Department of the Army
Program Manager for
Chemical Demilitarization
Aberdeen Proving Ground, Maryland

Chemical Stockpile Disposal Project

Programmatic Process Functional Analysis Workbook (FAWB)

Book 27

Metal Parts Furnace

MPF

Revision 1, *Change 3*
February 11, 2004

NOTE: The MPF programmatic process FAWB applies to ANCDF, PBCDF, TOCDF and UMCDF.

ALL FAWB SYSTEMS

Book (Chapter[1])	System Identifier	FAWB Title
UTILITY SYSTEMS (Site-specific)		
1 (5.15)	NGLPG	Fuel Gas System (Natural Gas and Liquefied Petroleum Gas)
2 (5.14)	HYPU	Hydraulic Power Unit and Distribution System
3 (5.19)	BCS	Bulk Chemical Storage System
4 (5.16)	CAS	Compressed Air Systems (Plant, Instrument, and Life Support)
5 (5.22)	SGS	Steam Generation System
6 (5.26)	DMS	Door Monitoring System
7 (5.28)	PCS	Primary Cooling Systems
8 (5.12)	EPS	Electrical Distribution and Emergency Power System
9 (5.13)	—	(HVAC FAWB moved to Book 20 (Process Systems))
10 (5.17)	WATER	Water Systems (Process Water, Potable Water, and Water Treatment Systems)
11 (5.21)	CDSS	Central Decon Supply System
12 (5.18)	TSHS	Toxic Storage and Handling Systems (Agent Collection, Spent Decon, and Sumps)
13 (5.20)	ACSWS	Acid and Caustic Storage and Wash System (DELETED[2])
14 (5.27)	FDSS	Fire Detection and Suppression System
15 -19	—	(not assigned; reserved for future use)
PROCESS SYSTEMS (Programmatic)		
20	HVAC	Heating, Ventilation, and Air Conditioning System
21	RHS	Rocket Handling System
22	PHS	Projectile Handling System
23	MHS	Mine Handling System
24	BCHS	Bulk Container Handling System
25	DFS	Deactivation Furnace System
26	LIC	Liquid Incineration System
27	MPF	Metal Parts Furnace System
28[3]	PAS/PFS	DFS, LIC, and MPF Pollution Abatement System and PAS Filter System
29	BRA	Brine Reduction Area and BRA PAS
30	CHB	Container Handling Building
31	ACAMS	Automatic Continuous Air Monitoring System
32	TCE	Treaty Compliance Equipment
33[4]	DUN	Dunnage Incineration System and DUN PAS

[1] TOCDF has original "chapter" numbers for utility system FAWBs.

[2] The ACSWS FAWB was deleted.

[3] The PAS and PFS draft FAWBs were combined into a single PAS/PFS FAWB (Book 28).

[4] A DUN FAWB is not being developed per direction of PM-CSD on 9-10-98.

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APPENDIXES

FIGURES

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FIGURES (cont'd)

TABLES

REVISION LOG

REV.#	PAGE(S)	REFERENCE AND DESCRIPTION OF CHANGE
0	NA	Initial Issue
Rev.1	*1-1,B-1, C-1,2*	*Updated to reflect current status of demil program and programmatic process FAWBs.*
	2-5, H-1	*Revised stockpile items list, added reference memorandum and reference to PBAP1001SRL.*
	3-6, 7, B-4, C-15, F-3	*Added discussion on furnace pressure control, including addition of a wide-range pressure transmitter by TEMP-2583-MPF.*
	4-1, B-3	*ECP UMAC816RCA – Revised MPF-BLOW-101 motor power rating.*
	3-5, 8,19-22, 4-2, C-16, App.D, App.E, F-1,3,5,6, App.G, App.H	*Updated to reflect current source documentation (e.g., P&IDs, PLC code, and SOPs).*
	3-6, B-4	*Added text and FAWB Note for discrepancy between P&IDs and vendor documentation. Ref: ANAP632MPF, PBAC525MPF, UMAP559MPF.*
	3-3	*ECP TEMP-2535-MPF – PLC Timer For The Conveyors*
	3-4,8, B-4	*ECP TEMP-2563-MPF – MPF Temperature Control Loop Mod.*
	B-5, C-16	*ECP TEMP-2600-MPF R1 – MPF Waste Feed Cutoff Low Temperature Alarms*
	B-3	*ECP TEMP-2314-MPF – Furnace Temperature Control*
	D-10,12,13,14	*ECP TEMP-2429-MPF – MPF Discharge Airlock Purge Valve Sequence*
	3-19, D-33	*ECP TEMP-2569-MPF – MPF AFB 1400 Degree Purge Bypass*
	3-9,10,17, B-5	*ECP TEMP-2605-MPF – MPF Discharge Airlock ACAMS Solenoids*
	3-9,17,18, B-5	*ECP TEMP-2477-MPF – Change in MPF Furnace Times*
	B-1	*ECP PBAC1000DUN – DUN and DUN PAS Deletion & Sec Waste Processing*
	2-2, 3-2,6, B-2,3,4	*Modified based on discussions at the Jan 2001 ANCDF MPF review meeting.*
	Appendix A	*Updated with latest comprehensive acronym list.*
	Appendix C	*Created new site-specific A&I matrices for ANCDF, PBCDF and UMCDF based on latest source documentation, site-specific input, and ECPs UMAP818MPF for UMCDF RCRA AWFCOs and UMUF873MPF for UMCDF MACT AWFCOs.*
	Appendix E	*Added ANCDF screens and TOCDF screens for Stop Feed and RCRA alarms, and TOCDF screen, MPF Overview (MPO).*
1 CH1	*Appendix C*	*Inserted revised UMCDF MPF A&I matrix per ECPs UMSF1190ICS and UMSF1191MPF.*
1 CH2	*C-3 thru C-8*	*Westinghouse Anniston Letter WSN-96-007830 – ANCDF Review of A&I Matrices for the MPF, MPF PAS, DFS, DFS PAS, LIC, and LIC PAS.*
	C-3 thru C-8	*Westinghouse Anniston Document Change Proposal #AN-04-013 – MPF – Corrected A&I Matrices to Reflect the As-Built and Tested Conditions*
	D-11	*Westinghouse Anniston Letter WSN-96-008829 – ANCDF Review of FAWB 27, MPF System.*
1 CH3	*C-3,8*	*Westinghouse Anniston Document Change Proposal #AN-04-060 – Modification to the MPF FAWB Book 27 A&I Matrix under AN-1225-ECP.*

SECTION 1
INTRODUCTION

1.1 CSD PROJECT BASELINE TECHNOLOGY OVERVIEW

The Office of the Project Manager for Chemical Stockpile Disposal (PM-CSD) is responsible for the disposal of the United States' existing unitary chemical weapon stockpile. PM-CSD manages execution of the design, construction, equipment acquisition/installation, systemization, plant operations, and closure of all CSD project sites.

The CSD project baseline technology consists of the following:

- mechanical disassembly or puncturing the munitions to remove chemical agent and any explosives or propellant,
- incineration of the chemical agent and any explosives and propellant, and
- thermal detoxification of metal parts and any contaminated dunnage.

This technology was demonstrated during a series of operational verification testing (OVT) campaigns at the Johnston Atoll Chemical Agent Disposal System (JACADS). JACADS represent*ed* the first generation of a full-scale facility implementation of the project baseline technology. JACADS *completed disposal* of the chemical agent and munitions stockpiled at Johnston Atoll *in November, 2000.*

The second generation plants implementing the baseline technology include the following:

- Tooele Chemical Agent Disposal Facility (TOCDF), located at the Deseret Chemical Depot in Tooele, Utah;
- Anniston Chemical Agent Disposal Facility (ANCDF), located at the Anniston Army Depot near Anniston, Alabama;
- Umatilla Chemical Agent Disposal Facility (UMCDF), located at the Umatilla Chemical Depot near Hermiston, Oregon; and,
- Pine Bluff Chemical Agent Disposal Facility (PBCDF), located at the Pine Bluff Arsenal near Pine Bluff, Arkansas.

Unless otherwise noted, the programmatic functional analysis workbooks (FAWBs) for process systems apply to each of these CSD sites.

1.2 BACKGROUND

FAWBs for 25 plant systems were issued for JACADS in January 1985 by The Ralph M. Parsons Company (now the Parsons Infrastructure & Technology Group, Inc.). Parsons is the Design and Systems Integration Contractor (DSIC) for the CSD project. The FAWBs provided the basis for the facility control system's programmable logic

controller (PLC) and computer systems programming. The JACADS FAWBs were later revised by United Engineers & Constructors and, by the July 1989 issue, two additional systems had been added.

FAWBs for TOCDF were issued in April 1993 by Parsons. There were 28 plant systems defined for TOCDF; however, only 27 FAWBs were issued (The Residue Handling Area FAWB was not issued). Most of the TOCDF plant systems were the same as those for JACADS; however, there were some differences due to different plant configurations, system consolidations, and the inclusion of additional systems. The TOCDF systems contractor (SC) received the FAWBs and assumed responsibility for maintaining the set current with the TOCDF plant configuration and the evolution of its operational strategy. Utility system FAWBs also were developed for ANCDF, PBCDF and UMCDF. Their purpose is to assist the sites during utility systems equipment procurement, and to describe their use in facility operation. Utility system FAWBs are more site-specific, consist primarily of SC-procured equipment, and will be maintained by the individual demilitarization sites.

In September 1997, PM-CSD began the development of programmatic process FAWBs for process systems common to all sites, eliminating the need to maintain separate process FAWBs at each site. Having a single set of process FAWBs provides a means to ensure operational consistency between the sites and to accurately record differences between the demil facilities. The programmatic process FAWBs serve as an invaluable training tool for the Systems Contractor for Training (SCT) to ensure consistent training on process systems for all sites, and to quickly identify site-specific training requirements.

1.3 PROGRAMMATIC PROCESS FAWB SYSTEMS

Sixteen process systems having minimal differences between sites were designated as programmatic systems. These programmatic process FAWBs are maintained as a single reference rather than at each site. Minor site configuration differences between the sites are highlighted in the FAWB discussions and tables. Fourteen of these 16 systems were included in the 28 original plant system FAWBs developed by the DSIC. For conciseness, the dunnage incinerator (DUN) and DUN pollution abatement system (PAS) FAWBs were to be combined into a single FAWB, for a total of 15 programmatic process FAWBs. However, development of a programmatic FAWB for the DUN and DUN PAS was suspended indefinitely at the direction of the PM-CSD Operations Team (see FAWB Note B-1). In addition, FAWBs for the wet PAS and the PAS filter system (PFS) were combined into a single FAWB (see FAWB Note B-2). Therefore, a total of 13 programmatic FAWBs were developed for the process systems. The heating, ventilating, and air-conditioning (HVAC) FAWB originally was included as one of the utility system FAWBs produced for ANCDF in 1996 (HVAC FAWB was Book 9 for ANCDF Utility FAWBs). It has been recategorized as a process system and is included in the set of programmatic process FAWBs.

The programmatic process FAWBs are numbered in accordance with the convention established during production of the ANCDF and UMCDF utility system FAWBs. This convention reserves book numbers 1 through 19 for utility systems, and book numbers 20 through 34 for the process FAWBs. Programmatic process FAWB book numbers and

titles are listed in Table 1.1. The original TOCDF FAWB chapter numbers are shown for reference.

Twelve of the 28 original plant system FAWBs are designated as site-specific utility systems. For these systems, the SC is delivered an initial utility FAWB indicating the system design configuration and operational strategy. The SC maintains the utility FAWBs to reflect the site-specific configuration. The utility FAWBs are listed in Table 1.2; original TOCDF FAWB chapter numbers are shown for reference.

The two remaining systems of the 28 originally planned plant system FAWBs are the acid and caustic storage and wash system (ACSWS) (5.20) and the residue handling area (5.24). The ACSWS FAWB at TOCDF no longer is maintained and has not been developed for follow-on sites (see FAWB Note B-3). A FAWB for the residue handling area was not produced due to its lack of automatic control features.

Table 1.1 Programmatic Process FAWBs

FAWB Book #	FAWB Title (TOCDF FAWB Chapter #)
20	Munitions Demilitarization Building HVAC (5.13)
21	Rocket Handling System (5.1)
22	Projectile Handling System (5.2)
23	Mine Handling System (5.3)
24	Bulk Container Handling System (5.4)
25	Deactivation Furnace System (DFS) (5.5)
26	Liquid Incinerator (LIC) System (5.6)
27	Metal Parts Furnace (MPF) System (5.7)
28[1]	DFS, LIC, and MPF Pollution Abatement System and PAS Filter System (5.9)
29	Brine Reduction Area (BRA) and BRA PAS (5.23)
30	Container Handling Building (5.11)
31	Automatic Continuous Air Monitoring System (5.25)
32	Treaty Compliance Equipment (Not included in original FAWB)
33[2]	DUN System and DUN PAS (5.8 & 5.10)

[1] Per discussions held during the comment resolution matrix meeting for the PAS FAWB on 11-10-98, the draft programmatic process FAWBs for the PAS and PFS were combined into a single PAS/PFS FAWB, Book 28 (See FAWB Note B-2).

[2] As directed at the FAWB teleconference on 9-10-98, a programmatic process FAWB for the DUN/DUN PAS is not being developed (See FAWB Note B-1).

Table 1.2 Site-Specific Utility FAWBs

FAWB Book #	FAWB Title (TOCDF FAWB Chapter #)
1	Fuel Gas System (5.15)
2	Hydraulic Power Unit and Distribution System (5.14)
3	Bulk Chemical Storage System (5.19)
4	Compressed Air Systems (5.16)
5	Steam Generation System (5.22)
6	Door Monitoring System (5.26)
7	Primary Cooling System (5.28)
8	Electrical Distribution & Emergency Power System (5.12)
9	Not used; formerly HVAC
10	Water Systems (5.17)
11	Central Decon Supply System (5.21)
12	Toxic Storage and Handling Systems (5.18)
13	Not used; formerly acid and caustic storage and wash system
14	Fire Detection and Protection System (5.27)
15 - 19	Not assigned; reserved for future use

1.4 PROGRAMMATIC PROCESS FAWB PURPOSE

The programmatic process FAWBs serve as a repository for all control information for the automated aspects of the baseline technology demilitarization process systems. They serve as one of the source documents for PLC control system and computer system programming, operator training, and facility operation. These FAWBs also serve as programmatic reference documents that define how the process systems operate and capture the differences between facility operational configurations. Each programmatic process FAWB contains a subsection that defines the system boundaries and identifies the interfaces with other plant process and utility systems.

Programmatic process FAWBs are living documents, subject to configuration control under the CSD project Participant Quality Assurance Plan. They are meant to be continuously updated with user input whenever system modifications are made, or as needed to enhance the information presented. Programmatic process FAWB revisions are implemented as outlined in Section 1.6. The process by which the SCT maintains the programmatic process FAWBs and the roles and responsibilities of each organization affiliated with the CSD project are described in detail in the Programmatic Process FAWB Maintenance Plan.

Programmatic Process FAWB Limitations

Even though the FAWBs contain detailed descriptions of the configuration and control for each process system, they are not all-inclusive. Every effort is made to include the

level of detail necessary to fully describe the specific operating configuration for each process system. Each process FAWB includes supporting references to direct the user to relevant programmatic and site-specific documentation (e.g., standing operating procedures, drawings).

Because of the revision cycle time, there will be a slight lag time between recent changes and their reflection in the FAWB. Maintenance of the FAWBs will be done semiannually, or more frequently if needed, to reflect significant modifications.

The FAWB maintenance program relies heavily on input from each baseline technology demilitarization site. Timely and accurate input ensures that the FAWBs reflect the current configuration at each of the sites. All information received will be thoroughly reviewed to ensure consistent and accurate documentation.

As a programmatic document, the FAWBs describe the configuration and operation of four separate facilities. Care must be taken by the user to ensure that the information extracted from this document reflects the configuration for the facility of interest. Site-specific differences are highlighted in both the text and the appendices to avoid confusion.

1.5 PROGRAMMATIC PROCESS FAWB ORGANIZATION

The process FAWBs document the chemical demilitarization facility operations at ANCDF, PBCDF, TOCDF, and UMCDF. The format and structure of the programmatic process FAWBs differ from the original format prepared by the DSIC, and from the format previously maintained at TOCDF. The information from earlier versions has been retained and updated to reflect lessons learned from the design, construction, systemization, and operation of the demilitarization facilities, including JACADS and the Chemical Agent Munition Disposal System (CAMDS). The overall layout of the programmatic process FAWBs is shown in Table 1-3.

1.6 PROGRAMMATIC PROCESS FAWB REVISIONS

The programmatic process FAWBs are maintained by the SCT to reflect the operational and control system configuration at each CSD site that implements the baseline destruction technology. Each programmatic process FAWB will be reviewed and revised, as required, on a semiannual basis. Individual process FAWBs can be revised more frequently, if needed, to reflect significant configuration changes. Programmatic process FAWB modifications can be generated by the following:

- Engineering change proposals at any of the CSD sites
- CSD project programmatic lessons learned
- Operational modifications that do not involve configuration changes
- Programmatic changes
- Need for greater detail or clarification

The programmatic process FAWB maintenance plan identifies the organizations that participate in the FAWB maintenance program and the responsibilities of each to supply information that could result in revisions to the FAWB. All organizations are represented

on the FAWB Evolvement/Evaluation Team (FEET), and are involved with review of each FAWB revision to ensure that the site configuration and operating strategy is current.

Table 1.3 Organization of the Programmatic Process FAWBs

Section	Title	Contents
1	Introduction	General FAWB background, organization, and revision method
2	System Overview	Purpose of the system; operational and process design basis summary; system boundaries and interfaces
3	Process Description	Description of subsystems; control sequences
4	Component Summary	Tables listing parameters for primary components; power source listings
App. A	Acronyms and Abbreviations	
App. B	FAWB Notes	Notes that provide additional detail or background information
App. C	Alarm and Interlock Matrices	Programmatic matrices or matrices for each site
App. D	PLC Automatic Control Sequences	Automatic logic contained in the PLC code; burner management system automatic controls; sequencer logic for demil systems
App. E	Operator Screens	Advisor PC screens for each site
App. F	Instrument Ranges	Tables showing instrument ranges and setpoints
App. G	Intercontroller Communications	Tables listing the digital intercontroller inputs/outputs (DICIs/DICOs)
App. H	References	Listing of reference documents, including drawings, used to prepare and maintain the FAWB

SECTION 2
SYSTEM OVERVIEW

2.1 PURPOSE AND FUNCTION

The metal parts furnace (MPF) system thermally decontaminates drained GB, H, HD, HT, and VX munitions and bulk items. The munitions are thermally treated after all explosive charges installed in the munitions have been removed and the agent has been drained. The MPF is designed to process during the mortar, projectile, ton container, spray tank, bomb, and mine drum campaigns.

The MPF system consists of two furnace chambers: (1) primary furnace and (2) an afterburner. The MPF primary furnace is heated by 10 burners, and the afterburner is heated by two burners. The purpose of the MPF primary chamber is to decontaminate drained munitions and bulk items by heating the metal to at least 1000°F, with a minimum residence time of 15 minutes. The primary chamber exhaust gases flow to the afterburner. The afterburner ensures the destruction of the agent heel that is volatized or partially combusted in the primary chamber. This is accomplished by heating the gases to 2000°F for a minimum residence time of 0.5 seconds.

Exhaust gases from the afterburner flow to the MPF pollution abatement system (PAS) and PAS filter system[1] (PFS) for cleansing prior to discharge to the atmosphere. The draft in the furnaces is provided by the induced-draft (ID) fan in the MPF PAS.

Decontaminated metal parts are transferred outside the munitions demilitarization building (MDB) through a discharge airlock to the discharge tray unloading conveyor. Then they are transferred to the discharge cooling conveyor where they await transfer to a roll-off container for disposal. Prior to disposal, projectiles and mortars are deformed using the projectile deformation equipment[2] (PDE). The processed munitions and bulk items go to the residue handling area (RHA) for disposal, and the metal parts handling trays are returned to the unpack area (UPA).

2.2 OPERATIONAL SUMMARY

The MPF system is designed to process munition containers and bulk items that are not sent through the deactivation furnace system (DFS). The munitions and bulk items previously contained liquid agents GB, H, HD, HT, or VX. In the MPF, any residual agent in the munitions or bulk items is incinerated.

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[1] The PFS is part of the designs at ANCDF, PBCDF, and UMCDF only. TOCDF does not, and will not have a PFS (See FAWB Note B-4).

[2] The PDE is described in the treaty compliance equipment (TCE) FAWB (Programmatic Process FAWB Book 32).

The MPF three-zone, roller hearth furnace and the MPF afterburner must reach operating temperature before processing can proceed. This means that utilities are being supplied and all components of the MPF system are operating correctly. The MPF combustion air blower must be running to supply combustion and dilution air for the MPF system.

Based on the operational availability of the MPF, munitions or bulk items on a tray are moved by charge car to a position where the tray can be conveyed into the MPF. At ANCDF, TOCDF, and UMCDF, munition processing begins for the MPF system when a load is transferred into the MPF feed conveyor/airlock from the first floor munitions corridor charge car. When the charge car is aligned with the feed conveyor/airlock and the airlock and zone 1 are empty, the airlock inlet door is opened. The charge car and airlock conveyors run in the forward direction until the load is in the airlock. When the load is in the proper position, both conveyors stop and the airlock inlet door lowers and clamps. At PBCDF, munition processing begins for the MPF system when a load is transferred into the MPF feed conveyor/airlock from the BDS indexing hydraulic conveyor. When the load is in the proper position, both conveyors stop and the airlock inlet door lowers and clamps.

For the load to enter the furnace, the MPF feed conveyor/airlock discharge door unclamps and opens. Then, the load is transported into zone 1 in the furnace by running the feed conveyor/airlock conveyor and zone 1 conveyor until the load is properly positioned on the zone 1 conveyor. Both conveyors are stopped and the MPF feed conveyor/airlock discharge door lowers and clamps. *At all sites except TOCDF,* an air purge of the MPF feed conveyor/airlock allows the MPF charge conveyor/airlock to be purged with air from the *lower munitions corridor* (see FAWB Note B-5).

The MPF system has the ability to process loads semicontinuously. As one load passes through a section, another load may follow, allowing cyclic loading of the furnace to meet production rate.

The four natural gas burners in zone 1 begin the decontamination process. Combustion air for all burners is forced into the furnace by the MPF combustion air blower (MPF-BLOW-101). In zone 1, heatup of the load and initial burn of residual agent is accomplished. At TOCDF, the MPF is operated at 1450°F for bombs and ton containers, 1525°F for spray tanks, and 1600°F for projectiles/mortars. The design operating temperatures at other sites are 1400°F for ton containers[3] and spray tanks, and 1600°F for mortars/projectiles and bombs. While the load is in zone 1, the conveyor oscillates to ensure even heating of the load and rollers. Heating of the load continues until a zone-specific cycle timer "times out". The timer is preset to a prescribed value for the selected munition campaign (see Table 3.1).

When the zone 1 cycle timer times out, the zone 1 and 2 conveyors start in the forward direction in fast speed to transfer the load from zone 1 to zone 2. When the load is correctly positioned on the zone 2 conveyor, the zone 2 conveyor begins to oscillate and the zone 2 cycle timer begins to count down. Then, a new tray is transported to zone 1, the zone 1 conveyor begins to oscillate, and the zone 1 cycle timer starts. The final

[3] *At the Jan 2001 ANCDF MPF review meeting, ANCDF stated that they will run the MPF at 1450°F for ton containers.*

burnout of agent in the munition containers occurs in zone 2, which is equipped with four burners.

When the zone 2 cycle timer times out, the zone 2 and 3 conveyors start in the forward direction in fast speed to transfer the load to zone 3. When the load is in zone 3, the zone 3 conveyor begins to oscillate, and the zone 3 cycle timers begins to count down.

With zone 2 empty, the tray in zone 1 is transferred to zone 2, as discussed above. A new tray is transferred to zone 1 from the MPF feed conveyor/airlock, also as discussed above.

In zone 3, two burners complete the decontamination process. The zone 3 cycle timer starts timing out, ensuring XXXXX (5X) requirements are met (i.e., minimum of 1000°F for 15 minutes to ensure detoxification of munition/bulk containers). The 5X requirement is met for ton containers, spray tanks, and weteye bombs during processing in zone 3. For all other items, the 5X requirement is met by a combination of processing time in zones 2 and 3. At the completion of the zone 3 "time out", the MPF discharge conveyor/airlock inlet door is raised. The zone 3 conveyor and MPF discharge conveyor/airlock start in the forward direction and run until the load is positioned in the discharge airlock. The MPF discharge conveyor/airlock inlet door lowers and clamps to isolate the MPF discharge conveyor/airlock from the MPF.

After the MPF discharge conveyor/airlock inlet door is closed, the MPF discharge conveyor/airlock is purged with air from the MPF room. This air purge cools down the munition and tray in the airlock. The purged air goes to the afterburner. Before the load can be transferred out of the MPF discharge conveyor/airlock, the load must be verified to be free of agent. The purged air is sampled for agent by an Automatic Continuous Air Monitoring System (ACAMS) monitor to ensure complete, thermal decontamination has been achieved. If the sample results are negative (i.e., no agent detected), the load is transferred out of the MPF discharge conveyor/airlock to the MPF discharge tray unloading conveyor. If agent contamination is detected, the tray must be transferred back into the MPF system for further processing (Zone 3 is left empty during agent monitoring of the tray in the discharge airlock).

The load is transferred by raising the MPF discharge conveyor/airlock discharge door and running the MPF discharge conveyor/airlock conveyor and the MPF discharge tray unloading conveyor until the load is transferred to the MPF discharge tray unloading conveyor. When the load is correctly positioned on the MPF discharge tray unloading conveyor, both conveyors stop and the MPF discharge conveyor/airlock discharge door lowers and clamps.

Before the load can be transferred from the MPF discharge tray unloading conveyor to the MPF discharge cooling conveyor, the MPF discharge tray unloading conveyor must be lowered to the same height as the MPF discharge cooling conveyor. Then, the load is transferred to the MPF discharge-cooling conveyor and moved towards the roll-off portion of the conveyor to clear the MPF discharge tray unloading conveyor. After the load is transferred and moved, the MPF discharge tray unloading conveyor is raised until it is aligned once again with the discharge airlock to receive another load. The cooling conveyor can hold numerous loads and acts as a buffer storage for decontaminated loads. The cooling conveyor also provides time for the loads to cool before they are either

processed by the PDE or discharged into roll-off containers that are transported by truck for disposal. Bulk item metal goes to the residue handling area (RHA) prior to disposal, and the munition trays are returned to the unpack area (UPA).

Combustion gases from the primary furnace exhaust through a refractory-lined crossover duct to the afterburner. The crossover duct taps into the top of zone 1 in the primary furnace and the bottom of the horizontal afterburner. The afterburner has two natural gas burners. The MPF afterburner raises the temperature of the MPF exhaust gas to 2000°F, regardless of the type of munition/container being processed. From the afterburner, the exhaust gases are drawn into the MPF PAS and MPF PFS (see FAWB Note B-4) by the MPF ID fan. The exhaust gases flow to the MPF PAS for scrubbing and, at ANCDF, PBCDF, and UMCDF, to the MPF PFS for carbon filtration.

At TOCDF, furnace draft for the MPF is supplied by a single-speed, two-stage ID fan that is part of the MPF PAS. At ANCDF, PBCDF, and UMCDF, furnace draft also is supplied by ID fans; however, the ID fan configuration consists of two independent adjustable-speed drive (ASD) blowers.

2.3 PROCESS DESIGN BASIS SUMMARY

The MPF system is designed to thermally decontaminate drained ton containers, spray tanks, and bombs, and deburstered and drained projectiles and mortars. In addition, the MPF is used to thermally decontaminate empty mine drums and miscellaneous waste. The munitions and bulk items at TOCDF, ANCDF, PBCDF, and UMCDF to be processed in the MPF are listed in Table 2.1. The munition and bulk item feed rates and processing times for the MPF are based on the munition and bulk items being processed, and are discussed in subsection 3.3 of this FAWB.

The MPF system is designed to operate automatically. All powered roller conveyors, airlock doors, and furnace operations can be operated remotely from the control room (CON).

The treatment process is designed to burn all residual agent and heat the metal components to a minimum of 1000°F for at least 15 minutes to attain the 5X level of decontamination. The afterburner is designed to provide a minimum overall gas residence time of 0.5 seconds at 2000°F.

The design of the MPF also provides for the incineration of contaminated combustible dunnage and decontamination to the 5X level, as may be required.

The furnace can hold three tray assemblies at one time. The processing configuration for spray tanks and weteye bombs, however, allows for only two tray assemblies to be processed simultaneously, due to the length of the processing cradle that overhangs both ends of the tray assembly. Each zone of the furnace has a capacity for centering one tray assembly of projectiles or bulk items in each of the firing zones.

The airlocks are sized to accommodate one tray assembly containing one spray tank. The airlock is designed to operate at a slight negative pressure when both doors are closed.

Table 2.1 ANCDF, PBCDF, TOCDF, UMCDF Stockpile Items for MPF Processing

ANCDF[a]	PBCDF[a]	TOCDF[a]	UMCDF
105-mm projectile (M360), GB (M60), HD		105-mm projectile (M360), GB	
155-mm projectile (M110), HD (M121A1), VX (M121A1/M121), GB (M122), GB		155-mm projectile (M104), H (M110), H (M121A1), VX (M121A1/M121), GB (M122), GB	155-mm projectile (M121A1), VX (M121A1/M121), GB
8-in. projectile (M426), GB		8-in. Projectile (M426) VX[b]	8-in. Projectile (M426) GB (M426) VX
4.2-in. mortar (M2/M2A1), HD (M2/M2A1), HT		4.2-in. mortar (M2/M2A1), HD (M2/M2A1), HT	
Mine drums, no agent	Mine drums, no agent	Mine drums, no agent	Mine drums, no agent
			500-lb bomb (MK-94), GB
		750-lb bomb (MC-1), GB	750-lb bomb (MC-1), GB
		Weteye bomb (MK-116), GB	
		Spray tank (TMU-28), VX	Spray tank (TMU-28), VX
Ton container, HD	Ton container, HD HT	Ton container, GA[c] GB HD L[c] VX	Ton container, HD

[a] *The ANCDF, PBCDF, and TOCDF original design basis documents include items that were subsequently reclassified as non-stockpile items based on Department of the Army Memorandum for Distribution, Declassification of the U.S. Chemical Weapons Stockpile, 19 December 1995.The ANCDF items were GB and VX ton containers; the PBCDF items were H/HD mortars and GB ton containers, and the TOCDF items were H ton containers. As nonstockpile items, these munitions will not be processed as part of the chemical stockpile disposal project.ECP PBAP1001SRL deletes the items from the PBCDF design basis documents.*

[b] Destroyed at CAMDS.

[c] The design basis for TOCDF included processing of GA and Lewisite filled ton containers. Because these bulk items will not be processed at TOCDF, Lewisite (L) and GA are listed for information only.

The MPF discharge airlock is of steel construction and has thermal insulation to protect the metal shell from the heat given off by the tray assemblies. A tight-sealing door (i.e., maximum leakage rate of 2 scfm at a differential pressure of 2.0 in. wc.) between the primary chamber and the exit airlock has internal refractory insulation to minimize heat losses to the airlock.

2.4 SYSTEM BOUNDARIES AND INTERFACES

The MPF system consists primarily of the GFE equipment that comprises the MPF furnace chambers and supporting components and instrumentation. The primary interfaces include the following:

(1) Feed: At ANCDF, TOCDF, and UMCDF, all feed to the MPF system comes from the charge car in the first-floor munitions corridor. At PBCDF, ton containers are fed directly to the MPF feed conveyor/airlock from the BDS room.

(2) PAS/PFS: The high-temperature exhaust gases (around 2,000°F) that are produced in the MPF system are sent to the MPF PAS for quenching and neutralization and, at ANCDF, PBCDF, and UMCDF, to the MPF PFS (see FAWB Note B-4). A single-speed PAS ID fan at TOCDF and a variable-speed PAS ID fan at other sites moves the gases through the MPF, and PAS/PFS.

(3) Scrap: The decontaminated metal parts exiting from the MPF system are transferred to a scrap roll-off container for disposal. Projectiles and mortars are deformed using the PDE prior to disposal.

(4) Utilities: The MPF system requires fuel gas, primary cooling water, MPF secondary cooling water, process water, instrument air, plant air, and electrical power. In addition, air is drawn into the MPF room through roof-mounted air filter units; the air can be heated or cooled. The air is used by the MPF combustion air blower to supply combustion air to the primary furnace and afterburner.

SECTION 3
PROCESS DESCRIPTION

3.1 INTRODUCTION

The metal parts furnace (MPF) system thermally treats contaminated metal parts, including drained munitions, bulk containers, and mine drums. These items are loaded onto metal parts trays and fed to the MPF via roller conveyors. The MPF is heated by 10 burners; the afterburner is heated by two burners. Any residual agent on the metal parts is volatilized and burned in the primary furnace. The decontaminated metal parts are transferred outside the MDB through a discharge airlock. Subsequently, they are transferred through the discharge tray unloading conveyor to the discharge cooling conveyor where they await transfer to a roll-off container for disposal. Prior to disposal, projectiles and mortars are deformed using the projectile deformation equipment [1] (PDE). MPF exhaust gases flow to the afterburner, where any unburned gases are destroyed by incineration at high temperature (2000°F). Afterburner exhaust gases flow to the MPF pollution abatement system (PAS) and MPF PAS filter system[2] (PFS), where they are quenched, neutralized, and filtered.

3.2 DESCRIPTION OF SUBSYSTEMS

The MPF system consists of a primary furnace, an afterburner, a feed airlock, a discharge airlock, a discharge tray unloading conveyor, a discharge cooling conveyor, a combustion air blower, MPF secondary cooling water, and associated instrumentation and piping. The MPF system is installed at two levels, one above the other. The airlocks and primary chamber are located on the lower level. The upper level contains the afterburner and combustion air blower. Stairs are provided between the two levels.

3.2.1 MPF Feed Conveyor/Airlock

The MPF feed conveyor/airlock (MMS-CNVP-119) allows for the feeding of munitions and bulk items into the MPF while providing a physical boundary between the lower munitions corridor (BDS room at PBCDF) and the MPF burner zones to contain heat and gases within the MPF. The MPF feed conveyor/airlock is a steel chamber that encloses a powered roller conveyor, with pneumatically actuated doors at each end. At ANCDF, TOCDF, and UMCDF, one end of the airlock opens to the first floor munitions corridor through which a charge car travels to bring loaded trays to the MPF feed conveyor/airlock. At PBCDF, the airlock receives trays directly from the BDS indexing hydraulic conveyor in the BDS room. At all sites, the discharge end of the airlock opens to zone 1 of the MPF primary chamber.

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[1] The PDE is described in the treaty compliance equipment (TCE) FAWB (Programmatic Process FAWB Book 32).

[2] The PFS is part of the designs at ANCDF, PBCDF, and UMCDF only. TOCDF does not, and will, not have a PFS (See FAWB Note B-4).

The doors of the airlock, in addition to being pneumatically raised up and down, are pneumatically clamped for a tighter seal when closed. A door is considered open when the UNCLAMPED and RAISED positions are verified. A door is considered closed when both the LOWERED and CLAMPED positions are verified. A door RAISE solenoid cannot be energized if the door UNCLAMPED position is not verified. Also, neither door's UNCLAMP solenoid can be energized if the other door's LOWERED and CLAMPED positions are not verified. These interlocks ensure that: (1) two doors cannot be open at the same time, and (2) a door cannot be raised while it is still clamped.

The MPF feed conveyor/airlock is powered by a single-speed, reversible, 2 horsepower (hp) electric motor, with the forward direction defined as rolling toward the MPF. The conveyor is fitted with two position switches, one located near the middle of the airlock and the other at the end of the conveyor nearest the MPF. A motion sensor also indicates to the programmable logic controller (PLC) whether the conveyor is moving or not.

At all sites except TOCDF, there is an air purge *system for* the MPF feed conveyor/airlock (see FAWB Note B-5). The *air purge system* includes an air inlet line with an open/close valve to provide air to the airlock from the *lower munitions corridor, and* an air outlet line with another open/close valve to vent from the airlock to the MPF afterburner.

3.2.2 MPF System Combustion Air Blower

All combustion air for the MPF system (i.e., the MPF primary furnace and the afterburner) is provided by the MPF combustion air blower (MPF-BLOW-101) located in the MPF room. The blower is an electrically driven centrifugal blower. Design parameters for the blower are given in Table 4.1. Air is drawn entirely from the MPF system room itself. An inlet damper controlled by a pressure control loop on the blower discharge provides blower surge protection. As the blower pressure increases from its setpoint, the inlet damper is modulated closed.

Combustion air is supplied to each of the 12 burners in the MPF system for the pilot flame and the main burner flame. Airflow to each burner is measured by an annubar corrected for pressure and temperature to yield a mass flow. The flow to each burner is controlled by a damper. The controllers for each of the primary chamber burners set the airflow at a constant rate. This yields a variety of air-to-fuel ratios, all of which are greater than 12 (20% excess air). The controllers for each of the afterburner burners set the combustion airflow at a constant air-to-fuel ratio of 12:1 (20% excess air).

Combustion air is supplied to the pilots by regulators set at 0.5 psig. Combustion air also is used to cool the burner flame scanners and keep the MPF tray sensor sight glasses clean. Additionally, combustion air is provided to the dilution air system in order to maintain the afterburner oxygen (O_2) content greater than 8%. Sparge air used for bulk items in zone 3 also is supplied from the combustion air blower. Sparge air use is described in the next subsection.

3.2.3 MPF Primary Furnace

Thermal decontamination of munition bodies and bulk items occurs in the MPF primary furnace. The MPF is a horizontal, refractory-lined, carbon-steel enclosure approximately 42-feet-long, 8-feet-wide, and 10-feet-high. One end of the MPF opens to the feed airlock

and the other end opens to the discharge airlock. Each airlock has a refractory-lined door into the MPF; the discharge end door also is water-cooled. The furnace is long enough to hold three metal-parts trays at one time. The MPF furnace length is divided into three burner zones; the first section of the furnace (closest to feed airlock) is called zone 1, the second section is zone 2, and the final section is zone 3. Zones 1 and 2 each have four natural gas burners, while zone 3 has only two. The process activity in each of these zones is described later.

The door at the feed end is in common with the MPF feed conveyor/airlock described previously. The door at the discharge end is similar and is interlocked with the MPF feed conveyor/airlock exit door in the same way as the previous door is interlocked with the MPF feed conveyor/airlock inlet door. The discharge end door differs in that it has built-in cooling water heat exchanger piping with channels for the circulation of secondary cooling water (see FAWB Note B-6). This is necessary for the discharge end door, but not for the charge end door, because the metal parts at the discharge end of the furnace are at decontamination temperature and radiate a significantly higher amount of heat. The metal parts absorb a significant amount of heat as they travel through the three MPF zones. The operation and controls of the MPF secondary cooling water system are described in Section 3.2.6.

Each furnace zone has a powered roller conveyor that is independently powered and controlled. The conveyor is used for munition and bulk item transport and processing. Each section of the conveyor is slightly longer than one metal parts tray; so, a total of three trays can fit in the furnace at once. Each conveyor section is powered by a single-speed, reversible (forward and reverse), 2-hp electric motor with two separate clutches: one that drives the rollers at a fast speed and one that drives the rollers at a slow speed[3]. Fast speed (20 feet/min) is used when transporting a load from one zone to the next. Slow speed (3.6 feet/min) is used during the oscillation mode. After the load is transported into a furnace zone for decontamination, the conveyor oscillates by cycling between forward and reverse to protect the conveyor rollers from damage due to nonuniform heating. The forward direction is defined as rolling toward the discharge end. Left and right are defined as facing the forward direction of travel. Each section is fitted with two position switches; one located near the middle of the section and the other at the end of the section nearest the discharge end. A motion sensor indicates to the PLC whether the section is moving.

Each zone has a separate temperature controller to regulate the burner-firing rate. Each controller regulates the amount of fuel gas delivered to the burners in its zone to maintain temperature. This provides each zone with independent temperature control. For additional temperature control during agent combustion, air-atomized water sprays are provided in zones 1 and 2 (discussed in later paragraphs in this subsection). Combustion air is supplied to the MPF burners by the MPF system combustion air blower (see Subsection 3.2.2).

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[3] *Under TEMP-2535-MPF, TOCDF modified PLC timers to include a five-second delay when switching between clutches. The delay allows time for air to bleed from the lines thereby ensuring that both clutches are not engaged at the same time.*

In zone 1, the tray and metal parts are heated to the operating temperature of the furnace. At TOCDF, this temperature is 1450°F for bombs and ton containers, 1525°F for spray tanks, and 1600°F for all other items. The design temperature values at other sites are 1400°F for ton containers and spray tanks, and 1600°F for mortars/projectiles and bombs. Heat is provided through four gas-fired burners mounted in the side walls. The burners are controlled by the calculated average gas temperatures measured by two sets of dual-element thermocouples[4] also mounted on the side walls. Zone 1 has two overfire burners (1 and 2) on the right-hand side of the furnace near the top of the chamber and two underfire burners (3 and 4) on the left-hand side of the furnace at floor level. The fuel flow rate is modulated by a flow control valve; the output is determined by the temperature controller (14-TIC-152) for the zone. The combustion air is supplied at a fixed rate. If the temperature is below setpoint, the fuel flow control valve is modulated open; if above setpoint, the valve is modulated closed *(see FAWB Note B-14)*. The primary furnace outlet exhaust gas duct is connected in the middle of the top of zone 1.

In zone 2, heat is supplied to maintain the same operating temperature as in zone 1 (Temperature in zones 1, 2, and 3 are the same in the furnace). Zone 2 temperature is maintained by four gas-fired burners mounted in the side walls. The burners are controlled by the calculated average gas temperature measured by two sets of dual-element thermocouples[4] also mounted on the side walls. The burners in zone 2 are arranged similarly to those in zone 1. Burners 5 and 6 are the overfire burners on the right, near the top of the chamber; burners 7 and 8 are the underfire burners on the left at floor level. This arrangement provides forced circulation of gases in the furnace. The fuel flow rate is modulated by a flow control valve; the output is determined by the temperature controller (14-TIC-141) for the zone. If the temperature is below setpoint, the flow control valve is modulated open; if above setpoint, the valve is modulated closed *(see FAWB Note B-14)*.

By the time the metal parts reach zone 3, they have been heated, as required, and the residual agent has been volatilized and burned. In zone 3, the metal parts are held for a predetermined time to ensure decontamination to the 5X level. Theoretical minimum MPF cycle times are given in Table 3.1 (on page 3-18). The heat required to maintain temperature is provided by two gas-fired burners mounted in the side walls. The temperature is controlled based on the calculated average gas temperature measured by two sets of dual-element thermocouples[4] mounted on the side walls. In zone 3, burner 9 is the overfire burner on the right side of the furnace and burner 10 is the underfire burner on the left side. The fuel flow rate is modulated by a flow control valve; the output is determined by the temperature controller (14-TIC-153) for the zone. If the temperature is below setpoint, the flow control valve is modulated open; if above setpoint, the valve is modulated closed *(see FAWB Note B-14)*.

The residence time in each zone for each munition is programmed to ensure that thermal decontamination requirements are met (see Table 3.1 on page 3-18).

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[4] TOCDF no longer uses dual-element thermocouple sets (see FAWB Note B-8). In follow-on site designs, the dual-element sets have two thermocouples with only one active thermocouple output for averaging. The second thermocouple can be used to replace the active one when needed.

In zone 3, if ton containers or spray tanks (TOCDF and UMCDF) are being processed (see FAWB Note B-7), sparge air is introduced to the chamber through a 1-inch pipe. Sparge air is provided to ensure combustion of residue on ton containers and spray tanks as they are being thermally decontaminated in zone 3. The 1-inch pipe is mounted in such a way as to blow air into one of the holes punched in the bulk container by the BDS. Because two holes are punched in the bulk container, sparge air forces circulation through the container to promote burnout of combustible material. The flow through the pipe is measured by an orifice plate and controlled by a flow control valve (14-FV-856) to provide a constant flow rate determined by the control room operator (CRO). At TOCDF, sparge air is supplied at 40 acfm (approximately 32 scfm). Design flowrates for future sites are approximately 125 scfm. A block valve (14-XV-857) on the line opens when the furnace temperature is above 1000°F and the furnace is processing ton containers, spray tanks, or weteye bombs; sparge air is supplied continuously while these conditions are met. A pressure alarm on the sparge air line indicates when the manual block valve (14-3"-V-93) is closed or some other such blockage has occurred. The alarm is masked when not processing ton containers or spray tanks. Sparge air normally is supplied from the combustion air blower discharge. If this air supply has insufficient pressure, a capped tee is provided for tie-in to the plant air header.

In zones 1 and 2, combustion of agent residue takes place, resulting in temperature spikes above the operating setpoint. This is true especially when processing bulk items that potentially contain larger agent heels. To control the temperature when agent combustion takes place, air-atomized water spray nozzles are used. The nozzles protrude through the side wall of the furnace in zones 1 and 2, both above and below the level of the conveyor. Process water is piped to twelve nozzles, six in zone 1 and six in zone 2, to reduce zone temperature when required. Process water is sprayed into the zone by three nozzles located above the conveyor rollers and three nozzles located below the conveyor rollers. A water flow control valve is provided for each set of three nozzles. Plant air is supplied to the nozzles to atomize the water spray for efficient water vaporization and zone cooling.

At TOCDF, water flow to the nozzles in zone 1 is controlled by a temperature controller (14-TIC-152A) that receives a signal representing the averaged temperature between the temperature in the duct leading to the afterburner (14-TI-010) and the zone 1 temperature (average of 14-TIT-152 and 14-TIT-391)[see FAWB Note B-9]. At follow-on sites, 14-TIC-152A also controls water flow to these nozzles, but the controller receives a signal from the same thermocouples as those used for fuel gas control. At all sites, the setpoint of the water spray temperature controller is 50°F higher than the setpoint for the fuel gas flow temperature controller. As the temperature rises above setpoint, the water flow control valves are modulated open, and as the temperature falls below setpoint, the water flow control valves are modulated closed.

In zone 2 at all sites, water flow to the spray nozzles is controlled by a temperature controller (14-TIC-141A) that receives a signal from the same thermocouples as those used for fuel gas control. The setpoint of the water spray temperature controller is 50°F higher than the setpoint for the fuel gas flow temperature controller. As the temperature rises above setpoint, the water flow control valves are modulated open; as the temperature falls below setpoint, the water flow control valves are modulated closed.

One solenoid block valve (14-XV-717) is provided for the water supply to all nozzles, and one solenoid block valve (14-XV-738) is provided for the air supply. The water solenoid valve automatically opens whenever the furnace temperature goes above 1000°F. This allows the water flow control valves to modulate the water spray as necessary. The air solenoid valve automatically opens to cool the spray nozzles whenever any burner in the furnace is started or the furnace temperature is greater than 1000°F. *Both solenoid valves fail closed on a loss of power (see FAWB Note B-15).*

A single thermocouple from a dual set[5] in each zone provides the signal for the extreme temperature limit (ETL) shutdown and the burner purge bypass permissive (14-TIT-071 in zone 1, 14-TIT-072 in zone 2, 14-TIT-079 in zone 3). The ETL alarms can be reset remotely from the control room (CON) (see FAWB Note B-10). All alarm and interlock details are presented in the Appendix C Alarm/Interlock Matrix.

