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Failure and Reliability Analysis for the Master Pump Shutdown System

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Abstract: This failure/reliability analysis examines the Master Pump Shutdown System (MPSS) design developed as part of the W-314 Project. The analysis examines the probability the MPSS will perform its intended safety function when called upon to do so. The analysis examines the configuration in phase 1 and phase 2 of Project W-314.

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FAILURE AND RELIABILITY ANALYSIS FOR THE MASTER PUMP SHUTDOWN SYSTEM

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Fluor Federal Services, Inc.

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EXECUTIVE SUMMARY

A failure and reliability analysis was performed for the Master Pump Shutdown System of the Hanford Tank Farms. A typical waste transfer path was identified for the purpose of this evaluation. The failure probability and reliability of the system at ten different leak detector locations were determined. Failure probabilities ranged in value from 1.9×10^{-3} to 4.9×10^{-4} resulting in system reliabilities greater than 99.8%. This analysis also provided answers to the following key questions for the MPSS design process:

1. Are there single component failures, which could prevent the Master Pump Shutdown System from performing its safety function?

For the Phase I design configuration there are many ganged relay contacts and motor control contactors whose failure will prevent the MPSS from performing its safety function. It is intended in Phase II, the ganged relay be replaced with individual leak detectors.

For the Phase II design where the ganged relays are replaced, there is one active component for each leak detector location analyzed whose failure would prevent the MPSS from performing its safety function. The component is the waste transfer pump motor control contactor, with a 4.66×10^{-4} failure probability. Removal of this component from the analyses resulted in an increase in reliability of the MPSS Safety Function from greater than 99.90% to greater than 99.995% for the Phase II MPSS design configuration.

For Phase II design where the ganged relays are not replaced additional single component(s) (ganged relay) could prevent the MPSS from performing its safety function. The reliability of the MPSS would then become equal to the Phase I design configuration.

2. Are there any components, which will not allow the MPSS to perform its safety function upon loss of electrical power to that component?

No components were identified which would prevent the Master Pump Shutdown System from performing its safety function upon loss of electrical power. All MPSS and leak detection system components, which were part of this assessment, transfer to a de-energized state resulting in a tripped MPSS and shutdown of the waste transfer process.

3. Is physical isolation of the MPSS safety class cables from each other necessary?

The cable configuration of a single conduit was evaluated for safety-class cables for both analog and discrete signal wires. In the case of a single conduit configuration the failure rate is orders of magnitude less than the 1×10^{-6} /yr failure rate criterion of the Project Development Specification document (HNF 2000a). External events such as seismic, fire, wind, or excavation accidents were not accounted for in this failure analysis.

4. Is physical isolation of Safety Class Wiring from General Service wiring necessary?

The cable configuration of a single conduit for safety class wiring and general service wiring was evaluated for both analog and discrete signal wires. In the case of a single conduit configuration the failure rate is also orders of magnitude less than the 1×10^{-6} /yr failure rate criterion of the Project Development Specification document (HNF 2000a). External events such as seismic, fire, wind, or excavation accidents were not accounted for in this failure analysis.

5. Does the current MPSS design meet or exceed the Option 1b (RPP 1999) system reliability estimate?

The MPSS Option 1b system reliability estimate is 99.887%. The current Safety Function MPSS design reliability was calculated to be 99.855%. The current design has reliability slightly less than the Option 1b system reliability estimate.

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List of Abbreviations and Acronyms

ASL	Analog Shutdown Loop
CAFTA	Computer Aided Fault Tree Analysis
FT	Fault Tree
HMI	Human Machine Interface
MCC	Motor Control Center
LDE	Leak Detector Element
LDK	Leak Detector Relay
MPSS	Master Pump Shutdown System
MPSS/PLC	PLC portion of Master Pump Shutdown System
MPSS/SYS	Master Pump Shutdown System and Leak Detection Systems
PDS	Project Development Specification
PLC	Programmable Logic Controller

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FAILURE AND RELIABILITY ANALYSIS FOR THE MASTER PUMP SHUTDOWN SYSTEM

1.0 Introduction

The Master Pump Shutdown System (MPSS) will be installed in the 200 Areas of the Hanford Site to monitor and control the transfer of liquid waste between tank farms and between the 200 West and 200 East areas through the Cross-Site Transfer Line. The Safety Function provided by the MPSS is to shutdown any waste transfer process within or between tank farms if a waste leak should occur along the selected transfer route.

The MPSS, which provides this Safety Class Function, is composed of Programmable Logic Controllers (PLCs), interconnecting wires, relays, Human to Machine Interfaces (HMI), and software. These components are defined as providing a Safety Class Function and will be designated in this report as MPSS/PLC. Input signals to the MPSS/PLC are provided by leak detection systems from each of the tank farm leak detector locations along the waste transfer route. The combination of the MPSS/PLC, leak detection system, and transfer pump controller system will be referred to as MPSS/SYS. The components addressed in this analysis are associated with the MPSS/SYS.

1.1 Purpose

The purpose of this failure and reliability analysis is to address the following design issues of the Project Development Specification (PDS) for the MPSS/SYS (HNF 2000a):

1. Single Component Failure Criterion,
2. System Status Upon Loss of Electrical Power,
3. Physical Separation of Safety Class cables,
4. Physical Isolation of Safety Class Wiring from General Service Wiring, and
5. Meeting the MPSS/PLC Option 1b (RPP 1999) Reliability estimate.

The failure and reliability analysis examined the system on a component level basis and identified any hardware or software elements that could fail and/or prevent the system from performing its intended safety function.

1.2 Scope

The scope of this failure analysis included the Safety Class MPSS design (MPSS/PLC) and all of the related leak detection systems associated with the selected waste transfer path. This analysis identified those system components, operator actions, and software failures, which would prevent the MPSS/PLC from performing its required safety function. The failure analysis was conducted in accordance with the U.S. Nuclear Regulatory Commission Fault Tree Handbook, NUREG-0492. The reliability of the MPSS/PLC and leak detection systems was evaluated as a system (MPSS/SYS) without recovery capability from

component failures. As a result the reliability was determined taking the compliment of the MPSS/SYS failure probability for each leak detection location evaluated.

The scope included the field elements (leak detectors and motor control relays that interrupt the transfer pump motor control circuit), the Programmable Logic Controllers, and the HMI waste transfer route identification and download process. These components and actions were included each time a transfer route leak detector location was selected for analysis. The HMI configures the PLC logic for the particular transfer route selected. The analysis examined the *potential for failure of the HMI to properly configure the PLCs* for the intended transfer route. The new W-314 leak detector design was evaluated in the failure analysis using the same analytical techniques as was used for the existing leak detector designs.

The installation of the MPSS/SYS will be accomplished in two phases: Phase I and Phase II. Phase I will use some of the existing leak detection systems where one gang relay for the entire tank farm will provide a single signal to the MPSS/PLC regardless of where the leak occurs in the tank farm. For Phase II the tank farm leak detection systems will be upgraded and two trip signals will be provided to the MPSS/PLC for each of the leak detector locations within a tank farm.

The MPSS/PLC Programmable Logic Controllers/Human Machine Interfaces (HMIs) use commercially available application software. The PLC manufacture, RTP Corporation, does have a software quality assurance program that meets the requirements of NQA-1. Additionally the PLC manufacturer routinely supplies PLCs and software for their PLCs to Nuclear Power Plants. Therefore, software failures resulting from potential programming errors in the application software were not addressed in this analysis. The success of the MPSS/PLC depends on the transmission of a shutdown signal between PLC nodes. The analysis included in this report did examine data transport between PLC nodes.

2.0 Summary

The failure of the MPSS/SYS was assessed using fault tree methodology. The allowed time for a waste transfer was taken to be 115 days. Evaluations have been made for nine different leak locations along a transfer route which begins in the 200 West Area at the SY102 waste tank, goes through the Cross-Site Transfer Line and ends at 241-AW-102 waste tank in the 200 East Area. A range of failure probabilities from 2.9×10^{-3} to 5.8×10^{-4} was determined for the various leak detection sites along the selected transfer route (Figure 3-1) for Phase I and Phase II design configurations.

1. Single Component Failure Criterion

Single component/event failures were identified which would result in the failure of the MPSS/SYS from shutting down a waste transfer as a result of a leak. These components are associated with the various leak detection systems used along the transfer route. A list of the single component failures is provided in Table 2-1. These component failure probabilities are greater than the 1×10^{-6} criterion as provided by the customer (BEH-99-009). A more detailed discussion of these results is provided in Section 4.5.

One common failure for each of the addressed leak detection locations is the improper address verification for the leak detector at that site. This is a human error where the leak detector site is not included into the transfer route. The rest of the failures are associated with the individual leak detector systems at the leak detector locations being assessed (leak detector elements, relays, discrete signal wires). A common component failure to all of the leak detector assessments is a failure of the motor control center contactor to open on demand (MCC-A3).

2. System Status Upon Loss of Electrical Power

No MPSS/SYS components were identified which would prevent the MPSS/SYS from performing its safety function upon loss of electrical power. All MPSS/SYS components, which were part of this assessment, transfer to a de-energized state resulting in a tripped MPSS/SYS system and shutdown of the waste transfer process.

3. Physical Separation of Safety Class cables

4. Physical Isolation of Safety Class Wiring from General Service Wiring

The cable-wiring configuration of a single conduit was evaluated and compared against a separate conduit configuration for safety-class and general-service cables for both analog and discrete signal wires. These frequency calculations are provided in Appendix D of this document. The failure mode of concern is a short of a safety-class or general service analog or discrete signal wire to another energized wire in a separate analog or discrete signal cable resulting in a false permissive signal. Shorting of wires within the same cable would be the same for both the separate conduit and single conduit configurations and therefore was not made part of the frequency assessment.

The frequencies calculated for this failure mode in a single conduit was conservatively determined to be 2.3×10^{-10} /year for an analog circuit of ten miles in length. The ten miles was used to provide an upper bound to the distances between tank farm area nodes and also the distance between the 200 West and 200 East Areas.

The frequency of such a failure mode for a discrete signal wire was conservatively determined to be 2.55×10^{-9} / year for a circuit of one mile in length in the same conduit. The one-mile distance was used to provide an upper bound to the distance that would occur within a tank farm coming from a particular leak detector cabinet and ending at the PLC area node for the tank farm.

Both frequencies are less than the failure criteria of 1×10^{-6} /year as provided by CH2M HILL Hanford Group.

5. Meeting the MPSS/PLC Option 1b Reliability estimate

A fault tree was developed for just the MPSS/PLC, which was defined as providing only the Safety Function. The scope of the fault tree is provided in Figure 3-7. The MPSS/PLC Safety Function failure probability was determined using this fault tree which is provided in Appendix A-10.

For this analysis reliability is defined as the probability that the system can transfer the safety function signal from the 242-A Evap Area Node to the 242-S Evap Area Node. The mission time for the analysis was selected to be 5 years in length (RPP 1999). The failure probability of 1.45×10^{-3} and reliability of 99.855% was determined for the MPSS/PLC System Safety Function.

A preliminary estimate for the MPSS/PLC Safety Function reliability was determined in August of 1999 via a parts count methodology and is provided in Table 3-B, Option 1B of (RPP 1999). The calculated reliability via this method is 99.887% over a 5-year time frame. In the report an estimate for the reliability of the MPSS, currently being used in the Tank Farms, was provided for comparison purposes of 97.13%.

The calculated reliability for the MPSS/PLC safety function in this report (99.963%) exceeds the reliability of the Options report Option 1B estimate (99.887%) and the current MPSS reliability estimate (97.13%) of August 1999.

Table 2-1. MPSS/SYS Single Component/Event Failures

Leak Detection Location	Single Component/Event Failures
Phase I Tank 241-SY-102 Central Pump Pit 02A	Improper Address Verification for LDE-133 for Waste Transfer Route
	Relay/Contact K-241-SY-PPA Fails to Open
	Relay/Contact K-241-SY-PPB Fails to Open
	Relay/Contact K-241-SY-PP Fails to Open
	Relay/Contactor MCC-A3 Fails Closed
	Leak Detector LDE-133 Elements Mechanically Fail
	Circuit from K-241-SY-PPB to S252A/B-PLC Shorts to Another Active Loop
	Circuit for LDK-133 Shorts to Ground (100 ft)
	Improper Downloading of LDE-133 Address for Transfer Route
Phase II Tank 241-SY-102 Central Pump Pit 02A	Improper Address Verification for LDE-133 for Waste Transfer Route
	Relay/Contactor MCC-A3 Fails Closed
	Leak Detector LDE-133 Elements Mechanically Fail
	Circuit from LDE-133 Shorts to Another Active Circuit (100 ft)
	Improper Downloading of LDE-133 Address for Transfer Route
Phase I 241-SY-A Valve Pit SY Tank Farm	Improper Address Verification for LDE-144 for Waste Transfer Route
	Relay/Contact K-241-SY-PPA Fails to Open
	Relay/Contact K-241-SY-PPB Fails to Open
	Relay/Contact K-241-SY-PP Fails to Open
	Relay/Contactor MCC-A3 Fails Closed
	Leak Detector LDE-144 Elements Mechanically Fail
	Circuit from K-241-SY-PPB to S252A/B-PLC Shorts to Another Active Loop
	Circuit for LDK-144 Shorts to Ground (100 ft)
Phase II 241-SY-A Valve Pit SY Tank Farm	Improper Downloading of LDE-144 Address for Transfer Route
	Improper Address Verification for LDE-144 for Waste Transfer Route
	Relay/Contactor MCC-A3 Fails Closed
	Leak Detector LDE-144 Elements Mechanically Fail
	Circuit from LDE-133 Shorts to Another Active Circuit (100 ft)
Phase I & II Diversion Box 6241-A Cross-Site Transfer Line	Improper Downloading of LDE-144 Address for Transfer Route
	Relay/Contactor MCC-A3 Fails Closed
Phase I & II Vent Station 6241-V Cross-Site Transfer Line	Improper Address Verification for LDE-3150 and LDE-3150A for Transfer Route - Common Cause
	Relay/Contactor MCC-A3 Fails Closed
Phase I & II Tank AN-101 Central Pump Pit 01A	Improper Address Verification for LDE-3151 and LDE3151A for Transfer Route - Common Cause
	Relay/Contactor MCC-A3 Fails Closed
	Leak Detector LDE-201 Elements Mechanically Fail
	Improper Downloading of LDE-201 Address for Transfer Route

Table 2-1. MPSS/SYS Single Component/Event Failures

Leak Detection Location	Single Component/Event Failures
Phase I & II 241-AZ Valve Pit	Improper Address Verification for LDE-221 for Transfer Route
	Relay/Contactor MCC-A3 Fails Closed
	Leak Detector LDE-221 Elements Mechanically Fail
	Improper Downloading of LDE-221 Address for Transfer Route
Phase I & II 241-AP-A Valve Pit	Improper Address Verification for LDE-APA for Transfer Route
	Relay/Contactor MCC-A3 Fails Closed
	Leak Detector LDE-APA Elements Mechanically Fail
	Improper Downloading of LDE-APA Address for Transfer Route
Phase I & II 241-AP Valve Pit	Improper Address Verification for LDE-227 for Transfer Route
	Relay/Contactor MCC-A3 Fails Closed
	Leak Detector LDE-227 Elements Mechanically Fail
	Improper Downloading of LDE-227 Address for Transfer Route
Phase I Tank 241-AW-102 Central Pump Pit 02A AW Tank Farm	Improper Address Verification for LDE-184 for Transfer Route
	Relay/Contactor MCC-A3 Fails Closed
	Relay/Contact K-241-AW-PP Fails Closed
	Leak Detector LDE-184 Elements Mechanically Fail
	Circuit from LDK-184 to K-241-AW-PP Shorts to Another Active Circuit (1000 ft)
	Improper Downloading of LDE-184 Address for Transfer Route
Phase I Tank 241-AW-102 Central Pump Pit 02A AW Tank Farm	Improper Address Verification for LDE-184 for Transfer Route
	Relay/Contactor MCC-A3 Fails Closed
	Leak Detector LDE-184 Elements Mechanically Fail
	Circuit from LDK-184 to K-241-AW-PP Shorts to Another Active Circuit (1000 ft)
	Improper Downloading of LDE-184 Address for Transfer Route

3.0 System Descriptions

This section presents system descriptions and one line diagrams (Figure 3-1 - Figure 3-5) developed from information obtained from piping and instrumentation and electrical elementary diagram drawings provided in the reference list. The drawing numbers are provided in Section 6.0, "Hanford Drawings". The one line diagrams are the basis for the fault tree models discussed in Section 4.0 and provided in Appendices A through C. The installation of the MPSS/SYS will be done in two phases, Phase I and Phase II designs. In Phase I some of the older style leak detector circuitry (gang relays) will be used until the newer leak detector circuitry is installed throughout the tank farms during Phase II.

3.1 Waste Transfer Route

The waste transfer route selected for the failure analysis of the MPSS/SYS starts at the 241-SY-102 waste tank in the 200 West Area, passes through the Cross-Site Transfer Line, through the AN and AP tank farms, and ends at 241-AW-102 waste tank in the 200 East Area. A one-line diagram of this waste transfer route is provided in Figure 3-1, Transfer Route for the Master Pump Shutdown System Failure Analysis. A listing of all of the components that are associated with the MPSS/SYS is provided in Table 3-1. The transfer route analyzed was selected, based on system complexity, to bound all other potential transfer routes between and within the 200W and 200E tank farms.

3.2 Leak Detection Systems

The two types of leak detection systems are included in the MPSS/SYS failure analysis. The new Pit Leak Detection system provides individual signals to the MPSS/PLC. The older leak detection systems, which are more common for this transfer route, provide trip signals to common relays, which then provide permissive signals to the MPSS/PLC. The single line diagrams for the leak detector elements of the 241-SY tank farm are provided in Figure 3-2. For Phase I the signals from the two leak detector elements provide signals to a single circuit, which trips a common relay, K-241-SY-PP. The status of this relay is monitored by the MPSS/PLC. For Phase II two signals are provided via each of the leak detector elements. One signal goes to the Channel A PLC and the other to the Channel B PLC.

The single line diagrams for the leak detector elements for the Cross-Site Transfer Line are provided in Figure 3-3. The signals from the 6241-A Diversion Box and the 6241-V Vent Station leak detector elements provide signals to relays for each leak detection element which are monitored by the MPSS/PLC at the 252-S Substation. Based on these signals, permissive signals are sent to the master permissive for the 241-SY-102 Central Pump Pit 02A pump and the master permissive for the Cross-Site Transfer Line Booster Pumps. There are no design differences between Phase I and Phase II designs for this area node.

The single line diagrams for the leak detector elements for the 241-AN-101 Central Pump Pit 01A, 241-AZ Valve Pit, 241-AP-A Valve Pit, and the 241-AP Valve Pit are provided in Figure 3-4. Each of these leak detector elements provides two discrete signals to the MPSS/PLC for Channel A and Channel B. There are no design differences between Phase I and Phase II designs for these area nodes.

The single line diagrams for the 241-AW-102 Central Pump Pit 02A leak detector are provided in Figure 3-5. For Phase I the signals are sent to a common relay for the AW tank farms. This common relay provides signals to the AW Area Node PLCs for processing. For Phase II design two discrete signals are sent directly to the AW Area Node PLCs.

Based on this information permissive signals are generated and passed on to other PLCs via analog signal wires which are in bundles of eight. Each MPSS/PLC PLC has the capability of transferring information toward the 200 West area (clockwise) or toward the 200 East Area (counter-clockwise). The PLCs at the very end of the MPSS/PLC can only send and receive information in one direction.

3.3 Master Pump Shutdown System

The portion of the MPSS/SYS, which controls the waste transfer process through the selected waste transfer route (Figure 3-1), is provided in Figure 3-6. This figure shows all of the PLCs involved in monitoring the waste transfer process, input and output PLC information, and the interconnection between the PLCs and Cross-Site Transfer Line. The front end of the waste transfer route is monitored by The 252-S Area Node PLC monitors and controls the waste transfer process by providing permissive signals to 241-SY-102 Pump 02A and the Cross-Site Transfer Line Booster Pumps. The other PLCs in Tank Farms 241-AN, 241-AZ, 241-AP, and 241-AW monitor leak detection relays along the selected waste transfer route and pass the analog permissive signals onto the next PLC in the clockwise and counter-clockwise directions.

The MPSS/PLC Safety-Class-Function hardware is represented in Figure 3-7. The safety class PLCs for all of the MPSS/PLC area nodes is shown. For the safety class function the input signal is taken to come into the system via the 242-A EVAP Area Node. The signal is then transferred through AW-Farm, AP-Farm, AY/AZ-Farms, AN-Farm, Cross-Site Transfer System, and 252-S Substation area nodes to the 242-S Evap Area Node. The signal is then delivered out of the Safety-Class-Function portion of the MPSS.

Table 3-1. MPSS/SYS Waste Transfer Route System Components

Item No	Phase	Designator	Location	Leak Detection Element ¹	Leak Detection Relay ¹	PLC Input Trip Relay for MPSS/SYS ¹	Drawings
1	I	Tank 241-SY-102 Central Pump Pit 02A	SY Tank Farm	LDE-133	LD1-PP-02A-1	K-241-SY-PPB	H-2-37735 Sh 2 Rev 0, H-14-020831 Sh 3 Rev 1
	II	Tank 241-SY-102 Central Pump Pit 02A	SY Tank Farm	LDE-133	LD2-PP-02A-1	LD1-PP-02A-1 LD2-PP-02A-1	N/A
2	I	241-SY-A Valve Pit	SY Tank Farm	LDE-144	LD1-VP-SY-A LD2-VP-SY-A	K-241-SY-PPB	H-2-37735 Sh 2 Rev 7, H-14-020831 Sh 2 Rev 1 H-2-37770-2, H-2-822402
	II	241-SY-A Valve Pit	SY Tank Farm	LDE-144	LD2-VP-SY-A	LD1-VP-SY-A LD3-VP-SY-A	N/A
3	I&II	Diversion Box 6241-A	Cross-Site Transfer Line	LDE-3150	LDK-3150 K-DB-2 K-DB-3	K-DB-1	H-2-822403 H-2-822436
	I&II	Diversion Box 6241-A	Cross-Site Transfer Line	LDE-3150A	LDK-3150A K-DB-2A K-DB-3A	K-DB-1A	H-2-822403 H-2-822436
4	I&II	Vent Station 6241-V	Cross-Site Transfer Line	LDE-3151	LDK-3151 K-VS-3 K-VS-1	K-VS-1	H-2-822404 H-2-822436
	I&II	Vent Station 6241-V	Cross-Site Transfer Line	LDE-3151A	LDK-3151A K-VS-3A K-VS-1A	K-VS-1A	H-2-822404 H-2-822436
5	I&II	Tank AN-101 Central Pump Pit 01A	AN Tank Farm	LDE-201	LDK-201	K-241-AN-PP	H-14-103327 H-14-103357
6	I&II	241-AZ Valve Pit	AN Tank Farm	LDE-221		LDK-AZ-1 K-AZC-2	H-14-103248
7	I&II	241-AP-A Valve Pit	AP Tank Farm	LDE-APA		LDK-APA-1 K-APAC-2	N/A
8	I&II	241-AP Valve Pit	AP Tank Farm	LDE-227		LD1-609 K-APC-3	H-14-020803-5, H-2-90476-6, H-2-90476-8 H-2-90476-4

Table 3-1. MPSS/SYS Waste Transfer Route System Components

Item No	Phase	Designator	Location	Leak Detection Element ¹	Leak Detection Relay ¹	PLC Input Trip Relay for MPSS/SYS ¹	Drawings
9	I	Tank 241-AW-102 Central Pump Pit 02A	AW Tank Farm	LDE-184	LDK-184-1 LDK-184-2	K-241-AW-PP	H-2-70329, H-14-020802 H-2-90276
9	II	Tank 241-AW-102 Central Pump Pit 02A	AW Tank Farm	LDE-184	LDK-184-2	LDK-184-1 LDK-184-3	N/A
10	I&II	SY-102 Central Pump Pit 02A	SY Tank Farm	WT-K-A3-A WT-K-A3-B		MCC A3	

1 - Bolded items are used as labels in Figures 3-1 through 3-5 and the Basic Event Definitions in Appendices A, B and C

Figure 3-2. Phase I & Phase II Simplified Diagrams for SY Tank Farm Transfer Route Leak Detector Elements

Figure 3-3. Phase I and Phase II Simplified Diagrams for Cross-Site Transfer Line Leak Detector Elements

SY-102 Central Pump Pit
02A Pump Shutoff Circuit

Figure 3-4. Phase I and Phase II Simplified Diagrams for Waste Transfer Route AN/AZ/AP Leak Detector Elements

Figure 3-5. Phase I and Phase II Simplified Diagrams for Waste Transfer
Route AW Leak Detector Element

Phase I
AW-102 Central Pump Pit 02A

Phase II
AW-102 Central Pump Pit 02A

Figure 3-6. Master Pump Shutdown System for Waste Transfer Route

Figure 3-7. Master Pump Shutdown System for Option 1b Safety Function Analysis

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4.0 Analysis

This section describes the failure analysis and contains a discussion of the methodology, assumptions, input, fault tree models and the results of the analysis.

4.1 Methodology

Fault tree methodology is an analytical technique where an undesired state of the system is specified and the system is analyzed according to its environment and operation to find all credible ways in which the undesired event can occur. The fault tree itself is a graphical representation of the various parallel and sequential combinations of faults that will result in the occurrence of the event of interest.

A fault tree is composed of entities known as gates, which serve to permit or prevent the passage of fault logic up the tree. Two types of gates are used to construct a fault tree: the AND gate and the OR gate.

The fault tree models were developed and evaluated using a software program. This system was developed and evaluated using the CAFTA software program developed by Science Applications International Corporation. The users' guide for this software program is referenced in Section 6.0 (SAIC 1993). Testing and acceptance of the CAFTA software program was performed and was documented (WHC 1993).

The CAFTA software package can be used to quantify a fault tree to obtain cut sets (one or more events that results in the failure of the system), which then can be used to obtain sensitivity and important information about system components. Basic event and failure rate information generated during the fault tree development is also used during the quantification of the fault tree.

The MPSS/SYS architecture is reasonably "typical" for each tank farm. This similarity was used throughout the analysis in the construction of each of the fault trees for each of the evaluated leak detector locations along the transfer route.

Based on the results of the model quantification, a listing of critical system components can be developed. This listing of system components is sorted based on importance factors for each component. The importance factor for a system component is based on the mean time between failures for that component.

The safety function of the MPSS/SYS is *"To Shutdown a Waste Transfer In or Between Tank Farms when a Leak Occurs Along the Transfer Route."* Any single component failures were identified and listed in tabular format. The single failure cases are "Acceptable" if they are immediately detectable or shown to have a probability of occurrence of less than 1×10^{-6} as provided by the customer's statement of work (BEH-99-009).

System Component Importance Factors

A system component or cut set contribution to the system failure(s) is termed its importance. It is a function of time, failure characteristics, and system design. Inspection, maintenance, and failure detection

can be applied to system components according to their order of importance, and systems can be upgraded by improving components having the largest importance.

For the CAFTA evaluation process, the Fussell-Vesely method was used as the basis for calculating the importance of system components to the reliability of the system. The Fussell-Vesely component importance factor uses the comparison of the ratio of the probability of a system component contributing to a cut set failure to the total system failure rate based on all the system components and various system failure modes. This provides a relative ranking of the system components in relation to the total failure probability of the system.

Each component is ranked and listed on the basis of these importance factors in tabular format. The components with the highest importance factors are at the top of the list and the components with the lowest importance factors at the bottom of the list (Appendix C).

4.2 Failure Analysis Assumptions and Model Bases

The scope of this failure analysis is bounded by the following assumptions:

1. The fault trees for each of the waste transfer leak paths were developed without accounting for any recovery of system components during the active waste transfer process.
2. There is no common mode failure between cable runs that is random in nature. External events can cause common mode failures in cable runs such as seismic events, and excavation events.
3. External events (digging, heavy equipment, seismic, etc.) were not accounted for in the failure and reliability analysis.
4. The Mission Time used for the MPSS/SYS failure and reliability analysis of 115 days was determined using the surveillance requirements (92 days) plus the 25% extension period (23 days) allowed for the Hanford Tank Farms leak detection systems Section 1.4, and Table 1.4-1 in (HNF 2000b).
5. All system components (PLCs, Leak Detector Elements, Relays, etc.) are verified to be functioning properly prior to the initiation of a waste transfer.
6. Waste transfer route and all related MPSS/SYS components are correctly identified via written procedures. The waste transfer route data file is generated by trained personnel for use in the transfer route set up.
7. Failure to shutdown the Main Transfer Pump by the MPSS/SYS constitutes a failure of the system.
8. HMI and PLC software is correct and bug free.
9. Failure of an Analog Shutdown Loop (ASL) occurs when a short occurs with another active ASL resulting in undetected continued operation of the ASL.

10. Loss of electrical power to any MPSS/PLC PLC area node results in the loss of all permissive signals generated by the PLC (fails safe) by engineering design.
11. Failure Analysis of the MPSS/SYS does not include the effects of a seismic event, during or after the event
12. Three analog wiring cables with individual grounded sheathings consisting of eight circuits apiece will be housed in a single conduit of four inches in diameter.

4.3 Analysis Input

The drawings used in the development of the fault trees are provided in Section 6.0 under the heading of "Hanford Drawings." The data used in the development of the Type Code files provided in Appendix B was obtained from the following references: (IEEE, 1984), (Powers 1992), (Blanton 1993), (RAC 1995), and (RAC 1991). These references are referred to in the Type Code files provided in Appendix C under the "Source" column and sometimes in the basic event definitions in the Basic Event file in Appendix B.

Failure rates for the PLC, analog input/output modules, and digital input/output modules were calculated using the Military Handbook for Reliability Prediction of Electronic Equipment (MIL-HDBK-217F 1995). The calculations are provided in Appendix B for each of the above components. Also provided is the estimation of the length of the runs for each of the circuits used in the transmission of analog signals between the various PLCs of the MPSS/PLC.

The failure rate for the MPSS/PLC PLC analog signal circuits was determined using the failure rate data from (IEEE-493 1990). This failure rate accounts for all types of failures of circuits. The particular types of failure that is of concern for this analysis is a short of the circuit of concern to another active circuit. There are a total of eight circuits (six active) per wiring cable. There is a maximum of two safety-class cables and one general service cable in a MPSS/PLC conduit.

A conservative estimate was made for the percentage of the failure rate representing a short to another active analog circuit within a safety-class cable between two sheathed wire pairs. The sequence of events that would be required for a circuit short to another active analog circuit would be:

1. Deactivated signal wire shorts to its sheathing (1.60×10^{-10} /hr/ft),
2. Sheathing ground fails at terminal box,
3. Active signal wire shorts to its sheathing (1.60×10^{-10} /hr/ft),
4. Sheathing ground fails at terminal box, and
5. Both sheathings come in electrical contact with each other.

Ignoring events 2, 3, and 5 and only accounting for events 1 and 3, one can see that the failure rate of these two independent events would be extremely small (2.6×10^{-20}). If the events are not independent but have a Common Cause, this can be accounted for numerically using a Beta Factor methodology as provided in (Fullwood 1988). The failure rate for the MPSS/PLC PLC analog signal circuits used in this analysis was calculated using a conservative Beta Factor value of 10% (Fullwood 1988) times the wire short failure rate obtained from (IEEE-493 1990).

The programming of the waste transfer route into the area node PLCs is done via the HMI by operations. It was assumed that independent personnel would tightly control this activity via written procedures and multiple oversight checks. Based on this process the lowest human failure rate was selected for this activity, 1×10^{-3} per component. For the cross-site transfer route there are two leak detectors in the diversion box and the vent station. If one of the leak detector elements for one of these locations is not included into the transfer route PLC data file, there is a high probability that the second one will not be included also. This event was accounted for through the use of a Beta factor of 0.10 (Henley 1981).

4.4 Analysis Models

As described in Section 4.1, Methodology, the models used in the failure analysis consist of Fault Trees. These Fault Trees are shown in Appendices A-1a through A-9b for each of the waste leak locations along the transfer route. Three of the area nodes have a different design for the Phase I and Phase II design configurations and therefore have a fault tree provided in Appendix A for each of the design phases. Component failure modes and associated failure probabilities are provided in Appendix B, "Basic Event File - MPS-115Day."

The MPSS/PLC Safety Function fault tree is provided in Appendix A-10. This fault tree is modeled on the basis of the system provided in Figure 3-7. The component failure modes and associated failure probabilities are provided in Appendix B, "Basic Event File - MPS-5Year."

Component failure rates that were used to generate the failure probabilities for both of the above basic event files are provided in Appendix B, "Type Code File" listing.

4.5 Analysis Results

Leak Detector Locations

A fault tree was developed for each of the nine leak detector locations along the selected transfer route (Figure 3-1). The twelve fault trees developed for this failure analysis are provided in Appendix A-1a through A-9b. Three of the leak detector locations have a Phase I and a Phase II leak detector design configuration. Therefore two fault trees are provided for SY-102 Central Pump Pit, SY-A Valve Pit, and AW-102 Central Pump Pit. The MPSS/SYS failure probability for each of the leak locations and design phases was determined using these fault trees.

For these analyses reliability is defined as the probability that the system will stop the transfer of waste when a leak occurs at a particular location along the transfer route. The mission time of 115 days for each of the analyses was determined on the basis of the surveillance time plus the 25% allowed grace period (HNF 2000b, Section 1.4, and Table 1.4-1). The failure probability and reliability of the MPSS/SYS System for each of the leak locations is provided in Table 4-1. The MPSS/SYS failure probability for the various waste leak locations range in value from 2.9×10^{-3} to 5.8×10^{-4} when accounting for human failure to define the proper leak detection devices along the transfer route (MPSS/SYS With Human Error). The higher MPSS/SYS failure probabilities (lower reliabilities) are associated with the leak detector locations where all signals are channeled through a single relay (common relay) for the tank farm, such as

241-SY-102. The lower failure probabilities (higher reliabilities) are associated with the leak detector locations where two leak detectors are provided (6241-A Diversion Box and 6241-V Vent Station).

The newer leak detection systems (AN-101, AZ Valve Pit, AP-A Valve Pit, AP Valve Pit, and 241-AW-102) have a lower failure rate and higher reliability than the older leak detection system designs. The older designs are represented by the Phase I design of the 241-SY-102 Central Pump Pit and 241-SY-A Valve Pit systems.

The two columns of Table 4-1 labeled "MPSS/SYS Without Human Error" provide the failure probabilities and system reliabilities without human error being accounted for in the analysis. The MPSS/SYS failure probability for the various waste leak locations range in value from 1.9×10^{-3} to 4.8×10^{-4} for Phase I and Phase II design configurations. For just Phase II design configurations the MPSS/SYS failure probability range in value from 4.7×10^{-4} to 5.5×10^{-4} . These failure probabilities result in system reliabilities greater than or equal to 99.945%.

The last two columns of Table 4-1 labeled "MPSS/SYS Without Human Error or Single Component Failures" provide the failure probabilities and system reliabilities without human error or single component failures being accounted for in the analysis. The MPSS/SYS failure probability for the various waste leak locations range in value from 8.3×10^{-5} to 7.7×10^{-6} for Phase II design configurations. These failure probabilities result in system reliabilities greater than 99.992%. These calculations were provided to show the impact of single component failures on the reliability of the MPSS/SYS.

The cutset/importance files are provided in Appendices C-1a through C-9b for each of the leak detector locations evaluated along the transfer route. The importance of the various components of the MPSS/SYS is provided via the Fussell-Vesely importance factor ranking system. The results provided in Table 4-3 is based on the component/event importance tables provided in Appendices C-1a through C-9b. Only single component/event failures, which result in the failure of the system, are provided in Table 4-3. The name of the waste transfer location, the system component basic event, failure probability of component or event and the Fussell-Vesely importance factor is provided in the table. The components are sorted from the highest to the lowest importance for each of the evaluated leak detection locations along the transfer route.

Safety Function

A fault tree was developed for a portion of the MPSS, which was defined as providing only the Safety Function, MPSS/PLC. The scope of the fault tree is provided in Figure 3-7. The MPSS/PLC failure probability was determined using this fault tree and is provided in Appendix A-10.

For this analysis reliability is defined as the probability that the system can transfer a signal from the 242-A Evap Area Node to the 242-S Evap Area Node. The mission time for the analysis was selected to be 5 years in length (RPP 1999). The calculated failure probability of 1.45×10^{-3} and reliability of 99.855% for the MPSS/PLC is provided in Table 4-2 row C-10.

A preliminary estimate for the MPSS/PLC reliability was determined to be 99.887% via a parts count methodology, Table 3-B of Option 1B (RPP 1999). This value and its corresponding failure probability are provided in Table 4-2 in the row labeled "Options Report" for comparison purposes.

The cutset/importance files for the MPSS/PLC analysis is provided in Appendices C-10. The importance of the various components of the MPSS/PLC is provided via the Fussell-Vesely importance factor ranking system. There are no single component failures, which would result in the failure of the MPSS/PLC. Only single component/event failures, which result in the failure of the system, are provided in Table 4-3. As a result there are no entries provided in Table 4-3 for this analysis.

Table 4-1 MPSS/SYS Failure Probability and Reliability Given a Waste Transfer Leak

Appendix	Leak Detection Location	Leak Detection Element	PLC Input Trip Relay for MPSS	MPSS/SYS With Human Error		MPSS/SYS Without Human Error		MPSS/SYS Without Human Error or Single Component Failures	
				Failure Probability	System Reliability	Failure Probability	System Reliability	Failure Probability	System Reliability
'C-1a	Tank 241-SY-102 Central Pump Pit 02A Phase I	LDE-133	K-241-SY-PPB	2.87×10^{-3}	99.713%	1.87×10^{-3}	99.813%	N/A	N/A
'C-1b	Tank 241-SY-102 Central Pump Pit 02A Phase II	LDE-133	LD1-PP-O-2A-1 LD3-PP-O-2A-1	1.47×10^{-3}	99.853%	4.74×10^{-4}	99.953%	7.70×10^{-6}	99.9992
'C-2a	241-SY-A Valve Pit SY Tank Farm Phase I	LDE-144	K-241-SY-PPB	2.87×10^{-3}	99.713%	1.87×10^{-3}	99.813%	N/A	N/A
'C-2b	241-SY-A Valve Pit SY Tank Farm Phase II	LDE-144	LD1-VP-SY-A LD3-PP-02A-1	1.47×10^{-3}	99.853%	4.74×10^{-4}	99.953%	7.70×10^{-6}	99.9992
'C-3	Diversion Box 6241-A Cross-Site Transfer Line	LDE-3150	K-DB-1	5.78×10^{-4}	99.943%	4.78×10^{-4}	99.952%	1.17×10^{-5}	99.9999
		LDE-3150A	K-DB-1A						
'C-4	Vent Station 6241-V Cross-Site Transfer Line	LDE-3151	K-VS-1	5.76×10^{-4}	99.942%	4.76×10^{-4}	99.952%	9.27×10^{-6}	99.9991
		LDE-3151A	K-VS-1A						
'C-5	Tank AN-101 Central Pump Pit 01A	LDE-201	LDK-201-1 K-201C-2	1.51×10^{-3}	99.849%	5.07×10^{-4}	99.949%	4.10×10^{-5}	99.9959
'C-6	241-AZ Valve Pit	LDE-221	LDK-AZ-1 K-AZC-2	1.53×10^{-3}	99.847%	5.31×10^{-4}	99.947%	6.46×10^{-5}	99.9935
'C-7	241-AP-A Valve Pit	LDE-APA	LDK-APA-1 K-APAC-2	1.55×10^{-3}	99.845%	5.49×10^{-4}	99.945%	8.29×10^{-5}	99.9917
'C-8	241-AP Valve Pit	LDE-227	LD1-609-1 K-APC-2	1.55×10^{-3}	99.845%	5.49×10^{-4}	99.945%	8.29×10^{-5}	99.9917
'C-9a	Tank 241-AW-102 Central Pump Pit 02A AW Tank Farm Phase I	LDE-184	K-241-AW-PP	1.97×10^{-3}	99.803%	9.67×10^{-4}	99.903%	N/A	N/A
'C-9b	Tank 241-AW-102 Central Pump Pit 02A AW Tank Farm Phase II	LDE-184	LDK-184-1 LDK-184-3	1.51×10^{-3}	99.849%	5.11×10^{-4}	99.949%	4.49×10^{-5}	99.9955

Failure Probabilities and Reliabilities are based on a 115-day mission time, Section 1.4, Table 1.4-1 (HNF 2000b).

Table 4-2 MPSS/PLC Failure Probability and Reliability Given a Waste Transfer Leak

Appendix/ Report	System Description	MPSS/PLC Without Human Error		MPSS/PLC Without Human Error and Single Component Failures	
		Failure Probability	System Reliability	Failure Probability	System Reliability
¹ C-10	Safety Function (PLCs, Digital I/O, Analog I/O cards, Analog Wiring)	1.45×10^{-3}	99.855%	1.45×10^{-3}	99.855
¹ Options Report	Option 1B Safety Function Failure Probability and Reliability	1.13×10^{-3}	99.887%	1.13×10^{-3}	99.887
¹ Options Report	Existing MPSS/SYS	2.87×10^{-2}	97.13%	N/A	N/A

¹Failure Probability and Reliability are based on a 5-year mission time (RPP 1999)

Table 4-3. MPSS/SYS Single Component/Event Failures

Appendix	Leak Detection Location	Basic Event	Single Event Failures	Component Failure Probability	Fussell-Vesely Factor
C-1a	Phase I Tank 241-SY-102 Central Pump Pit 02A	MVRLDE133N	Improper Address Verification for LDE-133 for Waste Transfer Route	1.00E-03	3.48E-01
		MREKSYPPAH	Relay/Contact K-241-SY-PPA Fails to Open	4.66E-04	1.62E-01
		MREKSYPPBH	Relay/Contact K-241-SY-PPB Fails to Open	4.66E-04	1.62E-01
		MREKSYPP_H	Relay/Contact K-241-SY-PP Fails to Open	4.66E-04	1.62E-01
		MREMCC-A3H	Relay/Contactor MCC-A3 Fails Closed	4.66E-04	1.62E-01
		MLDLDE133H	Leak Detector LDE-133 Elements Mechanically Fail	1.38E-07	4.80E-04
		MLPKSYPPBS	Circuit from K-241-SY-PPB to S252A/B-PLC Shorts to Another Active Loop	4.42E-07	1.54E-04
		MLPLDE133S	Circuit for LDK-133 Shorts to Ground (100 ft)	2.21E-07	7.68E-05
		MDLLDE133N	Improper Downloading of LDE-133 Address for Transfer Route	1.00E-07	3.48E-05
C-1b	Phase II Tank 241-SY-102 Central Pump Pit 02A	MVRLDE133N	Improper Address Verification for LDE-133 for Waste Transfer Route	1.00E-03	6.80E-01
		MREMCC-A3H	Relay/Contactor MCC-A3 Fails to Open	4.66E-04	3.17E-03
		MLDLDE133H	Leak Detector LDE-133 Elements Mechanically Fail	1.38E-07	9.38E-04
		MLPLDE133S	Circuit from LDE-133 Shorts to Another Active Circuit (100 ft)	2.21E-07	1.50E-04
		MDLLDE133N	Improper Downloading of LDE-133 Address for Transfer Route	1.00E-07	6.79E-05

Table 4-3. MPSS/SYS Single Component/Event Failures

Appendix	Leak Detection Location	Basic Event	Single Event Failures	Component Failure Probability	Fussell-Vesely Factor
C-2a	Phase I 241-SY-A Valve Pit SY Tank Farm Phase I	MVRLDE144N	Improper Address Verification for LDE-144 for Waste Transfer Route	1.00E-03	3.48E-01
		MREKSYPPAH	Relay/Contact K-241-SY-PPA Fails to Open	4.66E-04	1.62E-01
		MREKSYPPBH	Relay/Contact K-241-SY-PPB Fails to Open	4.66E-04	1.62E-01
		MREKSYPP_H	Relay/Contact K-241-SY-PP Fails to Open	4.66E-04	1.62E-01
		MREMCC-A3H	Relay/Contactor MCC-A3 Fails Closed	4.66E-04	1.62E-01
		MLDLDE144H	Leak Detector LDE-144 Elements Mechanically Fail	1.38E-07	4.80E-04
		MLPKSYPPBS	Circuit from K-241-SY-PPB to S252A/B-PLC Shorts to Another Active Loop	4.42E-07	1.54E-04
		MLPLDE144S	Circuit for LDK-144 Shorts to Ground (100 ft)	2.21E-07	7.68E-05
		MDLLDE144N	Improper Downloading of LDE-144 Address for Transfer Route	1.00E-07	3.48E-05
		MVRLDE144N	Improper Address Verification for LDE-144 for Waste Transfer Route	1.00E-03	6.80E-01
C-2b	Phase II 241-SY-A Valve Pit SY Tank Farm	MREMCC-A3H	Relay/Contactor MCC-A3 Fails Closed	4.66E-04	3.17E-03
		MLDLDE144H	Leak Detector LDE-144 Elements Mechanically Fail	1.38E-07	9.38E-04
		MLPLDE144S	Circuit from LDE-133 Shorts to Another Active Circuit (100 ft)	2.21E-07	1.50E-04
		MDLLDE144N	Improper Downloading of LDE-144 Address for Transfer Route	1.00E-07	6.79E-05

Table 4-3. MPSS/SYS Single Component/Event Failures

Appendix	Leak Detection Location	Basic Event	Single Event Failures	Component Failure Probability	Fussell-Vesely Factor
C-3	Phase I & II Diversion Box 6241-A Cross-Site Transfer Line	MREMCC-A3H	Relay/Contactor MCC-A3 Fails Closed	4.66E-04	3.17E-03
		MVR3150__C	Improper Address Verification for LDE-3150 and LDE-3150A for Transfer Route - Common Cause	1.00E-04	1.74E-01
C-4	Phase I & II Vent Station 6241-V Cross-Site Transfer Line	MREMCC-A3H	Relay/Contactor MCC-A3 Fails Closed	4.66E-04	3.17E-03
		MVR3151__C	Improper Address Verification for LDE-3151 and LDE3151A for Transfer Route - Common Cause	1.00E-04	1.74E-01
C-5	Phase I & II Tank AN-101 Central Pump Pit 01A	MVRLDE201N	Improper Address Verification for LDE-201 for Transfer Route	1.00E-03	6.74E-01
		MREMCC-A3H	Relay/Contactor MCC-A3 Fails Closed	4.66E-04	3.14E-01
		MLDLDE201H	Leak Detector LDE-201 Elements Mechanically Fail	1.38E-07	9.29E-03
		MDLLDE201N	Improper Downloading of LDE-201 Address for Transfer Route	1.00E-07	6.73E-05
		MVRLDE201N	Improper Address Verification for LDE-221 for Transfer Route	1.00E-03	6.74E-01
C-6	Phase I & II 241-AZ Valve Pit	MREMCC-A3H	Relay/Contactor MCC-A3 Fails Closed	4.66E-04	3.14E-01
		MLDLDE221H	Leak Detector LDE-221 Elements Mechanically Fail	1.38E-07	9.29E-03
		MDLLDE221N	Improper Downloading of LDE-221 Address for Transfer Route	1.00E-07	6.73E-05

Table 4-3. MPSS/SYS Single Component/Event Failures

Appendix	Leak Detection Location	Basic Event	Single Event Failures	Component Failure Probability	Fussell-Vesely Factor
C-7	Phase I & II 241-AP-A Valve Pit	MVRLDAPAN	Improper Address Verification for LDE-APA for Transfer Route	1.00E-03	6.73E-01
		MREMCC-A3H	Relay/Contactor MCC-A3 Fails Closed	4.66E-04	3.14E-01
		MLDLDE221H	Leak Detector LDE-APA Elements Mechanically Fail	1.38E-07	9.27E-03
		MDLLDE221N	Improper Downloading of LDE-APA Address for Transfer Route	1.00E-07	6.72E-05
C-8	Phase I & II 241-AP Valve Pit	MVRLDE227N	Improper Address Verification for LDE-227 for Transfer Route	1.00E-03	6.73E-01
		MREMCC-A3H	Relay/Contactor MCC-A3 Fails Closed	4.66E-04	3.14E-01
		MLDLDE227H	Leak Detector LDE-227 Elements Mechanically Fail	1.38E-07	9.27E-03
		MDLLDE227N	Improper Downloading of LDE-227 Address for Transfer Route	1.00E-07	6.72E-05
C-9a	Phase I Tank 241-AW-102 Central Pump Pit 02A AW Tank Farm	MVRLDE184N	Improper Address Verification for LDE-184 for Transfer Route	1.00E-03	5.16E-01
		MREMCC-A3H	Relay/Contactor MCC-A3 Fails Closed	4.66E-04	2.41E-01
		MREK1AWPPH	Relay/Contact K-241-AW-PP Fails Closed	4.66E-04	2.41E-01
		MLDLDE184H	Leak Detector LDE-184 Elements Mechanically Fail	1.38E-07	7.12E-04
		MLPLDK184S	Circuit from LDK-184 to K-241-AW-PP Shorts to Another Active Circuit (1000 ft)	2.21E-07	1.14E-04
		MDLLDE184N	Improper Downloading of LDE-184 Address for Transfer Route	1.00E-07	5.16E-05

Table 4-3. MPSS/SYS Single Component/Event Failures

Appendix	Leak Detection Location	Basic Event	Single Event Failures	Component Failure Probability	Fussell-Vesely Factor
C-9b	Phase II Tank 241-AW-102 Central Pump Pit 02A AW Tank Farm	MVRLDE184N	Improper Address Verification for LDE-184 for Transfer Route	1.00E-03	6.79E-01
		MREMCC-A3H	Relay/Contactor MCC-A3 Fails Closed	4.66E-04	3.16E-01
		MLDLDE184H	Leak Detector LDE-184 Elements Mechanically Fail	1.38E-07	9.36E-04
		MLPLDK184S	Circuit from LDK-184 to K-241-AW-PP Shorts to Another Active Circuit (1000 ft)	2.21E-07	1.50E-04
		MDLLDE184N	Improper Downloading of LDE-184 Address for Transfer Route	1.00E-07	6.78E-05

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5.0 Conclusions and Recommendations

The failure and reliability analysis of the MPSS/SYS resulted in failure probabilities ranging in value from 1.5×10^{-3} to 5.8×10^{-4} and system reliabilities of 99.71 to 99.94 for both Phase I and Phase II design configurations. These MPSS/SYS reliabilities take into account human error in the definition of the waste transfer path for each of the waste leak detection locations for which the system was evaluated. When human error is removed a range of failure probabilities of 4.7×10^{-4} to 9.7×10^{-4} and system reliabilities greater than 99.990 are obtained.

