A	AN01A-t-2	AN241-WT-P-001	AN01A-t-2	AN241-WT-P-001	AN241-WT-P-001	AN241-WT-P-001					W-314
AN	AN01A-t-4	241-AN-01A	AN01A-t-1	AN01A-t-5	AN241-WT-P-001	AN01-T-1	AN241-WT-P-001	AN01A-t-5					W-314
AN	AN01A-t-7	241-AN-01A	AN01A-t-1	AN01A-t-8	AN01A-t-6	AN01A-t-8	AN01A-t-1	AN01A-t-6					W-314
AN	ANB-WT-V-218	241-AN-B	F	ANB-WT-V-219	ANB-WT-V-219	ANB-WT-V-221	F	ANB-WT-V-221	ANB-WT-ZS-218A	ANB-WT-ZS-218B	ANB-WT-ZS-218C	H-14-020801-6r2	W-314
AP	AP-WT-V-501	241-AP	AP-WT-V-511	G	G	AP-WT-V-513	AP-WT-V-511	AP-WT-V-513	AP-WT-ZS-501A	AP-WT-ZS-501B		H-14-020803-5r1	Exisiting
AP	AP-WT-V-502	241-AP	AP-WT-V-512	AP-WT-V-509	AP-WT-V-509	AP-WT-V-519	AP-WT-V-512	AP-WT-V-519	AP-WT-ZS-502A	AP-WT-ZS-502B	??	H-14-020803-5r1	Exisiting

TABLE 9 - 3-Way Valves

Farm	Valve No.	Pit No.	Pos A Inlet	Pos A Outlet	Pos B Inlet	Pos B Outlet	Pos C Inlet	Pos C Outlet	Pos A Tag	Pos B Tag	Pos C Tag	DWG #	Comment
AP	AP-WT-V-504	241-AP	AP-WT-V-514	B	B	AP-WT-V-509	AP-WT-V-514	AP-WT-V-509	AP-WT-ZS-504A	AP-WT-ZS-504B	??	H-14-020803-5r1	Exisiting
AP	AP-WT-V-505	241-AP	AP-WT-V-515	E	E	AP-WT-V-510	AP-WT-V-515	AP-WT-V-510	AP-WT-ZS-505A	AP-WT-ZS-505B	AP-WT-ZS-505C	H-14-020803-5r1	Exisiting
AP	AP-WT-V-507	241-AP	AP-WT-V-517	AP-WT-V-510	AP-WT-V-510	AP-WT-V-520	AP-WT-V-517	AP-WT-V-520	AP-WT-ZS-507A	LS517-1-2 AP-WT-ZS-507B	LS517-1-3	H-14-020803-5r1	Exisiting
AP	AP-WT-V-508	241-AP	AP-WT-V-518	F	F	AP-WT-V-516	AP-WT-V-518	AP-WT-V-516	AP-WT-ZS-508A	AP-WT-ZS-508B	LS518-1-3	H-14-020803-5r1	Exisiting
AP	AP-WT-V-601	241-AP	AP-WT-V-611	J	J	AP-WT-V-603	AP-WT-V-611	AP-WT-V-603	AP-WT-ZS-601A	AP-WT-ZS-601B	LS611-1-3 AP-WT-ZS-603C	H-14-020803-5r1	Existing
AP	AP-WT-V-602	241-AP	AP-WT-V-612	AP-WT-V-614	AP-WT-V-614	J	AP-WT-V-612	J	AP-WT-ZS-602A	AP-WT-ZS-602B	AP-WT-ZS-603C	H-14-020803-5r1	Existing
AP	AP-WT-V-603	241-AP	AP-WT-V-613	AP-WT-V-601	AP-WT-V-601		AP-WT-V-613	H	AP-WT-ZS-603A	AP-WT-ZS-603B	AP-WT-ZS-603C	H-14-020803-5r1	Existing
AP	AP-WT-V-606	241-AP	AP-WT-V-616	AP-WT-V-608	AP-WT-V-608	D	AP-WT-V-616	D	AP-WT-ZS-606A	AP-WT-ZS-606B	AP-WT-ZS-606C	H-14-020803-5r1	Existing
AP	AP-WT-V-607	241-AP	AP-WT-V-617	AP-WT-V-615	AP-WT-V-615	K	AP-WT-V-617	K	AP-WT-ZS-607A	AP-WT-ZS-607B	AP-WT-ZS-607C	H-14-020803-5r1	Existing
AP	AP-WT-V-608	241-AP	AP-WT-V-618	K	K	AP-WT-V-606	AP-WT-V-618	AP-WT-V-606	AP-WT-ZS-608A	AP-WT-ZS-608B	AP-WT-ZS-608C	H-14-020803-5r1	Existing
AP	AP-WT-V-703t	241-AP	AP-WT-V-701t	AP-WT-V-704t	AP-WT-V-609	AP-WT-V-704t	AP-WT-V-701t	AP-WT-V-609	AP-WT-ZS-703tA	AP-WT-ZS-703tB	AP-WT-ZS-703tC	Letter 7C500-99-013	W-314

TABLE 9 - 3-Way Valves

Farm	Valve No.	Pit No.	Pos A Inlet	Pos A Outlet	Pos B Inlet	Pos B Outlet	Pos C Inlet	Pos C Outlet	Pos A Tag	Pos B Tag	Pos C Tag	DWG #	Comment
AP	AP-WT-V-704t	241-AP	AP-WT-V-806t	AP-WT-V-803/ AP-WT-V-619	AP-WT-V-703t	AP-WT-V-803/ AP-WT-V-619	AP-WT-V-806t	AP-WT-V-703t	AP-WT-ZS-704tA	AP-WT-ZS-704tB	AP-WT-ZS-704tC	Letter 7C500-99-013	W-314
AW	AWA-WT-V-312	241-AW-A	AWA-WT-V-320	AWA-WT-V-313	AWA-WT-V-308	AWA-WT-V-313	AWA-WT-V-320	AWA-WT-V-313	ZS-312A	ZS-312B	ZS-312C	H-14-100800	W-314
AW	AWA-WT-V-313	241-AW-A	AWA-WT-V-309	AWA-WT-V-314	AWA-WT-V-314	AWA-WT-V-312	AWA-WT-V-312	AWA-WT-V-309	ZS-313A	ZS-313B	ZS-313C	H-14-100800	W-314
AW	AWA-WT-V-314	241-AW-A	AWA-WT-V-310	AWA-WT-V-313	AWA-WT-V-313	AWA-WT-V-311	AWA-WT-V-310	AWA-WT-V-311A	ZS-314A	ZS-314B	ZS-314C	H-14-100800	W-314
AW	AWA-WT-V-318	241-AW-A	AWA-WT-V-315	AWA-WT-V-316	AWA-WT-V-315	AWA-WT-V-319	AWA-WT-V-316	ZS-318A	ZS-318A	ZS-318B	ZS-318C	H-14-100800	W-314
AW	AWB-WT-V-209	241-AW-B	AW-B-WT-V-215	AWB-WT-V-211	R13	AWB-WT-V-215	AWB-WT-V-211	R13	AWB-WT-ZS-209A	AWB-WT-ZS-209B	AWB-WT-ZS-209C	H-14-100800	W-314
AW	AWB-WT-V-210	241-AW-B	AWB-WT-V-211	AWB-WT-V-207	AWB-WT-V-206	AWB-WT-V-211	AWB-WT-V-207	AWB-WT-V-206	AWB-WT-ZS-210A	AWB-WT-ZS-210B	AWB-WT-ZS-210C	H-14-100800	W-314
AW	AWB-WT-V-211	241-AW-B	AWB-WT-V-210	AWB-WT-V-209	AWB-WT-V-212	AWB-WT-V-210	AWB-WT-V-212	AWB-WT-V-209	AWB-WT-ZS-211A	AWB-WT-ZS-211B	AWB-WT-ZS-211C	H-14-100800	W-314
AW	AWB-WT-V-212	241-AW-B	AWB-WT-V-211	AWB-WT-V-214	AWB-WT-V-213	AWB-WT-V-211	AWB-WT-V-213	AWB-WT-V-214	AWB-WT-ZS-212A	AWB-WT-ZS-212B	AWB-WT-ZS-212C	H-14-100800	W-314
AW	AWB-WT-V-215	241-AW-B	AWB-WT-V-216	AWB-WT-V-217	AWB-WT-V-209	AWB-WT-V-216	AWB-WT-V-217	AWB-WT-V-209	AWB-WT-ZS-215A	AWB-WT-ZS-215B	AWB-WT-ZS-215C	H-14-100800	W-314
AW	AWB-WT-V-217	241-AW-B	AWB-WT-V-218	AWB-WT-V-215	AWB-WT-V-215	AWB-WT-V-219	AWB-WT-V-218	AWB-WT-V-219	AWB-WT-ZS-217A	AWB-WT-ZS-217B	AWB-WT-ZS-217C	H-14-100800	W-314
AW	AWA-WT-V-319	241-AW-A	AWA-WT-V-317	AWA-WT-V-326	AWA-WT-V-326	AWA-WT-V-318	AWA-WT-V-318	AWA-WT-V-317	AWA-WT-ZS-319A	AWA-WT-ZS-319B	AWA-WT-ZS-319C	H-14-100800	W-314