Fuel gas is supplied to the MPF through the fuel gas distribution system. The gas pressure is dropped from the gas header pressure of 35 psig to a pressure of 4 psig as it enters the fuel gas control rack, which is located outside the munitions demilitarization building (MDB) wall. The fuel gas safety shutoff valves and other controls are located outside the MDB rather than in the MPF system room (a category B area) to ease maintenance procedures. The fuel flow rate is measured by an orifice plate and regulated by a flow controller through a flow control valve for each burner.

The operation of each burner is supervised by a Fireye unit that performs all burner safety functions required by the National Fire Protection Association (NFPA), when connected to various hard-wired interlocks in the burner-management panel. In conjunction with the PLC, all furnace purging and lighting operations are done through the Fireye system. The Fireye has direct control of the fuel block valves, pilot valve, and burner igniter. The PLC has control of the fuel and air control valves and controls the blower. The Fireye signals the PLC to drive the controls to low-fire, high-fire, or AUTO at the proper stages of the ignition sequence and monitors the blower, control valves, and airflows to verify that they are in the correct state. If any burner safety interlocks are violated, the Fireye immediately shuts down the burner and signals the PLC to shut down related equipment, as defined in the Alarm/Interlock Matrix. The Fireye also locks out the burner, requiring the operator to reset the Fireye before operation can be resumed.

The MPF primary chamber pressure is maintained more negative than the MPF room (TOCDF primary chamber pressure is –5.0 in. wc.; ANCDF plans to operate at –2.0 in.wc.). Pressure instrumentation senses the chamber and room pressure and transmits the information to programmable logic controller (PLC) pressure controller 14-PIC-070. At TOCDF, where the MPF has a single-speed ID fan, MPF primary chamber pressure is controlled by modulating ID fan inlet damper 14-PV-070 to maintain the setpoint in the pressure controller. At all other sites, MPF primary chamber pressure is controlled by modulating the speed of the adjustable-speed drive (ASD) ID fans to maintain the

[5] TOCDF no longer uses dual-element thermocouple sets (see FAWB Note B-8). In follow-on site designs, the dual-element sets have two thermocouples with only one active thermocouple output for averaging. The second thermocouple can be used to replace the active one when needed.

setpoint in the pressure controller (see FAWB Note B-16). The ID inlet fan damper position remains fixed, based on the setpoint in damper controller 14-HIC-070. MANUAL operation mode, also available to operators, allows the MPF primary chamber pressure to be controlled in a manner similar to TOCDF. In MANUAL mode, ID fan speed can be maintained constant based on a speed entered into ID fan speed controller 24-HIC-778A for the first stage, and into ID fan speed controller 24-HIC-285A for the second stage. The ID fan inlet damper then can be manually positioned to maintain the desired pressure in the primary chamber.

TOCDF added wide-range pressure transmitter 14-PIT-070A that provides pressure indication and alarms during upsets in which the furnace pressure becomes more negative than the range of 14-PIT-070 (see FAWB Note B-17).

Exhaust gases exit the MPF through a duct in the middle of the roof in zone 1 and flow to the afterburner through a refractory lined crossover duct. This makes the furnace a countercurrent design, with the exhaust gases exiting the process at the opposite end from where the trays exit. Temperature, oxygen, and carbon monoxide levels are monitored in the exhaust duct to indicate process conditions inside the furnace.

3.2.4 MPF Afterburner

The MPF system afterburner (MPF-FURN-102) is a horizontal, cylindrical, refractory-lined chamber mounted directly above the MPF in the MPF room. Exhaust gases from zone 1 of the MPF enter the bottom at one end of the afterburner and travel the horizontal length of the chamber, exiting at the other end into an exhaust duct. Two fuel gas burners (burners 11 and 12) are mounted near the afterburner inlet on the end wall. The exhaust gases are heated by the burners to a temperature of 2000°F to ensure that any traces of agent carried over from the MPF in the exhaust gas are burned before reaching the MPF PAS/PFS.

Combustion air and fuel gas enter the chamber through the burners. Combustion air is supplied to the afterburner by the MPF system combustion air blower. Airflow to each burner is measured by an annubar corrected for pressure and temperature to yield a mass flow; the flow is controlled by a damper. The combustion airflow controller modulates the airflow control damper to achieve an airflow that is in excess of the fuel flow. The controller operates in ratio mode, initially set to an air-to-fuel ratio of 12:1 (i.e., 20% excess air; stoichiometric ratio is 10:1).

During periods when the agent volatilization rate is high, additional air from the combustion air blower is admitted to the afterburner by two ducts that enter the sides of the chamber. This is to ensure adequate free oxygen is present for complete combustion to occur in the afterburner. The ducts have a common pitot tube, flow controller, and separate control valves to control the amount of air added. A high-speed oxygen analyzer on the afterburner exhaust sends a signal to the airflow controllers to maintain an oxygen content of 8% in the exhaust gas. As long as the oxygen level stays above this point, the control valves remain closed. If the oxygen concentration is at or below 8%, the control valves open to allow a preset constant flowrate and remain open at this flowrate for 5 minutes. After 5 minutes, if the oxygen concentration is above 8%, the control valves close; otherwise, the valves remain open for another 5 minutes. This cycle continues until the oxygen concentration is above 8%.

Fuel gas is supplied to the afterburner through the same gas regulator as for the MPF burners and is controlled at the same fuel gas rack outside the MDB. The fuel flow rate to each burner is measured by an orifice plate and modulated by a flow control valve. The output of this control valve is determined by the flow controller, which receives a set CV[6] signal from the afterburner temperature controller. If the temperature is below setpoint, the flow control valve is modulated open; if above setpoint, the valve is modulated closed *(see FAWB Note B-14)*.

The operation of each burner is supervised by a Fireye unit that performs all burner safety functions required by the NFPA, when connected to various hard-wired interlocks in the burner-management panel. In conjunction with the PLC, all furnace purging and lighting operations are done through the Fireye system. The Fireye has direct control of the fuel block valves, pilot valve, and burner igniter. The PLC has control of the fuel and air control valves and controls the blower. The Fireye signals the PLC to drive the controls to low-fire, high-fire, or AUTO at the proper stages of the ignition sequence and monitors the blower, control valves, and airflows to verify that they are in the correct state. If any burner safety interlocks are violated, the Fireye immediately shuts down the burner and signals the PLC to shut down related equipment, as defined in the Alarm/Interlock Matrix (see Appendix C). The Fireye also locks out the burner, requiring the operator to reset it before operation can be resumed.

Temperature of the afterburner is controlled by the calculated average gas temperatures measured by two sets of dual-element thermocouples (see footnote 3 on page 3-4) located on the side wall of the chamber. The normal temperature setpoint is 2000°F. The average temperature calculated from measurements taken inside the chamber feeds a temperature controller (14-TIC-065). The output of the temperature controller is sent to the output of the fuel gas flow controllers. The average afterburner exhaust gas temperature is controlled by modulating the firing rate of the burners. If the measured temperature is below setpoint, the fuel valves are modulated open; if above setpoint, the fuel valves are modulated closed. The combustion airflow valves are modulated to maintain 20% excess air. *At TOCDF,* additional temperature control is provided by ramping open the dilution air control valves when the afterburner temperature reaches 2050°F (see FAWB Note B-9).

A single thermocouple from a dual set (see footnote 4 on page 3-6) provides the signal for the ETL shutdown and the burner purge bypass permissive (14-TIT-087). The ETL alarm can be reset remotely from the CON (see FAWB Note B-10). Details of the temperature interlocks can be found in the Appendix C Alarm/Interlock Matrix.

A refractory venturi in the exhaust duct is located between the afterburner and the quench tower. This refractory venturi causes a differential pressure drop that is used to measure the flow of the exhaust gases from the afterburner. This information is used to calculate the residence time of the gases in the afterburner. The minimum residence time in the afterburner is 0.5 second at 2000°F. The differential pressure signal is compensated for

[6] CV (control variable) refers to a loop control variable value and is expressed in percent, where 100% corresponds to the maximum output. It is the control output of the proportional integral derivative (PID) controller when in AUTOMATIC mode or the control value as inserted by the operator in MANUAL mode. It represents the analog output to an analog controllable device.

temperature and pressure; the volumetric flow rate is converted by the MPF system controller into residence time displayed to the nearest tenth of a second. Low residence time and high differential pressure initiate stop-feed signals and alarm in the CON.

3.2.5 MPF Discharge Conveyor/Airlock

The MPF discharge conveyor/airlock (MPF-CNVP-101) is an insulated steel chamber with pneumatically actuated doors at each end, enclosing a powered roller conveyor. The MPF discharge conveyor/airlock is similar to the MPF feed conveyor/airlock in operation. A major construction difference is that the discharge airlock is insulated while the feed airlock is not. The MPF discharge conveyor/airlock allows thermally decontaminated munition containers to be transported outside the MDB for cooling and disposal, while maintaining a physical boundary between the MPF furnace area and the MDB exterior. One airlock door opens to the MPF and allows decontaminated metal parts trays to exit the MPF and enter the airlock. The other airlock door opens outside the MDB to the MPF discharge tray unloading conveyor. The airlock operates at a negative pressure relative to the room.

The MPF discharge conveyor/airlock contains two pneumatically operated doors like the MPF feed conveyor/airlock, but the inlet door is water-cooled (see FAWB Note B-6). Secondary cooling water is supplied to the door frame. Water cooling prevents the door mechanism from binding due to expansion of the airlock-side of the door when exposed to hot metals parts trays exiting the furnace. The water enters the door at approximately 100°F and leaves the door frame at 140°F during MPF operation. The airlock discharge end door is similar, although not water-cooled, and is interlocked with the MPF discharge end door so that at least one must be closed at all times.

The MPF discharge airlock conveyor inside the airlock is powered by a single-speed, reversible, 2-hp electric motor. The forward conveyor direction is rolling away from the MPF. This conveyor is fitted with two position switches. One is located near the middle of the airlock to indicate tray presence. The other is located at the end of the conveyor nearest the MPF system discharge tray unloading conveyor to indicate end of tray travel. A motion sensor indicates to the PLC whether the conveyor is moving or not.

The MPF system discharge airlock is an intermediate point between the hot, agent-contaminated furnace and the outside. After the MPF discharge conveyor/airlock inlet door is closed, the airlock is purged with air from the MPF room. This air purge cools down the munitions and tray in the airlock. The air purge goes to the afterburner. An air inlet line with an open/closed valve provides air to the airlock from the MPF system room. An air outlet line with another open/closed valve vents from the airlock to the MPF system afterburner. Both valves must be closed for either airlock door to open. During normal operation, after a hot tray has been admitted to the airlock and both doors have been verified closed, the valves are sequenced open automatically and a timer is initiated. *The valves close when the timer expires, which is 20 minutes for projectiles and 15 minutes for all other munitions (see FAWB Note B-18).* When verified closed, the outer door opens to advance the tray outside. To avoid pressurizing the discharge airlock, the vents are sequenced. When admitting air: open the outlet, then open the inlet; when stopping airflow: close the inlet, then close the outlet.

Before the load can be transferred out of the MPF discharge conveyor/airlock and outside the MDB, the load must be verified to be free of agent. The purged air is sampled for agent by an automatic, continuous air-monitoring system (ACAMS) monitor to ensure complete thermal decontamination has been achieved *(see FAWB Note B-18)*. Air flows from the MPF room, through the MPF discharge conveyor/airlock, to the ACAMS and is piped to the MPF afterburner. If the sample results are negative (i.e., no agent detected), the load is transferred out of the MPF discharge conveyor/airlock to the MPF discharge tray unloading conveyor.

If agent contamination is detected, the discharge airlock door clamp is interlocked from unclamping and the tray must be transferred back into the MPF primary furnace for further processing (Zone 3 is left empty during agent monitoring of the tray in the discharge airlock). If the ACAMS monitor is NOT NORMAL (e.g., off or in calibration), the airlock purge timer is interrupted, trays are interlocked from transferring in the furnace, and the discharge door cannot be opened. When the ACAMS is restored to a NORMAL operating condition, the timer resumes timing, and the system operates normally.

3.2.6 MPF Secondary Cooling Water System

The secondary cooling water (SCW) system consists of two separate systems. The system discussed provides cooling for the MPF discharge airlock door. The second system provides cooling for the hydraulic modules and is described as part of the site-specific utility system FAWBs.

The MPF SCW system is a closed-loop system that circulates water to the MPF discharge airlock door. Water is used as the cooling medium. Heat is transferred from the door to the cooling water and through a plate heat exchanger to the primary cooling system. Thus, the MPF secondary cooling water functions as an intermediate system between the toxic operations and the outside, eliminating the possibility of the direct transfer of agent through the cooling system.

This system is comprised of a 100-gal cooling medium expansion tank, two circulation pumps (one operating and one spare), a plate and frame heat exchanger, an air separator, and the supply/return piping. The MPF secondary cooling water expansion tank (SCW-TANK-101) receives makeup water from the process water system. Makeup water must be added locally and manually. If system pressure exceeds 50 psig, a pressure-safety valve lifts to vent the pressure to the atmosphere. A pressure regulator maintains the internal pressure of the tank at less than 3 psig. If the internal tank pressure exceeds 3 psig, a pressure control valve vents the excess pressure to the area sump. A high-level switch (61-LSH-227), set at 1 ft 6 in. above the tank bottom, activates a high-level alarm at the CON. A low-level switch (61-LSL-226), set at 6 in., activates a low-level alarm at the CON. A level gauge provides local indication of tank level. A low-low level switch (61-LSLL-606), set at 3 in., stops feed to the MPF and interrupts the zone 3 timer to prevent cycling the airlock door. The timer does not reset; it resumes when level is restored.

Temperature of the outlet of the expansion tank is sensed by a temperature element, and is indicated locally and at the CON. The temperature indicating transmitter (61-TIT-229) generates an alarm at the CON when the high-high temperature setpoint is reached.

The outlet of the expansion tank serves as the inlet to circulation pumps. There is one circulation pump (SCW-PUMP-101) and one installed, spare circulation pump (-102). The pumps are 5-hp centrifugal pumps, and are rated at 77 gal/min capacity and 41 psi ΔP. Pump pressures are indicated locally by pressure indicators. Hand switches are field-mounted for selection of either local or remote control of the pumps. In the local mode, the pumps are turned on/off manually by a local start/stop station. In the remote mode, the pump can be manually operated by the CON operator or automatically by the PLC. Pump status and local/remote status is indicated at the CON. Alarms alert the operator that the selected pump failed to start or automatic transfer failed to occur.

A pressure-indicating transmitter (61-PIT-223) near the pump outlet indicates pressure locally and in the CON. The pressure-indicating transmitter also generates an alarm on low system pressure at the CON. This condition starts the standby pump and stops the primary pump. If the pump outlet pressure continues to drop, a low-low-pressure switch (61-PSLL-222) activates and initiates the following: (1) a low-low-pressure alarm at the CON, (2) stops feed, (3) stops the zone 3 cycle timer, (4) prevents raising the door from zone 3 to the discharge airlock, (5) prevents unclamping the exit door from the discharge airlock, and (6) shuts down both MPF secondary cooling water pumps.

An orifice plate flow meter measures the flow, which is indicated in the CON and alarmed if the flow is low.

MPF secondary cooling water is passed through a plate and frame exchanger (SCW-EXCH-101) for giving up its heat to the primary cooling system. The heat exchanger is rated at 1.225 MMBtu/hr. The inlet/outlet temperature of the exchanger is locally indicated by temperature indicators. The outlet temperature of the exchanger is sensed by a temperature element and is indicated locally by a temperature-indicating transmitter, which generates an alarm on high temperature at the CON.

The secondary cooling water is sent to the MPF discharge airlock door. If the cooling water pressure to the door exceeds 45 psig, secondary water is recirculated to the expansion tank through a regulator valve. After leaving the MPF discharge airlock door, the water flows through the air separator (SCW-SEPA-101) and is returned to the cooling water expansion tank.

3.2.7 MPF Discharge Tray Unloading Conveyor

Munition containers are transferred from the MPF discharge conveyor/airlock to the MPF discharge tray unloading conveyor (MMS-CNVP-120). The discharge tray unloading conveyor is located outside the MDB and is long enough to hold one tray at a time. This conveyor transfers munition containers from the MPF discharge conveyor/airlock to the MPF discharge cooling conveyor. The purpose of the conveyor is to move a tray far enough away from the MDB for it to be moved perpendicularly by the discharge cooling conveyor (see Section 3.2.8). The discharge cooling conveyor is a chain conveyor positioned perpendicular to the discharge tray unloading conveyor so that the chains run between the rollers of the tray unloading conveyor.

The discharge tray unloading conveyor is a powered conveyor driven by two electric motors. One motor, a single-speed, reversible, 1-hp electric motor, is for raising and lowering the conveyor. When the conveyor is raised, the level of the rollers is above the

level of the chains, and the rollers move the tray lengthwise away from the MDB. When raised, the conveyor is aligned with the MPF discharge conveyor/airlock and can receive trays. After receiving a tray, before transferring to the MPF discharge cooling conveyor, the MPF discharge tray unloading conveyor must be lowered to align it with the MPF discharge cooling conveyor. When the conveyor is lowered, the rollers are below the chains, allowing a tray to be moved sideways off the discharge tray unloading conveyor to the discharge cooling conveyor. Limit switches sense the conveyor position UP or DOWN.

The second motor associated with the MPF discharge tray unloading conveyor is a single-speed, reversible, 3-hp electric motor that powers the roller conveyor. The forward direction for the conveyor is defined as rolling away from the MPF discharge airlock/conveyor. The conveyor is fitted with a single-position switch located at the end of the conveyor, farthest from the MPF discharge airlock conveyor. A motion sensor indicates to the PLC if the conveyor is moving. Emergency rope switches along each side of the conveyor can immediately stop both the roller drive and conveyor lift motors for personnel safety.

3.2.8 MPF Discharge Cooling Conveyor

The MPF discharge cooling conveyor receives trays from the MPF discharge tray unloading conveyor. The MPF discharge cooling conveyor allows the trays containing decontaminated metal parts waste to cool and provides a temporary storage area for the metal parts until they are disposed of or transported to the projectile deformation equipment (PDE). The PDE is described in the TCE FAWB (Programmatic Process FAWB Book 32).

The discharge cooling conveyor consists of a 78-foot-long chain conveyor section and a 4-foot-long gravity roller section. At the loading end, the chain conveyor extends between the rollers of the discharge tray unloading conveyor. At the discharge end, the chain conveyor section unloads the trays onto the gravity roller section, which is long enough to hold a single tray. This section has a mechanical stop to prevent the tray from rolling off and falling to the ground. When the tray is sitting on the gravity roller section, the metal parts are removed from the tray by a bridge crane and electromagnet. The bridge crane and electromagnet are manually controlled to transfer the metal parts to the PDE or a roll-off container. The gravity section rollers are in three sections separated by gaps to provide forklift access for removing empty trays.[7]

The conveyor is powered by two, single-speed, reversible, 25-hp electric motors. Hardware interlocks are in place to prevent the motors from operating unless the MPF discharge tray unloading conveyor is in the DOWN position. A motion sensor indicates to the PLC if the conveyor is moving. Emergency rope switches along each side of the conveyor will immediately stop the motors for personnel safety.

The conveyor is supplied with three photoswitches, one at the front of the conveyor near the discharge tray unloading conveyor, one near the end of the chain section, and one at the end of the gravity section. The photoswitch at the front end of the conveyor senses the trailing

[7] At TOCDF, any time spray tank cradles are processed through the MPF furnace, it is necessary to off-load the cooling conveyor using the bridge crane due to interference problems with the motor drive housing.

edge of a tray leaving the discharge tray unloading conveyor. During normal operation, the chain conveyor will advance the tray until this trailing edge is sensed and then the conveyor will stop. This will maximize the packing of trays on the conveyor. If the unloading operator needs to unload a tray that has not yet reached the gravity section, he/she may do so by placing the conveyor in LOCAL and pushing the FORWARD START button. The conveyor will advance until the lead tray is on the gravity section and the following tray is at the end of the cooling conveyor. After a tray is removed from the cooling conveyor, the REPACK push-button is depressed and the control screen is placed in AUTO. This will run the conveyor in reverse until the photoswitch at the front of the conveyor is made. The repacking of the trays ensures that minimum spacing is maintained between trays, which maximizes the accumulation capacity of the conveyor. If only one tray is on the cooling conveyor, the operator will stop the cooling conveyor when the tray is on the gravity section. If switches at both ends of the cooling conveyor and gravity section are made, the conveyor is not allowed to advance.

3.3 CONTROL SEQUENCE LIST

The following subsections present the control sequences for MPF startup, MPF furnace loading operations, burner relight, loss of power, normal shutdown, and emergency shutdown. The control sequences are based on the TOCDF PLC control code and standing operating procedures (SOPs).

3.3.1 MPF Startup Sequence

Steps in startup of the MPF system are:

(A) Line up valves, including fuel gas, secondary cooling water, and plant air. If necessary, fill the SCW system as follows:

(1) Verify valve lineup. Place pumps in LOCAL and OFF.

(2) Open manual block valve on process water line at tank and fill system. Vent high points in piping and heat exchangers.

(3) When system is filled, close process water valve and start pumps. Continue to vent piping and heat exchangers until complete. Stop pumps.

(4) Open expansion tank vent or drain valves to bring liquid level to mid-point. Close vent and drain valves. Place pumps in REMOTE.

(B) Place furnace control screens in AUTO. The following actions will occur:

(1) The secondary cooling water pump will start.

(2) If the PAS/PFS normal conditions from MPF PAS/PFS[8] exist, the combustion air blower will start.

[8] The PFS is part of the designs at ANCDF, PBCDF, and UMCDF only. TOCDF does not, and will, not have a PFS (See FAWB Note B-4). PAS/PFS normal conditions are described in the PAS/PFS FAWB (Programmatic Process FAWB Book 28).

(3) All burner combustion air valves automatically drive to high-fire 5 seconds after the blower starts unless the emergency power digital intercontroller communication output (DICO) has been received (see Appendix G).

(4) When the low exhaust gas flow switch in the MPF PAS is made, the blower is on, the burner fuel block valves are closed, and the combustion air valves are at high-fire, the MPF and afterburner purge timers in the burner management panels begin to time out[9].

(5) In AUTO mode, the PLC calls for all conveyor motors to oscillate. If a conveyor has no tray on it, the motor remains in SLOW forward. The purpose of this mode is to keep the rollers turning to avoid deformation as a result of nonuniform temperature.

(C) When the MPF and afterburner purges are complete, initiate afterburner light-off. The operator must toggle each control screen burner start switch from the CON. If the system purge is complete, the PLC sends a signal to the burner management panel to initiate the following Fireye ignition sequence:

(1) Ensure running interlocks are made and fuel block valves are closed (The Fireye checks to verify that the safety interlocks are closed). If they are not, the burner will lock out.

(2) Once the operator sends a start signal to the burner, the Fireye sends a signal to the PLC to drive the combustion air and fuel gas control valves for this burner to low-fire for ignition. The afterburner burners have been adjusted with hard stops on the control valve so the PLC drives the combustion air and fuel gas valves to 0% CV position for low-fire. If low-fire is not verified after 10 minutes, the burner will lock out. Once the Fireye has verified low-fire fuel gas position, it proceeds to the next step.

(3) The Fireye initiates pilot burner trial for ignition and proves flame within 10 seconds; otherwise, lockout occurs.

(4) The Fireye initiates main-burner trial for ignition and proves flame within 10 seconds; otherwise, burner lockout occurs.

(5) The Fireye signals the PLC to resume control of the air and fuel control valves in automatic mode. The PLC maintains the fuel gas control valve at the low-fire position for 30 minutes to allow the flame to stabilize. The 30-minute timer is bypassed during relight if the afterburner temperature remains above > 500°F.

(D) After flame has been stabilized in either burner in the afterburner, the PLC ramps-up the temperature setpoint at 100°F per hour until the chamber exhaust gas reaches the final setpoint.

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[9] At TOCDF, the system purge timer is set for 6.5 minutes and the primary chamber purge timer is set for 9 minutes. In order to ensure that NFPA purge requirements are met, the timer value may be increased for sites with a PFS due to the volume added to the system by the MPF PFS.

(E) At any time after one burner in the afterburner is lit, the operator can toggle any of the control screen MPF burner start switches and initiate the Fireye ignition sequence. (The combustion air blower has been running, with the combustion air valves set to the high-fire position.) Steps the Fireye follows to light an MPF burner are:

(1) Ensure running interlocks are made and fuel block valves are closed (The Fireye checks to verify that safety interlocks are closed). If not, the burner will lock out.

(2) Since the MPF and afterburner purges are complete, the Fireye starts its 60-second purge.

(3) After the 60-second Fireye purge, the Fireye sends a signal to the PLC to drive the combustion air and fuel gas control valves for the burner to low-fire for ignition. The PLC ignores the command for the combustion air, since the furnace designer has specified that burners shall be lighted with air at high-fire. The fuel gas valve should already be at low-fire, since this is the default position. If low-fire is not verified after 10 minutes, the burner will lock out. Once the Fireye has verified low-fire fuel gas position, it proceeds to the next step.

(4) The Fireye initiates pilot burner trial for ignition and proves flame within 10 seconds; otherwise lockout occurs.

(5) The Fireye initiates main-burner trial for ignition and proves flame within 10 seconds; otherwise burner lockout occurs.

(6) The Fireye signals the PLC to resume control of the air and fuel control valves in automatic mode.

(F) The PLC maintains the fuel gas at the low-fire position for 30 minutes to allow the flame to stabilize. The 30-minute timer is bypassed during relight if all three zone temperatures remain > 500°F.

(G) After flame is stabilized in at least one burner in each zone, the PLC releases the fuel and airflow controllers to AUTO, with the fuel controller responding to the temperature controller and the air controller remaining at high-fire. The PLC ramps-up the temperature setpoint at 100°F per hour until the chamber exhaust gas reaches the operating temperature determined by the operator.

3.3.2 MPF Loading Operations

When the MPF and afterburner have reached operating temperature and there is enough room on the cooling conveyor for the tray exiting the furnace, the MPF CON operator proceeds as follows:

(A) Initiate metal parts processing by toggling the START FEED switch on the CON control screen. This initiates automatic operation of the furnace. This process continues indefinitely until it is interrupted by either a safety interlock stop feed (see Appendix C) or by the operator toggling the STOP FEED switch on the CON control screen. If a safety interlock stop feed occurs, the controller does not automatically resume feed when the interlock clears; instead, the operator has to re-initiate processing.

(B) All operations are performed in the context of various safety interlocks in the software. These interlocks exist whether the action is controlled by the PLC in automatic mode or by the CON operator in the MANUAL mode:

(1) No door can be opened if any adjacent door is not verified CLOSED and CLAMPED.

(2) A conveyor with a tray present can not be advanced (either in FORWARD or REVERSE) in the direction of an adjacent door unless the door is verified OPEN.

(3) A conveyor with a tray present can not be advanced (either in FORWARD or REVERSE) in the direction of an adjacent conveyor that also has a tray present.

(4) A tray can not be transferred from zone 2 to zone 3 if the high-temperature alarm (14-TAH-141A) in zone 2 has tripped. This prevents the transfer of a tray load that is still volatilizing agent.

(5) A tray can not be transferred from zone 2 to zone 3 if a tray is present in the discharge airlock. This ensures that zone 3 is open in case the tray in the discharge airlock needs to be cycled back into zone 3 for additional processing.

(6) Automatic transfers do not take place to or from a conveyor that is placed in MANUAL.

(C) The PLC performs all transfers at fast speed in AUTO mode, which matches the feed and discharge conveyors' speed, and oscillates at slow speed. In both AUTO and MANUAL modes, at all temperatures, if a conveyor is not transferring a tray, control of conveyors in zones 1, 2, and 3 defaults to the oscillation mode.

(D) During normal operation, when all transfer operations are complete and both doors to the MPF are closed, the PLC initiates a timed cycle in each zone. The timers measure the cumulative time above the low-low temperature setpoint. A timer is stopped if the temperature in the zone drops below the low-low temperature setpoint and is restarted without reset when the temperature increases above the setpoint. The duration of the zone timers is set initially as defined in Table 3.1. The duration of the zone timers is verified prior to agent operations. The zone timer durations are set so that it is not accessible to the CRO. When the zone timer times out, the PLC initiates transfer operations, providing the receiving zone or discharge airlock is empty and all interlocks are clear.

(E) The position of trays in the MPF can be monitored in the CON by control screen icons that indicate tray PRESENT for each conveyor and tray TRANSFER for each possible transfer point. The PLC executes the following transfer operations (not applicable for spray tanks or weteye bombs):

(1) Zone 3 to discharge airlock.

(a) No tray in discharge airlock; verify.

(b) UNCLAMP and RAISE the inner discharge airlock door; verify.

(c) Start the discharge airlock conveyor FORWARD; verify. Start the zone 3 conveyor FORWARD FAST; verify. When the tray transfer is verified complete by the discharge conveyor end position switch, STOP the discharge conveyor; verify.

(d) LOWER and CLAMP the inner discharge airlock door; verify.

Table 3.1 Theoretical Minimum MPF Cycle Times in Minutes[a]

Munition	5X time	Zone 1	Zone 2	Zone 3[b]
Ton Container (VX,GB,HD,HT)	34.9	*40.0[f]*	*40.0[f]*	*25.0[f]*
Spray Tank[cde] (VX)	22.0	40.0	0.0	26.0
MC-1 750-lb Bomb (GB)	16.4	19.7	19.7	9.7
MK-94 500-lb Bomb (GB)	16.4	19.7	19.7	9.7
Weteye Bomb[cde] (GB)	16.7	*35.0[f]*	0.0	20.0
4.2-in. Mortar (HD,HT)	16.4	19.7	19.7	9.7
105-mm Projectile (HD)	16.4	19.7	19.7	9.7
105-mm Projectile (GB)	*16.4*	*27.0[f]*	*27.0[f]*	*7.0[f]*
155-mm Projectile (VX/HD)	18.3	21.7	21.7	11.7
155-mm Projectile (GB)	15.9	19.3	19.3	9.3
8-in. Projectile (VX)	20.0	23.4	23.4	13.4
8-in. Projectile (GB)	16.7	20.1	20.1	10.1

[a] All values, unless otherwise noted, are taken from "Study Report Covering Agent Vaporization Rates in the Metal Parts Furnace for the Johnston Atoll Chemical Agent Disposal System (JACADS) Project",: Franklin G. Rinker, Maumee Research and Engineering (MRE), Inc., July 21, 1987.

[b] The total time a tray remains in the furnace still equals three times the 5X timers set by MRE. Difference between zone 3 and the zone 1 and zone 2 timers is to allow for zone 3 to remain open for *15* minutes while the tray inside the discharge airlock is sampled for agent vapors.

[c] These values are taken from "Study Report Covering Simulants Use in the Metal Parts Furnace Including Wet Eye Bomb and Spray Tank for Testing in the JACADS Project," MRE, Inc., November 1988.

[d] The oscillation mode for spray tanks and weteyes requires that no two adjacent zones be occupied simultaneously. The long zone 1 timer is meant to meet that requirement.

[e] Each tray needs a tray extender attached to the tray when processing spray tanks and weteyes to allow the MPF to work as a two-zone furnace.

[f] *Ton container and weteye bomb cycle times were modified as part of ECP TEMP-2605-MPF (see FAWB Note B-18). GB 105-mm projectile cycle times were modified under ECP TEMP-2477-MPF.*

(2) Zone 2 to zone 3. Start the zone 2 conveyor FORWARD FAST; verify. When the tray transfer is verified complete by the zone 3 conveyor end position switch, STOP the zone 3 conveyor and place in the oscillation mode.

(3) Zone 1 to zone 2. Start the zone 1 conveyor FORWARD FAST; verify. When the tray transfer is verified complete by the zone 2 conveyor end position switch, STOP the zone 2 conveyor and place in the oscillation mode.

(4) Charge airlock (when zone 1 conveyor is empty).

(a) UNCLAMP and RAISE the MPF charge door; verify.

(b) Start the charge airlock conveyor FORWARD; verify. (The zone 1 conveyor is still running FORWARD FAST.) When the tray transfer is verified complete by the zone 1 conveyor end position switch, STOP the zone 1 conveyor and place in oscillation mode.

(c) LOWER and CLAMP the MPF charge door; verify.

(d) When the charge airlock conveyor is empty, send a DEMAND DICO to the charge car controller to initiate feed of a new tray.

(e) If the agent heel is greater than the allowable for each munition, the agent heel weight displayed on the BC1 screen flashes red and the tray is interlocked in the AUTO mode from being transferred to the MPF[10]. The agent heel value continues to flash red until the agent capacity is less than the allowable. When the tray arrives in the MPF charge airlock, the MPF furnace entrance door clamps are interlocked from opening until the minimum allowable time for each munition has elapsed since the previous munition tray has been transferred to the furnace. For example, GB ton containers can only be fed to the furnace at a rate of one ton container every *40* minutes with an agent heel less than or equal to 75 pounds.

(f) When the charge car is in position to feed a tray, the charge car controller sends a FEED DICO to the MPF controller. The MPF controller starts the charge airlock conveyor FORWARD; verify. UNCLAMP and RAISE the outer feed airlock door; verify. Send a DICO to the charge car controller to feed the tray. The charge car starts to feed the tray. When the tray transfer is verified complete by the charge airlock conveyor end position switch, STOP the charge airlock conveyor; verify. If the transfer is not detected after a preset time, the MPF controller sends a TRANSFER MALFUNCTION DICO to tell the charge car to stop and remain in position. If no MALFUNCTION DICO is detected by the charge car, it waits a preset time, and then stops and continues handling in the first-floor munitions corridor.

(g) LOWER and CLAMP the outer feed airlock door; verify.

[10] See the BCHS FAWB [Programmatic Process FAWB Book 24] and the PHS FAWB [Programmatic Process FAWB Book 22] for a complete description of the TOCDF tray tracking system.

(h) When processing miscellaneous waste through the MPF, a tray of waste cannot be inside the furnace at the same time as trays of munitions are in the furnace. To prevent this from happening, all waste trays are numbered with 900-series numbers. When a 900-series tray is entered at the charge car, the PLC checks for trays in the furnace. If no trays are present in the furnace, the zone timers change to 20 minutes for zone 1, 20 minutes for zone 2, and 10 minutes for zone 3, and the sparge air damper (14-XV-857) goes closed. The operator enters the weight of waste on the tray on the BC1 screen. If the input weight is less than the permitted limit, the tray is processed through the furnace. If the input weight exceeds the permitted limit, the entry door is interlocked from opening. Once the tray reaches the cooling conveyor, the PLC checks for any other trays inside the furnace. If no more waste trays are inside the furnace, the timers are reset to the campaign selected and the sparge air damper returns to its normal indication. The PLC also prevents any other munition tray from entering the furnace anytime a waste tray is present inside the furnace.

3.3.3 Burner Relight

During normal operation, if any of the *BMS* conditions for safe burner operation are upset, the Fireye unit shuts down that burner and locks out. *At TOCDF, if an MPF primary furnace combustion air flow controller is in AUTO, the PLC drives the combustion air valve for the burner to 0% CV for any upset that causes a burner to shut down or lockout*[11]*. If a combustion air flow controller is in MANUAL, the CV for the combustion air valve does not change when the burner shuts down or locks out, unless an upset occurs that causes both afterburner burners to lockout. Examples of such upsets are loss of power, two-stage ID fan failure, combustion air blower failure, or loss of minimum system draft (See table D.7 in appendix D for burner lockout conditions). If one of these upsets occurs with a combustion air flow controller in MANUAL, the PLC drives the combustion air valve for the burner to 0% CV.*

For TOCDF afterburner burners, if an afterburner combustion air flow controller is in AUTO, the PLC ramps the combustion air valve for the burner to 25% CV for any upset that causes a burner lockout (See table D.7 in appendix D for all burner lockout conditions), except for a loss of site power. On a loss of site power or if the burner shuts down[11]*, the combustion air valves for the MPF afterburner burners are driven to high-fire (100% CV). If an afterburner combustion air flow controller is in MANUAL, the CV for the combustion air valve does not change when the burner shuts down or locks out.*

Actions are taken to achieve burner relight are as follows:

(A) An operator activates the burner RESET and START switches from the CON.

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[11] *Conditions that shut down the burner without causing a burner lockout are generated by PLC interlocks. Burner lockouts are initiated by hardwired interlocks in the BMS panel and are listed in table D.7 in appendix D. PLC interlocks that generate MPF burner shutdowns are quench tower high-high sump level, scrubber tower high-high-high and low-low-low sump levels, and quench tower overhead high-high-high temperature.*

(B) The PLC sends a signal to the burner management panel to initiate the Fireye ignition sequence:

(1) Ensure running interlocks are made and fuel block valves are closed (The Fireye checks to verify that safety interlocks are closed).

(2) The Fireye waits for the high-fire interlock to close. The high-fire interlock for the afterburner is closed if the afterburner purge is maintained (i.e., *the afterburner temperature is greater than 1400°F , or* minimum exhaust flow has been maintained and at least one burner in the afterburner is on*; see table D.7 in appendix D for system purge logic*). The high-fire interlock for the MPF primary chamber is closed if the MPF purge is maintained in addition to the afterburner purge. MPF purge is maintained if *minimum exhaust flow has been maintained and*, in each zone, the zone temperature is at least 1400°F, or at least one burner *combustion air control valve is at high fire in the zone (See table D.7 in appendix D for MPF purge logic)*. If the MPF/afterburner purges are maintained, a hard-wired contact in the burner management panel indicates to the Fireye that the high-fire condition is met. This allows the Fireye to proceed with the 60-second Fireye purge timer and subsequent ignition sequence.

If these conditions are not met, a purge is required before the burner can be relighted. If a purge is required for an MPF relight and the afterburner is still operating, only the MPF needs to be purged. If the afterburners are to be relighted and the chamber is below 1400°F, then the entire furnace system must be purged, including the PAS/PFS.

The logic for these purges under various conditions is accomplished in the burner management panel by hard-wired relays and timers in conjunction with the Fireye *(See table D.7 in appendix D for purge logic)*.

(C) At this point, the sequence is identical to Burner Light-off (see Subsection 3.3.1, step C for afterburner burner and step E for primary furnace burner).

3.3.4 Loss of Power

Loss of electric power is a significant concern in the operation of this system. Since agent vapors could be evolving in the MPF at the time power is lost, the system is designed to maintain temperature in the afterburner for a sufficient period such that volatiles from residue in the MPF are destroyed. To do this, one burner is relighted in the afterburner.

In the event of loss of power, the following conditions exist almost immediately:

(A) Power is interrupted to the combustion air blower, MPF system exhaust blower (part of the MPF PAS/PFS), and all PAS/PFS pumps. Loss of these systems results in a STOP FEED by the MPF system controller.

(B) The Fireye immediately closes the safety shutoff valves *(e.g., 14-XV-207 & -208 for burner #1)* to all burners and locks out all burners.

(C) The control system, which is on the site uninterruptible power supply (UPS), continues to function.

(D) A DICO is sent from the power controller (ICS-CONR-109) to the MPF system controller, and a process interlock drives all valves to the safe position. For the combustion air valves, safe position is defined as closed for the MPF burners and high-fire for the afterburners. This minimizes agent combustion in the MPF and maintains draft through the afterburner.

(E) Draft to the furnace is maintained for a limited time by the spindown of the exhaust blower.

The emergency generator is started to provide essential power. As soon as essential power is established, the MPF system controller receives a DICO from the power controller (which defines t = 0 seconds), and initiates the following sequence:

(A) (TOCDF) At t = 0 seconds, the MPF system controller starts the emergency exhaust blower to maintain furnace draft (see Programmatic Process FAWB Book 28). The emergency blower should start well before the main blower has spun down too far to provide minimum furnace draft.

(B) (ANCDF, PBCDF, UMCDF) At t = 0 seconds, the MPF system controller restarts one stage of the ASD fan and it runs at a speed that limits its power usage to 25 hp. (see the PAS/PFS FAWB [Programmatic Process FAWB Book 28]).

(C) At t = 20 seconds, the MPF system controller starts the combustion air blower. Once this is running, the operator resets and relights a burner in the afterburner (see Burner Relight control sequence).

(D) At t = 30 seconds, the MPF system controller starts the furnace conveyors in oscillation mode to protect the rollers from deformation. An SCW pump also is started.

The afterburner continues to operate with one burner until the residual agent in the metal parts remaining in the furnace is destroyed. This is determined by verifying that the raw carbon monoxide concentration at 14-AI-508 is less than 100 ppm. At this point, the furnace can be shut down as described in the normal MPF shutdown control sequence.

3.3.5 Normal MPF Shutdown

After metal parts feed has been stopped and the MPF has been emptied of metal parts, the operator can shut down the furnace by the following process:

(A) The CON operator verifies that the MPF is empty of all munitions.

(B) The CON operator ensures that a 5-minute 5X decontamination period is completed, with the furnace empty after all munitions are processed through the discharge airlock.

(C) The CON operator begins rampdown of the MPF by inputting a temperature setpoint of 1000°F into MPF fire rate controllers 14-TIC-152, 14-TIC-141, and 14-TIC-153 (Note: Zone 1 and 2 temperature controllers must be placed in LOOP MANUAL before inserting the 1000°F setpoint in the controllers to prevent undesired quench spray and potential furnace damage). The controller ramps down the MPF temperature to 1000°F at 100°F per hour.

(D) The CON operator begins rampdown of the MPF afterburner by inserting a temperature setpoint of 1000°F into MPF afterburner fire rate controller TIC-65. The controller ramps down the afterburner temperature to 1000°F at 100°F per hour.

(E) When either the primary chamber or afterburner temperature reaches 1000°F, the CON operator shuts off the burners for that chamber and the furnace is allowed to cool naturally. When each burner is shut down, its combustion air valve *closes* (0% *CV*) and the fuel gas block valves close. *The CON operator then drives the combustion air valve to high-fire to provide cooling through the system and to maintain system purge.*

(F) When the furnace has cooled to <350°F for two hours, the CON operator secures the MPF conveyors and combustion air blower.

(G) To complete shutdown of the MPF, the MPF PAS/PFS is shut down. The MPF can be bottled up by closing all combustion air valves and the combustion air blower inlet damper.

3.3.6 Emergency Shutdown

The CON operator initiates an MPF emergency shutdown by pushing the emergency stop (E-stop) button on any one of *six* CON consoles[12]. Emergency shutdown activation cuts power to the BMS (all burners shutdown), stops all blowers, fans, and pumps in the MPF and system, drives all valves and dampers to the safe position, and terminates feed. Power also is interrupted to most pumps and blowers in the PAS/PFS with all valves being driven to the safe position. At TOCDF, the quench brine pump remains running, and the MPF emergency exhaust blower (PAS-BLOW-106) starts automatically if the MPF afterburner temperature is greater than 1000°F. At ANCDF, PBCDF, and UMCDF, the quench brine pump, clean liquor pump, clean liquor air cooler(s), and gas reheater are not shutdown from the console E-stop. One stage of the ASD exhaust ID fan remains running at reduced speed to provide furnace draft (Stage 2 of the ID Fans is shutdown after depressing the CON E-stop if Stage 1 is running). If necessary, the emergency quench nozzles will provide cooling to the hot exhaust gases that flow during the time it takes for the exhaust blower to spin down.

Emergency shutdown of the MPF burners also can be accomplished by pushing the emergency stop on the burner management system panel.

After initiating the emergency shutdown, the CON operator verifies the expected actions have occurred. If the expected actions do not occur, the CON operator takes manual action to ensure the MPF equipment is in its safe position.

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[12] *The ANCDF design and the TOCDF site have six CON console E-stops. The UMCDF design currently shows only five, however, the DSIC is preparing an ECP to add the sixth that is located on ICS-CONS-108. The PBCDF design currently shows only four CON console E-stops, however, the DSIC is preparing an ECP to add a fifth that is located on ICS-CONS-108.*

SECTION 4
COMPONENT SUMMARY

4.1 MPF SYSTEM COMPONENTS

The MPF system consists of a primary furnace, an afterburner, a feed airlock, a discharge airlock, a discharge tray unloading conveyor, a discharge cooling conveyor, a combustion air blower, MPF secondary cooling water, and associated instrumentation and piping.

Design parameters associated with the MPF combustion air blower and the MPF secondary cooling water circulation pumps are listed in Tables 4.1 and 4.2, respectively.

Table 4.1 MPF Combustion Air Blower Design Parameters

	ANCDF	PBCDF	TOCDF	UMCDF
Quantity	1	1	1	1
Tag #(s)	MPF-BLOW-101	MPF-BLOW-101	MPF-BLOW-101	MPF-BLOW-101
Blower Type	Motor-driven centrifugal	Motor-driven centrifugal	Motor-driven centrifugal	Motor-driven centrifugal
Rated Flow/ Δ Pressure[1]	4870 scfm 52 in. wc.	4900 scfm 54 in. wc.	7640 acfm 56.5 in. wc.	4744 scfm 52 in. wc.
Motor Power	75 hp	75 hp	100 hp[2]	*75 hp*
P&IDs	AN-1-D-529	PB-1-D-529	TE-1-D-529	UM-1-D-529

[1] At local operating conditions.
[2] *S*ee FAWB Note B-11.

Table 4.2 MPF Secondary Cooling Water Circulation Pump Design Parameters

	ANCDF	PBCDF	TOCDF	UMCDF
Quantity	2	2	2	2
Tag #(s)	SCW-PUMP-101 SCW-PUMP-102	SCW-PUMP-101 SCW-PUMP-102	SCW-PUMP-101 SCW-PUMP-102	SCW-PUMP-101 SCW-PUMP-102
Pump Type	Motor-driven centrifugal	Motor-driven centrifugal	Motor-driven centrifugal	Motor-driven centrifugal
Rated Flow/ Δ Pressure	77 gpm/ 41 psi	77 gpm/ 41 psi	77 gpm/ 41 psi	77 gpm/ 41 psi
Motor Power	5 hp	5 hp	5 hp	5 hp
P&IDs	AN-1-D-11	PB-1-D-11	TE-1-D-11	UM-1-D-11

4.2 EQUIPMENT POWER SOURCES

Table 4.3 lists the equipment power sources for the major equipment used in the MPF furnace systems based on *site drawing revisions listed in Appendix H.* Power sources are characterized as either critical, essential or utility. Critical loads are powered by the UPS panelboards and do not experience an interruption in power if offsite power is lost. Essential loads are required for safe shutdown of the facility, but can tolerate an interruption in power while being loaded on an onsite emergency diesel generator (EDG). Utility loads are not required if offsite power is lost and are not powered by the onsite EDG. Only motive power sources are listed in the tables; instrumentation and control power sources are not listed. In addition, hydraulically and pneumatically powered, and non-powered equipment are not included in the tables.