The purpose of this analysis is to provide input to the design process of the MPSS/SYS in the following key areas:

1. Single Component Failure Criterion

A list of single component or actions is provided in Table 4-2. The failure of any of these components or actions would result in the failure of the MPSS/SYS to perform the Safety Function of shutting down the waste transfer process at a particular leak detector location along the selected waste transfer path. There are a minimum of four and a maximum of nine component or activity failures, which would result in the failure of the MPSS/SYS and leak detector system to perform the safety function.

The MPSS/SYS PDS (HNF 2000a) specifies a maximum single system component failure probability of 1×10^{-6} . The single component failure would result in the failure of the MPSS to perform its safety function. The Phase II MPSS/SYS design does not meet this failure probability criterion. For each of the leak detector locations selected and evaluated, there is one common system component which has a failure probability greater than 1×10^{-6} : the transfer pump motor control contactors (4.66×10^{-4} failure probability).

Eliminating this component from consideration in each of the analyses would result in an increase in reliability from greater than 99.900% to greater than 99.992% (Table 4-1).

2. System Status Upon Loss of Electrical Power

No components were identified which would prevent the MPSS/SYS from performing its safety function upon loss of electrical power. All MPSS/SYS and leak detection system components, which were part of this assessment, transfer to a de-energized state resulting in a tripped MPSS/SYS system and shutdown of a waste transfer process.

3. Physical Isolation of Safety Class Channel A wiring from Channel B wiring, and
4. Physical Isolation of Safety Class Wiring from General Service wiring

The signal cable configuration of a single conduit was evaluated and compared against a separate conduit configuration for safety-class and general-service cables for both analog and discrete signal wires. These frequency calculations are provided in Appendix D.

The failure mode of concern is a short of a safety-class or general service analog or discrete signal wire to another energized wire in a separate analog signal or discrete signal cable resulting in a false

permissive signal. Shorting of wires within the same signal cable would be the same for both the separate conduit and single conduit configurations and therefore was not made part of this frequency assessment.

The frequency of such an occurrence for an analog signal wire was conservatively determined to be 2.3×10^{-10} /year for a circuit of ten miles in length in the same conduit. The comparable frequency for the case of having the analog safety class and general service signal cables running in separate conduits was determined to be 2.51×10^{-12} /year.

The frequency of such an occurrence for a discrete signal wire was conservatively determined to be 2.55×10^{-9} / year for circuit of one mile in length in the same conduit. The comparable frequency for the case of having the analog safety class and general service signal cables running in separate conduits was determined to be 3.46×10^{-11} /year.

External events such as seismic, fire, wind, or excavation accidents were not accounted for in this portion of the failure analysis. The frequencies provided above are less than the failure criteria of 1×10^{-6} /year as specified by the MPSS/SYS PDS (HNF 2000a).

5. Meeting the MPSS/PLC Option 1b (RPP 1999) Reliability estimate

The MPSS/PLC Safety Function failure probability was determined using a fault tree which is provided in Appendix A-10. The scope of the fault tree is provided in Figure 3-7. This fault tree was developed for just the Safety Function of the MPSS/PLC.

For this analysis reliability is defined as the probability that the system can transfer the safety function signal from the 242-A Evap Area Node to the 242-S Evap Area Node. The mission time for the analysis was selected to be 5 years in length (RPP 1999). The failure probability of 1.45×10^{-4} and reliability of 99.963% was determined for the MPSS/PLC System Safety Function.

A preliminary estimate for the MPSS/PLC Safety Function reliability was determined in August of 1999 via a parts count methodology and is provided in Table 3-B, Option 1B (RPP 1999). The calculated reliability via this method is 99.887% over a 5-year time frame. In the report an estimate of the current MPSS reliability was provided for comparison purposes of 97.13%.

The calculated reliability for the MPSS/PLC safety function in this report (99.855%) is slightly less than the reliability of the Options report Option 1B estimate (99.887%) and greater than the existing MPSS reliability estimate (97.13%) of August 1999.

6.0 References

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Appendix A

Master Pump Shutdown System

Fault Trees

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Appendix A-1a

SY-102 Central Pump Pit 02A Fault Tree

Phase I

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Appendix A-1b

SY-102 Central Pump Pit 02A Fault Tree

Phase II

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Appendix A-2a
241-SY-A Valve Pit Fault Tree
Phase I

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Appendix A-2b

241-SY-A Valve Pit Fault Tree

Phase II

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Appendix A-3

6241-A Diversion Box Fault Tree

Phase I & Phase II

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Appendix A-4
6241-V Vent Station Fault Tree
Phase I & Phase II

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Appendix A-5

AN-101 Central Pump Pit 01A Fault Tree

Phase I & Phase II

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Page 3

Appendix A-6
241-AZ Valve Pit Fault Tree
Phase I & Phase II

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Appendix A-7

241-AP-A Valve Pit Fault Tree

Phase I & Phase II

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Appendix A-8

241- AP Valve Pit Fault Tree

Phase I & II

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Appendix A-9a

AW-102 Central Pump Pit Fault Tree

Phase I

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Appendix A-9b

AW-102 Central Pump Pit Fault Tree

Phase II

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Appendix A-10
MPSS Safety Function Fault Tree

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Appendix B

Basic Events and Type Codes

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CAFTA Database Report MPS-115Day.BE

\TREES\MPS-115Day.BE

NAME	RATE	U	FACTOR	U	C	PROB	DESC
1 MAI242APAI	3.57E-08	H		115	D	5	4.93E-05 Analog Input Module 242-A Channel A Fails to Provide a Change of State
2 MAI242APBI	3.57E-08	H		115	D	5	4.93E-05 Analog Input Module 242-A Channel B Fails to Provide a Change of State
3 MAI242S_AI	3.57E-08	H		115	D	5	4.93E-05 Analog Input Module 242-S Channel A Fails to Provide a Change of State
4 MAI242S_BI	3.57E-08	H		115	D	5	4.93E-05 Analog Input Module 242-S Channel B Fails to Provide a Change of State
5 MAI252S_AI	3.57E-08	H		115	D	5	4.93E-05 Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A
6 MAI252S_BI	3.57E-08	H		115	D	5	4.93E-05 Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-B
7 MAIANAPLCI	3.57E-08	H		115	D	5	4.93E-05 Analog Input Module AN PLC-A Fails to Provide a Change of State
8 MAIANBPLCI	3.57E-08	H		115	D	5	4.93E-05 Analog Input Module AN PLC-B Fails to Provide a Change of State
9 MAIAAPLCI	3.57E-08	H		115	D	5	4.93E-05 Analog Input Module AP PLC-A Fails to Provide a Change of State
10 MAIABPLCI	3.57E-08	H		115	D	5	4.93E-05 Analog Input Module AP PLC-B Fails to Provide a Change of State
11 MAIAWAPLCI	3.57E-08	H		115	D	5	4.93E-05 Analog Input Module Fails to Provide Correct Signal to AW PLC-A
12 MAIABPLCI	3.57E-08	H		115	D	5	4.93E-05 Analog Input Module AZ PLC-A Fails to Provide a Change of State
13 MAIAZAPLCI	3.57E-08	H		115	D	5	4.93E-05 Analog Input Module AZ PLC-B Fails to Provide a Change of State
14 MAIAZBPLCI	3.57E-08	H		115	D	5	4.93E-05 Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A
15 MAIS252A_I	3.57E-08	H		115	D	5	4.93E-05 Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-B
16 MAIS252B_I	3.57E-08	H		115	D	5	4.93E-05 Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-B
17 MAMEY201_H	5.00E-06	H		115	D	5	6.87E-03 Amplifier Module EY-201-1/2 Fails
18 MAMEYAPA_H	5.00E-06	H		115	D	5	6.87E-03 Amplifier Module EY-APA Fails to Trip
19 MAMEYAZ12H	5.00E-06	H		115	D	5	6.87E-03 Amplifier Module EY-AZ-1/2 Fails to Trip
20 MAMLD3609H	5.00E-06	H		115	D	5	6.87E-03 Amplifier Module LD3-609 Fails to Trip
21 MAO242APAI	3.57E-08	H		115	D	5	4.93E-05 Analog Output Module 242-A PLC-A Fails to Provide a Change of State
22 MAO242APBI	3.57E-08	H		115	D	5	4.93E-05 Analog Output Module 242-A PLC-B Fails to Provide a Change of State
23 MAO252S_AI	3.57E-08	H		115	D	5	4.93E-05 Analog Output Mod 252-S PLC-A Fails to Provide Correct Permissive Signal
24 MAO252S_BI	3.57E-08	H		115	D	5	4.93E-05 Analog Output Mod 252-S PLC-B Fails to Provide Correct Permissive Signal
25 MAOANAPLCI	3.57E-08	H		115	D	5	4.93E-05 Analog Output Module ANA PLC-A Fails to Provide a Change of State
26 MAOANBPLCI	3.57E-08	H		115	D	5	4.93E-05 Analog Output Module AN PLC-B Fails to Provide Correct Permissive Signal
27 MAOAPAPLCI	3.57E-08	H		115	D	5	4.93E-05 Analog Output Module AP PLC-A Fails to Provide a Change of State
28 MAOAPBPLCI	3.57E-08	H		115	D	5	4.93E-05 Analog Output Module AP PLC-B Fails to Provide a Change of State
29 MAOAWAPLCI	3.57E-08	H		115	D	5	4.93E-05 Analog Output Module AW PLC-A Fails to Provide a Change of State
30 MAOAWBPLCI	3.57E-08	H		115	D	5	4.93E-05 Analog Output Module AW PLC-B Fails to Provide a Change of State
31 MAOAZAPLCI	3.57E-08	H		115	D	5	4.93E-05 Analog Output Module AZ PLC-A Fails to Provide a Change of State
32 MAOAZBPLCI	3.57E-08	H		115	D	5	4.93E-05 Analog Output Module AZ PLC-B Fails to Provide a Change of State
33 MCP242APAI	7.20E-08	H		115	D	5	9.94E-05 PLC Central Processor 242-A PLC-A Fails to Provide Correct Signal
34 MCP242APBI	7.20E-08	H		115	D	5	9.94E-05 PLC Central Processor 242-A PLC-B Fails to Provide Correct Signal
35 MCP242S_AI	7.20E-08	H		115	D	5	9.94E-05 PLC Central Processor 242-S PLC-A Fails to Provide Correct Signal
36 MCP242S_BI	7.20E-08	H		115	D	5	9.94E-05 PLC Central Processor 242-S PLC-B Fails to Provide Correct Signal
37 MCP252S_AI	7.20E-08	H		115	D	5	9.94E-05 PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal
38 MCP252S_BI	7.20E-08	H		115	D	5	9.94E-05 PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal
39 MCPANAPLCI	7.20E-08	H		115	D	5	9.94E-05 PLC Central Processor ANA PLC-A Fails to Provide Correct Signal
40 MCPANBPLCI	7.20E-08	H		115	D	5	9.94E-05 PLC Central Processor ANB PLC-B Fails to Provide Correct Signal
41 MCPAPAPLCI	7.20E-08	H		115	D	5	9.94E-05 PLC Central Processor AP PLC-A Fails to Provide Correct Signal
42 MCPAPBPLCI	7.20E-08	H		115	D	5	9.94E-05 PLC Central Processor APB PLC-B Fails to Provide Correct Signal
43 MCPAZAPLCI	7.20E-08	H		115	D	5	9.94E-05 PLC Central Processor AZA PLC-A Fails to Provide Correct Signal
44 MCPAZBPLCI	7.20E-08	H		115	D	5	9.94E-05 PLC Central Processor AZB PLC-B Fails to Provide Correct Signal
45 MCPS252A_I	7.20E-08	H		115	D	5	9.94E-05 PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal
46 MCPS252B_I	7.20E-08	H		115	D	5	9.94E-05 PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal
47 MDI252S_AI	1.51E-07	H		115	D	5	2.08E-04 Digital Input Module Fails to Provide Correct Signal to 252-S PLC-A
48 MDI252S_BI	1.51E-07	H		115	D	5	2.08E-04 Digital Input Module Fails to Provide Correct Signal to 252-S PLC-B
49 MDIANAPLCI	1.51E-07	H		115	D	5	2.08E-04 Digital Input Module Fails to Provide Correct Signal to AN PLC-A

NAME	RATE	U	FACTOR	U	C	PROB	DESC
50 MDIABNPLCI	1.51E-07 H	115	D	5	2.08E-04	Digital Input Module	Fails to Provide Correct Signal to AN PLC-B
51 MDIAPAPLCI	1.51E-07 H	115	D	5	2.08E-04	Digital Input Module	AP PLC-A Fails to Provide a Change of State
52 MDIAPBPLCI	1.51E-07 H	115	D	5	2.08E-04	Digital Input Module	AP PLC-B Fails to Provide a Change of State
53 MDIAWAPLCI	1.51E-07 H	115	D	5	2.08E-04	Digital Input Module	Fails to Provide Correct Signal to AW PLC-A
54 MDIAWBPLCI	1.51E-07 H	115	D	5	2.08E-04	Digital Input Module	Fails to Provide Correct Signal to AW PLC-B
55 MDIAZAPLCI	1.51E-07 H	115	D	5	2.08E-04	Digital Input Module	AZ PLC-A Fails to Provide a Change of State
56 MDIAZBPLCI	1.51E-07 H	115	D	5	2.08E-04	Digital Input Module	AZ PLC-B Fails to Provide a Change of State
57 MDIS252A_I	1.51E-07 H	115	D	5	2.08E-04	Digital Input Module	Fails to Provide Correct Signal to 252-S PLC-A
58 MDIS252B_I	1.51E-07 H	115	D	5	2.08E-04	Digital Input Module	Fails to Provide Correct Signal to 252-S PLC-B
59 MDL3150A_N	1.00E-07 N	1	N	1	1.00E-07	Improper Downloading of	LDE-3150A Address for Transfer Route
60 MDL3150_N	1.00E-07 N	1	N	1	1.00E-07	Improper Downloading of	LDE-3150 Address for Transfer Route
61 MDL3151A_N	1.00E-07 N	1	N	1	1.00E-07	Improper Downloading of	LDE-3151A Address for Transfer Route
62 MDL3151_N	1.00E-07 N	1	N	1	1.00E-07	Improper Downloading of	LDE-3151 Address for Transfer Route
63 MDLLE133N	1.00E-07 N	1	N	1	1.00E-07	Improper Downloading of	LDE-133 Address for Transfer Route
64 MDLLE144N	1.00E-07 N	1	N	1	1.00E-07	Improper Downloading of	LDE-144 Address for Transfer Route
65 MDLLE145N	1.00E-07 N	1	N	1	1.00E-07	Improper Downloading of	LDE-145 Address for Transfer Route
66 MDLLE184N	1.00E-07 N	1	N	1	1.00E-07	Improper Downloading of	LDE-184 Address for Transfer Route
67 MDLLE201N	1.00E-07 N	1	N	1	1.00E-07	Improper Downloading of	LDE-201 Address for Transfer Route
68 MDLLE221N	1.00E-07 N	1	N	1	1.00E-07	Improper Downloading of	LDE-221 Address for Transfer Route
69 MDLLE227N	1.00E-07 N	1	N	1	1.00E-07	Improper Downloading of	LDE-227 Address for Transfer Route
70 MDLLEAPAN	1.00E-07 N	1	N	1	1.00E-07	Improper Downloading of	LDE-APA Address for Transfer Route
71 MDO242S_AI	1.51E-07 H	115	D	5	2.08E-04	Digital Output Module	242-S PLC-A Fails to Provide Correct Permissive Signal
72 MDO242S_BI	1.51E-07 H	115	D	5	2.08E-04	Digital Output Module	242-S PLC-B Fails to Provide Correct Permissive Signal
73 MDO252S_AI	1.51E-07 H	115	D	5	2.08E-04	Digital Output Module	252-S PLC-A Fails to Provide Correct Permissive Signal
74 MDO252S_BI	1.51E-07 H	115	D	5	2.08E-04	Digital Output Module	252-S PLC-B Fails to Provide Correct Permissive Signal
75 MDO252S_AI	1.51E-07 H	115	D	5	2.08E-04	Digital Output Module	252-S PLC-A Fails to Provide Correct Permissive Signal
76 MDO252S_BI	1.51E-07 H	115	D	5	2.08E-04	Digital Output Module	252-S PLC-B Fails to Provide Correct Permissive Signal
77 MDOANAPLCI	1.51E-07 H	115	D	5	2.08E-04	Discrete Output Mod	AN PLC-A Fails to Provide Correct Permissive
78 MDOANBPLCI	1.51E-07 H	115	D	5	2.08E-04	Digital Output Module	AN PLC-B Fails to Provide Correct Permissive
79 MDO252A_I	1.51E-07 H	115	D	5	2.08E-04	Digital Output Module	252-S PLC-B Fails to Provide Correct Permissive Signal
80 MIE02A_A	1.51E-07 H	1	O	1.00E+00	Waste Transfer Leak in	Central Pump Pit	SY-102-02A and/or Connecting Pipe
81 MIE241-APA	1.51E-07 H	1	O	1.00E+00	Waste Transfer Leak in	241-AP Valve Pit	01A and/or Connecting Pipe
82 MIE241-AZA	1.51E-07 H	1	O	1.00E+00	Waste Transfer Leak in	241-AZ Valve Pit	and/or Connecting Pipe
83 MIE241APRA	1.51E-07 H	1	O	1.00E+00	Waste Transfer Leak in	241-AP-A Central Pump Pit	01A and/or Connecting Pipe
84 MIE6241-AA	1.51E-07 H	1	O	1.00E+00	Waste Transfer Leak in	6241-A Diversion Box	and/or Connecting Pipe
85 MIE6241-VA	1.51E-07 H	1	O	1.00E+00	Waste Transfer Leak in	6241-V Vent Station	and/or Connecting Pipe
86 MIEAN101AA	1.51E-07 H	1	O	1.00E+00	Waste Transfer Leak in	AN-1010 Central Pump Pit	01A and/or Connecting Pipe
87 MIEAW-102A	1.51E-07 H	1	O	1.00E+00	Waste Transfer Leak in	AW-102 Central Pump Pit	02A and/or Connecting Pipe
88 MIESY-AVPA	1.51E-07 H	1	O	1.00E+00	Waste Transfer Leak in	241-SY-A Valve Pit	and/or Connecting Pipe
89 MIESY-BVPA	1.51E-07 H	1	O	1.00E+00	Waste Transfer Leak in	241-SY-B Valve Pit	and/or Connecting Pipe
90 MIRA-EASTH	3.38E-07 H	115	D	5	4.66E-04	Interface Relay	A-EAST Fails to Change State
91 MIRA-WESTH	3.38E-07 H	115	D	5	4.66E-04	Interface Relay	A-WEST Fails to Change State
92 MIRC-EASTH	3.38E-07 H	115	D	5	4.66E-04	Interface Relay	C-EAST Fails to Change State
93 MIRC-WESTH	3.38E-07 H	115	D	5	4.66E-04	Interface Relay	C-WEST Fails to Change State
94 MLDE3150AH	1.00E-09 H	115	D	5	1.38E-06	Leak Detector	LDE-3150A Elements Mechanically Fail
95 MLDE3150_H	1.00E-09 H	115	D	5	1.38E-06	Leak Detector	LDE-3150 Elements Mechanically Fail
96 MLDE3151AH	1.00E-09 H	115	D	5	1.38E-06	Leak Detector	LDE-3151A Elements Mechanically Fail
97 MLDE3151_H	1.00E-09 H	115	D	5	1.38E-06	Leak Detector	LDE-3151 Elements Mechanically Fail
98 MLDE133H	1.00E-09 H	115	D	5	1.38E-06	Leak Detector	LDE-133 Elements Mechanically Fail

NAME	RATE	U	FACTOR	U	C	PROB	DESC
99 MLDLDE144H	1.00E-09	H	115	D	5	1.38E-06	Leak Detector LDE-144 Elements Mechanically Fail
100 MLDLDE145H	1.00E-09	H	115	D	5	1.38E-06	Leak Detector LDE-145 Elements Mechanically Fail
101 MLDLDE184H	1.00E-09	H	115	D	5	1.38E-06	Leak Detector LDE-184 Elements Mechanically Fail
102 MLDLDE201H	1.00E-09	H	115	D	5	1.38E-06	Leak Detector LDE-201 Elements Mechanically Fail
103 MLDLDE221H	1.00E-09	H	115	D	5	1.38E-06	Leak Detector LDE-221 Elements Mechanically Fail
104 MLDLDE227H	1.00E-09	H	115	D	5	1.38E-06	Leak Detector LDE-227 Elements Mechanically Fail
105 MLDLDEAPAH	1.00E-09	H	115	D	5	1.38E-06	Leak Detector LDE-APA Elements Mechanically Fail
106 MLP9ASNCWS	1.60E-12	H	3266000	D	5	6.27E-05	Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,400 ft)
107 MLP9ASNSHS	1.60E-12	H	228850	D	5	4.39E-06	Analog Circuit 9A SN CW Shorts to Another Active Circuit (1990 ft)
108 MLP9BSNCWS	1.60E-12	H	3266000	D	5	6.27E-05	Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,400 ft)
109 MLP9BSNSHS	1.60E-12	H	228850	D	5	4.39E-06	Analog Circuit 9B SN CW Shorts to Another Active Circuit (1990 ft)
110 MLPAP1ACWS	1.60E-12	H	241500	D	5	4.64E-06	Analog Circuit 1A-CW for AP PLC-A Shorts to Another Active Circuit (2100 ft)
111 MLPAP1BCWS	1.60E-12	H	241500	D	5	4.64E-06	Analog Circuit 1B-CW for AP PLC-B Shorts to Another Active Circuit (2100 ft)
112 MLPAP1ACWS	1.60E-12	H	66700	D	5	1.28E-06	Analog Circuit 1A-CW for AW PLC-A Shorts to Another Active Circuit (580 ft)
113 MLPAP1BCWS	1.60E-12	H	66700	D	5	1.28E-06	Analog Circuit 1B-CW for AW PLC-B Shorts to Another Active Circuit (580 ft)
114 MLPAP1ACWS	1.60E-12	H	182850	D	5	3.51E-06	Analog Circuit 1A-CW for AZ PLC-A Shorts to Another Active Circuit (1590 ft)
115 MLPAP1BCWS	1.60E-12	H	182850	D	5	3.51E-06	Analog Circuit 1B-CW for AZ PLC-B Shorts to Another Active Circuit (1590 ft)
116 MLPK-201_S	1.60E-12	H	34500	D	5	6.62E-07	Circuit from K-201 to K-241-AN-PP Shorts to Another Active Circuit (300 ft)
117 MLPK-DB-1S	1.60E-12	H	425500	D	5	8.17E-06	Circuit for K-DB-1 to 252-S PLC-A Shorts to Another Active Loop (3700 ft)
118 MLPK-VS-1S	1.60E-12	H	1437500	D	5	2.76E-05	Circuit for K-VS-1 to 252-S PLC-A Shorts to Another Active Loop (12,500 ft)
119 MLPK201C2S	1.60E-12	H	34500	D	5	6.62E-07	Circuit from K-201C-2 to AN PLC-B Shorts to Another Active Circuit (300 ft)
120 MLPKAPAC2S	1.60E-12	H	11500	D	5	2.21E-07	Circuit from K-APAC-2 to AP PLC-B Shorts to Another Active Circuit (100 ft)
121 MLPKAPC-2S	1.60E-12	H	11500	D	5	2.21E-07	Circuit from K-APC-2 to AP PLC-B Shorts to Another Active Circuit (100 ft)
122 MLPKAZC-2S	1.60E-12	H	46000	D	5	8.83E-07	Circuit from K-AZC-2 to AZ PLC-B Shorts to Another Active Circuit (400 ft)
123 MLPKDB-1AS	1.60E-12	H	425500	D	5	8.17E-06	Circuit from K-DB-1A to 252-S PLC-B Shorts to Another Active Circuit (3700 ft)
124 MLPKSYPPBS	1.60E-12	H	23000	D	5	4.42E-07	Circuit from K-241-SY-PPB to 252S PLC-A/B Shorts to Another Active Loop (200 ft)
125 MLPKVS-1AS	1.60E-12	H	1437500	D	5	2.76E-05	Circuit for K-VS-1A to 252-S PLC-B Shorts to Another Active Circuit (12,500 ft)
126 MLPD1-PPS	1.60E-12	H	23000	D	5	4.42E-07	Circuit from LDI-PP-02A-1 to 252-S PLC-A Shorts to Another Active Circuit(200ft)
127 MLPD1609S	1.60E-12	H	11500	D	5	2.21E-07	Circuit from LDI-609 to AP PLC-A Shorts to Another Active Circuit (100 ft)
128 MLPD1841S	1.60E-12	H	11500	D	5	2.21E-07	Circuit from LDK-184-1 to AP PLC-A Shorts to Another Active Circuit (100 ft)
129 MLPD1843S	1.60E-12	H	11500	D	5	2.21E-07	Circuit from LDK-184-3 to AP PLC-B Shorts to Another Active Circuit (100 ft)
130 MLPD1VPAS	1.60E-12	H	23000	D	5	4.42E-07	Circuit from LDI-VP-SY-A to S252 PLC-A Shorts to Another Active Circuit(200 ft)
131 MLPD3-PPS	1.60E-12	H	23000	D	5	4.42E-07	Circuit from LD3-PP-02A-1 to S252 PLC-B Shorts to Another Active Circuit(200 ft)
132 MLPD3VPAS	1.60E-12	H	23000	D	5	4.42E-07	Circuit from LD3-VP-SY-A to S252 PLC-B Shorts to Another Active Circuit(200 ft)
133 MLPD609AS	1.60E-12	H	11500	D	5	2.21E-07	Circuit from LDK-APA-1 to AP PLC-A Shorts to Another Active Circuit (100 ft)
134 MLPD133S	1.60E-12	H	11500	D	5	2.21E-07	Circuit from LDE-133 Shorts to Another Active Circuit (100 ft)
135 MLPD144S	1.60E-12	H	11500	D	5	2.21E-07	Circuit from LDE-144 Shorts to Another Active Circuit (100 ft)
136 MLPD184S	1.60E-12	H	11500	D	5	2.21E-07	Circuit from LDE-184 Shorts to Another Active Circuit (100 ft)
137 MLPD1609S	1.60E-12	H	11500	D	5	2.21E-07	Circuit from LDI-609 to KLD-SN-ENC-1 Shorts to Another Active Circuit (100 ft)
138 MLPDK133S	1.60E-12	H	11500	D	5	2.21E-07	Circuit for LDK-133 Shorts to Ground (100 ft)
139 MLPDK144S	1.60E-12	H	17250	D	5	3.31E-07	Circuit for LDK-144 Shorts to Ground (150 ft)
140 MLPDK145S	1.60E-12	H	20125	D	5	3.86E-07	Circuit for LDK-145 Shorts to Ground (175 ft)
141 MLPDK184S	1.60E-12	H	11500	D	5	2.21E-07	Circuit from LDK-184 to K-241-AW-PP Shorts to Another Active Circuit (100 ft)
142 MLPDK201S	1.60E-12	H	34500	D	5	6.62E-07	Circuit from LDK-201-1 to AN PLC-A Shorts to Another Active Circuit (300 ft)
143 MLPDKAPAS	1.60E-12	H	11500	D	5	2.21E-07	Circuit from LDK-APA-1 to AP PLC-A Shorts to Another Active Circuit (100 ft)
144 MLPDKAZAS	1.60E-12	H	11500	D	5	2.21E-07	Circuit from LDK-AZ-1 to AP PLC-A Shorts to Another Active Circuit (100 ft)
145 MLPDRCAS	1.60E-12	H	34500	D	5	6.62E-07	Circuit from PLD Cabinet to AN PLC-A Shorts to Another Active Circuit (300 ft)
146 MLPDRCBS	1.60E-12	H	34500	D	5	6.62E-07	Circuit from PLD Cabinet to AN PLC-B Shorts to Another Active Circuit (300 ft)
147 MLPDRC_S	1.60E-12	H	34500	D	5	6.62E-07	Circuit from PLD Cabinet to AN PLC Shorts to Another Active Circuit (300 ft)

NAME	RATE	U	FACTOR	U	C	PROB	DESC
148 MLPSY102AS	1.60E-12	H	23000	D	5	4.42E-07	Circuit for SY-102 02A Pump Permissive A Shorts to Another Active Loop (200 ft)
149 MLPSY102BS	1.60E-12	H	23000	D	5	4.42E-07	Circuit for SY-102 02A Pump Permissive B Shorts to Another Active Loop (200 ft)
150 MREY2011H	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact EY-201-1 Fails to Open (Short, FMD-91 Pg 3-173)
151 MREY2012H	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact EY-201-2 Fails to Open (Short, FMD-91 Pg 3-173)
152 MREYAZ-1H	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact EY-AZ-1 Fails Closed (Short, FMD-91 Pg 3-173)
153 MREYAZ-2H	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact EY-AZ-2 Fails Closed (Short, FMD-91 Pg 3-173)
154 MREK-201_H	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact K-201 Fails Closed (Short, FMD-91 Pg 3-173)
155 MREK-DB-1H	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact K-DB-1 Fails Closed (Short, FMD-91 Pg 3-173)
156 MREK-DB-2H	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact K-DB-2 Fails Closed (Short, FMD-91 Pg 3-173)
157 MREK-DB-3H	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact K-DB-3 Fails Closed (Short, FMD-91 Pg 3-173)
158 MREK-VS-1H	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact K-VS-1 Fails Closed (Short, FMD-91 Pg 3-173)
159 MREK-VS-3H	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact K-VS-3 Fails Closed (Short, FMD-91 Pg 3-173)
160 MREK1ANPH	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact K-241-AN-PP Fails to Open (Short, FMD-91 Pg 3-173)
161 MREK1AWPH	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact K-241-AW-PP Fails Closed (Short, FMD-91 Pg 3-173)
162 MREK201C2H	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact K-201C-2 Fails to Close (Short, FMD-91 Pg 3-173)
163 MREK201C3H	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact K-201C-3 Fails Closed (Short, FMD-91 Pg 3-173)
164 MREK3150AH	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact LDK-3150A Fails Closed (Short, FMD-91 Pg 3-173)
165 MREK3150H	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact LDK-3150 Fails Closed (Short, FMD-91 Pg 3-173)
166 MREK3151AH	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact LDK-3151A Fails Closed (Short, FMD-91 Pg 3-173)
167 MREK3151H	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact LDK-3151 Fails Closed (Short, FMD-91 Pg 3-173)
168 MREKAPC-2H	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact K-APC-2 Fails Closed (Short, FMD-91 Pg 3-173)
169 MREKAPC-3H	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact K-APC-3 Fails Closed (Short, FMD-91 Pg 3-173)
170 MREKAZC-2H	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact K-AZC-2 Fails Closed (Short, FMD-91 Pg 3-173)
171 MREKDB-1AH	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact K-DB-1A Fails Closed (Short, FMD-91 Pg 3-173)
172 MREKDB-2AH	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact K-DB-2A Fails Closed (Short, FMD-91 Pg 3-173)
173 MREKDB-3AH	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact K-DB-3A Fails Closed (Short, FMD-91 Pg 3-173)
174 MREKSYPPAH	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact K-241-SY-PPA Fails to Open (Short, FMD-91 Pg 3-173)
175 MREKSYPPBH	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact K-241-SY-PPB Fails to Open (Short, FMD-91 Pg 3-173)
176 MREKSYPPH	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact K-241-SY-PP Fails to Open (Short, FMD-91 Pg 3-173)
177 MREKVS-1AH	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact K-VS-1A Fails Closed (Short, FMD-91 Pg 3-173)
178 MREKVS-3AH	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact K-VS-3A Fails Closed (Short, FMD-91 Pg 3-173)
179 MRELD1-PPH	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact LDI-PP-02A-1 Fails to Open (Short, FMD-91 Pg 3-173)
180 MRELD1609H	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact LDI-609 Fails to Open (Short, FMD-91 Pg 3-173)
181 MRELD1841H	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact LDK-184-1 Fails to Open (Short, FMD-91 Pg 3-173)
182 MRELD1842H	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact LDK-184-2 Fails to Open (Short, FMD-91 Pg 3-173)
183 MRELD1843H	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact LDK-184-3 Fails to Open (Short, FMD-91 Pg 3-173)
184 MRELD1VPAH	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact LDI-VP-SY-A Fails Closed (Short, FMD-91 Pg 3-173)
185 MRELD1VPBH	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact LDI-VP-SY-B Fails Closed (Short, FMD-91 Pg 3-173)
186 MRELD2-PPH	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact LD2-PP-02A-1 Fails to Open (Short, FMD-91 Pg 3-173)
187 MRELD2VPAH	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact LD2-VP-SY-A Fails Closed (Short, FMD-91 Pg 3-173)
188 MRELD2VPBH	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact LD2-VP-SY-B Fails Closed (Short, FMD-91 Pg 3-173)
189 MRELD3-PPH	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact LD3-PP-02A-1 Fails Closed (Short, FMD-91 Pg 3-173)
190 MRELD3VPAH	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact LD3-VP-02A-A Fails Closed (Short, FMD-91 Pg 3-173)
191 MRELD6091H	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact LD2-609-1 Fails Closed (Short, FMD-91 Pg 3-173)
192 MRELD6092H	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact LD2-609-2 Fails Closed (Short, FMD-91 Pg 3-173)
193 MRELDAP1AH	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact EY-APA-1 Fails Closed (Short, FMD-91 Pg 3-173)
194 MRELDAP2AH	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact EY-APA-2 Fails Closed (Short, FMD-91 Pg 3-173)
195 MRELDK184H	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact LDK-184 Fails Closed (Short, FMD-91 Pg 3-173)
196 MRELDK201H	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact LDK-201-1 Fails Closed (Short, FMD-91 Pg 3-173)

NAME	RATE	U	FACTOR	U	C	PROB	DESC
197 MRELDKAPAH	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact LDK-APA-1 Fails to Open (Short, FMD-91 Pg 3-173)
198 MRELDKAZIH	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact LDK-AZ-1 Fails to Open (Short, FMD-91 Pg 3-173)
199 MRELK3150H	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact LDK-3150 Fails Closed (Short, FMD-91 Pg 3-173)
200 MREMcC-A3H	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)
201 MREWTKA3BH	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)
202 MREWTKA3BH	3.38E-07	H	115	D	5	4.66E-04	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)
203 MVR3150A_N	1.00E-03	N	1	N	1	1.00E-03	Improper Address Verification for LDE-3150A for Transfer Route
204 MVR3150_C	1.00E-04	N	1	N	1	1.00E-04	Improper Address Verification for LDE-3150/A for Transfer Route
205 MVR3150_N	1.00E-03	N	1	N	1	1.00E-03	Improper Address Verification for LDE-3150 for Transfer Route
206 MVR3151A_N	1.00E-03	N	1	N	1	1.00E-03	Improper Address Verification for LDE-3151A for Transfer Route
207 MVR3151_C	1.00E-04	N	1	N	1	1.00E-04	Improper Address Verification for LDE-3151/A for Transfer Route
208 MVR3151_N	1.00E-03	N	1	N	1	1.00E-03	Improper Address Verification for LDE-3151 for Transfer Route
209 MVRLE133N	1.00E-03	N	1	N	1	1.00E-03	Improper Address Verification for LDE-133 for Transfer Route
210 MVRLE144N	1.00E-03	N	1	N	1	1.00E-03	Improper Address Verification for LDE-144 for Transfer Route
211 MVRLE145N	1.00E-03	N	1	N	1	1.00E-03	Improper Address Verification for LDE-145 for Transfer Route
212 MVRLE184N	1.00E-03	N	1	N	1	1.00E-03	Improper Address Verification for LDE-184 for Transfer Route
213 MVRLE201N	1.00E-03	N	1	N	1	1.00E-03	Improper Address Verification for LDE-201 for Transfer Route
214 MVRLE221N	1.00E-03	N	1	N	1	1.00E-03	Improper Address Verification for LDE-221 for Transfer Route
215 MVRLE227N	1.00E-03	N	1	N	1	1.00E-03	Improper Address Verification for LDE-227 for Transfer Route
216 MVRLEAPAN	1.00E-03	N	1	N	1	1.00E-03	Improper Address Verification for LDE-APA for Transfer Route

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NAME	RATE	U	FACTOR	U	C	PROB	DESC
1 MAI242APAI	3.57E-08	H	0.5	Y	3	1.56E-04	Analog Input Module 242-A Channel A Fails to Provide a Change of State
2 MAI242APBI	3.57E-08	H	0.5	Y	3	1.56E-04	Analog Input Module 242-A Channel B Fails to Provide a Change of State
3 MAI242SAI	3.57E-08	H	0.5	Y	3	1.56E-04	Analog Input Module 242-S Channel A Fails to Provide a Change of State
4 MAI242SBI	3.57E-08	H	0.5	Y	3	1.56E-04	Analog Input Module 242-S Channel B Fails to Provide a Change of State
5 MAI252SAI	3.57E-08	H	0.5	Y	3	1.56E-04	Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A
6 MAI252SBI	3.57E-08	H	0.5	Y	3	1.56E-04	Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-B
7 MAIANAPLCI	3.57E-08	H	0.5	Y	3	1.56E-04	Analog Input Module AN PLC-A Fails to Provide a Change of State
8 MAIANBPLCI	3.57E-08	H	0.5	Y	3	1.56E-04	Analog Input Module AN PLC-B Fails to Provide a Change of State
9 MAIAPAPLCI	3.57E-08	H	0.5	Y	3	1.56E-04	Analog Input Module AP PLC-A Fails to Provide a Change of State
10 MAIAPBPLCI	3.57E-08	H	0.5	Y	3	1.56E-04	Analog Input Module AP PLC-B Fails to Provide a Change of State
11 MAIAWAPLCI	3.57E-08	H	0.5	Y	3	1.56E-04	Analog Input Module AW PLC-A Fails to Provide a Change of State
12 MAIAWBPLCI	3.57E-08	H	0.5	Y	3	1.56E-04	Analog Input Module AW PLC-B Fails to Provide a Change of State
13 MAIAZAPLCI	3.57E-08	H	0.5	Y	3	1.56E-04	Analog Input Module AZ PLC-A Fails to Provide a Change of State
14 MAIAZBPLCI	3.57E-08	H	0.5	Y	3	1.56E-04	Analog Input Module AZ PLC-B Fails to Provide a Change of State
15 MAO242APAI	3.57E-08	H	0.5	Y	3	1.56E-04	Analog Output Module 242-A PLC-A Fails to Provide a Change of State
16 MAO242APBI	3.57E-08	H	0.5	Y	3	1.56E-04	Analog Output Module 242-A PLC-B Fails to Provide a Change of State
17 MAO252SAI	3.57E-08	H	0.5	Y	3	1.56E-04	Analog Output Mod 252-S PLC-A Fails to Provide Correct Permissive Signal
18 MAO252SBI	3.57E-08	H	0.5	Y	3	1.56E-04	Analog Output Mod 252-S PLC-B Fails to Provide Correct Permissive Signal
19 MAOANAPLCI	3.57E-08	H	0.5	Y	3	1.56E-04	Analog Output Module ANA PLC-A Fails to Provide a Change of State
20 MAOANBPLCI	3.57E-08	H	0.5	Y	3	1.56E-04	Analog Output Module AN PLC-B Fails to Provide Correct Permissive Signal
21 MAOAPAPLCI	3.57E-08	H	0.5	Y	3	1.56E-04	Analog Output Module AP PLC-A Fails to Provide a Change of State
22 MAOAPBPLCI	3.57E-08	H	0.5	Y	3	1.56E-04	Analog Output Module AP PLC-B Fails to Provide a Change of State
23 MAOAWAPLCI	3.57E-08	H	0.5	Y	3	1.56E-04	Analog Output Module AW PLC-A Fails to Provide a Change of State
24 MAOAWBPLCI	3.57E-08	H	0.5	Y	3	1.56E-04	Analog Output Module AW PLC-B Fails to Provide a Change of State
25 MAOAZAPLCI	3.57E-08	H	0.5	Y	3	1.56E-04	Analog Output Module AZ PLC-A Fails to Provide a Change of State
26 MAOAZBPLCI	3.57E-08	H	0.5	Y	3	1.56E-04	Analog Output Module AZ PLC-B Fails to Provide a Change of State
27 MCP242APAI	7.20E-08	H	0.5	Y	3	3.15E-04	PLC Central Processor 242-A PLC-A Fails to Provide Correct Signal
28 MCP242APBI	7.20E-08	H	0.5	Y	3	3.15E-04	PLC Central Processor 242-A PLC-B Fails to Provide Correct Signal
29 MCP242SAI	7.20E-08	H	0.5	Y	3	3.15E-04	PLC Central Processor 242-S PLC-A Fails to Provide Correct Signal
30 MCP242SBI	7.20E-08	H	0.5	Y	3	3.15E-04	PLC Central Processor 242-S PLC-B Fails to Provide Correct Signal
31 MCP252SAI	7.20E-08	H	0.5	Y	3	3.15E-04	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal
32 MCP252SBI	7.20E-08	H	0.5	Y	3	3.15E-04	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal
33 MCPANAPLCI	7.20E-08	H	0.5	Y	3	3.15E-04	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal
34 MCPANBPLCI	7.20E-08	H	0.5	Y	3	3.15E-04	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal
35 MCPAPAPLCI	7.20E-08	H	0.5	Y	3	3.15E-04	PLC Central Processor APA PLC-A Fails to Provide Correct Signal
36 MCPAPBPLCI	7.20E-08	H	0.5	Y	3	3.15E-04	PLC Central Processor APB PLC-B Fails to Provide Correct Signal
37 MCPAWAPLCI	7.20E-08	H	0.5	Y	3	3.15E-04	PLC Central Processor APA PLC-A Fails to Provide Correct Signal
38 MCPAWBPLCI	7.20E-08	H	0.5	Y	3	3.15E-04	PLC Central Processor AWB PLC-B Fails to Provide Correct Signal
39 MCPAZAPLCI	7.20E-08	H	0.5	Y	3	3.15E-04	PLC Central Processor AZA PLC-A Fails to Provide Correct Signal
40 MCPAZBPLCI	7.20E-08	H	0.5	Y	3	3.15E-04	PLC Central Processor AZB PLC-B Fails to Provide Correct Signal
41 MDI242APAI	1.51E-07	H	0.5	Y	3	6.61E-04	Digital Input Module 242-A Channel A Fails to Provide a Change of State
42 MDI242APBI	1.51E-07	H	0.5	Y	3	6.61E-04	Digital Input Module 242-A Channel B Fails to Provide a Change of State
43 MDO242SAI	1.51E-07	H	0.5	Y	3	6.61E-04	Digital Output Module 242-S PLC-A Fails to Provide Correct Permissive Signal
44 MDO242SBI	1.51E-07	H	0.5	Y	3	6.61E-04	Digital Output Module 242-S PLC-B Fails to Provide Correct Permissive Signal
45 MLP242A1AS	1.60E-12	H	1200	Y	3	1.68E-05	Analog Circuit 1A-CW for 242-A PLC-A Shorts to Another Active Circuit (240 ft)
46 MLP242A1BS	1.60E-12	H	1200	Y	3	1.68E-05	Analog Circuit 1B-CW for 242-A PLC-B Shorts to Another Active Circuit (240 ft)
47 MLP252S1AS	1.60E-12	H	1750	Y	3	2.45E-05	Interface Loop 252-S 1A CW Shorts to Another Active Loop (350 ft)
48 MLP252S1BS	1.60E-12	H	1750	Y	3	2.45E-05	Interface Loop 252-S 1B CW Shorts to Another Active Loop (350 ft)
49 MLP9ASNCWS	1.60E-12	H	142000	Y	3	1.99E-03	Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,400 ft)