TABLE 9 - 3-Way Valves

Farm	Valve No.	Pit No.	Pos A Inlet	Pos A Outlet	Pos B Inlet	Pos B Outlet	Pos C Inlet	Pos C Outlet	Pos A Tag	Pos B Tag	Pos C Tag	DWG #	Comment
AW	AWA-WT-V-320	241-AW-A	AWA-WT-V-312	L11	AWA-WT-V-312	AWA-WT-V-325	AWA-WT-V-325	L11	AWA-WT-ZS-320A	AWA-WT-ZS-320B	AWA-WT-ZS-320C	H-14-100800	W-314
AW	AWA-WT-V-324	241-AW-A	AWA-WT-V-322	AWA-WT-V-321	AWA-WT-V-321	AWA-WT-V-325	AWA-WT-V-325	AWA-WT-V-322	AWA-WT-ZS-324A	AWA-WT-ZS-324B	AWA-WT-ZS-324C	H-14-100800	W-314
AW	AWA-WT-V-325	241-AW-A	AWA-WT-V-320	AWA-WT-V-326	AWA-WT-V-326	AWA-WT-V-324	AWA-WT-V-320	AWA-WT-V-324	AWA-WT-ZS-325A	AWA-WT-ZS-325B	AWA-WT-ZS-325C	H-14-100800	W-314
AW	AWA-WT-V-326	241-AW-A	AWA-WT-V-323	AWA-WT-V-325	AWA-WT-V-325	AWA-WT-V-319	AWA-WT-V-319	AWA-WT-V-323	AWA-WT-ZS-326A	AWA-WT-ZS-326B	AWA-WT-ZS-326C	H-14-100800	W-314
AW		AW FLUSH PIT										H-14-021802	
AW		AW FLUSH PIT										H-14-021802	
AW		AW FLUSH PIT										H-14-021802	
AW		AW FLUSH PIT										H-14-021802	
AZ	AZVP-WT-V-226	241-AZ	AZVP-WT-V-221	J	AZ VP-WT-V-222	J	AZVP-WT-V-221	AZVP-WT-V-222	AZ VP-WT-ZS-226A	AZVP-WT-ZS-226B	AZVP-WT-ZS-226C	H-14-103248	W-314
AZ	AZVP- WT-V-227	241-AZ	L	AZ VP-WT-V-224	AZ VP-WT-V-224	AZ VP-WT-V-223	L	AZ VP-WT-V-223	AZ VP-WT-ZS-227A	AZ VP-WT-V-227B	AZVP-WT-V-227C	H-14-103248	W-314
AZ	AZVP-WT-V-228	241-AZ	K	L	L	J	K	J	AZA-WT-S-228A	AZA-WT-ZS-228B	AZA-WT-ZS-228C	H-14-103248	W-314

TABLE 9 - 3-Way Valves

Farm	Valve No.	Pit No.	Pos A Inlet	Pos A Outlet	Pos B Inlet	Pos B Outlet	Pos C Inlet	Pos C Outlet	Pos A Tag	Pos B Tag	Pos C Tag	DWG #	Comment
AZ	AZ01A-V-608	241-AZ-01A	J	H	J	K	K	H	AZ01A-WT-ZS-608A	AZ01A-WT ZS-608B	AZ01A-WT ZS-608C		W-314
AZ	AZ01A-V-609	241-AZ-01A	V-110	V-614	J	V-110	J	V-614	AZ01A-WT ZS-609A	AZ01A-WT ZS-609B	AZ01A-WT ZS-609C		W-314
AZ	AZ01A-V-611	241-AZ-01A	SN PUMP	SN PUMP	N	SN PUMP	N	SN-PUMP	AZ01A-WT ZS-611A	AZ01A-WT ZS-611B	AZ01A-WT ZS-611C		W-314
AZ	AZ01A-V-612	241-AZ-01A	V-613	U11	U12	V-613	U11	U12	AZ01A-WT ZS-612A	AZ01A-WT ZS-612B	AZ01A-WT ZS-612C		W-314
AZ	AZ01A-V-613	241-AZ-01A	L	V-612	L	K	K	V-612	AZ01A-WT-ZS-613A	AZ01A-WT-ZS-613B	AZ01A-WT-ZS-613C		W-314
AZ	AZ01A-V-614	214-AZ-01A	N	SN PUMP	V-609	N	V-609	SN PUMP	AZ01A-WT-ZS-614A	AZ01A-WT-ZS-614B	AZ01A-WT-ZS-614C		W-314
SY	SYA-WT-V-227	241-SY-A VALVE PIT VP-3101	F	SYA-V-222	SYA-V-228	SYA-V-222	F	SYA-V-228	TBD	TBD	TBD	H-2-822402-1r7	
SY	SYA-WT-V-222	241-SY-A VALVE PIT	226	227	L12	227	226	L12	TBD	TBD	TBD	H-2-822402-1r7	
SY	SYA-WT-V-228	241-SY-A VALVE PIT	H	L16	H	V-227	L16	V-227	TBD	TBD	TBD	H-2-822402-1r7	

TABLE 9 - 3-Way Valves

Farm	Valve No.	Pit No.	Pos A Inlet	Pos A Outlet	Pos B Inlet	Pos B Outlet	Pos C Inlet	Pos C Outlet	Pos A Tag	Pos B Tag	Pos C Tag	DWG #	Comment
SY	SYB-WT-V-321	241-SY-B VALVE PIT	R16	R12	R19	R12	R16	R19	TBD	TBD	TBD	H-2-822402 H-14-020831-4r3	
AN	AN02A-WT-V-602	Central Pump Pit-02A	A	G	A		SN Pump P-004	G-Tank Return	AZ02A-WT-ZS-602A	AN02A-WT-ZS-602B	AZ02A-WT-ZS-602C	H-14-02080 1-2r4	
AN	AN07A-WT-V-607	Central Pump Pit-07A	A	G-Tank Return	A	Drop Leg	Drop Leg	G-Tank Return	AZ02A-WT-607A	AZ02A-WT-607B	AZ02A-WT-607C	H-14-02080 1-4r1	
AZ	AZ02A-WT-V-608	241-AZ-02A	J	H	J	K	K	H	AZ02A-WT-608A	AZ02A-WT-608B	AZ02A-WT-608C		
AZ	AZ02A-WT-V-609	AZ02A	V-110	V-614	V-110	J	J	V-614	AZ02A-WT-609A	AZ02A-WT-609B	AZ02A-WT-609C		
AZ	V-611	241-AZ-02A	SN PUMP	SN PUMP	V-614	SN PUMP	V-614	SN PUMP	AZ02A-WT-611A	AZ02A-WT-611B	AZ02A-WT-611C		
AZ	V-612	241-AZ-02A	V-610	L	M	V-610	M	L	AZ02A-WT-612A	AZ02A-WT-612B	AZ02A-WT-612c		
AZ	V-613	241-AZ-02A	L	U13	L	K	K	U13	AZ02A-WT-613A	AZ02A-WT-613B	AZ02A-WT-613c		

TABLE 9 - 3-Way Valves

Farm	Valve No.	Pit No.	Pos A Inlet	Pos A Outlet	Pos B Inlet	Pos B Outlet	Pos C Inlet	Pos C Outlet	Pos A Tag	Pos B Tag	Pos C Tag	DWG #	Comment
AZ	V-614	241-AZ-02A	N	SN PUMP	V-609	N	V-609	SN PUMP	AZ02A-WT-614A	AZ02A-WT-614B	AZ02A-WT-614C		
AP	AP01A-WT-V-101	Central Pump Pit 241-AP-0	SN-611	SN Pump	SN-611	Tank Return	SN Pump	Tank Return	AP02A-WT-ZS-101A	AP02A-WT-ZS-101B	AP02A-WT-ZS-101C	H-14-020803-1r1	
AP	AP02A-WT-MOV-243	Central Pump Pit 241-AP-0	SN-612	SN Pump	SN-612	SN PUMP	SN Pump	Tank Return	AP02A-WT-ZS-243A	AP02A-WT-ZS-243B	AP02A-WT-ZS-243C	H-14-020803-3r1	
AP	AP02A-WT-MOV-242	Central Pump Pit	SN PUMP	Tank Return	B	Tank Return	B	SN PUMP	AP02A-WT-ZS-242A	AP02A-WT-ZS-242B	AP02A-WT-ZS-242C		
AP	AP04A-WT-MOV-246	Central Pump Pit	SN Pump	Tank Return	B	Tank Return	B	SN Pump					
AP	AP03A-WT-V-103	Central Pump Pit 241-AP-0	SN-613	SN Pump	SN-613	Tank Return	SN Pump	Tank Return				H-14-020803-1r1	
AP	AP04A-WT-MOV-247	Central Pump Pit 241-AP-0	SN-614	Tank FCV-248	SN-614	Tank Return	SN Pump	FCV-248				H-14-020803-3r1	
AP	AP05A-WT-V-105	Central Pump Pit 241-AP-0	SN-615	SN Pump	SN-615	Tank Return	SN Pump	Tank Return				H-14-020803-2r1	
AP	AP06A-WT-V-106	Central Pump Pit 241-AP-0	SN-616	SN Pump	SN-616	Tank Return	SN Pump	Tank Return				H-14-020803-4r1	