Table 4.3 MPF Equipment Power Sources

Equipment Tag	Description	Site(s)	Power Source	Power Type
MMS-CNVP-119	MPF Feed Conveyor / Airlock	AN/PB/TE/ UM	SPS-MCC-102	Essential
MMS-CNVP-120	MPF Discharge Tray Unloading Conveyor (Conveyor Drive, Motor A)	AN/TE/UM	SPS-MCC-107	Utility
		PB	SPS-MCC-105	Utility
MMS-CNVP-120	MPF Discharge Tray Unloading Conveyor (Lift Drive, Motor B)	AN/TE/UM	SPS-MCC-107	Utility
		PB	SPS-MCC-105	Utility
MMS-CNVP-121	MPF Discharge Cooling Conveyor (Conveyor Drive, Motor A)	AN/TE/UM	SPS-MCC-107	Utility
		PB	SPS-MCC-105	Utility
MMS-CNVP-121	MPF Discharge Cooling Conveyor (Lift Drive, Motor B)	AN/TE/UM	SPS-MCC-107	Utility
		PB	SPS-MCC-105	Utility
MPF-BLOW-101	MPF Combustion Air Blower	AN/PB/TE/ UM	SPS-MCC-102	Essential
MPF-CNVP-101	MPF Discharge Conveyor / Airlock	AN/PB/TE/ UM	SPS-MCC-102	Essential
MPF-CRAN-401	Crane - Metal Parts Furnace (includes Magnet/Spreader Bar at TE)	AN/PB/TE/ UM	SPS-PANB-403	Utility
MPF-CRAN-401	Crane – Metal Parts Furnace (Magnet/Spreader Bar)	AN/UM[1]	SPS-PANB-410	Utility
MPF-FURN-101	Metal Parts Furnace (MPF Zone 1 Drive Motor A)	AN/PB/TE/ UM	SPS-MCC-102	Essential
MPF-FURN-101	Metal Parts Furnace (MPF Zone 2 Drive Motor B)	AN/PB/TE/ UM	SPS-MCC-102	Essential

Table 4.3 (Cont'd)

Equipment Tag	Description	Site(s)	Power Source	Power Type
MPF-FURN-101	Metal Parts Furnace (MPF Zone 3 Drive Motor C)	AN/PB/TE/ UM	SPS-MCC-102	Essential
MPF-MONO-402	Monorail Hoist	AN/TE/UM	SPS-PANB-410	Utility
		PB	SPS-MCC-104	Utility
SCW-PUMP-101	MPF Secondary Cooling Water Circulating Pump	AN/PB/UM	SPS-MCC-101	Essential
		TE	SPS-MCC-102	Essential
SCW-PUMP-102	MPF Secondary Cooling Water Circulating Pump (Spare)	AN/PB/TE/ UM	SPS-MCC-102	Essential

[1] PB power source was not in referenced design documentation; power supply at PB will be added in a future design revision.

APPENDIX A

Acronyms and Abbreviations

The acronyms and abbreviations listed below are common for all of the programmatic process FAWBs:

A&I	alarm and interlock matrix
AASS	automatic agent sampling system
ABCDF	Aberdeen Chemical Agent Disposal Facility
AC	alternating current
ACAMS	automatic continuous air monitoring system
acfm	actual cubic foot per minute
ACS	agent collection system
ACSWS	acid and caustic storage and wash system
ADC	air dilution controller
AgF	silver fluoride
AHT	agent holding tank
AHU	air handling unit
AMC	Army Materiel Command
ANAD	Anniston Army Depot (Alabama)
ANCDF	Anniston Chemical Agent Disposal Facility
ANSI	American National Standards Institute
AQS	agent quantification system
AR	Army Regulation
ASA	automatic submerged arc
ASC	allowable stack concentration
ASD	adjustable-speed drive
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	acid wash system
AWFCO	automatic waste feed cutoff
BCHS	bulk container handling system
BCS	bulk chemical storage
BDS	bulk drain station
BGCDF	Blue Grass Chemical Agent Disposal Facility
BLAD	blast load attenuation duct
BMS	burner management system
BPS	burster punch station (MIN)
BRA	brine reduction area
BRS	burster removal station (PMD)
BSA	buffer storage area
BSR	burster size reduction machine
Btu	British thermal unit
°C	degrees Celsius
CAMDS	Chemical Agent Munition Disposal System
CAB	combustion air blower

CAL	chemical assessment laboratory
CAS	compressed air system
CBR	chemical, biological, and radiologic al (filter)
CCB	configuration control board
CCS	central control system
CCTV	closed-circuit television
CDS	central decontamination supply
CDSS	central decontamination supply system
CDTF	Chemical Demilitarization Training Facility
CEHNC	U.S. Army Engineering & Support Center, Huntsville.
CEMS	continuous emission monitoring system
CFR	Code of Federal Regulations
CGA	Compressed Gas Association
CHB	container handling building
CHWS	chilled water supply
CO	carbon monoxide (monitors/analyzers)
COM	communications system
CON	control room
COR	munitions corridor
CPA	client-Parsons authorization
CRO	control room operator
CRT	cathode ray tube
CS	crimp station (PMD)
CSS	campaign select screen
CSD	Chemical Stockpile Disposal (Project)
CV	control variable
CWC	Chemical Weapons Convention
CWS	chilled water supply
DAAMS	depot area air monitoring system
db	dry bulb
DC	direct current
DCD	Deseret Chemical Depot
DDESB	Department of Defense Explosives Safety Board
decon	decontamination (solution)
demil	demilitarization
DFS	deactivation furnace system
DICI	digital intercontroller communication input
DICO	digital intercontroller communication output
DMS	door monitoring system
DPE	demilitarization protective ensemble (suit)
DSA	DPE support area
dscf	dry standard cubic foot
DSIC	design and systems integration contractor
DUN	dunnage incinerator
E&M	engineering and maintenance
E-stop	emergency stop
EAC	equipment acquisition contractor
ECF	entry control facility
ECP	engineering change proposal
ECL	engineering control level
ECR	explosive containment room

ECV	explosive containment vestibule
EDG	emergency diesel generator
EHM	equipment hydraulic module
EIC	equipment installation contractor
EPS	emergency power system
ETL	extreme temperature limit
°F	degrees Fahrenheit
FAWB	functional analysis workbook
FDLL	field design lessons learned (program)
FDPS	fire detection and prevention system
FEET	FAWB evolvement/evaluation team
FEM	fire extinguishing medium
FIFO	first-in-first-out
FIL	activated carbon and HEPA filter
FPD	flame photometric detector
fpm	feet per minute
FSSS	flame safety shutdown system
ft	feet
GA	general arrangement; nerve agent ethyl N-dimethylphosphoramidocyanidate ($C_5H_{11}N_2O_2P$)
gal	gallon
GB	nerve agent Sarin, isopropyl methyl phosphonofluoridate ($C_4H_{10}FO_2P$)
GC	gas chromatograph
GEN	emergency generator
GFE	government-furnished equipment
GLD	gross level detector
GPD	gas plasma display
gpm	gallons per minute
gr	grain
H	blister agent mustard, made by the Levinstein process, Bis(2-chloroethyl) sulfide or 2,2'-dichlorodiethyl sulfide ($C_4H_8Cl_2S_{1.5}$ [empirical formula])
H_3PO_4	orthophosphoric acid
HCl	hydrochloric acid
HD	blister agent distilled mustard, Bis(2-chloroethyl) sulfide or 2,2'-dichlorodiethyl sulfide ($C_4H_8Cl_2S$)
HDC	heated discharge conveyor
HDV	hydraulic directional control valve
HEPA	high-efficiency particulate air (filter)
HLE	high-level exposure
HOA	hand-off-auto
hp	horsepower
hr	hour
HRA	health risk assessment
HT	60% by weight blister agent distilled mustard and 40% agent T [Bis[2(2-chloroethylthio)ethyl] ether]
HVAC	heating, ventilating, and air-conditioning
HVC	heating, ventilating, and cooling
HYD	hydraulic power
HYPU	hydraulic power unit
HYVM	hydraulic control valve manifold
I/O	input/output

I-lock	interlock
IAS	instrument air system
icfm	inlet cubic foot per minute (acfm at the inlet)
ICS	instrumentation and control system
ID	induced draft
	inside diameter
IDLH	immediately dangerous to life and health
IGS	inertial gas sampling
in.	inch
in. wc.	inches water column
IR	infrared
ISO	International Standards Organization
JACADS	Johnston Atoll Chemical Agent Disposal System
kW	kilowatt
L	Lewisite (blister agent)
LAB	laboratory
lb	pound
lb/hr	pounds per hour
LCO	limiting condition of operation
ln	line
LIC	liquid incinerator
LIFO	last-in-first-out
LIT	level-indicating transmitter
LOQ	limit of quantification
LOR	local-off-remote
LPG	liquefied petroleum gas
LQCP	laboratory quality control plan
LR	local-remote
LSB	LSS bottle filling system
LSS	life support system
LVS	low volume sampler
mA	milliamperes
MCC	motor control center
MCP	monitoring concept plan
MDB	munitions demilitarization building
MDM	multipurpose demilitarization machine
MEL	master equipment list
MER	mechanical equipment room
mg/m^3	milligrams per cubic meter
MIG	mine glovebox
MIN	mine machine
MMS	mine and munitions system
MPB	munitions processing bay
MPF	metal parts furnace
MPL	multiposition loader
	maximum permissible limit (for DPE)
MPRS	miscellaneous parts removal station (PMD)
MSB	monitor support building
MSS	munition sampling system
NaOCl	sodium hypochlorite
NaOH	sodium hydroxide

NCRS	nose closure removal station (PMD)
NEMA	National Electrical Manufacturers Association
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Association
NG	natural gas
NRT	near real time
O&M	operations and maintenance
OBV	observation corridor
ONC	onsite container
OS	orientation station (MIN)
OSHA	Occupational Safety and Health Administration
OVT	operational verification testing
P&A	precision and accuracy
P&ID	piping and instrument diagram
PA	public address
PAS	pollution abatement system
PBA	Pine Bluff Arsenal
PBCDF	Pine Bluff Chemical Agent Disposal Facility
PCS	primary cooling system
PCT	preconcentrator tube
PDAR(S)	process data acquisition and recording system
PDE	projectile deformation equipment
PDIT	pressure differential indicator transmitter
PDS	pull and drain station (MDM) punch and drain station (MIN)
PFD	process flow diagram
PFS	PAS filter system
pH	potential of hydrogen (a measure of acidity or alkalinity)
PHS	projectile handling system
PID	proportional integral derivative
pig	overpacked shipping container
PKPL	pick-and-place machine (also PPL)
PLA	plant air system
PLC	programmable logic controller
PLL	programmatic lessons learned (program)
PLS	proximity limit sensor/switch
PMB	personnel and maintenance building
PMCD	Program Manager for Chemical Demilitarization (formerly PEO-PM Cml Demil)
PM-CSD	Project Manager for Chemical Stockpile Disposal
PMD	projectile/mortar disassembly (machine)
PML	personnel, maintenance, and laundry (complex or building)
POT	potable water
PPL	pick-and-place machine
PPS	primary power system
PQAP	Participant Quality Assurance Plan
PRW	process water
PSB	process support building
psig	pounds per square inch, gauge
PSV	pressure safety valve
PUB	process and utility building
PUDA	Pueblo Depot Activity (Colorado)

PWR	power systems (unit substation, uninterruptible power supply, battery rooms, and emergency generator)
RCRA	Resource Conservation and Recovery Act
RDS	rocket drain station
RDTE	research, development, testing, and evaluation
RFI	Request for Information
RHA	residue handling area
RHS	rocket handling system
rpm	revolutions per minute
rps	revolutions per second
RSM	rocket shear machine
RSS	rocket shear station
SC	systems contractor
SCBA	self-contained breathing apparatus
scf	standard cubic foot
scfh	standard cubic feet per hour
scfm	standard cubic feet per minute
SCW	secondary cooling water
SCT	systems contractor for training
SDS	spent decon system
sg	specific gravity
SGS	steam generation system
SOP	standing operating procedure
SPS	secondary power system
SRS	slag removal system
TBD	to be determined
TCE	treaty compliance equipment
TEAD	Tooele Army Depot (Utah)
TIP	tray information packet
TM	Army Technical Manual
TMA	toxic maintenance area
TNT	trinitrotoluene (explosive)
TOCDF	Tooele Chemical Agent Disposal Facility
TOX	toxic cubicle
TSCA	Toxic Substances Control Act
TSHS	toxic storage and handling system
TSO	Tight shutoff
TWA	time-weighted average
UE&C	United Engineers and Constructors
UMCDF	Umatilla Chemical Agent Disposal Facility
UPA	unpack area
UPS	uninterruptible power supply
UV	ultraviolet
VCR	video cassette recorder
VX	nerve agent, O-ethyl S-(2-diisopropylaminoethyl) methylphosphonothiolate ($C_{11}H_{26}NO_2PS$)
wc	water column
WTS	water treatment system
XXX	3X level of decontamination
XXXXX	5X level of decontamination (minimum of 1000ºF for 15 minutes)
Z	general designation for monitoring hazard level

APPENDIX B

FAWB Notes

Appendix B contains notes to expand upon the descriptions contained in the text of the FAWB. The notes include related experiences at the Johnston Atoll Chemical Agent Disposal System (JACADS).

B-1 Per discussions held during the comment resolution matrix meeting for the HVAC FAWB on 9-10-98, the programmatic process FAWBs are being prepared under the assumption that the DUN, DUN PAS and DUN PFS (at ANCDF) systems will not be used for processing at *any of the four sites. Therefore, a* programmatic process FAWB for the DUN/DUN PAS/PFS is not being developed. Handling and disposal of dunnage are considered site-specific activities that have not yet been determined. *PBCDF deleted the DUN from the design by PBAC1000DUN.* The DUN is installed at TOCDF and remains in the design at ANCDF. At UMCDF, the DUN was being removed from the design, however, its use at UMCDF is currently being studied. *The DSIC is preparing a RCRA and design package for the UMCDF DUN, DUN PAS, and DUN PFS.*

B-2 Per discussions held during the comment resolution matrix meeting for the PAS FAWB on 11-10-98, the programmatic process FAWBs for the PAS and PFS were combined into a single PAS/PFS FAWB that applies to all four sites. Since TOCDF will not have a PFS, discussions related to the PFS are applicable to ANCDF, PBCDF and UMCDF only (see FAWB Note B-4 below).

B-3 The acid/caustic storage and wash system is no longer used at TOCDF and has been removed from the ANCDF, UMCDF, and PBCDF site designs by ECPs ANAC343PAS, R1, UMAC160PAS, R1, and PBAC340PAS, respectively.

B-4 The PFS was incorporated into the ANCDF, PBCDF, and UMCDF designs under ECPs ANAC459PAS, PBAC406PAS and UMAC0193PAS, respectively. TOCDF will not have a PFS. *Since the DUN PFS is unique to the DUN, it is considered part of the DUN system (see FAWB Note B-1).*

B-5 The TOCDF PLC code prevents trays from being staged inside of the charge airlock during automatic processing. A ventilation system for the MPF feed conveyor/airlock has been designed for TOCDF (TOCDF ECP EN-2444, TEMP-1987-MPF) but has not yet been approved for implementation. If the ECP is approved and implemented, the PLC code restriction will be modified. The MPF charge airlock purge vent line has been approved for future sites in ECPs UMAP208SRL (incorporated in CRev. 4), ANAP451SRL (incorporated in CRev. 6), and PBAP397SRL. *ANCDF and UMCDF personnel confirmed the installation of the charge airlock vent system and noted that it draws air from the*

lower munitions corridor. At the Jan 2001 ANCDF MPF review meeting, the DSIC recommended that the vent valves not normally be used because they may affect the furnace pressure. For contingencies in which the valves are used, the DSIC recommended operation in MANUAL. However, if AUTOMATIC logic is programmed, the following interlocks were recommended: both doors clamped, the afterburner at normal operating temperature, and a time delay expired that allows for a tray to pass normally through the airlock. The EIC is issuing an RFI to have the DSIC document the logic recommendations and determine impacts on throughput rates if trays are held on the charge car instead of buffering them in the charge airlock. Final descriptions of *each site's* system will be provided in a future revision of the MPF FAWB.

B-6 Because of corrosion problems, the secondary cooling water heat exchanger for the MPF discharge airlock door was replaced at JACADS with a heat exchanger with stainless steel tubes. The design for ANCDF, UMCDF & PBCDF calls for SCW-EXCH-101 materials to be the manufacturers standard.

B-7 The referenced version of the TOCDF code includes operation of sparge air during the weteye bomb campaign. Because of the weteye bomb materials and configuration, it is not expected that sparge air will be used during weteye bomb processing.

B-8 At TOCDF, ECP TEMP-2302-DFS eliminated the dual temperature elements from the four operating furnaces (2 LICs, DFS, and MPF) because the spare element was typically failed or near the point of failure when the primary element failed. Thus, the spare provided little or no benefit. In addition, on the MPF, which uses Type K thermocouples *(see FAWB Note B-9)*, using a single element thermocouple allows for use of larger diameter element and wire which provides for a thermocouple configuration with a longer life expectancy. The FDLL has recommended this change for implementation at the follow-on sites. *UMCDF issued ECP UMSF763MPF to implement this change.*

B-9 TOCDF ECP TEMP-2277-MPF implemented a number of changes to the MPF primary furnace and afterburner temperature instrumentation and control. The Field Design Lessons-Learned (FDLL) Team reviewed the changes for applicability to follow-on sites and has determined the changes to be site-specific. The ECP changes that affected the MPF FAWB include:

1. When 14-TIC-065 temperature reaches 2050°F, the dilution air valves ramp open to add excess oxygen to the afterburner to assist in combustion and aid in cooling the afterburner. When 14-TIC-065 temperature exceeds 2075°F, all primary chamber burners except for #3 (zone 1), #6 (zone 2), and #10 (zone 3) are shutdown. When 14-TIC-065 temperature exceeds 2250°F, burners #3, #6, and #10 shutdown, the afterburner burners are shutdown, and the afterburner combustion air dampers are driven to 25% CV.

2. The extreme temperature limit (ETL) setpoint for the afterburner, 14-TSHH-087, is 2400°F (previous setpoint was 2200°F). *ECP TEMP-2314-MPF changed thermocouples for TIT-065, -069, and –087 from type "K" to type "R" to allow temperature monitoring and control above 2300°F.*

3. The controller (14-TIC-152A) setpoint for water spray in zone 1 is 50°F above the zone 1 temperature setpoint entered in 14-TIC-152. A calculated average temperature is used to control the water spray. The calculated average temperature is the average between the duct (primary furnace to afterburner) temperature (14-TI-010) and the zone 1 temperature (the average between 14-TIT-152 and 14-TIT-391). If the calculated average temperature increases above the 14-TIC-152A setpoint, the spray valves are modulated open. If it decreases below the setpoint, the spray valves are modulated closed.

4. The temperature controller used to generate the RCRA automatic waste feed cutoff (AWFCO) alarms for all three furnaces zones and the afterburner were changed:

   Zone 1: From 14-TIC-071 to 14-TIC-152.

   Zone 2: From 14-TIC-072 to 14-TIC-141

   Zone 3: From 14-TIC-079 to 14-TIC-153

   Afterburner: From 14-TIC-087 to 14-TIC-065

5. Raw primary chamber CO value is now displayed on Advisor PC screen MPF, MPF furnace temperature control.

B-10 A card was installed and software changes were made at TOCDF under ECP TEMP-1970-MPF allowing the CRO to reset ETL switches from a handswitch in the CON. The FDLL team has determined that this configuration will be implemented at the follow-on sites. *At the Jan 2001 ANCDF MPF review meeting, ANCDF indicated that they would not be adding a remote ETL reset from the CON. They will be adding, however, an Advisor PC message reading, "Manual Reset Required for ETL," to be displayed when an ETL alarm occurs.*

B-11 *The MPF combustion air blower motor power is 75 hp at ANCDF, PBCDF, and UMCDF, and 100 hp at TOCDF.* The motors are smaller at follow-on sites because of the higher inlet air densities due to site elevation differences.

B-12 TOCDF ECP TEMP-2290-MPF implemented changes to some of the MPF RCRA automatic waste feed cutoff setpoints (and some MPF PAS setpoints). The MPF system setpoint changes were: 14-TAHH-152, -141, -153 from 1800°F to 1650°F; 14-TALL-152, -141, -153 from 1150°F to 1200°F; and 14-TALL-065 from 1600°F to 1800°F. The FDLL determined that these changes were site specific and will not be implemented at the follow-on sites. *14-TAHH-152, -141, -153 setpoints were later changed by TEMP-2491-MPF from 1650°F to 1700°F.*

B-13 TOCDF ECP TEMP-2340-MPF implemented code changes to make 14-TAL-152 (zone 1), 14-TAL-141 (zone 2), and 14-TAL-153 (zone 3) pre-alarms only and eliminated the "STOP FEED" signal. Stop feed protection at TOCDF is covered under 14-TALL-152, 14-TALL-141, and 14-TALL-153. The FDLL team has determined that this configuration will be implemented at the follow-on sites.

B-14 Under ECP TEMP-2563-MPF, TOCDF modified the control system response to a significant temperature drop in a zone or in the afterburner. If the temperature drops more than 200°F below the operating setpoint, the PLC ramps temperature back to the operating setpoint using the built-in ramp function (100°F per hour). The operator, however, has the option to take MANUAL control and increase the temperature at a faster rate. Use of the built-in ramp rate prevents overshoot of the operating setpoint temperature that previously occurred when the temperature control loop was simply returned to AUTO.

B-15 Vendor documents for all sites list the failure position of 14-XV-717/738 as fail-closed. ANCDF, TOCDF, and UMCDF P&IDs show the failure position as fail-open. ANAP632MPF and UMAP559MPF have been issued to modify the ANCDF and UMCDF P&IDs. The change was incorporated at PBCDF under PBAC525MPF.

B-16 Design documentation for ANCDF, PBCDF, and UMCDF indicates that there are two modes of automatic operation for furnace pressure control: 1) modulating the ID fan speed with the ID fan inlet damper at a preset position, or 2) modulating the ID fan inlet damper position with the ID fan at a preset speed. After discussions with the DSIC and EIC, it was decided that since speed control of the ID fans is the desired pressure control mode, furnace pressure control by modulating the ID fan inlet damper position would not be available as an automatic control mode (see RFI S-ALL-216). If furnace pressure control in this mode is desired, the operator can place the system in MANUAL, set the ID fan speed, and manually position the ID fan inlet damper to maintain the desired primary chamber pressure.

B-17 At TOCDF, TEMP-2583-MPF added wide range pressure transmitter, 14-PDIT-070A, in parallel with 14-PDIT-070 to alert the operator when the primary chamber pressure is beyond the range of 14-PDIT-070. 14-PDIT-070A range is +10 in wc to –40 in wc. Excessive-negative-pressure alarms are provided at –20 in wc and –35 in wc that must be acknowledged by a CON supervisor and reset by a controls engineer. At –20.0 in wc, if 14-PIC-070 is in MANUAL, the PLC temporarily drives the ID fan damper to 15% CV and drives the venturi scrubber to 35% CV. After 5 seconds 14-PIC-070 is released to AUTO at the previous setpoint. The venturi scrubber differential pressure controller, 14-PDIC-222 is also released to AUTO after 5 seconds. If 14-PIT-070A > -20 in wc, it controls to a 30 in wc setpoint. If 14-PIT-070A < -20 in wc, it controls to the previous setpoint. At –35 in wc, the PLC shuts down both stages of the ID fan if both of the afterburner burners are not released to AUTO by the BMS. Thus, if either of the

afterburner burners is released to AUTO (i.e., the burner is on main flame), the ID fan will not shutdown even if the furnace pressure decrease below –35 in wc. This ECP was presented at a PLL ECP review meeting in November 2000, and is under review at follow-on sites.

B-18 Under ECP TEMP-2605-MPF, TOCDF installed a three-way solenoid valve on the ACAMS sampling line that allows sampling from either the MPF discharge airlock or monitor room 09-148. The purpose of the change is to extend the life of ACAMS monitors by reducing smoke and debris contamination of the ACAMS when a load is initially transferred into the discharge airlock. The change includes modified zone cycle times for bulk items and an increase in the discharge airlock retention time from 10 to 15 minutes (Note: projectiles are held in the airlock for 20 minutes per TEMP-2477-MPF). Under the change, the ACAMS is normally aligned to sample the monitor room but is aligned to monitor the discharge airlock for an eight-minute (based on April 2001 PLC code) sampling period whenever a load is in the airlock. A solenoid block valve on the monitor room sampling line closes during the airlock sample period as an added precaution to prevent discharge airlock vapors from migrating into the monitor room. JACADS implemented a similar change under ECP MONS-0040 R1. The JACADS and TOCDF ECPs were reviewed by the PLL ECP review program. The change is under review at PBCDF and pending review at ANCDF and UMCDF.

B-19 The MPF zone temperature controllers (TIC-151, -142, -153) normally operate using a calculated average temperature from two transmitters in each zone. Under ECP TEMP-2600-MPF R1, TOCDF modified the PLC code to ensure that, if the two transmitter values are significantly different, the most conservative temperature value is used to initiate the RCRA alarms in each zone.

APPENDIX C

Alarm and Interlock Matrices

Appendix C contains *site-specific* MPF alarm and interlock (A&I) matrices *for all four sites*. A&I matrices depict in a consolidated format the software and hardware alarms and interlocks for the equipment and instrumentation in a specific system.

Specific guidelines were developed during development of utility system FAWBs for ANCDF and UMCDF that *are* followed in the programmatic FAWB*s*. *Fourteen* specific guidelines have been established that define the format and content of entries in the A&I matrices:

1. Analog signals from transmitters (e.g., LITs) are not listed; the alarms are indicated separately.
2. All software prealarms and alarms (e.g., LAHs) that are indicated in the CON are listed. Setpoints and actions are shown where applicable.
3. Equipment and instrument status indication signals (e.g., open/close, on/off) are not listed unless they initiate action.
4. Alarms generated from GFE package units that report to the PLC are listed. If not already available and listed, the GFE internal alarms and actions will be added to the matrix when available from the site systems contractor and *"SC to provide detail"* will be entered into the "remarks" column.
5. For field switch generated alarms, the switch tag is listed, not the alarm tag. For example, a low-low pressure alarm (PALL) generated by the field switch, 13-PSLL-008, is listed as 13-PSLL-008 rather than 13-PALL-008. The purpose for this listing is to distinguish between field switch generated hardwired alarms and alarms generated in the software based on the analog output from a transmitter.
6. Instruments that initiate actions are listed in a vertical column sorted by prefix, loop number, instrument ID, then suffix. For example, for 99-TSH-100A, the prefix is 99, the loop number is 100, the instrument ID is TSH, and the suffix is A). Actions are listed in column across the top of the matrix and include prealarms and alarms.
7. Setpoints are listed for all instruments where applicable. Instrument ranges for analog transmitters are shown in Appendix F. Unless otherwise noted, tank level setpoints are shown from the level transmitter tap.
8. Only hand switches (push buttons) that cause system shutdowns are listed; other software and hardwired hand switches are not listed.

9. Local alarms are not listed.

10. Matrices are grouped by subsystem as applicable within each FAWB. For example, separate matrices are provided in the RHS FAWB for the rocket input feed assembly, the rocket drain station of the RSM, and the rocket shear station of the RSM.

11. Alarms associated with automatic actions are classified as *"alarms"* and alarms without automatic actions are classified as *"prealarms."*

12. Instruments listed in the matrix that are RCRA reportable are designated as such by entering *"RCRA"* in the remarks column.

13. Clarifications are provided when necessary in the remarks column of the A&I matrices, or in the system and/or operator response column in alarm and system response tables.

14. Device malfunction alarms are not shown unless they initiate automatic actions such as equipment switchovers (e.g., to a standby pump), system shutdowns, or a stop feed signal.

ANCDF METAL PARTS FURNACE (MPF) SYSTEM

ANCDF MPF — ALARM AND INTERLOCK MATRIX — **ANCDF MPF**

P&IDs: AN-1-D-11, -528, -529, -530/1, and -530/2; PLC: ICS-CONR-113, INTERLOCK I-8

F00 - SPARE
F01 - SPARE
F02 - S/D COOLING CONVEYOR MMS-CNVP-121
F03 - S/D UNLOAD CONVEYOR MMS-CNVP-120
F04 - STOP ZONE 1 TIMER
F05 - STOP ZONE 2 TIMER
F06 - STOP ZONE 3 TIMER
F07 - S/D DISCHARGE AIRLOCK CONVEYOR
F10 - S/D ZONE 3 CONVEYOR
F11 - S/D ZONE 2 CONVEYOR
F12 - S/D ZONE 1 CONVEYOR
F13 - S/D CHARGE AIRLOCK CONVEYOR
F14 - S/D COMBUSTION AIR BLOWER
F15 - S/D RESPECTIVE AFTERBURNER BURNER
F16 - S/D RESPECTIVE PRIMARY CHAMBER BURNER
F17 - STOP FEED
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - SPARE
P13 - SPARE
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LQR PMP ON
P07 - SPARE
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LQR PUMPS
P04 - S/D 1ST & 2ND STG ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D IST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	B8:011/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX
1	14 PDAH 007	MPF CHARGE AIRLOCK	-0.1 in wc																															X	90 sec delay.	0450/00	NA
2	14 PDAL 007	MPF CHARGE AIRLOCK	-6.0 in wc																															X	90 sec delay. SP per Jan 2001 AN MPF mtg, but subject to change during systemization.	0450/02	NA
3	14 PDAH 012	MPF DISCHARGE AIRLOCK	-0.5 in wc																															X	90 sec delay.	0450/06	NA
4	14 PDAL 012	MPF DISCHARGE AIRLOCK	-6.0 in wc																															X	90 sec delay. SP per Jan 2001 AN MPF mtg, but subject to change during systemization.	0450/04	NA
5	14 XA 016A	MPF CHARGE AIRLOCK CLAMP	MALF	X	X																														Alarm to be added to P&ID (see NOTE 2).	0483/11	352
6	14 XA 016B	MPF CHARGE AIRLOCK DOOR	MALF	X	X																														Alarm to be added to P&ID (see NOTE 2).	0484/11	352
7	14 XA 018A	MPF ENTRY CLAMP	MALF	X	X																														Alarm to be added to P&ID (see NOTE 2).	0471/11	358
8	14 XA 018B	MPF ENTRY DOOR	MALF	X	X																														Alarm to be added to P&ID (see NOTE 2).	0472/11	358
9	14 XA 020A	MPF EXIT DOOR	MALF	X	X																														Alarm to be added to P&ID (see NOTE 2).	0473/11	356
10	14 XA 020B	MPF EXIT CLAMP	MALF	X	X																														Alarm to be added to P&ID (see NOTE 2).	0474/11	356
11	14 XA 022A	MPF DISCHARGE AIRLOCK DOOR	MALF	X	X																														Alarm to be added to P&ID (see NOTE 2).	0475/11	354
12	14 XA 022B	MPF DISCHARGE AIRLOCK CLAMP	MALF	X	X																														Alarm to be added to P&ID (see NOTE 2).	0476/11	354
13	14 XA 024	CHARGE AIRLOCK CONVEYOR	MALF	X	X			X																												0466/11	362
14	14 XA 026	MPF FURN ZONE 1 CONVEYOR	MALF	X	X				X																											0480/11	368
15	14 XA 028	MPF FURN ZONE 2 CONVEYOR	MALF	X	X					X																										0481/11	370
16	14 XA 030	MPF FURN ZONE 3 CONVEYOR	MALF	X	X						X																									0482/11	372
17	14 XA 032	DISCHARGE AIRLOCK CONVEYOR	MALF	X	X							X																								0470/11	360
18	14 PSHH 034	FURNACE CHAMBER PRESSURE	-0.1 in wc		X																														RCRA AWFCO MPF-09.	4420/10	364
19	14 PSLL 034	FURNACE CHAMBER PRESSURE	-6.5 in wc																															X	SP from TOCDF. Verify vs vendor setpoint. ANCDF preparing RFI.	4420/12	NA
20	14 AISH 036	FUEL GAS LEAK TO ROOM	25% LEL		X																														Stop feed being added to P&ID by ANAP1018PAS, R1.	4420/02	374
21	14 XA 051	MMS-CNVP-120 CONV MALF	MALF	X	X											X																			S/D conveyor drive only.	0467/11	376
22	14 SSL 058	MMS-CNVP-119 CHG AL CONV.	zero speed	X																															Input to 14-XA-24.	B401/13	NA
23	14 TAH 065	MPF AFTERBURNER TEMP HIGH	SP+100F																															X	SP per RFI AN-4269.	1050/02	NA
24	14 TAL 065	MPF AFTERBURNER TEMP LOW	SP-100F																															X	SP per RFI AN-4269.	1050/00	NA
25	14 PAH 070	MPF PRIMARY CHMBER	-0.50 in wc																															X		4450/02	NA
26	14 PAL 070	MPF PRIMARY CHMBER	-4.5 in wc																															X		4450/00	NA
27	14 TALL 071	MPF ZONE 1 TEMP LOW-LOW	1000F		X																														SP per Jan 2001 AN MPF mtg. Alarm to be added to P&ID.	4452/00	524
28	14 TSHH 071	MPF ZONE 1 (ETL)	1800F			X																													LOCKOUT burners in zone 1. BMS 3-P running interlock. Local reset required.	4420/14	NA
29	14 TSL 071	MPF ZONE 1 RELIGHT	1400F																																Purge bypass not available. Also part of RCRA AWFCO MPF-21; see remarks for 14-BSLL-883.	4420/16	NA
30	14 TALL 072	MPF ZONE 2 TEMP LOW-LOW	1000F		X																														SP per Jan 2001 AN MPF mtg. Alarm to be added to P&ID.	4452/04	528

CH 2

CH 3

ANCDF METAL PARTS FURNACE (MPF) SYSTEM

ANCDF MPF — ALARM AND INTERLOCK MATRIX — **ANCDF MPF**

P&IDs: AN-1-D-11, -528, -529, -530/1, and -530/2; PLC: ICS-CONR-113, INTERLOCK I-8

F00 - SPARE	**P17 - SPARE**
F01 - SPARE	**P16 - SPARE**
F02 - S/D COOLING CONVEYOR MMS-CNVP-121	**P15 - SPARE**
F03 - S/D UNLOAD CONVEYOR MMS-CNVP-120	**P14 - SPARE**
F04 - STOP ZONE 1 TIMER	**P13 - SPARE**
F05 - STOP ZONE 2 TIMER	**P12 - S/D WATER RETURN PMP**
F06 - STOP ZONE 3 TIMER	**P11 - BKUP BRINE PMP ON**
F07 - S/D DISCHARGE AIRLOCK CONVEYOR	**P10 - BKUP CLEAN LQR PMP ON**
F10 - S/D ZONE 3 CONVEYOR	**P07 - SPARE**
F11 - S/D ZONE 2 CONVEYOR	**P06 - S/D BRINE PUMPS**
F12 - S/D ZONE 1 CONVEYOR	**P05 - S/D CLEAN LQR PUMPS**
F13 - S/D CHARGE AIRLOCK CONVEYOR	**P04 - S/D 1ST & 2ND STG ID FAN**
F14 - S/D COMBUSTION AIR BLOWER	**P03 - SPARE**
F15 - S/D RESPECTIVE AFTERBURNER BURNER	**P02 - SPARE**
F16 - S/D RESPECTIVE PRIMARY CHAMBER BURNER	**P01 - S/D IST STAGE ID FAN**
F17 - STOP FEED	**P00 - S/D 2ND STAGE ID FAN**
MALFUNCTION	**PREALARM**

ITM NUM	TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	B8:011/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX	
31	14 TSHH 072	MPF ZONE 2 (ETL)	1800F		X																														LOCKOUT burners in zone 2. BMS 3-P running interlock. Local reset required.	4421/00	NA	
32	14 TSL 072	MPF ZONE 2 RELIGHT	1400F																																Purge bypass not available. Also part of RCRA AWFCO MPF-21; see remarks for 14-BSLL-887.	4421/02	NA	
33	14 XA 077	MPF-BLOW-101	MALF	X	X	X	X	X																											LOCKOUT ALL BURNERS. BMS 3-P running interlock.	2061/11	366	
34	14 TALL 079	MPF ZONE 3 TEMP LOW-LOW	1000F		X																														SP per Jan 2001 AN MPF mtg. Alarm to be added to P&ID.	4452/10	532	
35	14 TSHH 079	MPF ZONE 3 (ETL)	1800F			X																													LOCKOUT burners in zone 3. BMS 3-P running interlock. Local reset required.	4421/04	NA	
36	14 TSL 079	MPF ZONE 3 RELIGHT	1400F																																Purge bypass not available. Also part of RCRA AWFCO MPF-21; see remarks for 14-BSLL-891.	4421/06	NA	
37	**14 TAH 087**	**MPF AFTERBURNER TEMP HIGH**	**2150 F**																														X			**1050/10**	**NA**	CH 2
38	14 TAHH 087	MPF AFTERBURNER TEMP HIGH-HIGH	2150 F		X																														RCRA AWFCO MPF-07. Alarm and SP per RFI AN-4269.	**1021/04**	**536**	CH 2
39	14 TSHHH 087	AFTERBURNER TEMP (ETL)	2200F		X		X																												LOCKOUT both AFB burners. Primary burners will S/D on loss of AFB. Tag # per RFI AN-4269. Local reset required.	1020/12	TBD	
40	14 TSLL 087	AFTERBURNER TEMP LOW-LOW	1850F		X																														RCRA AWFCO MPF-08. SP per RFI AN-4269.	1020/14	TBD	
41	14 TSLLL 087	AFTERBURNER TEMP LOW-LOW-LOW	1400F																																Purge bypass not available. Tag # per RFI AN-4269.	1020/14	TBD	
42	14 SSL 088F/R	MMS-CNVP-120 UNLOAD CONV.	zero speed	X																															Input to 14-XA-388A. S/D MPF-CNVP-101 if discharge AL exit door is open.	I:106/13 I:106/14	NA	
43	14 SSL 090F/R	MMS-CNVP-120 UNLOAD CONV.	zero speed	X																															Input to 14-XA-388A. S/D MPF-CNVP-101 if discharge AL exit door is open.	I:106/15 I:106/16	NA	
44	14 SSL 098	MPF FURN ZONE 2 CONVEYOR	zero speed	X																															Input to 14-XA-28.	B402/01	NA	
45	14 SSL 099	MPF FURN ZONE 3 CONVEYOR	zero speed	X																															Input to 14-XA-30.	B402/03	NA	
46	14 SSL 100	MPF-CNVP-101 DSCHG AL CONV.	zero speed	X																															Input to 14-XA-32. FWD I-lock for Zone 3 conv if MPF exit door is open.	B401/15	NA	
47	14 PAL 118	MPF-BLOW-101	40 in wc																														X			2050/10	NA	
48	14 PSLL 138	MPF-BLOW-101	30 in wc		X	X	X																												LOCKOUT all 12 burners. BMS 3-P running interlock. SP per DSIC (Note: vendor-supplied SP is 40 in wc).	2020/04	380	
49	14 TAH 141	ZONE 2 BURNER CONTROL	SP+100F																														X			STOP Transfer Zone 2 to 3. Alarm to be added to AN-1-D-529.	4451/12	NA	
50	14 TAHH 141	ZONE 2 BURNER CONTROL	1800 F		X																														RCRA AWFCO MPF-03. SP per Jan 2001 AN MPF mtg.	**4452/06**	**530**	CH 2
51	14 TAL 141	ZONE 2 BURNER CONTROL	SP-100F																														X				4450/06	504	
52	14 TALL 141	ZONE 2 BURNER CONTROL	1000 F		X									X																						RCRA AWFCO MPF-04. SP per Jan 2001 AN MPF mtg.	4450/04	386	
53	14 TAH 152	ZONE 1 BURNER CONTROL	SP+100F																														X			STOP Transfer Zone 1 to 2. Alarm to be added to AN-1-D-529.	4450/14	NA	
54	14 TAHH 152	ZONE 1 BURNER CONTROL	1800 F		X																														RCRA AWFCO MPF-01. SP per Jan 2001 AN MPF mtg.	**4452/02**	**464**	CH 2

ANCDF METAL PARTS FURNACE (MPF) SYSTEM

ANCDF MPF — ALARM AND INTERLOCK MATRIX — **ANCDF MPF**

P&IDs: AN-1-D-11, -528, -529, -530/1, and -530/2; PLC: ICS-CONR-113, INTERLOCK I-8

F00 - SPARE
F01 - SPARE
F02 - S/D COOLING CONVEYOR MMS-CNVP-121
F03 - S/D UNLOAD CONVEYOR MMS-CNVP-120
F04 - STOP ZONE 1 TIMER
F05 - STOP ZONE 2 TIMER
F06 - STOP ZONE 3 TIMER
F07 - S/D DISCHARGE AIRLOCK CONVEYOR
F10 - S/D ZONE 3 CONVEYOR
F11 - S/D ZONE 2 CONVEYOR
F12 - S/D ZONE 1 CONVEYOR
F13 - S/D CHARGE AIRLOCK CONVEYOR
F14 - S/D COMBUSTION AIR BLOWER
F15 - S/D RESPECTIVE AFTERBURNER BURNER
F16 - S/D RESPECTIVE PRIMARY CHAMBER BURNER
F17 - STOP FEED
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - SPARE
P13 - SPARE
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LQR PMP ON
P07 - SPARE
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LQR PUMPS
P04 - S/D 1ST & 2ND STG ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D IST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	B8:011/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX
55	14 TAL 152	ZONE 1 BURNER CONTROL	SP-100F																																X		4450/12	502
56	14 TALL 152	ZONE 1 BURNER CONTROL	1000 F		X										X																					RCRA AWFCO MPF-02. SP per Jan 2001 AN MPF mtg.	4450/10	388
57	14 TAH 153	ZONE 3 BURNER CONTROL	SP+100F																																X		4451/02	NA
58	14 TAHH 153	ZONE 3 BURNER CONTROL	1800 F		X																															RCRA AWFCO MPF-05. SP per Jan 2001 AN MPF mtg.	**4452/12**	**534**
59	14 TAL 153	ZONE 3 BURNER CONTROL	SP-100F																																X		4451/00	506
60	14 TALL 153	ZONE 3 BURNER CONTROL	1000 F		X									X																					RCRA AWFCO MPF-06. SP per Jan 2001 AN MPF mtg.	4450/16	390
61	14 PAH 155B	MPF PILOT FUEL GAS	2.5 psig																																X		2050/02	NA
62	14 PAL 155B	MPF PILOT FUEL GAS	1.5 psig																																X		2050/00	NA
63	14 SSL 157	MPF FURN ZONE 1 CONVEYOR	zero speed	X																																Input to 14-XA-26.	B401/17	NA
64	14 PAH 159	MPF MAIN FUEL GAS	5.0 psig																																X	SP per Jan 2001 AN MPF mtg.	2050/06	NA
65	14 PAL 159	MPF MAIN FUEL GAS	3.0 psig																																X	SP per Jan 2001 AN MPF mtg.	2050/04	NA
66	14 PSHH 160	MPF PILOT FUEL GAS	3.0 psig																																	SP from TOCDF.	2020/06	NA
67	14 PSHH 207	BURNER 1 FUEL GAS	4.5 psig			X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 1.	2020/10	NA
68	14 PSLL 207	BURNER 1 FUEL GAS	3.0 psig			X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 1.	2020/12	NA
69	14 PSHH 227	BURNER 2 FUEL GAS	4.5 psig			X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 2.	2220/02	NA
70	14 PSLL 227	BURNER 2 FUEL GAS	3.0 psig			X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 2.	2220/04	NA
71	14 PSHH 247	BURNER 3 FUEL GAS	4.5 psig			X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 3.	2420/02	NA
72	14 PSLL 247	BURNER 3 FUEL GAS	3.0 psig			X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 3.	2420/04	NA
73	14 PSHH 267	BURNER 4 FUEL GAS	4.5 psig			X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 4.	2620/02	NA
74	14 PSLL 267	BURNER 4 FUEL GAS	3.0 psig			X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 4.	2620/04	NA
75	14 PSHH 287	BURNER 5 FUEL GAS	4.5 psig			X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 5.	2820/02	NA
76	14 PSLL 287	BURNER 5 FUEL GAS	3.0 psig			X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 5.	2820/04	NA
77	14 PSHH 307	BURNER 6 FUEL GAS	4.5 psig			X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 6.	3020/02	NA
78	14 PSLL 307	BURNER 6 FUEL GAS	3.0 psig			X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 6.	3020/04	NA

CH 2

CH 2

ANCDF METAL PARTS FURNACE (MPF) SYSTEM

ANCDF MPF — ALARM AND INTERLOCK MATRIX — **ANCDF MPF**

P&IDs: AN-1-D-11, -528, -529, -530/1, and -530/2; PLC: ICS-CONR-113, INTERLOCK I-8

F00 - SPARE
F01 - SPARE
F02 - S/D COOLING CONVEYOR MMS-CNVP-121
F03 - S/D UNLOAD CONVEYOR MMS-CNVP-120
F04 - STOP ZONE 1 TIMER
F05 - STOP ZONE 2 TIMER
F06 - STOP ZONE 3 TIMER
F07 - S/D DISCHARGE AIRLOCK CONVEYOR
F10 - S/D ZONE 3 CONVEYOR
F11 - S/D ZONE 2 CONVEYOR
F12 - S/D ZONE 1 CONVEYOR
F13 - S/D CHARGE AIRLOCK CONVEYOR
F14 - S/D COMBUSTION AIR BLOWER
F15 - S/D RESPECTIVE AFTERBURNER BURNER
F16 - S/D RESPECTIVE PRIMARY CHAMBER BURNER
F17 - STOP FEED
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - SPARE
P13 - SPARE
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LQR PMP ON
P07 - SPARE
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LQR PUMPS
P04 - S/D 1ST & 2ND STG ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D IST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	B8:011/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX
79	14 PSHH 327	BURNER 7 FUEL GAS	4.5 psig		X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 7.	3220/02	NA
80	14 PSLL 327	BURNER 7 FUEL GAS	3.0 psig		X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 7.	3220/04	NA
81	14 PSHH 347	BURNER 8 FUEL GAS	4.5 psig		X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 8.	3420/02	NA
82	14 PSLL 347	BURNER 8 FUEL GAS	3.0 psig		X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 8.	3420/04	NA
83	14 PSHH 367	BURNER 9 FUEL GAS	4.5 psig		X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 9.	3620/02	NA
84	14 PSLL 367	BURNER 9 FUEL GAS	3.0 psig		X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 9.	3620/04	NA
85	14 AISH 386	FUEL GAS LEAK TO ROOM	25% LEL	X																															Stop feed being added to P&ID per RFI S-ALL-0239	1020/04	402
86	14 PSHH 387	BURNER 10 FUEL GAS	4.5 psig		X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 10.	3820/02	NA
87	14 PSLL 387	BURNER 10 FUEL GAS	3.0 psig		X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 10.	3820/04	NA
88	14 XA 388A	MMS-CNVP-120B	MALF	X	X											X																			S/D conveyor lift motor only.	0468/11	376
89	14 PSHH 390	AFTERBURNER CHAMBER PRESS	-0.1 in wc		X																														RCRA AWFCO MPF-10. 30 sec delay. (Note: vendor-supplied SP is -3.0 in wc). See NOTE 3.	1020/10	404
90	14 XS 393A/B	MMS-CNVP-120 PULL CORD	Pulled		X											X	X																			0420/14	462
91	14 XS 394A/B	MMS-CNVP-121 PULL CORD	Pulled		X											X	X																				0420/16	466
92	14 PSHH 407	BURNER 11 FUEL GAS	4.5 psig			X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 11.	0020/02	NA
93	14 PSLL 407	BURNER 11 FUEL GAS	3.0 psig			X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 11.	0020/04	NA
94	14 PSHH 427	BURNER 12 FUEL GAS	4.5 psig			X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 12.	0220/02	NA
95	14 PSLL 427	BURNER 12 FUEL GAS	3.0 psig			X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 12.	0220/04	NA
96	14 XY 501	DISCHARGE AIRLOCK EXHAUST	MALF	X	X																															I-lock for MPF exit door unclamp.	0477/11	474
97	14 XY 502	DISCHARGE AIRLOCK EXHAUST	MALF	X	X																															I-lock for MPF exit door unclamp.	0478/11	474
98	14 FAL 718	MPF-FURN-101 PRW SPRAY	0.2 gpm																																X	Per Jan 2001 AN MPF meeting, alarm will be enabled when 14-XV-717 is open and TIC-141A or TIC-152A CV > 5%.	4451/14	NA
99	14 ISH 782	MPF-FURN-101C ZN 3 CONV	120% AMPS																																X		0420/00	NA
100	14 ISH 783	MPF-FURN-101B ZN 2 CONV	120% AMPS																																X	3 sec delay.	0420/02	NA