CAFTA Database Report MPS-5Year.BE

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NAME	RATE	U	FACTOR	U	C	PROB	DESC
50 MLP9ASNSHS	1.60E-12	H	9950	Y	3	1.39E-04	Analog Circuit 9A SN CW Shorts to Another Active Circuit (1990 ft)
51 MLP9BSNCWS	1.60E-12	H	142000	Y	3	1.99E-03	Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,400 ft)
52 MLP9BSNSHS	1.60E-12	H	9950	Y	3	1.39E-04	Analog Circuit 9B SN CW Shorts to Another Active Circuit (1990 ft)
53 MLPAP1ACWS	1.60E-12	H	10500	Y	3	1.47E-04	Analog Circuit 1A-CW for AP PLC-A Shorts to Another Active Circuit (2100 ft)
54 MLPAP1BCWS	1.60E-12	H	10500	Y	3	1.47E-04	Analog Circuit 1B-CW for AP PLC-B Shorts to Another Active Circuit (2100 ft)
55 MLPAP1ACWS	1.60E-12	H	2900	Y	3	4.06E-05	Analog Circuit 1A-CW for AW PLC-A Shorts to Another Active Circuit (580 ft)
56 MLPAP1BCWS	1.60E-12	H	2900	Y	3	4.06E-05	Analog Circuit 1B-CW for AW PLC-B Shorts to Another Active Circuit (580 ft)
57 MLPAP1ACWS	1.60E-12	H	7950	Y	3	1.11E-04	Analog Circuit 1A-CW for AZ PLC-A Shorts to Another Active Circuit (1590 ft)
58 MLPAP1BCWS	1.60E-12	H	7950	Y	3	1.11E-04	Analog Circuit 1B-CW for AZ PLC-B Shorts to Another Active Circuit (1590 ft)

TYPE	RATE	U	DESC	SOURCE
1 AI I	3.57E-08	H	Analog Input Module @@@@@@ Fails to Provide a Change of State	MIL-HDBK-217F (5.1)
2 AM H	5.00E-06	H	Amplifier Module @@@@@@ Fails	WSRC-TR-93-262 Pg 41
3 AO I	3.57E-08	H	Analog Output Module @@@@@@ Fails to Provide a Change of State	MIL-HDBK-217F (5.1)
4 CA H	1.60E-10	H	Electrical Wire @@@@@@ Fails Open or Shorts (/hr/ft)	IEEE Std 493 Pg 168
5 CN H	2.00E-08	H	Contacts For @@@@@@ Fails Closed	IEEE Std 500 214-13
6 CP I	7.20E-08	H	PLC Central Processor @@@@@@ Fails to Provide Correct Signal	MIL-HDBK-217F (5.3)
7 DI I	1.51E-07	H	Discrete Input Mod @@@@@@ Fails to Provide Correct Signal	MIL-HDBK-217F (13.2)
8 DL N	1.00E-07	H	Improper Downloading of @@@@@@ Address for Transfer Route	Check Sum Failure
9 DO I	1.51E-07	H	Discrete Output Mod @@@@@@ Fails to Provide Correct Permissive	MIL-HDBK-217F (13.2)
10 IR H	3.38E-07	H	Interface Relay @@@@@@ Fails to Change State	RAC NPRD-95 Pg 2-169
11 LD H	1.00E-09	H	Leak Detector @@@@@@ Elements Mechanically Fail	Structural Failure
12 LP S	1.60E-12	H	Interface Loop @@@@@@ Shorts to Another Active Loop (/ft)	IEEE Std 493 Pg 168
13 PB H	3.50E-09	H	Push Button @@@@@@ Fails Closed (Short, FMD-91 Pg 3-219)	RAC NPRD-95 Pg 2-196
14 RE H	3.38E-07	H	Relay/Contact @@@@@@ Fails Closed (Short, FMD-91 Pg 3-173)	RAC NPRD-95 Pg 2-169
15 RE I	5.07E-07	H	Relay/Contact @@@@@@ Fails Open (Open, FMD-91 Pg 3-173)	RAC NPRD-95 Pg 2-169
16 RL H	5.50E-08	H	Relay Latch Switch @@@@@@ Fails Closed (Short, FMD-91 Pg 3-173)	RAC NPRD-95 Pg 2-170
17 RL I	2.75E-07	H	Relay Latch Switch @@@@@@ Fails Open (Open, FMD-91 Pg 3-173)	RAC NPRD-95 Pg 2-170
18 SS H	2.15E-08	H	Selector Switch @@@@@@ Fails Closed (Short, FMD-91 Pg 3-216)	RAC NPRD-95 Pg 2-204
19 VR C	1.00E-04	N	Improper Address Verification for @@@@@@ for Transfer Route CC	Common Cause Beta .1
20 VR N	1.00E-03	N	Improper Address Verification for @@@@@@ for Transfer Route	Human Err Procedure

Failure Rate Frequency Calculations for MPSS Components

PLC Failure Rate Calculation

$$\lambda_p = \lambda_{BD} \pi_{MFG} \pi_T \pi_{CD} + \lambda_{BP} \pi_E \pi_Q \pi_{PT} + \lambda_{EOS} \text{ Failures}/10^6 \text{ hrs}$$

λ_{BD}	=	0.00	Die Base Failure Rate - Not applicable Failure Rate is associated with initial burn in
π_{MFG}	=	2.00	Manufacturing Process Correction Factor
π_T	=	1.00	Temperature Factor Taken to be 1.00
π_{CD}	=	5.20	Die Complexity Correction Factor - F.S. 1.00 - A<.4
λ_{BP}	=	0.0043	Package Base Failure Rate (120 Pins)
π_E	=	0.50	Environment Factor
π_Q	=	1.00	Quality Factor
π_{PT}	=	1.00	Package Type Correction Factor
λ_{EOS}	=	0.07	Electrical Overstress Failure Rate

$$\begin{aligned}\lambda_p &= (0.00 + 0.002 + 0.07)/10^6 \text{ hrs} \\ &= 7.20 \times 10^{-8} / \text{hr}\end{aligned}$$

Ref: MILHDBK-217F Section 5.3 - Microcircuits

Analog Logic Card Failure Rate Calculation

$$\lambda_p = (C_1 \pi_T + C_2 \pi_E) \pi_Q \pi_L \text{ Failures}/10^6 \text{ hrs}$$

C_1	=	0.005	Complexity Failure Rate 101 to 1000
π_T	=	1.00	Temperature Factor Taken to be 1.00
C_2	=	0.0059	Complexity Failure Rate 101 to 1000
π_E	=	5.20	Environment Factor
π_Q	=	1.00	Quality Factor
π_L	=	1.00	Learning Factor - Years in Production >2.0

$$\begin{aligned}\lambda_p &= [(0.005 + 0.031) \times 1 \times 1]/10^6 \text{ hrs} \\ &= 3.57 \times 10^{-8} / \text{hr}\end{aligned}$$

Ref: MILHDBK-217F Section 5.1 Microcircuits, Gate/Logic Arrays
and Microprocessors

Failure Rate Frequency Calculations for MPSS Components

Digital Logic Card Failure Rate Calculation

$$\lambda_p = \lambda_b \pi_Q \pi_E \text{ Failures}/10^6 \text{ hrs}$$

λ_b	=	0.029	Temperature Factor Taken to be 1.00
π_Q	=	5.20	Quality Factor
π_E	=	1.00	Environment Factor

$$\begin{aligned}\lambda_p &= [0.029 \times 5.20 \times 1]/10^6 \text{ hrs} \\ &= 1.51 \times 10^{-7} / \text{hr}\end{aligned}$$

Ref: MILHDBK-217F Section 13.2 Relays, Solid State and Time Delay

MPSS Conduit/Wire Runs Between Tank Farm PLCs

<u>Origin</u>	<u>Destination</u>	<u>Distance</u>
242-S Evaporator Bldg	252-S Substation	350 ft
252-S Substation	241-SY-271 Bldg	200 ft
252-S Substation	Diversion Box 6241-A Booster Pumps LDE-3150/A	3,700 ft
252-S Substation	Vent Station 6241-V LDE-3151/A	12,500 ft
252-S Substation	244-A Inst Enclosure Interface Relay	28,400 ft
	241-AN-271 Instr Bldg ANA-PLC ANB-PLC	30,390 ft
241-AN-271 Inst Bldg ANA-PLC ANB-PLC	241-AZ-271 Inst Bldg AZA-PLC AZB-PLC	1,590 ft
241-AZ-271 Inst Bldg AZA-PLC AZB-PLC	241-AP-271 Inst Bldg APA-PLC APB-PLC	2,100 ft
241-AP-271 Inst Bldg APA-PLC APB-PLC	241-AW-271 Inst Bldg AWA-PLC AWB-PLC	580 ft
241-AW-271 Inst Bldg AWA-PLC AWB-PLC	241-A Evaporator Bldg A242A-PLC A242B-PLC	240 ft

Appendix C

Cutsets and Importance Factors

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Appendix C-1a

Cutsets and Importance Factors for SY-102 Central Pump Pit 02A Phase I

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CUTSET REPORT

.\TREES\MPV-SY.CUT
Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
1) M01000				With H.E.	Without H.E.
1) MIE02A	A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip	1.00E-03	1	1.00E-00	1.00E-03
MVRLDEI133N	Improper Address Verification for LDE-133 for Transfer Route				
2) MIE02A	A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip	1.00E-03	1	1.00E-00	1.00E-03
MREMcC-A3H	Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	4.66E-04
3) MIE02A	A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip	3.38E-07	115	4.66E-04	4.66E-04
MREKSYPPAH	Relay/Contact K-241-SY-PPA Fails to Open (Short, FMD-91 Pg 3-173)				
4) MIE02A	A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip	3.38E-07	115	4.66E-04	4.66E-04
MREKSYPPH	Relay/Contact K-241-SY-PP Fails to Open (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	4.66E-04
5) MIE02A	A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip	3.38E-07	115	4.66E-04	4.66E-04
MREKSYPPBH	Relay/Contact K-241-SY-PPB Fails to Open (Short, FMD-91 Pg 3-173)				
6) MCP252S_AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	3.38E-07	115	4.66E-04	4.66E-04
MCP252S_BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.61E-06
MIE02A	A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip	9.20E-07	115	1.27E-03	1.61E-06
7) MCP252S_BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.61E-06
MIE02A	A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip	9.20E-07	115	1.27E-03	1.61E-06
MREWTKA3AH	Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)				
8) MCP252S_AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	3.38E-07	115	4.66E-04	4.66E-04
MIE02A	A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip	9.20E-07	115	1.27E-03	1.61E-06
MREWTKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	4.66E-04
9) MIE02A	A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip	3.38E-07	115	4.66E-04	4.66E-04
MLPKSYPPBS	Circuit from K-241-SY-PPB to 252S PLC-A/B Shorts to Another Active Loop	1.50E-12	23000	4.42E-07	4.42E-07
10) MIE02A	A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip	1.50E-12	11500	2.21E-07	2.21E-07
MLPLDEI133S	Circuit from LDE-133 Shorts to Another Active Circuit (100 ft)				
11) MIE02A	A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip	1.50E-12	11500	2.21E-07	2.21E-07
MRELD1-PPH	Relay/Contact LD1-PP-02A-1 Fails to Open (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	4.66E-04
MRELD2-PPH	Relay/Contact LD2-PP-02A-1 Fails to Open (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	4.66E-04
12) MIE02A	A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip	3.38E-07	115	4.66E-04	4.66E-04
MREWTKA3AH	Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	4.66E-04
MREWTKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	4.66E-04
13) MIE02A	A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip	1.00E-10	115	1.38E-07	1.38E-07
MLDLDEI133H	Leak Detector LDE-133 Elements Mechanically Fail				
14) MCP252S_BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.23E-07
MDI252S_AI	Digital Input Module Fails to Provide Correct Signal to 252-S PLC-A	7.00E-08	115	9.66E-05	9.66E-05
MIE02A	A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip	9.20E-07	115	1.27E-03	1.23E-07
15) MCP252S_AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	7.00E-08	115	9.66E-05	9.66E-05
MDI252S_BI	Digital Input Module Fails to Provide Correct Signal to 252-S PLC-B	1.00E-07	1	1.00E-00	1.00E-07
MIE02A	A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip	1.00E-07	1	1.00E-00	1.00E-07
MLDLDEI133N	Improper Downloading of LDE-133 Address for Transfer Route				
16) MIE02A	A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip	7.00E-08	115	9.66E-05	4.50E-08
MDI252S_AI	Digital Input Module Fails to Provide Correct Signal to 252-S PLC-A	3.38E-07	115	1.00E+00	1.00E+00
MIE02A	A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip	7.00E-08	115	9.66E-05	4.50E-08
MREWTKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	7.00E-08	115	9.66E-05	4.50E-08
18) MDI252S_BI	Digital Input Module Fails to Provide Correct Signal to 252-S PLC-B	3.38E-07	115	1.00E+00	1.00E+00
MIE02A	A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip	3.38E-07	115	4.66E-04	4.66E-04
MREWTKA3AH	Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)	9.20E-07	115	1.27E-03	3.33E-08
19) MCP252S_AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MD0252S_BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	2.62E-05

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CUTSET REPORT

.\TREES\MPV-SY.CUT
Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MIE02A__A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip			1	1.00E+00	
20) MCP252S_BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	3.33E-08
MD0252S_AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	
MIE02A__A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip			1	1.00E+00	
21) MD0252S_AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	1.22E-08
MIE02A__A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip			1	1.00E+00	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
22) MD0252S_BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	1.22E-08
MIE02A__A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip			1	1.00E+00	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
23) MDI252S_AI Digital Input Module Fails to Provide Correct Signal to 252-S PLC-A		7.00E-08	115	9.66E-05	9.33E-09
MDI252S_BI Digital Input Module Fails to Provide Correct Signal to 252-S PLC-B		7.00E-08	115	9.66E-05	
MIE02A__A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip			1	1.00E+00	
24) MDI252S_AI Digital Input Module Fails to Provide Correct Signal to 252-S PLC-A		7.00E-08	115	9.66E-05	2.53E-09
MD0252S_BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	
MIE02A__A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip			1	1.00E+00	
25) MDI252S_BI Digital Input Module Fails to Provide Correct Signal to 252-S PLC-B		7.00E-08	115	9.66E-05	2.53E-09
MD0252S_AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	
MIE02A__A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip			1	1.00E+00	
26) MD0252S_AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	6.87E-10
MD0252S_BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	
MIE02A__A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip			1	1.00E+00	

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.\TREES\MPV-SY.CUT CUTSET REPORT
 Top event: M01000 Top prob.: 2.87E-03 Sort by: Fussel Vesely

Basic Event Name	Prob	FusVes	Critic	Birbmn	RedW	AchW
MIE02A_A	1.00E+00	1.00E+00	1.00E+00	2.87E-03	2.58E+13	1.00E+00
MVRLDEI33N	1.00E-03	3.48E-01	3.48E-01	9.98E-01	1.53E+00	3.49E+02
MREKSYPPAH	4.66E-04	1.62E-01	1.62E-01	9.98E-01	1.19E+00	3.49E+02
MREKSYPP H	4.66E-04	1.62E-01	1.62E-01	9.98E-01	1.19E+00	3.49E+02
MREKSYPPBH	4.66E-04	1.62E-01	1.62E-01	9.98E-01	1.19E+00	3.49E+02
MREMCC-A3H	4.66E-04	1.62E-01	1.62E-01	9.98E-01	1.19E+00	3.49E+02
MCP252S_AI	1.27E-03	8.20E-04	8.19E-04	1.85E-03	1.00E+00	1.65E+00
MCP252S_BI	1.27E-03	8.20E-04	8.19E-04	1.85E-03	1.00E+00	1.65E+00
MREWTKA3BH	4.66E-04	3.01E-04	3.01E-04	1.85E-03	1.00E+00	1.65E+00
MREWTKA3AH	4.66E-04	3.01E-04	3.01E-04	1.85E-03	1.00E+00	1.65E+00
MLPKSYPPBS	4.42E-07	1.54E-04	1.54E-04	9.97E-01	1.00E+00	3.49E+02
MLPLDEI33S	2.21E-07	7.68E-05	7.68E-05	9.97E-01	1.00E+00	3.49E+02
MRELD2-PPH	4.66E-04	7.56E-05	7.56E-05	4.65E-04	1.00E+00	1.16E+00
MRELD1-PPH	4.66E-04	7.56E-05	7.56E-05	4.65E-04	1.00E+00	1.16E+00
MDI252S_AI	9.66E-05	6.24E-05	6.24E-05	1.85E-03	1.00E+00	1.65E+00
MDI252S_BI	9.66E-05	6.24E-05	6.24E-05	1.85E-03	1.00E+00	1.65E+00
MLDLDEI33H	1.38E-07	4.80E-05	4.80E-05	9.97E-01	1.00E+00	3.49E+02
MDLLDEI33N	1.00E-07	3.48E-05	3.48E-05	9.97E-01	1.00E+00	3.49E+02
MDO252S_AI	2.62E-05	1.69E-05	1.69E-05	1.85E-03	1.00E+00	1.65E+00
MDO252S_BI	2.62E-05	1.69E-05	1.69E-05	1.85E-03	1.00E+00	1.65E+00

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Appendix C-1b

Cutsets and Importance Factors for SY-102 Central Pump Pit 02A Phase II

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CUTSET REPORT

.\TREES\MPV-SYU.CUT
Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
1) M01005					
1) MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip		1.00E-03	1	1.00E+00	1.00E-03
MVRLDEL133N Improper Address Verification for LDE-133 for Transfer Route		1.00E-03	1	1.00E-03	1.00E-03
2) MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip		3.38E-07	115	1.00E+00	4.66E-04
MREMCC-A3H Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	1.61E-06
3) MCP252S_AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
MCP252S_BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip		9.20E-07	115	1.00E+00	5.92E-07
4) MCP252S_AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip		3.38E-07	115	1.00E+00	5.92E-07
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		9.20E-07	115	1.27E-03	5.92E-07
5) MCP252S_BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip		3.38E-07	115	1.00E+00	5.92E-07
MRELD1-PPH Relay/Contact LD1-PP-02A-1 Fails to Open (Short, FMD-91 Pg 3-173)		9.20E-07	115	1.27E-03	5.92E-07
6) MCP252S_AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		3.38E-07	115	1.00E+00	5.92E-07
MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip		9.20E-07	115	1.27E-03	5.92E-07
MRELD2-PPH Relay/Contact LD2-PP-02A-1 Fails to Open (Short, FMD-91 Pg 3-173)		9.20E-07	115	1.00E+00	5.92E-07
7) MCP252S_AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		3.38E-07	115	1.27E-03	5.92E-07
MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip		9.20E-07	115	1.00E+00	5.92E-07
MRELD3-PPH Relay/Contact LD3-PP-02A-1 Fails Closed (Short, FMD-91 Pg 3-173)		9.20E-07	115	1.27E-03	5.92E-07
8) MCP252S_BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		3.38E-07	115	1.00E+00	5.92E-07
MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip		1.74E-07	115	2.40E-04	3.05E-07
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		9.20E-07	115	1.27E-03	3.05E-07
9) MA1252S_AI Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A		1.74E-07	115	2.40E-04	3.05E-07
MCP252S_BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	3.05E-07
MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip		1.74E-07	115	2.40E-04	3.05E-07
10) MA1252S_BI Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-B		9.20E-07	115	1.27E-03	3.05E-07
MCP252S_AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		1.60E-12	11500	1.00E+00	2.21E-07
MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip		3.38E-07	115	1.00E+00	2.21E-07
MRELD1-PPH Relay/Contact LD1-PP-02A-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	1.27E-03	2.21E-07
11) MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip		3.38E-07	115	1.00E+00	2.21E-07
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	1.27E-03	2.21E-07
12) MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip		3.38E-07	115	1.00E+00	2.21E-07
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	1.27E-03	2.21E-07
13) MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip		3.38E-07	115	1.00E+00	2.21E-07
MRELD1-PPH Relay/Contact LD1-PP-02A-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	1.27E-03	2.21E-07
14) MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip		3.38E-07	115	1.00E+00	2.21E-07
MRELD2-PPH Relay/Contact LD2-PP-02A-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	1.27E-03	2.21E-07
15) MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip		3.38E-07	115	1.00E+00	2.21E-07
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	1.27E-03	2.21E-07
16) MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip		3.38E-07	115	1.00E+00	2.21E-07
MRELD1-PPH Relay/Contact LD1-PP-02A-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	1.27E-03	2.21E-07
17) MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip		3.38E-07	115	1.00E+00	2.21E-07
MRELD1-PPH Relay/Contact LD1-PP-02A-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	1.27E-03	2.21E-07

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	PROB.	B.E.	MOD./CS.
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MRELD2-PPH Relay/Contact LD2-PP-02A-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04		
18) MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip			1	1.00E+00		1.38E-07
MDLDEL133H Leak Detector LDE-133 Elements Mechanically Fail		1.00E-10	115	1.38E-07		
19) MAI252S_AI Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A		1.74E-07	115	2.40E-04		1.12E-07
MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip			1	1.00E+00		
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04		1.12E-07
20) MAI252S_AI Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A		1.74E-07	115	2.40E-04		1.12E-07
MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip			1	1.00E+00		
MRELD3-PPH Relay/Contact LD3-PP-02A-1 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04		1.12E-07
21) MAI252S_AI Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A		1.74E-07	115	2.40E-04		1.12E-07
MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip			1	1.00E+00		
MRELD2-PPH Relay/Contact LD2-PP-02A-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04		1.12E-07
22) MAI252S_AI Analog Input Mod Fails to Provide Correct Signal to S252 PLC-B		1.74E-07	115	2.40E-04		1.12E-07
MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip			1	1.00E+00		
MRELD1-PPH Relay/Contact LD1-PP-02A-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04		1.12E-07
23) MAI252S_AI Analog Input Mod Fails to Provide Correct Signal to S252 PLC-B		1.74E-07	115	2.40E-04		1.12E-07
MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip			1	1.00E+00		
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04		1.00E-07
24) MDLDEL133N Improper Downloading of LDE-133 Address for Transfer Route		1.00E-07	1	1.00E+00		
MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip			1	1.00E+00		
25) MAI252S_AI Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A		1.74E-07	115	2.40E-04		5.76E-08
MAI252S_AI Analog Input Mod Fails to Provide Correct Signal to S252 PLC-B		1.74E-07	115	2.40E-04		
MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip			1	1.00E+00		
26) MCP252S_AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03		3.33E-08
MDO252S_AI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05		
MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip			1	1.00E+00		
27) MCP252S_AI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03		3.33E-08
MDO252S_AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05		
MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip			1	1.00E+00		
28) MDO252S_AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05		1.22E-08
MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip			1	1.00E+00		
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04		
29) MDO252S_AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05		1.22E-08
MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip			1	1.00E+00		
30) MRELD2-PPH Relay/Contact LD2-PP-02A-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04		1.22E-08
MDO252S_AI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05		
MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip			1	1.00E+00		
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04		1.22E-08
31) MDO252S_AI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05		
MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip			1	1.00E+00		
32) MRELD1-PPH Relay/Contact LD1-PP-02A-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04		1.22E-08
MDO252S_AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05		
MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip			1	1.00E+00		
33) MRELD3-PPH Relay/Contact LD3-PP-02A-1 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04		6.29E-09
MAI252S_AI Analog Input Mod Fails to Provide Correct Signal to S252 PLC-B		1.74E-07	115	2.40E-04		
MDO252S_AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05		
MIE02A_A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip			1	1.00E+00		

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
34) M0252S_AI Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A		1.74E-07	115	2.40E-04	6.29E-09
M0252S_BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	
MIE02A__A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip		1.00E+00	1	1.00E+00	
35) M0252S_AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	6.87E-10
M0252S_BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	
MIE02A__A Waste Transfer Leak in Central Pump Pit SY-102-02A and/or Connecting Pip		1.00E+00	1	1.00E+00	

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.\TREES\MPV-SYU.CUT
 Top event: M01005
 Top prob.: 1.47E-03
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 Sort by: Fussel Vesely

Basic Event Name	Prob	FusVes	Critic	Birbmn	ReqW	AchW
MIE02A_A	1.00E+00	1.00E+00	1.00E+00	1.47E-03	0.00E+00	1.00E+00
MVRLDEL33N	1.00E-03	6.78E-01	6.78E-01	1.00E+00	3.11E+00	6.79E+02
MEMCC-A3H	4.66E-04	3.16E-01	3.16E-01	9.99E-01	1.46E+00	6.79E+02
MCP252S_AI	1.27E-03	2.52E-03	2.52E-03	2.93E-03	1.00E+00	2.98E+00
MCP252S_BI	1.27E-03	2.12E-03	2.12E-03	2.46E-03	1.00E+00	2.67E+00
MREWTKA3AH	4.66E-04	9.27E-04	9.26E-04	2.93E-03	1.00E+00	2.98E+00
MRELD1-PPH	4.66E-04	9.27E-04	9.26E-04	2.93E-03	1.00E+00	2.98E+00
MRELD2-PPH	4.66E-04	7.80E-04	7.79E-04	2.46E-03	1.00E+00	2.67E+00
MRELD3-PPH	4.66E-04	7.80E-04	7.79E-04	2.46E-03	1.00E+00	2.67E+00
MREWTKA3BH	4.66E-04	7.80E-04	7.79E-04	2.46E-03	1.00E+00	2.67E+00
MAI252S_AI	2.40E-04	4.77E-04	4.77E-04	2.93E-03	1.00E+00	2.99E+00
MAI252S_BI	2.40E-04	4.01E-04	4.01E-04	2.46E-03	1.00E+00	2.67E+00
MLPLDEL33S	2.21E-07	1.50E-04	1.50E-04	9.99E-01	1.00E+00	6.79E+02
MLDLDEL33H	1.38E-07	9.35E-05	9.35E-05	9.99E-01	1.00E+00	6.79E+02
MDLLDEL33N	1.00E-07	6.78E-05	6.78E-05	9.99E-01	1.00E+00	6.79E+02
MDO252S_AI	2.62E-05	5.21E-05	5.21E-05	2.93E-03	1.00E+00	2.99E+00
MDO252S_BI	2.62E-05	4.38E-05	4.38E-05	2.46E-03	1.00E+00	2.67E+00

Appendix C-2a

Cutsets and Importance Factors for 241-SY-A Valve Pit Phase I

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CUTSET REPORT

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
1) M02000					
1) MIESY-AVPA Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe		1.00E-03	1	1.00E+00	1.00E-03
MVRLDE144N Improper Address Verification for LDE-144 for Transfer Route		1.00E-03	1	1.00E-03	1.00E-03
2) MIESY-AVPA Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe		3.38E-07	115	1.00E+00	4.66E-04
MREKSYPPAH Relay/Contact K-241-SY-PPA Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	1.00E+00	4.66E-04
3) MIESY-AVPA Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe		3.38E-07	115	1.00E+00	4.66E-04
MREKSYPPH Relay/Contact K-241-SY-PP Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	1.00E+00	4.66E-04
4) MIESY-AVPA Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe		3.38E-07	115	1.00E+00	4.66E-04
MREMCC-A3H Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	1.00E+00	4.66E-04
5) MIESY-AVPA Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe		3.38E-07	115	1.00E+00	4.66E-04
MREKSYPPBH Relay/Contact K-241-SY-PPB Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	1.00E+00	4.66E-04
6) MCP252S_AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
MCP252S_BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
7) MIESY-AVPA Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe		9.20E-07	115	1.00E+00	5.92E-07
MCP252S_BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
8) MIESY-AVPA Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe		3.38E-07	115	1.00E+00	4.66E-04
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	1.00E+00	4.66E-04
9) MIESY-AVPA Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe		1.60E-12	23000	1.00E+00	4.42E-07
MPLFKSYPPBS Circuit from K-241-SY-PPB to 252S PLC-A/B Shorts to Another Active Loop		1.60E-12	1	1.00E+00	4.42E-07
10) MIESY-AVPA Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe		1.60E-12	11500	1.00E+00	2.21E-07
MPLFDE144S Circuit from LDE-144 Shorts to Another Active Circuit (100 ft)		1.60E-12	1	1.00E+00	2.17E-07
11) MIESY-AVPA Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe		3.38E-07	115	1.00E+00	4.66E-04
MRELD1VPAH Relay/Contact LD1-VP-SY-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	1.00E+00	4.66E-04
12) MIESY-AVPA Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe		3.38E-07	115	1.00E+00	4.66E-04
MRELD2VPAH Relay/Contact LD2-VP-SY-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	1.00E+00	4.66E-04
13) MIESY-AVPA Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe		1.00E-10	115	1.00E+00	1.38E-07
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		1.00E-10	115	1.00E+00	1.38E-07
14) MCP252S_BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.23E-07
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		9.20E-07	115	1.27E-03	1.23E-07
15) MCP252S_AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.00E+00	1.23E-07
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		9.20E-07	115	1.00E+00	1.23E-07
16) MIESY-AVPA Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe		1.00E-07	1	1.00E+00	1.00E-07
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		1.00E-07	1	1.00E+00	1.00E-07
17) MIESY-AVPA Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe		7.00E-08	115	1.00E+00	4.50E-08
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		7.00E-08	115	1.00E+00	4.50E-08
18) MIESY-AVPA Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe		3.38E-07	115	1.00E+00	4.66E-04
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	1.00E+00	4.66E-04
19) MCP252S_AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	3.33E-08
MDO252S_BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	

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CUTSET REPORT

.\TREES\MPV-SYA.CUT
Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MIESY-AVPA Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe					
20) MCP252S_BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	1	1.00E+00	1.00E+00
MDO252S_AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	1.27E-03	3.33E-08
MIESY-AVPA Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe					
21) MDO252S_AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	1.22E-08
MIESY-AVPA Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe					
22) MDO252S_BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		3.38E-07	115	1.00E+00	1.00E+00
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		1.90E-08	115	4.66E-04	1.22E-08
MIESY-AVPA Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe					
23) MDO252S_BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		3.38E-07	115	2.62E-05	1.00E+00
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		7.00E-08	115	1.00E+00	1.00E+00
MDI252S_AI Digital Input Module Fails to Provide Correct Signal to 252-S PLC-A		7.00E-08	115	9.66E-05	9.33E-09
MIESY-AVPA Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe					
24) MDO252S_BI Digital Input Module Fails to Provide Correct Signal to 252-S PLC-B		7.00E-08	115	9.66E-05	9.33E-09
MIESY-AVPA Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe					
25) MDO252S_AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		7.00E-08	115	1.00E+00	2.53E-09
MIESY-AVPA Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe					
26) MDO252S_BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	2.53E-09
MIESY-AVPA Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe					
27) MDO252S_AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	6.87E-10
MIESY-AVPA Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe					
28) MDO252S_BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	2.62E-05
MIESY-AVPA Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe					
29) MDO252S_AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	1.00E+00	1.00E+00

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. \TRES\MPV-SYA.CUT		Top prob.: 2.87E-03		CUTSET REPORT		Sort by: Fussel Vesely	
Top event: M02000		FusVes		Critic		Birbmb	
Basic Event Name	Prob	FusVes		Critic		Birbmb	
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MIESY-AVPA	1.00E+00	1.00E+00	1.00E+00	1.00E+00	2.87E-03	0.00E+00	1.00E+00
MYRLDE144N	1.00E-03	3.48E-01	3.48E-01	3.48E-01	9.98E-01	1.53E+00	3.49E+02
MREKSYPP H	4.66E-04	1.62E-01	1.62E-01	1.62E-01	9.98E-01	1.19E+00	3.49E+02
MREMCC-A3H	4.66E-04	1.62E-01	1.62E-01	1.62E-01	9.98E-01	1.19E+00	3.49E+02
MREKSYPPBH	4.66E-04	1.62E-01	1.62E-01	1.62E-01	9.98E-01	1.19E+00	3.49E+02
MREKSYPPAH	4.66E-04	1.62E-01	1.62E-01	1.62E-01	9.98E-01	1.19E+00	3.49E+02
MCP252S_AI	1.27E-03	8.20E-04	8.19E-04	8.19E-04	1.85E-03	1.00E+00	1.65E+00
MCP252S_BI	1.27E-03	8.20E-04	8.19E-04	8.19E-04	1.85E-03	1.00E+00	1.65E+00
MREWTKA3AH	4.66E-04	3.01E-04	3.01E-04	3.01E-04	1.85E-03	1.00E+00	1.65E+00
MREWTKA3BH	4.66E-04	3.01E-04	3.01E-04	3.01E-04	1.85E-03	1.00E+00	1.65E+00
MLPKSYPPBS	4.42E-07	1.54E-04	1.54E-04	1.54E-04	9.97E-01	1.00E+00	3.49E+02
MLPLDE144S	2.21E-07	7.68E-05	7.68E-05	7.68E-05	9.97E-01	1.00E+00	3.49E+02
MRELD1VPAH	4.66E-04	7.56E-05	7.56E-05	7.56E-05	4.65E-04	1.00E+00	1.16E+00
MRELD2VPAH	4.66E-04	7.56E-05	7.56E-05	7.56E-05	4.65E-04	1.00E+00	1.16E+00
MDI252S_BI	9.66E-05	6.24E-05	6.24E-05	6.24E-05	1.85E-03	1.00E+00	1.65E+00
MDI252S_AI	9.66E-05	6.24E-05	6.24E-05	6.24E-05	1.85E-03	1.00E+00	1.65E+00
MLDLDE144H	1.38E-07	4.80E-05	4.80E-05	4.80E-05	9.97E-01	1.00E+00	3.49E+02
MDLLDE144N	1.00E-07	3.48E-05	3.48E-05	3.48E-05	9.97E-01	1.00E+00	3.49E+02
MDO252S_AI	2.62E-05	1.69E-05	1.69E-05	1.69E-05	1.85E-03	1.00E+00	1.65E+00
MDO252S_BI	2.62E-05	1.69E-05	1.69E-05	1.69E-05	1.85E-03	1.00E+00	1.65E+00

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Appendix C-2b

Cutsets and Importance Factors for 241-SY-A Valve Pit Phase II

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.\TREES\MPV-SYAU.CUT
Filter: 'ALL'
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Filter: 'ALL'	MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
1)	M02005					
1)	MIESY-AVPA Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe					
	MVRUDE144N Improper Address Verification for LDE-144 for Transfer Route					
2)	MIESY-AVPA Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe		1.00E-03	1	1.00E+00	4.70E-04
	MREKCC-A3H Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)					
3)	MC252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		3.38E-07	115	1.00E+00	4.66E-04
	MREKCC-A3H Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)					
4)	MC252S AI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
	MREKCC-A3H Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)					
5)	MIESY-AVPA Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe		9.20E-07	115	1.00E+00	
	MREKCC-A3H Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)					
6)	MC252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
	MREKCC-A3H Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)					
7)	MC252S AI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.00E+00	
	MREKCC-A3H Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)					
8)	MC252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		3.38E-07	115	4.66E-04	
	MREKCC-A3H Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)					
9)	MC252S AI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
	MREKCC-A3H Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)					
10)	MC252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		3.38E-07	115	4.66E-04	
	MREKCC-A3H Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)					
11)	MC252S AI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.00E+00	
	MREKCC-A3H Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)					
12)	MC252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		3.38E-07	115	4.66E-04	
	MREKCC-A3H Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)					
13)	MC252S AI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
	MREKCC-A3H Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)					
14)	MC252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		3.38E-07	115	4.66E-04	
	MREKCC-A3H Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)					
15)	MC252S AI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.00E+00	
	MREKCC-A3H Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)					
16)	MC252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		3.38E-07	115	4.66E-04	
	MREKCC-A3H Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)					
17)	MC252S AI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
	MREKCC-A3H Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)					
18)	MC252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		3.38E-07	115	4.66E-04	
	MREKCC-A3H Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)					
19)	MC252S AI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.00E+00	
	MREKCC-A3H Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)					
20)	MC252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		3.38E-07	115	4.66E-04	
	MREKCC-A3H Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)					
21)	MC252S AI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
	MREKCC-A3H Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)					
22)	MC252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		3.38E-07	115	4.66E-04	
	MREKCC-A3H Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)					
23)	MC252S AI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.00E+00	
	MREKCC-A3H Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)					
24)	MC252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		3.38E-07	115	4.66E-04	

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CUTSET REPORT

.\TREES\MPV-SYAU.CUT
Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MRELD2VPAH	Relay/Contact LD2-VP-SY-A Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	1.38E-07
18) MIESY-AVPA	Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe	1.00E-10	115	1.00E+00	1.38E-07
MLDLDE144H	Leak Detector LDE-144 Elements Mechanically Fail	1.74E-07	115	2.40E-04	1.12E-07
19) MAI252S_AI	Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A	3.38E-07	115	4.66E-04	1.12E-07
MIESY-AVPA	Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe	1.74E-07	115	2.40E-04	1.12E-07
MREWTKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	1.12E-07
20) MAI252S_AI	Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A	1.74E-07	115	1.00E+00	1.12E-07
MIESY-AVPA	Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe	3.38E-07	115	4.66E-04	1.12E-07
MRELD3VPAH	Relay/Contact LD3-VP-02A-A Fails Closed (Short, FMD-91 Pg 3-173)	1.74E-07	115	2.40E-04	1.12E-07
21) MAI252S_AI	Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A	3.38E-07	115	4.66E-04	1.12E-07
MIESY-AVPA	Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe	1.74E-07	115	1.00E+00	1.12E-07
MRELD2VPAH	Relay/Contact LD2-VP-SY-A Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	1.12E-07
22) MAI252S_AI	Analog Input Mod Fails to Provide Correct Signal to S252 PLC-B	1.74E-07	115	2.40E-04	1.12E-07
MIESY-AVPA	Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe	3.38E-07	115	4.66E-04	1.12E-07
MRELD1VPAH	Relay/Contact LD1-VP-SY-A Fails Closed (Short, FMD-91 Pg 3-173)	1.74E-07	115	1.00E+00	1.12E-07
23) MAI252S_AI	Analog Input Mod Fails to Provide Correct Signal to S252 PLC-B	3.38E-07	115	4.66E-04	1.12E-07
MIESY-AVPA	Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe	1.74E-07	115	2.40E-04	1.12E-07
MREWTKA3AH	Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	1.00E-07
24) MDLDEL144N	Improper Downloading of LDE-144 Address for Transfer Route	1.00E-07	115	1.00E+00	1.00E-07
MIESY-AVPA	Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe	1.74E-07	115	2.40E-04	5.76E-08
25) MAI252S_AI	Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A	1.74E-07	115	2.40E-04	1.12E-07
MIESY-AVPA	Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe	9.20E-07	115	1.27E-03	3.33E-08
26) MCP252S_AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	1.90E-08	115	2.62E-05	3.33E-08
MDO252S_AI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	9.20E-07	115	1.27E-03	3.33E-08
MIESY-AVPA	Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe	1.90E-08	115	2.62E-05	1.22E-08
27) MCP252S_AI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MDO252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	1.22E-08
MIESY-AVPA	Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe	3.38E-07	115	4.66E-04	1.22E-08
28) MDO252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	1.22E-08
MIESY-AVPA	Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe	3.38E-07	115	4.66E-04	1.22E-08
29) MRELD2VPAH	Relay/Contact LD2-VP-SY-A Fails Closed (Short, FMD-91 Pg 3-173)	1.90E-08	115	1.00E+00	1.22E-08
MIESY-AVPA	Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe	3.38E-07	115	4.66E-04	1.22E-08
30) MDO252S_AI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	1.22E-08
MREWTKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	1.22E-08
31) MDO252S_AI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	1.22E-08
MIESY-AVPA	Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe	3.38E-07	115	4.66E-04	1.22E-08
32) MRELD1VPAH	Relay/Contact LD1-VP-SY-A Fails Closed (Short, FMD-91 Pg 3-173)	1.90E-08	115	1.00E+00	1.22E-08
MDO252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	3.38E-07	115	4.66E-04	1.22E-08
MIESY-AVPA	Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe	1.90E-08	115	2.62E-05	1.22E-08
33) MRELD3VPAH	Relay/Contact LD3-VP-02A-A Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	6.29E-09
MDO252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.74E-07	115	2.40E-04	6.29E-09
MIESY-AVPA	Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe	1.90E-08	115	2.62E-05	1.00E+00
34) MAI252S_AI	Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A	1.74E-07	115	2.40E-04	6.29E-09

.\TREES\MPV-SYAU.CUT				CUTSET REPORT				8-01-00	9:14	Page	3
Filter: 'ALL'											
MODULE/EVENT NAME		DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.					
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MDO252S_BI		Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05						
MIESY-AVPA		Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe		1	1.00E+00						
35) MDO252S_AI		Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	6.87E-10					
MDO252S_BI		Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05						
MIESY-AVPA		Waste Transfer Leak in 241-SY-A Valve Pit and/or Connecting Pipe		1	1.00E+00						

.\TREES\MPV-SYAU.CUT		Top prob.: 1.47E-03		CUTSET REPORT		Sort by: Fussel Vesely	
Top event: M02005		FusVes		Critic		Birnbm	
Basic Event Name	Prob	-----		-----		-----	
						RedW	AchW
MIESY-AVPA	1.00E+00	1.00E+00	1.00E+00	1.47E-03	0.00E+00	1.00E+00	1.00E+00
MVRLDE144N	1.00E-03	6.78E-01	6.78E-01	1.00E+00	3.11E+00	6.79E+02	6.79E+02
MREMC-A3H	4.66E-04	3.16E-01	3.16E-01	9.99E-01	1.46E+00	6.79E+02	6.79E+02
MCP252S_AI	1.27E-03	2.52E-03	2.52E-03	2.93E-03	1.00E+00	2.98E+00	2.98E+00
MCP252S_BI	1.27E-03	2.12E-03	2.12E-03	2.46E-03	1.00E+00	2.67E+00	2.67E+00
MREWTKA3AH	4.66E-04	9.27E-04	9.26E-04	2.93E-03	1.00E+00	2.98E+00	2.98E+00
MRELD1VPAH	4.66E-04	9.27E-04	9.26E-04	2.93E-03	1.00E+00	2.98E+00	2.98E+00
MRELD2VPAH	4.66E-04	7.80E-04	7.79E-04	2.46E-03	1.00E+00	2.67E+00	2.67E+00
MREWTKA3BH	4.66E-04	7.80E-04	7.79E-04	2.46E-03	1.00E+00	2.67E+00	2.67E+00
MAI252S_AI	2.40E-04	4.77E-04	4.77E-04	2.93E-03	1.00E+00	2.99E+00	2.99E+00
MAI252S_BI	2.40E-04	4.01E-04	4.01E-04	2.46E-03	1.00E+00	2.67E+00	2.67E+00
MLPLDE144S	2.21E-07	1.50E-04	1.50E-04	9.99E-01	1.00E+00	6.79E+02	6.79E+02
MLDLDE144H	1.38E-07	9.35E-05	9.35E-05	9.99E-01	1.00E+00	6.79E+02	6.79E+02
MDLLDE144N	1.00E-07	6.78E-05	6.78E-05	9.99E-01	1.00E+00	6.79E+02	6.79E+02
MDO252S_AI	2.62E-05	5.21E-05	5.21E-05	2.93E-03	1.00E+00	2.99E+00	2.99E+00
MDO252S_BI	2.62E-05	4.38E-05	4.38E-05	2.46E-03	1.00E+00	2.67E+00	2.67E+00

Appendix C-3

Cutsets and Importance Factors for 6241-A Diversion Box Phase I & II

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
1) M03000					
1) MIE6241-AA	Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe	3.38E-07	115	1.00E+00	4.71E-04
MRECC-A3H	Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)			4.66E-04	4.66E-04
2) MIE6241-AA	Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe	1.00E-04	1	1.00E+00	1.00E-04
MVR3150_C	Improper Address Verification for LDE-3150A for Transfer Route Common C			1.00E-04	
3) MCP252S_AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.61E-06
MCP252S_BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	
MIE6241-AA	Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe			1.00E+00	1.00E-06
MVR3150A_N	Improper Address Verification for LDE-3150A for Transfer Route	1.00E-03	1	1.00E+00	
MVR3150_N	Improper Address Verification for LDE-3150 for Transfer Route	1.00E-03	1	1.00E-03	
5) MCP252S_AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.00E-03	5.92E-07
MIE6241-AA	Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe			1.00E+00	
MRETKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
6) MCP252S_BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	5.92E-07
MIE6241-AA	Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe			1.00E+00	
MRETKA3AH	Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
7) MIE6241-AA	Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe			1.00E+00	4.66E-07
MREK3150_H	Relay/Contact LDK-3150 Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
MVR3150A_N	Improper Address Verification for LDE-3150A for Transfer Route	1.00E-03	1	1.00E-03	
8) MIE6241-AA	Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe			1.00E+00	4.66E-07
MREK-DB-2H	Relay/Contact K-DB-2 Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
MVR3150A_N	Improper Address Verification for LDE-3150A for Transfer Route	1.00E-03	1	1.00E-03	
9) MIE6241-AA	Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe			1.00E+00	4.66E-07
MREK3150AH	Relay/Contact LDK-3150A Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
10) MIE6241-AA	Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe			1.00E+00	4.66E-07
MREKDB-1AH	Relay/Contact K-DB-1A Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
MVR3150_N	Improper Address Verification for LDE-3150 for Transfer Route	1.00E-03	1	1.00E-03	
11) MIE6241-AA	Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe			1.00E+00	4.66E-07
MREK-DB-3H	Relay/Contact K-DB-3 Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
MVR3150A_N	Improper Address Verification for LDE-3150A for Transfer Route	1.00E-03	1	1.00E-03	
12) MIE6241-AA	Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe			1.00E+00	4.66E-07
MREK-DB-1H	Relay/Contact K-DB-1 Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
MVR3150A_N	Improper Address Verification for LDE-3150A for Transfer Route	1.00E-03	1	1.00E-03	
13) MIE6241-AA	Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe			1.00E+00	4.66E-07
MREKDB-2AH	Relay/Contact K-DB-2A Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
14) MIE6241-AA	Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe			1.00E+00	4.66E-07
MREKDB-3AH	Relay/Contact K-DB-3A Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
15) MIE6241-AA	Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe			1.00E+00	2.17E-07
MREKDB-2H	Relay/Contact K-DB-2 Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
16) MIE6241-AA	Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe			1.00E+00	2.17E-07
MREKDB-1AH	Relay/Contact K-DB-1A Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
17) MIE6241-AA	Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe			1.00E+00	2.17E-07