TABLE 9 - 3-Way Valves

Farm	Valve No.	Pit No.	Pos A Inlet	Pos A Outlet	Pos B Inlet	Pos B Outlet	Pos C Inlet	Pos C Outlet	Pos A Tag	Pos B Tag	Pos C Tag	DWG #	Comment
AP	AP07A-WT-V-107	Central Pump Pit 241-AP-0	SN-617	SN Pump	SN-617	Tank Return	SN Pump	Tank Return				H-14-020803-2r1	
AP	AP08A-WT-V-108	Central Pump Pit 241-AP-0	SN-618	SN Pump	SN-618	Tank Return	SN Pump	Tank Return				H-14-020803-4r1	
AW	AW04A-WT-V-604	Central Pump Pit.	A	G-Tank Return	A	SN Pump	G-Tank Return	SN Pump				H-14-020802-3r3	
AW	AW05A-WT-V-605	Central Pump Pit.	A	G-Tank Return	A	SN Pump	G-Tank Return	SN Pump				H-14-020802-1r3	
AW	No Valve Number	241-AY-102A	A	C	A	U11	U11	C					
AW	No Valve Number	241-AY-102A	U8	U3	U8	B	U3	B					
AW	AW02A-t-2	Central Pump Pit	J	L	J	AW02A-t-4	L	AW02A-t-4					
AW	AW02A-t-4	Central Pump Pit	AW02A-t-2	V	V	AW02A-t-9	AW02A-t-2	AW02A-t-9				H-2-020802	
AW	AW02A-t-9	Central Pump Pit ~~PIT-02A~~	H	U	U	AW02A-t-4 tt	H	AW02A-t-4				H-2-020802	

TABLE 9 - 3-Way Valves

Farm	Valve No.	Pit No.	Pos A Inlet	Pos A Outlet	Pos B Inlet	Pos B Outlet	Pos C Inlet	Pos C Outlet	Pos A Tag	Pos B Tag	Pos C Tag	DWG #	Comment
AW	AW02A-t-7	Central Pump Pit	N	AW02A-t-9	H	AW02A-t-9	H	N					
SY	SY02A-WT-V-104	Central Pump Pit,	SY02A-WT-V-105	SY02A-WT-FQT-163	SY02A-WT-V-103	SY02A-WT-FQT-163	SY02A-WT-V-103	SY02A-WT-V-105				H-14-020831-2r1	
SY	SY02A-WT-V-106	Central Pump Pit,	SY02A-WT-V-105	H	H	SY02A-WT-V-107	SY02A-WT-V-105	V-107				H-14-020831-2r1	
204-AR	WT-MOV-14	NA	WT-MOV-1	38	38	37	WT-MOV-1	37				*H-2-70703*	
204-AR	WT-MOV-17	NA	WT-MOV-18 WT-MOV-21	WT-MOV-7	WT-MOV-7	WT-MOV-6	WT-MOV-18 WT-MOV-21	WT-MOV-6				*H-2-70703*	
244-S	A-1	244-S Pump Pit	12	F	12	3	3	F				H-2-71085 H-2-73801	
244-S	A-2	244-S Pump Pit	12	A-3	12	J	J	A-3				H-2-71085 H-2-73801	
244-S	A-3	244-S Pump Pit	A-2	6		A-2		6				H-2-71085 H-2-73801	
204-AR	WT-MOV-15												

TABLE 9 - 3-Way Valves

Farm	Valve No.	Pit No.	Pos A Inlet	Pos A Outlet	Pos B Inlet	Pos B Outlet	Pos C Inlet	Pos C Outlet	Pos A Tag	Pos B Tag	Pos C Tag	DWG #	Comment
204-AR	WT-MOV-16												
241-AP	A-t-2	New APVP	A-t-1	1	A-t-1	A-t-3	1	A-t-3				Letter 7C500-99-013	TEMP TAG
241-AP	A-t-4	New APVP	1	A-t-5	A-t-5	A-t-7	A-t-7	1				Letter 7C500-99-013	TEMP TAG
241-AP	A-t-8	New APVP ~~AZVP~~	A-t-7	A-t-13	A-t-7	3	A-t-13	3				Letter 7C500-99-013	TEMP TAG
241-AP	A-t-7	New APVP ~~AZVP~~	A-t-8	A-t-4	A-t-8	2	A-t-4	2					
241-AP	A-t-10	New APVP ~~AZVP~~	K	2	A-t-11	2	A-t-11	K					

TABLE 10

2-Way Valve List

Table 10 2-Way Valve List - Use and Description

The columns shown on TABLE 10 are defined as follows:

- Farm- Identifies the tank farm where valve is located.
- Valve No.- Identifies the valve identification number.
- Pit No.- Identifies the Valve Pit where valve is located.
- Inlet- Identifies the nearest identifiable device (valve, connector or instrument) to the inlet of the valve. In general, the direction of flow may be in either direction, so inlet and outlet may be interchanged.
- Outlet- Identifies the nearest identifiable device (valve, connector or instrument) to the outlet of the valve. In general, the direction of flow may be in either direction, so inlet and outlet may be interchanged.
- Closed Tag- Identifies the instrument tag number of the limit switch which indicates the valve is in the closed position. (See FIGURE 1 for valve position configurations).
- Open Tag- Identifies the instrument tag number of the limit switch which indicates the valve is in the open position. (See FIGURE 1 for valve position configurations).
- DWG# - References the P&ID drawing where valve and/or limit switches are shown.

FIGURE 1. VALVE POSITION CONFIGURATIONS

TABLE 10 - 2-Way Valves

Farm	Valve No.	Pit No.	Inlet	Outlet	Closed Tag	Open Tag	DWG #
AN	AN-A-WT-V-301	241-AN-A	L3	AN-A-WT-V-302	AN-A-WT-ZS-301A	AN-A-WT-ZS-301B	H-14-020801-5r1
AN	AN-A-WT-V-304	241-AN-A	L5	AN-A-WT-V-303	AN-A-WT-ZS-304A	AN-A-WT-ZS-304B	H-14-020801-5r1
AN	AN-A-WT-V-306	241-AN-A	L7	AN-A-WT-V-305	AN-A-WT-ZS-306A	AN-A-WT-ZS-306B	H-14-020801-5r1
AN	AN-A-WT-V-308	241-AN-A	L9	AN-A-WT-V-307	AN-A-WT-ZS-308A	AN-A-WT-ZS-308B	H-14-020801-5r1
AN	AN-A-WT-V-309	241-AN-A	C	AN-A-WT-V-307	AN-A-WT-ZS-309A	AN-A-WT-ZS-309B	H-14-020801-5r1
AN	AN-A-WT-V-313	241-AN-A	L14	AN-A-WT-V-314	AN-A-WT-ZS-313A	AN-A-WT-ZS-313B	H-14-020801-5r1
AN	AN-A-WT-V-315	241-AN-A	L15	AN-A-WT-V-314	AN-A-WT-ZS-315A	AN-A-WT-ZS-315B	H-14-020801-5r1
AN	AN-A-WT-V-317	241-AN-A	L16	AN-A-WT-V-316	AN-A-WT-ZS-317A	AN-A-WT-ZS-317B	H-14-020801-5r1
AN	AN-A-WT-V-320	241-AN-A	L19	AN-A-WT-V-319	AN-A-WT-ZS-320A	AN-A-WT-ZS-320B	H-14-020801-5r1
AN	AN-A-WT-V-322	241-AN-A	G	AN-A-WT-V-321	AN-A-WT-ZS-322A	AN-A-WT-ZS-322B	H-14-020801-5r1
AN	AN-A-WT-V-323	241-AN-A	L1	H	AN-A-WT-ZS-323A	AN-A-WT-ZS-323B	H-14-020801-5r1
AN	AN01A-t-5	241-AN-01A	7	AN01A-t-4	AN01A-WT-ZS-426A	AN01A-WT-ZS-426B	H-14-103327
AN	AN01A-t-8	241-AN-01A	D	AN01A-t-7	AN01A-WT-ZS-427A	AN01A-WT-ZS-427B	H-14-103327
AN	AN01A-t-6	241-AN-01A	H	AN01A-t-7	AN01A-WT-ZS-428A	AN01A-WT-ZS-428B	H-14-103327
AN	AN01A-t-9	241-AN-01A	B	AN01A-t-2			
AN	AN-B-WT-V-204	241-AN-B	R5	AN-B-WT-V-203	AN-B-WT-ZS-204A	AN-B-WT-ZS-204B	H-14-020801-6r2
AN	AN-B-WT-V-206	241-AN-B	R7	AN-B-WT-V-205	AN-B-WT-ZS-206A	AN-B-WT-ZS-206B	H-14-020801-6r2
AN	AN-B-WT-V-208	241-AN-B	R9	AN-B-WT-V-207	AN-B-WT-ZS-208A	AN-B-WT-ZS-208B	H-14-020801-6r2
AN	AN-B-WT-V-209	241-AN-B	C	AN-B-WT-V-207	AN-B-WT-ZS-209A	AN-B-WT-ZS-209B	H-14-020801-6r2
AN	AN-B-WT-V-213	241-AN-B	R14	AN-B-WT-V-214	AN-B-WT-ZS-213A	AN-B-WT-ZS-213B	H-14-020801-6r2
AN	AN-B-WT-V-215	241-AN-B	R15	AN-B-WT-V-214	AN-B-WT-ZS-215A	AN-B-WT-ZS-215B	H-14-020801-6r2
AN	AN-B-WT-V-217	241-AN-B	R16	AN-B-WT-V-216	AN-B-WT-ZS-217A	AN-B-WT-ZS-217B	H-14-020801-6r2
AN	AN-B-WT-V-219	241-AN-B	R19	AN-B-WT-V-218	AN-B-WT-ZS-219A	AN-B-WT-ZS-219B	H-14-020801-6r2
AN	AN-B-WT-V-221	241-AN-B	D	AN-B-WT-V-218	AN-B-WT-ZS-221A	AN-B-WT-ZS-221B	H-14-020801-6r2