CH 2

ANCDF METAL PARTS FURNACE (MPF) SYSTEM

ANCDF MPF — ALARM AND INTERLOCK MATRIX — **ANCDF MPF**

P&IDs: AN-1-D-11, -528, -529, -530/1, and -530/2; PLC: ICS-CONR-113, INTERLOCK I-8

B8:010/	B8:011/
F00 - SPARE	**P17 - SPARE**
F01 - SPARE	**P16 - SPARE**
F02 - S/D COOLING CONVEYOR MMS-CNVP-121	**P15 - SPARE**
F03 - S/D UNLOAD CONVEYOR MMS-CNVP-120	**P14 - SPARE**
F04 - STOP ZONE 1 TIMER	**P13 - SPARE**
F05 - STOP ZONE 2 TIMER	**P12 - S/D WATER RETURN PMP**
F06 - STOP ZONE 3 TIMER	**P11 - BKUP BRINE PMP ON**
F07 - S/D DISCHARGE AIRLOCK CONVEYOR	**P10 - BKUP CLEAN LQR PMP ON**
F10 - S/D ZONE 3 CONVEYOR	**P07 - SPARE**
F11 - S/D ZONE 2 CONVEYOR	**P06 - S/D BRINE PUMPS**
F12 - S/D ZONE 1 CONVEYOR	**P05 - S/D CLEAN LQR PUMPS**
F13 - S/D CHARGE AIRLOCK CONVEYOR	**P04 - S/D 1ST & 2ND STG ID FAN**
F14 - S/D COMBUSTION AIR BLOWER	**P03 - SPARE**
F15 - S/D RESPECTIVE AFTERBURNER BURNER	**P02 - SPARE**
F16 - S/D RESPECTIVE PRIMARY CHAMBER BURNER	**P01 - S/D IST STAGE ID FAN**
F17 - STOP FEED	**P00 - S/D 2ND STAGE ID FAN**
MALFUNCTION	**PREALARM**

ITM NUM	TAG NUMBER			DESCRIPTION		SET POINT	B8:010/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	B8:011/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX
101	14	ISH	784	MPF-FURN-101A	ZN 1 CONV	120% AMPS																																	X	3 sec delay.	0420/04	NA
102	14	ISH	785	MMS-CNVP-119	CHG AL CONV	120% AMPS																																	X	3 sec delay.	0420/06	NA
103	14	ISH	786	MPF-CNVP-101	DISH AL CONV	120% AMPS																																	X	3 sec delay.	0420/10	NA
104	14	PDAHH	786	MPF EXHAUST REFRACT VENTURI		1.2 in wc		X																																RCRA AWFCO MPF-11. See NOTE 3.	1050/04	434
105	14	KAL	786A	MPF EXHAUST RESIDENCE TIME		0.5 sec		X																																	1050/06	406
106	14	XA	792	MMS-CNVP-121	COOLING CONV	MALF	X	X												X																					0469/11	392
107	14	XA	796	FUEL GAS FLOW CONTROL		MALF	X	X																																Close FV-796	2060/11	436
108	14	SSL	798F/R	MMS-CNVP-121	COOLING CONV	zero speed	X																																	Input to 14-XA-792. I-lock for MMS-CNVP-120, unload conv/lift.	I:107/00 I:107/01	NA
109	14	PSL	857	MPF-FURN-101	SPARGE AIR	20 in wc																																	X	3 sec delay. Alarm active for ton containers only. SP from TOCDF.	0420/12	NA
110	14	BSLL	883	MPF-FURN-101	#1 E100	LOCKOUT		X	X																															RCRA AWFCO MPF-21 for all burners out in zone 1, or 2 burners out and zone 1 temp < 1400 F based on 14-TSL-071. See NOTE 3.	2020/00	408
111	14	BSLL	884	MPF-FURN-101	#2 E100	LOCKOUT		X	X																															RCRA AWFCO MPF-21. See REMARKS for 14-BSLL-883. See NOTE 3.	2220/00	410
112	14	BSLL	885	MPF-FURN-101	#3 E100	LOCKOUT		X	X																															RCRA AWFCO MPF-21. See REMARKS for 14-BSLL-883. See NOTE 3.	2420/00	412
113	14	BSLL	886	MPF-FURN-101	#4 E100	LOCKOUT		X	X																															RCRA AWFCO MPF-21. See REMARKS for 14-BSLL-883. See NOTE 3.	2620/00	414
114	14	BSLL	887	MPF-FURN-101	#5 E100	LOCKOUT		X	X																															RCRA AWFCO MPF-21 for all burners out in zone 2, or 2 burners out and zone 2 temp < 1400 F based on 14-TSL-072. See NOTE 3.	2820/00	416
115	14	BSLL	888	MPF-FURN-101	#6 E100	LOCKOUT		X	X																															RCRA AWFCO MPF-21. See REMARKS for 14-BSLL-887. See NOTE 3.	3020/00	418
116	14	BSLL	889	MPF-FURN-101	#7 E100	LOCKOUT		X	X																															RCRA AWFCO MPF-21. See REMARKS for 14-BSLL-887. See NOTE 3.	3220/00	420
117	14	BSLL	890	MPF-FURN-101	#8 E100	LOCKOUT		X	X																															RCRA AWFCO MPF-21. See REMARKS for 14-BSLL-887. See NOTE 3.	3420/00	422
118	14	BSLL	891	MPF-FURN-101	#9 E100	LOCKOUT		X	X																															RCRA AWFCO MPF-21 for all burners out in zone 3, or 1 burner out and zone 3 temp < 1400 F based on 14-TSL-079. See NOTE 3.	3620/00	424
119	14	BSLL	892	MPF-FURN-101	#10 E100	LOCKOUT		X	X																															RCRA AWFCO MPF-21. See REMARKS for 14-BSLL-891. See NOTE 3.	3820/00	426
120	14	BSLL	893	MPF-FURN-102	#11 E100	LOCKOUT		X		X																																0020/00	428

CH 2

CH 2

ANCDF METAL PARTS FURNACE (MPF) SYSTEM

ANCDF MPF — ALARM AND INTERLOCK MATRIX — **ANCDF MPF**

P&IDs: AN-1-D-11, -528, -529, -530/1, and -530/2; PLC: ICS-CONR-113, INTERLOCK I-8

F00 - SPARE
F01 - SPARE
F02 - S/D COOLING CONVEYOR MMS-CNVP-121
F03 - S/D UNLOAD CONVEYOR MMS-CNVP-120
F04 - STOP ZONE 1 TIMER
F05 - STOP ZONE 2 TIMER
F06 - STOP ZONE 3 TIMER
F07 - S/D DISCHARGE AIRLOCK CONVEYOR
F10 - S/D ZONE 3 CONVEYOR
F11 - S/D ZONE 2 CONVEYOR
F12 - S/D ZONE 1 CONVEYOR
F13 - S/D CHARGE AIRLOCK CONVEYOR
F14 - S/D COMBUSTION AIR BLOWER
F15 - S/D RESPECTIVE AFTERBURNER BURNER
F16 - S/D RESPECTIVE PRIMARY CHAMBER BURNER
F17 - STOP FEED
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - SPARE
P13 - SPARE
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LQR PMP ON
P07 - SPARE CH 2
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LQR PUMPS
P04 - S/D 1ST & 2ND STG ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D IST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	TAG NUMBER			DESCRIPTION		SET POINT	B8:010/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	B8:011/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX
121	14	BSLL	893/4	MPF-FURN-102	AFTERBURNERS	LOCKOUT		X	X	X																													S/D all burners.	0200/04	432
122	14	BSLL	894	MPF-FURN-102	#12 E100	LOCKOUT		X		X																														0220/00	430
123	14	XS	902A	MPF-FURN-101	LOCAL E-STOP	E-STOP		X	X																														S/D burners #1-10.	4420/06	340
124	14	XS	902B	MPF-FURN-102	LOCAL E-STOP	E-STOP		X	X	X	X																												S/D all burners.	1020/06	342
125	61	XA	216	SCW-PUMP-101	CIRC PUMP 1	MALF	X																																Switchover to backup.	4260/11	NA
126	61	XA	220	SCW-PUMP-102	CIRC PUMP 2	MALF	X																																Switchover to backup.	4261/11	NA
127	61	PSLL	222	SCW-PMP-101/102	SEC COOL WTR	30 psig		X																														3 sec delay. Umclamp I-lock for discharge airlock exit door. Raise I-lock for MPF exit door. S/D both SCW pumps.	4220/06	384
128	61	PAL	223	SCWPMP101/102	SEC COOL WTR	35 psig																																5 sec delay after pump startup. Switchover to backup.	4250/00	NA
129	61	LSL	226	SCW-TANK-101	SEC COOL WTR	6 in																															X	3 sec delay. Local operator to add PRW.	4220/00	NA
130	61	LSH	227	SCW-TANK-101	SEC COOL WTR	18 in																															X	3 sec delay. Local operator to drain PRW.	4220/02	NA
131	61	TAHH	229	SCW-TANK-101	SEC COOL WTR	150F		X																														Umclamp I-lock for discharge airlock exit door.	4250/02	442
132	61	TAH	233	SCW-EXCH-101	SEC COOL WTR	130F																															X		4250/04	NA
133	61	FAL	267	SCW-PUMP-101	SEC COOL WTR	**70 gpm**																															X		4250/06	NA	CH 2
134	61	LSLL	606	SCW-TANK-101	SEC COOL WTR	3 in		X																														10 sec delay. Local operator to add PRW. Umclamp I-lock for discharge airlock exit door.	4220/04	478
135	71	XS	003	ICS-CONS-110	EMERG STOP	E-STOP		X	X	X	X	X	X	X	X																			X	X			X	X		4421/10	344
136	71	XS	023	ICS-CONS-112	EMERG STOP	E-STOP		X	X	X	X	X	X	X	X																			X	X			X	X		4421/12	344
137	71	XS	043	ICS-CONS-111	EMERG STOP	E-STOP		X	X	X	X	X	X	X	X																			X	X			X	X		4421/16	344
138	71	XS	063	ICS-CONS-115	EMERG STOP	E-STOP		X	X	X	X	X	X	X	X																			X	X			X	X		4422/00	344
139	71	XS	083	ICS-CONS-116	EMERG STOP	E-STOP		X	X	X	X	X	X	X	X																			X	X			X	X		4422/02	344
140	71	XS	143	ICS-CONS-108	EMERG STOP	E-STOP		X	X	X	X	X	X	X	X																			X	X			X	X		**4422/12**	**344**	CH 2

NOTE 1: At the Jan 2001 ANCDF MPF review meeting, ANCDF stated that the process CEMS that monitor the MPF primary chamber exhaust will not have any alarms associated with them. The revised CEMS configuration is being implemented by ANAP1019MON and ANAC1038SRL under Change Case 172 R1. Refer to PAS/PFS programmatic process FAWB, Book 28 for ANCDF MPF CEMS alarms.

NOTE 2: AN-1-D-528 shows single malfunction alarms (e.g. 14-XA-016) for all MPF airlock doors. The code, however, will have separate malfunction alarms for each clamp (e.g. XA-016A) and door (e.g. 14-XA-016B). Based on discussions at the Jan 2001 ANCDF MPF review meeting, the DSIC will prepare an ECP to add the separate alarms to AN-1-D-528.

NOTE 3: **Deleted.** CH 3

NOTE 4: **Deleted.** CH 2

PBCDF METAL PARTS FURNACE (MPF) SYSTEM

PBCDF MPF — ALARM AND INTERLOCK MATRIX — **PBCDF MPF**

P&IDs: PB-1-D-11, -528, -529, -530, and -531; PLC: ICS-CONR-113, INTERLOCK I-8

F00 - SPARE
F01 - SPARE
F02 - S/D COOLING CONVEYOR MMS-CNVP-121
F03 - S/D UNLOAD CONVEYOR MMS-CNVP-120
F04 - STOP ZONE 1 TIMER
F05 - STOP ZONE 2 TIMER
F06 - STOP ZONE 3 TIMER
F07 - S/D DISCHARGE AIRLOCK CONVEYOR
F10 - S/D ZONE 3 CONVEYOR
F11 - S/D ZONE 2 CONVEYOR
F12 - S/D ZONE 1 CONVEYOR
F13 - S/D CHARGE AIRLOCK CONVEYOR
F14 - S/D COMBUSTION AIR BLOWER
F15 - S/D RESPECTIVE AFTERBURNER BURNER
F16 - S/D RESPECTIVE PRIMARY CHAMBER BURNER
F17 - STOP FEED
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - SPARE
P13 - SPARE
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LQR PMP ON
P07 - S/D EMPTY OUT PUMP
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LQR PUMPS
P04 - S/D 1ST & 2ND STG ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D IST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	B8:011/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX
1	14 PDAH 007	MPF CHARGE AIRLOCK	-0.1 in wc																																X	90 sec delay.	0450/00	NA
2	14 PDAL 007	MPF CHARGE AIRLOCK	-6.0 in wc																																X	90 sec delay. SP based on ANCDF. PBCDF SP may be different.	0450/02	NA
3	14 PDAH 012	MPF DISCHARGE AIRLOCK	-0.5 in wc																																X	90 sec delay.	0450/06	NA
4	14 PDAL 012	MPF DISCHARGE AIRLOCK	-6.0 in wc																																X	90 sec delay. SP based on ANCDF. PBCDF SP may be different.	0450/04	NA
5	14 XA 016A	MPF CHARGE AIRLOCK CLAMP	MALF	X	X																															See NOTE 1.	0483/11	352
6	14 XA 016B	MPF CHARGE AIRLOCK DOOR	MALF	X	X																															See NOTE 1.	0484/11	352
7	14 XA 018A	MPF ENTRY CLAMP	MALF	X	X																															See NOTE 1.	0471/11	358
8	14 XA 018B	MPF ENTRY DOOR	MALF	X	X																															See NOTE 1.	0472/11	358
9	14 XA 020A	MPF EXIT DOOR	MALF	X	X																															See NOTE 1.	0473/11	356
10	14 XA 020B	MPF EXIT CLAMP	MALF	X	X																															See NOTE 1.	0474/11	356
11	14 XA 022A	MPF DISCHARGE AIRLOCK DOOR	MALF	X	X																															See NOTE 1.	0475/11	354
12	14 XA 022B	MPF DISCHARGE AIRLOCK CLAMP	MALF	X	X																															See NOTE 1.	0476/11	354
13	14 XA 024	CHARGE AIRLOCK CONVEYOR	MALF	X	X				X																												0466/11	362
14	14 XA 026	MPF FURN ZONE 1 CONVEYOR	MALF	X	X					X																											0480/11	368
15	14 XA 028	MPF FURN ZONE 2 CONVEYOR	MALF	X	X						X																										0481/11	370
16	14 XA 030	MPF FURN ZONE 3 CONVEYOR	MALF	X	X							X																									0482/11	372
17	14 XA 032	DISCHARGE AIRLOCK CONVEYOR	MALF	X	X								X																								0470/11	360
18	14 AAL 033	MPF AFTERBURNER INLET O2	3% O2																																X	See NOTE 2.	4420/00	NA
19	14 XS 033	MPF AFTERBURNER INLET O2	MALF	X																																See NOTE 2.	4421/14	NA
20	14 PSHH 034	FURNACE CHAMBER PRESSURE	-0.5 in wc		X																															RCRA AWFCO MPF-19. 5 sec delay. See NOTE 3.	4420/10	364
21	14 PSLL 034	FURNACE CHAMBER PRESSURE	-6.5 in wc																																	30 sec delay. SP from TOCDF. Verify vs vendor SP. Note: AN deleted time delay.	4420/12	NA
22	14 AISH 036	FUEL GAS LEAK TO ROOM	25% LEL		X																															3 sec delay. Stop feed being added to P&ID by PBAP0797PAS. Note: AN deleted time delay.	4420/02	374
23	14 XA 051	MMS-CNVP-120 CONV MALF	MALF	X	X											X																				S/D conveyor drive only.	0467/11	376
24	14 SSL 058	MMS-CNVP-119 CHG AL CONV.	zero speed	X																																Input to 14-XA-24.	B401/13	NA
25	14 TAH 065	MPF AFTERBURNER TEMP HIGH	SP+100F																																X	See FAWB Note B-9 for TOCDF responses to TIC-065 setpoints.	1050/02	NA
26	14 TAL 065	MPF AFTERBURNER TEMP LOW	SP-100F																																X	See REMARKS for 14-TAH-065.	1050/00	NA
27	14 PAH 070	MPF PRIMARY CHMBER	-0.50 in wc																																X	30 sec delay. SP from Jan 2000 AN code. Note: AN deleted time delay.	4450/02	NA
28	14 PAL 070	MPF PRIMARY CHMBER	-4.5 in wc																																X	30 sec delay. SP from Jan 2000 AN code. Note: AN deleted time delay.	4450/00	NA
29	14 TAHH 071	MPF ZONE 1 TEMP HIGH HIGH	1550F		X																															RCRA AWFCO MPF-01. See NOTE 3. Alarm not shown on PB-1-D-529.	TBD	TBD

PBCDF METAL PARTS FURNACE (MPF) SYSTEM

PBCDF MPF

ALARM AND INTERLOCK MATRIX

PBCDF MPF

P&IDs: PB-1-D-11, -528, -529, -530, and -531; PLC: ICS-CONR-113, INTERLOCK I-8

F00 - SPARE
F01 - SPARE
F02 - S/D COOLING CONVEYOR MMS-CNVP-121
F03 - S/D UNLOAD CONVEYOR MMS-CNVP-120
F04 - STOP ZONE 1 TIMER
F05 - STOP ZONE 2 TIMER
F06 - STOP ZONE 3 TIMER
F07 - S/D DISCHARGE AIRLOCK CONVEYOR
F10 - S/D ZONE 3 CONVEYOR
F11 - S/D ZONE 2 CONVEYOR
F12 - S/D ZONE 1 CONVEYOR
F13 - S/D CHARGE AIRLOCK CONVEYOR
F14 - S/D COMBUSTION AIR BLOWER
F15 - S/D RESPECTIVE AFTERBURNER BURNER
F16 - S/D RESPECTIVE PRIMARY CHAMBER BURNER
F17 - STOP FEED
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - SPARE
P13 - SPARE
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LQR PMP ON
P07 - S/D EMPTY OUT PUMP
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LQR PUMPS
P04 - S/D 1ST & 2ND STG ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D IST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	TAG NUMBER			DESCRIPTION	SET POINT	B8:010/ F00	F01	F02	F03	F04	F05	F06	F07	F10	F11	F12	F13	F14	F15	F16	F17	MALFUNCTION	B8:011/ P17	P16	P15	P14	P13	P12	P11	P10	P07	P06	P05	P04	P03	P02	P01	P00	PREALARM	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX
30	14	TSHH	071	MPF ZONE 1 (ETL)	1800F			X																															5 sec delay for PLC alarm. LOCKOUT burners in zone 1. BMS 3-P running interlock. Note: AN deleted time delay.	4420/14	NA
31	14	TSL	071	MPF ZONE 1 RELIGHT	1400F																																		Purge bypass not available	4420/16	NA
32	14	TAHH	072	MPF ZONE 2 TEMP HIGH HIGH	1550F		X																																RCRA AWFCO MPF-02. See NOTE 3. Alarm not shown on PB-1-D-529.	TBD	TBD
33	14	TSHH	072	MPF ZONE 2 (ETL)	1800F			X																															5 sec delay for PLC alarm. LOCKOUT burners in zone 2. BMS 3-P running interlock. Note: AN deleted time delay.	4421/00	NA
34	14	TSL	072	MPF ZONE 2 RELIGHT	1400F																																		Purge bypass not available	4421/02	NA
35	14	XA	077	MPF-BLOW-101	MALF	X	X	X	X	X																													LOCKOUT ALL BURNERS. BMS 3-P running interlock.	2061/11	366
36	14	TAHH	079	MPF ZONE 3 TEMP HIGH HIGH	1550F		X																																RCRA AWFCO MPF-03. See NOTE 3. Alarm not shown on PB-1-D-529.	TBD	TBD
37	14	TSHH	079	MPF ZONE 3 (ETL)	1800F			X																															5 sec delay for PLC alarm. LOCKOUT burners in zone 3. BMS 3-P running interlock. Note: AN deleted time delay.	4421/04	NA
38	14	TSL	079	MPF ZONE 3 RELIGHT	1400F																																		Purge bypass not available	4421/06	NA
39	14	TAHH	087	MPF AFTERBURNER TEMP HIGH-HIGH	2150 F		X																																RCRA AWFCO MPF-05. See NOTE 3. Alarm not shown on PB-1-D-529.	TBD	TBD
40	14	TALL	087	MPF AFTERBURNER TEMP LOW-LOW	1850 F		X																																RCRA AWFCO MPF-05. See NOTE 3. Alarm not shown on PB-1-D-529.	TBD	TBD
41	14	TSHH	087	AFTERBURNER TEMP (ETL)	2200F		X		X																														5 sec delay for PLC alarm. LOCKOUT both AFB burners. Primary burners will S/D on loss of AFB (TOCDF setpoint 2400 F; see FAWB Note B-9). Note: AN deleted time delay.	1020/12	TBD
42	14	TSL	087	AFTERBURNER TEMP LOW	1400F																																		Purge bypass not available	1020/14	NA
43	14	TSLL	087	AFTERBURNER TEMP LOW-LOW	TBD																																		Alarm is shown on PB-1-D-529, but does not exist at TOCDF.	1020/14	NA
44	14	SSL	088F/R	MMS-CNVP-120 UNLOAD CONV.	zero speed	X																																	Input to 14-XA-388A. S/D MPF-CNVP-101 if discharge AL exit door is open.	I:106/13 I:106/14	NA
45	14	SSL	090F/R	MMS-CNVP-120 UNLOAD CONV.	zero speed	X																																	Input to 14-XA-388A. S/D MPF-CNVP-101 if discharge AL exit door is open.	I:106/15 I:106/16	NA
46	14	SSL	098	MPF FURN ZONE 2 CONVEYOR	zero speed	X																																	Input to 14-XA-28.	B402/01	NA
47	14	SSL	099	MPF FURN ZONE 3 CONVEYOR	zero speed	X																																	Input to 14-XA-30.	B402/03	NA
48	14	SSL	100	MPF-CNVP-101 DSCHG AL CONV.	zero speed	X																																	Input to 14-XA-32. FWD I-lock for Zone 3 conv if MPF exit door is open.	B401/15	NA
49	14	PAL	118	MPF-BLOW-101	40 in wc																																	X		2050/10	NA

PBCDF METAL PARTS FURNACE (MPF) SYSTEM

PBCDF MPF — ALARM AND INTERLOCK MATRIX — **PBCDF MPF**

P&IDs: PB-1-D-11, -528, -529, -530, and -531; PLC: ICS-CONR-113, INTERLOCK I-8

F00 - SPARE
F01 - SPARE
F02 - S/D COOLING CONVEYOR MMS-CNVP-121
F03 - S/D UNLOAD CONVEYOR MMS-CNVP-120
F04 - STOP ZONE 1 TIMER
F05 - STOP ZONE 2 TIMER
F06 - STOP ZONE 3 TIMER
F07 - S/D DISCHARGE AIRLOCK CONVEYOR
F10 - S/D ZONE 3 CONVEYOR
F11 - S/D ZONE 2 CONVEYOR
F12 - S/D ZONE 1 CONVEYOR
F13 - S/D CHARGE AIRLOCK CONVEYOR
F14 - S/D COMBUSTION AIR BLOWER
F15 - S/D RESPECTIVE AFTERBURNER BURNER
F16 - S/D RESPECTIVE PRIMARY CHAMBER BURNER
F17 - STOP FEED
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - SPARE
P13 - SPARE
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LQR PMP ON
P07 - S/D EMPTY OUT PUMP
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LQR PUMPS
P04 - S/D 1ST & 2ND STG ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D IST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	B8:011/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX
50	14 PSLL 138	MPF-BLOW-101	20 in wc	X	X	X																														LOCKOUT all 12 burners. BMS 3-P running interlock. SP per DSIC (Note: vendor-supplied SP is 40 in wc).	2020/04	380
51	14 TAH 141	ZONE 2 BURNER CONTROL	SP+100F																																X	STOP Transfer Zone 2 to 3. Alarm not shown on PB-1-D-529.	4451/12	NA
52	14 TAL 141	ZONE 2 BURNER CONTROL	SP-100F																																X	(see FAWB Note B-13)	4450/06	504
53	14 TALL 141	ZONE 2 BURNER CONTROL	1000F	X										X																						RCRA AWFCO MPF-10. See NOTE 3. (see FAWB Notes B-9 and B-12)	4450/04	386
54	14 TAH 141A	ZONE 2 WATER SPRAY	SP+ 50F																																	Initiate water spray. Alarm is shown on PB-1-D-529, but is not an alarm at TOCDF.	TBD	NA
55	14 TAH 152	ZONE 1 BURNER CONTROL	SP+100F																																X	STOP Transfer Zone 1 to 2. Alarm not shown on PB-1-D-529.	4450/14	NA
56	14 TAL 152	ZONE 1 BURNER CONTROL	SP-100F																																X	(see FAWB Note B-13)	4450/12	502
57	14 TALL 152	ZONE 1 BURNER CONTROL	1000F	X											X																					RCRA AWFCO MPF-10. See NOTE 3. (see FAWB Notes B-9 and B-12)	4450/10	388
58	14 TAH 152A	ZONE 1 WATER SPRAY	SP+ 50F																																	Initiate water spray. Alarm is shown on PB-1-D-529, but is not an alarm at TOCDF.	TBD	NA
59	14 TAH 153	ZONE 3 BURNER CONTROL	SP+100F																																X		4451/02	NA
60	14 TAL 153	ZONE 3 BURNER CONTROL	SP-100F																																X	(see FAWB Note B-13)	4451/00	506
61	14 TALL 153	ZONE 3 BURNER CONTROL	1000F	X									X																							RCRA AWFCO MPF-10. See NOTE 3. (see FAWB Notes B-9 and B-12)	4450/16	390
62	14 PAH 155B	MPF PILOT FUEL GAS	2.5 psig																																X		2050/02	NA
63	14 PAL 155B	MPF PILOT FUEL GAS	1.5 psig																																X		2050/00	NA
64	14 SSL 157	MPF FURN ZONE 1 CONVEYOR	zero speed	X																																Input to 14-XA-26.	B401/17	NA
65	14 PAH 159	MPF MAIN FUEL GAS	5.0 psig																																X	SP based on ANCDF.	2050/06	NA
66	14 PAL 159	MPF MAIN FUEL GAS	3.0 psig																																X	SP based on ANCDF.	2050/04	NA
67	14 PSHH 160	MPF PILOT FUEL GAS	3.0 psig																																	SP from TOCDF.	2020/06	NA
68	14 PSHH 207	BURNER 1 FUEL GAS	4.5 psig		X																															SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 1.	2020/10	NA
69	14 PSLL 207	BURNER 1 FUEL GAS	3.0 psig		X																															SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 1.	2020/12	NA
70	14 PSHH 227	BURNER 2 FUEL GAS	4.5 psig		X																															SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 2.	2220/02	NA
71	14 PSLL 227	BURNER 2 FUEL GAS	3.0 psig		X																															SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 2.	2220/04	NA
72	14 PSHH 247	BURNER 3 FUEL GAS	4.5 psig		X																															SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 3.	2420/02	NA
73	14 PSLL 247	BURNER 3 FUEL GAS	3.0 psig		X																															SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 3.	2420/04	NA

PBCDF METAL PARTS FURNACE (MPF) SYSTEM

PBCDF MPF — ALARM AND INTERLOCK MATRIX — **PBCDF MPF**

P&IDs: PB-1-D-11, -528, -529, -530, and -531; PLC: ICS-CONR-113, INTERLOCK I-8

F00 - SPARE
F01 - SPARE
F02 - S/D COOLING CONVEYOR MMS-CNVP-121
F03 - S/D UNLOAD CONVEYOR MMS-CNVP-120
F04 - STOP ZONE 1 TIMER
F05 - STOP ZONE 2 TIMER
F06 - STOP ZONE 3 TIMER
F07 - S/D DISCHARGE AIRLOCK CONVEYOR
F10 - S/D ZONE 3 CONVEYOR
F11 - S/D ZONE 2 CONVEYOR
F12 - S/D ZONE 1 CONVEYOR
F13 - S/D CHARGE AIRLOCK CONVEYOR
F14 - S/D COMBUSTION AIR BLOWER
F15 - S/D RESPECTIVE AFTERBURNER BURNER
F16 - S/D RESPECTIVE PRIMARY CHAMBER BURNER
F17 - STOP FEED
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - SPARE
P13 - SPARE
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LQR PMP ON
P07 - S/D EMPTY OUT PUMP
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LQR PUMPS
P04 - S/D 1ST & 2ND STG ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D IST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	B8:011/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX
74	14 PSHH 267	BURNER 4 FUEL GAS	4.5 psig		X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 4.	2620/02	NA
75	14 PSLL 267	BURNER 4 FUEL GAS	3.0 psig		X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 4.	2620/04	NA
76	14 PSHH 287	BURNER 5 FUEL GAS	4.5 psig		X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 5.	2820/02	NA
77	14 PSLL 287	BURNER 5 FUEL GAS	3.0 psig		X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 5.	2820/04	NA
78	14 PSHH 307	BURNER 6 FUEL GAS	4.5 psig		X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 6.	3020/02	NA
79	14 PSLL 307	BURNER 6 FUEL GAS	3.0 psig		X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 6.	3020/04	NA
80	14 PSHH 327	BURNER 7 FUEL GAS	4.5 psig		X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 7.	3220/02	NA
81	14 PSLL 327	BURNER 7 FUEL GAS	3.0 psig		X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 7.	3220/04	NA
82	14 PSHH 347	BURNER 8 FUEL GAS	4.5 psig		X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 8.	3420/02	NA
83	14 PSLL 347	BURNER 8 FUEL GAS	3.0 psig		X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 8.	3420/04	NA
84	14 PSHH 367	BURNER 9 FUEL GAS	4.5 psig		X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 9.	3620/02	NA
85	14 PSLL 367	BURNER 9 FUEL GAS	3.0 psig		X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 9.	3620/04	NA
86	14 AISH 386	FUEL GAS LEAK TO ROOM	25% LEL	X																															Stop feed being added to P&ID by PBAP0797PAS.	1020/04	402
87	14 PSHH 387	BURNER 10 FUEL GAS	4.5 psig		X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 10.	3820/02	NA
88	14 PSLL 387	BURNER 10 FUEL GAS	3.0 psig		X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 10.	3820/04	NA
89	14 XA 388A	MMS-CNVP-120B	MALF	X	X											X																				S/D conveyor lift motor only.	0468/11	376
90	14 PSHH 390	AFTERBURNER CHAMBER PRESS	-0.5 in wc		X																														RCRA AWFCO MPF-27. 30 sec delay. See NOTE 3. (Note: vendor-supplied SP is -3.0 in wc).	1020/10	404
91	14 XS 393A/B	MMS-CNVP-120 PULL CORD	Pulled		X											X	X																			0420/14	462
92	14 XS 394A/B	MMS-CNVP-121 PULL CORD	Pulled		X											X	X																			0420/16	466
93	14 PSHH 407	BURNER 11 FUEL GAS	4.5 psig			X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 11.	0020/02	NA
94	14 PSLL 407	BURNER 11 FUEL GAS	3.0 psig			X																														SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 11.	0020/04	NA

PBCDF METAL PARTS FURNACE (MPF) SYSTEM

PBCDF MPF — ALARM AND INTERLOCK MATRIX — **PBCDF MPF**

P&IDs: PB-1-D-11, -528, -529, -530, and -531; PLC: ICS-CONR-113, INTERLOCK I-8

F00 - SPARE
F01 - SPARE
F02 - S/D COOLING CONVEYOR MMS-CNVP-121
F03 - S/D UNLOAD CONVEYOR MMS-CNVP-120
F04 - STOP ZONE 1 TIMER
F05 - STOP ZONE 2 TIMER
F06 - STOP ZONE 3 TIMER
F07 - S/D DISCHARGE AIRLOCK CONVEYOR
F10 - S/D ZONE 3 CONVEYOR
F11 - S/D ZONE 2 CONVEYOR
F12 - S/D ZONE 1 CONVEYOR
F13 - S/D CHARGE AIRLOCK CONVEYOR
F14 - S/D COMBUSTION AIR BLOWER
F15 - S/D RESPECTIVE AFTERBURNER BURNER
F16 - S/D RESPECTIVE PRIMARY CHAMBER BURNER
F17 - STOP FEED
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - SPARE
P13 - SPARE
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LQR PMP ON
P07 - S/D EMPTY OUT PUMP
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LQR PUMPS
P04 - S/D 1ST & 2ND STG ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D IST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	TAG NUMBER			DESCRIPTION	SET POINT	B8:010/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	B8:011/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX
95	14	PSHH	427	BURNER 12 FUEL GAS	4.5 psig			X																													SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 12.	0220/02	NA
96	14	PSLL	427	BURNER 12 FUEL GAS	3.0 psig			X																													SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 12.	0220/04	NA
97	14	XY	501	DISCHARGE AIRLOCK EXHAUST	MALF	X	X																														I-lock for MPF exit door unclamp.	0477/11	474
98	14	XY	502	DISCHARGE AIRLOCK EXHAUST	MALF	X	X																														I-lock for MPF exit door unclamp.	0478/11	474
99	14	AAH	508	MPF EXHAUST CO	160 ppm																														X		1 hr rolling avg. See NOTE 2.	4451/16	NA
100	14	XS	508	MPF EXHAUST CO	MALF	X																															See NOTE 2.	4422/04	NA
101	14	FAL	718	MPF-FURN-101 PRW SPRAY	0.2 gpm																														X		Enabled when 14-XV-717 is open and TIC-141A or TIC-152A CV > 5%. SP & response per ANCDF.	4451/14	NA
102	14	ISH	782	MPF-FURN-101C ZN 3 CONV	120% AMPS																														X			0420/00	NA
103	14	ISH	783	MPF-FURN-101B ZN 2 CONV	120% AMPS																														X		3 sec delay.	0420/02	NA
104	14	ISH	784	MPF-FURN-101A ZN 1 CONV	120% AMPS																														X		3 sec delay.	0420/04	NA
105	14	ISH	785	MMS-CNVP-119 CHG AL CONV	120% AMPS																														X		3 sec delay.	0420/06	NA
106	14	ISH	786	MPF-CNVP-101 DISH AL CONV	120% AMPS																														X		3 sec delay.	0420/10	NA
107	14	PDAHH	786	MPF EXHAUST REFRACT VENTURI	1.2 in wc		X																														RCRA AWFCO MPF-12. See NOTE 3.	1050/04	434
108	14	KAL	786A	MPF EXHAUST RESIDENCE TIME	0.5 sec		X																															1050/06	406
109	14	XA	792	MMS-CNVP-121 ACCUM CONV	MALF	X	X												X																			0469/11	392
110	14	FISH	796	MAIN FUEL GAS FLOW HIGH	SEE REMARKS		X																														Close FV-796. See NOTE 4.	2020/02	436
111	14	XA	796	FUEL GAS FLOW CONTROL	MALF	X	X																														Close FV-796	2060/11	436
112	14	SSL	798F/R	MMS-CNVP-121 COOLING CONV	zero speed	X																															Input to 14-XA-792. I-lock for MMS-CNVP-120, unload conv/lift.	I:107/00 I:107/01	NA
113	14	PSL	857	MPF-FURN-101 SPARGE AIR	20 in wc																														X		3 sec delay. Alarm active for ton containers only. SP from TOCDF.	0420/12	NA
114	14	BSLL	883	MPF-FURN-101 #1 E100	LOCKOUT		X	X																													RCRA AWFCO MPF-28. See NOTE 3.	2020/00	408
115	14	BSLL	884	MPF-FURN-101 #2 E100	LOCKOUT		X	X																													RCRA AWFCO MPF-28. See NOTE 3.	2220/00	410
116	14	BSLL	885	MPF-FURN-101 #3 E100	LOCKOUT		X	X																													RCRA AWFCO MPF-28. See NOTE 3.	2420/00	412
117	14	BSLL	886	MPF-FURN-101 #4 E100	LOCKOUT		X	X																													RCRA AWFCO MPF-28. See NOTE 3.	2620/00	414
118	14	BSLL	887	MPF-FURN-101 #5 E100	LOCKOUT		X	X																													RCRA AWFCO MPF-28. See NOTE 3.	2820/00	416
119	14	BSLL	888	MPF-FURN-101 #6 E100	LOCKOUT		X	X																													RCRA AWFCO MPF-28. See NOTE 3.	3020/00	418
120	14	BSLL	889	MPF-FURN-101 #7 E100	LOCKOUT		X	X																													RCRA AWFCO MPF-28. See NOTE 3.	3220/00	420
121	14	BSLL	890	MPF-FURN-101 #8 E100	LOCKOUT		X	X																													RCRA AWFCO MPF-28. See NOTE 3.	3420/00	422
122	14	BSLL	891	MPF-FURN-101 #9 E100	LOCKOUT		X	X																													RCRA AWFCO MPF-28. See NOTE 3.	3620/00	424
123	14	BSLL	892	MPF-FURN-101 #10 E100	LOCKOUT		X	X																													RCRA AWFCO MPF-28. See NOTE 3.	3820/00	426
124	14	BSLL	893	MPF-FURN-102 #11 E100	LOCKOUT		X		X																												RCRA AWFCO MPF-29. See NOTE 3.	0020/00	428
125	14	BSLL	893/4	MPF-FURN-102 AFTERBURNERS	LOCKOUT		X	X	X																												S/D all burners.	0200/04	432
126	14	BSLL	894	MPF-FURN-102 #12 E100	LOCKOUT		X		X																												RCRA AWFCO MPF-29. See NOTE 3.	0220/00	430
127	14	XS	902A	MPF-FURN-101 LOCAL E-STOP	E-STOP		X	X																													S/D burners #1-10.	4420/06	340
128	14	XS	902B	MPF-FURN-102 LOCAL E-STOP	E-STOP		X	X	X	X																											S/D all burners.	1020/06	342

PBCDF METAL PARTS FURNACE (MPF) SYSTEM

PBCDF MPF — ALARM AND INTERLOCK MATRIX — **PBCDF MPF**

P&IDs: PB-1-D-11, -528, -529, -530, and -531; PLC: ICS-CONR-113, INTERLOCK I-8

F00 - SPARE
F01 - SPARE
F02 - S/D COOLING CONVEYOR MMS-CNVP-121
F03 - S/D UNLOAD CONVEYOR MMS-CNVP-120
F04 - STOP ZONE 1 TIMER
F05 - STOP ZONE 2 TIMER
F06 - STOP ZONE 3 TIMER
F07 - S/D DISCHARGE AIRLOCK CONVEYOR
F10 - S/D ZONE 3 CONVEYOR
F11 - S/D ZONE 2 CONVEYOR
F12 - S/D ZONE 1 CONVEYOR
F13 - S/D CHARGE AIRLOCK CONVEYOR
F14 - S/D COMBUSTION AIR BLOWER
F15 - S/D RESPECTIVE AFTERBURNER BURNER
F16 - S/D RESPECTIVE PRIMARY CHAMBER BURNER
F17 - STOP FEED
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - SPARE
P13 - SPARE
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LQR PMP ON
P07 - S/D EMPTY OUT PUMP
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LQR PUMPS
P04 - S/D 1ST & 2ND STG ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D IST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	TAG NUMBER			DESCRIPTION		SET POINT	B8:010/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	B8:011/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX
129	61	XA	216	SCW-PUMP-101	CIRC PUMP 1	MALF	X																																Switchover to backup.	4260/11	NA
130	61	XA	220	SCW-PUMP-102	CIRC PUMP 2	MALF	X																																Switchover to backup.	4261/11	NA
131	61	PSLL	222	SCW-PMP-101/102	SEC COOL WTR	30 psig		X								X																						3 sec delay. Umclamp I-lock for discharge airlock exit door. S/D both SCW pumps. Note: AN deleted zone 3 timer I-lock.	4220/06	384
132	61	PAL	223	SCWPMP101/102	SEC COOL WTR	35 psig																																5 sec delay after pump startup. Switchover to backup.	4250/00	NA
133	61	LSL	226	SCW-TANK-101	SEC COOL WTR	6 in																															X	3 sec delay. Local operator to add PRW.	4220/00	NA
134	61	LSH	227	SCW-TANK-101	SEC COOL WTR	18 in																															X	3 sec delay. Local operator to drain PRW.	4220/02	NA
135	61	TAHH	229	SCW-TANK-101	SEC COOL WTR	150F		X								X																						Note: AN deleted zone 3 timer I-lock and added unclamp I-lock for discharge airlock exit door.	4250/02	442
136	61	TAH	233	SCW-EXCH-101	SEC COOL WTR	130F																															X		4250/04	NA
137	61	FAL	267	SCW-PUMP-101	SEC COOL WTR	80 gpm																															X		4250/06	NA
138	61	LSLL	606	SCW-TANK-101	SEC COOL WTR	3 in		X								X																						10 sec delay. Local operator to add PRW. Note: AN deleted zone 3 timer I-lock and added unclamp I-lock for discharge airlock exit door.	4220/04	478
139	71	XS	003	ICS-CONS-110	EMERG STOP	E-STOP		X	X	X	X	X	X	X	X																X		X	X		X	X	X		4421/10	344
140	71	XS	023	ICS-CONS-112	EMERG STOP	E-STOP		X	X	X	X	X	X	X	X																X		X	X		X	X	X		4421/12	344
141	71	XS	043	ICS-CONS-111	EMERG STOP	E-STOP		X	X	X	X	X	X	X	X																X		X	X		X	X	X		4421/16	344
142	71	XS	083	ICS-CONS-116	EMERG STOP	E-STOP		X	X	X	X	X	X	X	X																X		X	X		X	X	X		4422/02	344
143	71	XS	143	ICS-CONS-108	EMERG STOP	E-STOP		X	X	X	X	X	X	X	X																X		X	X		X	X	X	The DSIC is preparing an ECP to add this E-stop to PB-1-D-530. Ref. RFI C-ALL-005.	TBD	TBD

NOTE 1: PB-1-D-528 shows single malfunction alarms (e.g. 14-XA-016) for all MPF airlock doors. The code, however, will have separate malfunction alarms for each clamp (e.g. XA-016A) and door (e.g. 14-XA-016B). An ECP is required to add the separate alarms to PB-1-D-528.

NOTE 2: The CEMS alarms in the A&I matrix reflect the alarms in approved RFI S-ALL-249, which documents the operation, alarm, interlock requirements, and setpoints for the CEMS non-agent monitors. These requirements were derived from the Code of Federal Regulations (40 CFR, Part 60), site RCRA and air permits, and process requirements. The EIC is using this RFI as a basis for the PBCDF PLC software code. Parsons will be preparing ECPs to implement this RFI into the PBCDF design.

NOTE 3: RCRA AWFCO setpoints from 1-15-99 PBCDF RCRA permit Table VII-13 - Metal Parts Furnace Waste-Feed Cutoff Parameters. Some setpoints may be modified based on trial burn results.

NOTE 4: Under TEMP-1109-MPF, TOCDF removed14-FISH-796. At the Jan 2001 ANCDF MPF Review Meeting, ANCDF decided that the alarm would be active only if all burners are shutdown and fuel flow is greater than 0 scfm. There will be no automatic action. An operator can close 14-FV-796 in response to the alarm. The PBCDF SC will determine the PBCDF alarm response.