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MREK-DB-1H Relay/Contact K-DB-1 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREKDB-1AH Relay/Contact K-DB-1A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
18) MIE6241-AA Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe			1	1.00E+00	2.17E-07
MREK3150_H Relay/Contact LDK-3150 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREKDB-2AH Relay/Contact K-DB-2A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
19) MIE6241-AA Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe			1	1.00E+00	2.17E-07
MREK3150_H Relay/Contact LDK-3150 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREKDB-1AH Relay/Contact K-DB-1A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
20) MIE6241-AA Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe			1	1.00E+00	2.17E-07
MREK-DB-2H Relay/Contact K-DB-2 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREK3150AH Relay/Contact LDK-3150A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
21) MIE6241-AA Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe			1	1.00E+00	2.17E-07
MREK-DB-3H Relay/Contact K-DB-3 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREKDB-1AH Relay/Contact K-DB-1A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
22) MIE6241-AA Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe			1	1.00E+00	2.17E-07
MREK-DB-3H Relay/Contact K-DB-3 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREK3150AH Relay/Contact LDK-3150A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
23) MIE6241-AA Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe			1	1.00E+00	2.17E-07
MREK-DB-3H Relay/Contact K-DB-3 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREKDB-3AH Relay/Contact K-DB-3A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
24) MIE6241-AA Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe			1	1.00E+00	2.17E-07
MREK-DB-3H Relay/Contact K-DB-3 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREKDB-2AH Relay/Contact K-DB-2A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
25) MIE6241-AA Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe			1	1.00E+00	2.17E-07
MREK3150AH Relay/Contact LDK-3150A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREK3150_H Relay/Contact LDK-3150 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
26) MIE6241-AA Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe			1	1.00E+00	2.17E-07
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
27) MIE6241-AA Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe			1	1.00E+00	2.17E-07
MREK-DB-2H Relay/Contact K-DB-2 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREKDB-2AH Relay/Contact K-DB-2A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
28) MIE6241-AA Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe			1	1.00E+00	2.17E-07
MREK-DB-1H Relay/Contact K-DB-1 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREK3150AH Relay/Contact LDK-3150A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
29) MIE6241-AA Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe			1	1.00E+00	2.17E-07
MREK3150_H Relay/Contact LDK-3150 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREKDB-3AH Relay/Contact K-DB-3A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
30) MIE6241-AA Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe			1	1.00E+00	2.17E-07
MREK-DB-1H Relay/Contact K-DB-1 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREKDB-3AH Relay/Contact K-DB-3A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
31) MIE6241-AA Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe			1	1.00E+00	2.17E-07
MREK-DB-1H Relay/Contact K-DB-1 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREKDB-2AH Relay/Contact K-DB-2A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
32) MCP252S_AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.23E-07
MDI252S_BI Digital Input Module Fails to Provide Correct Signal to 252-S PLC-B		7.00E-08	115	9.66E-05	
MIE6241-AA Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe			1	1.00E+00	
33) MCP252S_BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.23E-07

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MDI252S_AI	Digital Input Module Fails to Provide Correct Signal to 252-S PLC-A	7.00E-08	115	9.66E-05	
MIE6241-AA	Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe		1	1.00E+00	
34) MDI252S_AI	Digital Input Module Fails to Provide Correct Signal to 252-S PLC-A	7.00E-08	115	9.66E-05	4.50E-08
MIE6241-AA	Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe		1	1.00E+00	
MREWTKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
35) MDI252S_AI	Digital Input Module Fails to Provide Correct Signal to 252-S PLC-B	7.00E-08	115	9.66E-05	4.50E-08
MIE6241-AA	Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe		1	1.00E+00	
MREWTKA3AH	Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
36) MCP252S_AI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MDI252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE6241-AA	Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe		1	1.00E+00	
37) MCP252S_AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MDI252S_AI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE6241-AA	Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe		1	1.00E+00	
38) MDI252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	1.22E-08
MIE6241-AA	Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe		1	1.00E+00	
MREWTKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
39) MDI252S_AI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	1.22E-08
MIE6241-AA	Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe		1	1.00E+00	
MREWTKA3AH	Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
40) MDI252S_AI	Digital Input Module Fails to Provide Correct Signal to 252-S PLC-A	7.00E-08	115	9.66E-05	9.33E-09
MIE6241-AA	Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe		1	1.00E+00	
41) MDI252S_AI	Digital Input Module Fails to Provide Correct Signal to 252-S PLC-B	7.00E-08	115	9.66E-05	2.53E-09
MDI252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE6241-AA	Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe		1	1.00E+00	
42) MDI252S_AI	Digital Input Module Fails to Provide Correct Signal to 252-S PLC-A	7.00E-08	115	9.66E-05	2.53E-09
MDI252S_AI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE6241-AA	Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe		1	1.00E+00	
43) MDI252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	6.87E-10
MDI252S_AI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE6241-AA	Waste Transfer Leak in 6241-A Diversion Box and/or Connecting Pipe		1	1.00E+00	

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Top event: M03000		Top prob.: 5.78E-04		Sort by: Fussel Vesely		
Basic Event Name	Prob	FusVes	Critic	Birnbm	RedW	AchW
MIE6241-AA	1.00E+00	1.00E+00	1.00E+00	5.78E-04	0.00E+00	1.00E+00
MREMCC-A3H	4.66E-04	8.07E-01	8.07E-01	1.00E+00	5.18E+00	1.73E+03
MVR3150_C	1.00E-04	1.73E-01	1.73E-01	1.00E+00	1.21E+00	1.73E+03
MVR3150A_N	1.00E-03	4.96E-03	4.95E-03	2.86E-03	1.00E+00	5.94E+00
MVR3150_N	1.00E-03	4.96E-03	4.95E-03	2.86E-03	1.00E+00	5.94E+00
MCP252S_BI	1.27E-03	4.08E-03	4.07E-03	1.86E-03	1.00E+00	4.21E+00
MCP252S_AI	1.27E-03	4.08E-03	4.07E-03	1.86E-03	1.00E+00	4.21E+00
MREK-DB-1H	4.66E-04	2.31E-03	2.31E-03	2.86E-03	1.00E+00	5.95E+00
MREK-DB-3H	4.66E-04	2.31E-03	2.31E-03	2.86E-03	1.00E+00	5.95E+00
MREK3150AH	4.66E-04	2.31E-03	2.31E-03	2.86E-03	1.00E+00	5.95E+00
MREKDB-3AH	4.66E-04	2.31E-03	2.31E-03	2.86E-03	1.00E+00	5.95E+00
MREK3150_H	4.66E-04	2.31E-03	2.31E-03	2.86E-03	1.00E+00	5.95E+00
MREKDB-2AH	4.66E-04	2.31E-03	2.31E-03	2.86E-03	1.00E+00	5.95E+00
MREK-DB-2H	4.66E-04	2.31E-03	2.31E-03	2.86E-03	1.00E+00	5.95E+00
MREKDB-1AH	4.66E-04	2.31E-03	2.31E-03	2.86E-03	1.00E+00	5.95E+00
MREWTKA3AH	4.66E-04	1.50E-03	1.50E-03	1.86E-03	1.00E+00	4.21E+00
MREWTKA3BH	4.66E-04	1.50E-03	1.50E-03	1.86E-03	1.00E+00	4.21E+00
MDI252S_AI	9.66E-05	3.10E-04	3.10E-04	1.86E-03	1.00E+00	4.21E+00
MDI252S_BI	9.66E-05	3.10E-04	3.10E-04	1.86E-03	1.00E+00	4.21E+00
MDO252S_BI	2.62E-05	8.42E-05	8.42E-05	1.86E-03	1.00E+00	4.21E+00
MDO252S_AI	2.62E-05	8.42E-05	8.42E-05	1.86E-03	1.00E+00	4.21E+00

Appendix C-4

Cutsets and Importance Factors for 6241-V Vent Station Phase I & II

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CUTSET REPORT

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	PROB.	B.E.	MOD./CS.
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1) M03500						
1) MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe		3.38E-07	115	1.00E+00	4.66E-04	4.66E-04
MREKCC-A3H Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)						
2) MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe		1.00E-04	1	1.00E+00	1.00E-04	1.00E-04
MVR3151_C Improper Address Verification for LDE-3151A for Transfer Route Common C						
3) MCP252S_AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06	1.61E-06
MCP252S_BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06	1.61E-06
MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe						
4) MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe						
MVR3151A_N Improper Address Verification for LDE-3151A for Transfer Route						
MVR3151_N Improper Address Verification for LDE-3151 for Transfer Route		1.00E-03	1	1.00E+00	1.00E-03	1.00E-03
5) MCP252S_AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07	5.92E-07
MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe						
6) MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	5.92E-07	5.92E-07
MCP252S_BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07	5.92E-07
MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe						
7) MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	4.66E-07	4.66E-07
MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe						
8) MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe		3.38E-07	115	4.66E-04	4.66E-07	4.66E-07
MVR3151A_N Improper Address Verification for LDE-3151A for Transfer Route						
MREK-VS-1H Relay/Contact K-VS-1 Fails Closed (Short, FMD-91 Pg 3-173)		1.00E-03	1	1.00E+00	4.66E-07	4.66E-07
9) MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe		3.38E-07	115	4.66E-04	4.66E-07	4.66E-07
MVR3151A_N Improper Address Verification for LDE-3151A for Transfer Route						
MREK3151AH Relay/Contact LDK-3151A Fails Closed (Short, FMD-91 Pg 3-173)		1.00E-03	1	1.00E+00	4.66E-07	4.66E-07
MVR3151_N Improper Address Verification for LDE-3151 for Transfer Route						
10) MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe		3.38E-07	115	4.66E-04	4.66E-07	4.66E-07
MVR3151A_N Improper Address Verification for LDE-3151A for Transfer Route						
11) MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe		3.38E-07	115	4.66E-04	4.66E-07	4.66E-07
MVR3151A_N Improper Address Verification for LDE-3151A for Transfer Route						
12) MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe		3.38E-07	115	4.66E-04	4.66E-07	4.66E-07
MVR3151A_N Improper Address Verification for LDE-3151A for Transfer Route						
13) MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe		3.38E-07	115	4.66E-04	4.66E-07	4.66E-07
MVR3151A_N Improper Address Verification for LDE-3151A for Transfer Route						
14) MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe		3.38E-07	115	4.66E-04	4.66E-07	4.66E-07
MVR3151A_N Improper Address Verification for LDE-3151A for Transfer Route						
15) MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe		3.38E-07	115	4.66E-04	4.66E-07	4.66E-07
MVR3151A_N Improper Address Verification for LDE-3151A for Transfer Route						
16) MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe		3.38E-07	115	4.66E-04	4.66E-07	4.66E-07
MVR3151A_N Improper Address Verification for LDE-3151A for Transfer Route						
17) MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe		3.38E-07	115	4.66E-04	4.66E-07	4.66E-07
MVR3151A_N Improper Address Verification for LDE-3151A for Transfer Route						

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CUTSET REPORT

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Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MREK-VS-1H Relay/Contact K-VS-1 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREK3151AH Relay/Contact LDK-3151A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
18) MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe			1	1.00E+00	2.17E-07
MREK-VS-1H Relay/Contact K-VS-1 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREKVS-1AH Relay/Contact K-VS-1A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
19) MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe			1	1.00E+00	2.17E-07
MREK-VS-3H Relay/Contact K-VS-3 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREKVS-1AH Relay/Contact K-VS-1A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
20) MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe			1	1.00E+00	2.17E-07
MREK-VS-3H Relay/Contact K-VS-3 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREK3151AH Relay/Contact LDK-3151A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
21) MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe			1	1.00E+00	2.17E-07
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
22) MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe			1	1.00E+00	2.17E-07
MREK3151H Relay/Contact LDK-3151 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREKVS-1AH Relay/Contact K-VS-1A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
23) MCP252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.23E-07
MDI252S BI Digital Input Module Fails to Provide Correct Signal to 252-S PLC-B		7.00E-08	115	9.66E-05	
MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe			1	1.00E+00	
24) MCP252S BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.23E-07
MDI252S AI Digital Input Module Fails to Provide Correct Signal to 252-S PLC-A		7.00E-08	115	9.66E-05	
MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe			1	1.00E+00	
25) MDI252S AI Digital Input Module Fails to Provide Correct Signal to 252-S PLC-A		9.20E-07	115	1.27E-03	1.23E-07
MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe			1	1.00E+00	
26) MDI252S BI Digital Input Module Fails to Provide Correct Signal to 252-S PLC-B		7.00E-08	115	9.66E-05	4.50E-08
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe			1	1.00E+00	
27) MCP252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	3.33E-08
MDO252S BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	
MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe			1	1.00E+00	
28) MCP252S BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	3.33E-08
MDO252S AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	
MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe			1	1.00E+00	
29) MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe			1	1.00E+00	2.76E-08
MLPK-VS-1S Circuit for K-VS-1 to 252-S PLC-A Shorts to Another Active Loop (12,500		1.60E-12	1437500	2.76E-05	
MVR3151A Improper Address Verification for IDE-3151A for Transfer Route		1.00E-03	1	1.00E-03	
30) MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe			1	1.00E+00	1.29E-08
MLPK-VS-1S Circuit for K-VS-1 to 252-S PLC-A Shorts to Another Active Loop (12,500		1.60E-12	1437500	2.76E-05	
MREKVS-1AH Relay/Contact K-VS-1A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
31) MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe			1	1.00E+00	1.29E-08
MLPK-VS-1S Circuit for K-VS-1 to 252-S PLC-A Shorts to Another Active Loop (12,500		1.60E-12	1437500	2.76E-05	
MREK3151AH Relay/Contact LDK-3151A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
32) MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe			1	1.00E+00	1.29E-08
MLPK-VS-1S Circuit for K-VS-1 to 252-S PLC-A Shorts to Another Active Loop (12,500		1.60E-12	1437500	2.76E-05	
MREKVS-3AH Relay/Contact K-VS-3A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
33) MDO252S AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	1.22E-08

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CUTSET REPORT

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Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe			1	1.00E+00	
MREWTRX3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
34) MDO252S_BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	1.22E-08
MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe			1	1.00E+00	
MREWTRX3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
35) MDI252S_AI Digital Input Module Fails to Provide Correct Signal to 252-S PLC-A		7.00E-08	115	9.66E-05	9.33E-09
MDI252S_BI Digital Input Module Fails to Provide Correct Signal to 252-S PLC-B		7.00E-08	115	9.66E-05	
MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe			1	1.00E+00	
36) MDI252S_AI Digital Input Module Fails to Provide Correct Signal to 252-S PLC-A		7.00E-08	115	9.66E-05	2.53E-09
MDO252S_BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	
MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe			1	1.00E+00	
37) MDI252S_BI Digital Input Module Fails to Provide Correct Signal to 252-S PLC-B		7.00E-08	115	9.66E-05	2.53E-09
MDO252S_AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	
MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe			1	1.00E+00	
38) MDO252S_AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	6.87E-10
MDO252S_BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	
MIE6241-VA Waste Transfer Leak in 6241-V Vent Station and/or Connecting Pipe			1	1.00E+00	

.\TREES\MPV-VS-CUT		Top prob.: 5.76E-04		CUTSET REPORT		Sort by: Fussel Vesely	
Top event: M03500		FusVes		Critic		Birnbm	
Basic Event Name	Prob	FusVes	Critic	Birnbm	RedW	AchW	
MIE6241-VA	1.00E+00	1.00E+00	1.00E+00	5.76E-04	0.00E+00	1.00E+00	
MREMCC-A3H	4.66E-04	8.10E-01	8.10E-01	1.00E+00	5.27E+00	1.74E+03	
MVR3151_C	1.00E-04	1.74E-01	1.74E-01	1.00E+00	1.21E+00	1.74E+03	
MVR3151A_N	1.00E-03	4.21E-03	4.21E-03	2.42E-03	1.00E+00	5.21E+00	
MVR3151_N	1.00E-03	4.17E-03	4.16E-03	2.40E-03	1.00E+00	5.16E+00	
MCP252S_AI	1.27E-03	4.09E-03	4.09E-03	1.86E-03	1.00E+00	4.22E+00	
MCP252S_BI	1.27E-03	4.09E-03	4.09E-03	1.86E-03	1.00E+00	4.22E+00	
MREKVS-3AH	4.66E-04	1.96E-03	1.96E-03	2.42E-03	1.00E+00	5.21E+00	
MREKVS-1AH	4.66E-04	1.96E-03	1.96E-03	2.42E-03	1.00E+00	5.21E+00	
MREK3151AH	4.66E-04	1.96E-03	1.96E-03	2.42E-03	1.00E+00	5.21E+00	
MREK3151_H	4.66E-04	1.94E-03	1.94E-03	2.40E-03	1.00E+00	5.16E+00	
MREK-VS-1H	4.66E-04	1.94E-03	1.94E-03	2.40E-03	1.00E+00	5.16E+00	
MREK-VS-3H	4.66E-04	1.94E-03	1.94E-03	2.40E-03	1.00E+00	5.16E+00	
MREWTKA3AH	4.66E-04	1.50E-03	1.50E-03	1.86E-03	1.00E+00	4.22E+00	
MREWTKA3BH	4.66E-04	1.50E-03	1.50E-03	1.86E-03	1.00E+00	4.22E+00	
MDI252S_AI	9.66E-05	3.12E-04	3.11E-04	1.86E-03	1.00E+00	4.22E+00	
MDI252S_BI	9.66E-05	3.12E-04	3.11E-04	1.86E-03	1.00E+00	4.22E+00	
MLPK-VS-1S	2.76E-05	1.15E-04	1.15E-04	2.40E-03	1.00E+00	5.16E+00	
MD0252S_AI	2.62E-05	8.46E-05	8.45E-05	1.86E-03	1.00E+00	4.22E+00	
MD0252S_BI	2.62E-05	8.46E-05	8.45E-05	1.86E-03	1.00E+00	4.22E+00	

Appendix C-5

Cutsets and Importance Factors for AN-101 Central Pump Pit 01A Phase I & II

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CUTSET REPORT

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Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	With H.E. *1.51E-03	Without H.E. 4.84E-04
1) M04000					
1) MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi		1.00E-03	1	1.00E+00	1.00E-03
MVRLDE201N Improper Address Verification for LDE-201 for Transfer Route					
2) MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi		3.38E-07	115	1.00E+00	4.66E-04
MREMcC-A3H Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)					
3) MAMEY201_H Amplifier Module EY-201-1/2 Fails		5.00E-06	115	4.66E-04	8.71E-06
MCANAPLCI PLC Central Processor ANA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi		5.00E-06	115	1.00E+00	8.71E-06
MC252S_AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi		5.00E-06	115	1.00E+00	3.20E-06
5) MAMEY201_H Amplifier Module EY-201-1/2 Fails		3.38E-07	115	1.00E+00	
MRELDK201H Relay/Contact LDK-201-1 Fails Closed (Short, FMD-91 Pg 3-173)		5.00E-06	115	4.66E-04	3.20E-06
MAMEY201_H Amplifier Module EY-201-1/2 Fails		1.74E-07	115	6.87E-03	1.65E-06
6) MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi		5.00E-06	115	1.00E+00	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	1.27E-03	1.61E-06
MAMEY201_H Amplifier Module EY-201-1/2 Fails		9.20E-07	115	1.00E+00	
8) MC252S_AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
MCANBPPLCI PLC Central Processor ANB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.00E+00	
9) MC252S_AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
MC252S_BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi		9.20E-07	115	1.00E+00	1.61E-06
MC252S_BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
MCANAPLCI PLC Central Processor ANA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.00E+00	
10) MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi		9.20E-07	115	1.27E-03	1.61E-06
MC252S_BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
MCANBPPLCI PLC Central Processor ANB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.00E+00	
11) MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi		5.00E-06	115	6.87E-03	6.63E-07
MAMEY201_H Amplifier Module EY-201-1/2 Fails		7.00E-08	115	9.66E-05	
MDANAPLCI Digital Input Module Fails to Provide Correct Signal to AN PLC-A		9.20E-07	115	1.00E+00	5.92E-07
13) MC252S_BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi		3.38E-07	115	4.66E-04	5.92E-07
MRELDK201H Relay/Contact LDK-201-1 Fails Closed (Short, FMD-91 Pg 3-173)		9.20E-07	115	1.27E-03	
14) MCANAPLCI PLC Central Processor ANA PLC-A Fails to Provide Correct Signal		3.38E-07	115	1.00E+00	
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi		9.20E-07	115	4.66E-04	5.92E-07
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		9.20E-07	115	1.27E-03	
15) MCANAPLCI PLC Central Processor ANA PLC-A Fails to Provide Correct Signal		3.38E-07	115	1.00E+00	
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi		9.20E-07	115	4.66E-04	5.92E-07
MREK201C2H Relay/Contact K-201C-2 Fails to Close (Short, FMD-91 Pg 3-173)		9.20E-07	115	1.27E-03	
16) MCANBPPLCI PLC Central Processor ANB PLC-B Fails to Provide Correct Signal		3.38E-07	115	1.00E+00	
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi		9.20E-07	115	4.66E-04	5.92E-07
MRELDK201H Relay/Contact LDK-201-1 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	1.27E-03	
17) MCANBPPLCI PLC Central Processor ANB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.00E+00	

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CUTSET REPORT

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Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
18) MCP252S_AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
19) MCP252S_AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails to Provide Correct Signal		3.38E-07	115	4.66E-04	
20) MCP252S_AI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
21) MAMEY201_H Amplifier Module EY-201-1/2 Fails		5.00E-06	115	6.87E-03	4.31E-07
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		1.60E-12	3266000	6.27E-05	
22) MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails to Close (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
23) MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi		3.38E-07	115	4.66E-04	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	1.00E+00	2.17E-07
24) MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails to Close (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
25) MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi		3.38E-07	115	4.66E-04	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	1.00E+00	2.17E-07
26) MAMEY201_H Amplifier Module EY-201-1/2 Fails		3.38E-07	115	4.66E-04	
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
27) MAMEY201_H Amplifier Module EY-201-1/2 Fails		5.00E-06	115	6.87E-03	1.80E-07
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi		1.90E-08	115	2.62E-05	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails to Provide Correct Permissive Si			1	1.00E+00	
28) MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi		5.00E-06	115	6.87E-03	1.80E-07
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		1.90E-08	115	2.62E-05	
29) MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails to Provide Correct Signal		1.00E-10	115	1.38E-07	1.38E-07
30) MCP252S_AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.23E-07
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi		7.00E-08	115	9.66E-05	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails to Provide Correct Signal			1	1.00E+00	
31) MCP252S_AI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.23E-07
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi		7.00E-08	115	9.66E-05	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails to Provide Correct Signal			1	1.00E+00	
32) MCP252S_AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.23E-07
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi		7.00E-08	115	9.66E-05	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails to Provide Correct Signal			1	1.00E+00	
33) MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi		9.20E-07	115	1.27E-03	1.23E-07
MREWTKA3AH Relay/Contact WT-K-A3-A Fails to Provide Correct Signal		7.00E-08	115	9.66E-05	
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails to Provide Correct Signal		1.74E-07	115	2.40E-04	1.12E-07
34) MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	

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CUTSET REPORT

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MRK201C2H Relay/Contact K-201C-2 Fails to Close (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
34) MAI252S AI Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A		1.74E-07	115	2.40E-04	1.12E-07
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
MREWTK3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
35) MAI252S BI Analog Input Mod Fails to Provide Correct Signal to S252 PLC-B		1.74E-07	115	2.40E-04	1.12E-07
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
MREWTK3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
36) MAI252S BI Analog Input Mod Fails to Provide Correct Signal to S252 PLC-B		1.74E-07	115	2.40E-04	1.12E-07
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
MRELDK201H Relay/Contact LDK-201-1 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
37) MDLDE201N Improper Downloading of LDE-201 Address for Transfer Route		1.00E-07	1	1.00E-07	1.00E-07
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
38) MAOANBP1CI Analog Output Module AN PLC-B Fails to Provide Correct Permissive Signal		9.80E-08	115	1.35E-04	6.31E-08
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
MRELDK201H Relay/Contact LDK-201-1 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
39) MAOANBP1CI Analog Output Module AN PLC-B Fails to Provide Correct Permissive Signal		9.80E-08	115	1.35E-04	6.31E-08
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
MREWTK3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
40) MDIANBP1CI Digital Input Module Fails to Provide Correct Signal to AN PLC-B		7.00E-08	115	9.66E-05	4.50E-08
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
MREWTK3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
41) MDIANBP1CI Digital Input Module Fails to Provide Correct Signal to AN PLC-A		7.00E-08	115	9.66E-05	4.50E-08
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
MREK201C2H Relay/Contact K-201C-2 Fails to Close (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
42) MDIANBP1CI Digital Input Module Fails to Provide Correct Signal to AN PLC-A		7.00E-08	115	9.66E-05	4.50E-08
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
MREWTK3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
43) MDIANBP1CI Digital Input Module Fails to Provide Correct Signal to AN PLC-B		7.00E-08	115	9.66E-05	4.50E-08
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
MRELDK201H Relay/Contact LDK-201-1 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
44) MCPANAP1CI PLC Central Processor ANA PLC-A Fails to Provide Correct Permissive Si		9.20E-07	115	1.27E-03	3.33E-08
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
45) MCP252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		1.90E-08	115	2.62E-05	
MDO252S BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si			1	1.00E+00	
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
46) MCP252S BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	3.33E-08
MDOANAP1CI Discrete Output Mod AN PLC-A Fails to Provide Correct Permissive		1.90E-08	115	2.62E-05	
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
47) MCP252S BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	3.33E-08
MDO252S AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si			1	1.00E+00	
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
48) MCPANBP1CI PLC Central Processor ANB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	3.33E-08
MDO252S AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si			1	1.00E+00	
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
49) MCPANBP1CI PLC Central Processor ANB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	3.33E-08
MDOANAP1CI Discrete Output Mod AN PLC-A Fails to Provide Correct Permissive		1.90E-08	115	2.62E-05	
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
50) MAMEY201_H Amplifier Module EY-201-1/2 Fails		5.00E-06	115	6.87E-03	3.02E-08
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
MLP9ASNSHS Analog Circuit 9A SN CW Shorts to Another Active Circuit (1990 ft)		1.60E-12	228850	4.39E-06	
51) MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	2.92E-08
MLP9BSNCWS Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,		1.60E-12	3266000	6.27E-05	
MRELDRK201H Relay/Contact LDK-201-1 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
52) MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	2.92E-08
MLP9ASNCWS Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,		1.60E-12	3266000	6.27E-05	
MREK201C2H Relay/Contact K-201C-2 Fails to Close (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
53) MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	2.92E-08
MLP9BSNCWS Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,		1.60E-12	3266000	6.27E-05	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
54) MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	2.92E-08
MLP9ASNCWS Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,		1.60E-12	3266000	6.27E-05	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
55) MAI252S AI Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A			1	1.00E+00	2.32E-08
MDIANBP1CI Digital Input Module Fails to Provide Correct Signal to AN PLC-B		1.74E-07	115	2.40E-04	
56) MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	2.32E-08
MDIANBP1CI Digital Input Module Fails to Provide Correct Signal to AN PLC-A		7.00E-08	115	9.66E-05	
57) MAOANBP1CI Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	1.31E-08
MDIANBP1CI Digital Input Module Fails to Provide Correct Signal to AN PLC-B		1.90E-08	115	2.62E-05	
58) MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	1.22E-08
MDO252S AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		3.38E-07	115	4.66E-04	
59) MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	1.22E-08
MDO252S BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	
60) MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	1.22E-08
MRELDRK201H Relay/Contact LDK-201-1 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
61) MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	1.22E-08
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
62) MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	1.22E-08
MDO252S BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	
63) MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	1.22E-08
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
64) MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	9.33E-09
MDO252S BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	
65) MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	6.29E-09
MDO252S BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	
MIEAN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	

CUTSET REPORT

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
66) MAI252S_BI Analog Input Mod Fails to Provide Correct Signal to S252 PLC-B		1.74E-07	115	2.40E-04	6.29E-09
MDO252S_AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	
MIEN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
67) MAI252S_BI Analog Input Mod Fails to Provide Correct Signal to S252 PLC-B		1.74E-07	115	2.40E-04	6.29E-09
MDOANAPLCI Discrete Output Mod AN PLC-A Fails to Provide Correct Permissive		1.90E-08	115	2.62E-05	
MIEN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
68) MDIANAPLCI Digital Input Module Fails to Provide Correct Signal to AN PLC-A		7.00E-08	115	9.66E-05	6.06E-09
MIEN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
MLP9BSNCWS Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,		1.60E-12	3266000	6.27E-05	
MDIANBPLCI Digital Input Module Fails to Provide Correct Signal to AN PLC-B		7.00E-08	115	9.66E-05	6.06E-09
MIEN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
69) MDOANAPLCI Discrete Output Mod AN PLC-A Fails to Provide Correct Permissive		1.60E-12	3266000	6.27E-05	
MLP9ASNCWS Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,		9.80E-08	115	1.35E-04	3.55E-09
MDOANBPLCI Analog Output Module AN PLC-B Fails to Provide Correct Permissive Signal		1.90E-08	115	2.62E-05	
MIEN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
70) MAOANBPLCI Analog Output Module AN PLC-B Fails to Provide Correct Permissive Signal		9.80E-08	115	1.35E-04	3.55E-09
MDO252S_AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	
MIEN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
71) MDOANAPLCI Discrete Output Mod AN PLC-A Fails to Provide Correct Permissive		7.00E-08	115	9.66E-05	2.53E-09
MDO252S_BI Digital Input Module Fails to Provide Correct Signal to AN PLC-A		1.90E-08	115	2.62E-05	
MIEN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
72) MDOANAPLCI Discrete Output Mod AN PLC-A Fails to Provide Correct Permissive		7.00E-08	115	9.66E-05	2.53E-09
MDO252S_BI Digital Input Module Fails to Provide Correct Signal to AN PLC-B		1.90E-08	115	2.62E-05	
MIEN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
73) MDIANBPLCI Digital Input Module Fails to Provide Correct Signal to AN PLC-B		7.00E-08	115	9.66E-05	2.53E-09
MDOANAPLCI Discrete Output Mod AN PLC-A Fails to Provide Correct Permissive		1.90E-08	115	2.62E-05	
MIEN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
74) MDOANAPLCI Discrete Output Mod AN PLC-A Fails to Provide Correct Permissive		7.00E-08	115	9.66E-05	2.53E-09
MDO252S_BI Digital Input Module Fails to Provide Correct Signal to AN PLC-B		1.90E-08	115	2.62E-05	
MIEN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
75) MDIANBPLCI Digital Input Module Fails to Provide Correct Signal to AN PLC-B		7.00E-08	115	9.66E-05	2.53E-09
MDOANAPLCI Discrete Output Mod AN PLC-A Fails to Provide Correct Permissive		1.90E-08	115	2.62E-05	
MIEN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
76) MDO252S_AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.60E-12	3266000	6.27E-05	
MLP9ASNCWS Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,		1.90E-08	115	2.62E-05	1.64E-09
MIEN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
77) MDOANAPLCI Discrete Output Mod AN PLC-A Fails to Provide Correct Permissive		1.60E-12	3266000	6.27E-05	
MDOANAPLCI Discrete Output Mod AN PLC-A Fails to Provide Correct Permissive		1.90E-08	115	2.62E-05	1.64E-09
MIEN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
78) MDIANBPLCI Digital Input Module Fails to Provide Correct Signal to AN PLC-B		1.60E-12	3266000	6.27E-05	
MLP9BSNCWS Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,		1.90E-08	115	2.62E-05	6.87E-10
MDO252S_BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	
MIEN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	
79) MDO252S_BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	6.87E-10
MDOANAPLCI Discrete Output Mod AN PLC-A Fails to Provide Correct Permissive		1.90E-08	115	2.62E-05	
MIEN101AA Waste Transfer Leak in AN-1010 Central Pump Pit 01A and/or Connecting Pi			1	1.00E+00	

.\TREES\MPV-AN.CUT		CUTSET REPORT				
Top event: M04000		Top prob.: 1.51E-03		Sort by: Fussel Vesely		
Basic Event Name	Prob	FusVes	Critic	Birbmn	RedW	AchW
MIFAN101AA	1.00E+00	1.00E+00	1.00E+00	1.51E-03	0.00E+00	1.00E+00
MVRUDE201N	1.00E-03	6.63E-01	6.63E-01	9.99E-01	2.97E+00	6.64E+02
MREMCC-A3H	4.66E-04	3.09E-01	3.09E-01	9.99E-01	1.45E+00	6.64E+02
MAMEY201_H	6.87E-03	1.79E-02	1.78E-02	3.91E-03	1.02E+00	3.58E+00
MCP252S_AI	1.27E-03	8.79E-03	8.77E-03	1.04E-02	1.01E+00	7.90E+00
MCFANAPLCI	1.27E-03	8.79E-03	8.77E-03	1.04E-02	1.01E+00	7.90E+00
MRELDK201H	4.66E-04	3.37E-03	3.36E-03	1.08E-02	1.00E+00	8.20E+00
MREWTKA3AH	4.66E-04	3.37E-03	3.36E-03	1.08E-02	1.00E+00	8.20E+00
MCP252S_BI	1.27E-03	3.04E-03	3.04E-03	3.61E-03	1.00E+00	3.39E+00
MCFANAPLCI	1.27E-03	3.04E-03	3.04E-03	3.61E-03	1.00E+00	3.39E+00
MAI252S_AI	2.40E-04	1.26E-03	1.26E-03	7.90E-03	1.00E+00	6.24E+00
MREK201C2H	4.66E-04	1.21E-03	1.21E-03	3.91E-03	1.00E+00	3.59E+00
MREWTKA3BH	4.66E-04	1.21E-03	1.21E-03	3.91E-03	1.00E+00	3.59E+00
MDIANAPLCI	9.66E-05	6.98E-04	6.95E-04	1.08E-02	1.00E+00	8.20E+00
MLP9ASNCWS	6.27E-05	3.29E-04	3.29E-04	7.90E-03	1.00E+00	6.25E+00
MDIANBPLCI	9.66E-05	2.51E-04	2.51E-04	3.91E-03	1.00E+00	3.59E+00
MD0252S_AI	2.62E-05	1.89E-04	1.89E-04	1.08E-02	1.00E+00	8.20E+00
MD0ANAPLCI	2.62E-05	1.89E-04	1.89E-04	1.08E-02	1.00E+00	8.20E+00
MAI252S_BI	2.40E-04	1.72E-04	1.72E-04	1.08E-03	1.00E+00	1.72E+00
MA0ANBPLCI	1.35E-04	9.69E-05	9.69E-05	1.08E-03	1.00E+00	1.72E+00
MLDI2E201H	1.38E-07	9.14E-05	9.14E-05	9.98E-01	1.00E+00	6.64E+02
MD0252S_BI	2.62E-05	6.81E-05	6.80E-05	3.91E-03	1.00E+00	3.59E+00
MDLLDE201N	1.00E-07	6.63E-05	6.63E-05	9.98E-01	1.00E+00	6.64E+02
MLP9BSNCWS	6.27E-05	4.49E-05	4.49E-05	1.08E-03	1.00E+00	1.72E+00
MLP9ASNSHS	4.39E-06	2.00E-05	2.00E-05	6.86E-03	1.00E+00	5.55E+00

Appendix C-6

Cutsets and Importance Factors for 241-AZ Valve Pit Phase I & II

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CUTSET REPORT

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
1) M04500					
1) MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1.00E-03	1	1.00E+00	1.00E-03
2) MVRLE221N Improper Address Verification for IDE-221 for Transfer Route		1.00E-03	1	1.00E-03	1.00E-03
2) MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		3.38E-07	115	1.00E+00	4.66E-04
3) MREMCC-A3H Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)		5.00E-06	115	4.66E-04	8.71E-06
3) MAMEYA212H Amplifier Module EY-AZ-1/2 Fails to Trip		9.20E-07	115	6.87E-03	1.27E-03
3) MCPANAPLCI PLC Central Processor ANA PLC-A Fails to Provide Correct Signal		5.00E-06	115	1.00E+00	8.71E-06
4) MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		9.20E-07	115	1.27E-03	1.27E-03
4) MAMEYA212H Amplifier Module EY-AZ-1/2 Fails to Trip		5.00E-06	115	1.00E+00	8.71E-06
4) MCPAZAPLCI PLC Central Processor AZA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.27E-03
5) MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		5.00E-06	115	6.87E-03	8.71E-06
5) MAMEYA212H Amplifier Module EY-AZ-1/2 Fails to Trip		9.20E-07	115	1.27E-03	1.27E-03
5) MCP252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		5.00E-06	115	1.00E+00	8.71E-06
6) MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		5.00E-06	115	6.87E-03	3.20E-06
6) MAMEYA212H Amplifier Module EY-AZ-1/2 Fails to Trip		1.00E+00	1	1.00E+00	1.00E+00
7) MRELDKAZ1H Relay/Contact LDK-AZ-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	8.71E-06
7) MAMEYA212H Amplifier Module EY-AZ-1/2 Fails to Trip		5.00E-06	115	6.87E-03	3.20E-06
8) MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		3.38E-07	115	1.00E+00	8.71E-06
8) MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		1.74E-07	115	2.40E-04	1.65E-06
8) MAI252S AI Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A		5.00E-06	115	6.87E-03	1.65E-06
9) MAMEYA212H Amplifier Module EY-AZ-1/2 Fails to Trip		1.00E+00	1	1.00E+00	1.00E+00
9) MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1.74E-07	115	2.40E-04	1.65E-06
9) MAIANAPLCI Analog Input Module AN PLC-A Fails to Provide a Change of State		5.00E-06	115	6.87E-03	1.65E-06
10) MAMEYA212H Amplifier Module EY-AZ-1/2 Fails to Trip		9.20E-07	115	1.00E+00	1.61E-06
10) MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		9.20E-07	115	1.27E-03	1.61E-06
10) MCPANAPLCI PLC Central Processor ANA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
10) MCPAZBPLCI PLC Central Processor AZB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
11) MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		9.20E-07	115	1.00E+00	1.61E-06
11) MCPANBPLCI PLC Central Processor ANB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
11) MCPAZAPLCI PLC Central Processor AZA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
12) MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		9.20E-07	115	1.00E+00	1.61E-06
12) MCPAZBPLCI PLC Central Processor AZB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
13) MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		9.20E-07	115	1.27E-03	1.61E-06
13) MCP252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
13) MCPANBPLCI PLC Central Processor ANB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
14) MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		9.20E-07	115	1.00E+00	1.61E-06
14) MCP252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
14) MCPAZBPLCI PLC Central Processor AZB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
15) MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		9.20E-07	115	1.00E+00	1.61E-06
15) MCP252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
15) MCP252S BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
16) MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		9.20E-07	115	1.00E+00	1.61E-06
16) MCP252S BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
16) MCPAZAPLCI PLC Central Processor AZA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
17) MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		9.20E-07	115	1.00E+00	1.61E-06
17) MCP252S BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06

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CUTSET REPORT

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
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MCPANAPLCI PLC Central Processor ANA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
18) MCPANAPLCI PLC Central Processor ANA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
MCPANBPLCI PLC Central Processor ANB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
19) NAMEYAZI2H Amplifier Module EY-AZ-1/2 Fails to Trip		5.00E-06	115	6.87E-03	9.29E-07
MAOAZAPLCI Analog Output Module AZ PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
20) NAMEYAZI2H Amplifier Module EY-AZ-1/2 Fails to Trip		5.00E-06	115	6.87E-03	9.29E-07
MAOANAPLCI Analog Output Module ANA PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
21) NAMEYAZI2H Amplifier Module EY-AZ-1/2 Fails to Trip		5.00E-06	115	6.87E-03	6.63E-07
MDIAZAPLCI Digital Input Module AZ PLC-A Fails to Provide a Change of State		7.00E-08	115	9.66E-05	
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
22) MCPAZBPLCI PLC Central Processor AZB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
MRELDKAZI1H Relay/Contact LDK-AZ-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
23) MCPAZBPLCI PLC Central Processor AZB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
24) MCP252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
MREKAZC-2H Relay/Contact K-AZC-2 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
25) MCP252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
26) MCP252S BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
27) MCP252S BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
MRELDKAZI1H Relay/Contact LDK-AZ-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
28) MCPANAPLCI PLC Central Processor ANA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
MREKAZC-2H Relay/Contact K-AZC-2 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
29) MCPANAPLCI PLC Central Processor ANA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
30) MCPANBPLCI PLC Central Processor ANB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
31) MCPANBPLCI PLC Central Processor ANB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
MRELDKAZI1H Relay/Contact LDK-AZ-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
32) MCPAZAPLCI PLC Central Processor AZA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
33) MCPAZAPLCI PLC Central Processor AZA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	PROB.	PROB.
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	
MREKAZC-2H	Relay/Contact K-AZC-2 Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
34) MAMEYAZ12H	Amplifier Module EX-AZ-1/2 Fails to Trip	5.00E-06	115	6.87E-03	4.31E-07
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	
MIEP9ASNCWS	Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,	1.60E-12	3266000	6.27E-05	2.17E-07
35) MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	
MREKAZC-2H	Relay/Contact K-AZC-2 Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
MRELDKAZ1H	Relay/Contact LDK-AZ-1 Fails to Open (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
36) MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	
MRELDKAZ1H	Relay/Contact LDK-AZ-1 Fails to Open (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
MREWTKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
37) MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	
MREWTKA3AH	Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
MREWTKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
38) MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	
MREKAZC-2H	Relay/Contact K-AZC-2 Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
MREWTKA3AH	Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)	5.00E-06	115	6.87E-03	1.80E-07
39) MAMEYAZ12H	Amplifier Module EX-AZ-1/2 Fails to Trip	1.90E-08	115	2.62E-05	
MDO252S-AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1	1.00E+00	
40) MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe	1.00E-10	115	1.38E-07	1.38E-07
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe	9.20E-07	115	1.27E-03	1.23E-07
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe	7.00E-08	115	9.66E-05	
41) MCP252S-AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		1	1.00E+00	
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe	9.20E-07	115	1.27E-03	1.23E-07
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe	7.00E-08	115	9.66E-05	
42) MCP252S-BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		1	1.00E+00	
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe	9.20E-07	115	1.27E-03	1.23E-07
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe	7.00E-08	115	9.66E-05	
43) MCPANAPLCI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal		1	1.00E+00	
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe	9.20E-07	115	1.27E-03	1.23E-07
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe	7.00E-08	115	9.66E-05	
44) MCPANBPLCI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal		1	1.00E+00	
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe	9.20E-07	115	1.27E-03	1.23E-07
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe	7.00E-08	115	9.66E-05	
45) MCPAZAPLCI	PLC Central Processor AZA PLC-A Fails to Provide Correct Signal		1	1.00E+00	
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe	9.20E-07	115	1.27E-03	1.23E-07
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe	7.00E-08	115	9.66E-05	
46) MCPAZBPLCI	PLC Central Processor AZB PLC-B Fails to Provide Correct Signal		1	1.00E+00	
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe	9.20E-07	115	1.27E-03	1.23E-07
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe	7.00E-08	115	9.66E-05	
47) MAI252S-AI	Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A		1	1.00E+00	
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe	1.74E-07	115	2.40E-04	1.12E-07
MREWTKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
48) MAI252S-AI	Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A		1	1.00E+00	
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe	1.74E-07	115	2.40E-04	1.12E-07
MREKAZC-2H	Relay/Contact K-AZC-2 Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
49) MAI252S-BI	Analog Input Mod Fails to Provide Correct Signal to S252 PLC-B		1	1.00E+00	
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe	1.74E-07	115	2.40E-04	1.12E-07