TABLE 10 - 2-Way Valves

Farm	Valve No.	Pit No.	Inlet	Outlet	Closed Tag	Open Tag	DWG #
AN	AN-B-WT-V-803	241-AN-B	R20	AN-B-WT-V-203	AN-B-WT-ZS-803A	AN-B-WT-ZS-803B	H-14-020801-6r2
AN	AN04A-WT-V-400	241-AN-04A	B	MOV-622			
AN	AN04A-WT-FCV-620	241-AN094A	MOV-521	7			
AN	AN-WT-V-110	241-AN-04D					H-14-103331
AN	AN-WT-V-111	241-AN-04D					H-14-103331
AN	AN-WT-V-112	241-AN-04D					H-14-103331
AN	AN-WT-V-113	241-AN-04D					H-14-103331
AN	AN-WT-V-114	241-AN-04D					H-14-103331
AZ	AZVP-WT-V-221	241-AZ	A	AZVP-WT-V-226	AZVP-WT-ZS-221A	AZVP-WT-ZS-221B	H-14-103248
AZ	AZVP-WT-V-222	241-AZ	H	AZVP-WT-V-226	AZVP-WT-ZS-222A	AZVP-WT-ZS-222B	H-14-103248
AZ	AZVP-WT-V-223	241-AZ	F	AZVP-WT-V-227	AZVP-WT-ZS-223A	AZVP-WT-ZS-223B	H-14-103248
AZ	AZVP-WT-V-224	241-AZ	E	AZVP-WT-V-227	AZVP-WT-ZS-224A	AZVP-WT-ZS-224B	H-14-103248
AZ	AZVP-WT-V-225	241-AZ	C		AZVP-WT-ZS-225A	AZVP-WT-ZS-225B	H-14-103248
AZ	AZ01A-WT-V-610	241-AZ-01A	L	SNPUMP			
AZ	AZ02A-WT-V-610	241-AZ-02A	AZ02A-WT-V-612	SN PUMP			
AP	AP-WT-V-509	241-AP	AP-WT-V-504	AP-WT-V-502	AP-WT-ZS-509A	AP-WT-ZS-509B	H-14-020803-5r1
AP	AP-WT-V-510	241-AP	AP-WT-V-505	AP-WT-V-507	AP-WT-ZS-510A	AP-WT-ZS-510B	H-14-020803-5r1
AP	AP-WT-V-511	241-AP	11	AP-WT-V-501	AP-WT-ZS-511A	AP-WT-ZS-511B	H-14-020803-5r1
AP	AP-WT-V-512	241-AP	10	AP-WT-V-502	AP-WT-ZS-512A	AP-WT-ZS-512B	H-14-020803-5r1
AP	AP-WT-V-513	241-AP	12	AP-WT-V-501	AP-WT-ZS-513A	AP-WT-ZS-513B	H-14-020803-5r1
AP	AP-WT-V-514	241-AP	9	AP-WT-V-504	AP-WT-ZS-514A	AP-WT-ZS-514B	H-14-020803-5r1
AP	AP-WT-V-515	241-AP	5	AP-WT-V-505	AP-WT-ZS-515A	AP-WT-ZS-515B	H-14-020803-5r1
AP	AP-WT-V-516	241-AP	8	AP-WT-V-508	AP-WT-ZS-516A	AP-WT-ZS-516B	H-14-020803-5r1
AP	AP-WT-V-517	241-AP	6	AP-WT-V-507	AP-WT-ZS-517A	AP-WT-ZS-517B	H-14-020803-5r1

TABLE 10 - 2-Way Valves

Farm	Valve No.	Pit No.	Inlet	Outlet	Closed Tag	Open Tag	DWG #
AP	AP-WT-V-518	241-AP	7	AP-WT-V-508	AP-WT-ZS-518A	AP-WT-ZS-518B	H-14-020803-5r1
AP	AP-WT-V-519	241-AP	AP-WT-V-502	G	AP-WT-ZS-519A	AP-WT-ZS-519B	H-14-020803-5r1
AP	AP-WT-V-520	241-AP	AP-WT-V-507	F	AP-WT-ZS-520A	AP-WT-ZS-520B	H-14-020803-5r1
AP	AP-WT-V-609	241-AP	14	P	AP-WT-ZS-609A	AP-WT-ZS-609B	H-14-020803-5r1
AP	AP-WT-V-610	241-AP	13	N	AP-WT-ZS-610A	AP-WT-ZS-610B	H-14-020803-5r1
AP	AP-WT-V-611	241-AP	18	V-601	AP-WT-ZS-611A	AP-WT-ZS-611B	H-14-020803-5r1
AP	AP-WT-V-612	241-AP	19	V-602	AP-WT-ZS-612A	AP-WT-ZS-612B	H-14-020803-5r1
AP	AP-WT-V-613	241-AP	17	V-603	AP-WT-ZS-613A	AP-WT-ZS-613B	H-14-020803-5r1
AP	AP-WT-V-614	241-AP	20	V-602	AP-WT-ZS-614A	AP-WT-ZS-614B	H-14-020803-5r1
AP	AP-WT-V-615	241-AP	24	V-607	AP-WT-ZS-615A	AP-WT-ZS-615B	H-14-020803-5r1
AP	AP-WT-V-616	241-AP	21	V-606	AP-WT-ZS-616A	AP-WT-ZS-616B	H-14-020803-5r1
AP	AP-WT-V-617	241-AP	23	V-607	AP-WT-ZS-617A	AP-WT-ZS-617B	H-14-020803-5r1
AP	AP-WT-V-618	241-AP	22	V-608	AP-WT-ZS-618A	AP-WT-ZS-618B	H-14-020803-5r1
AP	AP-WT-V-619	241-AP	P	M	AP-WT-ZS-619A	AP-WT-ZS-619B	H-14-020803-5r1
AP	AP-WT-V-620	241-AP	N	C	AP-WT-ZS-620A	AP-WT-ZS-620B	H-14-020803-5r1
AP	AP-WT-V-801	241-AP	25	L/AP-V-805	AP-WT-ZS-801A	AP-WT-ZS-801B	H-14-020803-5r1
AP	AP-WT-V-802	241-AP	L	AP-V-803/AP-V-804	AP-WT-ZS-802A	AP-WT-ZS-802B	H-14-020803-5r1
AP	AP-WT-V-705t	241-AP	AP-WTV-704t	16			H-14-020803-Sr1
AP	AP-WT-V-803	241-AP	P	AP-V-802/AP-V-804	AP-WT-ZS-803A	AP-WT-ZS-803B	H-14-020803-5r1
AP	AP-WT-V-804	241-AP	N	AP-V-802/AP-V-803	AP-WT-ZS-804A	AP-WT-ZS-804B	H-14-020803-5r1
AP	AP-WT-V-805	241-AP	30	L/AP-V-801	AP-WT-ZS-805A	AP-WT-ZS-805B	H-14-020803-5r1
AP	AP-WT-V-706t	241-AP	16	AP-V-704t	AP-WT-ZS-806tA	AP-WT-V-806tB	Letter 7C500-99-013 TEMPORARY TAGNAME