TOCDF ALARM AND INTERLOCK MATRIX
SYSTEM: METAL PARTS FURNACE (MPF) [Note 1]

PLC: ICS-CONR-113
INTERLOCK: I-8
P&IDs: TE-1-D-11, -528, -529. -530/1, -530/2, EG-1-D-528

01) STOP FEED
02) SHUTDOWN RESPECTIVE PRIMARY CHAMBER BURNER (LOCKOUT)
03) SHUTDOWN RESPECTIVE AFTERBURNER BURNER (LOCKOUT)
04) SHUTDOWN COMBUSTION AIR BLOWER
05) SHUTDOWN CHARGE AIRLOCK CONVEYOR
06) SHUTDOWN ZONE 1 CONVEYOR
07) SHUTDOWN ZONE 2 CONVEYOR
08) SHUTDOWN ZONE 3 CONVEYOR
09) SHUTDOWN DISCHARGE AIRLOCK CONVEYOR
10) STOP ZONE 1 TIMER
11) STOP ZONE 2 TIMER
12) STOP ZONE 3 TIMER
13) SHUTDOWN UNLOAD CONVEYOR
14) SHUTDOWN COOLING CONVEYOR
15) SHUTDOWN ID FAN
16) SHUTDOWN LUBE OIL SYSTEM
17) S/D WATER RETURN PUMP
18) S/D BRINE PUMP
19) S/D CLEAN LIQUOR PUMP
20) PREALARM
21) ALARM

ITM	TAG NUMBER	DESCRIPTION	SETPOINT	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	REMARKS	ALARM BIT B001:XX/XX
1	14-PDAH-007	MPF CHARGE AIRLOCK	-0.1 in wc																					X	90 sec delay	450/00
2	14-PDAL-007	MPF CHARGE AIRLOCK	-8.0 in wc																					X	240 sec delay. Ref: TEMP2548MPF.	450/02
3	14-PDAH-012	MPF DISCHARGE AIRLOCK	-0.5 in wc																					X	90 sec delay	450/06
4	14-PDAL-012	MPF DISCHARGE AIRLOCK	-8.0 in wc																					X	240 sec delay. Ref: TEMP2548MPF.	450/04
5	14-XA-016	CHARGE AIRLOCK DOOR	MALF	X																				X	Separate alarms for clamp (483/11) and door (484/11)	483/11 484/11
6	14-XA-018	MPF CHARGE DOOR	MALF	X																				X	Separate alarms for clamp (471/11) and door (472/11)	471/11 472/11
7	14-XA-020	MPF DISCHARGE DOOR	MALF	X																				X	Separate alarms for clamp (473/11) and door (474/11)	473/11 474/11
8	14-XA-022	DISCHARGE AIRLOCK DOOR	MALF	X																				X	Separate alarms for clamp (475/11) and door (476/11)	475/11 476/11
9	14-XA-024	CHARGE AIRLOCK CONVEYOR	MALF	X				X																X		466/11
10	14-XA-026	MPF-FURN-101A CONVEYOR	MALF	X					X															X		480/11
11	14-XA-028	MPF-FURN-101B CONVEYOR	MALF	X						X														X		481/11
12	14-XA-030	MPF-FURN-101C CONVEYOR	MALF	X							X													X		482/11
13	14-XA-032	DISCHARGE AIRLOCK CONVEYOR	MALF	X								X												X		470/11
14	14-ASL-033	MPF AFTERBURNER INLET OXYGEN	3% O2																					X		4420/00
15	14-XA-033	MPF AFTERBURNER INLET OXYGEN	MALF																					X		4421/14
16	14-PSHH-034	FURNACE CHAMBER PRESSURE	-0.1 in wc	X																				X	RCRA. 5 sec delay.	4420/10
17	14-PSLL-034	FURNACE CHAMBER PRESSURE	-6.5 in wc																					X	30 sec delay.	4420/12
18	14-AISH-036	FUEL GAS LEAK TO ROOM	25% LEL	X																				X		4420/02
19	14-XA-051	MMS-CNVP-120 CONV MALF	MALF	X												X								X	S/D conveyor drive only.	0467/11
20	14-SSL-058	MMS-CNVP-119 CHG AL CONV.	zero speed																						Input to 14-XA-24.	B401/13
21	14-TAH-065	MPF AFTERBURNER TEMP HIGH	SP + 100 F																				X		(see FAWB Note B-9)	1050/02
22	14-TAHH-065	MPF AFTERBURNER TEMP HIGH-HIGH	2175 degF	X																				X	RCRA. (see FAWB Note B-9)	1021/04
23	14-TAHHH-065	MPF AFTERBURNER TEMP HIGH-HIGH-HIGH	2250 degF																					X	(see FAWB Note B-9)	1021/06
24	14-TAL-065	MPF AFTERBURNER TEMP LOW	SP - 100 F																				X		(see FAWB Note B-9)	1050/00
25	14-TALL-065	MPF AFTERBURNER TEMP LOW-LOW	1800 degF	X																				X	RCRA. (see FAWB Notes B-9 and B-12)	1020/16
26	14-PAH-070	MPF PRIMARY CHAMBER	-0.25 in wc																				X		30 sec delay.	4450/02
27	14-PAL-070	MPF PRIMARY CHAMBER	-6.0 in wc																				X		30 sec delay.	4450/00
28	14-PAL-070A	MPF PRIMARY CHAMBER (WIDE RANGE)	-20.0 in wc																						At same SP as alarm, if 14-PIC-070 is in MANUAL, PLC drives ID fan damper to 15% CV and venturi to 35% CV. Alarm requires CON reset (see FAWB Note B-17).	1022/11
29	14-PALL-070A	MPF PRIMARY CHAMBER (WIDE RANGE)	-35.0 in wc															X							Alarm requires CON reset. At same SP as alarm, PLC shuts down both stages of ID fan if both AFB burners are not released to AUTO by the BMS (see FAWB Note B-17).	1022/06
30	14-TAH-071	MPF ZONE 1 TEMP HIGH	1775 degF																				X		(see FAWB Note B-9)	4451/04
31	14-TALL-071	MPF ZONE 1	1150 degF	X																				X	(see FAWB Note B-9)	4452/04
32	14-TSHH-071	MPF ZONE 1 (ETL)	1800 degF		X																			X	LOCKOUT burners in zone 1. BMS 3-P running interlock. 5 sec delay for PLC alarm.	4420/14
33	14-TSL-071	MPF ZONE 1	1400 degF																					X	PURGE BYPASS NOT AVAILABLE	4420/16
34	14-TAH-072	MPF ZONE 2 TEMP HIGH	1775 degF																				X		(see FAWB Note B-9)	4451/06
35	14-TALL-072	MPF ZONE 2	1150 degF	X																				X	(see FAWB Note B-9)	4452/04
36	14-TSHH-072	MPF ZONE 2 (ETL)	1800 degF		X																			X	LOCKOUT burners in zone 2. BMS 3-P running interlock. 5 sec delay for PLC alarm.	4421/00

TOCDF ALARM AND INTERLOCK MATRIX
SYSTEM: METAL PARTS FURNACE (MPF) [Note 1]

PLC: ICS-CONR-113
INTERLOCK: I-8
P&IDs: TE-1-D-11, -528, -529. -530/1, -530/2, EG-1-D-528

01) STOP FEED
02) SHUTDOWN RESPECTIVE PRIMARY CHAMBER BURNER (LOCKOUT)
03) SHUTDOWN RESPECTIVE AFTERBURNER BURNER (LOCKOUT)
04) SHUTDOWN COMBUSTION AIR BLOWER
05) SHUTDOWN CHARGE AIRLOCK CONVEYOR
06) SHUTDOWN ZONE 1 CONVEYOR
07) SHUTDOWN ZONE 2 CONVEYOR
08) SHUTDOWN ZONE 3 CONVEYOR
09) SHUTDOWN DISCHARGE AIRLOCK CONVEYOR
10) STOP ZONE 1 TIMER
11) STOP ZONE 2 TIMER
12) STOP ZONE 3 TIMER
13) SHUTDOWN UNLOAD CONVEYOR
14) SHUTDOWN COOLING CONVEYOR
15) SHUTDOWN ID FAN
16) SHUTDOWN LUBE OIL SYSTEM
17) S/D WATER RETURN PUMP
18) S/D BRINE PUMP
19) S/D CLEAN LIQUOR PUMP
20) PREALARM
21) ALARM

ITM	TAG NUMBER	DESCRIPTION	SETPOINT	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	REMARKS	ALARM BIT B001:XX/XX
37	14-TSL-072	MPF ZONE 2	1400 degF																					X	PURGE BYPASS NOT AVAILABLE	4421/02
38	14-XA-077	MPF-BLOW-101	MALFUNCTION	X	X	X	X																	X	LOCKOUT ALL BURNERS. BMS 3-P running interlock.	2061/11
39	14-TAH-079	MPF ZONE 3 TEMP HIGH	1775 degF																				X		(see FAWB Note B-9)	4451/10
40	14-TALL-079	MPF ZONE 3	1150 degF	X																				X	(see FAWB Note B-9)	4452/10
41	14-TSHH-079	MPF ZONE 3 (ETL)	1800 degF		X																			X	LOCKOUT burners in zone 3. BMS 3-P running interlock. 5 sec delay for PLC alarm.	4421/04
42	14-TSL-079	MPF ZONE 3	1400 degF																					X	PURGE BYPASS NOT AVAILABLE	4421/06
43	14-TAH-087	AFTERBURNER TEMP HIGH	2175 degF																				X		(see FAWB Note B-9)	1050/10
44	14-TSHH-087	AFTERBURNER TEMPERATURE (ETL)	2400 F	X	X	X																		X	5 sec delay for PLC alarm. LOCKOUT both AFB burners (3-P interlock). Primary burners will S/D on loss of AFB (see FAWB Note B-9).	1020/12
45	14-TSL-087	AFTERBURNER TEMPERATURE LOW	1400 degF																					X	PURGE BYPASS NOT AVAILABLE	1020/14
46	14-SSL-088F/R	MMS-CNVP-120 UNLOAD CONV.	zero speed																						Input to 14-XA-388A. S/D MPF-CNVP-101 if discharge AL exit door is open.	I:106/13 I:106/14
47	14-SSL-090F/R	MMS-CNVP-120 UNLOAD CONV.	zero speed																						Input to 14-XA-388A. S/D MPF-CNVP-101 if discharge AL exit door is open.	I:106/15 I:106/16
48	14-SSL-098	MPF FURNACE ZONE 2 CONVEYOR	zero speed																						Input to 14-XA-28.	B402/01
49	14-SSL-099	MPF FURNACE ZONE 3 CONVEYOR	zero speed																						Input to 14-XA-30.	B402/03
50	14-SSL-100	MPF-CNVP-101 DISCHARGE AL CONV	zero speed																						Input to 14-XA-32. FWD I-lock for Zone 3 conv if MPF exit door is open.	B401/15
46	14-PAL-118	MPF BLOWER-101	40 in wc																				X			2050/10
47	14-PSLL-138	MPF BLOWER-101	20 in wc	X	X	X																		X	LOCKOUT all 12 burners (BMS 3-P interlock).	2020/04
48	14-TAH-141	ZONE 2 BURNER CONTROL	SP + 100 degF																				X		STOP TRANSFER ZONE 2 TO ZONE 3	4451/12
49	14-TAHH-141	ZONE 2 BURNER CONTROL	1700 F	X																				X	RCRA. (see FAWB Notes B-9 , B-12 and B-19)	4452/06
50	14-TAL-141	ZONE 2 BURNER CONTROL	SP-100 F																				X		(see FAWB Note B-13)	4450/06
51	14-TALL-141	ZONE 2 BURNER CONTROL	1200 F	X										X										X	RCRA. (see FAWB Notes B-9 , B-12 and B-19)	4450/04
52	14-TAH-152	ZONE 1 BURNER CONTROL	SP + 100 degF																				X		STOP TRANSFER ZONE 1 TO ZONE 2	4450/14
53	14-TAHH-152	ZONE 1 BURNER CONTROL	1700 F	X																				X	RCRA. (see FAWB Notes B-9 , B-12 and B-19)	4452/02
54	14-TAL-152	ZONE 1 BURNER CONTROL	SP-100 F																				X		(see FAWB Note B-13)	4450/12
55	14-TALL-152	ZONE 1 BURNER CONTROL	1200 F	X									X											X	RCRA. (see FAWB Notes B-9 , B-12 and B-19)	4450/10
56	14-TAH-153	ZONE 3 BURNER CONTROL	SP + 100 F																					X		4451/02
57	14-TAHH-153	ZONE 3 BURNER CONTROL	1700 F	X																				X	RCRA. (see FAWB Notes B-9 , B-12 and B-19)	4452/12
58	14-TAL-153	ZONE 3 BURNER CONTROL	SP-100 F																				X		(see FAWB Note B-13)	4451/00
59	14-TALL-153	ZONE 3 BURNER CONTROL	1200 F	X											X									X	RCRA. (see FAWB Notes B-9 , B-12 and B-19)	4450/16
60	14-PAH-155B	MPF PILOT FUEL GAS	2.5 psig																				X			2050/02
61	14-PAL-155B	MPF PILOT FUEL GAS	1.5 psig																				X			2050/00
62	14-SSL-157	MPF FURNACE ZONE 1 CONVEYOR	zero speed																						Input to 14-XA-26.	B401/17
63	14-PAH-159	MPF MAIN FUEL GAS	4.25 psig																				X			2050/06
64	14-PAL-159	MPF MAIN FUEL GAS	3.5 psig																				X			2050/04

TOCDF ALARM AND INTERLOCK MATRIX
SYSTEM: METAL PARTS FURNACE (MPF) [Note 1]

PLC: ICS-CONR-113
INTERLOCK: I-8
P&IDs: TE-1-D-11, -528, -529. -530/1, -530/2, EG-1-D-528

01) STOP FEED
02) SHUTDOWN RESPECTIVE PRIMARY CHAMBER BURNER (LOCKOUT)
03) SHUTDOWN RESPECTIVE AFTERBURNER BURNER (LOCKOUT)
04) SHUTDOWN COMBUSTION AIR BLOWER
05) SHUTDOWN CHARGE AIRLOCK CONVEYOR
06) SHUTDOWN ZONE 1 CONVEYOR
07) SHUTDOWN ZONE 2 CONVEYOR
08) SHUTDOWN ZONE 3 CONVEYOR
09) SHUTDOWN DISCHARGE AIRLOCK CONVEYOR
10) STOP ZONE 1 TIMER
11) STOP ZONE 2 TIMER
12) STOP ZONE 3 TIMER
13) SHUTDOWN UNLOAD CONVEYOR
14) SHUTDOWN COOLING CONVEYOR
15) SHUTDOWN ID FAN
16) SHUTDOWN LUBE OIL SYSTEM
17) S/D WATER RETURN PUMP
18) S/D BRINE PUMP
19) S/D CLEAN LIQUOR PUMP
20) PREALARM
21) ALARM

ITM	TAG NUMBER	DESCRIPTION	SETPOINT	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	REMARKS	ALARM BIT B001:XX/XX
65	14-PSHH-160	MPF PILOT FUEL GAS	3.0 psig																					X		2020/06
66	14-PSHH-207	BURNER 1 FUEL GAS	4.5 psig		X																			X	BMS 3-P interlock.	2020/10
67	14-PSLL-207	BURNER 1 FUEL GAS	3.0 psig		X																			X	BMS 3-P interlock.	2020/12
68	14-PSHH-227	BURNER 2 FUEL GAS	4.5 psig		X																			X	BMS 3-P interlock.	2220/02
69	14-PSLL-227	BURNER 2 FUEL GAS	3.0 psig		X																			X	BMS 3-P interlock.	2220/04
70	14-PSHH-247	BURNER 3 FUEL GAS	4.5 psig		X																			X	BMS 3-P interlock.	2420/02
71	14-PSLL-247	BURNER 3 FUEL GAS	3.0 psig		X																			X	BMS 3-P interlock.	2420/04
72	14-PSHH-267	BURNER 4 FUEL GAS	4.5 psig		X																			X	BMS 3-P interlock.	2620/02
73	14-PSLL-267	BURNER 4 FUEL GAS	3.0 psig		X																			X	BMS 3-P interlock.	2620/04
74	14-PSHH-287	BURNER 5 FUEL GAS	4.5 psig		X																			X	BMS 3-P interlock.	2820/02
75	14-PSLL-287	BURNER 5 FUEL GAS	3.0 psig		X																			X	BMS 3-P interlock.	2820/04
76	14-PSHH-307	BURNER 6 FUEL GAS	4.5 psig		X																			X	BMS 3-P interlock.	3020/02
77	14-PSLL-307	BURNER 6 FUEL GAS	3.0 psig		X																			X	BMS 3-P interlock.	3020/04
78	14-PSHH-327	BURNER 7 FUEL GAS	4.5 psig		X																			X	BMS 3-P interlock.	3220/02
79	14-PSLL-327	BURNER 7 FUEL GAS	3.0 psig		X																			X	BMS 3-P interlock.	3220/04
80	14-PSHH-347	BURNER 8 FUEL GAS	4.5 psig		X																			X	BMS 3-P interlock.	3420/02
81	14-PSLL-347	BURNER 8 FUEL GAS	3.0 psig		X																			X	BMS 3-P interlock.	3420/04
82	14-PSHH-367	BURNER 9 FUEL GAS	4.5 psig		X																			X	BMS 3-P interlock.	3620/02
83	14-PSLL-367	BURNER 9 FUEL GAS	3.0 psig		X																			X	BMS 3-P interlock.	3620/04
84	14-AISH-386	FUEL GAS LEAK TO ROOM	25% LEL	X																				X		1020/04
85	14-PSHH-387	BURNER 10 FUEL GAS	4.5 psig		X																			X	BMS 3-P interlock.	3820/02
86	14-PSLL-387	BURNER 10 FUEL GAS	3.0 psig		X																			X	BMS 3-P interlock.	3820/04
87	14-XA-388A	MMS-CNVP-120B	MALF.	X												X								X	S/D lift motor only.	0468/11
88	14-PSHH-390	MPF AFTERBURNER CHAMBER PRESS.	-0.10 in wc	X																				X	30 sec delay.	1020/10
89	14-XS-393A/B	MMS-CNVP-120 ROPE SWITCH	PULLED	X												X	X							X		0420/14
90	14-XS-394A/B	MMS-CNVP-121 ROPE SWITCH	PULLED	X												X	X							X		0420/16
91	14-PSHH-407	BURNER 11 FUEL GAS	4.5 psig			X																		X	BMS 3-P interlock.	0020/02
92	14-PSLL-407	BURNER 11 FUEL GAS	3.0 psig			X																		X	BMS 3-P interlock.	0020/04
93	14-PSHH-427	BURNER 12 FUEL GAS	4.5 psig			X																		X	BMS 3-P interlock.	0220/02
94	14-PSLL-427	BURNER 12 FUEL GAS	3.0 psig			X																		X	BMS 3-P interlock.	0220/04
95	14-XY-501	MPF DISCHARGE AIRLOCK EXH VLV	MALFUNCTION	X																				X	I-lock for MPF exit door unclamp.	0477/11
96	14-XY-502	MPF DISCHARGE AIRLOCK PURGE VLV	MALFUNCTION	X																				X	I-lock for MPF exit door unclamp.	0478/11
97	14-AAH-508	MPF EXHAUST CARBON MONOXIDE	100 ppm																					X	HOURLY ROLLING AVG/1 SAMPLE/MIN.	4451/16
98	14-XS-508	MPF EXHAUST CARBON MONOXIDE	MALFUNCTION																					X	Enabled when MPF total fuel gas > 10 scfm.	4422/04
99	14-FAL-718	MPF-FURN-101 PRW SPRAY	0.0 gpm																				X			4451/14
100	14-ISH-782	MPF-FURN-101C TORQUE	120% AMPS																				X			0420/00
101	14-ISH-783	MPF-FURN-101B TORQUE	120% AMPS																				X		3 sec delay.	0420/02
102	14-ISH-784	MPF-FURN-101A TORQUE	120% AMPS																				X		3 sec delay.	0420/04
103	14-ISH-785	MPF-FURN-101D TORQUE	120% AMPS																				X		3 sec delay.	0420/06
104	14-ISH-786	MPF-FURN-101E TORQUE	120% AMPS																				X		3 sec delay.	0420/08
105	14-PDAHH-786	MPF EXHAUST REFRAC. VENTURI	1.2 in wc	X																				X	RCRA	1050/04
106	14-KAL-786A	MPF EXHAUST RESIDENCE TIME	0.5 sec	X																				X		1050/06
107	14-XA-792	MMS-CNVP-121	MALFUNCTION	X													X							X		0469/11
108	14-XA-796	FUEL GAS FLOW CONTROL	MALFUNCTION	X																				X	Close FV-796.	2060/11
109	14-SSL-798F/R	MMS-CNVP-121 COOLING CONV.	zero speed																						Input to 14-XA-792. I-lock for MMS-CNVP-120, unload conv/lift.	I:107/00 I:107/01
109	14-PSL-857	SPARGE AIR	20 in wc																					X	3 sec delay. Alarm for ton containers and spray tanks only.	0420/12
110	14-BSLL-883	LOCKOUT ALARM-BURNER 1	LOCKOUT	X	X																			X		2020/00
111	14-BSLL-884	LOCKOUT ALARM-BURNER 2	LOCKOUT	X	X																			X		2220/00
112	14-BSLL-885	LOCKOUT ALARM-BURNER 3	LOCKOUT	X	X																			X		2420/00

TOCDF ALARM AND INTERLOCK MATRIX
SYSTEM: METAL PARTS FURNACE (MPF) [Note 1]

PLC: ICS-CONR-113
INTERLOCK: I-8
P&IDs: TE-1-D-11, -528, -529. -530/1, -530/2, EG-1-D-528

01) STOP FEED
02) SHUTDOWN RESPECTIVE PRIMARY CHAMBER BURNER (LOCKOUT)
03) SHUTDOWN RESPECTIVE AFTERBURNER BURNER (LOCKOUT)
04) SHUTDOWN COMBUSTION AIR BLOWER
05) SHUTDOWN CHARGE AIRLOCK CONVEYOR
06) SHUTDOWN ZONE 1 CONVEYOR
07) SHUTDOWN ZONE 2 CONVEYOR
08) SHUTDOWN ZONE 3 CONVEYOR
09) SHUTDOWN DISCHARGE AIRLOCK CONVEYOR
10) STOP ZONE 1 TIMER
11) STOP ZONE 2 TIMER
12) STOP ZONE 3 TIMER
13) SHUTDOWN UNLOAD CONVEYOR
14) SHUTDOWN COOLING CONVEYOR
15) SHUTDOWN ID FAN
16) SHUTDOWN LUBE OIL SYSTEM
17) S/D WATER RETURN PUMP
18) S/D BRINE PUMP
19) S/D CLEAN LIQUOR PUMP
20) PREALARM
21) ALARM

ITM	TAG NUMBER	DESCRIPTION	SETPOINT	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	REMARKS	ALARM BIT B001:XX/XX
113	14-BSLL-886	LOCKOUT ALARM-BURNER 4	LOCKOUT	X	X																			X		2620/00
114	14-BSLL-887	LOCKOUT ALARM-BURNER 5	LOCKOUT	X	X																			X		2820/00
115	14-BSLL-888	LOCKOUT ALARM-BURNER 6	LOCKOUT	X	X																			X		3020/00
116	14-BSLL-889	LOCKOUT ALARM-BURNER 7	LOCKOUT	X	X																			X		3220/00
117	14-BSLL-890	LOCKOUT ALARM-BURNER 8	LOCKOUT	X	X																			X		3420/00
118	14-BSLL-891	LOCKOUT ALARM-BURNER 9	LOCKOUT	X	X																			X		3620/00
119	14-BSLL-892	LOCKOUT ALARM-BURNER 10	LOCKOUT	X	X																			X		3820/00
120	14-BSLL-893	LOCKOUT ALARM-BURNER 11	LOCKOUT	X		X																		X		0020/00
121	14-BSLL-893/894	LOCKOUT BOTH AFTERBURNER BURNERS	LOCKOUT	X	X	X																			S/D all burners.	0200/04
122	14-BSLL-894	LOCKOUT ALARM-BURNER 12	LOCKOUT	X		X																		X		0220/00
123	14-XS-902A	MPF LOCAL EMERGENCY SHUTDOWN	E-STOP	X	X																			X	S/D burners #1-10.	4420/06
124	14-XS-902B	AFB LOCAL EMERGENCY SHUTDOWN	E-STOP	X	X	X	X																	X	S/D all burners.	1020/06
125	61-XA-216	SCW-PUMP-101	MALFUNCTION																					X	Switchover to backup.	4260/11
126	61-XA-220	SCW-PUMP-102	MALFUNCTION																					X	Switchover to backup.	4261/11
127	61-PSLL-222	SEC. COOLING WTR PUMP DISCHARGE	30 psig	X											X									X	3 sec delay. Umclamp I-lock for discharge airlock exit door. Raise I-lock for MPF exit door. S/D both SCW pumps.	4220/06
128	61-PAL-223	SCW-PUMP-101/102 DISCHARGE PRESS.	35 psig																					X	5 sec delay after pump startup. Switchover to backup.	4250/00
129	61-LSL-226	SCW-TANK-101	6 in																				X		3 sec delay. Local operator to add PRW.	4220/00
130	61-LSH-227	SCW EXHANGER TANK	18 in																				X		3 sec delay. Local operator to drain PRW.	4220/02
131	61-TAHH-229	SEC. COOLING WTR PUMP SUCTION	150 F	X											X									X		4250/02
132	61-TAH-233	MPF DOOR WTR HEAT EXCH EXIT	130 F																				X			4250/04
133	61-FAL-267	SEC. COOLING WATER CIRC. FLOW	80 gpm																				X			4250/06
134	61-LSLL-606	SCW-TANK-101	3 in	X											X									X	10 sec delay. Local operator to add PRW.	4220/04
135	71-XS-003	SHIFT SUPERVISOR CONSOLE	E-STOP	X	X	X	X	X	X	X	X	X												X		4421/10
136	71-XS-023	LEAD OPERATOR CONSOLE	E-STOP	X	X	X	X	X	X	X	X	X						X	X	X		X		X		4421/12
137	71-XS-043	#1 FURNACE OPERATOR CONSOLE	E-STOP	X	X	X	X	X	X	X	X	X						X	X	X		X		X		4421/16
138	71-XS-063	#2 FURNACE OPERATOR CONSOLE	E-STOP	X	X	X	X	X	X	X	X	X						X	X	X		X		X		4422/00
139	71-XS-083	DEMIL/FURNACE OPERATOR CONSOLE	E-STOP	X	X	X	X	X	X	X	X	X												X		4422/02

NOTE 1: See PAS/PFS FAWB (Programmatic Process FAWB Book 28) for ACAMS and additional CEMS alarms.

UMCDF METAL PARTS FURNACE (MPF) SYSTEM

UMCDF MPF — ALARM AND INTERLOCK MATRIX — **UMCDF MPF**

P&IDs: UM-1-D-11, -528, -529, -530/1, and -530/2; PLC: ICS-CONR-113, INTERLOCK I-8

F00 - SPARE
F01 - SPARE
F02 - S/D COOLING CONVEYOR MMS-CNVP-121
F03 - S/D UNLOAD CONVEYOR MMS-CNVP-120
F04 - STOP ZONE 1 TIMER
F05 - STOP ZONE 2 TIMER
F06 - STOP ZONE 3 TIMER
F07 - S/D DISCHARGE AIRLOCK CONVEYOR
F10 - S/D ZONE 3 CONVEYOR
F11 - S/D ZONE 2 CONVEYOR
F12 - S/D ZONE 1 CONVEYOR
F13 - S/D CHARGE AIRLOCK CONVEYOR
F14 - S/D COMBUSTION AIR BLOWER
F15 - S/D RESPECTIVE AFTERBURNER BURNER
F16 - S/D RESPECTIVE PRIMARY CHAMBER BURNER
F17 - STOP FEED
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - SPARE
P13 - SPARE
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LQR PMP ON
P07 - S/D EMPTY OUT PUMP
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LQR PUMPS
P04 - S/D 1ST & 2ND STG ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D IST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	B8:011/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX	
1	14 PDAH 007	MPF CHARGE AIRLOCK	-0.1 in wc																															X	90 sec delay.	0450/00	NA	
2	14 PDAL 007	MPF CHARGE AIRLOCK	-6.0 in wc																															X	90 sec delay.	0450/02	NA	CH 1
3	14 PDAH 012	MPF DISCHARGE AIRLOCK	-0.5 in wc																															X	90 sec delay.	0450/06	NA	
4	14 PDAL 012	MPF DISCHARGE AIRLOCK	-6.0 in wc																															X	90 sec delay.	0450/04	NA	CH 1
5	14 **XY** **001A**	MPF CHARGE AIRLOCK CLAMP	MALF	X	X																														See NOTE 1.	0483/11	352	CH 1
6	14 **XY** **001B**	MPF CHARGE AIRLOCK DOOR	MALF	X	X																														See NOTE 1.	0484/11	352	CH 1
7	14 **XY** **008A**	MPF ENTRY CLAMP	MALF	X	X																														See NOTE 1.	0471/11	358	CH 1
8	14 **XY** **008B**	MPF ENTRY DOOR	MALF	X	X																														See NOTE 1.	0472/11	358	CH 1
9	14 **XY** **013A**	MPF EXIT DOOR	MALF	X	X																														See NOTE 1.	0473/11	356	CH 1
10	14 **XY** **013B**	MPF EXIT CLAMP	MALF	X	X																														See NOTE 1.	0474/11	356	CH 1
11	14 **XY** **035A**	MPF DISCHARGE AIRLOCK DOOR	MALF	X	X																														See NOTE 1.	0475/11	354	CH 1
12	14 **XY** **035B**	MPF DISCHARGE AIRLOCK CLAMP	MALF	X	X																														See NOTE 1.	0476/11	354	CH 1
13	14 XA 024	CHARGE AIRLOCK CONVEYOR	MALF	X	X				X																											0466/11	362	
14	14 XA 026	MPF FURN ZONE 1 CONVEYOR	MALF	X	X					X																										0480/11	368	
15	14 XA 028	MPF FURN ZONE 2 CONVEYOR	MALF	X	X						X																									0481/11	370	
16	14 XA 030	MPF FURN ZONE 3 CONVEYOR	MALF	X	X							X																								0482/11	372	
17	14 XA 032	DISCHARGE AIRLOCK CONVEYOR	MALF	X	X								X																							0470/11	360	
18	**14** **AAH** **033**	**MPF AFTERBURNER INLET O2**	**15% O2**																															**X**		**4452/14**	**NA**	CH 1
19	14 AAL 033	MPF AFTERBURNER INLET O2	3% O2																															X	See NOTE 2.	**4452/16**	NA	CH 1
20	14 XS 033	MPF AFTERBURNER INLET O2	MALF	X																															See NOTE 2. **5 sec delay.**	4421/14	NA	CH 1
21	14 PSHH 034	FURNACE CHAMBER PRESSURE	**-0.15 in wc**		X																														RCRA AWFCO MPF-19 **and MACT AWFCO MPF(M)-18.** See NOTE 3.	4420/10	364	CH 1
22	14 PSLL 034	FURNACE CHAMBER PRESSURE	-6.5 in wc																																30 sec delay. Verify vs vendor SP. Note: AN deleted time delay.	4420/12	NA	CH 1
23	14 AISH 036	FUEL GAS LEAK TO ROOM	25% LEL		X																														3 sec delay. Stop feed added to P&ID by UMAP0833PAS. Note: AN deleted time delay.	4420/02	374	CH 1
24	**14** **PAH** **037**	**AFB PRESSURE HIGH**	**-0.5 in wc**																															**X**		**1051/12**	**NA**	CH 1
25	**14** **PAHH** **037**	**AFB PRESSURE HIGH HIGH**	**-0.15 in wc**		**X**																														**RCRA AWFCO MPF-27 and MACT AWFCO MPF(M)-30**	**1051/14**	**336**	CH 1
26	14 XA 051	MMS-CNVP-120 CONV MALF	MALF	X	X											X																			S/D conveyor drive **and lift drive**.	0467/11	376	CH 1
27	14 SSL 058	MMS-CNVP-119 CHG AL CONV.	zero speed	X																															Input to 14-XA-24. **8 sec delay.**	B401/13	NA	CH 1
28	14 TAH 065	MPF AFTERBURNER TEMP HIGH	SP+100F																															X		1050/02	NA	
29	14 TAHH 065	MPF AFTERBURNER TEMP HIGH-HIGH	2150 F		X																														RCRA AWFCO MPF-05 **and MACT AWFCO MPF(M)-5**. See NOTE 3.	**1051/04**	**382**	CH 1
30	14 TAL 065	MPF AFTERBURNER TEMP LOW	SP-100F																															X		1050/00	NA	
31	14 TALL 065	MPF AFTERBURNER TEMP LOW-LOW	1850 F		X																														RCRA AWFCO MPF-06 **and MACT AWFCO MPF(M)-06**. See NOTE 3.	**1051/06**	**382**	CH 1
32	14 PAH 070	MPF PRIMARY CHMBER	-0.50 in wc																															X		4450/02	NA	

UMCDF METAL PARTS FURNACE (MPF) SYSTEM

UMCDF MPF — ALARM AND INTERLOCK MATRIX — **UMCDF MPF**

P&IDs: UM-1-D-11, -528, -529, -530/1, and -530/2; PLC: ICS-CONR-113, INTERLOCK I-8

B8:010/																B8:011/															
F00 - SPARE																P17 - SPARE															
F01 - SPARE																P16 - SPARE															
F02 - S/D COOLING CONVEYOR MMS-CNVP-121																P15 - SPARE															
F03 - S/D UNLOAD CONVEYOR MMS-CNVP-120																P14 - SPARE															
F04 - STOP ZONE 1 TIMER																P13 - SPARE															
F05 - STOP ZONE 2 TIMER																P12 - S/D WATER RETURN PMP															
F06 - STOP ZONE 3 TIMER																P11 - BKUP BRINE PMP ON															
F07 - S/D DISCHARGE AIRLOCK CONVEYOR																P10 - BKUP CLEAN LQR PMP ON															
F10 - S/D ZONE 3 CONVEYOR																P07 - S/D EMPTY OUT PUMP															
F11 - S/D ZONE 2 CONVEYOR																P06 - S/D BRINE PUMPS															
F12 - S/D ZONE 1 CONVEYOR																P05 - S/D CLEAN LQR PUMPS															
F13 - S/D CHARGE AIRLOCK CONVEYOR																P04 - S/D 1ST & 2ND STG ID FAN															
F14 - S/D COMBUSTION AIR BLOWER																P03 - SPARE															
F15 - S/D RESPECTIVE AFTERBURNER BURNER																P02 - SPARE															
F16 - S/D RESPECTIVE PRIMARY CHAMBER BURNER																P01 - S/D IST STAGE ID FAN															
F17 - STOP FEED																P00 - S/D 2ND STAGE ID FAN															
MALFUNCTION																PREALARM															

ITM NUM	TAG NUMBER			DESCRIPTION	SET POINT	17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX	
33	14	PAL	070	MPF PRIMARY CHMBER	**-6.0 in wc**																															X		4450/00	NA	CH 1
34	14	TSHH	071	MPF ZONE 1 (ETL)	1800F		X																													5 sec delay for PLC alarm. LOCKOUT burners in zone 1. BMS 3-P running interlock. Note: AN deleted time delay.	4420/14	NA	
35	14	TSL	071	MPF ZONE 1 RELIGHT	1400F																															Purge bypass not available	4420/16	NA	
36	14	TSHH	072	MPF ZONE 2 (ETL)	1800F		X																													5 sec delay for PLC alarm. LOCKOUT burners in zone 2. BMS 3-P running interlock. Note: AN deleted time delay.	4421/00	NA	
37	14	TSL	072	MPF ZONE 2 RELIGHT	1400F																															Purge bypass not available	4421/02	NA	
38	14	XA	077	MPF-BLOW-101	MALF	X	X	X	X	X																										LOCKOUT ALL BURNERS. BMS 3-P running interlock.	2061/11	366	
39	14	TSHH	079	MPF ZONE 3 (ETL)	1800F		X																													5 sec delay for PLC alarm. LOCKOUT burners in zone 3. BMS 3-P running interlock. Note: AN deleted time delay.	4421/04	NA	
40	14	TSL	079	MPF ZONE 3 RELIGHT	1400F																															Purge bypass not available	4421/06	NA	
41	14	TSHH	087	AFTERBURNER TEMP (ETL)	2200F		X		X																											5 sec delay for PLC alarm. LOCKOUT both AFB burners. Primary burners will S/D on loss of AFB (TOCDF setpoint 2400 F; see FAWB Note B-9). Note: AN deleted time delay.	1020/12	**536**	CH 1
42	14	TSL	087	AFTERBURNER TEMP LOW	1400F																															Purge bypass not available	1020/14	NA	
43	14	TSLL	087	AFTERBURNER TEMP LOW-LOW	TBD																															Alarm is shown on UM-1-D-529, but does not exist at TOCDF. **5 sec delay.**	1020/14	NA	CH 1
44	14	TALL	087A	MPF AFTERBURNER TEMP LOW-LOW	**1800 F**		X																													MACT AWFCO MPF(M)-**07**. ROHA. See NOTE 3.	**1050/12**	**328**	CH 1
45	14	SSL	088F/R	MMS-CNVP-120 UNLOAD CONV.	zero speed	X																														Input to 14-XA-388A. S/D MPF-CNVP-101 if discharge AL exit door is open.	I:106/13 I:106/14	NA	
46	14	SSL	090F/R	MMS-CNVP-120 UNLOAD CONV.	zero speed	X																														Input to 14-XA-388A. S/D MPF-CNVP-101 if discharge AL exit door is open.	I:106/15 I:106/16	NA	
47	14	SSL	098	MPF FURN ZONE 2 CONVEYOR	zero speed	X																														Input to 14-XA-28.	B402/01	NA	
48	14	SSL	099	MPF FURN ZONE 3 CONVEYOR	zero speed	X																														Input to 14-XA-30.	B402/03	NA	
49	14	SSL	100	MPF-CNVP-101 DSCHG AL CONV.	zero speed	X																														Input to 14-XA-32.	B401/15	NA	CH 1
50	14	PAL	118	MPF-BLOW-101	40 in wc																														X		2050/10	NA	
51	14	PSLL	138	MPF-BLOW-101	20 in wc		X	X	X																											LOCKOUT all 12 burners. BMS 3-P running interlock. **RCRA AWFCO MPF-11 and MACT AWFCO MPF(M)-10.**	2020/04	380	CH 1
52	14	TAL	141	ZONE 2 BURNER CONTROL	SP-100F																														X	(see FAWB Note B-13)	4450/06	504	

UMCDF METAL PARTS FURNACE (MPF) SYSTEM

UMCDF MPF — ALARM AND INTERLOCK MATRIX — **UMCDF MPF**

P&IDs: UM-1-D-11, -528, -529, -530/1, and -530/2; PLC: ICS-CONR-113, INTERLOCK I-8

F00 - SPARE
F01 - SPARE
F02 - S/D COOLING CONVEYOR MMS-CNVP-121
F03 - S/D UNLOAD CONVEYOR MMS-CNVP-120
F04 - STOP ZONE 1 TIMER
F05 - STOP ZONE 2 TIMER
F06 - STOP ZONE 3 TIMER
F07 - S/D DISCHARGE AIRLOCK CONVEYOR
F10 - S/D ZONE 3 CONVEYOR
F11 - S/D ZONE 2 CONVEYOR
F12 - S/D ZONE 1 CONVEYOR
F13 - S/D CHARGE AIRLOCK CONVEYOR
F14 - S/D COMBUSTION AIR BLOWER
F15 - S/D RESPECTIVE AFTERBURNER BURNER
F16 - S/D RESPECTIVE PRIMARY CHAMBER BURNER
F17 - STOP FEED
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - SPARE
P13 - SPARE
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LQR PMP ON
P07 - S/D EMPTY OUT PUMP
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LQR PUMPS
P04 - S/D 1ST & 2ND STG ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D IST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	TAG NUMBER			DESCRIPTION	SET POINT	B8:010/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	B8:011/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX	
53	14	TALL	141	ZONE 2 BURNER CONTROL	**1000 F** SEE REMARKS	X										X																						RCRA AWFCO MPF-10 **and MACT AWFCO MPF(M)-8**. SPs: 1000F for TCs, 1400F for projos, 1100F for spray tanks and bombs. See NOTE 3.	4450/04	386	CH 1
54	14	TAH	141A	ZONE 2 TEMPERATURE HIGH	SP+100F																															X	STOP Transfer Zone 2 to 3.	4451/12	NA	
55	14	TAHH	141A	ZONE 2 TEMPERATURE HIGH HIGH	**1750 F** SEE REMARKS	X										X																						RCRA AWFCO MPF-02 **and MACT AWFCO MPF(M)-02**. SPs: 1750F for projos, 1550F for bulk items. See NOTE 3.	**4422/06**	**382**	CH 1
56	14	TALL	141B	ZONE 2 TEMPERATURE LOW LOW	**1000 F** SEE REMARKS	X										X																						MACT AWFCO MPF(M)-**09**. ROHA. SPs: 1000F for TCs, 1400F for projos, 1100F for spray tanks and bombs. See NOTE 3.	**4452/06**	**328**	CH 1
57	14	TAL	152	ZONE 1 BURNER CONTROL	SP-100F																															X	(see FAWB Note B-13)	4450/12	**NA**	CH 1
58	14	TALL	152	ZONE 1 BURNER CONTROL	**1000 F** SEE REMARKS	X											X																					RCRA AWFCO MPF-10 **and MACT AWFCO MPF(M)-08**. SPs: 1000F for TCs, 1400F for projos, 1100F for spray tanks and bombs. See NOTE 3.	4450/10	388	CH 1
59	14	TAH	152A	ZONE 1 TEMPERATURE HIGH	SP+100F																															X	STOP Transfer Zone 1 to 2.	4450/14	NA	
60	14	TAHH	152A	ZONE 1 TEMPERATURE HIGH HIGH	**1750 F** SEE REMARKS	X																																RCRA AWFCO MPF-01 **and MACT AWFCO MPF(M)-01**. SPs: 1750F for projos, 1550F for bulk items. See NOTE 3.	**4452/02**	**382**	CH 1
61	14	TALL	152B	ZONE 1 TEMPERATURE LOW LOW	**1000 F** SEE REMARKS	X																																MACT AWFCO MPF(M)-**09**. ROHA. SPs: 1000F for TCs, 1400F for projos, 1100F for spray tanks and bombs. See NOTE 3.	**4452/12**	**328**	CH 1
62	14	TAH	153	ZONE 3 BURNER CONTROL	SP+100F																															X		4451/02	NA	
63	14	TAHH	153	ZONE 3 BURNER CONTROL	**1750 F** SEE REMARKS	X																																RCRA AWFCO MPF-03 **and MACT AWFCO MPF(M)-03**. SPs: 1750F for projos, 1550F for bulk items. See NOTE 3.	**4423/06**	**382**	CH 1
64	14	TAL	153	ZONE 3 BURNER CONTROL	SP-100F																															X	(see FAWB Note B-13)	4451/00	**NA**	CH 1
65	14	TALL	153	ZONE 3 BURNER CONTROL	**1000 F** SEE REMARKS	X									X																						RCRA AWFCO MPF-10 **and MACT AWFCO MPF(M)-08**. SPs: 1000F for TCs, 1400F for projos, 1100F for spray tanks and bombs. See NOTE 3.	4450/16	390	CH 1
66	14	TALL	153A	ZONE 3 TEMPERATURE LOW LOW	**1000 F** SEE REMARKS	X									X																						MACT AWFCO MPF(M)-**09**. ROHA. SPs: 1000F for TCs, 1400F for projos, 1100F for spray tanks and bombs. See NOTE 3.	**4453/00**	**390**	CH 1
67	14	PAH	155B	MPF PILOT FUEL GAS	2.5 psig																															X		2050/02	NA	
68	14	PAL	155B	MPF PILOT FUEL GAS	1.5 psig																															X		2050/00	NA	
69	14	SSL	157	MPF FURN ZONE 1 CONVEYOR	zero speed	X																																Input to 14-XA-26.	B401/17	NA	
70	14	PAH	159	MPF MAIN FUEL GAS	5.0 psig																															X		2050/06	NA	CH 1
71	14	PAL	159	MPF MAIN FUEL GAS	**3.5 psig**																															X		2050/04	NA	CH 1

UMCDF METAL PARTS FURNACE (MPF) SYSTEM

UMCDF MPF — ALARM AND INTERLOCK MATRIX — **UMCDF MPF**

P&IDs: UM-1-D-11, -528, -529, -530/1, and -530/2; PLC: ICS-CONR-113, INTERLOCK I-8

F00 - SPARE
F01 - SPARE
F02 - S/D COOLING CONVEYOR MMS-CNVP-121
F03 - S/D UNLOAD CONVEYOR MMS-CNVP-120
F04 - STOP ZONE 1 TIMER
F05 - STOP ZONE 2 TIMER
F06 - STOP ZONE 3 TIMER
F07 - S/D DISCHARGE AIRLOCK CONVEYOR
F10 - S/D ZONE 3 CONVEYOR
F11 - S/D ZONE 2 CONVEYOR
F12 - S/D ZONE 1 CONVEYOR
F13 - S/D CHARGE AIRLOCK CONVEYOR
F14 - S/D COMBUSTION AIR BLOWER
F15 - S/D RESPECTIVE AFTERBURNER BURNER
F16 - S/D RESPECTIVE PRIMARY CHAMBER BURNER
F17 - STOP FEED
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - SPARE
P13 - SPARE
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LQR PMP ON
P07 - S/D EMPTY OUT PUMP
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LQR PUMPS
P04 - S/D 1ST & 2ND STG ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D IST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17 16 15 14 13 12 11 10 07 06 05 04 03 02 01 00	B8:011/ 17 16 15 14 13 12 11 10 07 06 05 04 03 02 01 00	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX	
72	**14 PALL 159**	**MPF MAIN FUEL GAS**	**3.0 psig**	**X**		**RCRA AWFCO MPF-04 and MACT AWFCO MPF(M)-4.**	**2050/12**	**382**	CH 1
73	14 PSHH 160	MPF PILOT FUEL GAS	3.0 psig		**X**	SP from TOCDF.	2020/06	NA	CH 1
74	14 PSHH 207	BURNER 1 FUEL GAS	4.5 psig	X		SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 1.	2020/10	NA	
75	14 PSLL 207	BURNER 1 FUEL GAS	3.0 psig	X		SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 1.	2020/12	NA	
76	14 PSHH 227	BURNER 2 FUEL GAS	4.5 psig	X		SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 2.	2220/02	NA	
77	14 PSLL 227	BURNER 2 FUEL GAS	3.0 psig	X		SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 2.	2220/04	NA	
78	14 PSHH 247	BURNER 3 FUEL GAS	4.5 psig	X		SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 3.	2420/02	NA	
79	14 PSLL 247	BURNER 3 FUEL GAS	3.0 psig	X		SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 3.	2420/04	NA	
80	14 PSHH 267	BURNER 4 FUEL GAS	4.5 psig	X		SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 4.	2620/02	NA	
81	14 PSLL 267	BURNER 4 FUEL GAS	3.0 psig	X		SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 4.	2620/04	NA	
82	14 PSHH 287	BURNER 5 FUEL GAS	4.5 psig	X		SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 5.	2820/02	NA	
83	14 PSLL 287	BURNER 5 FUEL GAS	3.0 psig	X		SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 5.	2820/04	NA	
84	14 PSHH 307	BURNER 6 FUEL GAS	4.5 psig	X		SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 6.	3020/02	NA	
85	14 PSLL 307	BURNER 6 FUEL GAS	3.0 psig	X		SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 6.	3020/04	NA	
86	14 PSHH 327	BURNER 7 FUEL GAS	4.5 psig	X		SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 7.	3220/02	NA	
87	14 PSLL 327	BURNER 7 FUEL GAS	3.0 psig	X		SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 7.	3220/04	NA	
88	14 PSHH 347	BURNER 8 FUEL GAS	4.5 psig	X		SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 8.	3420/02	NA	
89	14 PSLL 347	BURNER 8 FUEL GAS	3.0 psig	X		SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 8.	3420/04	NA	
90	14 PSHH 367	BURNER 9 FUEL GAS	4.5 psig	X		SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 9.	3620/02	NA	
91	14 PSLL 367	BURNER 9 FUEL GAS	3.0 psig	X		SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 9.	3620/04	NA	

UMCDF METAL PARTS FURNACE (MPF) SYSTEM

UMCDF MPF — **UMCDF MPF**

ALARM AND INTERLOCK MATRIX

P&IDs: UM-1-D-11, -528, -529, -530/1, and -530/2; PLC: ICS-CONR-113, INTERLOCK I-8

F00 - SPARE
F01 - SPARE
F02 - S/D COOLING CONVEYOR MMS-CNVP-121
F03 - S/D UNLOAD CONVEYOR MMS-CNVP-120
F04 - STOP ZONE 1 TIMER
F05 - STOP ZONE 2 TIMER
F06 - STOP ZONE 3 TIMER
F07 - S/D DISCHARGE AIRLOCK CONVEYOR
F10 - S/D ZONE 3 CONVEYOR
F11 - S/D ZONE 2 CONVEYOR
F12 - S/D ZONE 1 CONVEYOR
F13 - S/D CHARGE AIRLOCK CONVEYOR
F14 - S/D COMBUSTION AIR BLOWER
F15 - S/D RESPECTIVE AFTERBURNER BURNER
F16 - S/D RESPECTIVE PRIMARY CHAMBER BURNER
F17 - STOP FEED
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - SPARE
P13 - SPARE
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LQR PMP ON
P07 - S/D EMPTY OUT PUMP
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LQR PUMPS
P04 - S/D 1ST & 2ND STG ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D IST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	B8:011/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX	
92	14 AISH 386	FUEL GAS LEAK TO ROOM	25% LEL		X																														Stop feed being added to P&ID by UMAP0833PAS.	1020/04	402	
93	14 PSHH 387	BURNER 10 FUEL GAS	4.5 psig			X																													SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 10.	3820/02	NA	
94	14 PSLL 387	BURNER 10 FUEL GAS	3.0 psig			X																													SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 10.	3820/04	NA	
95	14 XA 388A	MMS-CNVP-120B	MALF	X	X											X																			S/D conveyor lift motor only.	0468/11	376	CH 1
96	14 XS 393A/B	MMS-CNVP-120 PULL CORD	Pulled		X											X	X																			0420/14	462	
97	14 XS 394A/B	MMS-CNVP-121 PULL CORD	Pulled													X	X																			0420/16	466	CH 1
98	14 PSHH 407	BURNER 11 FUEL GAS	4.5 psig				X																												SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 11.	0020/02	NA	
99	14 PSLL 407	BURNER 11 FUEL GAS	3.0 psig				X																												SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 11.	0020/04	NA	
100	14 PSHH 427	BURNER 12 FUEL GAS	4.5 psig				X																												SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 12.	0220/02	NA	
101	14 PSLL 427	BURNER 12 FUEL GAS	3.0 psig				X																												SP from TOCDF. BMS 3-P running interlock. LOCKOUT burner 12.	0220/04	NA	
102	14 XY 501	DISCHARGE AIRLOCK EXHAUST	MALF	X	X																														I-lock for MPF exit door unclamp.	0477/11	474	
103	14 XY 502	DISCHARGE AIRLOCK EXHAUST	MALF	X	X																														I-lock for MPF exit door unclamp.	0478/11	474	
104	14 FAL 718	MPF-FURN-101 PRW SPRAY	0.2 gpm																															X	Enabled when 14-XV-717 is open and TIC-141A or TIC-152A CV > 5%. SP & response per ANCDF.	4451/14	NA	
105	14 ISH 782	MPF-FURN-101C ZN 3 CONV	120% AMPS																															X	**3 sec delay.**	0420/00	NA	CH 1
106	14 ISH 783	MPF-FURN-101B ZN 2 CONV	120% AMPS																															X	3 sec delay.	0420/02	NA	
107	14 ISH 784	MPF-FURN-101A ZN 1 CONV	120% AMPS																															X	3 sec delay.	0420/04	NA	
108	14 ISH 785	MMS-CNVP-119 CHG AL CONV	120% AMPS																															X	3 sec delay.	0420/06	NA	
109	14 ISH 786	MPF-CNVP-101 DISH AL CONV	120% AMPS																															X	3 sec delay.	0420/10	NA	
110	14 PDAHH 786	MPF EXHAUST REFRACT VENTURI	1.2 in wc		X																														RCRA AWFCO MPF-12. **MACT AWFCO MPF(M)-11.** See NOTE 3.	1050/04	434	CH 1
111	14 KAL 786A	MPF EXHAUST RESIDENCE TIME	0.5 sec		X																															1050/06	406	
112	14 PDAHH 786A	MPF EXHAUST REFRACT VENTURI	1.2 in wc		X																														MACT AWFCO MPF(M)-**12**. ROHA. See NOTE 3.	**1051/10**	**424**	CH 1
113	14 XA 792	MMS-CNVP-121 ACCUM CONV	MALF	X													X																			0469/11	392	CH 1
114	14 FISH 796	MAIN FUEL GAS FLOW HIGH	**370 scfm**		X																														Close FV-796. See NOTE 4.	2020/02	436	CH 1
115	14 XA 796	FUEL GAS FLOW CONTROL	MALF	X	X																														Close FV-796	2060/11	436	
116	14 SSL 798F/R	MMS-CNVP-121 COOLING CONV																																	**Bypassed in code; function based on both motor run contacts instead**	I:107/00 I:107/01	NA	CH 1
117	14 PSL 857	MPF-FURN-101 SPARGE AIR	20 in wc																															X	3 sec delay. Alarm active for TCs and spray tanks only. SP from TOCDF.	0420/12	NA	