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MRELDKAZ1H Relay/Contact LDK-AZ-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
50) MAI252S BI Analog Input Mod Fails to Provide Correct Signal to S252 PLC-B		1.74E-07	115	2.40E-04	1.12E-07
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
51) MAIANAPLCI Analog Input Module AN PLC-A Fails to Provide a Change of State		1.74E-07	115	2.40E-04	1.12E-07
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
MREKAZC-2H Relay/Contact K-AZC-2 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
52) MAIANAPLCI Analog Input Module AN PLC-A Fails to Provide a Change of State		1.74E-07	115	2.40E-04	1.12E-07
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
53) MAIANBPPLCI Analog Input Module AN PLC-B Fails to Provide a Change of State		1.74E-07	115	2.40E-04	1.12E-07
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
MRELDKAZ1H Relay/Contact LDK-AZ-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
54) MAIANBPPLCI Analog Input Module AN PLC-B Fails to Provide a Change of State		1.74E-07	115	2.40E-04	1.12E-07
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
55) MDLIDE221H Improper Downloading of LDE-221 Address for Transfer Route		1.00E-07	1	1.00E-07	1.00E-07
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
56) MAOAZBPPLCI Analog Output Module AZ PLC-B Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
MRELDKAZ1H Relay/Contact LDK-AZ-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
57) MAOANBPPLCI Analog Output Module AN PLC-B Fails to Provide Correct Permissive Signal		9.80E-08	115	1.35E-04	6.31E-08
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
58) MAOANAPLCI Analog Output Module ANA PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
MREKAZC-2H Relay/Contact K-AZC-2 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
59) MAOANAPLCI Analog Output Module ANA PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
60) MAOANBPPLCI Analog Output Module AN PLC-B Fails to Provide Correct Permissive Signal		9.80E-08	115	1.35E-04	6.31E-08
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
MRELDKAZ1H Relay/Contact LDK-AZ-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
61) MAOAZAPLCI Analog Output Module AZ PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
MREKAZC-2H Relay/Contact K-AZC-2 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
62) MAOAZAPLCI Analog Output Module AZ PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
63) MAOAZBPPLCI Analog Output Module AZ PLC-B Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
64) MDIAZAPLCI Digital Input Module AZ PLC-A Fails to Provide a Change of State		7.00E-08	115	9.66E-05	4.50E-08
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
MREKAZC-2H Relay/Contact K-AZC-2 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
65) MDIAZAPLCI Digital Input Module AZ PLC-A Fails to Provide a Change of State		7.00E-08	115	9.66E-05	4.50E-08
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
66) MDIAZBPICI	Digital Input Module AZ PLC-B Fails to Provide a Change of State	7.00E-08	115	9.66E-05	4.50E-08
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	
MREWTAK3AH	Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	4.50E-08
67) MDIAZBPICI	Digital Input Module AZ PLC-B Fails to Provide a Change of State	7.00E-08	115	9.66E-05	4.50E-08
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	
MRELDKAZ1H	Relay/Contact LDK-AZ-1 Fails to Open (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
68) MCP252S_AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MDO252S_BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	
69) MCP252S_BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MDO252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	
70) MCPANAPICI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MDO252S_BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	
71) MCPAZAPICI	PLC Central Processor AZA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MDO252S_BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	
72) MCPAZBPICI	PLC Central Processor AZB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MDO252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	
73) MCPANBPICI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MDO252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	
74) MAMEYAZ12H	Amplifier Module EY-AZ-1/2 Fails to Trip	5.00E-06	115	6.87E-03	3.02E-08
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	
75) MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe	1.60E-12	228850	4.39E-06	2.92E-08
MLP9ASNSHS	Analog Circuit 9A SN CW Shorts to Another Active Circuit (1990 ft)		1	1.00E+00	
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	
76) MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe	1.60E-12	3266000	6.27E-05	2.92E-08
MLP9ASNCWS	Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,	3.38E-07	115	4.66E-04	
MREKAZC-2H	Relay/Contact K-AZC-2 Fails Closed (Short, FMD-91 Pg 3-173)		1	1.00E+00	
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	
77) MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe	1.60E-12	3266000	6.27E-05	2.92E-08
MLP9ASNCWS	Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,	3.38E-07	115	4.66E-04	
MREWTAK3AH	Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		1	1.00E+00	
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	
78) MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe	1.60E-12	3266000	6.27E-05	2.92E-08
MLP9ASNCWS	Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,	3.38E-07	115	4.66E-04	
MREWTAK3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		1	1.00E+00	
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	
79) MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe	1.60E-12	3266000	6.27E-05	2.92E-08
MLP9ASNCWS	Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,	3.38E-07	115	4.66E-04	
MRELDKAZ1H	Relay/Contact LDK-AZ-1 Fails to Open (Short, FMD-91 Pg 3-173)		1	1.00E+00	
MAMEYAZ12H	Amplifier Module EY-AZ-1/2 Fails to Trip	5.00E-06	115	6.87E-03	2.41E-08
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	
80) MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe	1.60E-12	182850	3.51E-06	2.32E-08
MLP9A1ACS	Analog Circuit 1A-CW for AZ PLC-A Shorts to Another Active Circuit (1590	1.74E-07	115	2.40E-04	
MAIANAPICI	Analog Input Module AN PLC-A Fails to Provide a Change of State	7.00E-08	115	9.66E-05	
MDIAZBPICI	Digital Input Module AZ PLC-B Fails to Provide a Change of State		1	1.00E+00	
81) MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe	1.74E-07	115	2.40E-04	2.32E-08
MAI252S_AI	Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A	7.00E-08	115	9.66E-05	
MDIAZBPICI	Digital Input Module AZ PLC-B Fails to Provide a Change of State		1	1.00E+00	
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
82) MAI252S_BI Analog Input Mod	Fails to Provide Correct Signal to S252 PLC-B	1.74E-07	115	2.40E-04	2.32E-08
MDIAZAPLCI Digital Input	Module AZ PLC-A Fails to Provide a Change of State	7.00E-08	115	9.66E-05	
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
83) MAIANBPLCI Analog Input	Module AN PLC-B Fails to Provide a Change of State	1.74E-07	115	2.40E-04	2.32E-08
MDIAZAPLCI Digital Input	Module AZ PLC-A Fails to Provide a Change of State	7.00E-08	115	9.66E-05	
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
84) MAOANAPLCI Analog Output	Module ANA PLC-A Fails to Provide a Change of State	9.80E-08	115	1.35E-04	1.31E-08
MDIAZBPLCI Digital Input	Module AZ PLC-B Fails to Provide a Change of State	7.00E-08	115	9.66E-05	
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
85) MAOAZBPLCI Analog Output	Module AZ PLC-B Fails to Provide a Change of State	9.80E-08	115	1.35E-04	1.31E-08
MDIAZAPLCI Digital Input	Module AZ PLC-A Fails to Provide a Change of State	7.00E-08	115	9.66E-05	
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
86) MAOAZAPLCI Analog Output	Module AZ PLC-A Fails to Provide a Change of State	9.80E-08	115	1.35E-04	1.31E-08
MDIAZBPLCI Digital Input	Module AZ PLC-B Fails to Provide a Change of State	7.00E-08	115	9.66E-05	
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
87) MAOANBPLCI Analog Output	Module AN PLC-B Fails to Provide Correct Permissive Signal	9.80E-08	115	1.35E-04	1.31E-08
MDIAZAPLCI Digital Input	Module AZ PLC-A Fails to Provide a Change of State	7.00E-08	115	9.66E-05	
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
88) MDO252S_AI Digital Output	Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	1.22E-08
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
89) MREKAZC-2H Relay/Contact	K-AZC-2 Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
MDO252S_AI Digital Output	Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	1.22E-08
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
90) MREWTKA3BH Relay/Contact	WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
91) MRELDKAZ1H Relay/Contact	LDK-AZ-1 Fails to Open (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
MDO252S_AI Digital Output	Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	1.22E-08
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
92) MDIAZAPLCI Digital Input	Module AZ PLC-A Fails to Provide a Change of State	7.00E-08	115	9.66E-05	9.33E-09
MDIAZBPLCI Digital Input	Module AZ PLC-B Fails to Provide a Change of State	7.00E-08	115	9.66E-05	
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
93) MAIANAPLCI Analog Input	Module AN PLC-A Fails to Provide a Change of State	1.74E-07	115	2.40E-04	6.29E-09
MDO252S_AI Digital Output	Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
94) MAI252S_AI Analog Input	Mod Fails to Provide Correct Signal to S252 PLC-B	1.74E-07	115	2.40E-04	6.29E-09
MDO252S_AI Digital Output	Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
95) MAI252S_AI Analog Input	Mod Fails to Provide Correct Signal to 252-S PLC-A	1.74E-07	115	2.40E-04	6.29E-09
MDO252S_AI Digital Output	Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
96) MAIANBPLCI Analog Input	Module AN PLC-B Fails to Provide a Change of State	1.74E-07	115	2.40E-04	6.29E-09
MDO252S_AI Digital Output	Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
97) MDIAZAPLCI Digital Input	Module AZ PLC-A Fails to Provide a Change of State	7.00E-08	115	9.66E-05	6.06E-09
MIE241-AZA Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe			1	1.00E+00	
MLP9BSNCWS Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,		1.60E-12	3266000	6.27E-05	

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
98) MDIAZBPLCI	Digital Input Module AZ PLC-B Fails to Provide a Change of State	7.00E-08	115	9.66E-05	6.06E-09
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	
MLP9ASNCWS	Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,	1.60E-12	3266000	6.27E-05	
99) MAOAZBPLCI	Analog Output Module AZ PLC-B Fails to Provide a Change of State	9.80E-08	115	1.35E-04	3.55E-09
MDO252S-AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	
100) MAOANPLCI	Analog Output Module ANA PLC-A Fails to Provide a Change of State	9.80E-08	115	1.35E-04	3.55E-09
MDO252S BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	
101) MAOAZAPLCI	Analog Output Module AZ PLC-A Fails to Provide a Change of State	9.80E-08	115	1.35E-04	3.55E-09
MDO252S BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	
102) MAOANBPLCI	Analog Output Module AN PLC-B Fails to Provide Correct Permissive Signal	9.80E-08	115	1.35E-04	3.55E-09
MDO252S-AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	
103) MDIAZBPLCI	Digital Input Module AZ PLC-B Fails to Provide a Change of State	7.00E-08	115	9.66E-05	2.53E-09
MDO252S-AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	
104) MDIAZAPLCI	Digital Input Module AZ PLC-A Fails to Provide a Change of State	7.00E-08	115	9.66E-05	2.53E-09
MDO252S BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	
105) MDO252S-AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	1.64E-09
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	
106) MLP9BNCWS	Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,	1.60E-12	3266000	6.27E-05	
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	
107) MDO252S-AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	6.87E-10
MDO252S BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241-AZA	Waste Transfer Leak in 241-AZ Valve Pit and/or Connecting Pipe		1	1.00E+00	

Top event: M04500							Top prob.: 1.53E-03		CUTSET REPORT	
Basic Event Name		Prob	FusVes	Critic	Birnbnm	RedW	AchW			
MIE241-AZA	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.53E-03	0.00E+00	1.00E+00			
MVRLDE221N	1.00E-03	6.53E-01	6.53E-01	6.53E-01	9.99E-01	2.88E+00	6.53E+02			
MREMCC-A3H	4.66E-04	3.04E-01	3.04E-01	3.04E-01	9.99E-01	1.44E+00	6.53E+02			
MANEYAZ12H	6.87E-03	2.55E-02	2.54E-02	2.54E-02	5.66E-03	1.03E+00	4.67E+00			
MCPAZAPLCI	1.27E-03	9.71E-03	9.67E-03	9.67E-03	1.17E-02	1.01E+00	8.62E+00			
MCPANAPLCI	1.27E-03	9.71E-03	9.67E-03	9.67E-03	1.17E-02	1.01E+00	8.62E+00			
MCP252S AI	1.27E-03	9.71E-03	9.67E-03	9.67E-03	1.17E-02	1.01E+00	8.62E+00			
MCPANBPLCI	1.27E-03	4.02E-03	4.02E-03	4.02E-03	4.84E-03	1.00E+00	4.16E+00			
MCP252S BI	1.27E-03	4.02E-03	4.02E-03	4.02E-03	4.84E-03	1.00E+00	4.16E+00			
MCPAZBPLCI	1.27E-03	4.02E-03	4.02E-03	4.02E-03	4.84E-03	1.00E+00	4.16E+00			
MRELDKAZ1H	4.66E-04	3.82E-03	3.80E-03	3.80E-03	1.25E-02	1.00E+00	9.15E+00			
MREWTKA3AH	4.66E-04	3.82E-03	3.80E-03	3.80E-03	1.25E-02	1.00E+00	9.15E+00			
MREWTAK3BH	4.66E-04	1.73E-03	1.72E-03	1.72E-03	5.65E-03	1.00E+00	4.69E+00			
MREKAZC-2H	4.66E-04	1.73E-03	1.72E-03	1.72E-03	5.65E-03	1.00E+00	4.69E+00			
MAI252S AI	2.40E-04	1.24E-03	1.24E-03	1.24E-03	7.90E-03	1.00E+00	6.16E+00			
MAIANAPLCI	2.40E-04	1.24E-03	1.24E-03	1.24E-03	7.90E-03	1.00E+00	6.16E+00			
MDIAZAPLCI	9.66E-05	7.90E-04	7.87E-04	7.87E-04	1.25E-02	1.00E+00	9.15E+00			
MAOANAPLCI	1.35E-04	6.99E-04	6.98E-04	6.98E-04	7.90E-03	1.00E+00	6.16E+00			
MAOAZAPLCI	1.35E-04	6.99E-04	6.98E-04	6.98E-04	7.90E-03	1.00E+00	6.16E+00			
MDIAZBPLCI	9.66E-05	3.58E-04	3.57E-04	3.57E-04	5.65E-03	1.00E+00	4.69E+00			
MLP9ASNCWS	6.27E-05	3.24E-04	3.24E-04	3.24E-04	7.90E-03	1.00E+00	6.16E+00			
MD0252S-AI	2.62E-05	2.15E-04	2.14E-04	2.14E-04	1.25E-02	1.00E+00	9.15E+00			
MAI252S BI	2.40E-04	1.65E-04	1.65E-04	1.65E-04	1.05E-03	1.00E+00	1.69E+00			
MAIANBPLCI	2.40E-04	1.65E-04	1.65E-04	1.65E-04	1.05E-03	1.00E+00	1.69E+00			
MD0252S BI	2.62E-05	9.71E-05	9.68E-05	9.68E-05	5.65E-03	1.00E+00	4.69E+00			
MAOAZBPLCI	1.35E-04	9.31E-05	9.31E-05	9.31E-05	1.05E-03	1.00E+00	1.69E+00			
MAOANBPLCI	1.35E-04	9.31E-05	9.31E-05	9.31E-05	1.05E-03	1.00E+00	1.69E+00			
MLDIDE221H	1.38E-07	9.00E-05	9.00E-05	9.00E-05	9.98E-01	1.00E+00	6.53E+02			
MDLLDE221N	1.00E-07	6.52E-05	6.52E-05	6.52E-05	9.98E-01	1.00E+00	6.53E+02			
MFP9BSNCWS	6.27E-05	4.32E-05	4.32E-05	4.32E-05	1.05E-03	1.00E+00	1.69E+00			
MFP9ASNSHS	4.39E-06	1.97E-05	1.97E-05	1.97E-05	6.86E-03	1.00E+00	5.48E+00			
MFPZAZ1ACWS	3.51E-06	1.57E-05	1.57E-05	1.57E-05	6.86E-03	1.00E+00	5.48E+00			

Appendix C-7

Cutsets and Importance Factors for New AP-A Valve Pit Phase I & II

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CUTSET REPORT

\\TREES\MPV-APA.CUT
Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE		B.E.		MOD./CS.	
			With H.E.	Without H.E.	PROB.	PROB.	PROB.	PROB.
1) M05500			1.55E-03	4.86E-04				
1) MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P	1	1.00E+00	1.00E-03				
2) MVRLEAPAN	Improper Address Verification for IDE-APA for Transfer Route	1	1.00E+00	1.00E-03				
3) MREKCC-A3H	Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)	115	3.38E-07	4.66E-04				
4) MAMEYAPA_H	Amplifier Module EY-APA Fails to Trip	115	5.00E-06	6.87E-03				
5) MCPAZAPLCI	PLC Central Processor AZA PLC-A Fails to Provide Correct Signal	115	9.20E-07	1.27E-03				
6) MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P	1	1.00E+00	1.00E-03				
7) MAMEYAPA_H	Amplifier Module EY-APA Fails to Trip	115	5.00E-06	6.87E-03				
8) MCP252S_AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	115	9.20E-07	1.27E-03				
9) MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P	1	1.00E+00	1.00E-03				
10) MAMEYAPA_H	Amplifier Module EY-APA Fails to Trip	115	5.00E-06	6.87E-03				
11) MCPANAPLCI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	115	9.20E-07	1.27E-03				
12) MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P	1	1.00E+00	1.00E-03				
13) MAMEYAPA_H	Amplifier Module EY-APA Fails to Trip	115	5.00E-06	6.87E-03				
14) MCPAPAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	115	9.20E-07	1.27E-03				
15) MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P	1	1.00E+00	1.00E-03				
16) MAMEYAPA_H	Amplifier Module EY-APA Fails to Trip	115	5.00E-06	6.87E-03				
17) MAIAZAPLCI	PLC Central Processor AZA PLC-A Fails to Provide Correct Signal	115	9.20E-07	1.27E-03				
18) MAMEYAPA_H	Amplifier Module EY-APA Fails to Trip	115	5.00E-06	6.87E-03				
19) MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P	1	1.00E+00	1.00E-03				
20) MCP252S_BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	115	9.20E-07	1.27E-03				
21) MCPAPAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	115	9.20E-07	1.27E-03				
22) MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P	1	1.00E+00	1.00E-03				
23) MCP252S_BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	115	9.20E-07	1.27E-03				
24) MCPANAPLCI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	115	9.20E-07	1.27E-03				
25) MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P	1	1.00E+00	1.00E-03				
26) MCPANAPLCI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	115	9.20E-07	1.27E-03				
27) MCPANBPPLCI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	115	9.20E-07	1.27E-03				
28) MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P	1	1.00E+00	1.00E-03				
29) MCPANBPPLCI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	115	9.20E-07	1.27E-03				
30) MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P	1	1.00E+00	1.00E-03				
31) MCPANBPPLCI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	115	9.20E-07	1.27E-03				
32) MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P	1	1.00E+00	1.00E-03				
33) MCPANBPPLCI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	115	9.20E-07	1.27E-03				
34) MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P	1	1.00E+00	1.00E-03				
35) MCPANBPPLCI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	115	9.20E-07	1.27E-03				
36) MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P	1	1.00E+00	1.00E-03				
37) MCPANBPPLCI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	115	9.20E-07	1.27E-03				

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CUTSET REPORT

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Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MCPAZAPLCI	PLC Central Processor AZA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
18) MCPAPAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.61E-06
MCPAZBPPLCI	PLC Central Processor AZB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
19) MCPAZAPLCI	PLC Central Processor AZA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.61E-06
MCPAZBPPLCI	PLC Central Processor AZB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
20) MCP252S	AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.61E-06
MCPAZBPPLCI	PLC Central Processor AZB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	
21) MCP252S	AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.61E-06
MCPANBPPLCI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
22) MCP252S	AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.61E-06
MCP252S	BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
23) MCP252S	BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.61E-06
MCPAZAPLCI	PLC Central Processor AZA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
24) MAMEYAPA	H Amplifier Module EY-APA Fails to Trip	5.00E-06	115	6.87E-03	9.29E-07
MAOPAPPLCI	Analog Output Module AP PLC-A Fails to Provide a Change of State	9.80E-08	115	1.35E-04	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
25) MAMEYAPA	H Amplifier Module EY-APA Fails to Trip	5.00E-06	115	6.87E-03	9.29E-07
MAONAPPLCI	Analog Output Module ANA PLC-A Fails to Provide a Change of State	9.80E-08	115	1.35E-04	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
26) MAMEYAPA	H Amplifier Module EY-APA Fails to Trip	5.00E-06	115	6.87E-03	9.29E-07
MAOZAPPLCI	Analog Output Module AZ PLC-A Fails to Provide a Change of State	9.80E-08	115	1.35E-04	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
27) MAMEYAPA	H Amplifier Module EY-APA Fails to Trip	5.00E-06	115	6.87E-03	6.63E-07
MDTAPAPPLCI	Digital Input Module AP PLC-A Fails to Provide a Change of State	7.00E-08	115	9.66E-05	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
28) MCPANAPLCI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	5.92E-07
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
29) MREWTKA3B	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
MCPANAPLCI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	5.92E-07
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
30) MREKAPC-2H	Relay/Contact K-APC-2 Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
MCPANBPPLCI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	5.92E-07
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
31) MREWTKA3A	Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
MCPANBPPLCI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	5.92E-07
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
32) MCPAPAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	5.92E-07
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
33) MREKAPC-2H	Relay/Contact K-APC-2 Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
MCPAPAPPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	5.92E-07

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CUTSET REPORT

.\TREES\MPV-APA.CUT

Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
34) MCPAZAPUCI PLC Central Processor AZA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
35) MCPAZAPUCI PLC Central Processor AZA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
MREKAPC-2H Relay/Contact K-APC-2 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
36) MCPAZBPUCI PLC Central Processor AZB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
37) MCPAZBPUCI PLC Central Processor AZB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
MRELDKAPAH Relay/Contact LDK-APA-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
38) MCP252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
39) MCP252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
MREKAPC-2H Relay/Contact K-APC-2 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
40) MCP252S BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
MRELDKAPAH Relay/Contact LDK-APA-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
41) MCP252S BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
42) MAMEYAPA H Amplifier Module EY-APA Fails to Trip		5.00E-06	115	6.87E-03	4.31E-07
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
MLP9ASNCWS Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(128,		1.60E-12	3266000	6.27E-05	
43) MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	2.17E-07
MREKAPC-2H Relay/Contact K-APC-2 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
44) MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	2.17E-07
MRELDKAPAH Relay/Contact LDK-APA-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
45) MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	2.17E-07
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
46) MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	2.17E-07
MREKAPC-2H Relay/Contact K-APC-2 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MRELDKAPAH Relay/Contact LDK-APA-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
47) MAMEYAPA H Amplifier Module EY-APA Fails to Trip		5.00E-06	115	6.87E-03	1.80E-07
MDO252S AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
48) MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1.00E-10	115	1.00E+00	1.38E-07
MLDIDEAPAH Leak Detector LDE-APA Elements Mechanically Fail		9.20E-07	115	1.27E-03	1.23E-07
49) MCP252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		7.00E-08	115	9.66E-05	
MDIAPBPUCI Digital Input Module AP PLC-B Fails to Provide a Change of State					

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\\TREES\MPV-APA.CUT
Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
50) MCP252S BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.23E-07
MDIAPAPLCI Digital Input Module AP PLC-A Fails to Provide a Change of State		7.00E-08	115	9.66E-05	
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
51) MCPANAPLCI PLC Central Processor ANA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.23E-07
MDIAPBPPLCI Digital Input Module AP PLC-B Fails to Provide a Change of State		7.00E-08	115	9.66E-05	
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
52) MCPANBPPLCI PLC Central Processor ANB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.23E-07
MDIAPAPLCI Digital Input Module AP PLC-A Fails to Provide a Change of State		7.00E-08	115	9.66E-05	
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
53) MCPAPAPLCI PLC Central Processor APA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.23E-07
MDIAPBPPLCI Digital Input Module AP PLC-B Fails to Provide a Change of State		7.00E-08	115	9.66E-05	
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
54) MCPAPAPLCI PLC Central Processor AZA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.23E-07
MDIAPBPPLCI Digital Input Module AP PLC-B Fails to Provide a Change of State		7.00E-08	115	9.66E-05	
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
55) MCPAPBPPLCI PLC Central Processor AZB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.23E-07
MDIAPAPLCI Digital Input Module AP PLC-A Fails to Provide a Change of State		7.00E-08	115	9.66E-05	
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
56) MAIAZAPLCI Analog Input Module AZ PLC-A Fails to Provide a Change of State		1.74E-07	115	2.40E-04	1.12E-07
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
57) MREWKAP3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREWKAP3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		1.74E-07	115	2.40E-04	1.12E-07
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
58) MREKAPC-2H Relay/Contact K-APC-2 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREKAPC-2H Relay/Contact K-APC-2 Fails Closed (Short, FMD-91 Pg 3-173)		1.74E-07	115	2.40E-04	1.12E-07
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
59) MRELDKAP3H Relay/Contact LDK-APA-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MRELDKAP3H Relay/Contact LDK-APA-1 Fails to Open (Short, FMD-91 Pg 3-173)		1.74E-07	115	2.40E-04	1.12E-07
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
60) MREWKAP3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREWKAP3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		1.74E-07	115	2.40E-04	1.12E-07
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
61) MAI252S AI Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A		3.38E-07	115	4.66E-04	
MAI252S AI Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A		1.74E-07	115	2.40E-04	1.12E-07
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
62) MREWKAP3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREWKAP3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		1.74E-07	115	2.40E-04	1.12E-07
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
63) MREWKAP3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREWKAP3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		1.74E-07	115	2.40E-04	1.12E-07
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
64) MAIANAPLCI Analog Input Module AN PLC-A Fails to Provide a Change of State		3.38E-07	115	4.66E-04	
MAIANAPLCI Analog Input Module AN PLC-A Fails to Provide a Change of State		1.74E-07	115	2.40E-04	1.12E-07
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
65) MREKAPC-2H Relay/Contact K-APC-2 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREKAPC-2H Relay/Contact K-APC-2 Fails Closed (Short, FMD-91 Pg 3-173)		1.74E-07	115	2.40E-04	1.12E-07
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	

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Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
66) MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	1.12E-07
MIAIANBPLCI Analog Input Module AN PLC-B Fails to Provide a Change of State		1.74E-07	115	2.40E-04	1.00E+00
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	1.12E-07
67) MIAIANBPLCI Analog Input Module AN PLC-B Fails to Provide a Change of State		1.74E-07	115	2.40E-04	1.00E+00
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
MRELDKAPAH Relay/Contact LDK-APA-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	1.00E-07
68) MDLLEAPAN Improper Downloading of LDE-APA Address for Transfer Route		1.00E-07	1	1.00E-07	1.00E-07
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
69) MAOAZBPLCI Analog Output Module AZ PLC-B Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
MRELDKAPAH Relay/Contact LDK-APA-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	6.31E-08
70) MAOANAPLCI Analog Output Module ANA PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	6.31E-08
71) MAOANAPLCI Analog Output Module ANA PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
MREKAPC-2H Relay/Contact K-APC-2 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	6.31E-08
72) MAOANBPLCI Analog Output Module AN PLC-B Fails to Provide Correct Permissive Signal		9.80E-08	115	1.35E-04	6.31E-08
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	6.31E-08
73) MAOANBPLCI Analog Output Module AN PLC-B Fails to Provide Correct Permissive Signal		9.80E-08	115	1.35E-04	6.31E-08
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
MRELDKAPAH Relay/Contact LDK-APA-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	6.31E-08
74) MAOAPAPLCI Analog Output Module AP PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	6.31E-08
75) MAOAPAPLCI Analog Output Module AP PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
MREKAPC-2H Relay/Contact K-APC-2 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	6.31E-08
76) MAOAPBPLCI Analog Output Module AP PLC-B Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	6.31E-08
77) MAOAZAPLCI Analog Output Module AZ PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
MREKAPC-2H Relay/Contact K-APC-2 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	6.31E-08
78) MAOAZAPLCI Analog Output Module AZ PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	6.31E-08
79) MAOAZBPLCI Analog Output Module AZ PLC-B Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	6.31E-08
80) MAOAPBPLCI Analog Output Module AP PLC-B Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
MRELDKAPAH Relay/Contact LDK-APA-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	6.31E-08
81) MDIAPAPLCI Digital Input Module AP PLC-A Fails to Provide a Change of State		7.00E-08	115	9.66E-05	4.50E-08
MIE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P			1	1.00E+00	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	6.31E-08

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Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
82) MDIAPAPLCI	Digital Input Module AP PLC-A Fails to Provide a Change of State	7.00E-08	115	9.66E-05	4.50E-08
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
MREKAPC-2H	Relay/Contact K-APC-2 Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
83) MDIAPBPLCI	Digital Input Module AP PLC-B Fails to Provide a Change of State	7.00E-08	115	9.66E-05	4.50E-08
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
MREWTKA3AH	Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
84) MDIAPBPLCI	Digital Input Module AP PLC-B Fails to Provide a Change of State	7.00E-08	115	9.66E-05	4.50E-08
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
MRELDKAPAH	Relay/Contact LDK-APA-1 Fails to Open (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
85) MCP252S_AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MDO252S_BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
86) MCP252S_AI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MDO252S_BI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
87) MCP252S_AI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MDO252S_BI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
88) MCPANBPLCI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MDO252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
89) MCPAPAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MDO252S_BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
90) MCPAZAPLCI	PLC Central Processor AZA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MDO252S_BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
91) MCPANAPLCI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MDO252S_BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
92) MAMEYAPA_H	Amplifier Module EY-APA Fails to Trip	5.00E-06	115	6.87E-03	3.18E-08
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
93) MLPAPIACWS	Analog Circuit 1A-CW for AP PLC-A Shorts to Another Active Circuit (2100	1.60E-12	241500	4.64E-06	
MAMEYAPA_H	Amplifier Module EY-APA Fails to Trip	5.00E-06	115	6.87E-03	3.02E-08
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
94) MLP9ASNSHS	Analog Circuit 9A SN CW Shorts to Another Active Circuit (1990 ft)	1.60E-12	228850	4.39E-06	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
95) MLP9BNSCWS	Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,	1.60E-12	3266000	6.27E-05	
MREWTKA3AH	Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
96) MLP9ASNCWS	Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,	1.60E-12	3266000	6.27E-05	
MREWTKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
97) MLP9ASNCWS	Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,	1.60E-12	3266000	6.27E-05	
MREKAPC-2H	Relay/Contact K-APC-2 Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
98) MLP9BNSCWS	Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,	1.60E-12	3266000	6.27E-05	
MRELDKAPAH	Relay/Contact LDK-APA-1 Fails to Open (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	

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Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
98) NAMEYAPA H Amplifier Module EY-APA Fails to Trip		5.00E-06	115	6.87E-03	2.41E-08
MTE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1.00E+00	1	1.00E+00	
99) MPAZAIACWS Analog Circuit 1A-CW for AZ PLC-A Shorts to Another Active Circuit (1590		1.60E-12	182850	3.51E-06	
MLAIANBPLCI Analog Input Module AN PLC-B Fails to Provide a Change of State		1.74E-07	115	2.40E-04	2.32E-08
MDIAPAPLCI Digital Input Module AP PLC-A Fails to Provide a Change of State		7.00E-08	115	9.66E-05	
MTE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1.00E+00	1	1.00E+00	
MAIAZAPLCI Analog Input Module AZ PLC-A Fails to Provide a Change of State		1.74E-07	115	2.40E-04	2.32E-08
MDIAPBPLCI Digital Input Module AP PLC-B Fails to Provide a Change of State		7.00E-08	115	9.66E-05	
MTE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1.00E+00	1	1.00E+00	
MAI252S AI Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A		1.74E-07	115	2.40E-04	2.32E-08
MDIAPBPLCI Digital Input Module AP PLC-B Fails to Provide a Change of State		7.00E-08	115	9.66E-05	
MTE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1.00E+00	1	1.00E+00	
MAI252S BI Analog Input Mod Fails to Provide Correct Signal to S252 PLC-B		1.74E-07	115	2.40E-04	2.32E-08
MDIAPAPLCI Digital Input Module AP PLC-A Fails to Provide a Change of State		7.00E-08	115	9.66E-05	
MTE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1.00E+00	1	1.00E+00	
MAIANAPLCI Analog Input Module AN PLC-A Fails to Provide a Change of State		1.74E-07	115	2.40E-04	2.32E-08
MDIAPBPLCI Digital Input Module AP PLC-B Fails to Provide a Change of State		7.00E-08	115	9.66E-05	
MTE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1.00E+00	1	1.00E+00	
MAIAZBPLCI Analog Input Module AZ PLC-B Fails to Provide a Change of State		1.74E-07	115	2.40E-04	2.32E-08
MDIAPAPLCI Digital Input Module AP PLC-A Fails to Provide a Change of State		7.00E-08	115	9.66E-05	
MTE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1.00E+00	1	1.00E+00	
MAOANAPLCI Analog Output Module ANA PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	1.31E-08
MDIAPBPLCI Digital Input Module AP PLC-B Fails to Provide a Change of State		7.00E-08	115	9.66E-05	
MTE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1.00E+00	1	1.00E+00	
MAOANAPLCI Analog Output Module ANA PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	1.31E-08
MDIAPBPLCI Digital Input Module AP PLC-B Fails to Provide a Change of State		7.00E-08	115	9.66E-05	
MTE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1.00E+00	1	1.00E+00	
MAOANBPLCI Analog Output Module AN PLC-B Fails to Provide Correct Permissive Signal		9.80E-08	115	1.35E-04	1.31E-08
MDIAPAPLCI Digital Input Module AP PLC-A Fails to Provide a Change of State		7.00E-08	115	9.66E-05	
MTE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1.00E+00	1	1.00E+00	
MAOAPBPLCI Analog Output Module AP PLC-B Fails to Provide a Change of State		9.80E-08	115	1.35E-04	1.31E-08
MDIAPAPLCI Digital Input Module AP PLC-A Fails to Provide a Change of State		7.00E-08	115	9.66E-05	
MTE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1.00E+00	1	1.00E+00	
MAOAZAPLCI Analog Output Module AZ PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	1.31E-08
MDIAPBPLCI Digital Input Module AP PLC-B Fails to Provide a Change of State		7.00E-08	115	9.66E-05	
MTE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1.00E+00	1	1.00E+00	
MAOAZBPLCI Analog Output Module AZ PLC-B Fails to Provide a Change of State		9.80E-08	115	1.35E-04	1.31E-08
MDIAPAPLCI Digital Input Module AP PLC-A Fails to Provide a Change of State		7.00E-08	115	9.66E-05	
MTE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1.00E+00	1	1.00E+00	
MDO252S BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	1.22E-08
MTE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1.00E+00	1	1.00E+00	
MRELDKAPAH Relay/Contact LDK-APB-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MDO252S BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	1.22E-08
MTE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1.00E+00	1	1.00E+00	
MREWTK3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MDO252S AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	1.22E-08
MTE241APAA Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1.00E+00	1	1.00E+00	
MREKAPC-2H Relay/Contact K-APC-2 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	

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CUTSET REPORT

.\TREES\MPV-APA.CUT
Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
114) MDO252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	1.22E-08
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
MREWTKA3BH	Relay/Contact WT-KA3-B Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
115) MDIAPBPLCI	Digital Input Module AP PLC-A Fails to Provide a Change of State	7.00E-08	115	9.66E-05	9.33E-09
MDIAPBPLCI	Digital Input Module AP PLC-A Fails to Provide a Change of State	7.00E-08	115	9.66E-05	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
116) MAI252S_AI	Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A	1.74E-07	115	2.40E-04	6.29E-09
MDO252S_BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
117) MAIANAPLICI	Analog Input Module AN PLC-A Fails to Provide a Change of State	1.74E-07	115	2.40E-04	6.29E-09
MDO252S_BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
118) MAIAZBPLCI	Analog Input Module AZ PLC-B Fails to Provide a Change of State	1.74E-07	115	2.40E-04	6.29E-09
MDO252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
119) MAIANBPLCI	Analog Input Module AN PLC-B Fails to Provide a Change of State	1.74E-07	115	2.40E-04	6.29E-09
MDO252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
120) MAIAZAPLICI	Analog Input Module AZ PLC-A Fails to Provide a Change of State	1.74E-07	115	2.40E-04	6.29E-09
MDO252S_BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
121) MAI252S_BI	Analog Input Mod Fails to Provide Correct Signal to S52 PLC-B	1.74E-07	115	2.40E-04	6.29E-09
MDO252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
122) MDIAPBPLCI	Digital Input Module AP PLC-A Fails to Provide a Change of State	7.00E-08	115	9.66E-05	6.06E-09
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
MLP9BSNCWS	Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,	1.60E-12	3266000	6.27E-05	
123) MDIAPBPLCI	Digital Input Module AP PLC-B Fails to Provide a Change of State	7.00E-08	115	9.66E-05	6.06E-09
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
MLP9ASNCWS	Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,	1.60E-12	3266000	6.27E-05	
124) MAOAPBPLCI	Analog Output Module AP PLC-A Fails to Provide a Change of State	9.80E-08	115	1.35E-04	3.55E-09
MDO252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
125) MAOAPBPLCI	Analog Output Module AP PLC-B Fails to Provide a Change of State	9.80E-08	115	1.35E-04	3.55E-09
MDO252S_BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
126) MAOAZBPLCI	Analog Output Module AZ PLC-B Fails to Provide a Change of State	9.80E-08	115	1.35E-04	3.55E-09
MDO252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
127) MAOANAPLICI	Analog Output Module ANA PLC-A Fails to Provide a Change of State	9.80E-08	115	1.35E-04	3.55E-09
MDO252S_BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
128) MAOANBPLCI	Analog Output Module AN PLC-B Fails to Provide a Change of State	9.80E-08	115	1.35E-04	3.55E-09
MDO252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	
129) MAOAZAPLICI	Analog Output Module AZ PLC-A Fails to Provide a Change of State	9.80E-08	115	1.35E-04	3.55E-09
MDO252S_BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P		1	1.00E+00	

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.\TREES\MPV-APA.CUT
Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
130) MDIAPBPLCI	Digital Input Module AP PLC-B Fails to Provide a Change of State	7.00E-08	115	9.66E-05	2.53E-09
MDO252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P	1	1	1.00E+00	
131) MDIAPAPLCI	Digital Input Module AP PLC-A Fails to Provide a Change of State	7.00E-08	115	9.66E-05	2.53E-09
MDO252S_BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P	1	1	1.00E+00	
132) MDO252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	1.64E-09
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P	1	1	1.00E+00	
MLP9BSNCWS	Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,	1.60E-12	3266000	6.27E-05	
133) MDO252S_BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	1.64E-09
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P	1	1	1.00E+00	
MLP9ASNCWS	Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,	1.60E-12	3266000	6.27E-05	
134) MDO252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	6.87E-10
MIE241APAA	Waste Transfer Leak in 241-AP-A Central Pump Pit 01A and/or Connecting P	1	1	1.00E+00	

. \TREES\MPV-APA.CUT		CUTSET REPORT				
Top event: M05500		Top prob.: 1.55E-03		Sort by: Fussel Vesely		
Basic Event Name	Prob	FusYes	Critic	BirnBm	RedW	AchW
MIE241APAA	1.00E+00	1.00E+00	1.00E+00	1.55E-03	0.00E+00	1.00E+00
MVRLDEAPAN	1.00E-03	6.45E-01	6.45E-01	9.99E-01	2.82E+00	6.46E+02
MREMCC-A3H	4.66E-04	3.01E-01	3.01E-01	9.99E-01	1.43E+00	6.46E+02
MAMEYAPA_H	6.87E-03	3.25E-02	3.24E-02	7.30E-03	1.03E+00	5.68E+00
MCPANAPLCI	1.27E-03	9.59E-03	9.56E-03	1.17E-02	1.01E+00	8.53E+00
MCPAZAPLCI	1.27E-03	9.59E-03	9.56E-03	1.17E-02	1.01E+00	8.53E+00
MCP252S_AI	1.27E-03	9.59E-03	9.56E-03	1.17E-02	1.01E+00	8.53E+00
MCPANBPLCI	1.27E-03	9.59E-03	9.56E-03	1.17E-02	1.01E+00	8.53E+00
MCPANBPPLCI	1.27E-03	5.01E-03	5.00E-03	6.10E-03	1.01E+00	4.94E+00
MCP252S_BI	1.27E-03	5.01E-03	5.00E-03	6.10E-03	1.01E+00	4.94E+00
MRELDKAPAH	4.66E-04	3.88E-03	3.87E-03	1.28E-02	1.00E+00	9.29E+00
MREWTKA3AH	4.66E-04	3.88E-03	3.87E-03	1.28E-02	1.00E+00	9.29E+00
MREWTKA3BH	4.66E-04	2.20E-03	2.19E-03	7.28E-03	1.00E+00	5.70E+00
MREKAPC-2H	4.66E-04	2.20E-03	2.19E-03	7.28E-03	1.00E+00	5.70E+00
MAIAZAPLCI	2.40E-04	1.23E-03	1.23E-03	7.90E-03	1.00E+00	6.10E+00
MAI252S_AI	2.40E-04	1.23E-03	1.23E-03	7.90E-03	1.00E+00	6.10E+00
MAIANAPLCI	2.40E-04	1.23E-03	1.23E-03	7.90E-03	1.00E+00	6.10E+00
MDIAPAPLCI	9.66E-05	8.05E-04	8.01E-04	1.28E-02	1.00E+00	9.29E+00
MAOAZAPLCI	1.35E-04	6.91E-04	6.90E-04	7.90E-03	1.00E+00	6.10E+00
MAOANAPLCI	1.35E-04	6.91E-04	6.90E-04	7.90E-03	1.00E+00	6.10E+00
MDIAPBPLCI	9.66E-05	4.56E-04	4.54E-04	7.28E-03	1.00E+00	5.70E+00
MLP9ASNWS	6.27E-05	3.20E-04	3.20E-04	7.90E-03	1.00E+00	6.10E+00
MD0252S_AI	2.62E-05	2.18E-04	2.17E-04	1.28E-02	1.00E+00	9.29E+00
MAI252S_BI	2.40E-04	1.63E-04	1.63E-04	1.05E-03	1.00E+00	1.68E+00
MAIANBPLCI	2.40E-04	1.63E-04	1.63E-04	1.05E-03	1.00E+00	1.68E+00
MAIAZBPLCI	2.40E-04	1.63E-04	1.63E-04	1.05E-03	1.00E+00	1.68E+00
MD0252S_BI	2.62E-05	1.24E-04	1.23E-04	7.28E-03	1.00E+00	5.70E+00
MAOANBPLCI	1.35E-04	9.20E-05	9.20E-05	1.05E-03	1.00E+00	1.68E+00
MAOAZBPLCI	1.35E-04	9.20E-05	9.20E-05	1.05E-03	1.00E+00	1.68E+00
MAOAPBPLCI	1.35E-04	9.20E-05	9.20E-05	1.05E-03	1.00E+00	1.68E+00
MLDLDEAPAN	1.38E-07	8.90E-05	8.90E-05	9.98E-01	1.00E+00	6.46E+02
MDLIIDEAPAN	1.00E-07	6.45E-05	6.45E-05	9.98E-01	1.00E+00	6.46E+02
MLP9BSNWS	6.27E-05	4.27E-05	4.27E-05	1.05E-03	1.00E+00	1.68E+00
MLPAP1ACWS	4.64E-06	2.05E-05	2.05E-05	6.86E-03	1.00E+00	5.43E+00
MLP9ASNWS	4.39E-06	1.95E-05	1.95E-05	6.86E-03	1.00E+00	5.43E+00
MLPAZ1ACWS	3.51E-06	1.55E-05	1.55E-05	6.86E-03	1.00E+00	5.43E+00

Appendix C-8

Cutsets and Importance Factors for 241-AP Valve Pit Phase I & II

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CUTSET REPORT

.\TREES\MPV-AP.CUT
Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
1) M05000					
1) MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1.00E-03	1	1.00E+00	1.00E-03
MVRLD227N Improper Address Verification for IDE-227 for Transfer Route		1.00E-03	1	1.00E-03	1.00E-03
2) MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		3.38E-07	115	1.00E+00	4.66E-04
MREMCC-A3H Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)		5.00E-06	115	6.87E-03	8.71E-06
3) MAMLD3609H Amplifier Module LD3-609 Fails to Trip		9.20E-07	115	1.27E-03	
MCPAPAPLCI PLC Central Processor APA PLC-A Fails to Provide Correct Signal		5.00E-06	115	1.00E+00	8.71E-06
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		9.20E-07	115	1.27E-03	
MAMLD3609H Amplifier Module LD3-609 Fails to Trip		5.00E-06	115	6.87E-03	8.71E-06
4) MCPANAPLCI PLC Central Processor ANA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		5.00E-06	115	1.00E+00	8.71E-06
MCPAZAPLCI PLC Central Processor AZA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
5) MAMLD3609H Amplifier Module LD3-609 Fails to Trip		5.00E-06	115	6.87E-03	8.71E-06
MCPANAPLCI PLC Central Processor ANA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		5.00E-06	115	1.00E+00	8.71E-06
6) MAMLD3609H Amplifier Module LD3-609 Fails to Trip		9.20E-07	115	1.27E-03	
MCP252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		5.00E-06	115	6.87E-03	3.20E-06
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		5.00E-06	115	1.00E+00	8.71E-06
7) MAMLD3609H Amplifier Module LD3-609 Fails to Trip		9.20E-07	115	1.27E-03	
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		5.00E-06	115	1.00E+00	8.71E-06
8) MAMLD3609H Amplifier Module LD3-609 Fails to Trip		9.20E-07	115	1.27E-03	
MRELD1609H Relay/Contact LD1-609 Fails to Open (Short, FMD-91 Pg 3-173)		5.00E-06	115	6.87E-03	3.20E-06
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		5.00E-06	115	1.00E+00	8.71E-06
9) MREWTAK3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		5.00E-06	115	6.87E-03	3.20E-06
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		5.00E-06	115	1.00E+00	8.71E-06
10) MAMLD3609H Amplifier Module LD3-609 Fails to Trip		9.20E-07	115	1.27E-03	
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		5.00E-06	115	1.00E+00	8.71E-06
11) MAMLD3609H Amplifier Module LD3-609 Fails to Trip		9.20E-07	115	1.27E-03	
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		5.00E-06	115	1.00E+00	8.71E-06
12) MCP252S BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
MCPAPAPLCI PLC Central Processor APA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		9.20E-07	115	1.27E-03	1.61E-06
13) MCP252S BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
MCPANAPLCI PLC Central Processor ANA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		9.20E-07	115	1.27E-03	1.61E-06
14) MCPANAPLCI PLC Central Processor ANA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
MCPAZBPLCI PLC Central Processor AZB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		9.20E-07	115	1.27E-03	1.61E-06
15) MCPANAPLCI PLC Central Processor ANA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
MCPANBPLCI PLC Central Processor ANB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		9.20E-07	115	1.27E-03	1.61E-06
16) MCPANBPLCI PLC Central Processor ANB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
MCPAZAPLCI PLC Central Processor AZA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.00E+00	1.61E-06
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		9.20E-07	115	1.27E-03	1.61E-06
17) MCPANBPLCI PLC Central Processor ANB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06

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Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MCPAPAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
18) MCPAPAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.61E-06
MCPAZBPLCI	PLC Central Processor AZB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
19) MCPAZAPLCI	PLC Central Processor AZA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.61E-06
MCPAZBPLCI	PLC Central Processor AZB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
20) MCP252S AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.61E-06
MCP252S BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
21) MCP252S AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.61E-06
MCPANBPLCI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
22) MCP252S AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.61E-06
MCPAZBPLCI	PLC Central Processor AZB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
23) MCP252S BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.61E-06
MCPAZAPLCI	PLC Central Processor AZA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
24) MAMLD3609H	Amplifier Module LD3-609 Fails to Trip	5.00E-06	115	6.87E-03	9.29E-07
MAOAPAPLCI	Analog Output Module AP PLC-A Fails to Provide a Change of State	9.80E-08	115	1.35E-04	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
25) MAMLD3609H	Amplifier Module LD3-609 Fails to Trip	5.00E-06	115	6.87E-03	9.29E-07
MAOANAPLCI	Analog Output Module ANA PLC-A Fails to Provide a Change of State	9.80E-08	115	1.35E-04	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
26) MAMLD3609H	Amplifier Module LD3-609 Fails to Trip	5.00E-06	115	6.87E-03	9.29E-07
MAOAZAPLCI	Analog Output Module AZ PLC-A Fails to Provide a Change of State	7.00E-08	115	9.66E-05	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
27) MAMLD3609H	Amplifier Module LD3-609 Fails to Trip	5.00E-06	115	6.87E-03	9.29E-07
MDIAPAPLCI	Digital Input Module AP PLC-A Fails to Provide a Change of State	9.20E-07	115	1.00E+00	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
28) MCPANAPLCI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	3.38E-07	115	4.66E-04	5.92E-07
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe	9.20E-07	115	1.27E-03	
MREKAPC-3H	Relay/Contact K-APC-3 Fails Closed (Short, FMD-91 Pg 3-173)		1	1.00E+00	
29) MCPANAPLCI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	3.38E-07	115	4.66E-04	5.92E-07
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
30) MREWTKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	9.20E-07	115	1.27E-03	5.92E-07
MCPANBPLCI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal		1	1.00E+00	
MRELD1609H	Relay/Contact LDI-609 Fails to Open (Short, FMD-91 Pg 3-173)		1	4.66E-04	
31) MCPANBPLCI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	3.38E-07	115	4.66E-04	5.92E-07
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe	9.20E-07	115	1.27E-03	
MREWTKA3AH	Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		1	1.00E+00	
32) MCPAPAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	3.38E-07	115	4.66E-04	5.92E-07
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe	9.20E-07	115	1.27E-03	
MREWTKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		1	1.00E+00	
33) MCPAPAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	3.38E-07	115	4.66E-04	5.92E-07
		9.20E-07	115	1.27E-03	