TABLE 10 - 2-Way Valves

Farm	Valve No.	Pit No.	Inlet	Outlet	Closed Tag	Open Tag	DWG #
AP	AP-WT-V-701t	241-AP	15	AP-V-703t	AP-WT-ZS-701tA	AP-WT-V-701tB	Letter 7C500-99-013 TEMPORARY TAGNAME
AP	APFP-RW-V-201	FP					H-14-021803
AP	APFP-RW-V-202	FP					H-14-021803
AP	APFP-RW-V-203	APFP	APFP-RW-PSH-205				
AP	AP-WT-V-702t	241-AP	V-609/704-t	V-610/703-t			
AP	AP02A-t-3	241-AP-102A	B	Tank Return			
AP	AP02A-WT-FCV-244	241-AP-102A	MOV-243	G			
AP	AP04A-t-3	241-AP-104A	B	Tank Return			
AP	AP04A-WT-FCV-248	241-AP-104A	MOV-247	G			
AW	AWA-WT-V-323	241-AW-A	L16	AWA-WT-V-326	AWA-WT-ZS-261A	AWA-WT-ZS-261B	H-14-100800
AW	AWA-WT-V-309	241-AW-A	L7	AWA-WT-V-313	AWA-WT-ZS-264A	AWA-WT-ZS-264B	H-14-100800
AW	AWA-WT-V-308	241-AW-A	L9	AWA-WT-V-312	AWA-WT-ZS-266A	AWA-WT-ZS-266B	H-14-100800
AW	AWA-WT-V-310	241-AW-A	L5	AWA-WT-V-314	AWA-WT-ZS-270A	AWA-WT-ZS-270B	H-14-100800
AW	AWA-WT-V-316	241-AW-A	L2	AWA-WT-V-318	AWA-WT-ZS-271A	AWA-WT-ZS-271B	H-14-100800
AW	AWA-WT-V-317	241-AW-A	L1	AWA-WT-V-319	AWA-WT-ZS-272A	AWA-WT-ZS-272B	H-14-100800
AW	AWA-WT-V-321	241-AW-A	L14	~~G~~ AWA-WT-V-324	AWA-WT-ZS-274A	AWA-WT-ZS-274B	H-14-100800
AW	AWA-WT-V-322	241-AW-A	L15	AWA-WT-V-324	AWA-WT-ZS-276A	AWA-WT-ZS-276B	H-14-100800
AW	AWA-WT-V-315	241-AW-A	L3	AWA-WT-V-318	AWA-WT-ZS-277A	AWA-WT-ZS-277B	H-14-100800
AW	AWA-WT-V-311	241-AW-A	L4	AWA-WT-V-314	AWA-WT-ZS-280A	AWA-WT-ZS-280B	H-14-100800
AW	AWB-WT-V-218	241-AW-B	R7	AWB-WT-V-217	AWB-WT-ZS-264A	AWB-WT-ZS-264B	H-14-100800
AW	AWB-WT-V-216	241-AW-B	R9	AWB-WT-V-215	AWB-WT-ZS-266A	AWB-WT-ZS-266B	H-14-100800
AW	AWB-WT-V-213	241-AW-B	R1	AWB-WT-V-212	AWB-WT-ZS-272A	AWB-WT-ZS-272B	H-14-100800
AW	AWB-WT-V-206	241-AW-B	R14	~~G~~ AWB-WT-V-210	AWB-WT-ZS-274A	AWB-WT-ZS-274B	H-14-100800

TABLE 10 - 2-Way Valves

Farm	Valve No.	Pit No.	Inlet	Outlet	Closed Tag	Open Tag	DWG #
AW	AWB-WT-V-207	241-AW-B	R15	AWB-WT-V-210	AWB-WT-ZS-276A	AWB-WT-ZS-276B	H-14-100800
AW	AWB-WT-V-214	241-AW-B	R3	AWB-WT-V-212	AWB-WT-ZS-277A	AWB-WT-ZS-277B	H-14-100800
AW	AWB-WT-V-219	241-AW-B	R4	AWB-WT-V-217	AWB-WT-ZS-280A	AWB-WT-ZS-280B	H-14-100800
AW	AW02A-WT-V-t-8	241-AW-202A	N	AW02A-WT-V-t-7	TBD	TBD	H-14-020802-2r5
AW	AW02A-WT-V-t-3	241-AW-202A	L	AW02A-WT-V-t-2	TBD	TBD	H-14-020802-2r5
AW	AW02E-WT-V-105	241-AW-202E	1	4			H-14-020802-2r5
AW	AW02E-WT-V-106	241-AW-202E	2	AW02E-WT-V-107			H-14-020802-2r5
AW	AW02E-WT-V-107	241-AW-202E	C	AW02E-WT-V-106			H-14-020802-2r5
AW	AW02E-WT-FCV-160	241-AW-02E	3	D			H-14-020802-2r5
AW	*AW02A-t-6*	*AW-202A*	*H*	*AW02A-t-6*			
AW	*AW02A-t-1*	*AW-202A*	*J*	*AW02A-t-1*			
AW	*AW02A-t-5*	*AW-202A*	*AW02A-t-4*	*AW02A-t-9*			
X-SITE	WT-SOV-3125C	6241A	P-3125A	WT-SLL-3160	TBD	TBD	H-2-822403-1r4
X-SITE	WT-SOV-3125D	6241A	P-3125B	WT-SLL-3160	TBD	TBD	H-2-822403-1r4
X-SITE	WT-SOV-3125E	6241A	WT-SLL-3160	P-3125A	TBD	TBD	H-2-822403-1r4
X-SITE	WT-SOV-3125G	6241A	WT-SLL-3160	P-3125B	TBD	TBD	H-2-822403-1r4
X-SITE	WT-SOV-3163	6241	WT-SOV-3183B	WT-SLL-3160	TBD	TBD	H-2-822403-1r4
X-SITE	WT-SOV-3173A	6241A	WT-SOV-3173B	WT-SNL-3150	TBD	TBD	H-2-822403-1r4
X-SITE	WT-SOV-3173B	6241A	P-3115	WT-SOV-3173A	TBD	TBD	H-2-822403-1r4
X-SITE	WT-SOV-3182A	6241A	WT-SNL-3150	WT-SOV-3182B	TBD	TBD	H-2-822403-1r4
X-SITE	WT-SOV-3182B	6241A	WT-SNL-3182B	TE-3125B	TBD	TBD	H-2-822403-1r4
X-SITE	WT-SOV-3183A	6241A	WT-SLL-3160	WT-SOV-3183B	TBD	TBD	H-2-822403-1r4
X-SITE	WT-SOV-3183B	6241A	WT-SOV-3183A	WT-SOV-3163	TBD	TBD	H-2-822403-1r4
X-SITE	WT-SOV-3184	6241A	WT-3182B	WT-SNL-3150	TBD	TBD	H-2-822403-1r4
X-SITE	WT-V-3157G	6241-V	WT-3168B	FLT-3168	TBD	TBD	H-2-822404-1r4

TABLE 10 - 2-Way Valves

Farm	Valve No.	Pit No.	Inlet	Outlet	Closed Tag	Open Tag	DWG #
X-SITE	WT-V-3157H	6241-V	WT-3185B	FLT-3185	TBD	TBD	H-2-822404-1r4
X-SITE	WT-SOV-3165A	6241-V	WT-SNL-3150	WT-SOV-3166A	TBD	TBD	H-2-822404-1r4
X-SITE	WT-SOV-3165B	6241-V	WT-SLL-3160	WT-SOV-3166B	TBD	TBD	H-2-822404-1r4
X-SITE	WT-SOV-3166A	6241-V	WT-SOV-3165A	WT-SNL-3150	TBD	TBD	H-2-822404-1r4
X-SITE	WT-SOV-3166B	6241-V	WT-SOV-3165B	WT-SLL-3160	TBD	TBD	H-2-822404-1r4
X-SITE	WT-SOV-3167A	6241-V	WT-SOV-3167B	WT-SNL-3150	TBD	TBD	H-2-822404-1r4
X-SITE	WT-SOV-3167B	6241-V	WT-SOV-3167A	WT-V-3157E	TBD	TBD	H-2-822404-1r4
X-SITE	WT-SOV-3168A	6241-V	WT-SLL-3160	WT-SOV-3168B	TBD	TBD	H-2-822404-1r4
X-SITE	WT-SOV-3168B	6241-V	WT-V- 3168A	WT-V-3157G	TBD	TBD	H-2-822404-1r4
X-SITE	WT-SOV-3185A	6241-V	WT-SNL-3150	WT-SOV-3185B	TBD	TBD	H-2-822404-1r4
X-SITE	WT-SOV-3185B	6241-V	WT-V- 3185A	WT-V-3157H	TBD	TBD	H-2-822404-1r4
204-AR	MOV-1	NA	TK-1	MOV-14	TBD	TBD	H-2-70703-2r11
204-AR	MOV-6	NA	P-1B	MOV-17	TBD	TBD	H-2-70703-2r11
204-AR	MOV-7	NA	P-1A	MOV-17	TBD	TBD	H-2-70703-2r11
204-AR	MOV-10	NA	DR-414	P-1B	TBD	TBD	H-2-70703-2r11
204-AR	MOV-18	NA	LIQW-702	MOV-21	TBD	TBD	H-2-70703-2r11
204-AR	MOV-21	NA	MOV-18	LIQW-704	TBD	TBD	H-2-70703-2r11
204-AR	37	NA	MOV-14	P-1A	TBD	TBD	H-2-70703-2r11
204-AR	38	NA	LIQW-710	P-1B	TBD	TBD	H-2-70703-2r11
244S	WT-V-5355	244S	35	M	TBD	TBD	H-2-71068-1r3
A	A350-WT-V-202 or 350-1	A350	WT-P-020	B			H-14-020808
A	A350-WT-V-204 or 350-2	A350	WT-P-021	B			H-14-020808