UMCDF METAL PARTS FURNACE (MPF) SYSTEM

UMCDF MPF — **UMCDF MPF**

ALARM AND INTERLOCK MATRIX

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F01 - SPARE
F02 - S/D COOLING CONVEYOR MMS-CNVP-121
F03 - S/D UNLOAD CONVEYOR MMS-CNVP-120
F04 - STOP ZONE 1 TIMER
F05 - STOP ZONE 2 TIMER
F06 - STOP ZONE 3 TIMER
F07 - S/D DISCHARGE AIRLOCK CONVEYOR
F10 - S/D ZONE 3 CONVEYOR
F11 - S/D ZONE 2 CONVEYOR
F12 - S/D ZONE 1 CONVEYOR
F13 - S/D CHARGE AIRLOCK CONVEYOR
F14 - S/D COMBUSTION AIR BLOWER
F15 - S/D RESPECTIVE AFTERBURNER BURNER
F16 - S/D RESPECTIVE PRIMARY CHAMBER BURNER
F17 - STOP FEED
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - SPARE
P13 - SPARE
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LQR PMP ON
P07 - S/D EMPTY OUT PUMP
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LQR PUMPS
P04 - S/D 1ST & 2ND STG ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D IST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	TAG NUMBER	DESCRIPTION		SET POINT	B8:010/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	B8:011/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX	
118	14 BSLL 883	MPF-FURN-101	#1 E100	LOCKOUT		X																													Mask Word bit 17 is the only bit set.	2020/00	NA	CH 1
119	14 BSLL 884	MPF-FURN-101	#2 E100	LOCKOUT		X																													Mask Word bit 17 is the only bit set.	2220/00	NA	CH 1
120	14 BSLL 885	MPF-FURN-101	#3 E100	LOCKOUT		X																													Mask Word bit 17 is the only bit set.	2420/00	NA	CH 1
121	14 BSLL 886	MPF-FURN-101	#4 E100	LOCKOUT		X																													Mask Word bit 17 is the only bit set.	2620/00	NA	CH 1
122	**14 BSLL 883/4/5/6**	**MPF-FURN-101**	**ZONE #1**	**LOCKOUT**	**X**																														**RCRA AWFCO MPF-28 and MACT AWFCO MPF(M)-31 for all burners out in Zone 1, or 3 burners out and Zone 1 < 1400F. See NOTE 3**	**2650/02**	**408**	CH 1
123	14 BSLL 887	MPF-FURN-101	#5 E100	LOCKOUT		X																													Mask Word bit 17 is the only bit set.	2820/00	NA	CH 1
124	14 BSLL 888	MPF-FURN-101	#6 E100	LOCKOUT		X																													Mask Word bit 17 is the only bit set.	3020/00	NA	CH 1
125	14 BSLL 889	MPF-FURN-101	#7 E100	LOCKOUT		X																													Mask Word bit 17 is the only bit set.	3220/00	NA	CH 1
126	14 BSLL 890	MPF-FURN-101	#8 E100	LOCKOUT		X																													Mask Word bit 17 is the only bit set.	3420/00	NA	CH 1
127	**14 BSLL 887/8/9/90**	**MPF-FURN-101**	**ZONE #2**	**LOCKOUT**	**X**																														**RCRA AWFCO MPF-28 and MACT AWFCO MPF(M)-31 for all burners out in Zone 2, or 3 burners out and Zone 2 < 1400F. See NOTE 3**	**3450/02**	**410**	CH 1
128	14 BSLL 891	MPF-FURN-101	#9 E100	LOCKOUT		X																													Mask Word bit 17 is the only bit set.	3620/00	NA	CH 1
129	14 BSLL 892	MPF-FURN-101	#10 E100	LOCKOUT		X																													Mask Word bit 17 is the only bit set.	3820/00	NA	CH 1
130	**14 BSLL 891/2**	**MPF-FURN-101**	**ZONE #3**	**LOCKOUT**	**X**																														**RCRA AWFCO MPF-28 and MACT AWFCO MPF(M)-31 for all burners out in Zone 3, or 1 burner out and Zone 3 < 1400F. See NOTE 3**	**3850/02**	**412**	CH 1
131	14 BSLL 893	MPF-FURN-102	#11 E100	LOCKOUT			X																												Mask Word bit 17 is the only bit set.	0020/00	NA	CH 1
132	14 BSLL 893/4	MPF-FURN-102	AFTERBURNERS	LOCKOUT	X	X	X																												RCRA AWFCO MPF-29 **and MACT AWFCO MPF(M)-32.** S/D all burners. See NOTE 3.	**0220/06**	**426**	CH 1
133		**MPF-FURN-102 Burners Off**	**Aferburner**	**Not in Auto**	**X**	**X**																														**0205/10**	**426**	CH 1
134	14 BSLL 894	MPF-FURN-102	#12 E100	LOCKOUT			X																												Mask Word bit 17 is the only bit set.	0220/00	NA	CH 1
135	14 XS 902A	MPF-FURN-101	LOCAL E-STOP	E-STOP	X	X																													S/D burners #1-10.	4420/06	340	
136	14 XS 902B	MPF-FURN-102	LOCAL E-STOP	E-STOP	X	X	X	X																											S/D all burners.	1020/06	342	
137	61 XA 216	SCW-PUMP-101	CIRC PUMP 1	MALF	X																														Switchover to backup.	4260/11	NA	
138	61 XA 220	SCW-PUMP-102	CIRC PUMP 2	MALF	X																														Switchover to backup.	4261/11	NA	
139	61 PSLL 222	SCW-PMP-101/102	SEC COOL WTR	**20 psig**		X								X																					**5** sec delay. Unclamp I-lock for discharge airlock exit door. S/D both SCW pumps. Note: AN deleted zone 3 timer I-lock.	4220/06	384	CH 1
140	61 PAL 223	SCWPMP101/102	SEC COOL WTR	35 psig																															**30** sec delay after pump startup. Switchover to backup.	4250/00	NA	CH 1

UMCDF METAL PARTS FURNACE (MPF) SYSTEM

UMCDF MPF — **UMCDF MPF**

ALARM AND INTERLOCK MATRIX

P&IDs: UM-1-D-11, -528, -529, -530/1, and -530/2; PLC: ICS-CONR-113, INTERLOCK I-8

F00 - SPARE
F01 - SPARE
F02 - S/D COOLING CONVEYOR MMS-CNVP-121
F03 - S/D UNLOAD CONVEYOR MMS-CNVP-120
F04 - STOP ZONE 1 TIMER
F05 - STOP ZONE 2 TIMER
F06 - STOP ZONE 3 TIMER
F07 - S/D DISCHARGE AIRLOCK CONVEYOR
F10 - S/D ZONE 3 CONVEYOR
F11 - S/D ZONE 2 CONVEYOR
F12 - S/D ZONE 1 CONVEYOR
F13 - S/D CHARGE AIRLOCK CONVEYOR
F14 - S/D COMBUSTION AIR BLOWER
F15 - S/D RESPECTIVE AFTERBURNER BURNER
F16 - S/D RESPECTIVE PRIMARY CHAMBER BURNER
F17 - STOP FEED
MALFUNCTION

P17 - SPARE
P16 - SPARE
P15 - SPARE
P14 - SPARE
P13 - SPARE
P12 - S/D WATER RETURN PMP
P11 - BKUP BRINE PMP ON
P10 - BKUP CLEAN LQR PMP ON
P07 - S/D EMPTY OUT PUMP
P06 - S/D BRINE PUMPS
P05 - S/D CLEAN LQR PUMPS
P04 - S/D 1ST & 2ND STG ID FAN
P03 - SPARE
P02 - SPARE
P01 - S/D IST STAGE ID FAN
P00 - S/D 2ND STAGE ID FAN
PREALARM

ITM NUM	TAG NUMBER	DESCRIPTION	SET POINT	B8:010/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	B8:011/ 17	16	15	14	13	12	11	10	07	06	05	04	03	02	01	00	REMARKS	ALARM BIT B001:XX/XX	MASK WORD B8:XX	
141	61 LSL 226	SCW-TANK-101 SEC COOL WTR	6 in																															X	3 sec delay. Local operator to add PRW.	4220/00	NA	
142	61 LSH 227	SCW-TANK-101 SEC COOL WTR	18 in																															X	3 sec delay. Local operator to drain PRW.	4220/02	NA	
143	61 TAHH 229	SCW-TANK-101 SEC COOL WTR	150F	X									X																						Note: AN deleted zone 3 timer I-lock and added unclamp I-lock for discharge airlock exit door.	4250/02	442	
144	61 TAH 233	SCW-EXCH-101 SEC COOL WTR	130F																															X		4250/04	NA	
145	61 FAL 267	SCW-PUMP-101 SEC COOL WTR	**62 gpm**																															X		4250/06	NA	CH 1
146	61 LSLL 606	SCW-TANK-101 SEC COOL WTR	3 in	X									X																						10 sec delay. Local operator to add PRW. Note: AN deleted zone 3 timer I-lock and added unclamp I-lock for discharge airlock exit door.	4220/04	478	
147	71 XS 003	ICS-CONS-110 EMERG STOP	E-STOP	X	X	X	X	X	X	X	X	X												**X**			X						X			4421/10	344	CH 1
148	71 XS 023	ICS-CONS-112 EMERG STOP	E-STOP	X	X	X	X	X	X	X	X	X												**X**			X						X			4421/12	344	CH 1
149	71 XS 043	ICS-CONS-111 EMERG STOP	E-STOP	X	X	X	X	X	X	X	X	X												**X**			X						X			4421/16	344	CH 1
150	71 XS 063	ICS-CONS-115 EMERG STOP	E-STOP	X	X	X	X	X	X	X	X	X												**X**			X						X			4422/00	344	CH 1
151	71 XS 083	ICS-CONS-116 EMERG STOP	E-STOP	X	X	X	X	X	X	X	X	X												**X**			X						X			4422/02	344	CH 1
152	71 XS 143	ICS-CONS-108 EMERG STOP	E-STOP	X	X	X	X	X	X	X	X	X												**X**			X						X		The DSIC is preparing an ECP to add this E-stop to UM-1-D-530/1. Ref. RFI C-ALL-005.	**4423/10**	**344**	CH 1

NOTE 1: UM-1-D-528 shows single malfunction alarms (e.g. 14-XA-016) for all MPF airlock doors. The code, however, will have separate malfunction alarms for each clamp (e.g. **XY-001A**) and door (e.g. **14-XY-001B**). An ECP is required to add the separate alarms to UM-1-D-528.

NOTE 2: The CEMS configuration in the A&I matrix reflects changes decribed in UMAC908MON R2 that deletes the MPF primary chamber exhaust CO monitors. The MPF primary chamber exhaust O2 monitor alarm setpoint is from approved RFI S-ALL-249. CEMS alarms associated with monitors downstream of the MPF afterburner are included in the PAS/PFS FAWB, Book 28.

NOTE 3: RCRA AWFCOs are based on UMAP818MPF and MACT AWFCOs are based on UMUF873MPF.

NOTE 4: Under TEMP-1109-MPF, TOCDF removed14-FISH-796. At the Jan 2001 ANCDF MPF Review Meeting, ANCDF decided that the alarm would be active only if all burners are shutdown and fuel flow is greater than 0 scfm. There will be no automatic action. An operator can close 14-FV-796 in response to the alarm. The UMCDF SC will determine the UMCDF alarm response.

APPENDIX D

PLC Automatic Control Sequences

Appendix D contains a summary of PLC automatic control sequences based on the current versions of the PLC code for each of the sites. This appendix also includes descriptions of the burner management system (BMS) circuit logic for the MPF furnace.

The PLC automatic control sequence summaries were generated based on the control system rung ladders in the PLC code for the TOCDF MPF furnace. The operator interface with the PLCs, the Advisor PC system, stores device information in a database that consists of *tags*, or database records used for storing all necessary information related to a device that is monitored or controlled by the Advisor PC system. **D6** tags are used for discrete devices that may be controlled from the Control Room. In this appendix, automatic control for all devices with **D6** tags are described, grouped by the Advisor PC screens on which they appear. Details related to **D6** device format can be found in the CSDP Control Systems Software Design Guide. Note that Advisor PC tag numbers may not match P&ID tag numbers exactly since Advisor PC tag numbers are labels in the code that refer to a device that may be more encompassing than the P&ID device.

Because the MPF PLC automatic control sequences are or will be similar for all four sites, the control sequences are listed in a single table for each screen (Tables D.2 thru D.6) with annotations in the description for each device that indicate the differences, if any, between the control for the device at the different sites. Similarly, the BMS control logic summaries are listed in a single table (Table D.7) with annotations indicating any site-specific differences.

D.1 MPF PLC Automatic Control Sequences

Specific site code currently exists for *ANCDF and* TOCDF. The Equipment Installation Contractor (EIC) is developing site-specific code for UMCDF and PBCDF. At *all sites*, control for the MPF is *or will be* provided by ICS-CONR-113. The information in the tables is based on the *ANCDF and* TOCDF control system rung ladders as of *April 2001.*

The TOCDF MPF system has 22 Advisor PC screens associated with its operation. Six of the screens are associated with operation of the MPF PAS. *The ANCDF MPF has 24 Advisor PC screens associated with its operation. Eight of the screens are associated with MPF PAS/PFS operation.* Control sequences associated with *the TOCDF PAS screens and the ANCDF PAS/PFS* screens are described in the PAS/PFS Programmatic Process FAWB, Book 28. The 16 screens described in this appendix for the *ANCDF and* TOCDF MPF system are listed in Table D.1. Since the control sequences for the two AFB burners are similar, they are presented in a single table with AFB #2 (MPF burner #12) device identifiers (e.g., tag numbers, component numbers) enclosed in brackets []. Similarly,

since the control sequences for the ten primary furnace burners are similar, they are presented in a single table, with an index providing burner-specific device identifiers.

Table D.1 *ANCDF and* TOCDF MPF System Advisor PC Screens

Advisor PC Screen Name	Process Screen Designation
MPF Burner #11 [#12]	MBB [MBC]
MPF Furnace Material Handling	MPM
MPF Furnace Afterburner	MPA
MPF Burner #1 [#2 thru #10]	MB1 [MB2 thru MB9, MBA]
MPF Secondary Cooling	MPC
MPF Furnace Temperature Control	MPF

Table D.2. *ANCDF and* TOCDF MPF PLC Automatic Control Sequences
Advisor PC Screen: **MBB [MBC]**

Device:	**MPF Afterburner #1 [#2]**
Advisor PC Tag:	X14HS869 [X14HS870]
CONR:	C113 [C113]
Driver Word:	0060 [0260]
Driver Type:	4 (manual only)
Auto start:	N/A. The burner is manual operation only.
I-LOCK:	The following conditions must be satisfied to allow the burner to be started: • MPF Afterburner #1 [#2] BMS Lockout is not active • MPF Deathwish "Shutdown both afterburners" is not active (see A&I matrix)
Device:	**MPF Afterburner #1 [#2] BMS Lockout Reset Icon**
Advisor PC Tag:	X14HS881 [X14HS882]
CONR:	C113 [C113]
Driver Word:	0061 [0261]
Driver Type:	N/A
Auto start:	N/A
I-LOCK:	N/A When the operator selects this icon and issues a manual start command, the PLC will energize the "Lockout Reset" output for a preset time duration.

Table D.3. *ANCDF and* TOCDF MPF PLC Automatic Control Sequences
Advisor PC Screen: **MPM**

Device:	**MMS-CNVP-119 MPF Charge Airlock Conveyor**
Advisor PC Tag:	X14CNV119
CONR:	C113
Driver Word:	0466
Driver Type:	7
Auto Forward:	The auto forward relay will be active if either of the following conditions are satisfied: • Auto tray transfer charge airlock → zone #1 relay is active (see below) • Auto tray transfer charge car → charge airlock relay is active (see below)
Auto Reverse:	None.
Forward I-Lock:	The following conditions must be satisfied to allow the device to operate forward: • MMS-CNVP-119 Deathwish relay not active (see A&I matrix) • 14-ZS-002 (tray at end position) not active **OR** 14-XY-008B Charge door open and zone #1 conveyor running forward and zone #1 conveyor running fast
Reverse I-Lock:	The following conditions must be satisfied to allow the device to operate reverse: • MMS-CNVP-119 Deathwish relay not active (see A&I matrix) • 14-ZS-600 (tray in charge airlock) not active **OR** 14-XY-001 charge airlock door open and 05-ZS-168 charge car at MPF without tray present *and 14-ZS-600 (tray in charge airlock) active*
Relay:	Auto tray transfer charge airlock → zone #1 relay is active (see above) if the campaign is not selected to Wet-Eye Bombs or Spray Tanks and the following conditions are satisfied: • Tray transfer sequence counter is on step 4. • 14-ZS-600 (tray is in charge airlock) • Start feed Icon is active • 14-ZS-601 (tray is in zone #1) in not made Note: Once energized, the relay will remain active until 14-ZS-601 (tray in zone #1) is made. Auto tray transfer charge airlock → zone #1 relay is active (see above) if the campaign is selected to Wet-Eye Bombs or Spray Tanks and the following conditions are satisfied: • Tray transfer sequence counter is on step 4. • 14-ZS-600 (tray is in charge airlock)

Table D.3. *ANCDF and* TOCDF MPF PLC Automatic Control Sequences
Advisor PC Screen: **MPM**

	• Start feed Icon is active • 14-ZS-005 (tray at end of zone #3) is made or 14-ZS-603 (tray in zone #3) is not made • 14-ZS-003 (tray at end of zone #1) is not made • 14-ZS-601 (tray is in zone #1) in not made • 14-ZS-602 (tray is in zone #2) in not made Note: Once energized, the relay will remain active until 14-ZS-602 (tray in zone #2) is made.
Relay:	Auto tray transfer charge car → charge airlock relay is active (see above) if the following conditions are satisfied: • Charge Car has a tray and is aligned with the MPF • DICO from MPF to request a charge car with a tray (see below) is active • 14-ZS-600 (tray in charge airlock) not made • Charge Car Fail To Transfer Timer not expired (60 sec) • 14-ZS-601 (tray is in zone #1) in not made Note: Once energized, the relay will remain active until 14-ZS-600 (tray in charge airlock) is made, 14-ZS-601 (tray in zone #1) is made, or Charge Car Fail To Transfer Timer expires (60 sec). DICO from MPF to request a charge car with tray (see above) will be active if all of the following conditions are satisfied: • Feed Icon active • 14-ZS-600 (tray in charge airlock) not made • 14-XY-001B (charge airlock door) is in “auto” • 14-XY-001A (charge airlock clamps) is in “auto” • 14-CNVP-119 (charge airlock conveyor) is in “auto”
Device:	**MMS-CNVP-120A MPF Discharge Tray Unloading Conveyor**
Advisor PC Tag:	X14CN120A
CONR:	C113
Driver Word:	0467
Driver Type:	7
Auto Forward:	The auto forward relay will be active if all of the following conditions are satisfied: • 14-ZS-604 Tray on discharge airlock conveyor (note: this relay is bypassed once the auto forward relay is energized) • 14-ZS-035A MPF-FURN-101 discharge airlock door raised • 14-ZS-391A MMS-CNVP-120B Conveyor Raised
Auto Reverse:	None.
Forward I-Lock:	The following conditions must be satisfied to allow the device to operate forward: • MMS-CNVP-120A Deathwish relay not active (see A&I matrix) • 14-ZS-089 tray on unloading conveyor is not active

Table D.3. *ANCDF and* TOCDF MPF PLC Automatic Control Sequences Advisor PC Screen: **MPM**	
Reverse I-Lock:	The following conditions must be satisfied to allow the device to operate reverse: • MMS-CNVP-120A Deathwish relay not active (see A&I matrix) • 14-ZS-089 tray on unloading conveyor is not active **OR** 14-ZS-391A MMS-CNVP-120B unloading conveyor lift raised AND 14-XY-035B MPF-FURN-101 discharge airlock door raised AND valid tray number not entered AND 14-ZS-089 tray present on unloading conveyor *AND MPF-CNVP-101 discharge airlock conveyor is running in reverse.*
Device:	**MMS-CNVP-120B MPF Discharge Tray Unloading Conveyor Lift**
Advisor PC Tag:	X14CN120B
CONR:	C113
Driver Word:	0468
Driver Type:	7
Auto Raise:	The auto raise relay will be active if both of the following conditions are satisfied: • 14-ZS-089 (tray on unloading conveyor) not made • 14-XY-035B MPF-FURN-101 discharge airlock door auto open relay is active OR there is less than one minute remaining on the discharge airlock purge timer
Auto Lower:	The auto lower relay will be active whenever the auto raise relay is not active.
Raise I-Lock:	The following conditions must be satisfied to allow the device to raise: • 14-ZS-089A (tray in transition to discharge cooling conveyor) is not made • MMS-CNVP-121 discharge cooling conveyor is not running forward • MMS-CNVP-121 discharge cooling conveyor is not running reverse • MMS-CNVP-120 Deathwish relay not active (see A&I matrix)
Lower I-Lock:	The following conditions must be satisfied to allow the conveyor to operate lower: • Tray in transition between discharge airlock and unloading conveyor relay is not active • MMS-CNVP-121 discharge cooling conveyor is not running forward • MMS-CNVP-121 discharge cooling conveyor is not running reverse • MMS-CNVP-120 Deathwish relay not active (see A&I matrix) • Enter tray ID at exit conveyor request not outstanding

Table D.3. *ANCDF and* TOCDF MPF PLC Automatic Control Sequences
Advisor PC Screen: **MPM**

Device:	**MMS-CNVP-121 MPF Discharge Cooling Conveyor**
Advisor PC Tag:	X14CNV121
CONR:	C113
Driver Word:	0469
Driver Type:	7
Auto Forward:	The auto forward relay will be active if either of the following conditions are satisfied: • 14-ZS-089 (tray on unloading conveyor) is made AND 14-ZS-391B unloading conveyor lift lowered • MMS-CNVP-121 discharge cooling conveyor auto forward relay active (latch) AND tray was present on MMS-CNVP-121 relay active or 14-ZS-795 (tray at head of discharge cooling conveyor) is not made
Auto Reverse:	The auto reverse relay will be active if all of the following conditions are satisfied: • MMS-CNVP-121 discharge cooling conveyor auto forward relay active (latch) OR 14-HS-797 MMS-CNVP-121 local "Repack" push button input active • 14-ZS-795 (tray at beginning of discharge cooling conveyor) is not made and MMS-CNVP-121 is in automatic
Forward I-Lock:	The following conditions must be satisfied to allow the device to operate forward: • MMS-CNVP-121 Deathwish relay not active (see A&I matrix) • 14-ZS-076 (tray on MMS-CNVP-121) is not made OR 14-ZS-074 (tray at MMS-CNVP-121 exit end) is not made • 14-ZS-391A MMS-CNVP-120B lift raised OR 14-ZS-391B MMS-CNVP-120B lift lowered
Reverse I-Lock:	The following conditions must be satisfied to allow the device to operate reverse: • 14-ZS-391B MMS-CNVP-120B lift lowered AND 14-ZS-089 (tray on unloading conveyor) is not made • 14-ZS-391A MMS-CNVP-120B lift raised AND 14-ZS-795 (tray at head of cooling conveyor) is not made • MMS-CNVP-121 Deathwish relay not active (see A&I matrix)
Device:	**MMS-CNVP-101 MPF Discharge Airlock Conveyor**
Advisor PC Tag:	X14CNV101
CONR:	C113
Driver Word:	0470
Driver Type:	7
Auto Forward:	The auto forward relay will be active if either of the following conditions are satisfied: • Zone 3 to discharge airlock automatic tray transfer sequence relay is active (see below)

Table D.3. *ANCDF and* TOCDF MPF PLC Automatic Control Sequences
Advisor PC Screen: **MPM**

	• MPF-CNVP-101 auto forward relay active (latch) or 14-ZS-604 (tray on discharge airlock conveyor) is made AND MMS-CNVP-120A is running forward and 14-ZS-035A MPF discharge airlock door raised.
Auto Reverse:	There is no auto reverse logic for this device.
Forward I-Lock:	The following conditions must be satisfied to allow the device to operate forward: • MMS-CNVP-101 Deathwish relay not active (see A&I matrix) • 14-ZS-006 tray on MPF-CNVP-101 conveyor is not active OR 14-ZS-035A MPF-FURN-101 discharge airlock door is raised AND MMS-CNVP-120A conveyor is running forward
Reverse I-Lock:	The following conditions must be satisfied to allow the device to operate reverse: • MMS-CNVP-101 Deathwish relay not active (see A&I matrix) • 14-ZS-604 (tray in discharge airlock) is not made OR 14-ZS-013A MPF-FURN-101 exit door is open AND MPF-FURN-101C zone 3 conveyor is running reverse
Relay:	Auto tray transfer Zone 3 → discharge airlock relay is active (see above) if the following conditions are satisfied: • Tray transfer sequence counter is on step 1 • Start feed Icon is active • Zone 3 cycle timer is expired • 14-ZS-005 (tray at end of Zone #3) is made • 14-ZS-604 (tray in discharge airlock) is not made Note: Once energized, the relay will remain active until 14-ZS-604 (tray in discharge airlock) is made.
Device:	**14-XY-008A MPF Entry Door Clamp**
Advisor PC Tag:	X14XY008A
CONR:	C113
Driver Word:	0471
Driver Type:	9
Auto Clamp:	The auto clamp relay will be active if the following conditions is satisfied: • 14-XY-008B MPF entry door auto raise relay not active (see below)
Auto Unclamp:	The auto unclamp relay will be active if the following conditions is satisfied: • Charge airlock → zone #1 automatic tray transfer sequence relay is active (see below)

Table D.3. *ANCDF and* TOCDF MPF PLC Automatic Control Sequences Advisor PC Screen: **MPM**	
Clamp I-Lock:	The following condition must be satisfied to allow the device to clamp: • 14-ZS-008B MPF entry door closed
Unclamp I-Lock:	The following conditions must be satisfied to allow the device to unclamp: • 14-XY-001A MPF charge airlock door clamped • 14-ZS-001B MPF charge airlock door closed • 14-XY-013A MPF exit door clamped • 14-ZS-013B MPF exit door closed • *(AN only)* Tray ID OK for tray in charge airlock
Relay:	Auto tray transfer charge airlock → zone #1 relay is active (see above) if the campaign is not selected to Wet-Eye Bombs or Spray Tanks and the following conditions are satisfied: • Tray transfer sequence counter is on step 4. • 14-ZS-600 (tray is in charge airlock) • Start feed Icon is active • 14-ZS-601 (tray is in zone #1) in not made Note: Once energized, the relay will remain active until 14-ZS-601 (tray in zone #1) is made. Auto tray transfer charge airlock → zone #1 relay is active (see above) if the campaign is selected to Wet-Eye Bombs or Spray Tanks and the following conditions are satisfied: • Tray transfer sequence counter is on step 4. • 14-ZS-600 (tray is in charge airlock) • Start feed Icon is active • 14-ZS-005 (tray at end of zone #3) is made or 14-ZS-603 (tray in zone #3) is not made • 14-ZS-003 (tray at end of zone #1) is not made • 14-ZS-601 (tray is in zone #1) in not made • 14-ZS-602 (tray is in zone #2) in not made Note: Once energized, the relay will remain active until 14-ZS-602 (tray in zone #2) is made.
Device:	**14-XY-008B MPF Entry Door**
Advisor PC Tag:	X14XY008B
CONR:	C113
Driver Word:	0472
Driver Type:	9
Auto Raise:	The auto raise relay will be active if the following conditions is satisfied: • Charge airlock to Zone #1 automatic tray transfer sequence relay is active (see below)

Table D.3. *ANCDF and* TOCDF MPF PLC Automatic Control Sequences
Advisor PC Screen: **MPM**

Auto Lower:	The auto lower relay will be active if the following conditions is satisfied: • 14-XY-008B MPF entry door auto raise relay is not active
Raise I-Lock:	The following condition must be satisfied to allow the device to raise: • 14-ZS-008A MPF entry door unclamped OR 14-ZS-008B MPF entry door is raised • MPF Stop feed deathwish relay is not active (see A&I matrix)
Lower I-Lock:	The following conditions must be satisfied to allow the device to lower: • 14-ZS-008A MPF entry door unclamped OR 14-ZS-008B MPF entry door is lowered • 14-ZS-002 Tray in transition between charge airlock and Zone #1 relay is not active
Relay:	Auto tray transfer charge airlock → zone #1 relay is active (see above) if the campaign is not selected to Wet-Eye Bombs or Spray Tanks and the following conditions are satisfied: • Tray transfer sequence counter is on step 4. • 14-ZS-600 (tray is in charge airlock) • Start feed Icon is active • 14-ZS-601 (tray is in zone #1) in not made Note: Once energized, the relay will remain active until 14-ZS-601 (tray in zone #1) is made. Auto tray transfer charge airlock → zone #1 relay is active (see above) if the campaign is selected to Wet-Eye Bombs or Spray Tanks and the following conditions are satisfied: • Tray transfer sequence counter is on step 4. • 14-ZS-600 (tray is in charge airlock) • Start feed Icon is active • 14-ZS-005 (tray at end of zone #3) is made or 14-ZS-603 (tray in zone #3) is not made • 14-ZS-003 (tray at end of zone #1) is not made • 14-ZS-601 (tray is in zone #1) in not made • 14-ZS-602 (tray is in zone #2) in not made Note: Once energized, the relay will remain active until 14-ZS-602 (tray in zone #2) is made.
Device:	**14-XY-013A MPF Exit Door Clamp**
Advisor PC Tag:	X14XY013A
CONR:	C113
Driver Word:	0473
Driver Type:	9

Table D.3. *ANCDF and* TOCDF MPF PLC Automatic Control Sequences Advisor PC Screen: **MPM**	
Auto Clamp:	The auto clamp relay will be active if the following conditions is satisfied: • 14-XY-013B MPF exit door auto raise relay is not active
Auto Unclamp:	The auto unclamp relay will be active if the following conditions is satisfied: • Zone #3→discharge airlock automatic tray transfer sequence relay is active (see below)
Clamp I-Lock:	The following condition must be satisfied to allow the device to clamp: • 14-ZS-013B MPF exit door closed
Unclamp I-Lock:	The following conditions must be satisfied to allow the device to unclamp: • 14-XY-035A MPF discharge airlock door clamped • 14-ZS-035B MPF discharge airlock door lowered • 14-XY-008A MPF entry door clamped • 14-ZS-008B MPF entry door lowered • 14-XY-501 discharge airlock to afterburner purge damper not in malfunction • 14-XY-502 discharge airlock room inlet air purge damper not in malfunction • *(TE only) 14-ZS-501B discharge airlock to afterburner purge damper closed* • *(TE only) 14-ZS-502B discharge airlock room inlet air purge damper closed*
Relay:	Auto tray transfer Zone 3 → discharge airlock relay is active (see above) if the following conditions are satisfied: • Tray transfer sequence counter is on step 1 • Start feed Icon is active • Zone 3 cycle timer is expired • 14-ZS-005 (tray at end of zone #3) is made • 14-ZS-604 (tray in discharge airlock) is not made Note: Once energized, the relay will remain active until 14-ZS-604 (tray in discharge airlock) is made.
Device:	**14-XY-013B MPF Exit Door**
Advisor PC Tag:	X14XY013B
CONR:	C113
Driver Word:	0474
Driver Type:	9
Auto Raise:	The auto raise relay will be active if the following conditions is satisfied: • Zone #3→discharge airlock automatic tray transfer sequence relay is active (see below)

Table D.3. *ANCDF and* TOCDF MPF PLC Automatic Control Sequences
Advisor PC Screen: **MPM**

Auto Lower:	The auto lower relay will be active if the following conditions is satisfied: • 14-XY-013B MPF exit door auto raise relay is not active
Raise I-Lock:	The following condition must be satisfied to allow the device to raise: • 14-ZS-013A MPF exit door unclamped *(w/ 10 sec delay at AN)* OR 14-ZS-013B MPF exit door is raised • 61-PSLL-222 Secondary cooling water system pressure alarm LO LO is not active
Lower I-Lock:	The following conditions must be satisfied to allow the device to lower: • 14-ZS-013A MPF exit door unclamped OR 14-ZS-013B MPF exit door is lowered • 14-ZS-005 (tray at end of zone #3) is not made
Relay:	Auto tray transfer Zone 3 → discharge airlock relay is active (see above) if the following conditions are satisfied: • Tray transfer sequence counter is on step 1 • Start feed Icon is active • Zone 3 cycle timer is expired • 14-ZS-005 (tray at end of zone #3) is made • 14-ZS-604 (tray in discharge airlock) is not made Note: Once energized, the relay will remain active until 14-ZS-604 (tray in discharge airlock) is made.
Device:	**14-XY-035A MPF Discharge Airlock Door Clamp**
Advisor PC Tag:	X14XY035A
CONR:	C113
Driver Word:	0475
Driver Type:	9
Auto Clamp:	The auto clamp relay will be active if the following condition is satisfied: • 14-XY-035B MPF discharge airlock door auto raise relay not active (see below)
Auto Unclamp:	The auto unclamp relay will be active if the following conditions are satisfied: • 14-KY-501 Discharge airlock purge is complete OR 14-XY-035B auto raise relay is active (latch) • 14-ZS-089 Tray on unloading conveyor relay not active • Discharge airlock ACAMS alarm not active
Clamp I-Lock:	The following condition must be satisfied to allow the device to clamp: • 14-ZS-035B MPF discharge airlock door lowered
Unclamp I-Lock:	The following conditions must be satisfied to allow the device to unclamp: • 14-XY-013A MPF exit door clamped • 14-ZS-013B MPF exit door lowered

CH 2

Table D.3. *ANCDF and* TOCDF MPF PLC Automatic Control Sequences
Advisor PC Screen: **MPM**

	• 61-PSLL-222 Secondary cooling water system pressure alarm LO LO is not active • Discharge airlock ACAMS alarm not active • *(TE only) 14-ZS-501B discharge airlock to afterburner purge damper closed* • *(TE only) 14-ZS-502B discharge airlock room inlet air purge damper closed*
Device:	**14-XY-035B MPF Discharge Airlock Door**
Advisor PC Tag:	X14XY035B
CONR:	C113
Driver Word:	0476
Driver Type:	9
Auto Raise:	The auto raise relay will be active if the following conditions is satisfied: • 14-KY-501 Discharge airlock purge is complete OR 14-XY-035B auto raise relay is active (latch) • 14-ZS-089 Tray on unloading conveyor relay not active • Discharge airlock ACAMS alarm not active
Auto Lower:	The auto lower relay will be active if the following conditions is satisfied: • 14-XY-035B MPF discharge airlock door auto raise relay is not active (see above)
Raise I-Lock:	The following condition must be satisfied to allow the device to raise: • 14-ZS-035A MPF discharge airlock door unclamped OR 14-ZS-035A MPF discharge airlock door is raised
Lower I-Lock:	The following conditions must be satisfied to allow the device to lower: • 14-ZS-035A MPF discharge airlock door unclamped OR 14-ZS-035B MPF discharge airlock door is lowered • 14-ZS-006 (tray in transition between the discharge airlock and the unloading conveyor) is not made
Device:	**14-XY-501 MPF Discharge Airlock to Afterburner Purge Damper**
Advisor PC Tag:	X14XY501
CONR:	C113
Driver Word:	0477
Driver Type:	3
Auto Open:	*(TE only)* The auto open relay will be active if the following conditions are satisfied: • *Damper closing sequence delay timer timing* *OR* MPF discharge airlock purge enabled AND 14-ZS-035B MPF discharge airlock door closed AND 14-ZS-013B MPF exit door closed

Table D.3. *ANCDF and* TOCDF MPF PLC Automatic Control Sequences
Advisor PC Screen: **MPM**

	• 14-ZS-502B MPF discharge airlock room inlet air purge damper not closed OR MPF discharge airlock purge timer not expired
Auto Open:	*(AN only) The auto open relay will be active if the following conditions are satisfied:* • *MPF discharge airlock purge enabled* • *14-ZS-035B MPF discharge airlock door closed* • *14-ZS-013B MPF exit door closed* • *14-ZS-502B MPF discharge airlock room inlet air purge damper not closed OR MPF discharge airlock purge timer not expired*
Open I-Lock:	There are no software interlocks to prevent opening this device.
Device:	**14-XY-502 MPF Discharge Airlock Room Inlet Air Purge Damper**
Advisor PC Tag:	X14XY502
CONR:	C113
Driver Word:	0478
Driver Type:	3
Auto Open:	*(TE only)* The auto open relay will be active if the following conditions are satisfied: • *Damper closing sequence delay timer timing* *OR* MPF discharge airlock purge enabled AND 14-ZS-035B MPF discharge airlock door closed AND 14-ZS-013B MPF exit door closed • *Damper closing sequence delay timer timing* • 14-ZS-501A MPF discharge airlock to afterburner air purge damper open • MPF discharge airlock purge timer not expired
Auto Open:	*(AN only) The auto open relay will be active if the following conditions are satisfied:* • *MPF discharge airlock purge enabled* • *14-ZS-035B MPF discharge airlock door closed* • *14-ZS-013B MPF exit door closed* • *14-ZS-501A MPF discharge airlock to afterburner air purge damper open* • *MPF discharge airlock purge timer not expired*
Open I-Lock:	There are no software interlocks to prevent opening this device.
Device:	**14-XY-857 MPF Sparge Air Damper**
Advisor PC Tag:	X14XY857
CONR:	C113
Driver Word:	0479
Driver Type:	3

Table D.3. *ANCDF and* TOCDF MPF PLC Automatic Control Sequences
Advisor PC Screen: **MPM**

Auto Open:	The auto open relay will be active if the following conditions are satisfied: • MPF campaign selected to ton container, spray tank or wet-eye bomb • 14-TIC-153 MPF zone #3 temperature greater than 1000 ° F (reset at 975 °) • *(TE only) 4.2-in mortar processing not selected*
Open I-Lock:	The following condition must be satisfied to allow the device to open: • Any MPF burner 1 to 10 started • *(TE only) 105-mm projectile processing not selected*
Device:	**MPF-FURN-101A Zone #1 Conveyor**
Advisor PC Tag:	X14FR101A
CONR:	C113
Driver Word:	0480
Driver Type:	7

Auto Forward:	The auto forward relay will be active if the campaign is not selected to Wet-Eye Bombs or Spray Tanks and either of the following conditions are satisfied:
	• Zone #1 clutch is in fast speed and auto tray transfer charge airlock → zone #1 relay is active (see below) or Auto tray transfer zone #1 → zone #2 relay is active (see below)
	• Zone #1 clutch is in slow speed and the oscillate timer is not active (24 seconds) and 14-ZS-003 (tray at end of zone #1) is not made
	
	The auto forward relay will be active if the campaign is selected to Wet-Eye Bombs or Spray Tanks and either of the following conditions are satisfied:
	• Zone #1 clutch is in fast speed and auto tray transfer charge airlock → zone #1 relay is active (see below) or Auto tray transfer zone #1 → zone #2 relay is active (see below)
	• Zone #1 clutch is in slow speed and any of the following conditions are satisfied:
	  • Spray Tank/Wet-Eye trays in synch. relay (see below) is active and tray transfer zone #3 → discharge airlock relay is active (see below) or 14-ZS-603 (tray in zone #3) is not made and the oscillate timer is timing (24 seconds)
	  • Spray Tank/Wet-Eye trays in synch. relay (see below) is active and tray transfer zone #3 → discharge airlock relay is not active (see below) and 14-ZS-603 (tray in zone #3) is made and MPF-FURN-101C (zone #3 conveyor) is running forward
	  • Spray Tank/Wet-Eye trays in synch. relay (see below) is not active and 14-ZS-602 (tray in zone #2) is not made
	  • 14-ZS-003 (tray at end zone #1) is not made

Table D.3. *ANCDF and* TOCDF MPF PLC Automatic Control Sequences
Advisor PC Screen: **MPM**

Auto Reverse:	The auto reverse relay will be active if the campaign is not selected to Wet-Eye Bombs or Spray Tanks and both of the following conditions are satisfied: • Zone #1 clutch is in slow speed • The oscillation timer is timing or 14-ZS-003 (tray at end of zone #1) is made The auto reverse relay will be active if the campaign is selected to Wet-Eye Bombs or Spray Tanks, zone #1 clutch is in slow speed and either of the following conditions are satisfied: • tray transfer zone #3 → discharge airlock relay is active (see below) or 14-ZS-603 (tray in zone #3) is not made, 14-ZS-003 (tray at end of zone #1) is made, and the oscillate timer is not timing • tray transfer zone #3 → discharge airlock relay is not active (see below) and 14-ZS-603 (tray in zone #3) is made and MPF-FURN-101C (zone #3 conveyor) is running reverse
Forward I-Lock:	The following conditions must be satisfied to allow the device to operate forward: • Zone #1 Deathwish relay not active (see A&I matrix) • Zone #1 clutch speed change timer expired • Zone #1 is in oscillate mode and clutch is in slow speed **OR** zone #1 is in transfer mode and clutch is in fast speed and zone #2 is in fast/forward, or 14-ZS-003 (tray at end of zone #1) is not made
Reverse I-Lock:	The following conditions must be satisfied to allow the device to operate reverse: • Zone #1 Deathwish relay not active (see A&I matrix) • Zone #1 clutch speed change timer expired • Zone #1 is in transfer mode and clutch is in fast speed and charge airlock conveyor is running reverse with the charge door open or 14-ZS-601 (tray on zone #1) not made **OR** zone #1 is in oscillate mode and clutch is in slow speed
Relay:	Auto tray transfer charge airlock → zone #1 relay is active (see above) if the campaign is not selected to Wet-Eye Bombs or Spray Tanks and the following conditions are satisfied: • Tray transfer sequence counter is on step 4. • 14-ZS-600 (tray is in charge airlock) • Start feed Icon is active • 14-ZS-601 (tray is in zone #1) in not made Note: Once energized, the relay will remain active until 14-ZS-601 (tray in zone #1) is made.