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Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MREKAPC-3H Relay/Contact K-APC-3 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
34) MCPAZAPLCI PLC Central Processor AZA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MREKAPC-3H Relay/Contact K-APC-3 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
35) MCPAZAPLCI PLC Central Processor AZA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
36) MCPAZBPLCI PLC Central Processor AZB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MRELD1609H Relay/Contact LD1-609 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
37) MCPAZBPLCI PLC Central Processor AZB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
38) MCP252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
39) MCP252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MREKAPC-3H Relay/Contact K-APC-3 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
40) MCP252S BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
41) MCP252S BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MRELD1609H Relay/Contact LD1-609 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
42) MAMLD3609H Amplifier Module LD3-609 Fails to Trip		5.00E-06	115	6.87E-03	4.31E-07
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
43) MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1.60E-12	3266000	6.27E-05	
MREKAPC-3H Relay/Contact K-APC-3 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MRELD1609H Relay/Contact LD1-609 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
44) MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MREKAPC-3H Relay/Contact K-APC-3 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
45) MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MRELD1609H Relay/Contact LD1-609 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
46) MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		5.00E-06	115	6.87E-03	1.80E-07
47) MAMLD3609H Amplifier Module LD3-609 Fails to Trip		1.90E-08	115	2.62E-05	
MDO252S AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si			1	1.00E+00	
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
48) MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1.00E-10	115	1.38E-07	1.38E-07
MLDLDE27H Leak Detector LDE-27 Elements Mechanically Fail		9.20E-07	115	1.27E-03	1.23E-07
49) MCP252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		7.00E-08	115	9.66E-05	
MDTAPBPLCI Digital Input Module AP PLC-B Fails to Provide a Change of State					

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CUTSET REPORT

\\TREES\MPV-AP.CUT
Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe	1	1.00E+00		
50) MCP252S BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.23E-07
MDIAPAPICI	Digital Input Module AP PLC-A Fails to Provide a Change of State	7.00E-08	115	9.66E-05	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe	1	1.00E+00		
51) MCPANAPICI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.23E-07
MDIAPBPICI	Digital Input Module AP PLC-B Fails to Provide a Change of State	7.00E-08	115	9.66E-05	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe	1	1.00E+00		
52) MCPANBPICI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.23E-07
MDIAPAPICI	Digital Input Module AP PLC-A Fails to Provide a Change of State	7.00E-08	115	9.66E-05	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe	1	1.00E+00		
53) MCPAPAPICI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.23E-07
MDIAPBPICI	Digital Input Module AP PLC-B Fails to Provide a Change of State	7.00E-08	115	9.66E-05	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe	1	1.00E+00		
54) MCPAZAPICI	PLC Central Processor AZA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.23E-07
MDIAPBPICI	Digital Input Module AP PLC-B Fails to Provide a Change of State	7.00E-08	115	9.66E-05	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe	1	1.00E+00		
55) MCPAZBPICI	PLC Central Processor AZB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.23E-07
MDIAPAPICI	Digital Input Module AP PLC-A Fails to Provide a Change of State	7.00E-08	115	9.66E-05	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe	1	1.00E+00		
56) MAIAZAPICI	Analog Input Module AZ PLC-A Fails to Provide a Change of State	1.74E-07	115	2.40E-04	1.12E-07
MREKAPC-3H	Relay/Contact K-APC-3 Fails Closed (Short, FMD-91 Pg 3-173)	1	1.00E+00		
57) MAIAZBPICI	Analog Input Module AZ PLC-B Fails to Provide a Change of State	3.38E-07	115	4.66E-04	1.12E-07
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe	1.74E-07	115	2.40E-04	1.12E-07
MREWTKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	1	1.00E+00		
58) MAIAZBPICI	Analog Input Module AZ PLC-B Fails to Provide a Change of State	3.38E-07	115	4.66E-04	1.12E-07
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe	1.74E-07	115	2.40E-04	1.12E-07
MRELD1609H	Relay/Contact LD1-609 Fails to Open (Short, FMD-91 Pg 3-173)	1	1.00E+00		
59) MAIAZBPICI	Analog Input Module AZ PLC-B Fails to Provide a Change of State	3.38E-07	115	4.66E-04	1.12E-07
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe	1.74E-07	115	2.40E-04	1.12E-07
MREWTKA3AH	Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)	1	1.00E+00		
60) MAI252S AI	Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A	3.38E-07	115	4.66E-04	1.12E-07
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe	1.74E-07	115	2.40E-04	1.12E-07
MREKAPC-3H	Relay/Contact K-APC-3 Fails Closed (Short, FMD-91 Pg 3-173)	1	1.00E+00		
61) MAI252S AI	Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A	3.38E-07	115	4.66E-04	1.12E-07
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe	1.74E-07	115	2.40E-04	1.12E-07
MREWTKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	1	1.00E+00		
62) MAI252S BI	Analog Input Mod Fails to Provide Correct Signal to S252 PLC-B	3.38E-07	115	4.66E-04	1.12E-07
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe	1.74E-07	115	2.40E-04	1.12E-07
MREWTKA3AH	Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)	1	1.00E+00		
63) MAI252S BI	Analog Input Mod Fails to Provide Correct Signal to S252 PLC-B	3.38E-07	115	4.66E-04	1.12E-07
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe	1.74E-07	115	2.40E-04	1.12E-07
MRELD1609H	Relay/Contact LD1-609 Fails to Open (Short, FMD-91 Pg 3-173)	1	1.00E+00		
64) MAIANAPICI	Analog Input Module AN PLC-A Fails to Provide a Change of State	3.38E-07	115	4.66E-04	1.12E-07
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe	1.74E-07	115	2.40E-04	1.12E-07
MREWTKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	1	1.00E+00		
65) MAIANAPICI	Analog Input Module AN PLC-A Fails to Provide a Change of State	3.38E-07	115	4.66E-04	1.12E-07
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe	1.74E-07	115	2.40E-04	1.12E-07

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CUTSET REPORT

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Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MREKAPC-3H Relay/Contact K-APC-3 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
66) MAIANBPICI Analog Input Module AN PLC-B Fails to Provide a Change of State		1.74E-07	115	2.40E-04	1.12E-07
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MRELD1609H Relay/Contact LD1-609 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
67) MAIANBPICI Analog Input Module AN PLC-B Fails to Provide a Change of State		1.74E-07	115	2.40E-04	1.12E-07
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MRWTAKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
68) MDLIDE227N Improper Downloading of LDE-227 Address for Transfer Route		1.00E-07	1	1.00E+00	1.00E-07
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
69) MAOAZBPICI Analog Output Module AZ PLC-B Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MRWTAKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
70) MAOANAPICI Analog Output Module ANA PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MRWTAKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
71) MAOANAPICI Analog Output Module ANA PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MREKAPC-3H Relay/Contact K-APC-3 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
72) MAOANBPICI Analog Output Module AN PLC-B Fails to Provide Correct Permissive Signal		9.80E-08	115	1.35E-04	6.31E-08
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MRWTAKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
73) MAOANBPICI Analog Output Module AN PLC-B Fails to Provide Correct Permissive Signal		9.80E-08	115	1.35E-04	6.31E-08
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MRELD1609H Relay/Contact LD1-609 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
74) MAOAPAPICI Analog Output Module AP PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MRWTAKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
75) MAOAPAPICI Analog Output Module AP PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MREKAPC-3H Relay/Contact K-APC-3 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
76) MAOAPBPICI Analog Output Module AP PLC-B Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MRWTAKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
77) MAOAZAPICI Analog Output Module AZ PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MRWTAKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
78) MAOAZAPICI Analog Output Module AZ PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MRWTAKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
79) MAOAZBPICI Analog Output Module AZ PLC-B Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MRWTAKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
80) MAOAPBPICI Analog Output Module AP PLC-B Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MRELD1609H Relay/Contact LD1-609 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
81) MDIAPAPICI Digital Input Module AP PLC-A Fails to Provide a Change of State		7.00E-08	115	9.66E-05	4.50E-08
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MRWTAKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
82) MDIAPAPLCI	Digital Input Module AP PLC-A Fails to Provide a Change of State	7.00E-08	115	9.66E-05	4.50E-08
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
MREKAPC-3H	Relay/Contact K-APC-3 Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
83) MDIAPAPLCI	Digital Input Module AP PLC-B Fails to Provide a Change of State	7.00E-08	115	9.66E-05	4.50E-08
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
MREWTKA3AH	Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
84) MDIAPAPLCI	Digital Input Module AP PLC-B Fails to Provide a Change of State	7.00E-08	115	9.66E-05	4.50E-08
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
MRELD1609H	Relay/Contact LD1-609 Fails to Open (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
85) MCP252S AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MDO252S BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
86) MCP252S BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MDO252S AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
87) MCPAPBPLCI	PLC Central Processor A2B PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MDO252S AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
88) MCPANBPLCI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MDO252S AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
89) MCPAPAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MDO252S BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
90) MCPAZAPLCI	PLC Central Processor AZA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MDO252S BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
91) MCPANAPLCI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MDO252S BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
92) MAMLD3609H	Amplifier Module LD3-609 Fails to Trip	5.00E-06	115	6.87E-03	3.18E-08
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
93) MLPAP1ACWS	Analog Circuit 1A-CW for AP PLC-A Shorts to Another Active Circuit (2100	1.60E-12	241500	4.64E-06	
MAMLD3609H	Amplifier Module LD3-609 Fails to Trip	5.00E-06	115	6.87E-03	3.02E-08
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
94) MLP9ASNSHS	Analog Circuit 9A SN CW Shorts to Another Active Circuit (1990 ft)	1.60E-12	228850	4.39E-06	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	2.92E-08
95) MLP9BNSCWS	Circuit Fast to West Area (9B SN CW) Shorts to Another Active Circuit (28,	1.60E-12	3266000	6.27E-05	
MRELD1609H	Relay/Contact LD1-609 Fails to Open (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	2.92E-08
96) MLP9ASNCWS	Circuit Fast to West Area (9A SN CW) Shorts to Another Active Circuit (28,	1.60E-12	3266000	6.27E-05	
MREKAPC-3H	Relay/Contact K-APC-3 Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	2.92E-08
97) MLP9BNSCWS	Circuit Fast to West Area (9B SN CW) Shorts to Another Active Circuit (28,	1.60E-12	3266000	6.27E-05	
MREWTKA3AH	Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	2.92E-08
98) MLP9ASNCWS	Circuit Fast to West Area (9A SN CW) Shorts to Another Active Circuit (28,	1.60E-12	3266000	6.27E-05	
MREWTKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
98) MAMLD3609H Amplifier Module LD3-609 Fails to Trip		5.00E-06	115	6.87E-03	2.41E-08
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MLPAZ1ACWS Analog Circuit 1A-CW for AZ PLC-A Shorts to Another Active Circuit (1590)		1.60E-12	182850	3.51E-06	
99) MAIANBPLCI Analog Input Module AN PLC-B Fails to Provide a Change of State		1.74E-07	115	2.40E-04	2.32E-08
MDIAPAPLCI Digital Input Module AP PLC-A Fails to Provide a Change of State		7.00E-08	115	9.66E-05	
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MAIAZAPLCI Analog Input Module AZ PLC-A Fails to Provide a Change of State		1.74E-07	115	2.40E-04	2.32E-08
MDIAPBPLCI Digital Input Module AP PLC-B Fails to Provide a Change of State		7.00E-08	115	9.66E-05	
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MAI252S AI Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A		1.74E-07	115	2.40E-04	2.32E-08
MDIAPBPLCI Digital Input Module AP PLC-B Fails to Provide a Change of State		7.00E-08	115	9.66E-05	
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MAI252S BI Analog Input Mod Fails to Provide Correct Signal to S252 PLC-B		1.74E-07	115	2.40E-04	2.32E-08
MDIAPBPLCI Digital Input Module AP PLC-B Fails to Provide a Change of State		7.00E-08	115	9.66E-05	
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MAIANAPLCI Analog Input Module AN PLC-A Fails to Provide a Change of State		1.74E-07	115	2.40E-04	2.32E-08
MDIAPBPLCI Digital Input Module AP PLC-B Fails to Provide a Change of State		7.00E-08	115	9.66E-05	
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MAIAZBPLCI Analog Input Module AZ PLC-B Fails to Provide a Change of State		1.74E-07	115	2.40E-04	2.32E-08
MDIAPBPLCI Digital Input Module AP PLC-B Fails to Provide a Change of State		7.00E-08	115	9.66E-05	
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MAOAPAPLCI Analog Output Module AP PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	1.31E-08
MDIAPBPLCI Digital Input Module AP PLC-B Fails to Provide a Change of State		7.00E-08	115	9.66E-05	
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MAOANAPLCI Analog Output Module ANA PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	1.31E-08
MDIAPBPLCI Digital Input Module AP PLC-B Fails to Provide a Change of State		7.00E-08	115	9.66E-05	
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MAOANBPLCI Analog Output Module AN PLC-B Fails to Provide a Change of State		9.80E-08	115	1.35E-04	1.31E-08
MDIAPBPLCI Digital Input Module AP PLC-B Fails to Provide a Change of State		7.00E-08	115	9.66E-05	
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MAOAPBPLCI Analog Output Module AP PLC-B Fails to Provide a Change of State		9.80E-08	115	1.35E-04	1.31E-08
MDIAPBPLCI Digital Input Module AP PLC-B Fails to Provide a Change of State		7.00E-08	115	9.66E-05	
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MAOAZAPLCI Analog Output Module AZ PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	1.31E-08
MDIAPBPLCI Digital Input Module AP PLC-B Fails to Provide a Change of State		7.00E-08	115	9.66E-05	
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MAOAZBPLCI Analog Output Module AZ PLC-B Fails to Provide a Change of State		9.80E-08	115	1.35E-04	1.31E-08
MDIAPBPLCI Digital Input Module AP PLC-B Fails to Provide a Change of State		7.00E-08	115	9.66E-05	
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MDO252S BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	1.22E-08
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MRELD1609H Relay/Contact LD1-609 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MDO252S BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	1.22E-08
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MDO252S AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	1.22E-08
MIE241-APA Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe			1	1.00E+00	
MREKAPC-3H Relay/Contact K-APC-3 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
114) MDO252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	1.22E-08
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
MREWTRK3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
115) MDIAPAPLCI	Digital Input Module AP PLC-A Fails to Provide a Change of State	7.00E-08	115	9.66E-05	9.33E-09
MDIAPBPLCI	Digital Input Module AP PLC-B Fails to Provide a Change of State	7.00E-08	115	9.66E-05	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
116) MAI252S_AI	Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A	1.74E-07	115	2.40E-04	6.29E-09
MDO252S_BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
117) MAIANAPLCI	Analog Input Module AN PLC-A Fails to Provide a Change of State	1.74E-07	115	2.40E-04	6.29E-09
MDO252S_BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
118) MAIAZBPLCI	Analog Input Module AZ PLC-B Fails to Provide a Change of State	1.74E-07	115	2.40E-04	6.29E-09
MDO252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
119) MAIANBPLCI	Analog Input Module AN PLC-B Fails to Provide a Change of State	1.74E-07	115	2.40E-04	6.29E-09
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
120) MAIAZAPLCI	Analog Input Module AZ PLC-A Fails to Provide a Change of State	1.74E-07	115	2.40E-04	6.29E-09
MDO252S_BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
121) MAI252S_BI	Analog Input Mod Fails to Provide Correct Signal to S252 PLC-B	1.74E-07	115	2.40E-04	6.29E-09
MDO252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
122) MDIAPAPLCI	Digital Input Module AP PLC-A Fails to Provide a Change of State	7.00E-08	115	9.66E-05	6.06E-09
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
123) MLP9BSNCWS	Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,	1.60E-12	3266000	6.27E-05	6.06E-09
MDIAPBPLCI	Digital Input Module AP PLC-B Fails to Provide a Change of State	7.00E-08	115	9.66E-05	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
124) MAOAPBPLCI	Analog Output Module AP PLC-B Fails to Provide a Change of State	1.60E-12	3266000	6.27E-05	3.55E-09
MDO252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
125) MAOAPAPLCI	Analog Output Module AP PLC-A Fails to Provide a Change of State	9.80E-08	115	1.35E-04	3.55E-09
MDO252S_BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
126) MAOAZBPLCI	Analog Output Module AZ PLC-B Fails to Provide a Change of State	9.80E-08	115	1.35E-04	3.55E-09
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
127) MAOANAPLCI	Analog Output Module AN PLC-A Fails to Provide a Change of State	9.80E-08	115	1.35E-04	3.55E-09
MDO252S_BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
128) MAOANBPLCI	Analog Output Module AN PLC-B Fails to Provide Correct Permissive Signal	9.80E-08	115	1.35E-04	3.55E-09
MDO252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
129) MAOAZAPLCI	Analog Output Module AZ PLC-A Fails to Provide a Change of State	9.80E-08	115	1.35E-04	3.55E-09
MDO252S_BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	

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CUTSET REPORT

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Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
130) MDIAPBPLCI	Digital Input Module AP PLC-B Fails to Provide a Change of State	7.00E-08	115	9.66E-05	2.53E-09
MDO252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
131) MDIAPAPLCI	Digital Input Module AP PLC-A Fails to Provide a Change of State	7.00E-08	115	9.66E-05	2.53E-09
MDO252S_BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
132) MDO252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	1.64E-09
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
MIP9BSNCWS	Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,	1.60E-12	3266000	6.27E-05	
133) MDO252S_BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	1.64E-09
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	
MIP9ASNCWS	Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,	1.60E-12	3266000	6.27E-05	
134) MDO252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	6.87E-10
MIE241-APA	Waste Transfer Leak in 241-AP Valve Pit 01A and/or Connecting Pipe		1	1.00E+00	

.\TREES\MPV-AP.CUT		CUTSET REPORT		Top prob.: 1.55E-03		Sort by: Fussel Vesely	
Top event: M05000		FusVes		Critic		Birnbm	
Basic Event Name	Prob	FusVes		Critic		Birnbm	
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MIE241-APA	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.55E-03	0.00E+00	1.00E+00
MVRLDE227N	1.00E-03	6.45E-01	6.45E-01	6.45E-01	9.99E-01	2.82E+00	6.46E+02
MEMCC-A3H	4.66E-04	3.01E-01	3.01E-01	3.01E-01	9.99E-01	1.43E+00	6.46E+02
MMLD3609H	6.87E-03	3.25E-02	3.24E-02	3.24E-02	7.30E-03	1.03E+00	5.68E+00
MCPANAPLCI	1.27E-03	9.59E-03	9.56E-03	9.56E-03	1.17E-02	1.01E+00	8.53E+00
MCPAZAPLCI	1.27E-03	9.59E-03	9.56E-03	9.56E-03	1.17E-02	1.01E+00	8.53E+00
MCP252S AI	1.27E-03	9.59E-03	9.56E-03	9.56E-03	1.17E-02	1.01E+00	8.53E+00
MCPAPAPLCI	1.27E-03	9.59E-03	9.56E-03	9.56E-03	1.17E-02	1.01E+00	8.53E+00
MCPANBPLCI	1.27E-03	5.01E-03	5.00E-03	5.00E-03	6.10E-03	1.01E+00	4.94E+00
MCPAZBPLCI	1.27E-03	5.01E-03	5.00E-03	5.00E-03	6.10E-03	1.01E+00	4.94E+00
MCP252S BI	1.27E-03	5.01E-03	5.00E-03	5.00E-03	6.10E-03	1.01E+00	4.94E+00
MRELD1609H	4.66E-04	3.88E-03	3.87E-03	3.87E-03	1.28E-02	1.00E+00	9.29E+00
MREWTKA3AH	4.66E-04	3.88E-03	3.87E-03	3.87E-03	1.28E-02	1.00E+00	9.29E+00
MREWTKA3BH	4.66E-04	2.20E-03	2.19E-03	2.19E-03	7.28E-03	1.00E+00	5.70E+00
MREKAPC-3H	4.66E-04	2.20E-03	2.19E-03	2.19E-03	7.28E-03	1.00E+00	5.70E+00
MAIAZAPLCI	2.40E-04	1.23E-03	1.23E-03	1.23E-03	7.90E-03	1.00E+00	6.10E+00
MAI252S AI	2.40E-04	1.23E-03	1.23E-03	1.23E-03	7.90E-03	1.00E+00	6.10E+00
MAIANAPLCI	2.40E-04	1.23E-03	1.23E-03	1.23E-03	7.90E-03	1.00E+00	6.10E+00
MDIAPAPLCI	9.66E-05	8.05E-04	8.01E-04	8.01E-04	1.28E-02	1.00E+00	9.29E+00
MAOAZAPLCI	1.35E-04	6.91E-04	6.90E-04	6.90E-04	7.90E-03	1.00E+00	6.10E+00
MAOANAPLCI	1.35E-04	6.91E-04	6.90E-04	6.90E-04	7.90E-03	1.00E+00	6.10E+00
MAOAPAPLCI	1.35E-04	6.91E-04	6.90E-04	6.90E-04	7.90E-03	1.00E+00	6.10E+00
MDIAPBPLCI	9.66E-05	4.56E-04	4.54E-04	4.54E-04	7.28E-03	1.00E+00	5.70E+00
MLP9ASNCWS	6.27E-05	3.20E-04	3.20E-04	3.20E-04	7.90E-03	1.00E+00	6.10E+00
MD0252S AI	2.62E-05	2.18E-04	2.17E-04	2.17E-04	1.28E-02	1.00E+00	9.29E+00
MAI252S BI	2.40E-04	1.63E-04	1.63E-04	1.63E-04	1.05E-03	1.00E+00	1.68E+00
MAIANBPLCI	2.40E-04	1.63E-04	1.63E-04	1.63E-04	1.05E-03	1.00E+00	1.68E+00
MAIAZBPLCI	2.40E-04	1.63E-04	1.63E-04	1.63E-04	1.05E-03	1.00E+00	1.68E+00
MD0252S BI	2.62E-05	1.24E-04	1.23E-04	1.23E-04	7.28E-03	1.00E+00	5.70E+00
MAOANBPLCI	1.35E-04	9.20E-05	9.20E-05	9.20E-05	1.05E-03	1.00E+00	1.68E+00
MAOAZBPLCI	1.35E-04	9.20E-05	9.20E-05	9.20E-05	1.05E-03	1.00E+00	1.68E+00
MAOAPBPLCI	1.35E-04	9.20E-05	9.20E-05	9.20E-05	1.05E-03	1.00E+00	1.68E+00
MLDLDE227H	1.38E-07	8.90E-05	8.90E-05	8.90E-05	9.98E-01	1.00E+00	6.46E+02
MDLLDE227N	1.00E-07	6.45E-05	6.45E-05	6.45E-05	9.98E-01	1.00E+00	6.46E+02
MIP9BSNCWS	6.27E-05	4.27E-05	4.27E-05	4.27E-05	1.05E-03	1.00E+00	1.68E+00
MLPAP1ACWS	4.64E-06	2.05E-05	2.05E-05	2.05E-05	6.86E-03	1.00E+00	5.43E+00
MIP9ASNSHS	4.39E-06	1.95E-05	1.95E-05	1.95E-05	6.86E-03	1.00E+00	5.43E+00
MLPAZ1ACWS	3.51E-06	1.55E-05	1.55E-05	1.55E-05	6.86E-03	1.00E+00	5.43E+00

Appendix C-9a

Cutsets and Importance Factors for AW-102 Central Pump Pit 02A Phase I

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CUTSET REPORT

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Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.

1) M06000					
1) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip					
MVLDLDE184N Improper Address Verification for IDE-184 for Transfer Route		1.00E-03	1	1.00E+00	1.00E-03
2) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	4.66E-04
MREKLAWDPH Relay/Contact K-241-AW-PP Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
3) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	4.66E-04
MREMCC-A3H Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
4) MCP252S AI PLC Central Processor ANB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
MCANBPPLCI PLC Central Processor ANB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
5) MCP252S BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.00E+00	1.61E-06
MCPANAPLICI PLC Central Processor ANA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
6) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	1.61E-06
MCPAPAPLICI PLC Central Processor APA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
MCAPBPPLCI PLC Central Processor APB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
7) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	1.61E-06
MCPAPAPLICI PLC Central Processor APA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
MCPAZBPPLCI PLC Central Processor AZB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
8) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	1.61E-06
MCP252S BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
MCPAZAPLICI PLC Central Processor AZA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.00E+00	1.61E-06
9) MCPAPBPPLCI PLC Central Processor APB PLC-B Fails to Provide Correct Signal			1	1.27E-03	1.61E-06
MCPAZAPLICI PLC Central Processor AZA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
10) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	1.61E-06
MCPAZAPLICI PLC Central Processor AZA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
MCAPBPPLCI PLC Central Processor APB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
11) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	1.61E-06
MCP252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
MCP252S BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
12) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	1.61E-06
MCPAPAPLICI PLC Central Processor APA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
13) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	1.61E-06
MCPANAPLICI PLC Central Processor ANA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
MCAPBPPLCI PLC Central Processor APB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
14) MCP252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal			1	1.00E+00	1.61E-06
MCPAPBPPLCI PLC Central Processor APB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
15) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	1.61E-06
MCPANAPLICI PLC Central Processor ANA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
MCAPBPPLCI PLC Central Processor APB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
16) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	1.61E-06
MCPANAPLICI PLC Central Processor ANA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
MCAPBPPLCI PLC Central Processor APB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
17) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	1.61E-06
MCP252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	
MCPAZBPPLCI PLC Central Processor AZB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	

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CUTSET REPORT

\\TREES\MPV-AW.CUT
Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
18) MCPANBPICI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.61E-06
MCPAZAPICI	PLC Central Processor AZA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
19) MCPANBPICI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.61E-06
MCPAPAPICI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
20) MCP252S AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	5.92E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MREWTKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
21) MCP252S BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	5.92E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MREWTKA3AH	Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
22) MCPANAPICI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	5.92E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MREWTKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
23) MCPANBPICI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	5.92E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MREWTKA3AH	Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
24) MCPAPAPICI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	5.92E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MREWTKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
25) MCPAPBPICI	PLC Central Processor APB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	5.92E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MREWTKA3AH	Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
26) MCPAZAPICI	PLC Central Processor AZA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	5.92E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MREWTKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
27) MCPAZBPICI	PLC Central Processor AZB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	5.92E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MREWTKA3AH	Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
28) MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MLPLDK184S	Circuit from LDK-184 to K-241-AW-PP Shorts to Another Active Circuit (10	1.60E-12	11500	2.21E-07	
29) MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MRELD1841H	Relay/Contact LDK-184-1 Fails to Open (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
MRELD1842H	Relay/Contact LDK-184-2 Fails to Open (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
30) MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MREWTKA3AH	Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
MREWTKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
31) MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MLDLE184H	Leak Detector LDE-184 Elements Mechanically Fail	1.00E-10	115	1.38E-07	
32) MCP252S AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.23E-07
MDIAWBPICI	Digital Input Module Fails to Provide Correct Signal to AW PLC-B	7.00E-08	115	9.66E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
33) MCP252S BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.23E-07
MDIAWAPICI	Digital Input Module Fails to Provide Correct Signal to AW PLC-A	7.00E-08	115	9.66E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
34) MCPANAPICI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.23E-07

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CUTSET REPORT

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Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MDIABPLCI	Digital Input Module Fails to Provide Correct Signal to AW PLC-B	7.00E-08	115	9.66E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
35) MCPANBPLCI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.23E-07
MDIABPLCI	Digital Input Module Fails to Provide Correct Signal to AW PLC-A	7.00E-08	115	9.66E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
36) MCPAPAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.23E-07
MDIABPLCI	Digital Input Module Fails to Provide Correct Signal to AW PLC-B	7.00E-08	115	9.66E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
37) MCPAPBPLCI	PLC Central Processor APB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.23E-07
MDIABPLCI	Digital Input Module Fails to Provide Correct Signal to AW PLC-A	7.00E-08	115	9.66E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
38) MCPAZAPLCI	PLC Central Processor AZA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.23E-07
MDIABPLCI	Digital Input Module Fails to Provide Correct Signal to AW PLC-B	7.00E-08	115	9.66E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
39) MCPABZPLCI	PLC Central Processor AZB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.23E-07
MDIABPLCI	Digital Input Module Fails to Provide Correct Signal to AW PLC-A	7.00E-08	115	9.66E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
40) MAI252S AI	Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A	1.74E-07	115	2.40E-04	1.12E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
41) MREWTKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	1.12E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
42) MAIANAPLCI	Analog Input Module AN PLC-A Fails to Provide a Change of State	1.74E-07	115	2.40E-04	1.12E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
43) MREWTKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	1.12E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
44) MAIAPAPLCI	Analog Input Module AP PLC-A Fails to Provide a Change of State	1.74E-07	115	2.40E-04	1.12E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
45) MREWTKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	1.12E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
46) MAIAZAPLCI	Analog Input Module AZ PLC-A Fails to Provide a Change of State	1.74E-07	115	2.40E-04	1.12E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
47) MREWTKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	1.12E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
48) MDLDE184N	Improper Downloading of LDE-184 Address for Transfer Route	3.38E-07	115	4.66E-04	1.00E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
49) MAOANAPLCI	Analog Output Module ANA PLC-A Fails to Provide a Change of State	9.80E-08	115	1.35E-04	6.31E-08
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
50) MREWTKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	1.00E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
51) MAOANBPLCI	Analog Output Module ANB PLC-B Fails to Provide Correct Permissive Signal	9.80E-08	115	1.35E-04	6.31E-08
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
51) MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		9.80E-08	115	1.35E-04	6.31E-08
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
52) MAOAPBPICI Analog Output Module AP PLC-B Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		3.38E-07	115	4.66E-04	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		9.80E-08	115	1.35E-04	6.31E-08
53) MAOAWAPICI Analog Output Module AW PLC-A Fails to Provide a Change of State		3.38E-07	115	4.66E-04	
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		9.80E-08	115	1.35E-04	6.31E-08
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
54) MAOAWBPICI Analog Output Module AW PLC-B Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		3.38E-07	115	4.66E-04	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		9.80E-08	115	1.35E-04	6.31E-08
55) MAOAZAPICI Analog Output Module AZ PLC-A Fails to Provide a Change of State		3.38E-07	115	4.66E-04	
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		9.80E-08	115	1.35E-04	6.31E-08
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
56) MAOAZBPICI Analog Output Module AZ PLC-B Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		3.38E-07	115	4.66E-04	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		9.80E-08	115	1.35E-04	6.31E-08
57) MDIAWAPICI Digital Input Module Fails to Provide Correct Signal to AW PLC-A		7.00E-08	115	9.66E-05	4.50E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		3.38E-07	115	4.66E-04	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		9.80E-08	115	1.35E-04	6.31E-08
58) MDIAWBPICI Digital Input Module Fails to Provide Correct Signal to AW PLC-B		7.00E-08	115	9.66E-05	4.50E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		3.38E-07	115	4.66E-04	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		9.80E-08	115	1.35E-04	6.31E-08
59) MCPAPBPICI PLC Central Processor APB PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	3.33E-08
MD0252S_AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		9.20E-07	115	1.27E-03	3.33E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		3.38E-07	115	4.66E-04	
60) MCPAZAPICI PLC Central Processor AZA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	3.33E-08
MD0252S_AI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	3.33E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		3.38E-07	115	4.66E-04	
61) MCPAZBPICI PLC Central Processor AZB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	3.33E-08
MD0252S_AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	3.33E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		3.38E-07	115	4.66E-04	
62) MCPAPAPICI PLC Central Processor APA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	3.33E-08
MD0252S_AI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	3.33E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		3.38E-07	115	4.66E-04	
63) MCP252S_AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	3.33E-08
MD0252S_AI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	3.33E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		3.38E-07	115	4.66E-04	
64) MCP252S_AI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	3.33E-08
MD0252S_AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	3.33E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		3.38E-07	115	4.66E-04	
65) MCPANAPICI PLC Central Processor ANA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	3.33E-08
MD0252S_AI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	3.33E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		3.38E-07	115	4.66E-04	
66) MCPANBPICI PLC Central Processor ANB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	3.33E-08
MD0252S_AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	3.33E-08

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
67) MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	2.92E-08
MLP9BSNCWS	Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,	1.60E-12	3266000	6.27E-05	
MEWTAK3AH	Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
68) MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	2.92E-08
MLP9ASNCWS	Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,	1.60E-12	3266000	6.27E-05	
MEWTAK3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
69) MAT252S AI	Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A	1.74E-07	115	2.40E-04	2.32E-08
MDIABBLPCI	Digital Input Module Fails to Provide Correct Signal to AW PLC-B	7.00E-08	115	9.66E-05	
MTEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MAI252S BI	Analog Input Mod Fails to Provide Correct Signal to S252 PLC-B	1.74E-07	115	2.40E-04	2.32E-08
MDIAWAPLPI	Digital Input Module Fails to Provide Correct Signal to AW PLC-A	7.00E-08	115	9.66E-05	
MTEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MAIAZAPLPI	Analog Input Module AZ PLC-A Fails to Provide a Change of State	1.74E-07	115	2.40E-04	2.32E-08
MDIAWBPLCI	Digital Input Module Fails to Provide Correct Signal to AW PLC-B	7.00E-08	115	9.66E-05	
MTEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MAITANBPICI	Analog Input Module AN PLC-B Fails to Provide a Change of State	1.74E-07	115	2.40E-04	2.32E-08
MDTAWAPLPI	Digital Input Module Fails to Provide Correct Signal to AW PLC-A	7.00E-08	115	9.66E-05	
MTEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MAITAPAPLPI	Analog Input Module AP PLC-A Fails to Provide a Change of State	1.74E-07	115	2.40E-04	2.32E-08
MDTAWBPICI	Digital Input Module Fails to Provide Correct Signal to AW PLC-B	7.00E-08	115	9.66E-05	
MTEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MAITAZBPICI	Analog Input Module AZ PLC-B Fails to Provide a Change of State	1.74E-07	115	2.40E-04	2.32E-08
MDTAWAPLPI	Digital Input Module Fails to Provide Correct Signal to AW PLC-A	7.00E-08	115	9.66E-05	
MTEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MAITANAPLPI	Analog Input Module AN PLC-A Fails to Provide a Change of State	1.74E-07	115	2.40E-04	2.32E-08
MDIAWBPLCI	Digital Input Module Fails to Provide Correct Signal to AW PLC-B	7.00E-08	115	9.66E-05	
MTEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MAOAPAPLPI	Analog Output Module AP PLC-A Fails to Provide a Change of State	9.80E-08	115	1.35E-04	1.31E-08
MDIAWBPLCI	Digital Input Module Fails to Provide Correct Signal to AW PLC-B	7.00E-08	115	9.66E-05	
MTEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MAOAWBPICI	Analog Output Module AW PLC-B Fails to Provide a Change of State	9.80E-08	115	1.35E-04	1.31E-08
MDIAWAPLPI	Digital Input Module Fails to Provide Correct Signal to AW PLC-A	7.00E-08	115	9.66E-05	
MTEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MAOANBPICI	Analog Output Module AN PLC-B Fails to Provide Correct Permissive Signal	9.80E-08	115	1.35E-04	1.31E-08
MDIAWAPLPI	Digital Input Module Fails to Provide Correct Signal to AW PLC-A	7.00E-08	115	9.66E-05	
MTEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MAOANAPLPI	Analog Output Module ANA PLC-A Fails to Provide a Change of State	9.80E-08	115	1.35E-04	1.31E-08
MDTAWBPICI	Digital Input Module Fails to Provide Correct Signal to AW PLC-B	7.00E-08	115	9.66E-05	
MTEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MAOAPBPICI	Analog Output Module AP PLC-B Fails to Provide a Change of State	9.80E-08	115	1.35E-04	1.31E-08
MDIAWAPLPI	Digital Input Module Fails to Provide Correct Signal to AW PLC-A	7.00E-08	115	9.66E-05	
MTEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MAOAWAPLPI	Analog Output Module AW PLC-A Fails to Provide a Change of State	9.80E-08	115	1.35E-04	1.31E-08
MDTAWBPICI	Digital Input Module Fails to Provide Correct Signal to AW PLC-B	7.00E-08	115	9.66E-05	

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Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip					
83) MAOAZBPLCI Analog Output Module AZ PLC-B Fails to Provide a Change of State		9.80E-08	1	1.00E+00	1.00E+00
MDIAWAPLCI Digital Input Module Fails to Provide Correct Signal to AW PLC-A		7.00E-08	115	1.35E-04	1.31E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip					
84) MAOAZAPLCI Analog Output Module AZ PLC-A Fails to Provide a Change of State		9.80E-08	115	1.00E+00	1.00E+00
MDIAWAPLCI Digital Input Module Fails to Provide Correct Signal to AW PLC-B		7.00E-08	115	1.35E-04	1.31E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip					
85) MDO252S BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	9.66E-05	9.66E-05
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip					
86) MREWKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	1.00E+00	1.00E+00
MDO252S AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	1.22E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip					
87) MREWKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	4.66E-04
MDIAWAPLCI Digital Input Module Fails to Provide Correct Signal to AW PLC-A		7.00E-08	115	9.66E-05	9.33E-09
MDIAWAPLCI Digital Input Module Fails to Provide Correct Signal to AW PLC-B		7.00E-08	115	9.66E-05	9.66E-05
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip					
88) MAIANBPLCI Analog Input Module AN PLC-B Fails to Provide a Change of State		1.74E-07	115	1.00E+00	1.00E+00
MDO252S AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.40E-04	6.29E-09
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip					
89) MAIAPAPLCI Analog Input Module AP PLC-A Fails to Provide a Change of State		1.74E-07	115	2.62E-05	2.62E-05
MDO252S BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	1.00E+00	1.00E+00
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip					
90) MAIAPBPLCI Analog Input Module AP PLC-B Fails to Provide a Change of State		1.74E-07	115	2.40E-04	6.29E-09
MDO252S AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	2.62E-05
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip					
91) MAI252S BI Analog Input Mod Fails to Provide Correct Signal to S252 PLC-B		1.74E-07	115	1.00E+00	1.00E+00
MDO252S AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.40E-04	6.29E-09
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip					
92) MAI252S AI Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A		1.74E-07	115	1.00E+00	1.00E+00
MDO252S BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.40E-04	6.29E-09
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip					
93) MAIAZAPLCI Analog Input Module AZ PLC-A Fails to Provide a Change of State		1.74E-07	115	2.40E-04	6.29E-09
MDO252S BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	2.62E-05
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip					
94) MAIANAPLCI Analog Input Module AN PLC-A Fails to Provide a Change of State		1.74E-07	115	1.00E+00	1.00E+00
MDO252S BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.40E-04	6.29E-09
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip					
95) MDO252S AI Digital Output Module 252-S PLC-A Fails to Provide a Change of State		1.74E-07	115	2.40E-04	6.29E-09
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip					
96) MDIAWAPLCI Digital Input Module Fails to Provide Correct Signal to AW PLC-A		7.00E-08	115	2.62E-05	2.62E-05
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip					
97) MLP9BSNCWS Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,		1.60E-12	3266000	1.00E+00	1.00E+00
MDIAWAPLCI Digital Input Module Fails to Provide Correct Signal to AW PLC-B		7.00E-08	115	9.66E-05	6.06E-09
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip					
98) MLP9ASNCWS Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,		1.60E-12	3266000	1.00E+00	1.00E+00
MAOAZAPLCI Analog Output Module AZ PLC-A Fails to Provide a Change of State		9.80E-08	115	6.27E-05	6.27E-05
MDO252S BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	1.35E-04	3.55E-09
				2.62E-05	2.62E-05

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MTEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
99) MAOANBPLCI	Analog Output Module AN PLC-B Fails to Provide Correct Permissive Signal	9.80E-08	115	1.35E-04	3.55E-09
MD0252S AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MTEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
100) MAOAWBPLCI	Analog Output Module AW PLC-B Fails to Provide a Change of State	9.80E-08	115	1.35E-04	3.55E-09
MD0252S AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MTEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
101) MAOANAPLCI	Analog Output Module ANA PLC-A Fails to Provide a Change of State	9.80E-08	115	1.35E-04	3.55E-09
MD0252S BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MTEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
102) MAOAPAPLCI	Analog Output Module AP PLC-A Fails to Provide a Change of State	9.80E-08	115	1.35E-04	3.55E-09
MD0252S BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MTEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
103) MAOAPBPLCI	Analog Output Module AP PLC-B Fails to Provide a Change of State	9.80E-08	115	1.35E-04	3.55E-09
MD0252S AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MTEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
104) MAOAZBPLCI	Analog Output Module AZ PLC-B Fails to Provide a Change of State	9.80E-08	115	1.35E-04	3.55E-09
MD0252S AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MTEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
105) MAOAWAPLCI	Analog Output Module AW PLC-A Fails to Provide a Change of State	9.80E-08	115	1.35E-04	3.55E-09
MD0252S BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MTEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
106) MDTAWBPLCI	Digital Input Module Fails to Provide Correct Signal to AW PLC-B	7.00E-08	115	9.66E-05	2.53E-09
MD0252S AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MTEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
107) MDTAWAPLCI	Digital Input Module Fails to Provide Correct Signal to AW PLC-A	7.00E-08	115	9.66E-05	2.53E-09
MD0252S BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MTEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
108) MDO252S AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	1.64E-09
MTEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
109) MUP9BSNCWS	Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,	1.60E-12	3266000	6.27E-05	
MD0252S BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MTEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
110) MLEP9ASNCWS	Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,	1.60E-12	3266000	6.27E-05	
MD0252S AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	6.87E-10
MTEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	

.\TREES\MPV-AW.CUT		CUTSET REPORT			
Top event: M06000		Top prob.: 1.97E-03		Sort by: Fussel Vesely	
Basic Event Name	Prob	FusVes	Critic	Birbhm	AchW
MIEAW-102A	1.00E+00	1.00E+00	1.00E+00	1.97E-03	1.00E+00
MVRDL184N	1.00E-03	5.08E-01	5.08E-01	9.98E-01	5.09E+02
MREK1AWPPH	4.66E-04	2.37E-01	2.37E-01	9.98E-01	5.09E+02
MREMcC-A3H	4.66E-04	2.37E-01	2.37E-01	9.98E-01	5.09E+02
MCP252S AI	1.27E-03	3.65E-03	3.64E-03	5.64E-03	3.86E+00
MCPANBPLCI	1.27E-03	3.65E-03	3.64E-03	5.64E-03	3.86E+00
MCPAZAPLCI	1.27E-03	3.65E-03	3.64E-03	5.64E-03	3.86E+00
MCP252S BI	1.27E-03	3.65E-03	3.64E-03	5.64E-03	3.86E+00
MCPA2BPLCI	1.27E-03	3.65E-03	3.64E-03	5.64E-03	3.86E+00
MCPANAPLCI	1.27E-03	3.65E-03	3.64E-03	5.64E-03	3.86E+00
MCPAPBPLCI	1.27E-03	3.65E-03	3.64E-03	5.64E-03	3.86E+00
MCPAPAPLCI	1.27E-03	3.65E-03	3.64E-03	5.64E-03	3.86E+00
MREWTKA3AH	4.66E-04	1.71E-03	1.71E-03	7.19E-03	4.66E+00
MREWTKA3BH	4.66E-04	1.71E-03	1.71E-03	7.19E-03	4.66E+00
MDIAWBPLCI	9.66E-05	3.54E-04	3.53E-04	7.19E-03	4.66E+00
MDIAWAPLCI	9.66E-05	3.54E-04	3.53E-04	7.19E-03	4.66E+00
MLPLDX184S	2.21E-07	1.12E-04	1.12E-04	9.98E-01	5.09E+02
MRELD184IH	4.66E-04	1.10E-04	1.10E-04	4.65E-04	1.24E+00
MRELD1842H	4.66E-04	1.10E-04	1.10E-04	4.65E-04	1.24E+00
MDO252S BI	2.62E-05	9.62E-05	9.59E-05	7.19E-03	4.66E+00
MDO252S AI	2.62E-05	9.62E-05	9.59E-05	7.19E-03	4.66E+00
MAI252S AI	2.40E-04	7.18E-05	7.18E-05	5.88E-04	1.30E+00
MAIANAPLCI	2.40E-04	7.18E-05	7.18E-05	5.88E-04	1.30E+00
MAIAZBPLCI	2.40E-04	7.18E-05	7.18E-05	5.88E-04	1.30E+00
MAIAPLCI	2.40E-04	7.18E-05	7.18E-05	5.88E-04	1.30E+00
MAI252S BI	2.40E-04	7.18E-05	7.18E-05	5.88E-04	1.30E+00
MAIAZAPLCI	2.40E-04	7.18E-05	7.18E-05	5.88E-04	1.30E+00
MAIANBPLCI	2.40E-04	7.18E-05	7.18E-05	5.88E-04	1.30E+00
MAIAPBPLCI	2.40E-04	7.18E-05	7.18E-05	5.88E-04	1.30E+00
MLDLDE184H	1.38E-07	7.01E-05	7.01E-05	9.98E-01	5.09E+02
MDLLDE184N	1.00E-07	5.08E-05	5.08E-05	9.98E-01	5.09E+02
MAOANAPLCI	1.35E-04	4.04E-05	4.04E-05	5.88E-04	1.30E+00
MAOAZAPLCI	1.35E-04	4.04E-05	4.04E-05	5.88E-04	1.30E+00
MAOAPLCI	1.35E-04	4.04E-05	4.04E-05	5.88E-04	1.30E+00
MAOAWBPLCI	1.35E-04	4.04E-05	4.04E-05	5.88E-04	1.30E+00
MAOANBPLCI	1.35E-04	4.04E-05	4.04E-05	5.88E-04	1.30E+00
MAOAWAPLCI	1.35E-04	4.04E-05	4.04E-05	5.88E-04	1.30E+00
MAOAZBPLCI	1.35E-04	4.04E-05	4.04E-05	5.88E-04	1.30E+00
MAOAPBPLCI	1.35E-04	4.04E-05	4.04E-05	5.88E-04	1.30E+00
MLP9ASNCWS	6.27E-05	1.88E-05	1.88E-05	5.88E-04	1.30E+00
MLP9BSNCWS	6.27E-05	1.88E-05	1.88E-05	5.88E-04	1.30E+00