TABLE 10 - 2-Way Valves

Farm	Valve No.	Pit No.	Inlet	Outlet	Closed Tag	Open Tag	DWG #
SY	SY02A-WT-V-103	CENTRAL PUMP PIT 241-SY-02A	SY02A-WT-V-104	SN PUMP P-002			H-14-020831-2r1
SY	SY02A-WT-V-105	CENTRAL PUMP PIT 241-SY-02A	SY02A-WT-V-106	SY02A-WT-V-104			H-14-020831-2r1
SY	SY02A-WT-V-107	CENTRAL PUMP PIT 241-SY-02A	SY02A-WT-V-106	N			H-14-020831-2r1
SY	SY02A-WT-FCV-161	Central PUMP PIT 241-SY-02A	J	SYA-WT-V-104			
SY	SYA-WT-V-226	241-SY-A VALVE PIT	L15	SYA-WT-V-222			H-2-822402-1r7
SY	SYA-WT-V-221	241-SY-A VALVE PIT	F / L11	SYA-WT-V-220			H-2-822402-1r7
SY	SYA-WT-V-224	241-SY-A VALVE PIT	SYA-WT-V-225	SYA-WT-V-223			H-2-822402-1r7
SY	SYA-WT-V-220	241-SY-A VALVE PIT	G	SYA-WT-V-221			H-2-822402-1r7
SY	SYA-WT-V-223	241-SY-A VALVE PIT	L14	SYA-WT-V-224			H-2-822402-1r7
SY	SYA-WT-V-225	241-SY-A VALVE PIT	V-222/V-226	SYA-WT-V-224			H-2-8222402-1r7

TABLE 10 - 2-Way Valves

Farm	Valve No.	Pit No.	Inlet	Outlet	Closed Tag	Open Tag	DWG #
SY	SYFPA-RW-V-213	241-SY FLUSH PIT A (SYFPA)	SYFPA-RW-V-212	HOSE			H-14-021831-1r3
SY	SYFPA-RW-V-214	241-SY FLUSH PIT A (SYFPA)	JUNCTION	JUNCTION			H-14-021831-1r3
SY	SYFPA-RW-V-215	241-SY FLUSH PIT A (SYFPA)	JUNCTION	JUNCTION			H-14-021831-1r3
219-S		219-S	P-1	SNL-5350			H-2-820836
219-S	WT-V-5355	244-S					H-2-820836
241-AP	A-t-1	NEW APVPA	A	A-t-2			Letter 7C500-99-013 TEMP. TAGNAMES
241-AP	A-t-3	NEW APVPA	B	A-t-2			Letter 7C500-99-013 TEMP. TAGNAMES
241-AP	A-t-5	NEW APVPA	C	A-t-4			
241-AP	A-t-6	NEW APVPA	D	E			
241-AP	A-t-9	NEW APVPA	F	3/4			
241-AP	A-t-13	NEW APVPA	G	A-t-8			
241-AP	A-t-11	NEW APVPA	H	A-t-10			
241-AP	A-t-12	NEW APVPA	K	A-t-10			

TABLE 13

Encasement Drain Valve List

Table 13 Encasement Drain Valve - Use and Description

The columns shown on TABLE 13 are defined as follows:

- Farm- Identifies the tank farm where valve is located.
- Valve No.- (Key Field) Identifies the valve identification number.
- Pit No.- Identifies the Valve Pit where valve is located.
- Operate Posn- Inlet Identifies the nearest identifiable device (encasement, connector or instrument) to the inlet of the valve for this position.
- Operate Posn- Outlet Identifies the nearest identifiable device (encasement, connector or instrument) to the outlet of the valve for this position.
- Drain Posn- Inlet Identifies the nearest identifiable device (encasement, connector or instrument) to the inlet of the valve for this position.
- Drain Posn- Outlet Identifies the nearest identifiable device (encasement, connector or instrument) to the outlet of the valve for this position.
- Hydro Test- Posn Identifies the valve position for hydro test of the encasement.
- Operate Posn- Tag Identifies the instrument tag number of the limit switch which indicates the valve is in Operate position.
- Drain Posn- Identifies the instrument tag number of the limit switch which indicates the

Tag — valve is in Drain position.

- Hydro Test-Tag — Identifies the instrument tag number of the limit switch which indicates the valve is in Hydro Test.
- DWG# - — References the P&ID drawing where valve and/or limit switches are shown.

Table 13 - Encasement Drain Valve

FARM	Valve No.	Pit No.	Operate Pos Inlet	Operate Pos Outlet	Drain Pos Inlet	Drain Pos Outlet	Hydro Test	Oper Pos Tag	Drain Pos Tag	Hydro Pos Tag	DWG #
AN	AN-A-WT-V-403	241-AN-A	ENCASEMENT SL-168 (L17A)	OPEN TO PIT	L17A	ENCASEMENT SL-168	INLET PORT CLOSED				H-14-020801-5r1
AN	AN-A-WT-V-404	241-AN-A	ENCASEMENT SN-268 (L19A)	OPEN TO PIT	L19A	ENCASEMENT SN-268	INLET PORT CLOSED				H-14-020801-5r1
AN		241-AN-01A	Encase SNL-3150	Open To Pit	C	Pit Floor DR V-401	Inlet Port Closed				H-14-103327
AN		241-AN-01A	Encase SN-630	Open To Pit	J	Pit Floor DR V-401	Inlet Port Closed				H-14-103327
AN		241-AN-01A	DR-368	Open to Pit	DR-368	Pit Floor Drain	Inlet Port Closed				
AN	AN04A-WT-V-430	241-AN-04A	Encase SN-636	Open To Pit	H	Pit Floor DR V-409	Inlet Port Closed				H-14-103329
AW		241-AW-02A	ENCASEMENT SN-268	OPEN TO PIT	ENCASEMENT SN-268	PIT FLOOR DRAIN	INLET PORT CLOSED				H-14-020802-2r5
AW		241-AW-02A	ENCASEMENT SN-267	OPEN TO PIT	ENCASEMENT SN-267	PIT FLOOR DRAIN	INLET PORT CLOSED				H-14-020802-2r5
AW	AW4A-WT-V-406	241-AW-04A	ENCASEMENT SN-274	OPEN TO PIT	ENCASEMENT SN-274	PIT FLOOR DRAIN	INLET PORT CLOSED				H-14-020802-3r3
AW		241-AW-02D	ENCASEMENT DR-361	OPEN TO PIT	ENCASEMENT DR-361	PIT FLOOR DRAIN	INLET PORT CLOSED				H-14-020802-2r5

Table 13 - Encasement Drain Valve

FARM	Valve No.	Pit No.	Operate Pos Inlet	Operate Pos Outlet	Drain Pos Inlet	Drain Pos Outlet	Hydro Test	Oper Pos Tag	Drain Pos Tag	Hydro Pos Tag	DWG #
AW	AW2E-WT-V-404	241-AW-02E	ENCASEMENT SN-270	OPEN TO PIT	ENCASEMENT SN-270	PIT FLOOR DRAIN	INLET PORT CLOSED				H-14-020802-2r5
AW	AW2E-WT-V-403	241-AW-02E	ENCASEMENT SN-269	OPEN TO PIT	ENCASEMENT SN-269	PIT FLOOR DRAIN	INLET PORT CLOSED				H-14-020802-2r5
AW	AWA-WT-V-412	241-AW-A	ENCASEMENT SL-168	OPEN TO PIT	ENCASEMENT SL-168	PIT FLOOR DRAIN	INLET PORT CLOSED				H-14-100800 H-14-020802-4r2
AW	AWA-WT-V-411	241-AW-A	ENCASEMENT SN-220	OPEN TO PIT	ENCASEMENT SN-220	PIT FLOOR DRAIN	INLET PORT CLOSED				H-14-100800 H-14-020802-4r2
AW	AWB-WT-V-407	241-AW-B	ENCASEMENT SL-167	OPEN TO PIT	ENCASEMENT SL-167	PIT FLOOR DRAIN	INLET PORT CLOSED				H-14-100800 H-14-020802-5r1
AP	AP-WT-V-402	241-AP VALVE PIT	ENCASEMENT SN-609 (27)	OPEN TO PIT	ENCASEMENT SN-609 (27)	PIT FLOOR DRAIN	INLET PORT CLOSED				H-14-020803-5r1
AP	AP-WT-V-403	241-AP VALVE PIT	ENCASEMENT SN-610 (13)	OPEN TO PIT	ENCASEMENT SN-610 (13)	PIT FLOOR DRAIN	INLET PORT CLOSED				H-14-020803-5r1
AP	AP-WT-V-404	241-AP	ENCASEMENT SL-509 (28)	OPEN TO PIT	ENCASEMENT SL-509 (28)	PIT FLOOR DRAIN	INLET PORT CLOSED				H-14-020803-5r1