Table D.3. *ANCDF and* TOCDF MPF PLC Automatic Control Sequences
Advisor PC Screen: **MPM**

	Auto tray transfer charge airlock → zone #1 relay is active (see above) if the campaign is selected to Wet-Eye Bombs or Spray Tanks and the following conditions are satisfied: • Tray transfer sequence counter is on step 4. • 14-ZS-600 (tray is in charge airlock) • Start feed Icon is active • 14-ZS-005 (tray at end of zone #3) is made or 14-ZS-603 (tray in zone #3) is not made • 14-ZS-003 (tray at end of zone #1) is not made • 14-ZS-601 (tray is in zone #1) in not made • 14-ZS-602 (tray is in zone #2) in not made Note: Once energized, the relay will remain active until 14-ZS-602 (tray in zone #2) is made.
Relay:	Auto tray transfer zone #1 → zone #2 relay is active (see above) if the campaign is not selected to Wet-Eye Bombs or Spray Tanks and the following conditions are satisfied: • Tray transfer sequence counter is on step 3 • 14-ZS-601 (tray in zone #1) is made • Start feed Icon is active • Zone #1 cycle timer is expired • 14-ZS-602 (tray in zone #2) is not made Note: Once energized, the relay will remain active until 14-ZS-602 (tray in zone #2) is made. Auto tray transfer zone #1 → zone #2 relay is active (see above) if the campaign is selected to Wet-Eye Bombs or Spray Tanks and the following conditions are satisfied: • Tray transfer sequence counter is on step 3 • 14-ZS-601 (tray in zone #1) is made • Start feed Icon is active • Zone #1 cycle timer is expired • 14-TAH-141A zone #2 spray temperature alarm not active • 14-ZS-604 (tray in discharge airlock) is not made • 14-TAH-152A zone #1 spray temperature alarm not active • 14-ZS-003 (tray at end of zone #1) is not made or 14-ZS-601 (tray in zone #1) is not made • 14-ZS-603 (tray in zone #3) is not made Note: Once energized, the relay will remain active until 14-ZS-603 (tray in zone #3) is made.
Relay:	Spray Tank/Wet-Eye trays in synch. relay (see below) is active if the campaign is selected to Wet-Eye Bombs or Spray Tanks and the following conditions are satisfied: • The oscillate timer is not active (24 seconds) or 14-ZS-601 (tray in zone #1) is not made

Table D.3. *ANCDF and* TOCDF MPF PLC Automatic Control Sequences
Advisor PC Screen: **MPM**

	• 14-ZS-005 (tray at end of zone #3) is made or 14-ZS-603 (tray in zone #3) is not made Note: Once energized, the relay will remain active as long as both of the following conditions are satisfied: • 14-ZS-601 (tray in zone #1) is not made or both zone #1 and zone #2 conveyors are in auto. • 14-ZS-603 (tray in zone #3) is not made or both zone #2 and zone #3 conveyors are in auto.
Relay	Zone #1 is in transfer mode if any of the following conditions are satisfied (otherwise it is in oscillate mode). • Auto transfer charge airlock → zone #1 relay is active • Auto transfer zone #1 → zone #2 relay is active • Zone #1 conveyor is not in "auto"
Relay:	Zone #1 clutch to slow speed output from PLC will be active if the following conditions are satisfied: • Zone #1 clutch to fast speed has not been active for 5 seconds • Zone #1 is in oscillate mode for 5 seconds
Relay:	Zone #1 clutch to fast speed output from PLC will be active if the following conditions are satisfied: • Zone #1 clutch to slow speed has not been active for 5 seconds • Zone #1 is in transfer mode for 5 seconds
Device:	**MPF-FURN-101B Zone #2 Conveyor**
Advisor PC Tag:	X14FR101B
CONR:	C113
Driver Word:	0481
Driver Type:	7
Auto Forward:	The auto forward relay will be active if the campaign is not selected to Wet-Eye Bombs or Spray Tanks and either of the following conditions are satisfied: • Zone #2 clutch is in fast speed and auto tray transfer zone #2 → Zone #3 relay is active (see below) or auto tray transfer zone #1 → Zone #2 relay is active (see below) • Zone #2 clutch is in slow speed and the oscillate timer is not active (24 seconds) and 14-ZS-004 (tray at end of zone #2) is not made The auto forward relay will be active if the campaign is selected to Wet-Eye Bombs or Spray Tanks and either of the following conditions are satisfied: • Zone #2 clutch is in fast speed and auto tray transfer zone #2 → Zone #3 relay is active (see below) or auto tray transfer zone #1 → Zone #2 relay is active (see below) or auto tray transfer charge airlock → Zone #1 relay is active (see below)

Table D.3. *ANCDF and* TOCDF MPF PLC Automatic Control Sequences
Advisor PC Screen: **MPM**

	• Zone #2 clutch is in slow speed and either of the following conditions are satisfied:
	  • Zone #1 conveyor auto forward relay is made and the Spray Tank/Wet-Eye trays in synch. relay (see below) is not active or tray transfer zone #3 → discharge airlock relay is active (see below) or 14-ZS-603 (tray in zone #3) is not made
	  • Tray transfer zone #3 → discharge airlock relay is not active (see below) and 14-ZS-603 (tray in zone #3) is made and MPF-FURN-101C (zone #3 conveyor) auto forward relay is active

Auto Reverse:	The auto reverse relay will be active if the campaign is not selected to Wet-Eye Bombs or Spray Tanks and both of the following conditions are satisfied: • Zone #2 clutch is in slow speed • The oscillation timer is timing or 14-ZS-004 (tray at end of zone #2) is made The auto reverse relay will be active if the campaign is selected to Wet-Eye Bombs or Spray Tanks, zone #2 clutch is in slow speed and either of the following conditions are satisfied: • tray transfer zone #3 → discharge airlock relay is active (see below) or 14-ZS-603 (tray in zone #3) is not made, and MPF-FURN-101A (zone #1 conveyor) auto reverse relay is active • tray transfer zone #3 → discharge airlock relay is not active (see below) and 14-ZS-603 (tray in zone #3) is made and MPF-FURN-101C (zone #3 conveyor) auto reverse relay is active
Forward I-Lock:	The following conditions must be satisfied to allow the device to operate forward: • Zone #2 Deathwish relay not active (see A&I matrix) • Zone #2 clutch speed change timer expired • Zone #2 is in oscillate mode and clutch is in slow speed **OR** zone #2 is in transfer mode and clutch is in fast speed and zone #3 is in fast/forward, or 14-ZS-004 (tray at end of zone #2) is not made
Reverse I-Lock:	The following conditions must be satisfied to allow the device to operate reverse: • Zone #2 Deathwish relay not active (see A&I matrix) • Zone #2 clutch speed change timer expired • Zone #2 is in transfer mode and clutch is in fast speed and zone #1 conveyor is running reverse or 14-ZS-602 (tray on zone #2) is not made **OR** zone #2 is in oscillate mode and clutch is in slow speed

Table D.3. *ANCDF and* TOCDF MPF PLC Automatic Control Sequences Advisor PC Screen: **MPM**	
Relay:	Auto tray transfer charge airlock → zone #1 relay is active (see above) if the campaign is not selected to Wet-Eye Bombs or Spray Tanks and the following conditions are satisfied: • Tray transfer sequence counter is on step 4. • 14-ZS-600 (tray is in charge airlock) • Start feed Icon is active • 14-ZS-601 (tray is in zone #1) in not made Note: Once energized, the relay will remain active until 14-ZS-601 (tray in zone #1) is made. Auto tray transfer charge airlock → zone #1 relay is active (see above) if the campaign is selected to Wet-Eye Bombs or Spray Tanks and the following conditions are satisfied: • Tray transfer sequence counter is on step 4. • 14-ZS-600 (tray is in charge airlock) • Start feed Icon is active • 14-ZS-005 (tray at end of zone #3) is made or 14-ZS-603 (tray in zone #3) is not made • 14-ZS-003 (tray at end of zone #1) is not made • 14-ZS-601 (tray is in zone #1) in not made • 14-ZS-602 (tray is in zone #2) in not made Note: Once energized, the relay will remain active until 14-ZS-602 (tray in zone #2) is made.
Relay:	Auto tray transfer zone #1 → zone #2 relay is active (see above) if the campaign is not selected to Wet-Eye Bombs or Spray Tanks and the following conditions are satisfied: • Tray transfer sequence counter is on step 3 • 14-ZS-601 (tray in zone #1) is made • Start feed Icon is active • Zone #1 cycle timer is expired • 14-ZS-602 (tray in zone #2) is not made Note: Once energized, the relay will remain active until 14-ZS-602 (tray in zone #2) is made. Auto tray transfer zone #1 → zone #2 relay is active (see above) if the campaign is selected to Wet-Eye Bombs or Spray Tanks and the following conditions are satisfied: • Tray transfer sequence counter is on step 3 • 14-ZS-601 (tray in zone #1) is made • Start feed Icon is active • Zone #1 cycle timer is expired • 14-TAH-141A zone #2 spray temperature alarm not active • 14-ZS-604 (tray in discharge airlock) is not made • 14-TAH-152A zone #1 spray temperature alarm not active

Table D.3. *ANCDF and* TOCDF MPF PLC Automatic Control Sequences
Advisor PC Screen: **MPM**

	• 14-ZS-003 (tray at end of zone #1) is not made or 14-ZS-601 (tray in zone #1) is not made • 14-ZS-603 (tray in zone #3) is not made Note: Once energized, the relay will remain active until 14-ZS-603 (tray in zone #3) is made.
Relay:	Auto tray transfer zone #2 → zone #3 relay is active (see above) if the campaign is not selected to Wet-Eye Bombs or Spray Tanks and the following conditions are satisfied: • Tray transfer sequence counter is on step 2 • 14-ZS-602 (tray in zone #2) is made • Start feed Icon is active • 14-TAH-141A zone #2 water spray temperature alarm is not active • 14-ZS-604 (tray in discharge airlock) is not made • Zone #2 cycle timer is expired • 14-ZS-603 (tray in zone #3) is not made Note: Once energized, the relay will remain active until 14-ZS-603 (tray in zone #3) is made.
Relay	Zone #2 is in transfer mode if any of the following conditions are satisfied (otherwise it is in oscillate mode). • Auto transfer zone #2 → zone #3 relay is active • Auto transfer zone #1 → zone #2 relay is active • Zone #2 conveyor is not in "auto"
Relay:	Zone #2 clutch to slow speed output from PLC will be active if the following conditions are satisfied: • Zone #2 clutch to fast speed has not been active for 5 seconds • Zone #2 is in oscillate mode for 5 seconds
Relay:	Zone #2 clutch to fast speed output from PLC will be active if the following conditions are satisfied: • Zone #2 clutch to slow speed has not been active for 5 seconds • Zone #2 is in transfer mode for 5 seconds
Relay:	Spray Tank/Wet-Eye trays in synch. relay (see below) is active if the campaign is selected to Wet-Eye Bombs or Spray Tanks and the following conditions are satisfied: • The oscillate timer is not active (24 seconds) or 14-ZS-601 (tray in zone #1) is not made • 14-ZS-005 (tray at end of zone #3) is made or 14-ZS-603 (tray in zone #3) is not made Note: Once energized, the relay will remain active as long as both of the following conditions are satisfied:

Table D.3. *ANCDF and* TOCDF MPF PLC Automatic Control Sequences
Advisor PC Screen: **MPM**

- 14-ZS-601 (tray in zone #1) is not made or both zone #1 and zone #2 conveyors are in auto.
- 14-ZS-603 (tray in zone #3) is not made or both zone #2 and zone #3 conveyors are in auto.

Device: **MPF-FURN-101C Zone #3 Conveyor**
Advisor PC Tag: X14FR101C
CONR: C113
Driver Word: 0482
Driver Type: 7

Auto Forward: The auto forward relay will be active if any of the following conditions are satisfied:

- Zone #3 clutch is in fast speed and auto tray transfer zone #2 → Zone #3 relay is active (see below) or auto tray transfer zone #3 → discharge airlock relay is active (see below)
- Zone #3 clutch is in slow speed and the oscillate timer is not active (24 seconds) and 14-ZS-005 (tray at end of zone #3) is not made

The auto forward relay will be active if the campaign is not selected to Wet-Eye Bombs or Spray Tanks and either of the following conditions are satisfied:

- Zone #3 clutch is in fast speed and auto tray transfer zone #2 → Zone #3 relay is active (see below)or auto tray transfer zone #3 → discharge airlock relay is active (see below)
- Zone #3 clutch is in slow speed and 14-ZS-005 (tray at end of zone #3) is not made and oscillate timer is not active (24 seconds)

The auto forward relay will be active if the campaign is selected to Wet-Eye Bombs or Spray Tanks and either of the following conditions are satisfied:

- Zone #3 clutch is in fast speed and auto tray transfer zone #2 → Zone #3 relay is active (see below)or auto tray transfer zone #3 → discharge airlock relay is active (see below) or auto tray transfer zone #1 → Zone #2 relay is active (see below)
- Zone #3 clutch is in slow speed and 14-ZS-005 (tray at end of zone #3) is not made and either of the following conditions are satisfied:
  - Oscillate timer is not active (24 seconds) and the Spray Tank/Wet-Eye trays in synch. relay (see below) is active
  - The Spray Tank/Wet-Eye trays in synch. relay (see below) is not active

Table D.3. *ANCDF and* TOCDF MPF PLC Automatic Control Sequences Advisor PC Screen: **MPM**	
Auto Reverse:	The auto reverse relay will be active if the campaign is not selected to Wet-Eye Bombs or Spray Tanks and both of the following conditions are satisfied: • Zone #3 clutch is in slow speed • The oscillation timer is timing or 14-ZS-005 (tray at end of zone #3) is made The auto reverse relay will be active if the campaign is selected to Wet-Eye Bombs or Spray Tanks, zone #3 clutch is in slow speed and either of the following conditions are satisfied: • Spray Tanks/Wet-Eye trays in synch (see below) relay is active and tray transfer charge airlock → zone #1 relay is not active (see below) • oscillation timer is timing
Forward I-Lock:	The following conditions must be satisfied to allow the device to operate forward: • Zone #3 Deathwish relay not active (see A&I matrix) • Zone #3 clutch speed change timer expired • Zone #3 is in oscillate mode and clutch is in slow speed **OR** zone #3 is in transfer mode and clutch is in fast speed and discharge airlock conveyor is running forward with 14-ZS-013A MPF exit door raised, or 14-ZS-005 (tray at end of zone #3) is not made
Reverse I-Lock:	The following conditions must be satisfied to allow the device to operate reverse: • Zone #3 Deathwish relay not active (see A&I matrix) • Zone #3 clutch speed change timer expired • Zone #3 is in transfer mode and clutch is in fast speed and zone #2 conveyor is running reverse or 14-ZS-603 (tray on zone #3) is not made **OR** zone #3 is in oscillate mode and clutch is in slow speed
Relay:	Auto tray transfer zone #1 → zone #2 relay is active (see above) if the campaign is not selected to Wet-Eye Bombs or Spray Tanks and the following conditions are satisfied: • Tray transfer sequence counter is on step 3 • 14-ZS-601 (tray in zone #1) is made • Start feed Icon is active • Zone #1 cycle timer is expired • 14-ZS-602 (tray in zone #2) is not made Note: Once energized, the relay will remain active until 14-ZS-602 (tray in zone #2) is made. Auto tray transfer zone #1 → zone #2 relay is active (see above) if the campaign is selected to Wet-Eye Bombs or Spray Tanks and the

Table D.3. *ANCDF and* TOCDF MPF PLC Automatic Control Sequences
Advisor PC Screen: **MPM**

	following conditions are satisfied: • Tray transfer sequence counter is on step 3 • 14-ZS-601 (tray in zone #1) is made • Start feed Icon is active • Zone #1 cycle timer is expired • 14-TAH-141A zone #2 spray temperature alarm not active • 14-ZS-604 (tray in discharge airlock) is not made • 14-TAH-152A zone #1 spray temperature alarm not active • 14-ZS-003 (tray at end of zone #1) is not made or 14-ZS-601 (tray in zone #1) is not made • 14-ZS-603 (tray in zone #3) is not made Note: Once energized, the relay will remain active until 14-ZS-603 (tray in zone #3) is made.
Relay:	Auto tray transfer zone #2 → zone #3 relay is active (see above) if the campaign is not selected to Wet-Eye Bombs or Spray Tanks and the following conditions are satisfied: • Tray transfer sequence counter is on step 2 • 14-ZS-602 (tray in zone #2) is made • Start feed Icon is active • 14-TAH-141A zone #2 water spray temperature alarm is not active • 14-ZS-604 (tray in discharge airlock) is not made • Zone #2 cycle timer is expired • 14-ZS-603 (tray in zone #3) is not made Note: Once energized, the relay will remain active until 14-ZS-603 (tray in zone #3) is made.
Relay:	Auto tray transfer Zone 3 → discharge airlock relay is active (see above) if the following conditions are satisfied: • Tray transfer sequence counter is on step 1 • Start feed Icon is active • Zone 3 cycle timer is expired • 14-ZS-005 (tray at end of zone #3) is made • 14-ZS-604 (tray in discharge airlock) is not made Note: Once energized, the relay will remain active until 14-ZS-604 (tray in discharge airlock) is made.
Relay	Zone #3 is in transfer mode if any of the following conditions are satisfied (otherwise it is in oscillate mode). • Auto transfer zone #2 → zone #3 relay is active • Auto transfer zone #3 → discharge airlock relay is active • Zone #3 conveyor is not in “auto”

Table D.3. *ANCDF and* TOCDF MPF PLC Automatic Control Sequences
Advisor PC Screen: **MPM**

Relay:	Zone #3 clutch to slow speed output from PLC will be active if the following conditions are satisfied: • Zone #3 clutch to fast speed has not been active for 5 seconds • Zone #3 is in oscillate mode for 5 seconds
Relay:	Zone #3 clutch to fast speed output from PLC will be active if the following conditions are satisfied: • Zone #3 clutch to slow speed has not been active for 5 seconds • Zone #3 is in transfer mode for 5 seconds
Relay:	Spray Tank/Wet-Eye trays in synch. relay (see below) is active if the campaign is selected to Wet-Eye Bombs or Spray Tanks and the following conditions are satisfied: • The oscillate timer is not active (24 seconds) or 14-ZS-601 (tray in zone #1) is not made • 14-ZS-005 (tray at end of zone #3) is made or 14-ZS-603 (tray in zone #3) is not made Note: Once energized, the relay will remain active as long as both of the following conditions are satisfied: • 14-ZS-601 (tray in zone #1) is not made or both zone #1 and zone #2 conveyors are in auto. • 14-ZS-603 (tray in zone #3) is not made or both zone #2 and zone #3 conveyors are in auto.
Device:	**14-XY-001A MPF Charge Airlock Door Clamp**
Advisor PC Tag:	X14XY001A
CONR:	C113
Driver Word:	0483
Driver Type:	9
Auto Clamp:	The auto clamp relay will be active if the following condition is satisfied: • 14-XY-001B MPF charge airlock door auto unclamp relay not active
Auto Unclamp:	The auto unclamp relay will be active if the following conditions are satisfied: • Auto tray transfer charge car → charge airlock relay is active (see below)
Clamp I-Lock:	The following condition must be satisfied to allow the device to clamp: • 14-ZS-001B MPF charge airlock door lowered
Unclamp I-Lock:	The following conditions must be satisfied to allow the device to unclamp: • 14-XY-008A MPF entry door clamped • 14-ZS-008B MPF entry door lowered • *(TE only) Operator entered valid tray info or DICO to MPF that charge car has tray and is aligned is not active.* • *(TE only) Zone 2 temperature is within range for the tray type.* • *(TE only) Tray ID packet has valid weight info*

Table D.3. *ANCDF and* TOCDF MPF PLC Automatic Control Sequences
Advisor PC Screen: **MPM**

Relay:	Auto tray transfer charge car → charge airlock relay is active (see above) if the following conditions are satisfied: • Charge Car has a tray and is aligned with the MPF • DICO from MPF to request a charge car with a tray (see below) is active • 14-ZS-600 (tray in charge airlock) not made • Charge Car Fail To Transfer Timer not expired (60 sec) • 14-ZS-601 (tray is in zone #1) in not made Note: Once energized, the relay will remain active until 14-ZS-600 (tray in charge airlock) is made, 14-ZS-601 (tray in zone #1) is made, or Charge Car Fail To Transfer Timer expires (60 sec). DICO from MPF to request a charge car with tray (see above) will be active if all of the following conditions are satisfied: • Feed Icon active • 14-ZS-600 (tray in charge airlock) not made • 14-XY-001B (charge airlock door) is in "auto" • 14-XY-001A (charge airlock clamps) is in "auto" • 14-CNVP-119 (charge airlock conveyor) is in "auto"
Device:	**14-XY-001B MPF Charge Airlock Door**
Advisor PC Tag:	X14XY001B
CONR:	C113
Driver Word:	0484
Driver Type:	9
Auto Raise:	The auto raise relay will be active if the following conditions is satisfied: • Auto tray transfer charge car → charge airlock relay is active (see below)
Auto Lower:	The auto lower relay will be active if the following conditions is satisfied: • 14-XY-001B MPF charge airlock door auto raise relay is not active
Raise I-Lock:	The following conditions must be satisfied to allow the device to raise: • 14-XY-001A MPF charge airlock door unclamped OR 14-ZS-001A MPF charge airlock door is raised • *(TE only) MPF AWFCO test bit is not active*
Lower I-Lock:	The following conditions must be satisfied to allow the device to lower: • 14-ZS-001A MPF charge airlock door unclamped OR 14-ZS-001B MPF charge airlock door is lowered • 05-ZS-198A tray in transition between the charge car and charge airlock is not active • Charge car → charge airlock fail to arrive alarm is not active

Table D.3. *ANCDF and* TOCDF MPF PLC Automatic Control Sequences Advisor PC Screen: **MPM**	
Relay:	Auto tray transfer charge car → charge airlock relay is active (see above) if the following conditions are satisfied: • Charge Car has a tray and is aligned with the MPF • DICO from MPF to request a charge car with a tray (see below) is active • 14-ZS-600 (tray in charge airlock) not made • Charge Car Fail To Transfer Timer not expired (60 sec) • 14-ZS-601 (tray is in zone #1) in not made Note: Once energized, the relay will remain active until 14-ZS-600 (tray in charge airlock) is made, 14-ZS-601 (tray in zone #1) is made, or Charge Car Fail To Transfer Timer expires (60 sec). DICO from MPF to request a charge car with tray (see above) will be active if all of the following conditions are satisfied: • Feed Icon active • 14-ZS-600 (tray in charge airlock) not made • 14-XY-001B (charge airlock door) is in "auto" • 14-XY-001A (charge airlock clamps) is in "auto" • 14-CNVP-119 (charge airlock conveyor) is in "auto"
Device: Advisor PC Tag: CONR: Driver Word: Driver Type: Auto start: I-LOCK:	**MPF Feed Icon** MPFFEED C113 0485 N/A There is no auto/manual mode for the feed icon. The following conditions must be satisfied to allow the blower to operate: • MPF Stop Feed Deathwish relay not active (see A&I matrix)
Device:	**14-XY-503 MPF Charge Airlock to Afterburner Purge Damper** ***(This device was removed from the TE code and is not in the AN code. See FAWB Note B-5)***
Device:	**14-XY-504 MPF Charge Airlock Inlet Air Purge Damper** ***(This device was removed from the TE code and is not in the AN code. See FAWB Note B-5)***

Table D.4. *ANCDF and* TOCDF MPF PLC Automatic Control Sequences
Advisor PC Screen: **MB1 [MB2 thru MB9, MBA]**

Device:	**14-XY-796 MPF Main Fuel Gas Header Block Valve**
Advisor PC Screen:	MB1 only
Advisor PC Tag:	X14XY796
CONR:	C113
Driver Word:	2060
Driver Type:	3
Auto Open:	The auto open relay is always set active.
Open I-Lock:	The following condition must be satisfied to allow the device to open: • 14-FISH-796 alarm is not active (note: this alarm has been disabled in the referenced PLC code. Therefore, this I-Lock is always satisfied).

Device:	**MPF-BLOW-101 MPF Combustion Air Blower**
Advisor PC Screen:	MB1 only
Advisor PC Tag:	X14BLW101
CONR:	C113
Driver Word:	2061
Driver Type:	3
Auto Start:	The auto start relay is always set active.
Start I-Lock:	The following condition must be satisfied to allow the device to start: • MPF-BLOW-101 Deathwish relay not active (see A&I matrix) • MPF PAS Normal or MPF-BLOW-101 running *or (TE only) PAS-BLOW-106 running*

Table D.4. *ANCDF and* TOCDF MPF PLC Automatic Control Sequences
Advisor PC Screen: **MB1 [MB2 thru MB9, MBA]**

Device: **MPF Burner #1 (typical of 10, see below)**
Advisor PC Screen: MB1
Advisor PC Tag: X14HS859
CONR: C113
Driver Word: 2062
Driver Type: 4 (manual only)
Auto start: N/A. The burner is manual operation only.
I-LOCK: The following conditions must be satisfied to allow the burner to be started:

- MPF Burner #1 BMS Lockout is not active
- MPF Deathwish "Shutdown MPF burners" is not active (see A&I matrix)

MPF Burner Device Identifiers:

Burner #	Advisor PC Screen	Advisor PC Tag	Driver Word
1	MB1	X14HS859	2062
2	MB2	X14HS860	2260
3	MB3	X14HS861	2460
4	MB4	X14HS862	2660
5	MB5	X14HS863	2860
6	MB6	X14HS864	3060
7	MB7	X14HS865	3260
8	MB8	X14HS866	3460
9	MB9	X14HS867	3660
10	MBA	X14HS868	3860

Table D.4. *ANCDF and* TOCDF MPF PLC Automatic Control Sequences
Advisor PC Screen: **MB1 [MB2 thru MB9, MBA]**

Device: **MPF Burner #1 BMS Lockout Reset Icon (typical of 10, see below)**
Advisor PC Screen: MB1
Advisor PC Tag: X14HS871
CONR: C113
Driver Word: 2063
Driver Type: N/A
Auto start: N/A
I-LOCK: N/A

When the operator selects this icon and issues a manual start command, the PLC will energize the "Lockout Reset" output for a preset time duration.

MPF Burner BMS Lockout Reset Icon Device Identifiers:

Burner #	Advisor PC Screen	Advisor PC Tag	Driver Word
1	MB1	X14HS871	2063
2	MB2	X14HS872	2261
3	MB3	X14HS873	2461
4	MB4	X14HS874	2661
5	MB5	X14HS875	2861
6	MB6	X14HS876	3061
7	MB7	X14HS877	3261
8	MB8	X14HS878	3461
9	MB9	X14HS879	3661
10	MBA	X14HS880	3861

Table D.5. *ANCDF and* TOCDF MPF PLC Automatic Control Sequences
Advisor PC Screen: **MPC**

Device:	**SCW-PUMP-101 Secondary Cooling Water Circulating Pump**
Advisor PC Tag:	X61PMP101
CONR:	C113
Driver Word:	4260
Driver Type:	1
Auto start:	This device will automatically start if either of the following conditions are satisfied: • Device is selected as primary and the "switch over/shutdown primary pump" timer has not expired (see below) • Device is selected as secondary and the "shutdown primary pump switch over" timer has initiated (see below) The switch over/shutdown primary pump timer will initiate if either of the following conditions are satisfied: • 61-PAL-223 secondary cooling water system pressure alarm LO is active and the primary pump is running • Primary pump device malfunction alarm is active
Start I-LOCK:	The following condition must be satisfied for this device to run: • 61-PALL-222 - system pressure alarm LO LO not active (on time delay after pump start) Note: Device I-Lock will also force the device to manual
Device:	**SCW-PUMP-102 Secondary Cooling Water Circulating Pump**
Advisor PC Tag:	X61PMP102
CONR:	C113
Driver Word:	4261
Driver Type:	1
Auto start:	This device will automatically start if either of the following conditions are satisfied: • Device is selected as primary and the "switch over/shutdown primary pump" timer has not expired (see below) • Device is selected as secondary and the "shutdown primary pump switch over" timer has initiated (see below) The switch over/shutdown primary pump time will initiate if either of the following conditions are satisfied: • 61-PAL-223 secondary cooling water system pressure alarm LO is active and the primary pump is running • Primary pump device malfunction alarm is active
I-LOCK:	The following conditions must be satisfied for this device to run: • 61-PALL-222 - system pressure alarm LO LO not active (on time delay after pump start) Note: Device I-Lock will also force the device to manual

Table D.6. *ANCDF and* TOCDF MPF PLC Automatic Control Sequences
Advisor PC Screen: **MPF/MPA**

Device:	**14-XY-717 MPF Water Spray Block Valve**
Advisor PC Screen:	MPF
Advisor PC Tag:	X14XV717
CONR:	C113
Driver Word:	4460
Driver Type:	3
Auto Open:	This device will automatically open if either of the following conditions are satisfied: • 14-TIC-152 MPF zone #1 temperature ≥ 1000 ° F • 14-TIC-141 MPF zone #2 temperature ≥ 1000 ° F
Open I-Lock:	The open I-Lock for this device is always set active.
Device:	**14-XY-738 MPF Water Spray Atomizing Air Block Valve**
Advisor PC Screen:	MPF
Advisor PC Tag:	X14XV738
CONR:	C113
Driver Word:	4461
Driver Type:	3
Auto Open:	This device will automatically open if either of the following conditions are satisfied: • Any MPF burner 1 to 10 started • 14-XY-717 auto open relay is active (see above)
Open I-Lock:	The open I-Lock for this device is always set active.
Device:	**MPF ETL Reset Icon**
Advisor PC Screen:	MPF/MPA
Advisor PC Tag:	ETLRESET
CONR:	C113
Driver Word:	4463
Driver Type:	N/A
	The operator selects this icon and issues a manual start command to remotely reset 14-TSHH-071 (zone #1), 14-TSHH-072 (zone #2), 14-TSHH-079 (zone #3) and 14-TSHH-087 (afterburner) ETL lockout devices.

D.2 MPF Burner Management System Control Logic

There are five important control circuits associated with the FIREYE control schemes for the MPF furnaces. They are defined as:

L1-13 — Burner start circuit. It is usually energized via a discrete output from the PLC-3. It is a result of the operator starting a burner from a control screen.

13-3 — Fuel Valve End Switch (FVES) circuit. This circuit will be energized when all of the associated fuel gas block valves are closed. This circuit is required only until the "Pilot Trial For Ignition" step.

3-P — Running Interlock circuit. This circuit will contain the logic contacts associated with an operating burner. It will include items such as gas supply pressure HI HI, gas supply pressure LO LO, Extreme Thermal Limit (ETL), combustion air blower pressure LO LO, etc. If the 3-P circuit is lost at any time during the operation of the burner, the burner will LOCKOUT.

M-D — LO-FIRE circuit. This circuit will energize when the associated fuel gas control valve is at LO-FIRE. This circuit is required for lighting the burner.

D-8 — HI-PURGE circuit. This circuit will energize when the purge timer expires. This circuit is required for lighting the burner.

The control logic presented in Table D.7 is based on Wellman Thermal Systems drawings 40D429010 (sheets 1 to 18) and 40D429012 (sheets 1 to 5). Burner logic is shown for 1 primary furnace burner and 1 AFB burner. Instrument tags numbers associated with the other burners can be found on the MPF P&IDs.

Table D.7. TOCDF MPF BMS Circuit Logic

System Purge

The system purge timer (TMR-953) will initiate if all of the following conditions are satisfied:

- 24-FSLL-667 system minimum draft
- ZS-407B and ZS-408B burner #11 fuel gas block valves are closed
- ZS-427B and ZS-428B burner #12 fuel gas block valves are closed
- 24-FSL-666 minimum draft to purge
- TSL-87 not satisfied (MPF-FURN-102 < 1400 °F)
- *Control Relay 806 (CR-806) is energized (see below)*
- *Control Relay 810 (CR-810) is energized (see below)*
- *Control Relay 814 (CR-814) is energized (see below)*
- At least one afterburner combustion air valve at HI FIRE

Table D.7. TOCDF MPF BMS Circuit Logic

Once initiated, the system purge timer will time out after 6.5 minutes. Once timed out the following conditions must be satisfied to maintain system purge:

- TSL-87 satisfied (MPF-FURN-102 > 1400 °F)

-OR-

- *24-FSLL-667 system minimum draft*
- Either afterburner is firing on main fuel gas

-OR-

- *24-FSLL-667 system minimum draft*
- TSL-87 not satisfied (MPF-FURN-102 < 1400 °F)
- *Control Relay 806 (CR-806) is energized (see below)*
- *Control Relay 810 (CR-810) is energized (see below)*
- *Control Relay 814 (CR-814) is energized (see below)*
- At least one afterburner combustion air valve at HI FIRE

MPF-FURN-101 Purge

The primary chamber purge timer (TMR-816) will initiate if all of the following conditions are satisfied:

- 24-FSLL-667 system minimum draft
- 24-FSL-666 minimum draft to purge
- *Control Relay 806 (CR-806) is energized (see below)*
- *Control Relay 810 (CR-810) is energized (see below)*
- *Control Relay 814 (CR-814) is energized (see below)*

Once initiated, the primary chamber purge timer will time out after 9.0 minutes. Once timed out, 24-FSLL-667 (system minimum draft) and the following conditions must be satisfied to maintain primary chamber purge:

- *24-FSL-666 minimum draft to purge*
- *Control Relay 806 (CR-806) is energized (see below)*
- *Control Relay 810 (CR-810) is energized (see below)*
- *Control Relay 814 (CR-814) is energized (see below)*

-OR-

- TSL-71 satisfied (MPF-FURN-101 zone #1 > 1400 °F) or at least one zone #1 *burner is on*
- TSL-72 satisfied (MPF-FURN-101 zone #2 > 1400 °F) or at least one zone #2 *burner is on*
- TSL-79 satisfied (MPF-FURN-101 zone #3 > 1400 °F) or at least one zone #3 *burner is on*

Table D.7. TOCDF MPF BMS Circuit Logic

CR-806 is energized if the follow conditions are satisfied

- *PSLL-138 satisfied (MPF-BLOW-101)*
- *At least one combustion air valve in Zone 1 is at HI FIRE*
- *Either of the following:*
  - *MPF-FURN-101 purge is maintained*
  - *All eight Zone 1 fuel gas block valves are closed*

CR-810 is energized if the follow conditions are satisfied

- *PSLL-138 satisfied (MPF-BLOW-101)*
- *At least one combustion air valve in Zone 2 is at HI FIRE*
- *Either of the following:*
  - *MPF-FURN-101 purge is maintained*
  - *All eight Zone 2 fuel gas block valves are closed*

CR-814 is energized if the follow conditions are satisfied

- *PSLL-138 satisfied (MPF-BLOW-101)*
- *At least one combustion air valve in Zone 3 is at HI FIRE*
- *Either of the following:*
  - *MPF-FURN-101 purge is maintained*
  - *All four Zone 3 fuel gas block valves are closed*

MPF-FURN-101 Burner #1 (Typical of 10)

L1-13 The L1-13 circuit will be made when the PLC issues a burner start.

13-3 The 13-3 circuit will be made if the following conditions are satisfied:
- ZS-207B and ZS-208B burner #1 fuel gas block valves are closed

3-P The 3-P circuit will be made if all of the following conditions are satisfied:
- PSHH-207 primary fuel gas pressure switch high high
- PSLL-207 primary fuel gas pressure switch low low
- TSHH-71 Zone #1 ETL
- PSLL-138 satisfied (MPF-BLOW-101)
- MPF-BLOW-101 combustion air blower running
- 24-FSLL-667 system minimum draft
- Either stage of the ID fan running or Emergency ID fan running

M-D The M-D circuit will be made if all of the following conditions are satisfied:
- ZS-209 fuel gas flow control valve at low fire

D-8 The D-8 circuit will be made if the system purge timer has timed out (see above) and the primary chamber purge timer has time out (see above).

Table D.7. TOCDF MPF BMS Circuit Logic

MPF-FURN-102 Burner #11 (Typical of 2)

L1-13	The L1-13 circuit will be made when the PLC issues a burner start.
13-3	The 13-3 circuit will be made if the following conditions are satisfied: • ZS-407B and ZS-408B burner #11 fuel gas block valves are closed
3-P	The 3-P circuit will be made if all of the following conditions are satisfied: • PSHH-407 primary fuel gas pressure switch high high • PSLL-407 primary fuel gas pressure switch low low • TSHH-87 MPF-FURN-102 ETL • PSLL-138 satisfied (MPF-BLOW-101) • MPF-BLOW-101 combustion air blower running • 24-FSLL-667 system minimum draft • Either stage of the ID fan running or Emergency ID fan running
M-D	The M-D circuit will be made if all of the following conditions are satisfied: • ZS-409 fuel gas flow control valve at low fire
D-8	The D-8 circuit will be made if the system purge timer has timed out (see above).

APPENDIX E

Operator Screens

Appendix E contains the *ANCDF and* TOCDF Advisor PC screens associated with operation and control of the MPF system based on the *ANCDF and TOCDF control code as of April 2001*. As Advisor PC screens are generated for PBCDF and UMCDF, they will be included in this appendix. Table E.1 provides an index to the screens.

Table E.1 MPF System Advisor PC Screens

Figure #	Advisor PC Screen Name	Process Screen
E-1	*ANCDF MPF Burner #1*	*MB1*
E-2	*ANCDF MPF Burner #2*	*MB2*
E-3	*ANCDF MPF Burner #3*	*MB3*
E-4	*ANCDF MPF Burner #4*	*MB4*
E-5	*ANCDF MPF Burner #5*	*MB5*
E-6	*ANCDF MPF Burner #6*	*MB6*
E-7	*ANCDF MPF Burner #7*	*MB7*
E-8	*ANCDF MPF Burner #8*	*MB8*
E-9	*ANCDF MPF Burner #9*	*MB9*
E-10	*ANCDF MPF Burner #10*	*MBA*
E-11	*ANCDF MPF Burner #11*	*MBB*
E-12	*ANCDF MPF Burner #12*	*MBC*
E-13	*ANCDF MPF Furnace Temperature Control*	*MPF*
E-14	*ANCDF MPF Furnace Afterburner*	*MPA*
E-15	*ANCDF MPF Secondary Cooling*	*MPC*
E-16	*ANCDF MPF Furnace Material Handling*	*MPM*
E-17	*ANCDF MPF Stop Feed Status, Page 1*	*MPSF1*
E-18	*ANCDF MPF Stop Feed Status, Page 2*	*MPSF2*
E-19	*ANCDF MPF RCRA Alarm Summary*	*RCB*
E-20	*TOCDF* MPF Burner #1	MB1
E-21	*TOCDF* MPF Burner #2	MB2
E-22	*TOCDF* MPF Burner #3	MB3
E-23	*TOCDF* MPF Burner #4	MB4
E-24	*TOCDF* MPF Burner #5	MB5
E-25	*TOCDF* MPF Burner #6	MB6
E-26	*TOCDF* MPF Burner #7	MB7
E-27	*TOCDF* MPF Burner #8	MB8
E-28	*TOCDF* MPF Burner #9	MB9
E-29	*TOCDF* MPF Burner #10	MBA
E-30	*TOCDF* MPF Burner #11	MBB
E-31	*TOCDF* MPF Burner #12	MBC
E-32	*TOCDF* MPF Furnace Temperature Control	MPF
E-33	*TOCDF* MPF Furnace Afterburner	MPA

Table E.1 (Cont'd)

Figure #	Advisor PC Screen Name	Process Screen
E-34	*TOCDF* MPF Secondary Cooling	MPC
E-35	*TOCDF* MPF Furnace Material Handling	MPM
E-36	*TOCDF MPF Stop Feed Status, Page 1*	*MPSF1*
E-37	*TOCDF MPF Stop Feed Status, Page 2*	*MPSF2*
E-38	*TOCDF MPF RCRA Alarm Summary*	*RCB*
E-39	*TOCDF MPF Overview*	*MPO*

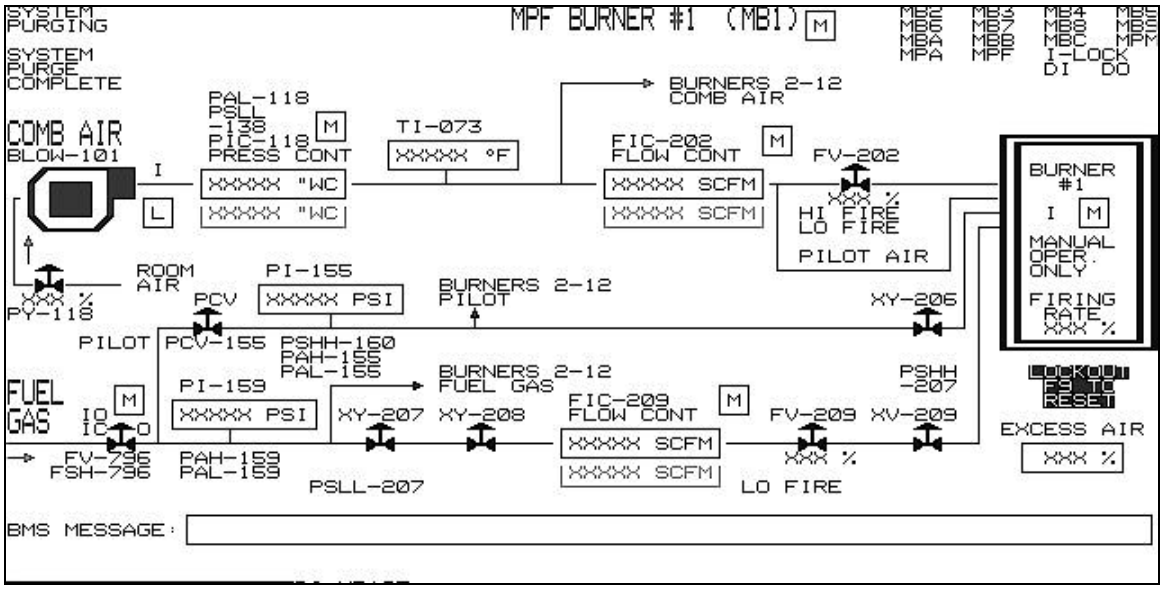

Figure E-1. ANCDF Advisor PC Screen MPF Burner #1 (MB1)

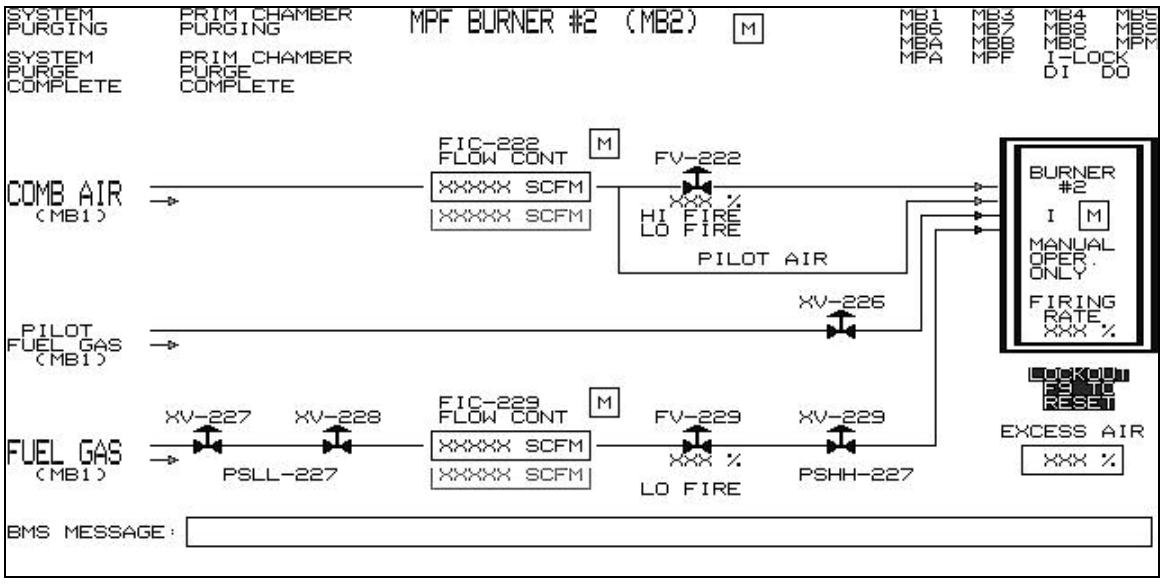

Figure E-2. ANCDF Advisor PC Screen MPF Burner #2 (MB2)

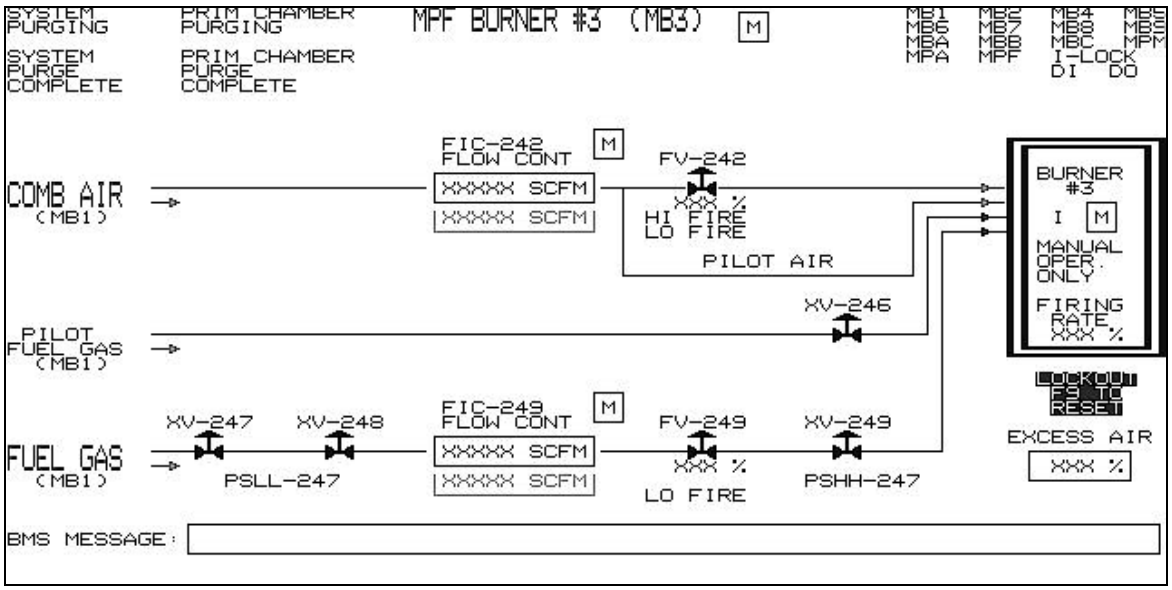

Figure E-3. ANCDF Advisor PC Screen MPF Burner #3 (MB3)

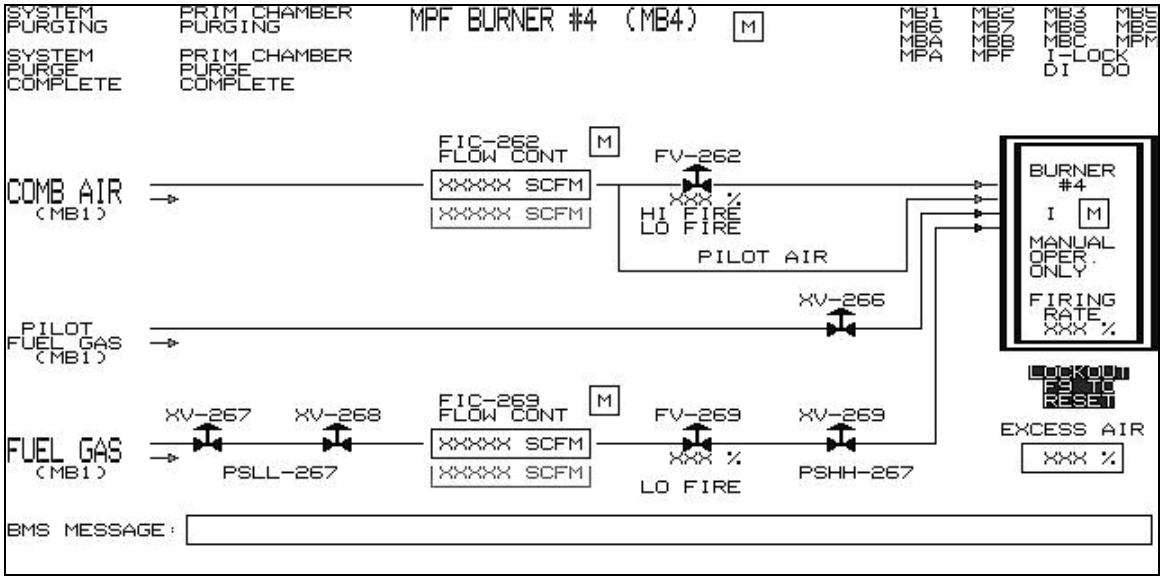

Figure E-4. ANCDF Advisor PC Screen MPF Burner #4 (MB4)

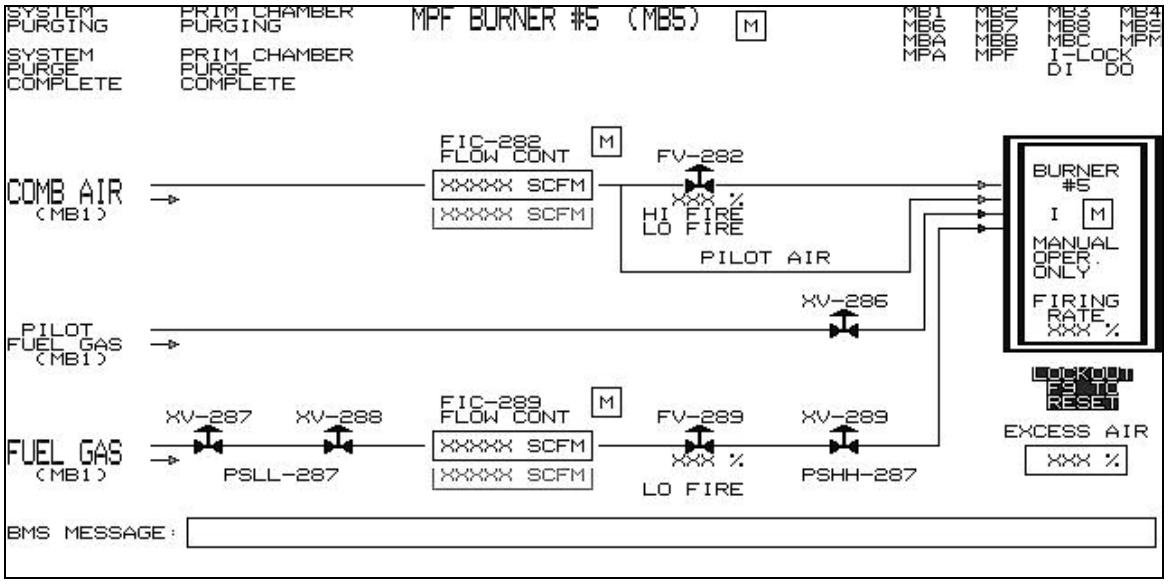

Figure E-5. ANCDF Advisor PC Screen MPF Burner #5 (MB5)