Appendix C-9b

Cutsets and Importance Factors for AW-102 Central Pump Pit 02A Phase II

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CUTSET REPORT

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Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	PROB.	MOD./CS.
1) M06005					
1) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1.00E-03	1	1.00E+00	1.00E-03
MVRLDE184N Improper Address Verification for LDE-184 for Transfer Route		1.00E-03	1	1.00E+00	1.00E-03
2) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		3.38E-07	115	4.66E-04	4.66E-04
MREMCC-A3H Relay/Contact MCC-A3 Fails Closed (Short, FMD-91 Pg 3-173)		9.20E-07	115	1.27E-03	1.61E-06
3) MCP252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
MCPAPBP1C1 PLC Central Processor APB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.00E+00	1.61E-06
4) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		9.20E-07	115	1.27E-03	1.61E-06
MCP252S BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
MCPAZAP1C1 PLC Central Processor AZA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.00E+00	1.61E-06
5) MCPAPAP1C1 PLC Central Processor APA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
MCPAZBP1C1 PLC Central Processor AZB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
6) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		9.20E-07	115	1.00E+00	1.61E-06
MCPAPBP1C1 PLC Central Processor APB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
MCPAZAP1C1 PLC Central Processor AZA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
7) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		9.20E-07	115	1.00E+00	1.61E-06
MCP252S BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
MCPAPAP1C1 PLC Central Processor APA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
8) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		9.20E-07	115	1.00E+00	1.61E-06
MCPAZAP1C1 PLC Central Processor AZA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
MCPAZBP1C1 PLC Central Processor AZB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
9) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		9.20E-07	115	1.00E+00	1.61E-06
MCP252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
MCP252S BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
10) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		9.20E-07	115	1.00E+00	1.61E-06
MCPANAP1C1 PLC Central Processor ANA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
MCPANBP1C1 PLC Central Processor ANB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
11) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		9.20E-07	115	1.00E+00	1.61E-06
MCPANAP1C1 PLC Central Processor ANA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
MCPAZBP1C1 PLC Central Processor AZB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
12) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		9.20E-07	115	1.00E+00	1.61E-06
MCP252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
MCPANBP1C1 PLC Central Processor ANB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
13) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		9.20E-07	115	1.00E+00	1.61E-06
MCP252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
MCPAZBP1C1 PLC Central Processor AZB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
14) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		9.20E-07	115	1.00E+00	1.61E-06
MCPANAP1C1 PLC Central Processor ANA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
MCPAPBP1C1 PLC Central Processor APB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
15) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		9.20E-07	115	1.00E+00	1.61E-06
MCPANBP1C1 PLC Central Processor ANB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
MCPAZAP1C1 PLC Central Processor AZA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
16) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		9.20E-07	115	1.00E+00	1.61E-06
MCP252S BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
MCPANAP1C1 PLC Central Processor ANA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06
17) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		9.20E-07	115	1.00E+00	1.61E-06
MCPANBP1C1 PLC Central Processor ANB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.61E-06

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CUTSET REPORT

.\TREES\MPV-AWU.CUT
Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MCPAPAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
18) MCPAPAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	1.61E-06
MCPAPAPLCI	PLC Central Processor APB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
19) MCPAPAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	5.92E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MRELD1842H	Relay/Contact LDK-184-2 Fails to Open (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
20) MCPAPAPLCI	PLC Central Processor APB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	5.92E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MREWTKA3AH	Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
21) MCPAPAPLCI	PLC Central Processor APB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	5.92E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MRELD1841H	Relay/Contact LDK-184-1 Fails to Open (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
22) MCPAPAPLCI	PLC Central Processor AZA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	5.92E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MRELD1843H	Relay/Contact LDK-184-3 Fails to Open (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
23) MCPAPAPLCI	PLC Central Processor AZA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	5.92E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
24) MCPAPAPLCI	PLC Central Processor AZA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	5.92E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MREWTKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
25) MCPAPAPLCI	PLC Central Processor AZB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	5.92E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MRELD1841H	Relay/Contact LDK-184-1 Fails to Open (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
26) MCPAPAPLCI	PLC Central Processor AZB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	5.92E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MREWTKA3AH	Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
27) MCP252S AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	5.92E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MCP252S AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	5.92E-07
28) MCP252S AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	5.92E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MRELD1843H	Relay/Contact LDK-184-3 Fails to Open (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
29) MCP252S AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	5.92E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MREWTKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
30) MCP252S BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	5.92E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MREWTKA3AH	Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
31) MCP252S BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	5.92E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MRELD1841H	Relay/Contact LDK-184-1 Fails to Open (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
32) MCPANAPLCI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	5.92E-07
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
MREWTKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
33) MCPANAPLCI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	5.92E-07

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00		
MRELD1842H Relay/Contact LDK-184-2 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
34) MCPANAPLCI PLC Central Processor ANA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00		
MRELD1843H Relay/Contact LDK-184-3 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
35) MCPANBPLCI PLC Central Processor ANB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00		
MRELD1841H Relay/Contact LDK-184-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
36) MCPANBPLCI PLC Central Processor ANB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00		
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
37) MCPAPAPLCI PLC Central Processor APA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00		
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
38) MCPAPAPLCI PLC Central Processor APA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	5.92E-07
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00		
MRELD1843H Relay/Contact LDK-184-3 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
39) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1.60E-12	11500	1.00E+00	2.21E-07
MPLDE184S Circuit from LDE-184 Shorts to Another Active Circuit (100 ft)		1	1.00E+00		
40) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		3.38E-07	115	4.66E-04	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
41) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00		
MRELD1841H Relay/Contact LDK-184-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
42) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00		
MRELD1841H Relay/Contact LDK-184-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MRELD1842H Relay/Contact LDK-184-2 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
43) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00		
MRELD1843H Relay/Contact LDK-184-3 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
44) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00		
MRELD1842H Relay/Contact LDK-184-2 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
45) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00		
MRELD1841H Relay/Contact LDK-184-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MRELD1843H Relay/Contact LDK-184-3 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
46) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00		
MLDLE184H Leak Detector LDE-184 Elements Mechanically Fail		1.00E-10	115	1.38E-07	
47) MCP252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.23E-07
MDIABPLCI Digital Input Module Fails to Provide Correct Signal to AW PLC-B		7.00E-08	115	9.66E-05	
48) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00		
MCP252S BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.23E-07
MDIABPLCI Digital Input Module Fails to Provide Correct Signal to AW PLC-A		7.00E-08	115	9.66E-05	
49) MCPANAPLCI PLC Central Processor ANA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.23E-07
MDIABPLCI Digital Input Module Fails to Provide Correct Signal to AW PLC-B		7.00E-08	115	9.66E-05	
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00		

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
50) MCPANBPLCI PLC Central Processor ANB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.23E-07
MDIAWAPLCI Digital Input Module Fails to Provide Correct Signal to AW PLC-A		7.00E-08	115	9.66E-05	
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
51) MCPAPAPLCI PLC Central Processor APA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.23E-07
MDIAWBPLCI Digital Input Module Fails to Provide Correct Signal to AW PLC-B		7.00E-08	115	9.66E-05	
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
52) MCPAPBPLCI PLC Central Processor APB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.23E-07
MDIAWAPLCI Digital Input Module Fails to Provide Correct Signal to AW PLC-A		7.00E-08	115	9.66E-05	
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
53) MCPA2APLCI PLC Central Processor AZA PLC-A Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.23E-07
MDIAWBPLCI Digital Input Module Fails to Provide Correct Signal to AW PLC-B		7.00E-08	115	9.66E-05	
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
54) MCPAZBPLCI PLC Central Processor AZB PLC-B Fails to Provide Correct Signal		9.20E-07	115	1.27E-03	1.23E-07
MDIAWAPLCI Digital Input Module Fails to Provide Correct Signal to AW PLC-A		7.00E-08	115	9.66E-05	
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
55) MAIANBPLCI Analog Input Module AN PLC-B Fails to Provide a Change of State		1.74E-07	115	2.40E-04	1.12E-07
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
56) MRELD1841H Relay/Contact LDK-184-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MDIAWAPLCI Analog Input Module AP PLC-A Fails to Provide a Change of State		1.74E-07	115	2.40E-04	1.12E-07
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
57) MRELD1843H Relay/Contact LDK-184-3 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MDIAWAPLCI Analog Input Module AP PLC-A Fails to Provide a Change of State		1.74E-07	115	2.40E-04	1.12E-07
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
58) MRELD1842H Relay/Contact LDK-184-2 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MDIAWAPLCI Analog Input Module AP PLC-A Fails to Provide a Change of State		1.74E-07	115	2.40E-04	1.12E-07
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
59) MREWTK3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MDIAWAPLCI Analog Input Module AP PLC-B Fails to Provide a Change of State		1.74E-07	115	2.40E-04	1.12E-07
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
60) MREWTK3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MDIAWAPLCI Analog Input Module AP PLC-B Fails to Provide a Change of State		1.74E-07	115	2.40E-04	1.12E-07
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
61) MRELD1841H Relay/Contact LDK-184-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MDIAWAPLCI Analog Input Module AZ PLC-A Fails to Provide a Change of State		1.74E-07	115	2.40E-04	1.12E-07
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
62) MREWTK3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MDIAWAPLCI Analog Input Module AZ PLC-A Fails to Provide a Change of State		1.74E-07	115	2.40E-04	1.12E-07
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
63) MRELD1842H Relay/Contact LDK-184-2 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MDIAWAPLCI Analog Input Module AZ PLC-A Fails to Provide a Change of State		1.74E-07	115	2.40E-04	1.12E-07
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
64) MRELD1843H Relay/Contact LDK-184-3 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MDIAWAPLCI Analog Input Module AZ PLC-B Fails to Provide a Change of State		1.74E-07	115	2.40E-04	1.12E-07
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
65) MREWTK3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
MDIAWAPLCI Analog Input Module AZ PLC-B Fails to Provide a Change of State		1.74E-07	115	2.40E-04	1.12E-07
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MRELD1841H Relay/Contact LDK-184-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
66) MAI252S AI Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A		1.74E-07	115	2.40E-04	1.12E-07
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MRELD1842H Relay/Contact LDK-184-2 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
67) MAI252S AI Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A		1.74E-07	115	2.40E-04	1.12E-07
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MRELD1843H Relay/Contact LDK-184-3 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
68) MAI252S AI Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A		1.74E-07	115	2.40E-04	1.12E-07
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MREWTAK3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
69) MAI252S BI Analog Input Mod Fails to Provide Correct Signal to S252 PLC-B		1.74E-07	115	2.40E-04	1.12E-07
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MRELD1841H Relay/Contact LDK-184-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
70) MAI252S BI Analog Input Mod Fails to Provide Correct Signal to S252 PLC-B		1.74E-07	115	2.40E-04	1.12E-07
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MREWTAK3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
71) MAIANAPLCI Analog Input Module AN PLC-A Fails to Provide a Change of State		1.74E-07	115	2.40E-04	1.12E-07
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MRELD1843H Relay/Contact LDK-184-3 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
72) MAIANAPLCI Analog Input Module AN PLC-A Fails to Provide a Change of State		1.74E-07	115	2.40E-04	1.12E-07
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MRELD1842H Relay/Contact LDK-184-2 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
73) MAIANAPLCI Analog Input Module AN PLC-A Fails to Provide a Change of State		1.74E-07	115	2.40E-04	1.12E-07
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MREWTAK3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
74) MAIANBPPLCI Analog Input Module AN PLC-B Fails to Provide a Change of State		1.74E-07	115	2.40E-04	1.12E-07
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MREWTAK3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
75) MDLDE184N Improper Downloading of LDE-184 Address for Transfer Route		1.00E-07	1	1.00E-07	1.00E-07
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
76) MAOAZBPPLCI Analog Output Module AZ PLC-B Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MRELD1841H Relay/Contact LDK-184-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
77) MAOANAPLCI Analog Output Module ANA PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MRELD1842H Relay/Contact LDK-184-2 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
78) MAOANAPLCI Analog Output Module ANA PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MREWTAK3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
79) MAOANAPLCI Analog Output Module ANA PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MRELD1843H Relay/Contact LDK-184-3 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
80) MAOANBPPLCI Analog Output Module ANA PLC-B Fails to Provide Correct Permissive Signal		9.80E-08	115	1.35E-04	6.31E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MRELD1841H Relay/Contact LDK-184-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
81) MAOANBPPLCI Analog Output Module ANA PLC-B Fails to Provide Correct Permissive Signal		9.80E-08	115	1.35E-04	6.31E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MREWTAK3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
82) MAOAPAPPLCI Analog Output Module AP PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08

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Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
83) MAOAPAPLCI Analog Output Module AP PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MRELD1843H Relay/Contact LDK-184-3 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
84) MAOAPAPLCI Analog Output Module AP PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MRELD1842H Relay/Contact LDK-184-2 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
85) MAOAPBPPLCI Analog Output Module AP PLC-B Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MRELD1841H Relay/Contact LDK-184-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
86) MAOAPBPPLCI Analog Output Module AP PLC-B Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
87) MAOAWAPLCI Analog Output Module AW PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
88) MAOAWAPLCI Analog Output Module AW PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MRELD1843H Relay/Contact LDK-184-3 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
89) MAOAWBPPLCI Analog Output Module AW PLC-B Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
90) MAOAWBPPLCI Analog Output Module AW PLC-B Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MRELD1841H Relay/Contact LDK-184-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
91) MAOAZAPLCI Analog Output Module AZ PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MRELD1842H Relay/Contact LDK-184-2 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
92) MAOAZAPLCI Analog Output Module AZ PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MRELD1843H Relay/Contact LDK-184-3 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
93) MAOAZBPPLCI Analog Output Module AZ PLC-B Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
94) MAOAWAPLCI Analog Output Module AW PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MRELD1842H Relay/Contact LDK-184-2 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
95) MAOAZAPLCI Analog Output Module AZ PLC-A Fails to Provide a Change of State		9.80E-08	115	1.35E-04	6.31E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
96) MDIAWAPLCI Digital Input Module Fails to Provide Correct Signal to AW PLC-A		7.00E-08	115	9.66E-05	4.50E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
97) MDIAWAPLCI Digital Input Module Fails to Provide Correct Signal to AW PLC-A		7.00E-08	115	9.66E-05	4.50E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip			1	1.00E+00	
MRELD1842H Relay/Contact LDK-184-2 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
98) MDIAWAPLCI Digital Input Module Fails to Provide Correct Signal to AW PLC-A		7.00E-08	115	9.66E-05	4.50E-08

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip	1	1.00E+00		
MRELD1843H	Relay/Contact LDK-184-3 Fails to Open (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
99) MDIAWBPLCI	Digital Input Module Fails to Provide Correct Signal to AW PLC-B	7.00E-08	115	9.66E-05	4.50E-08
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip	1	1.00E+00		
MREWTKA3AH	Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
100) MDIAWBPLCI	Digital Input Module Fails to Provide Correct Signal to AW PLC-B	7.00E-08	115	9.66E-05	4.50E-08
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip	1	1.00E+00		
MRELD1841H	Relay/Contact LDK-184-1 Fails to Open (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
101) MCPANAPLCI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MD0252S_BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip	1	1.00E+00		
102) MCD252S_AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MD0252S_BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip	1	1.00E+00		
103) MCD252S_BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MD0252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip	1	1.00E+00		
104) MCPAZAPLCI	PLC Central Processor AZA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MD0252S_BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip	1	1.00E+00		
105) MCPANBPLCI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MD0252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip	1	1.00E+00		
106) MCPAPAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MD0252S_BI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip	1	1.00E+00		
107) MCPAPBPLCI	PLC Central Processor APB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MD0252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip	1	1.00E+00		
108) MCPAZBPLCI	PLC Central Processor AZB PLC-B Fails to Provide Correct Signal	9.20E-07	115	1.27E-03	3.33E-08
MD0252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip	1	1.00E+00		
109) MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip	1	1.00E+00		
MLP9ASNCWS	Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,	1.60E-12	3266000	6.27E-05	2.92E-08
MREWTKA3BH	Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
110) MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip	1	1.00E+00		
MLP9ASNCWS	Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,	1.60E-12	3266000	6.27E-05	2.92E-08
MRELD1842H	Relay/Contact LDK-184-2 Fails to Open (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
111) MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip	1	1.00E+00		
MLP9BSNCWS	Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,	1.60E-12	3266000	6.27E-05	2.92E-08
MREWTKA3AH	Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
112) MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip	1	1.00E+00		
MLP9ASNCWS	Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,	1.60E-12	3266000	6.27E-05	2.92E-08
MRELD1843H	Relay/Contact LDK-184-3 Fails to Open (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
113) MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip	1	1.00E+00		
MLP9BSNCWS	Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,	1.60E-12	3266000	6.27E-05	2.92E-08
MRELD1841H	Relay/Contact LDK-184-1 Fails to Open (Short, FMD-91 Pg 3-173)	3.38E-07	115	4.66E-04	
114) MATAPAPLCI	Analog Input Module AP PLC-A Fails to Provide a Change of State	1.74E-07	115	2.40E-04	2.32E-08

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MDIAWBPLCI	Digital Input Module Fails to Provide Correct Signal to AW PLC-B	7.00E-08	115	9.66E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
115) MAI252S BI	Analog Input Mod Fails to Provide Correct Signal to S252 PLC-B	1.74E-07	115	2.40E-04	2.32E-08
MDIAWBPLCI	Digital Input Module Fails to Provide Correct Signal to AW PLC-A	7.00E-08	115	9.66E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
116) MAIA2BPLCI	Analog Input Module AZ PLC-B Fails to Provide a Change of State	1.74E-07	115	2.40E-04	2.32E-08
MDIAWBPLCI	Digital Input Module Fails to Provide Correct Signal to AW PLC-A	7.00E-08	115	9.66E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
117) MAIAWBPLCI	Analog Input Module AP PLC-B Fails to Provide a Change of State	1.74E-07	115	2.40E-04	2.32E-08
MDIAWBPLCI	Digital Input Module Fails to Provide Correct Signal to AW PLC-A	7.00E-08	115	9.66E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
118) MAIANAPLCI	Analog Input Module AN PLC-A Fails to Provide a Change of State	1.74E-07	115	2.40E-04	2.32E-08
MDIAWBPLCI	Digital Input Module Fails to Provide Correct Signal to AW PLC-B	7.00E-08	115	9.66E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
119) MAI252S AI	Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A	1.74E-07	115	2.40E-04	2.32E-08
MDIAWBPLCI	Digital Input Module Fails to Provide Correct Signal to AW PLC-B	7.00E-08	115	9.66E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
120) MAIANBPLCI	Analog Input Module AN PLC-B Fails to Provide a Change of State	1.74E-07	115	2.40E-04	2.32E-08
MDIAWBPLCI	Digital Input Module Fails to Provide Correct Signal to AW PLC-A	7.00E-08	115	9.66E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
121) MAIAZAPLCI	Analog Input Module AZ PLC-A Fails to Provide a Change of State	1.74E-07	115	2.40E-04	2.32E-08
MDIAWBPLCI	Digital Input Module Fails to Provide Correct Signal to AW PLC-B	7.00E-08	115	9.66E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
122) MAOAZAPLCI	Analog Output Module AZ PLC-A Fails to Provide a Change of State	9.80E-08	115	1.35E-04	1.31E-08
MDIAWBPLCI	Digital Input Module Fails to Provide Correct Signal to AW PLC-B	7.00E-08	115	9.66E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
123) MAOAZBPLCI	Analog Output Module AZ PLC-B Fails to Provide a Change of State	9.80E-08	115	1.35E-04	1.31E-08
MDIAWBPLCI	Digital Input Module Fails to Provide Correct Signal to AW PLC-A	7.00E-08	115	9.66E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
124) MAOANBPLCI	Analog Output Module AN PLC-B Fails to Provide Correct Permissive Signal	9.80E-08	115	1.35E-04	1.31E-08
MDIAWBPLCI	Digital Input Module Fails to Provide Correct Signal to AW PLC-A	7.00E-08	115	9.66E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
125) MAOANAPLCI	Analog Output Module ANA PLC-A Fails to Provide a Change of State	9.80E-08	115	1.35E-04	1.31E-08
MDIAWBPLCI	Digital Input Module Fails to Provide Correct Signal to AW PLC-B	7.00E-08	115	9.66E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
126) MAOAWBPLCI	Analog Output Module AW PLC-B Fails to Provide a Change of State	9.80E-08	115	1.35E-04	1.31E-08
MDIAWBPLCI	Digital Input Module Fails to Provide Correct Signal to AW PLC-A	7.00E-08	115	9.66E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
127) MAOAWAPLCI	Analog Output Module AW PLC-A Fails to Provide a Change of State	9.80E-08	115	1.35E-04	1.31E-08
MDIAWBPLCI	Digital Input Module Fails to Provide Correct Signal to AW PLC-B	7.00E-08	115	9.66E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
128) MAOAPAPLCI	Analog Output Module AP PLC-A Fails to Provide a Change of State	9.80E-08	115	1.35E-04	1.31E-08
MDIAWBPLCI	Digital Input Module Fails to Provide Correct Signal to AW PLC-B	7.00E-08	115	9.66E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
129) MAOAPBPLCI	Analog Output Module AP PLC-B Fails to Provide a Change of State	9.80E-08	115	1.35E-04	1.31E-08
MDIAWBPLCI	Digital Input Module Fails to Provide Correct Signal to AW PLC-A	7.00E-08	115	9.66E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1	1.00E+00	
130) MD0252S AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	1.22E-08

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1.00E+00	1	1.00E+00	
MRELD1842H Relay/Contact LDK-184-2 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
131) MDO252S_AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	1.22E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1.00E+00	1	1.00E+00	
MRELD1843H Relay/Contact LDK-184-3 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
132) MDO252S_AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	1.22E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1.00E+00	1	1.00E+00	
MREWTKA3BH Relay/Contact WT-K-A3-B Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
133) MDO252S_BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	1.22E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1.00E+00	1	1.00E+00	
MREWTKA3AH Relay/Contact WT-K-A3-A Fails Closed (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
134) MDO252S_BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	1.22E-08
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1.00E+00	1	1.00E+00	
MRELD1841H Relay/Contact LDK-184-1 Fails to Open (Short, FMD-91 Pg 3-173)		3.38E-07	115	4.66E-04	
135) MDIAWAPLCI Digital Input Module Fails to Provide Correct Signal to AW PLC-A		7.00E-08	115	9.66E-05	9.33E-09
MDIAWBPICI Digital Input Module Fails to Provide Correct Signal to AW PLC-B		7.00E-08	115	9.66E-05	
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1.00E+00	1	1.00E+00	
136) MAIAZAPLCI Analog Input Module AZ PLC-A Fails to Provide a Change of State		1.74E-07	115	2.40E-04	6.29E-09
MDO252S_BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1.00E+00	1	1.00E+00	
137) MAI252S_AI Analog Input Mod Fails to Provide Correct Signal to S252 PLC-B		1.74E-07	115	2.40E-04	6.29E-09
MDO252S_AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1.00E+00	1	1.00E+00	
138) MAIANBPICI Analog Input Module AN PLC-B Fails to Provide a Change of State		1.74E-07	115	2.40E-04	6.29E-09
MDO252S_AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1.00E+00	1	1.00E+00	
139) MAI252S_AI Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A		1.74E-07	115	2.40E-04	6.29E-09
MDO252S_BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1.00E+00	1	1.00E+00	
140) MAIFAPLCI Analog Input Module AP PLC-A Fails to Provide a Change of State		1.74E-07	115	2.40E-04	6.29E-09
MDO252S_BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1.00E+00	1	1.00E+00	
141) MAIANAPLCI Analog Input Module AN PLC-A Fails to Provide a Change of State		1.74E-07	115	2.40E-04	6.29E-09
MDO252S_BI Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1.00E+00	1	1.00E+00	
142) MAIAPBPICI Analog Input Module AP PLC-B Fails to Provide a Change of State		1.74E-07	115	2.40E-04	6.29E-09
MDO252S_AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1.00E+00	1	1.00E+00	
143) MAIAZBPICI Analog Input Module AZ PLC-B Fails to Provide a Change of State		1.74E-07	115	2.40E-04	6.29E-09
MDO252S_AI Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si		1.90E-08	115	2.62E-05	
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1.00E+00	1	1.00E+00	
144) MDIAWAPLCI Digital Input Module Fails to Provide Correct Signal to AW PLC-A		7.00E-08	115	9.66E-05	6.06E-09
MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1.00E+00	1	1.00E+00	
MLP9BSNCWS Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,		1.60E-12	3266000	6.27E-05	6.06E-09
MDIAWBPICI Digital Input Module Fails to Provide Correct Signal to AW PLC-B		7.00E-08	115	9.66E-05	
145) MIEAW-102A Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip		1.00E+00	1	1.00E+00	
MLP9ASNCWS Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,		1.60E-12	3266000	6.27E-05	3.55E-09
MDIAZBPICI Analog Output Module AZ PLC-B Fails to Provide a Change of State		9.80E-08	115	1.35E-04	

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CUTSET REPORT

.\TREES\MPV-AWU.CUT
Filter: 'ALL'

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MD0252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip	1	1.00E+00	1.00E+00	
147) MA0ANBPICI	Analog Output Module AN PLC-B Fails to Provide Correct Permissive Signal	9.80E-08	115	1.35E-04	3.55E-09
MD0252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip	1	1.00E+00	1.00E+00	
148) MA0ANAPICI	Analog Output Module ANA PLC-A Fails to Provide a Change of State	9.80E-08	115	1.35E-04	3.55E-09
MD0252S_AI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip	1	1.00E+00	1.00E+00	
149) MA0APAPICI	Analog Output Module AP PLC-A Fails to Provide a Change of State	9.80E-08	115	1.35E-04	3.55E-09
MD0252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip	1	1.00E+00	1.00E+00	
150) MA0AWAPICI	Analog Output Module AW PLC-A Fails to Provide a Change of State	9.80E-08	115	1.35E-04	3.55E-09
MD0252S_AI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip	1	1.00E+00	1.00E+00	
151) MA0AZAPICI	Analog Output Module AZ PLC-A Fails to Provide a Change of State	9.80E-08	115	1.35E-04	3.55E-09
MD0252S_AI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip	1	1.00E+00	1.00E+00	
152) MA0APBPICI	Analog Output Module AP PLC-B Fails to Provide a Change of State	9.80E-08	115	1.35E-04	3.55E-09
MD0252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip	1	1.00E+00	1.00E+00	
153) MA0AWBPICI	Analog Output Module AW PLC-B Fails to Provide a Change of State	9.80E-08	115	1.35E-04	3.55E-09
MD0252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip	1	1.00E+00	1.00E+00	
154) MDIAPBPICI	Digital Input Module Fails to Provide Correct Signal to AW PLC-B	7.00E-08	115	9.66E-05	2.53E-09
MD0252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip	1	1.00E+00	1.00E+00	
155) MDIAPAPICI	Digital Input Module Fails to Provide Correct Signal to AW PLC-A	7.00E-08	115	9.66E-05	2.53E-09
MD0252S_AI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip	1	1.00E+00	1.00E+00	
156) MD0252S_AI	Digital Output Module 252-S PLC-B Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	1.64E-09
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip	1	1.00E+00	1.00E+00	
157) MLP9ASNCWS	Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,	1.60E-12	3266000	6.27E-05	
MD0252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	1.64E-09
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip	1	1.00E+00	1.00E+00	
158) MLP9BSNCWS	Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,	1.60E-12	3266000	6.27E-05	
MD0252S_AI	Digital Output Module 252-S PLC-A Fails to Provide Correct Permissive Si	1.90E-08	115	2.62E-05	6.87E-10
MIEAW-102A	Waste Transfer Leak in AW-102 Central Pump Pit 02A and/or Connecting Pip	1	1.00E+00	1.00E+00	

.\TREES\MPV-AWU.CUT CUTSET REPORT
 Top event: M06005 Top prob.: 1.51E-03 Sort by: Fussel Vesely

Basic Event Name	Prob	FusVes	Critic	Birbmn	RedW	AchW
MIEAW-102A	1.00E+00	1.00E+00	1.00E+00	1.51E-03	3.40E+12	1.00E+00
MVRLDE184N	1.00E-03	6.62E-01	6.62E-01	9.99E-01	2.96E+00	6.62E+02
MREMCC-A3H	4.66E-04	3.08E-01	3.08E-01	9.99E-01	1.45E+00	6.62E+02
MCPAZAPLCI	1.27E-03	5.53E-03	5.51E-03	6.57E-03	1.01E+00	5.34E+00
MCP252S AI	1.27E-03	5.53E-03	5.51E-03	6.57E-03	1.01E+00	5.34E+00
MCPAPAPLCI	1.27E-03	5.53E-03	5.51E-03	6.57E-03	1.01E+00	5.34E+00
MCPANAPLCI	1.27E-03	5.53E-03	5.51E-03	6.57E-03	1.01E+00	5.34E+00
MCPANBPLCI	1.27E-03	5.14E-03	5.13E-03	6.10E-03	1.01E+00	5.04E+00
MCP252S BI	1.27E-03	5.14E-03	5.13E-03	6.10E-03	1.01E+00	5.04E+00
MCPAPBPLCI	1.27E-03	5.14E-03	5.13E-03	6.10E-03	1.01E+00	5.04E+00
MCPAZBPLCI	1.27E-03	5.14E-03	5.13E-03	6.10E-03	1.01E+00	5.04E+00
MREWTKA3AH	4.66E-04	2.51E-03	2.51E-03	8.12E-03	1.00E+00	6.37E+00
MRELD1841H	4.66E-04	2.51E-03	2.51E-03	8.12E-03	1.00E+00	6.37E+00
MRELD1842H	4.66E-04	2.37E-03	2.36E-03	7.66E-03	1.00E+00	6.07E+00
MREWTKA3BH	4.66E-04	2.37E-03	2.36E-03	7.66E-03	1.00E+00	6.07E+00
MRELD1843H	4.66E-04	2.37E-03	2.36E-03	7.66E-03	1.00E+00	6.07E+00
MDIAPBPLCI	9.66E-05	4.91E-04	4.90E-04	7.66E-03	1.00E+00	6.07E+00
MIAANAPLCI	2.40E-04	2.41E-04	2.41E-04	1.52E-03	1.00E+00	2.00E+00
MIAZAPLCI	2.40E-04	2.41E-04	2.41E-04	1.52E-03	1.00E+00	2.00E+00
MIA252S AI	2.40E-04	2.41E-04	2.41E-04	1.52E-03	1.00E+00	2.00E+00
MIAAPAPLCI	2.40E-04	2.41E-04	2.41E-04	1.52E-03	1.00E+00	2.00E+00
MIAZBPLCI	2.40E-04	1.67E-04	1.67E-04	1.05E-03	1.00E+00	1.70E+00
MIA252S BI	2.40E-04	1.67E-04	1.67E-04	1.05E-03	1.00E+00	1.70E+00
MIAAPBPLCI	2.40E-04	1.67E-04	1.67E-04	1.05E-03	1.00E+00	1.70E+00
MIAANBPLCI	2.40E-04	1.67E-04	1.67E-04	1.05E-03	1.00E+00	1.70E+00
MLPLDE184S	2.21E-07	1.46E-04	1.46E-04	9.98E-01	1.00E+00	6.62E+02
MDO252S AI	2.62E-05	1.41E-04	1.41E-04	8.12E-03	1.00E+00	6.37E+00
MROAZAPLCI	1.35E-04	1.36E-04	1.36E-04	1.52E-03	1.00E+00	2.01E+00
MROANAPLCI	1.35E-04	1.36E-04	1.36E-04	1.52E-03	1.00E+00	2.01E+00
MROAPAPLCI	1.35E-04	1.36E-04	1.36E-04	1.52E-03	1.00E+00	2.01E+00
MROAWAPLCI	1.35E-04	1.36E-04	1.36E-04	1.52E-03	1.00E+00	2.01E+00
MDO252S BI	2.62E-05	1.33E-04	1.33E-04	7.66E-03	1.00E+00	6.07E+00
MROAWBPLCI	1.35E-04	9.43E-05	9.43E-05	1.05E-03	1.00E+00	1.70E+00
MROAZBPLCI	1.35E-04	9.43E-05	9.43E-05	1.05E-03	1.00E+00	1.70E+00
MROANBPLCI	1.35E-04	9.43E-05	9.43E-05	1.05E-03	1.00E+00	1.70E+00
MROAPBPLCI	1.35E-04	9.43E-05	9.43E-05	1.05E-03	1.00E+00	1.70E+00
MLDLDE184H	1.38E-07	9.12E-05	9.12E-05	9.98E-01	1.00E+00	6.62E+02
MDLLDE184N	1.00E-07	6.61E-05	6.61E-05	9.98E-01	1.00E+00	6.62E+02
MLP9ASNCWS	6.27E-05	6.31E-05	6.30E-05	1.52E-03	1.00E+00	2.01E+00
MLP9BSNCWS	6.27E-05	4.37E-05	4.37E-05	1.05E-03	1.00E+00	1.70E+00

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Appendix C-10

Cutsets and Importance Factors for MPSS Safety Function

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CUTSET REPORT

.\TREES\MPV-SAFE.CUT
Filter: 'ALL' Truncation Limit: 1.00E-09

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
1) M20000					
1) MCP242APAI	PLC Central Processor 242-A PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	*1.45E-03
MCP252S_BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
2) MCP242APAI	PLC Central Processor 242-A PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
MCPANBPICI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
3) MCP242APAI	PLC Central Processor 242-A PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
MCP242S_BI	PLC Central Processor 242-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
4) MCP242APBI	PLC Central Processor 242-A PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
MCPAPAPICI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
5) MCP242S_AI	PLC Central Processor 242-S PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
MCPAZBPICI	PLC Central Processor AZB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
6) MCP252S_BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
MCP242APICI	PLC Central Processor 242-A PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
7) MCP252S_BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
MCPANAPICI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
8) MCP242S_AI	PLC Central Processor 242-S PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
MCPAWBPICI	PLC Central Processor AWB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
9) MCPANAPICI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
MCPAWBPICI	PLC Central Processor AWB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
10) MCPANAPICI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
MCP242APBI	PLC Central Processor 242-A PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
11) MCP242APBI	PLC Central Processor 242-A PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
12) MCP242S_AI	PLC Central Processor 242-S PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
MCP252S_BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
13) MCPANAPICI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
MCPANBPICI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
14) MCPANAPICI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
MCPAPBPICI	PLC Central Processor APB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
15) MCP242S_AI	PLC Central Processor 242-S PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
MCPAPBPICI	PLC Central Processor APB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
16) MCPANBPICI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
MCPAPAPICI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
17) MCPANBPICI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
MCPAWAPICI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
18) MCP242APAI	PLC Central Processor 242-A PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
MCPAPBPICI	PLC Central Processor APB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
19) MCP242APBI	PLC Central Processor 242-A PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
MCP252S_AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
20) MCP242S_BI	PLC Central Processor 242-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
MCPAPAPICI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
21) MCPANBPICI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
MCP242APAI	PLC Central Processor 242-A PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
22) MCPAPAPICI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
MCP242APBI	PLC Central Processor 242-A PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
23) MCP242S_BI	PLC Central Processor 242-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
MCP242APICI	PLC Central Processor 242-A PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
24) MCPAPAPICI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05

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CUTSET REPORT

.\FREES\MPV-SAFE.CUT
 Filter: 'ALL' Truncation Limit: 1.00E-09

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MCPAPAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
49) MCP252S_BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.62E-05
MCPAWAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
50) MCP242APAI	PLC Central Processor 242-A PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	8.00E-06
MLP9BSNCWS	Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,	1.60E-12	142000	1.99E-03	
51) MCP242APBI	PLC Central Processor 242-A PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	8.00E-06
MLP9ASNCWS	Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,	1.60E-12	142000	1.99E-03	
52) MCP242S_AI	PLC Central Processor 242-S PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	8.00E-06
MLP9BSNCWS	Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,	1.60E-12	142000	1.99E-03	
53) MCP242S_BI	PLC Central Processor 242-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	8.00E-06
MLP9ASNCWS	Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,	1.60E-12	142000	1.99E-03	
54) MCP252S_AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	8.00E-06
MLP9BSNCWS	Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,	1.60E-12	142000	1.99E-03	
55) MCP252S_BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	8.00E-06
MLP9ASNCWS	Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,	1.60E-12	142000	1.99E-03	
56) MCPANAPLCI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	8.00E-06
MLP9BSNCWS	Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,	1.60E-12	142000	1.99E-03	
57) MCPANBPLCI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	8.00E-06
MLP9ASNCWS	Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,	1.60E-12	142000	1.99E-03	
58) MCPAPAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	8.00E-06
MLP9BSNCWS	Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,	1.60E-12	142000	1.99E-03	
59) MCPAPBPLCI	PLC Central Processor APB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	8.00E-06
MLP9ASNCWS	Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,	1.60E-12	142000	1.99E-03	
60) MCPAWAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	8.00E-06
MLP9BSNCWS	Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,	1.60E-12	142000	1.99E-03	
61) MCPAWBPLCI	PLC Central Processor AWB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	8.00E-06
MLP9ASNCWS	Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,	1.60E-12	142000	1.99E-03	
62) MCPAZAPLCI	PLC Central Processor AZA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	8.00E-06
MLP9BSNCWS	Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,	1.60E-12	142000	1.99E-03	
63) MCPAZBPLCI	PLC Central Processor AZB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	8.00E-06
MLP9ASNCWS	Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,	1.60E-12	142000	1.99E-03	
64) MLP9ASNCWS	Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,	1.60E-12	142000	1.99E-03	3.95E-06
MLP9BSNCWS	Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,	1.60E-12	142000	1.99E-03	
65) MAIAWBPLCI	Analog Input Module Fails to Provide Correct Signal to AW PLC-B	1.74E-07	0.5	7.62E-04	3.06E-06
MCPAWAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
66) MAIAWBPLCI	Analog Input Module Fails to Provide Correct Signal to AW PLC-B	1.74E-07	0.5	7.62E-04	3.06E-06
MCP242S_AI	PLC Central Processor 242-S PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
67) MAI242S_AI	Analog Input Module 242-S Channel A Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCPAWBPLCI	PLC Central Processor AWB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
68) MAIAWBPLCI	Analog Input Module Fails to Provide Correct Signal to AW PLC-B	1.74E-07	0.5	7.62E-04	3.06E-06
MCPAPAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
69) MAIAWBPLCI	Analog Input Module Fails to Provide Correct Signal to AW PLC-B	1.74E-07	0.5	7.62E-04	3.06E-06
MCP252S_AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
70) MAI242S_AI	Analog Input Module 242-S Channel A Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCP242S_BI	PLC Central Processor 242-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
71) MAIAWBPLCI	Analog Input Module Fails to Provide Correct Signal to AW PLC-B	9.20E-07	0.5	7.62E-04	3.06E-06
MCP242APAI	PLC Central Processor 242-A PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
72) MAIAWBPLCI	Analog Input Module Fails to Provide Correct Signal to AW PLC-B	1.74E-07	0.5	7.62E-04	3.06E-06

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MCPANAPLCI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
73) MAI242S_AI	Analog Input Module 242-S Channel A Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCPANBPLCI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
74) MAIAWBPPLCI	Analog Input Module Fails to Provide Correct Signal to AW PLC-B	9.20E-07	0.5	7.62E-04	3.06E-06
MCPAZAPLCI	PLC Central Processor AZA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
75) MAIAZAPLCI	Analog Input Module AZ PLC-A Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCPAWBPLCI	PLC Central Processor AWB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
76) MAI242S_AI	Analog Input Module 242-S Channel A Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCPAZBPLCI	PLC Central Processor AZB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
77) MAIAZAPLCI	Analog Input Module AZ PLC-A Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCP252S_BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
78) MAIAZAPLCI	Analog Input Module AZ PLC-A Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCPANBPLCI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
79) MAI242S_AI	Analog Input Module 242-S Channel A Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCP252S_BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
80) MAIAZAPLCI	Analog Input Module AZ PLC-A Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCPAZBPLCI	PLC Central Processor AZB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
81) MAIAZAPLCI	Analog Input Module AZ PLC-A Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCPAPBPLCI	PLC Central Processor APB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
82) MAI242S_AI	Analog Input Module 242-S Channel A Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCPAPBPLCI	PLC Central Processor APB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
83) MAIAZAPLCI	Analog Input Module AZ PLC-A Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCP242S_BI	PLC Central Processor 242-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
84) MAIAZAPLCI	Analog Input Module AZ PLC-A Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCP242APBI	PLC Central Processor 242-A PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
85) MAI242S_AI	Analog Input Module 242-S Channel A Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCP242APBI	PLC Central Processor 242-A PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
86) MAIAZBPLCI	Analog Input Module AZ PLC-B Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCPANAPLCI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
87) MAIAZBPLCI	Analog Input Module AZ PLC-B Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCP242S_AI	Analog Input Module 242-S Channel A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
88) MAI242S_AI	Analog Input Module 242-S Channel B Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCPAWAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
89) MAIAZBPLCI	Analog Input Module AZ PLC-B Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCPAPAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
90) MAIAZBPLCI	Analog Input Module AZ PLC-B Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCPAZAPLCI	PLC Central Processor AZA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
91) MAI242S_BI	Analog Input Module 242-S Channel B Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCPAZAPLCI	PLC Central Processor AZA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
92) MAIAZBPLCI	Analog Input Module AZ PLC-B Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCPAWAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
93) MAIAZBPLCI	Analog Input Module AZ PLC-B Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCP242APAI	PLC Central Processor 242-A PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
94) MAI242S_BI	Analog Input Module 242-S Channel B Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCPANAPLCI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
95) MAIAZBPLCI	Analog Input Module AZ PLC-B Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCP252S_AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
96) MAI242S_BI	Analog Input Module 242-S Channel B Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MCP252S_AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
97) MAI242S_BI	Analog Input Module 242-S Channel B Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCP242S_AI	PLC Central Processor 242-S PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
98) MAI242S_BI	Analog Input Module 242-S Channel B Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCP242APAI	PLC Central Processor 242-A PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
99) MAI242S_BI	Analog Input Module 242-S Channel B Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCPAPAPICI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
100) MAI252S_AI	Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A	1.74E-07	0.5	7.62E-04	3.06E-06
MCPANBPICI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
101) MAI252S_AI	Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A	1.74E-07	0.5	7.62E-04	3.06E-06
MCP242APBI	PLC Central Processor 242-A PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
102) MAI252S_BI	Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-B	1.74E-07	0.5	7.62E-04	3.06E-06
MCP242S_AI	PLC Central Processor 242-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
103) MAI252S_AI	Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A	1.74E-07	0.5	7.62E-04	3.06E-06
MCPAPBPICI	PLC Central Processor APB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
104) MAI252S_AI	Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A	1.74E-07	0.5	7.62E-04	3.06E-06
MCPAZBPICI	PLC Central Processor AZB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
105) MAI252S_AI	Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A	1.74E-07	0.5	7.62E-04	3.06E-06
MCPANBPICI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
106) MAI252S_BI	Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-B	1.74E-07	0.5	7.62E-04	3.06E-06
MCP252S_BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
107) MAI252S_BI	Analog Input Mod Fails to Provide Correct Signal to S252 PLC-B	1.74E-07	0.5	7.62E-04	3.06E-06
MCPAZAPICI	PLC Central Processor AZA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
108) MAI252S_BI	Analog Input Mod Fails to Provide Correct Signal to S252 PLC-B	1.74E-07	0.5	7.62E-04	3.06E-06
MCP252S_AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
109) MAI252S_BI	Analog Input Mod Fails to Provide Correct Signal to S252 PLC-B	1.74E-07	0.5	7.62E-04	3.06E-06
MCPANAPICI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
110) MAI252S_BI	Analog Input Mod Fails to Provide Correct Signal to S252 PLC-B	1.74E-07	0.5	7.62E-04	3.06E-06
MCP242S_AI	PLC Central Processor 242-S PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
111) MAI252S_BI	Analog Input Mod Fails to Provide Correct Signal to S252 PLC-B	1.74E-07	0.5	7.62E-04	3.06E-06
MCPAPAPICI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
112) MAI252S_BI	Analog Input Mod Fails to Provide Correct Signal to S252 PLC-B	1.74E-07	0.5	7.62E-04	3.06E-06
MCP242APAI	PLC Central Processor 242-A PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
113) MAI252S_BI	Analog Input Mod Fails to Provide Correct Signal to S252 PLC-B	1.74E-07	0.5	7.62E-04	3.06E-06
MCPAWAPICI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
114) MAI252S_BI	Analog Input Mod Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCPAZBPICI	PLC Central Processor AZB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
115) MAI252S_BI	Analog Input Mod Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCPAPBPICI	PLC Central Processor APB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
116) MAI252S_BI	Analog Input Mod Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCP242APBI	PLC Central Processor 242-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
117) MAI252S_BI	Analog Input Mod Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCP242APBI	PLC Central Processor 242-A PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
118) MAI252S_BI	Analog Input Mod Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCPANBPICI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
119) MAI252S_BI	Analog Input Mod Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06
MCPANBPICI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
120) MAI252S_BI	Analog Input Mod Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	3.06E-06