Table 13 - Encasement Drain Valve

FARM	Valve No.	Pit No.	Operate Pos Inlet	Operate Pos Outlet	Drain Pos Inlet	Drain Pos Outlet	Hydro Test	Oper Pos Tag	Drain Pos Tag	Hydro Pos Tag	DWG #
AP	AP-WT-V-405	241-AP	ENCASEMENT SL-510 (29)	OPEN TO PIT	ENCASEMENT SL-510 (29)	PIT FLOOR DRAIN	INLET PORT CLOSED				H-14-020803-5r1
AY		241-AY-01A	ENCASE SN-635	OPEN TO PIT	ENCASE SN-635	PIT FLOOR DRAIN	INLET PORT CLOSED				H-14-102644-1r0
219-S	244-S-WT-V-5356	244-S									H-2-820836
219-S	244-S-WT-V-5357	244-S									H-2-820836
244-S	A-8	244-S Pump Pit	V-456	Open to Pit	V-456	Pit Floor Drain					
244-S	A-7	244-S Pump Pit	V-522	Open to Pit	V-522	Pit Floor Drain					
244-S	A-6	244-S Pump Pit	V-561	Open to Pit	V-561	Pit Floor Drain					
244-S	A-5	244-S Pump Pit	V-562	Open to Pit	V-562	Pit Floor Drain					
244-S	A-9	244-S Pump Pit	V-560	Open to Pit	V-560	Pit Floor Drain					
241-A-A	V-201	241-A-A	LIQW-702	Open to Pit	LIQW-702	Pit Floor Drain					

Table 13 - Encasement Drain Valve

FARM	Valve No.	Pit No.	Operate Pos Inlet	Operate Pos Outlet	Drain Pos Inlet	Drain Pos Outlet	Hydro Test	Oper Pos Tag	Drain Pos Tag	Hydro Pos Tag	DWG #
SY	SYA-WT-V-407	241-SY-A	ENCASEMENT WT- SNL-3150	OPEN TO PIT	ENCASEMENT WT- SNL-3150	PIT FLOOR DRAIN					H-2-822402-1r3 (2way)
SY	SY-WT-MOV-3156A	6241-A	ENCASEMENT WT- SNL-3150	OPEN TO PIT	ENCASEMENT WT- SNL-3150	PIT FLOOR					H-2-822403-1r4 (2way)
SY	SY-WT-MOV-3156B	6241-A	ENCASEMENT WT-SLL-3160	OPEN TO PIT	ENCASEMENT WT-SLL-3160	PIT FLOOR					H-2-822402-1r4 (2way)
SY	SY B-WT-V-140	241-SY-B	ENCASEMENT WT-SLL-3160	OPEN TO PIT	ENCASEMENT WT-SLL-3160	PIT FLOOR DRAIN					H-2-822402-1r3 (2way)
A	A350-WT-V-205	A350									H-14-020808
AZ	AZ-VP-WT-V-401	241-AZ	ENCASEMNT SN-633 G	PIT FLOOR	G	PIT FLOOR DRAIN	INLET PORT CLOSED				H-14-103248-1r0
AZ	AZ-VP-WT-V-403	241-AZ	ENCASEMNT SN-634 D	Pit Floor	D	Pit Floor Drain	INLET PORT CLOSED				H-14-103248-1r0
AZ	AZ-VP-WT-V-405	241-AZ	ENCASEMNT SN-637 B	Pit Floor	B	Pit Floor Drain	INLET PORT CLOSED				H-14-102689-1r0
		241-AZ-01A		OPEN TO PIT	ENCASE SN-632	Pit Floor Drain	INLET PORT CLOSED				H-14-102689-1r0
				OPEN TO PIT	ENCASE SN-631	Pit Floor Drain	INLET PORT CLOSED				H-14-102689-1r0

Table 13 - Encasement Drain Valve

FARM	Valve No.	Pit No.	Operate Pos Inlet	Operate Pos Outlet	Drain Pos Inlet	Drain Pos Outlet	Hydro Test	Oper Pos Tag	Drain Pos Tag	Hydro Pos Tag	DWG #
			ENCASE DR-100 (U13A)	OPEN TO PIT	ENCASE DR-100	Pit Floor Drain	INLET PORT CLOSED				H-14-102689-1r0
AZ		241-AZ	ENCASE SL-500	OPEN TO PIT	ENCASE SL-500	Pit Floor Drain	INLET PORT CLOSED				H-14-102689-1r0
AP	APVP-WT-V-401t	NEW APVP	Encase SN-641	OPEN TO PIT	ENCASE SN-201t	Pit Floor Drain	INLET PORT CLOSED				
AP	APVP-WT-V-402t	NEW APVP	Encase SN-640	OPEN TO PIT	ENCASE SN-209t	Pit Floor Drain	INLET PORT CLOSED				

TABLE 14

Drain Valve List

Table 14 Drain Valves Use and Description

The columns shown on TABLE 14 are defined as follows:

- Farm- Identifies the tank farm where drain valve is located.
- Valve No.- Identifies the valve identification number.
- Pit No.- Identifies the Valve Pit where valve is located.
- Inlet- Identifies the nearest identifiable device to the inlet of the valve.
- Outlet- Identifies the nearest identifiable device (valve, connector or tank) to the outlet of the valve.
- Closed Tag- Identifies the instrument tag number of the limit switch which indicates the valve is in the closed position.
- Open Tag- Identifies the instrument tag number of the limit switch which indicates the valve is in the open position.
- DWG# - References the P&ID drawing where valve and/or limit switches are shown.

Table 14 - Drain Valve List

Farm	Valve No.	Pit No.	Inlet	Outlet	Closed Tag	Open Tag	DWG #
AN	AN01A-WT-V-401	241-AN-01A	PIT FLOOR	241-AN-101			H-14-020801 - 1r5
AN	AN02A-WT-V-405	241-AN-02A	PIT FLOOR	241-AN-102			H-14-020801 - 2r4
AN	AN03A-WT-V-407	241-AN-03A	PIT FLOOR	241-AN-103			H-14-020801 - 2r4
AN	AN04A-WT-V-409	241-AN-04A	PIT FLOOR	241-AN-104			H-14-020801 - 3r2
AN	AN05A-WT-V-411	241-AN-05A	PIT FLOOR	241-AN-105			H-14-020801 - 3r2
AN	AN06A-WT-V-413	241-AN-06A	PIT FLOOR	241-AN-106			H-14-020801 - 4r1
AN	AN07A-WT-V-415	241-AN-07A	PIT FLOOR	241-AN-107			H-14-020801 - 4r1

Table 14 - Drain Valve List

Farm	Valve No.	Pit No.	Inlet	Outlet	Closed Tag	Open Tag	DWG #
AN	WT-V-434	241-AN-04D	PIT FLOOR	Riser 10 (Tank 104)			H-14-103331
AN	PIT FD	241-AN-A	PIT FLOOR	241-AN-101	NO VALVE NO.	FOR HMI	H-14-020801 -2r5
AN	PIT FD	241-AN-B	PIT FLOOR	241-AN-101	NO VALVE NO.	FOR HMI	H-14-020801 -2r5
AW	NO VALVE	241-AW-01A	PIT FLOOR	241-AW-101			H-14-020802 -1r3
AW	NO VALVE	241-AW-02A	PIT FLOOR	241-AW-102			H-14-020802 -2r5
AW	NO VALVE	241-AW-03A	PIT FLOOR	241-AW-103			H-14-020802 -3r3
AW	NO VALVE	241-AW-04A	PIT FLOOR	241-AW-104			H-14-020802 -3r3
AW	NO VALVE	241-AW-05A	PIT FLOOR	241-AW-105			H-14-020802 -1r3

Table 14 - Drain Valve List

Farm	Valve No.	Pit No.	Inlet	Outlet	Closed Tag	Open Tag	DWG #
AW	NO VALVE	241-AW-06A	PIT FLOOR	241-AW-106			H-14-020802 -3r3
AW	NO VALVE	241-AW-02D	PIT FLOOR	241-AW-102			H-14-020802 -3
AW	NO VALVE	241-AW-02E	PIT FLOOR	241-AW-102			H-14-020802 -3
AW	PIT FD	241-AW-A	PIT FLOOR	241-AW-02D	NEED VALVE NO.	FOR HMI	H-14-020802 -2,-3
AW	PIT FD	241-AW-B	PIT FLOOR	241-AW-02D	NEED VALVE NO.	FOR HMI	H-14-020802 -2,-3
AP	AP01A-WT-V-111	241-AP-01A	PIT FLOOR	241-AP-101			H-14-020803-1r1
AP	AP02A-WT-V-112	241-AP-02A	PIT FLOOR	241-AP-102			H-14-020803-3r1
AP	AP03A-WT-V-113	241-AP-03A	PIT FLOOR	241-AP-103			H-14-020803-1r1

Table 14 - Drain Valve List

Farm	Valve No.	Pit No.	Inlet	Outlet	Closed Tag	Open Tag	DWG #
AP	AP04A-WT-V-114	241-AP-04A	PIT FLOOR	241-AP-104			H-14-020803-3r1
AP	AP05A-WT-V-115	241-AP-05A	PIT FLOOR	241-AP-105			H-14-020803-2r1
AP	AP06A-WT-V-116	241-AP-06A	PIT FLOOR	241-AP-106			H-14-020803-4r1
AP	AP07A-WT-V-117	241-AP-07A	PIT FLOOR	241-AP-107			H-14-020803-2r1
AP	AP08A-WT-V-118	241-AP-08A	PIT FLOOR	241-AP-108			H-14-020803-4r1
AP	AP02D-WT-V-129	241-AP-02D	PIT FLOOR	241-AP-102			H-2-81187-3r1
AP	AP03D-WT-V-130	241-AP-03D	PIT FLOOR	241-AP-103			H-14-020803-1r1
AP	AP-WT-V-131	241-AP VALVE PIT	PIT FLOOR	241-AP-103			H-14-020803-1r1

Table 14 - Drain Valve List

Farm	Valve No.	Pit No.	Inlet	Outlet	Closed Tag	Open Tag	DWG #
AP	AP-WT-V-403T	NEW APVP	PIT FLOOR	241-AP-101	NEED VALVE NO.	FOR HMI	Letter 7C500-99-013 TEMPORARY TAG NAME
AP	APFP-RW-V-206	241-AP-FP		DR-715			H-14-021803
AY	NO VALVE	241-AY-01A	PIT FLOOR	241-AY-101			H-2-64400-4
AY	NO VALVE	241-AY-01B	PIT FLOOR	241-AY-101			H-2-64400-4
AY	NO VALVE	241-AY-01C	PIT FLOOR	241-AY-101			H-2-64400-4
AY	NO VALVE	241-AY-01D	PIT FLOOR	241-AY-101			H-2-64400-4
AY	NO VALVE	241-AY-01E	PIT FLOOR	241-AY-101			H-2-64400-4
AY	NO VALVE	241-AY-02A	PIT FLOOR	241-AY-102			H-2-64400-6
AY	NO VALVE	241-AY-02D	PIT FLOOR	241-AY-102			H-2-64400-7
AY	NO VALVE	241-AY-02E	PIT FLOOR	241-AY-102			H-2-64400-7
AZ	NO VALVE	241-AZ-01A	PIT FLOOR	241-AZ-101			H-2-68335-7

Table 14 - Drain Valve List

Farm	Valve No.	Pit No.	Inlet	Outlet	Closed Tag	Open Tag	DWG #
AZ	NO VALVE	241-AZ-01C	PIT FLOOR	241-AZ-101			H-2-68335-7
AZ	NO VALVE	241-AZ-02A	PIT FLOOR	241-AZ-102			H-2-68335-3
AZ	NO VALVE	241-AZ-02B	PIT FLOOR	241-AZ-102			H-2-68335-3
AZ	AZVP-WT-V-229	241-AZ-VP	PIT FLOOR	241-AZ-101			H-14-103248
SY	SY01A-WT-FDP-108	241-SY-01A	PIT FLOOR	241-SY-101			H-14-020831-1r0
SY	SY02A-WT-FDP-110	241-SY-02A	PIT FLOOR	241-SY-102			H-14-020831-2r1
SY	SY02D-WT-FDP-112	241-SY-02D	PIT FLOOR	241-SY-102			H-14-020831-2r1
SY	SY02E-WT-FDP-113	241-SY-02E	PIT FLOOR	241-SY-102			H-14-020831-3r1

Table 14 - Drain Valve List

Farm	Valve No.	Pit No.	Inlet	Outlet	Closed Tag	Open Tag	DWG #
SY	SY03A-WT-FDP-114	241-SY-03A	PIT FLOOR	241-SY-103			H-14-020831-3r1
AW	V-501	COB-501	PIT FLOOR				
AW	V-502	COB-502	PIT FLOOR				
AW	V-504	COB-504	PIT FLOOR				
AW	V-506	COB-506	PIT FLOOR				
AW	V-508	COB-508	PIT FLOOR				

TABLE 15

Drain Line List

Table 15 -Drain Lines Use and Description

The columns shown on TABLE 15 are defined as follows:

- Line- (Key field) Identifies the waste drain line by its identification number.
- Source Pit- Identifies the pit that the line starts from.
- Source Connection- Identifies the pit nozzle that the line begins at. (If applicable)
- Destination Pit- Identifies the pit that the line ends at.
- Destination Connection- Identifies the pit nozzle that the line ends at. (If applicable)
- Reference Dwg- Identifies the source drawing or drawings referenced for line information.
- Misc Notes- Design notes to assist or otherwise clarify information.

Table 15 - Drain Line List

LINE	SOURCE PIT	SOURCE CONNECTION	DESTINATION	DESTINATION CONNECTION	REF. DWG.	NOTES
3"DR	241-AN-01A		241-AN-101		H-14-020801-3	
3"DR	241-AN-02A		241-AN-102		H-14-020801-3	
3"DR	241-AN-03A		241-AN-103		H-14-020801-3	
3"DR	241-AN-04A		241-AN-104		H-14-020801-3	
3"DR	241-AN-05A		241-AN-105		H-14-020801-3	
3"DR	241-AN-06A		241-AN-106		H-14-020801-3	
3"DR	241-AN-07A		241-AN-107		H-14-020801-3	
DR-368	241-AN-A		241-AN-101		H-14-020801-2	
DR-369	241-AN-B		241-AN-101		H-14-020801-2	
3"DR	241-AW-01A		241-AW-101		H-14-020802-4	
3"DR	241-AW-02A		241-AW-102		H-14-020802-4	

Table 15 - Drain Line List

LINE	SOURCE PIT	SOURCE CONNECTION	DESTINATION	DESTINATION CONNECTION	REF. DWG.	NOTES
3"DR	241-AW-03A		241-AW-103		H-14-020802-4	
3"DR	241-AW-04A		241-AW-104		H-14-020802-4	
3"DR	241-AW-05A		241-AW-105		H-14-020802-4	
3"DR	241-AW-06A		241-AW-106		H-14-020802-4	
3"DR	241-AW-02D		241-AW-102		H-14-020802-3	
3"DR	241-AW-02E		241-AW-102		H-14-020802-3	
DR-362	241-AW-FP		241-AW-102		H-14-021802 H-14-020802	
DR-371	241-AW-801		241-AW-102		H-14-021802 H-14-020802	VIA DR-362
3"DR	241-AP-01A		241-AP-101		H-2-90528	
3"DR	241-AP-02A		241-AP-102		H-2-90529	
3"DR	241-AP-03A		241-AP-103		H-2-90530	

Table 15 - Drain Line List

LINE	SOURCE PIT	SOURCE CONNECTION	DESTINATION	DESTINATION CONNECTION	REF. DWG.	NOTES
3"DR	241-AP-04A		241-AP-104		H-2-90531	
3"DR	241-AP-05A		241-AP-105		H-2-90532	
3"DR	241-AP-06A		241-AP-106		H-2-90533	
3"DR	241-AP-07A		241-AP-107		H-2-90540	
3"DR	241-AP-08A		241-AP-108		H-2-90541	
3"DR	241-AP-02D		241-AP-102		H-2-81187	
3"DR	241-AP-03D		241-AP-103		H-2-90530	
DR-403t	NEW APVP	APVP-V-403t	241-AP-101	RISER 023	Letter 7C500-99-013	TEMPORARY TAGNAMES
4"DR	241-AY-01A		241-AY-101		H-2-64400-4	
3"DR	241-AY-01B		241-AY-101		H-2-64400-4	
3"DR	241-AY-01C		241-AY-101		H-2-64400-4	

Table 15 - Drain Line List

LINE	SOURCE PIT	SOURCE CONNECTION	DESTINATION	DESTINATION CONNECTION	REF. DWG.	NOTES
3"DR	241-AY-01D		241-AY-101		H-2-64400-5	
3"DR	241-AY-01E		241-AY-101		H-2-64400-5	
4"DR	241-AY-02A		241-AY-102		H-2-64400-6	
3"DR	241-AY-02B		241-AY-102		H-2-64400-6	
3"DR	241-AY-02C		241-AY-102		H-2-64400-6	
3"DR	241-AY-02D		241-AY-102		H-2-64400-7	
3"DR	241-AY-02E		241-AY-102		H-2-64400-7	
DR-100	241-AZ-VP	AZVP-WT-V-229	241-AZ-101		H-14-103248	
3"DR	241-SY-03A		241-SY-103		H-2-37783	
Drain	COB-502		SN-269		H-14-020831 5	Drain from COB-506 to SN-269 and AW-02E Pump Pit

Table 15 - Drain Line List

LINE	SOURCE PIT	SOURCE CONNECTION	DESTINATION	DESTINATION CONNECTION	REF. DWG.	NOTES
Drain	COB-504		SN-269		H-14-020831 5	Drain from COB-504 to SN-269 and AW-02E Pump Pit
Drain	COB-506		SN-269		H-14-020831 5	Drain from COB-506 to SN-269 and AW-02E Pump Pit
1" DRAIN	COB-508		SN-269/AW-02E VALVE PIT	L15	H-14-020801	DRAIN FROM COB-508 TO LINE - SN-~~264~~ 269
DR-343	242-A		241-AW-02D		H-14-020802, H-2-70399	