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MCP252S BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	0.5	4.02E-03	
121) MAIANBPLCI Analog Input Module AN PLC-B Fails to Provide a Change of State		1.74E-07	0.5	7.62E-04	3.06E-06
MCP252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	0.5	4.02E-03	
122) MAIANBPLCI Analog Input Module AN PLC-B Fails to Provide a Change of State		1.74E-07	0.5	7.62E-04	3.06E-06
MCPAPAPLCI PLC Central Processor APA PLC-A Fails to Provide Correct Signal		9.20E-07	0.5	4.02E-03	
123) MAIANBPLCI Analog Input Module AN PLC-B Fails to Provide a Change of State		1.74E-07	0.5	7.62E-04	3.06E-06
MCP242S AI PLC Central Processor 242-S PLC-A Fails to Provide Correct Signal		9.20E-07	0.5	4.02E-03	
124) MAIANBPLCI Analog Input Module AN PLC-B Fails to Provide a Change of State		1.74E-07	0.5	7.62E-04	3.06E-06
MCPAZAPLCI PLC Central Processor AZA PLC-A Fails to Provide Correct Signal		9.20E-07	0.5	4.02E-03	
125) MAIANBPLCI Analog Input Module AN PLC-B Fails to Provide a Change of State		1.74E-07	0.5	7.62E-04	3.06E-06
MCPANAPLCI PLC Central Processor ANA PLC-A Fails to Provide Correct Signal		9.20E-07	0.5	4.02E-03	
126) MAIANBPLCI Analog Input Module AN PLC-B Fails to Provide a Change of State		1.74E-07	0.5	7.62E-04	3.06E-06
MCP242APAI PLC Central Processor 242-A PLC-A Fails to Provide Correct Signal		9.20E-07	0.5	4.02E-03	
127) MAIANBPLCI Analog Input Module AN PLC-B Fails to Provide a Change of State		1.74E-07	0.5	7.62E-04	3.06E-06
MCPAWAPLCI PLC Central Processor APA PLC-A Fails to Provide Correct Signal		9.20E-07	0.5	4.02E-03	
128) MAIAAPLCI Analog Input Module AP PLC-A Fails to Provide a Change of State		1.74E-07	0.5	7.62E-04	3.06E-06
MCP252S BI PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal		9.20E-07	0.5	4.02E-03	
129) MAIAAPLCI Analog Input Module AP PLC-A Fails to Provide a Change of State		1.74E-07	0.5	7.62E-04	3.06E-06
MCP242APBI PLC Central Processor 242-A PLC-B Fails to Provide Correct Signal		9.20E-07	0.5	4.02E-03	
130) MAIAAPLCI Analog Input Module AP PLC-A Fails to Provide a Change of State		1.74E-07	0.5	7.62E-04	3.06E-06
MCPAPBPLCI PLC Central Processor APB PLC-B Fails to Provide Correct Signal		9.20E-07	0.5	4.02E-03	
131) MAIAAPLCI Analog Input Module AP PLC-A Fails to Provide a Change of State		1.74E-07	0.5	7.62E-04	3.06E-06
MCPANBPLCI PLC Central Processor ANB PLC-B Fails to Provide Correct Signal		9.20E-07	0.5	4.02E-03	
132) MAIAAPLCI Analog Input Module AP PLC-A Fails to Provide a Change of State		1.74E-07	0.5	7.62E-04	3.06E-06
MCP242S BI PLC Central Processor 242-S PLC-B Fails to Provide Correct Signal		9.20E-07	0.5	4.02E-03	
133) MAIAAPLCI Analog Input Module AP PLC-A Fails to Provide a Change of State		1.74E-07	0.5	7.62E-04	3.06E-06
MCPAWBPLCI PLC Central Processor AWB PLC-B Fails to Provide Correct Signal		9.20E-07	0.5	4.02E-03	
134) MAIAAPLCI Analog Input Module AP PLC-A Fails to Provide a Change of State		1.74E-07	0.5	7.62E-04	3.06E-06
MCPAZBPLCI PLC Central Processor AZB PLC-B Fails to Provide Correct Signal		9.20E-07	0.5	4.02E-03	
135) MAIAAPLCI Analog Input Module AP PLC-B Fails to Provide a Change of State		1.74E-07	0.5	7.62E-04	3.06E-06
MCPAPAPLCI PLC Central Processor APA PLC-A Fails to Provide Correct Signal		9.20E-07	0.5	4.02E-03	
136) MAIAAPLCI Analog Input Module AP PLC-B Fails to Provide a Change of State		1.74E-07	0.5	7.62E-04	3.06E-06
MCP242S AI PLC Central Processor 242-S PLC-A Fails to Provide Correct Signal		9.20E-07	0.5	4.02E-03	
137) MAIAAPLCI Analog Input Module AP PLC-B Fails to Provide a Change of State		1.74E-07	0.5	7.62E-04	3.06E-06
MCP242APAI PLC Central Processor 242-A PLC-A Fails to Provide Correct Signal		9.20E-07	0.5	4.02E-03	
138) MAIAAPLCI Analog Input Module AP PLC-B Fails to Provide a Change of State		1.74E-07	0.5	7.62E-04	3.06E-06
MCPAWAPLCI PLC Central Processor APA PLC-A Fails to Provide Correct Signal		9.20E-07	0.5	4.02E-03	
139) MAIAAPLCI Analog Input Module AP PLC-B Fails to Provide a Change of State		1.74E-07	0.5	7.62E-04	3.06E-06
MCPANAPLCI PLC Central Processor ANA PLC-A Fails to Provide Correct Signal		9.20E-07	0.5	4.02E-03	
140) MAIAAPLCI Analog Input Module AP PLC-B Fails to Provide a Change of State		1.74E-07	0.5	7.62E-04	3.06E-06
MCPAZAPLCI PLC Central Processor AZA PLC-A Fails to Provide Correct Signal		9.20E-07	0.5	4.02E-03	
141) MAIAAPLCI Analog Input Module AP PLC-B Fails to Provide a Change of State		1.74E-07	0.5	7.62E-04	3.06E-06
MCP252S AI PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal		9.20E-07	0.5	4.02E-03	
142) MAIAWAPLCI Analog Input Module Fails to Provide Correct Signal to AW PLC-A		1.74E-07	0.5	7.62E-04	3.06E-06
MCP242APBI PLC Central Processor 242-A PLC-B Fails to Provide Correct Signal		9.20E-07	0.5	4.02E-03	
143) MAIAWAPLCI Analog Input Module Fails to Provide Correct Signal to AW PLC-A		1.74E-07	0.5	7.62E-04	3.06E-06
MCPANBPLCI PLC Central Processor ANB PLC-B Fails to Provide Correct Signal		9.20E-07	0.5	4.02E-03	
144) MAIAWAPLCI Analog Input Module Fails to Provide Correct Signal to AW PLC-A		1.74E-07	0.5	7.62E-04	3.06E-06

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Filter: 'ALL' Truncation Limit: 1.00E-09 CUTSET REPORT

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MCPAPBPLCI	PLC Central Processor APB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
145) MAIAWAPLCI	Analog Input Module Fails to Provide Correct Signal to AW PLC-A	1.74E-07	0.5	7.62E-04	3.06E-06
MCP242S BI	PLC Central Processor 242-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
146) MAIAWAPLCI	Analog Input Module Fails to Provide Correct Signal to AW PLC-A	1.74E-07	0.5	7.62E-04	3.06E-06
MCPAWBPLCI	PLC Central Processor AWB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
147) MAIAWAPLCI	Analog Input Module Fails to Provide Correct Signal to AW PLC-A	1.74E-07	0.5	7.62E-04	3.06E-06
MCP252S BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
148) MAIAWAPLCI	Analog Input Module Fails to Provide Correct Signal to AW PLC-A	1.74E-07	0.5	7.62E-04	3.06E-06
MCPAZBPLCI	PLC Central Processor AZB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
149) MAO242APAI	Analog Output Module 242-A PLC-A Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAWBPLCI	PLC Central Processor AWB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
150) MAO242APAI	Analog Output Module 242-A PLC-A Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPANBPLCI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
151) MAO242APAI	Analog Output Module 242-A PLC-A Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAZBPLCI	PLC Central Processor AZB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
152) MAO242APAI	Analog Output Module 242-A PLC-A Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCP242S BI	PLC Central Processor 242-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
153) MAO242APAI	Analog Output Module 242-A PLC-A Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCP242APBI	PLC Central Processor 242-A PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
154) MAO242APAI	Analog Output Module 242-A PLC-A Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAPBPLCI	PLC Central Processor APB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
155) MAO242APAI	Analog Output Module 242-A PLC-A Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCP252S BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
156) MAO242APBI	Analog Output Module 242-A PLC-B Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCP252S AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
157) MAO242APBI	Analog Output Module 242-A PLC-B Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAPAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
158) MAO242APBI	Analog Output Module 242-A PLC-B Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCP242APAI	PLC Central Processor 242-A PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
159) MAO242APAI	Analog Output Module 242-A PLC-A Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAZAPLCI	PLC Central Processor AZA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
160) MAO242APBI	Analog Output Module 242-A PLC-B Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCP242S AI	PLC Central Processor 242-S PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
161) MAO242APBI	Analog Output Module 242-A PLC-B Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAWAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
162) MAO242APBI	Analog Output Module 242-A PLC-B Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPANAPLCI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
163) MAO252S AI	Analog Output Mod 252-S PLC-A Fails to Provide Correct Permissive Signal	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAPBPLCI	PLC Central Processor APB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
164) MAO252S AI	Analog Output Mod 252-S PLC-A Fails to Provide Correct Permissive Signal	9.80E-08	0.5	4.29E-04	1.73E-06
MCP242APBI	PLC Central Processor 242-A PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
165) MAO252S AI	Analog Output Mod 252-S PLC-A Fails to Provide Correct Permissive Signal	9.80E-08	0.5	4.29E-04	1.73E-06
MCP252S BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
166) MAO252S AI	Analog Output Mod 252-S PLC-A Fails to Provide Correct Permissive Signal	9.80E-08	0.5	4.29E-04	1.73E-06
MCPANBPLCI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
167) MAO252S AI	Analog Output Mod 252-S PLC-A Fails to Provide Correct Permissive Signal	9.80E-08	0.5	4.29E-04	1.73E-06
MCP242S BI	PLC Central Processor 242-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
168) MAO252S AI	Analog Output Mod 252-S PLC-A Fails to Provide Correct Permissive Signal	9.80E-08	0.5	4.29E-04	1.73E-06

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MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MCPAZBPLCI	PLC Central Processor AZB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
169) MAO252S AI	Analog Output Mod 252-S PLC-A Fails to Provide Correct Permissive Signal	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAWBPLCI	PLC Central Processor AWB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
170) MAO252S BI	Analog Output Mod 252-S PLC-B Fails to Provide Correct Permissive Signal	9.80E-08	0.5	4.29E-04	1.73E-06
MCPANAPLCI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
171) MAO252S BI	Analog Output Mod 252-S PLC-B Fails to Provide Correct Permissive Signal	9.80E-08	0.5	4.29E-04	1.73E-06
MCP252S AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
172) MAO252S BI	Analog Output Mod 252-S PLC-B Fails to Provide Correct Permissive Signal	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAWAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
173) MAO252S BI	Analog Output Mod 252-S PLC-B Fails to Provide Correct Permissive Signal	9.80E-08	0.5	4.29E-04	1.73E-06
MCP242APAI	PLC Central Processor 242-A PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
174) MAO252S BI	Analog Output Mod 252-S PLC-B Fails to Provide Correct Permissive Signal	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAPAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
175) MAO252S BI	Analog Output Mod 252-S PLC-B Fails to Provide Correct Permissive Signal	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAZAPLCI	PLC Central Processor AZA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
176) MAO252S BI	Analog Output Mod 252-S PLC-B Fails to Provide Correct Permissive Signal	9.80E-08	0.5	4.29E-04	1.73E-06
MCPANAPLCI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
177) MAOANAPLCI	Analog Output Module ANA PLC-A Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAWBPLCI	PLC Central Processor AWB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
178) MAOANAPLCI	Analog Output Module ANA PLC-B Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPANBPLCI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
179) MAOANAPLCI	Analog Output Module ANA PLC-B Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAPBPLCI	PLC Central Processor APB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
180) MAOANAPLCI	Analog Output Module ANA PLC-A Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCP252S BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
181) MAOANAPLCI	Analog Output Module ANA PLC-B Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAZBPLCI	PLC Central Processor AZB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
182) MAOANAPLCI	Analog Output Module ANA PLC-A Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCP242APBI	PLC Central Processor 242-A PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
183) MAOANAPLCI	Analog Output Module ANA PLC-B Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCP242S BI	PLC Central Processor 242-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
184) MAOANBPLCI	Analog Output Module AN PLC-B Fails to Provide Correct Permissive Signal	9.80E-08	0.5	4.29E-04	1.73E-06
MCPANAPLCI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
185) MAOANBPLCI	Analog Output Module ANA PLC-B Fails to Provide Correct Permissive Signal	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAWAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
186) MAOANBPLCI	Analog Output Module ANA PLC-B Fails to Provide Correct Permissive Signal	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAPAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
187) MAOANBPLCI	Analog Output Module AN PLC-B Fails to Provide Correct Permissive Signal	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAZAPLCI	PLC Central Processor AZA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
188) MAOANBPLCI	Analog Output Module AN PLC-B Fails to Provide Correct Permissive Signal	9.80E-08	0.5	4.29E-04	1.73E-06
MCP242APAI	PLC Central Processor 242-A PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
189) MAOANBPLCI	Analog Output Module AN PLC-B Fails to Provide Correct Permissive Signal	9.80E-08	0.5	4.29E-04	1.73E-06
MCP252S AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
190) MAOANBPLCI	Analog Output Module AN PLC-B Fails to Provide Correct Permissive Signal	9.80E-08	0.5	4.29E-04	1.73E-06
MCP242S AI	PLC Central Processor 242-S PLC-A Fails to Provide a Change of State	9.20E-07	0.5	4.02E-03	
191) MAOAPAPLCI	Analog Output Module AP PLC-A Fails to Provide Correct Signal	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAWBPLCI	PLC Central Processor AWB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
192) MAOAPAPLCI	Analog Output Module AP PLC-A Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06

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Filter: 'ALL' Truncation Limit: 1.00E-09

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MCPANBPLCI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
193) MAOAPAPLCI	Analog Output Module AP PLC-A Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAZBPLCI	PLC Central Processor AZB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
194) MAOAPAPLCI	Analog Output Module AP PLC-A Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCP242S BI	PLC Central Processor 242-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
195) MAOAPAPLCI	Analog Output Module AP PLC-A Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAPBPLCI	PLC Central Processor APB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
196) MAOAPAPLCI	Analog Output Module AP PLC-A Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCP242APBI	PLC Central Processor 242-A PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
197) MAOAPAPLCI	Analog Output Module AP PLC-A Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCP252S BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
198) MAOAPBPLCI	Analog Output Module AP PLC-B Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPANAPLCI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
199) MAOAPBPLCI	Analog Output Module AP PLC-B Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAPAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
200) MAOAPBPLCI	Analog Output Module AP PLC-B Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAZAPLCI	PLC Central Processor AZA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
201) MAOAPBPLCI	Analog Output Module AP PLC-B Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCP242APAI	PLC Central Processor 242-A PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
202) MAOAPBPLCI	Analog Output Module AP PLC-B Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCP252S AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
203) MAOAPBPLCI	Analog Output Module AP PLC-B Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAPAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
204) MAOAPBPLCI	Analog Output Module AP PLC-B Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCP242S AI	PLC Central Processor 242-S PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
205) MAOAWAPLCI	Analog Output Module AW PLC-A Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPANBPLCI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
206) MAOAWAPLCI	Analog Output Module AW PLC-A Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCP252S BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
207) MAOAWAPLCI	Analog Output Module AW PLC-A Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAZBPLCI	PLC Central Processor AZB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
208) MAOAWAPLCI	Analog Output Module AW PLC-A Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAPBPLCI	PLC Central Processor APB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
209) MAOAWAPLCI	Analog Output Module AW PLC-A Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCP242S BI	PLC Central Processor 242-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
210) MAOAWAPLCI	Analog Output Module AW PLC-A Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCP242APBI	PLC Central Processor 242-A PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
211) MAOAWAPLCI	Analog Output Module AW PLC-A Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAWBPLCI	PLC Central Processor AWB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
212) MAOAWBPLCI	Analog Output Module AW PLC-B Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAPAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
213) MAOAWBPLCI	Analog Output Module AW PLC-B Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPANAPLCI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
214) MAOAWBPLCI	Analog Output Module AW PLC-B Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAZAPLCI	PLC Central Processor AZA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
215) MAOAWBPLCI	Analog Output Module AW PLC-B Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAWAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
216) MAOAWBPLCI	Analog Output Module AW PLC-B Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06

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CUTSET REPORT

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 Filter: 'ALL' Truncation Limit: 1.00E-09

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MCP252S_AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
217) MAOAWBPLCI	Analog Output Module AW PLC-B Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCP242APAI	PLC Central Processor 242-A PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
218) MAOAWBPLCI	Analog Output Module AW PLC-B Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCP242S_AI	PLC Central Processor 242-S PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
219) MAOAZAPLCI	Analog Output Module AZ PLC-A Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPANBPLCI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
220) MAOAZAPLCI	Analog Output Module AZ PLC-A Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCP242APBI	PLC Central Processor 242-A PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
221) MAOAZAPLCI	Analog Output Module AZ PLC-A Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAPBPLCI	PLC Central Processor APB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
222) MAOAZAPLCI	Analog Output Module AZ PLC-A Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCP242S_BI	PLC Central Processor 242-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
223) MAOAZAPLCI	Analog Output Module AZ PLC-A Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAZBPLCI	PLC Central Processor AZB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
224) MAOAZAPLCI	Analog Output Module AZ PLC-A Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAWBPLCI	PLC Central Processor AWB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
225) MAOAZAPLCI	Analog Output Module AZ PLC-A Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCP252S_BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
226) MAOAZBPLCI	Analog Output Module AZ PLC-B Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCP242S_AI	PLC Central Processor 242-S PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
227) MAOAZBPLCI	Analog Output Module AZ PLC-B Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCP252S_AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
228) MAOAZBPLCI	Analog Output Module AZ PLC-B Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPAPPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
229) MAOAZBPLCI	Analog Output Module AZ PLC-B Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCP242APAI	PLC Central Processor 242-A PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
230) MAOAZBPLCI	Analog Output Module AZ PLC-B Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCP242APBI	PLC Central Processor 242-A PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
231) MAOAZBPLCI	Analog Output Module AZ PLC-B Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCPANAPLCI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
232) MAOAZBPLCI	Analog Output Module AZ PLC-B Fails to Provide a Change of State	9.80E-08	0.5	4.29E-04	1.73E-06
MCP242APAI	PLC Central Processor 242-A PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	
233) MAI242S_AI	Analog Input Module 242-S Channel A Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	1.51E-06
MLP9BSNCWS	Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,	1.60E-12	142000	1.99E-03	
234) MAI242S_BI	Analog Input Module 242-S Channel B Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	1.51E-06
MLP9ASNCWS	Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,	1.60E-12	142000	1.99E-03	
235) MAI252S_AI	Analog Input Mod Fails to Provide Correct Signal to 252-S PLC-A	1.74E-07	0.5	7.62E-04	1.51E-06
MLP9BSNCWS	Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,	1.60E-12	142000	1.99E-03	
236) MAI252S_BI	Analog Input Mod Fails to Provide Correct Signal to S252 PLC-B	1.74E-07	0.5	7.62E-04	1.51E-06
MLP9ASNCWS	Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,	1.60E-12	142000	1.99E-03	
237) MAIANAPLCI	Analog Input Module AN PLC-A Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	1.51E-06
MLP9BSNCWS	Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,	1.60E-12	142000	1.99E-03	
238) MAIANBPLCI	Analog Input Module AN PLC-B Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	1.51E-06
MLP9ASNCWS	Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,	1.60E-12	142000	1.99E-03	
239) MAIAPAPLCI	Analog Input Module AP PLC-A Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	1.51E-06
MLP9BSNCWS	Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,	1.60E-12	142000	1.99E-03	
240) MAIAPBPLCI	Analog Input Module AP PLC-B Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	1.51E-06

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CUTSET REPORT

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Filter: 'ALL' Truncation Limit: 1.00E-09

MODULE/EVENT NAME	DESCRIPTION	RATE	EXPOSURE	B.E. PROB.	MOD./CS. PROB.
MLP9ASNCWS	Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,	1.60E-12	142000	1.99E-03	
241) MAIAWAPLCI	Analog Input Module Fails to Provide Correct Signal to AW PLC-A	1.74E-07	0.5	7.62E-04	1.51E-06
MLP9BSNCWS	Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,	1.60E-12	142000	1.99E-03	
242) MAIAWBPPLCI	Analog Input Module Fails to Provide Correct Signal to AW PLC-B	1.74E-07	0.5	7.62E-04	1.51E-06
MLP9ASNCWS	Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,	1.60E-12	142000	1.99E-03	
243) MAIAZAPLCI	Analog Input Module AZ PLC-A Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	1.51E-06
MLP9BSNCWS	Circuit East to West Area(9B SN CW) Shorts to Another Active Circuit(28,	1.60E-12	142000	1.99E-03	
244) MAIAZBPLCI	Analog Input Module AZ PLC-B Fails to Provide a Change of State	1.74E-07	0.5	7.62E-04	1.51E-06
MLP9ASNCWS	Circuit East to West Area(9A SN CW) Shorts to Another Active Circuit(28,	1.60E-12	142000	1.99E-03	
245) MCPAWBPLCI	PLC Central Processor AWB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.23E-06
MDI242APAI	Digital Input Module 242-A Channel A Fails to Provide a Change of State	7.00E-08	0.5	3.07E-04	
246) MCPAZAPLCI	PLC Central Processor AZA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.23E-06
MDI242APBI	Digital Input Module 242-A Channel B Fails to Provide a Change of State	7.00E-08	0.5	3.07E-04	
247) MCPAZBPLCI	PLC Central Processor AZB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.23E-06
MDI242APAI	Digital Input Module 242-A Channel A Fails to Provide a Change of State	7.00E-08	0.5	3.07E-04	
248) MCP242APAI	PLC Central Processor 242-A PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.23E-06
MDI242APBI	Digital Input Module 242-A Channel B Fails to Provide a Change of State	7.00E-08	0.5	3.07E-04	
249) MCP242APBI	PLC Central Processor 242-A PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.23E-06
MDI242APAI	Digital Input Module 242-A Channel A Fails to Provide a Change of State	7.00E-08	0.5	3.07E-04	
250) MCP242S AI	PLC Central Processor 242-S PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.23E-06
MDI242APBI	Digital Input Module 242-A Channel B Fails to Provide a Change of State	7.00E-08	0.5	3.07E-04	
251) MCP242S BI	PLC Central Processor 242-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.23E-06
MDI242APAI	Digital Input Module 242-A Channel A Fails to Provide a Change of State	7.00E-08	0.5	3.07E-04	
252) MCP252S AI	PLC Central Processor 252-S PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.23E-06
MDI242APBI	Digital Input Module 242-A Channel B Fails to Provide a Change of State	7.00E-08	0.5	3.07E-04	
253) MCP252S BI	PLC Central Processor 252-S PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.23E-06
MDI242APAI	Digital Input Module 242-A Channel A Fails to Provide a Change of State	7.00E-08	0.5	3.07E-04	
254) MCPANAPLCI	PLC Central Processor ANA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.23E-06
MDI242APBI	Digital Input Module 242-A Channel B Fails to Provide a Change of State	7.00E-08	0.5	3.07E-04	
255) MCPANBPLCI	PLC Central Processor ANB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.23E-06
MDI242APAI	Digital Input Module 242-A Channel A Fails to Provide a Change of State	7.00E-08	0.5	3.07E-04	
256) MCPAPAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.23E-06
MDI242APBI	Digital Input Module 242-A Channel B Fails to Provide a Change of State	7.00E-08	0.5	3.07E-04	
257) MCPAPBPLCI	PLC Central Processor APB PLC-B Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.23E-06
MDI242APAI	Digital Input Module 242-A Channel A Fails to Provide a Change of State	7.00E-08	0.5	3.07E-04	
258) MCPAWAPLCI	PLC Central Processor APA PLC-A Fails to Provide Correct Signal	9.20E-07	0.5	4.02E-03	1.23E-06
MDI242APBI	Digital Input Module 242-A Channel B Fails to Provide a Change of State	7.00E-08	0.5	3.07E-04	

Top event: M20000		Top prob.: 1.45E-03		CUTSET REPORT	
		Sort by: Fussel Vesely			
Basic Event Name	Prob	FusVes	Critic	Birdbm	RedW AchW
MCPANAPLCI	4.02E-03	1.05E-01	1.04E-01	3.74E-02	1.12E+00 2.66E+01
MCPAPAPLCI	4.02E-03	1.05E-01	1.04E-01	3.74E-02	1.12E+00 2.66E+01
MCP242S_BI	4.02E-03	1.05E-01	1.04E-01	3.74E-02	1.12E+00 2.66E+01
MCPAPBPLCI	4.02E-03	1.05E-01	1.04E-01	3.74E-02	1.12E+00 2.66E+01
MCPAZAPLCI	4.02E-03	1.05E-01	1.04E-01	3.74E-02	1.12E+00 2.66E+01
MCP252S_AI	4.02E-03	1.05E-01	1.04E-01	3.74E-02	1.12E+00 2.66E+01
MCPAWBPLCI	4.02E-03	1.05E-01	1.04E-01	3.74E-02	1.12E+00 2.66E+01
MCP242APAI	4.02E-03	1.05E-01	1.04E-01	3.74E-02	1.12E+00 2.66E+01
MCP242APBI	4.02E-03	1.05E-01	1.04E-01	3.74E-02	1.12E+00 2.66E+01
MCP242S_AI	4.02E-03	1.05E-01	1.04E-01	3.74E-02	1.12E+00 2.66E+01
MCP252S_BI	4.02E-03	1.05E-01	1.04E-01	3.74E-02	1.12E+00 2.66E+01
MCPAWAPLCI	4.02E-03	1.05E-01	1.04E-01	3.74E-02	1.12E+00 2.66E+01
MCPAZBPLCI	4.02E-03	1.05E-01	1.04E-01	3.74E-02	1.12E+00 2.66E+01
MLP9BSNCWS	1.99E-03	5.21E-02	5.12E-02	3.74E-02	1.05E+00 2.67E+01
MLP9ASNCS	1.99E-03	5.21E-02	5.12E-02	3.74E-02	1.05E+00 2.67E+01
MAIAPAPLCI	7.62E-04	2.00E-02	1.96E-02	3.74E-02	1.02E+00 2.67E+01
MAI242S_BI	7.62E-04	2.00E-02	1.96E-02	3.74E-02	1.02E+00 2.67E+01
MAIANAPLCI	7.62E-04	2.00E-02	1.96E-02	3.74E-02	1.02E+00 2.67E+01
MAIAWAPLCI	7.62E-04	2.00E-02	1.96E-02	3.74E-02	1.02E+00 2.67E+01
MAI252S_BI	7.62E-04	2.00E-02	1.96E-02	3.74E-02	1.02E+00 2.67E+01
MAIAZBPLCI	7.62E-04	2.00E-02	1.96E-02	3.74E-02	1.02E+00 2.67E+01
MAIAZAPLCI	7.62E-04	2.00E-02	1.96E-02	3.74E-02	1.02E+00 2.67E+01
MAI242S_AI	7.62E-04	2.00E-02	1.96E-02	3.74E-02	1.02E+00 2.67E+01
MAIANBPLCI	7.62E-04	2.00E-02	1.96E-02	3.74E-02	1.02E+00 2.67E+01
MAIABPLCI	7.62E-04	2.00E-02	1.96E-02	3.74E-02	1.02E+00 2.67E+01
MAIAPBPLCI	7.62E-04	2.00E-02	1.96E-02	3.74E-02	1.02E+00 2.67E+01
MAI252S_AI	7.62E-04	2.00E-02	1.96E-02	3.74E-02	1.02E+00 2.67E+01
MAO242APBI	4.29E-04	1.12E-02	1.10E-02	3.74E-02	1.01E+00 2.67E+01
MAOANBPLCI	4.29E-04	1.12E-02	1.10E-02	3.74E-02	1.01E+00 2.67E+01
MAOAZAPLCI	4.29E-04	1.12E-02	1.10E-02	3.74E-02	1.01E+00 2.67E+01
MAOANAPLCI	4.29E-04	1.12E-02	1.10E-02	3.74E-02	1.01E+00 2.67E+01
MAOAZBPLCI	4.29E-04	1.12E-02	1.10E-02	3.74E-02	1.01E+00 2.67E+01
MAOAWAPLCI	4.29E-04	1.12E-02	1.10E-02	3.74E-02	1.01E+00 2.67E+01
MAOAPBPLCI	4.29E-04	1.12E-02	1.10E-02	3.74E-02	1.01E+00 2.67E+01
MAO252S_BI	4.29E-04	1.12E-02	1.10E-02	3.74E-02	1.01E+00 2.67E+01
MAOAWBPLCI	4.29E-04	1.12E-02	1.10E-02	3.74E-02	1.01E+00 2.67E+01
MAO242APAI	4.29E-04	1.12E-02	1.10E-02	3.74E-02	1.01E+00 2.67E+01
MAO252S_AI	4.29E-04	1.12E-02	1.10E-02	3.74E-02	1.01E+00 2.67E+01
MAOAPAPLCI	4.29E-04	1.12E-02	1.10E-02	3.74E-02	1.01E+00 2.67E+01
MDI242APAI	3.07E-04	8.03E-03	7.89E-03	3.74E-02	1.01E+00 2.67E+01
MDI242APBI	3.07E-04	8.03E-03	7.89E-03	3.74E-02	1.01E+00 2.67E+01
MLPAP1BCWS	1.47E-04	3.85E-03	3.79E-03	3.74E-02	1.00E+00 2.67E+01
MLPAP1ACWS	1.47E-04	3.85E-03	3.79E-03	3.74E-02	1.00E+00 2.67E+01
MLP9BSNSHS	1.39E-04	3.65E-03	3.59E-03	3.74E-02	1.00E+00 2.67E+01
MLP9ASNHS	1.39E-04	3.65E-03	3.59E-03	3.74E-02	1.00E+00 2.67E+01
MLPAZ1BCWS	1.11E-04	2.92E-03	2.87E-03	3.74E-02	1.00E+00 2.67E+01
MLPAZ1ACWS	1.11E-04	2.92E-03	2.87E-03	3.74E-02	1.00E+00 2.67E+01

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 Top event: M20000
 Top prob.: 1.45E-03
 CUTSET REPORT
 Sort by: Fussel Vesely

Basic Event Name	Prob	FusVes	Critic	Birnbm	RedW	AchW
MDO242S_BI	8.32E-05	2.18E-03	2.14E-03	3.74E-02	1.00E+00	2.67E+01
MDO242S_AI	8.32E-05	2.18E-03	2.14E-03	3.74E-02	1.00E+00	2.67E+01
MLPAW1BCWS	4.06E-05	1.06E-03	1.04E-03	3.74E-02	1.00E+00	2.67E+01
MLPAW1BCWS	4.06E-05	1.06E-03	1.04E-03	3.74E-02	1.00E+00	2.67E+01
MLP252S1AS	2.45E-05	6.41E-04	6.30E-04	3.74E-02	1.00E+00	2.67E+01
MLP252S1BS	2.45E-05	6.41E-04	6.30E-04	3.74E-02	1.00E+00	2.67E+01
MLP242A1AS	1.68E-05	4.40E-04	4.32E-04	3.74E-02	1.00E+00	2.67E+01
MLP242A1BS	1.68E-05	4.40E-04	4.32E-04	3.74E-02	1.00E+00	2.67E+01

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Appendix D

Conduit Configuration Evaluation

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Analog Signal Separate Conduit versus Common Conduit Comparison

The analog signals between tank farm programmable logic controllers (PLC) of the Master Pump Shutdown System (MPSS) will be carried via ground-shielded cables. A representation of a single cable is provided in Figure D-1. Each cable consists of eight individual twisted electrical wiring pairs. The twisted wire pair carries the analog signal. A grounded sheathing covers each individual twisted wiring pair. These wires carry low voltage and amperage signals. The sheathing carry induced stray signals to ground. There is essentially no heating of the wire or cable sheathing. The resulting low wire temperatures promote high reliability of the wire insulation and cable coatings.

There is a Channel A and Channel B for the safety class programmable logic controllers (PLC) of the MPSS. For each of the channels there is a cable for the inward-bound analog signals to the PLC of an MPSS area node and a cable for the outward-bound analog signals from the PLC of an area node. The same is true for the general service PLCs. There is a total of three PLCs at each area node of the MPSS. This results in six cables running between the area nodes of the MPSS.

The MPSS is designed to shutdown a waste transfer process upon the loss of a safety class permissive signal. Any MPSS component failure, which results in the loss of a permissive signal, is defined as fail-safe. A short to ground is fail-safe since it results in the loss of a permissive signal. A short of an analog wire to a grounded sheathing results in the loss of the permissive signal to the receiving PLC. For the purpose of this analysis it was assumed that a wire shorts to the grounded shielding nine out of ten times. This is considered to be a very conservative estimate. One out of ten times it does not go to ground. A short from one analog signal wire to another analog signal wire is not considered to be fail-safe since it could result in a continuation of a permissive signal.

The two conduit-cable configurations evaluated are the Separate Conduit (Figure D-2) and Single Conduit (Figure D-3) configurations. The separate conduit configuration is the base case, which the single conduit configuration will be compared against.

Analog Signal Separate Conduit Configuration

This configuration of the analog cable runs between individual tank farm programmable logic controllers has each of the pairs (inward-bound and outward-bound) of the Safety Class cables and the pair of General Service cables in separate conduits. Each of the conduits is separated by earthen fill. This configuration is shown in Figure D-2. This configuration is the base case for the purpose of comparison of the two configurations addressed in this analysis.

The most likely short that can occur for this cable configuration is between wire pairs within the same cable. A total of eight barriers must fail in order for a short to occur between wire pairs in separate cables, channels and conduits.

A short between twisted wire pairs of Channel A, Channel B or General Service requires the failure of six grounded barriers and two wire coatings. The fraction of shorts not failing safe from one analog wire to another conduit channel cable analog wire can be calculated by the following equation:

$$P_{nfs} = f^n \times (N_c N_{c/c} N_{aw/c}) / (N_c N_{c/c} N_{w/c})$$

γ - fraction of failures not to grounded barrier - 1×10^{-1}

$$f - (1 - e^{-\gamma})$$

n - number of grounded barriers - 6

N_c - Number of Other Conduits - 2

N_{c/c} - Number of Cables per Conduit - 2

N_{aw/c} - Number of Analog Signal Wires per Cable - 8

N_{w/c} - Number of Wires per Cable - 16

$$P_{nfs} = (1 - e^{-1})^6 \times (2 \times 2 \times 8) / (3 \times 2 \times 16) \\ = 2.97 \times 10^{-7}$$

This does not take into account for the earthen fill between the three separate conduits.

The frequency of a wire shorting is 1.6×10^{-10} per foot per year (IEEE 1990). Combining the fraction of non-safe failures with the wire shorting frequency gives the following frequency.

$$F_{sc} = P_{nfs} \times (1.6 \times 10^{-10}) \\ = 4.75 \times 10^{-17} / \text{ft} / \text{year}$$

Analog Signal Common Conduit Configuration

This configuration of the analog cable runs between individual tank farm programmable logic controllers has each of the two Safety Class cables and the single General Service cable in one conduit. This configuration is shown in Figure D-3.

The most likely short that can occur for this cable configuration is between wire pairs within the same cable. A total of six barriers must fail in order for a short to occur between wire pairs in separate cables and channels.

A short between twisted wire pairs of Channel A, Channel B or General Service requires the failure of four grounded barriers and two wire coatings. The fraction of shorts not failing safe from one analog wire to another analog wire in a separate conduit cable can be calculated by the following equation:

$$P_{nfs} = f^n \times (N_{c/c} N_{aw/c}) / (N_{ct/c} N_{w/c})$$

γ - fraction of failures not to grounded barrier - 1×10^{-1}

$$f - (1 - e^{-\gamma})$$

n - number of grounded barriers between wire pairs - 4

N_{c/c} - Number of Extra Cables in the Conduit - 4

N_{ct/c} - Total Number of Cables in the Conduit - 6

N_{aw/c} - Number of Analog Signal Wires per Cable - 8

N_{w/c} - Number of Wires per Cable - 16

$$P_{nfs} = (1 - e^{-1})^4 \times (4 \times 8) / (6 \times 16) \\ = 2.73 \times 10^{-5}$$

The frequency of a wire shorting is 1.6×10^{-10} per foot per year (IEEE 1990). Combining the fraction of non-safe failures with the wire shorting frequency gives the following frequency.

$$\begin{aligned}
 F_{cc} &= P_{nfs} \times (1.6 \times 10^{-10}) \\
 &= 4.37 \times 10^{-15} / \text{ft} / \text{year}
 \end{aligned}$$

Incremental Risk

Based on the above calculations the incremental risk associated with placing the wiring cables in one conduit versus separate conduits is:

$$\begin{aligned}
 \Delta F &= F_{cc} / F_{sc} \\
 &= 4.37 \times 10^{-15} / \text{ft} / \text{year} / 4.75 \times 10^{-17} / \text{ft} / \text{year} \\
 &= 92 / \text{ft} / \text{year}
 \end{aligned}$$

This is less than two orders of magnitude increase in the frequency of a non-safe short when going from a separate conduit configuration to a single conduit configuration.

For a cable length of 10 miles the yearly *non-safe* failure rate for an analog signal wire from cable to cable in *separate* conduits would be:

$$\begin{aligned}
 F &= L \times F_{cc} \\
 &= 10 \text{ miles} \times (5280 \text{ ft} / \text{mile}) \times 4.75 \times 10^{-17} / \text{ft} / \text{year} \\
 &= 2.51 \times 10^{-12} / \text{year}
 \end{aligned}$$

For a cable length of 10 miles the yearly *non-safe* failure rate for an analog signal wire from cable to cable in a *single* conduit would be:

$$\begin{aligned}
 F &= L \times F_{cc} \\
 &= 10 \text{ miles} \times (5280 \text{ ft} / \text{mile}) \times 4.37 \times 10^{-15} / \text{ft} / \text{year} \\
 &= 2.31 \times 10^{-10} / \text{year}
 \end{aligned}$$

Conclusion - Analog Signal Conduits

The non-safe shorting of the analog wire cables between MPSS area nodes has a very small frequency for both the separate conduit configuration and the single conduit configuration. Raising the failure rate from 10^{-17} to 10^{-15} per foot per year is a negligible change in risk unless the length of wire and cable is increased significantly to thousands of miles.

Discrete Signal Separate Conduit versus Common Conduit Comparison

The discrete signals between tank farm leak detector elements to the Programmable Logic Controllers of the Master Pump Shutdown System (MPSS) will be carried via ground-shielded cables. A representation of a single cable is provided in Figure D-4. Each cable will consist of a variable amount of twisted electrical wire pairs depending on which tank farm is being assessed. Each pair carries a discrete signal. The overall cable shield carries low current induced stray signals with a corresponding low voltage. There is essentially no heating of the wire insulation or cable sheathing. Low temperatures promote high reliability of the wire insulation and cable coatings.

There is a Channel A and Channel B cable for the safety class signals going to the programmable logic controllers (PLC) of the MPSS from the various leak detector systems. One channel carries the voltage trip signal and the other carries the current trip signal. A loss of either one of these signals would result in a shutdown of the waste transfer process via the MPSS. There is a general service cable carrying wires from the various leak detector systems to the MPSS PLC area node for that tank farm. There is a total of three PLCs at each area node of the MPSS, two safety class and one general service.

The MPSS is designed to shutdown a waste transfer process upon the loss of a safety class permissive signal. Any MPSS component failure or leak detector system, which results in the loss of a permissive signal, is defined as fail-safe. A short to ground is fail-safe since it results in the loss of a permissive signal. A short of a discrete signal wire to a grounded sheathing results in the loss of the permissive signal to the receiving area node PLC. For the purpose of this analysis it was assumed that a wire shorts to the grounded shielding nine out of ten times. This is a very conservative estimate. One out of ten times it does not go to ground. A short from one discrete signal wire to another discrete signal wire is not considered to be fail-safe since it could result in a continuation of the permissive signal.

The two conduit-cable configurations evaluated are the Separate Conduit (Figure D-5) and Single Conduit (Figure D-6) configurations. The separate conduit configuration is the base case, which the single conduit configuration will be compared against.

Discrete Signal Separate Conduit Configuration

This configuration of the three discrete cable runs between a tank farm leak detector system and the area node programmable logic controllers are in separate conduits. Each of the conduits is separated by earthen fill. This configuration is shown in Figure D-5. This configuration is the base case for the purpose of comparison of the two configurations addressed in this analysis.

The most likely short that can occur for this cable configuration is between wire pairs within the same cable. A total of six barriers must fail in order for a short to occur between wire pairs in separate cables and conduits.

A short between twisted wire pairs of Channel A, Channel B or General Service requires the failure of four grounded barriers and two wire coatings. The fraction of shorts not failing safe from one discrete wire to another conduit channel cable discrete wire can be calculated by the following equation:

$$P_{nfs} = f^n \times (N_c N_{c/c} N_{dw/c}) / (N_c N_{c/c} N_{w/c})$$

γ - fraction of failures not to grounded barrier - 1×10^{-1}

$f - (1 - e^{-\gamma})$
 n - number of grounded barriers - 4
 N_c - Number of Conduits - 2
 $N_{c/c}$ - Number of Cables per Conduit - 1
 $N_{dw/c}$ - Number of Discrete Signal Wires per Cable - 8
 $N_{w/c}$ - Number of Wires per Cable - 16

$$\begin{aligned}
 P_{nfs} &= (1 - e^{-1})^4 \times (2 \times 1 \times 8) / (2 \times 1 \times 16) \\
 &= 4.10 \times 10^{-5}
 \end{aligned}$$

This does not take into account for the earthen fill between the three separate conduits.

The frequency of a wire shorting is 1.6×10^{-10} per foot per year (IEEE 1990). Combining the fraction of non-safe failures with the wire shorting frequency gives the following frequency.

$$\begin{aligned}
 F_{sc} &= P_{nfs} \times (1.6 \times 10^{-10}) \\
 &= 6.56 \times 10^{-15} / \text{ft} / \text{year}
 \end{aligned}$$

Discrete Signal Common Conduit Configuration

This configuration of the discrete cable runs between leak detector system and the PLC area node has each of the two Safety Class cables and the single General Service cable in one conduit. This configuration is shown in Figure D-6.

The most likely short that can occur for this cable configuration is between wire pairs within the same cable. A total of four barriers must fail in order for a short to occur between wire pairs in separate cables and channels.

A short between twisted wire pairs of Channel A, Channel B or General Service requires the failure of two grounded barriers and two wire coatings. The fraction of shorts not failing safe from one discrete wire to another discrete wire in a separate conduit cable can be calculated by the following equation:

$$P_{nfs} = f^n \times (N_{c/c} N_{dw/c}) / (N_{ct/c} N_{w/c})$$

γ - fraction of failures not to grounded barrier - 1×10^{-1}
 $f - (1 - e^{-\gamma})$
 n - number of grounded barriers between wire pairs - 2
 $N_{c/c}$ - Number of Extra Cables in the Conduit - 2
 $N_{ct/c}$ - Total Number of Cables in the Conduit - 3
 $N_{dw/c}$ - Number of Discrete Signal Wires per Cable - 8
 $N_{w/c}$ - Number of Wires per Cable - 16

$$\begin{aligned}
 P_{nfs} &= (1 - e^{-1})^2 \times (2 \times 8) / (3 \times 16) \\
 &= 3.01 \times 10^{-3}
 \end{aligned}$$

The frequency of a wire shorting is 1.6×10^{-10} per foot per year (IEEE 1990). Combining the fraction of non-safe failures with the wire shorting frequency gives the following frequency.

$$\begin{aligned}
 F_{cc} &= P_{nfs} \times (1.6 \times 10^{-10}) \\
 &= 4.83 \times 10^{-13} / \text{ft} / \text{year}
 \end{aligned}$$

Incremental Risk

Based on the above calculations the incremental risk associated with placing the discrete wiring cables in one conduit versus separate conduits is:

$$\begin{aligned}
 \Delta F &= F_{cc} / F_{sc} \\
 &= 4.83 \times 10^{-13} / \text{ft} / \text{year} / 6.56 \times 10^{-15} / \text{ft} / \text{year} \\
 &= 73.6 / \text{ft} / \text{year}
 \end{aligned}$$

This is less than two orders of magnitude increase in the frequency of a non-safe short when going from a separate conduit configuration to a single conduit configuration.

For a cable length of 1 mile the yearly *non-safe* failure rate for a discrete signal wire from cable to cable in *separate* conduits would be:

$$\begin{aligned}
 F &= L \times F_{cc} \\
 &= 1 \text{ miles} \times (5280 \text{ ft} / \text{mile}) \times (6.56 \times 10^{-15} / \text{ft} / \text{year}) \\
 &= 3.46 \times 10^{-11} / \text{year}
 \end{aligned}$$

For a cable length of 10 miles the yearly *non-safe* failure rate for a discrete signal wire from cable to cable in a *single* conduit would be:

$$\begin{aligned}
 F &= L \times F_{cc} \\
 &= 1 \text{ mile} \times (5280 \text{ ft} / \text{mile}) \times (4.83 \times 10^{-13} / \text{ft} / \text{year}) \\
 &= 2.55 \times 10^{-9} / \text{year}
 \end{aligned}$$

Conclusion - Discrete Signal Conduit

The non-safe shorting of the discrete wire cables between MPSS area nodes has a very small frequency for both the separate conduit configuration and the single conduit configuration. Raising the failure rate from 10^{-15} to 10^{-13} per foot per year is a negligible change in risk unless the length of wire and cable is increased from a run of a few hundred feet to hundreds of miles.

Venn Diagram

A graphical representation of the failure space (short) of twisted wire pairs is shown in the Venn Diagram of Figure D-7. The rectangular box represents the total possible number of electrical shorts of all twisted wire pairs (safe "to ground" and non-safe "to other active circuit"). The area outside the circular region and inside the box (Region A) represents the shorts to ground (fail-safe). The common circular overlap area (Region B) represents shorts within cables that do not fail-safe to ground. The crosshatched area (Region C) represents the short between wires of different cables in separate conduits. The last area (Region D) represents the short between wires of different cables in the single conduit configuration.

Figure D-1. Shielded and Grounded Analog Signal Cable

Figure D-2. Analog Signal Cables in Separate Conduits Configuration

Figure D-4. Shielded and Grounded Discrete Signal Cable

Figure D-5. Discrete Signal Cables in Separate Conduits Configuration

Figure D-6. Three Shielded/Grounded Discrete Signal Cables in Single Conduit Configuration

Figure D-7. Venn Diagram for Separate and Common Conduit Configurations

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Appendix E
Peer Review Checklist

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FLUOR DANIEL NORTHWEST

TECHNICAL PEER REVIEWS

CHECKLIST FOR TECHNICAL PEER REVIEW

Document Reviewed: Failure and Reliability Analysis for the
 Title: Master Pump Shutdown System
 Author: David J. Braun
 Date: July 18, 2000
 Scope of Review: Entire document

Yes No* NA

☒	☐	☐	**	Previous reviews complete and cover analysis, up to scope of this review, with no gaps.
☒	☐	☐		Problem completely defined.
☒	☐	☐		Accident scenarios developed in a clear and logical manner.
☒	☐	☐		Necessary assumptions explicitly stated and supported.
☒	☐	☐		Computer codes and data files documented.
☒	☐	☐		Data used in calculations explicitly stated in document.
☒	☐	☐		Data checked for consistency with original source information as applicable.
☐	☐	☒		Mathematical derivations checked including dimensional consistency of results.
☒	☐	☐		Models appropriate and used within range of validity, or use outside range of established validity justified.
☒	☐	☐		Hand calculations checked for errors. Spreadsheet results should be treated exactly the same as hand calculations.
☒	☐	☐		Software input correct and consistent with document reviewed.
☒	☐	☐		Software output consistent with input and with results reported in document reviewed.
☒	☐	☐		Limits/criteria/guidelines applied in analysis results are appropriate and referenced.
☐	☐	☒		Limits/criteria/guidelines checked against references.
☒	☐	☐		Safety margins consistent with good engineering practices.
☒	☐	☐		Conclusions consistent with analytical results and applicable limits.
☒	☐	☐		Results and conclusions address all points required in the problem statement.
☒	☐	☐		Format consistent with applicable guides or other standards.
☐	☐	☒	**	Review calculations, comments, and/or notes are attached.
☒	☐	☐		Document approved (for example, the reviewer affirms the technical accuracy of the document).

MILTON V. SHULTZ

Reviewer (printed name and signature)

7/18/2000
Date

* All "no" responses must be explained below or on an additional sheet.

** Any calculations, comments, or notes generated as part of this review should be signed, dated, and attached to this checklist. The material should be labeled and recorded in such a manner as to be intelligible to a technically qualified third party.

NUCLEAR ENGINEERING

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