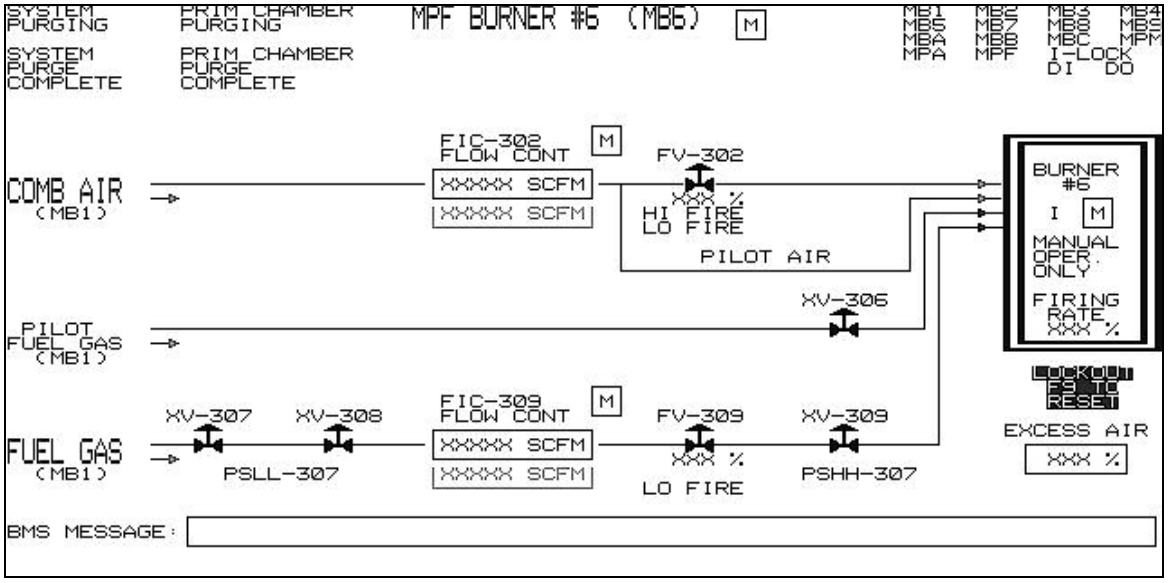

Figure E-6. ANCDF Advisor PC Screen MPF Burner #6 (MB6)

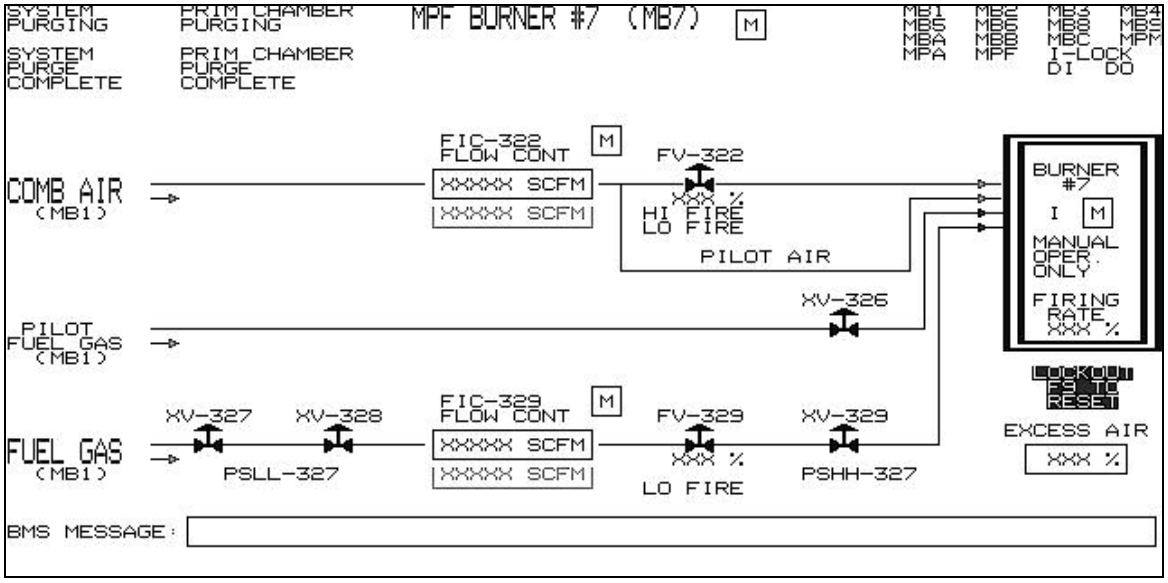

Figure E-7. ANCDF Advisor PC Screen MPF Burner #7 (MB7)

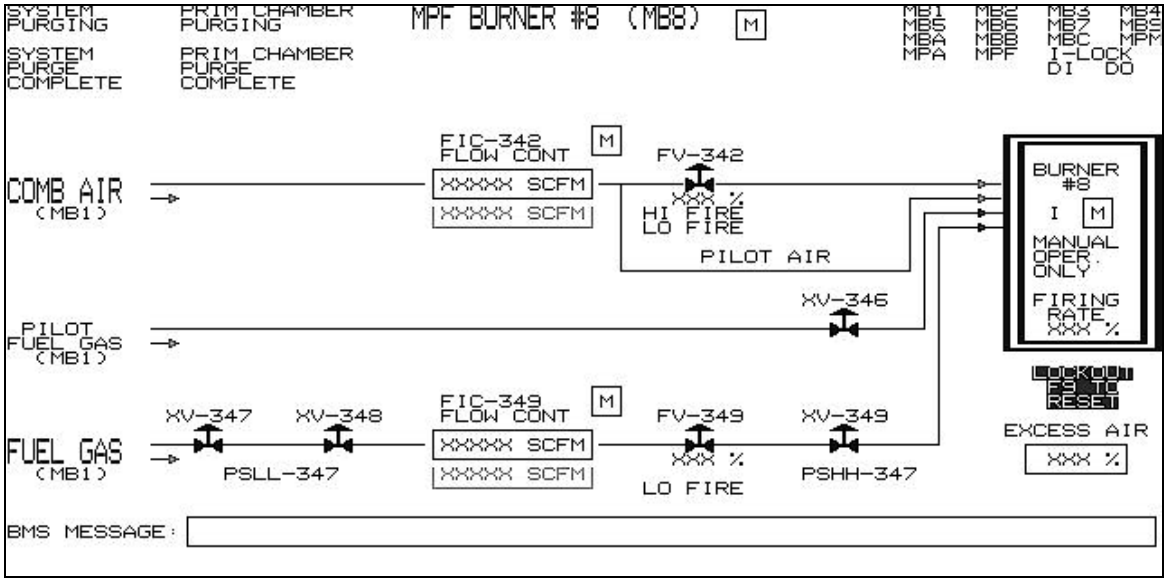

Figure E-8. ANCDF Advisor PC Screen MPF Burner #8 (MB8)

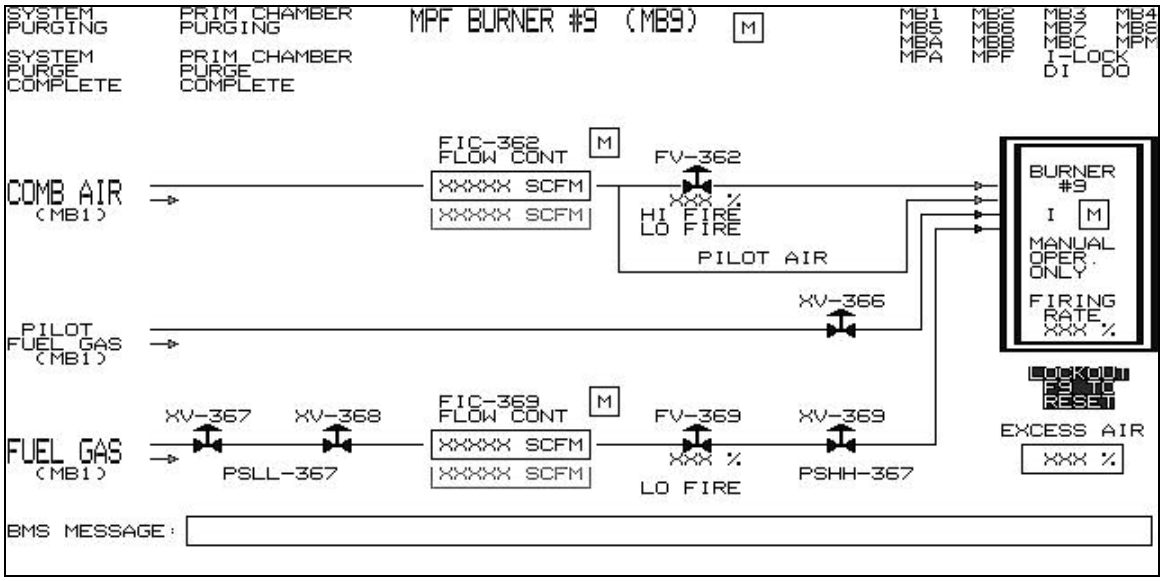

Figure E-9. ANCDF Advisor PC Screen MPF Burner #9 (MB9)

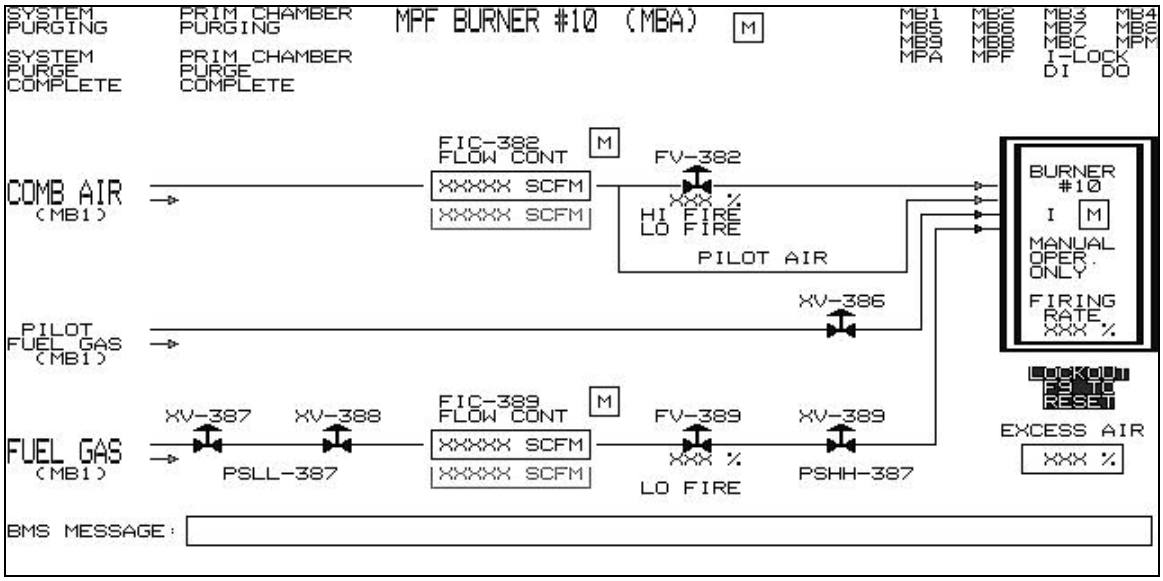

Figure E-10. ANCDF Advisor PC Screen MPF Burner #10 (MBA)

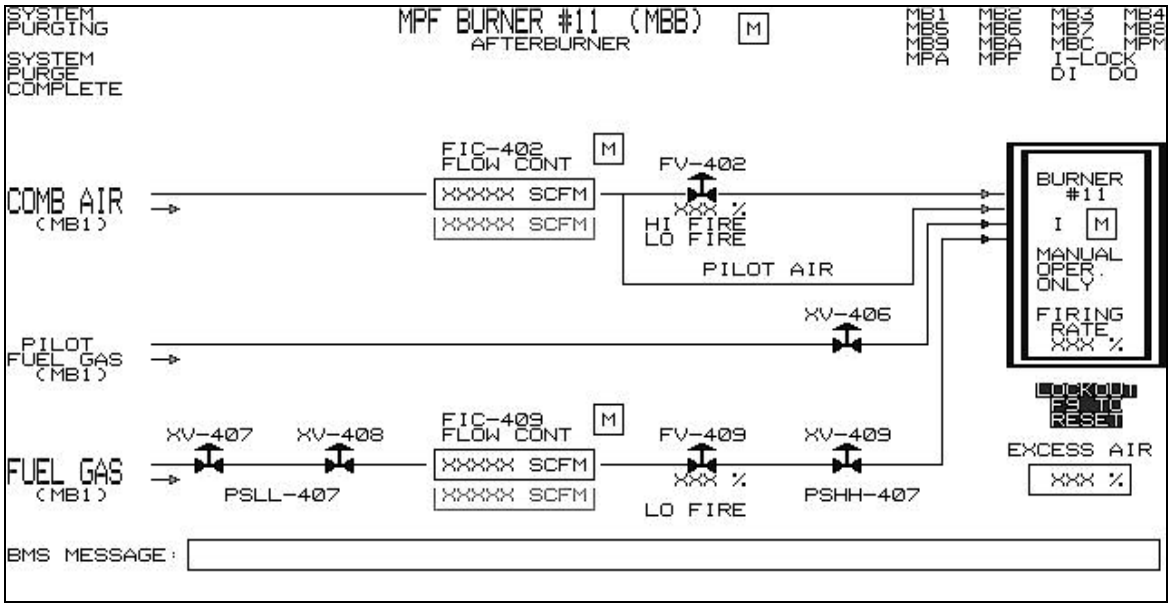

Figure E-11. ANCDF Advisor PC Screen MPF Burner #11 (MBB)

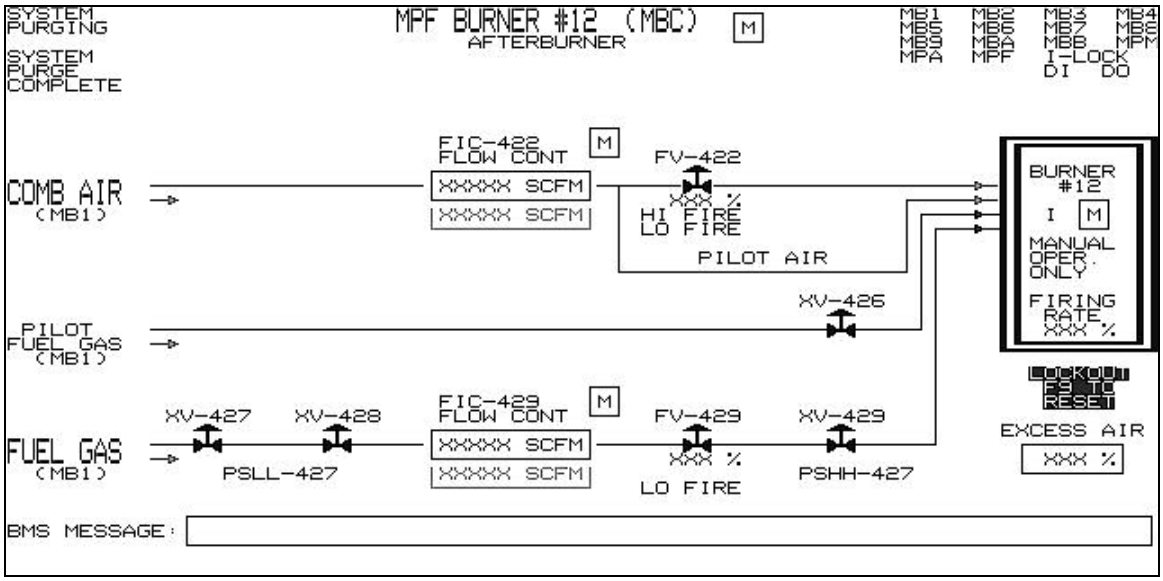

Figure E-12. ANCDF Advisor PC Screen MPF Burner #12 (MBC)

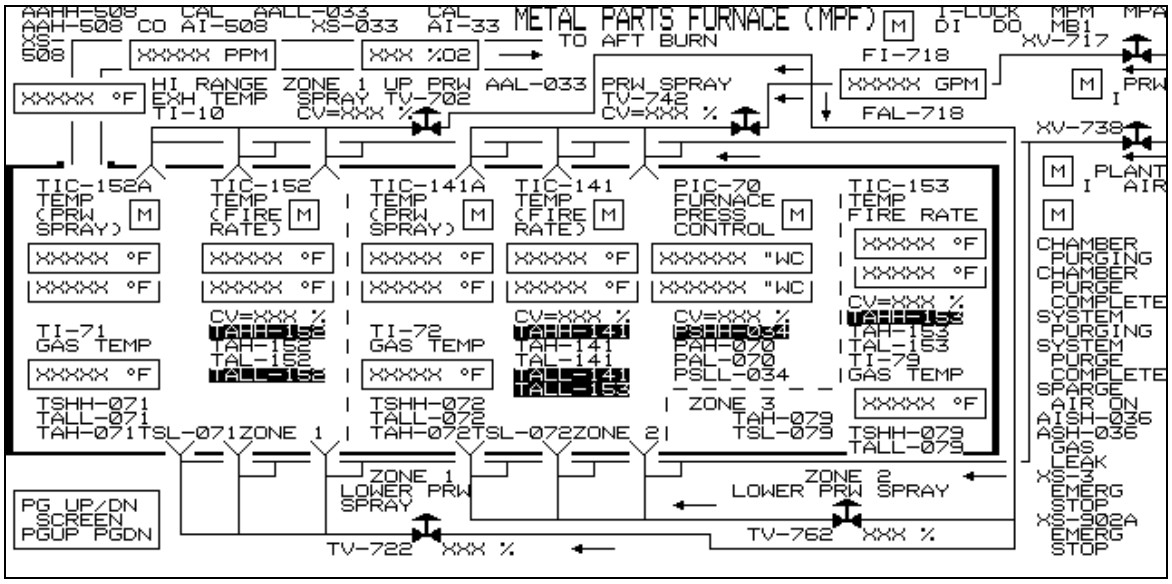

Figure E-13. ANCDF Advisor PC Screen MPF Furnace Temperature Control (MPF)

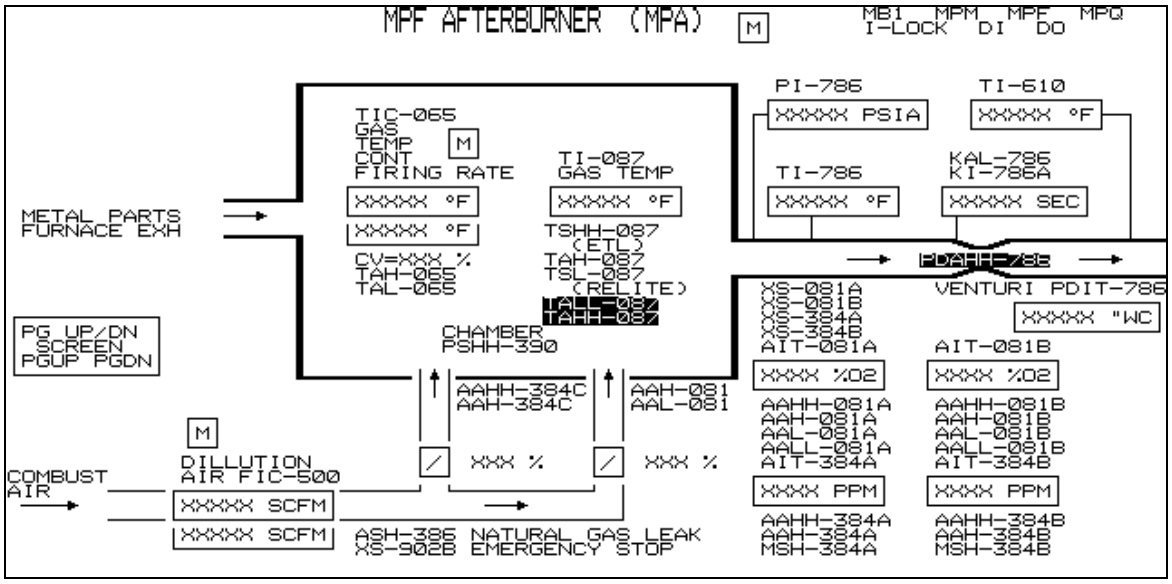

Figure E-14. ANCDF Advisor PC Screen MPF Afterburner (MPA)

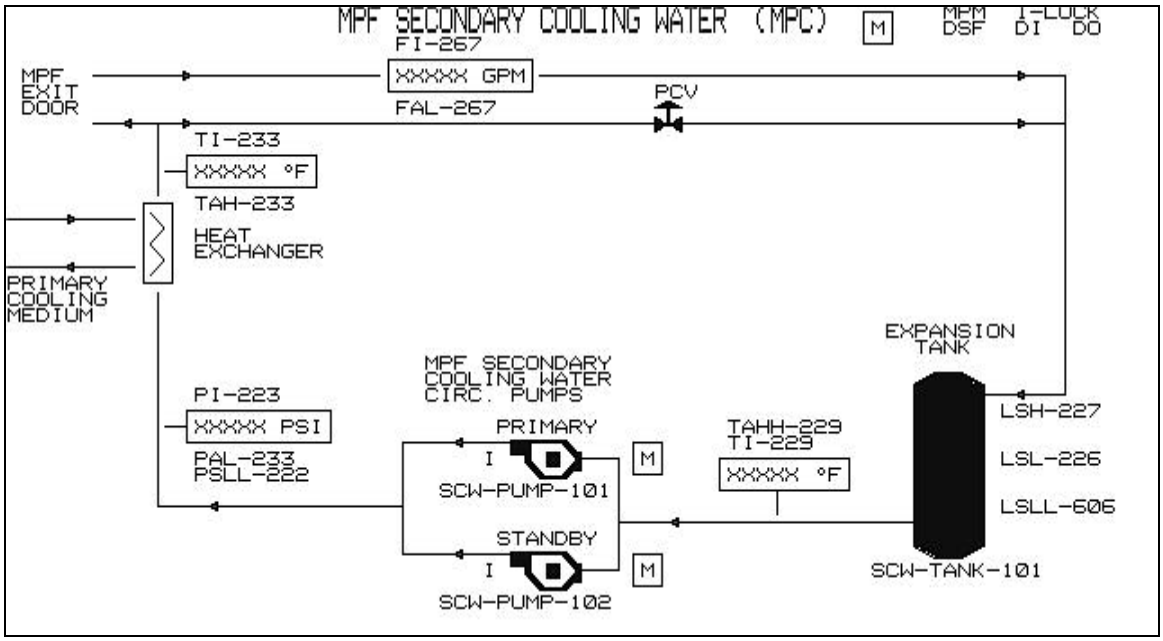

Figure E-15. ANCDF Advisor PC Screen MPF Secondary Cooling (MPC)

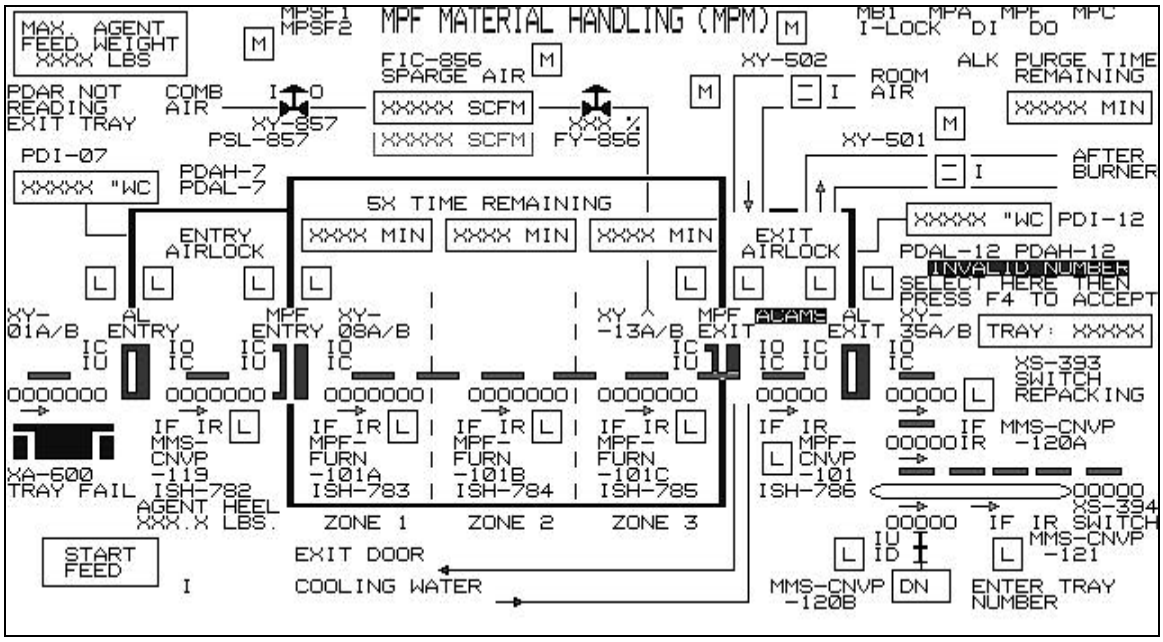

Figure E-16. ANCDF Advisor PC Screen MPF Furnace Material Handling (MPM)

MPF STOP FEED STATUS (MPSF1) PG 1 OF 2 MPSF2 MPM

24-TSHH-223	71-XS-03,TO,83	14CNVP120A	14-BSLL-883
#01 QNCH TWR OVHD	#18 CONSOLE E-STOP	#35 EXIT CONV ALM	#52 #1 E100 ALARM
24-FIC-218	14-XY-001A	14CNVP120B	14-BSLL-884
#02 BRINE TO VENTL	#19 CHG AIRLOK DR	#36 EXIT CONV LIFT	#53 #2 E100 ALARM
24-LIT-242	14-XY-001B	14-ASL-082	14-BSLL-885
#03 SUMP HI HI ALM	#20 CHG AL DR R/L	#37 EXH O2 ALARM	#54 #3 E100 ALARM
24-FIC-248	14-XY-035A	14-XS-082/670	14-BSLL-886
#04 CL LIQ LO LO	#21 DISH AIRLOK DR	#38 EXH O2 ALARM	#55 #4 E100 ALARM
24-PIT-258	14-XY-035B	14-PSLL-138	14-BSLL-887
#05 LIQ DISCH LOLC	#22 DISH AIRLOK DR	#39 COMB AIR EXH	#56 #5 E100 ALARM
24-PDIT-291	14-XY-013A	14-TALL-087	14-BSLL-888
#06 DP @ CAND HIHI	#23 EXIT DOOR ALM	#40 AB TEMP LO LO	#57 #6 E100 ALARM
24-TSHHH-510	14-XY-013B	61-PSLL-222	14-BSLL-889
#07 QNCH TWR OVHD	#24 EXIT DOOR ALM	#41 SEC COOL WTR	#58 #7 E100 ALARM
24-PDALL-222	14-XY-008A	14-TALL-141	14-BSLL-890
#08 VENTURI LO LO	#25 ENTRY DOOR ALM	#42 ZONE 2 TEMP	#59 #8 E100 ALARM
24-LSLL246/24E	14-XY-008B	14-TSLL-152	14-BSLL-891
#09 SCRUB SUMP ALM	#26 ENTRY DOOR ALM	#43 ZONE 1 TEMP	#60 #9 E100 ALARM
24-LSHH244/24E	14CNVP101	14-TALL-153	14-BSLL-892
#10 SCRUB SUMP ALM	#27 DISH AL CONVEY	#44 ZONE 3 TEMP	#61 #10 E100 ALARM
24-AIC-224	14CNVP119	14CNVP121	14-BSLL-893
#11 BRINE PH LO AL	#28 CHG AL CONVYER	#45 ACCUM CONV ALM	#62 #11 E100 ALARM
24-DIC-216	14-PSHH-034	14-XS-384/669	14-BSLL-894
#12 BRINE DEN HIHI	#29 ZONE 2 ALARM	#46 EXH CO ALARM	#63 #12 E100 ALARM
24-XY-949	14BLOW101	14-ASH-384	14-BSLL893/894
#13 INTAKE DAMPER	#30 COMB AIR ALM	#47 EXH CO ALARM	#64 #11 & #12 ALM
24-XY-950	14FURN101A	14-AAH-384	14FN102B1/12
#14 EXH DAMP MALF	#31 ZONE 1 CONVYER	#48 EXH CO HR AVG	#65 AB WARMUP TIME
24-LSLL513/243	1FURN101B	14-AISH-386	14-PDIT-786
#15 PACKED BED ALM	#32 ZONE 2 CONVYER	#49 ROOM GAS LEAK	#66 EXH GAS HI HI
14-XS-903A	14FURN101C	14-PSHH-390	14-XY-798
#16 LOCAL E-STOP	#33 ZONE 3 CONVYER	#50 CHAMBER ALARM	#67 GAS HEADER ALM
14-XS-903B	14-AISH-036	14-KAL-786A	14-FISH-796
#17 LOCAL E-STOP	#34 ROOM GAS LEAK	#51 EXH GAS LO ALM	#68 GAS HEADER ALM

Figure E-17. ANCDF Advisor PC Screen MPF Stop Feed Status, Page 1 (MPSF1)

MPF STOP FEED STATUS (MPSF2) PG 2 OF 2 MPSF1 MPM

61-TIT-229	61-LSLL-606	PAS703AR	
#01 SEC COOL WTR	#18 SEC COOL WTR	#35 PAS ACAMS ALM	#52
24-FISLL-674	24-BW-102A/B/6	24-TIT-509	
#02 OIL 2ND STAGE	#19 NO BLOWERS RUN	#36 QNCH TWR OVHD	#53
24-TSH-307A/F	24-TSH-446A/B	24-PIT-258	
#03 2ND STAGE MTR	#20 BEARING TEMP	#37 LIQ DISCH LO	#54
24-XSH-306	24-TSH-447A/B	HS-082, -670	
#04 2ND STAGE VIB	#21 BEARING TEMP	#38 EXH O2 IN CAL	#55
PAS703	24-FSLL-667	HS-384, -669	
#05 ACAMS OFFLINE	#22 NFPA BURN S/D	#39 EXH CO IN CAL	#56
	24-BLOW-102A	14-AAH-082	
#06	#23 1ST STAGE MALF	#40 EXH O2 HI	#57
24-ASH-670	24-BLOW-102B	24-AAL-670	
#07 STACK O2 ALM	#24 2ND STAGE MALF	#41 STACK O2 LO	#58
	24-IAH-500	14-TALL-071	
#08	#25 2ND STAGE I AL	#42 ZONE 1 LO LO	#59
24-ASH-669	24-IAH-972	14-TAHH-071	
#09 CO STACK ALM	#26 1ST STAGE I AL	#43 ZONE 1 HI HI	#60
24-AAH-669		14-TALL-072	
#10 CO HR AVG ALM	#27	#44 ZONE 2 LO LO	#61
24-FISLL-673	PAS701AR	14-TAHH-072	
#11 OIL 1ST STAGE	#28 STACK ACAMS ALM	#45 ZONE 2 HI HI	#62
14-XS-393A/B		14-TALL-079	
#12 CNVP PULL CORD	#29	#46 ZONE 3 LO LO	#63
24-TSH-371A/F	BRA TANK	14-TAHH-079	
#13 1ST STAGE MTR	#30 BRA TANK LVL	#47 ZONE 3 HI HI	#64
14-XS-394A/B		14-TAHH-087	
#14 CNVP PULL CORD	#31	#48 AFB CHMBR HIHI	#65
24-XSH-373	14-TIC-152	24-PALL-233	
#15 1ST STAGE VIB	#32 ZONE 1 TEMP LO	#49 BR DISCH LO LO	#66
14-XY-501	14-TIC-141	24-XY-250A&C	
#16 DAL EXH TO AB	#33 ZONE 2 TEMP LO	#50 BR VLVS IN MAN	#67
14-XY-502	14-TIC-153		
#17 DAL INLET AIR	#34 ZONE 3 TEMP LO	#51	#68

Figure E-18. ANCDF Advisor PC Screen MPF Stop Feed Status, Page 2 (MPSF2)

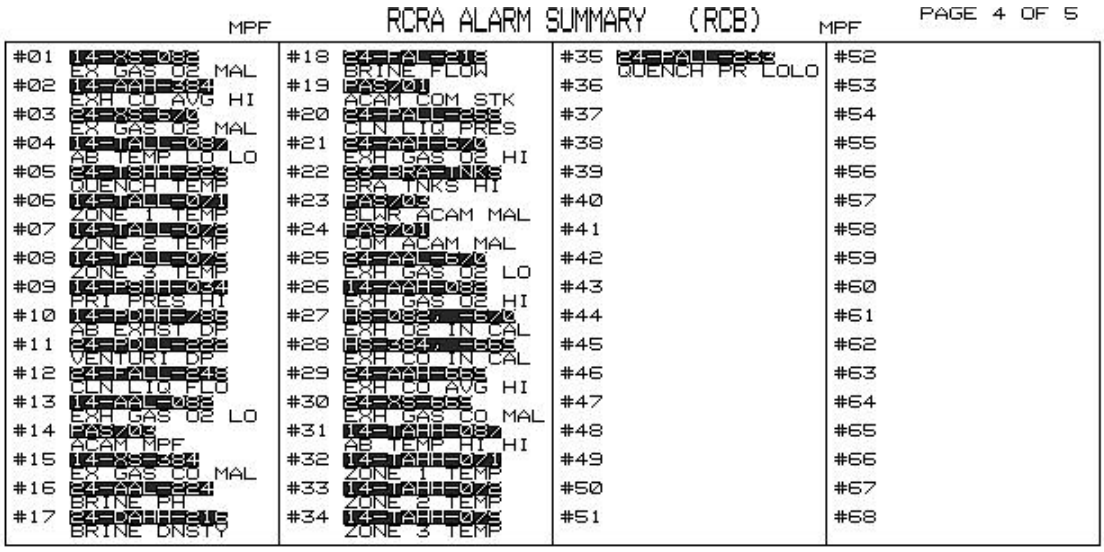

Figure E-19. ANCDF Advisor PC Screen MPF RCRA Alarm Summary (RCB)

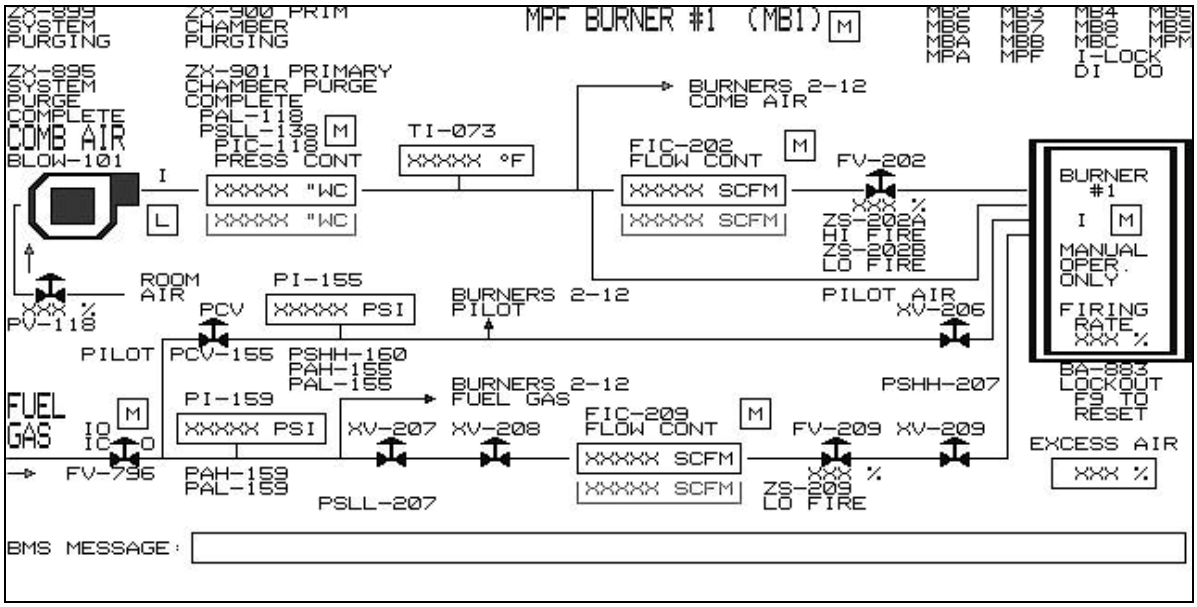

Figure E-*20*. TOCDF Advisor PC Screen MPF Burner #1 (MB1)

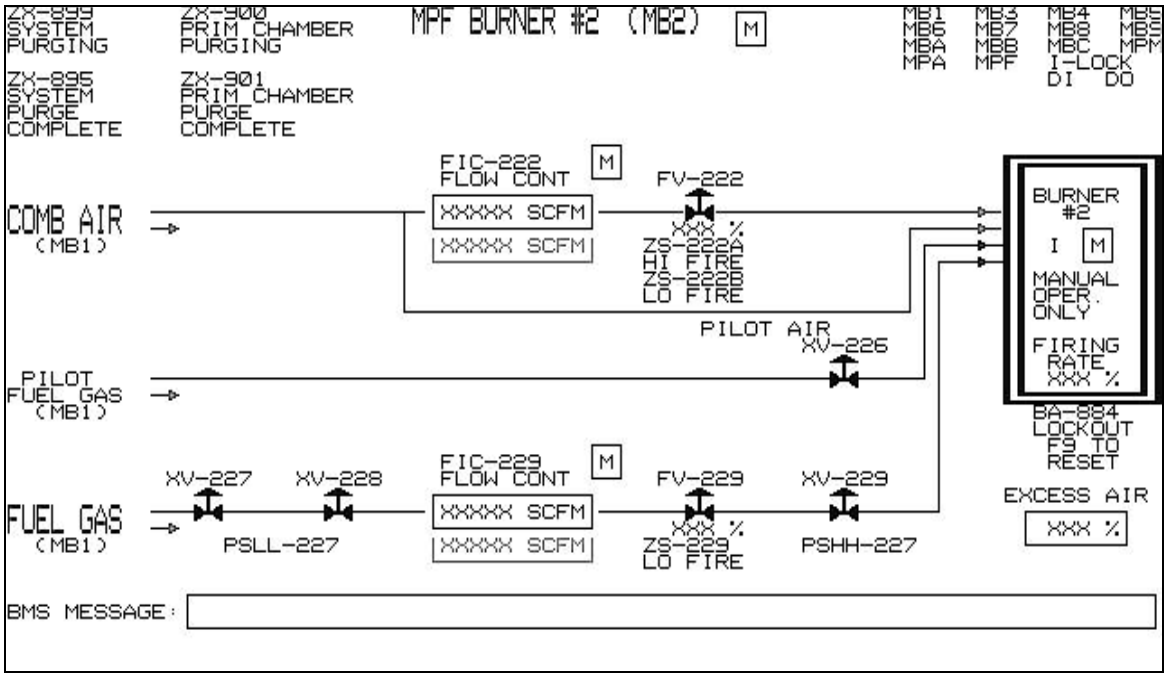

Figure E-*21*. TOCDF Advisor PC Screen MPF Burner #2 (MB2)

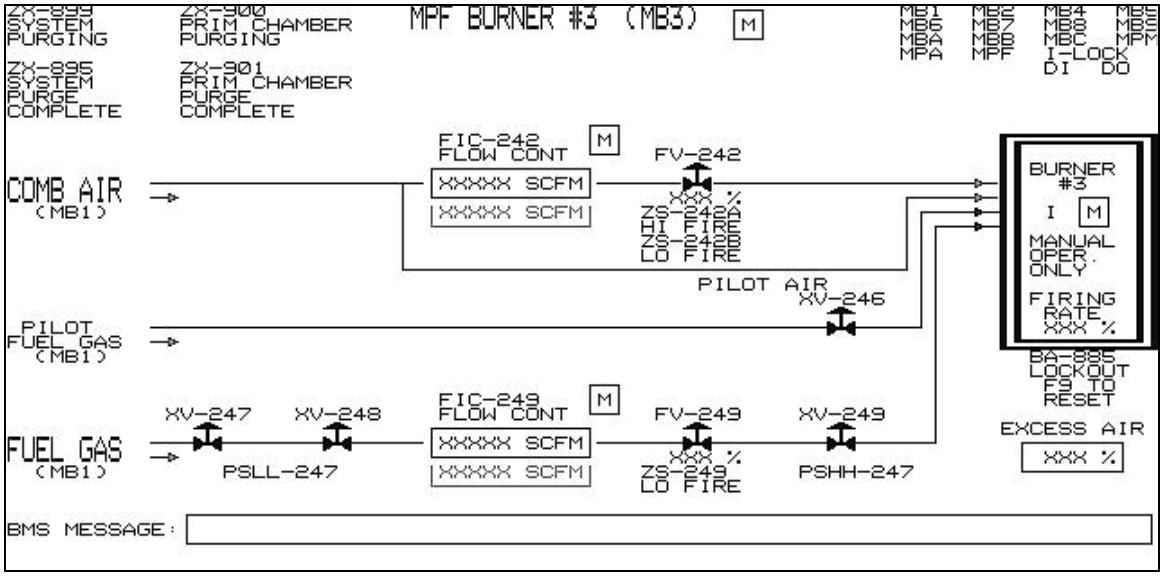

Figure E-*22*. TOCDF Advisor PC Screen MPF Burner #3 (MB3)

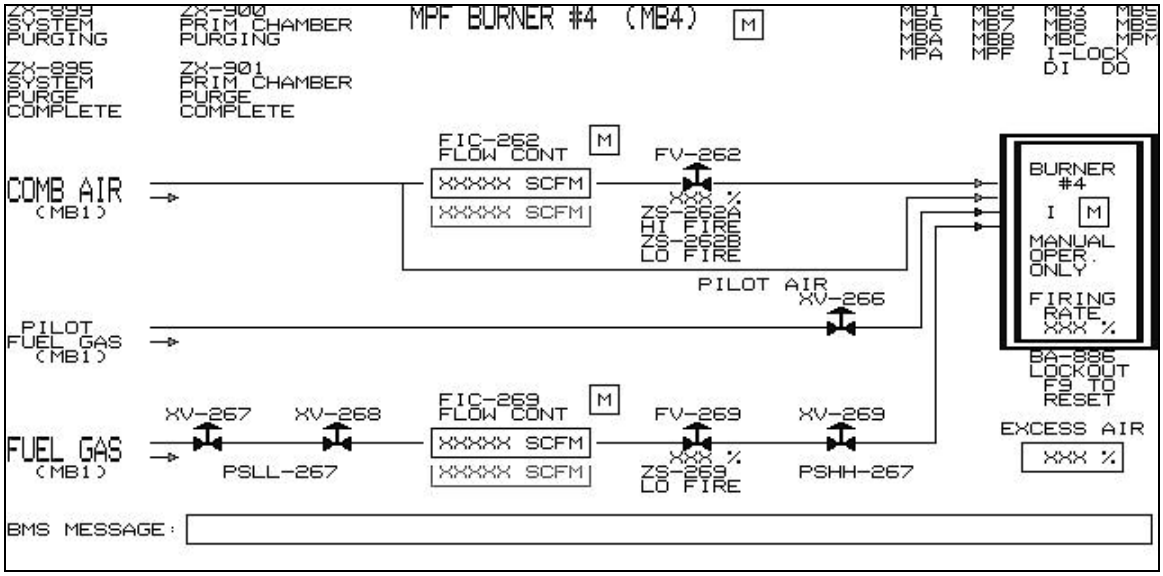

Figure E-*23*. TOCDF Advisor PC Screen MPF Burner #4 (MB4)

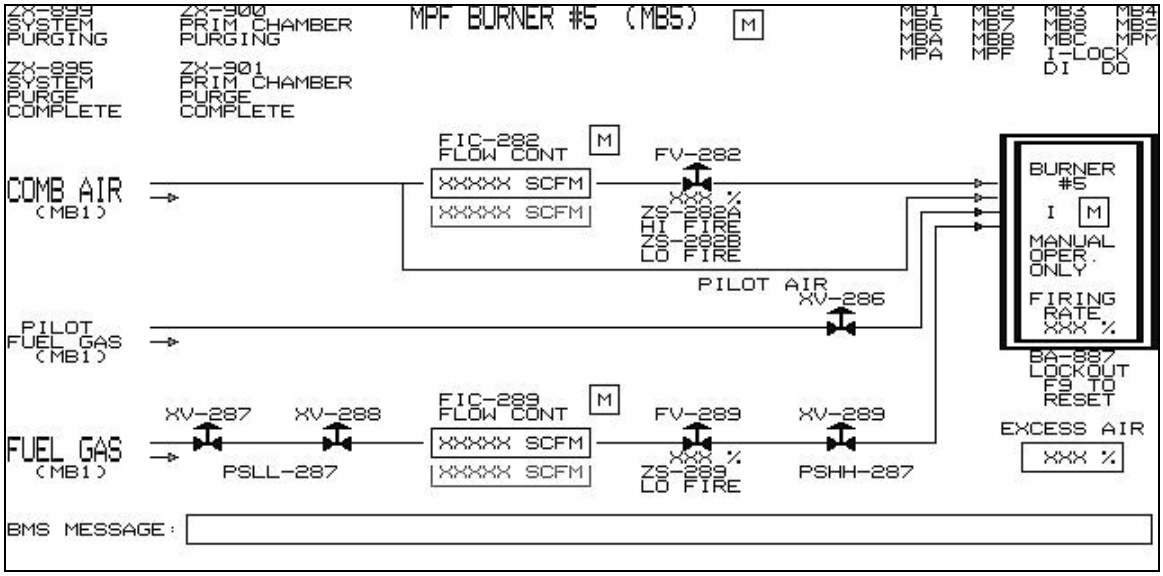

Figure E-*24*. TOCDF Advisor PC Screen MPF Burner #5 (MB5)

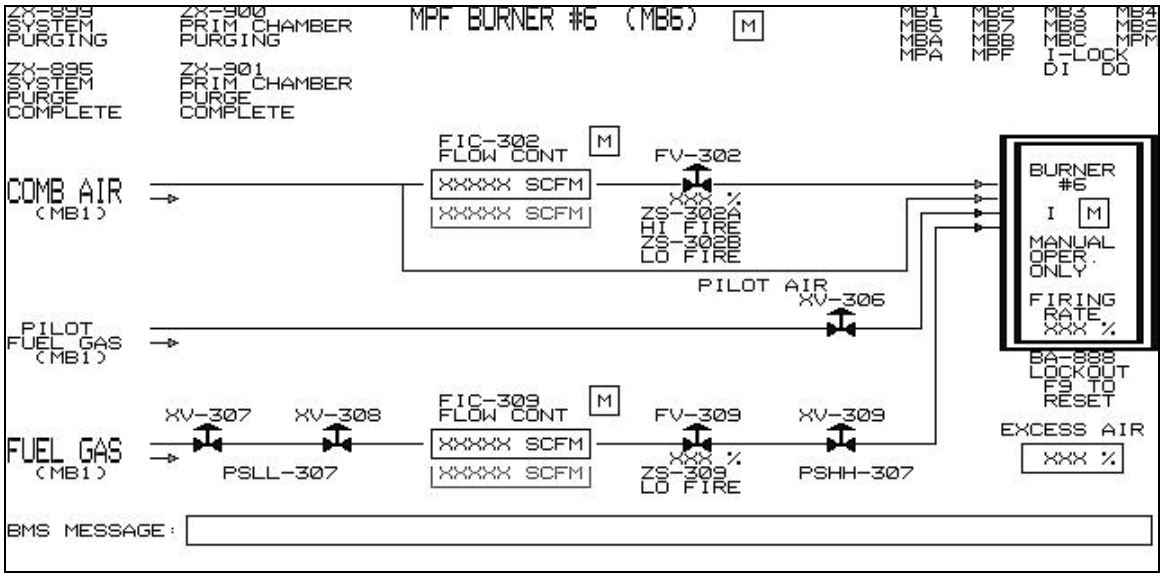

Figure E-*25*. TOCDF Advisor PC Screen MPF Burner #6 (MB6)

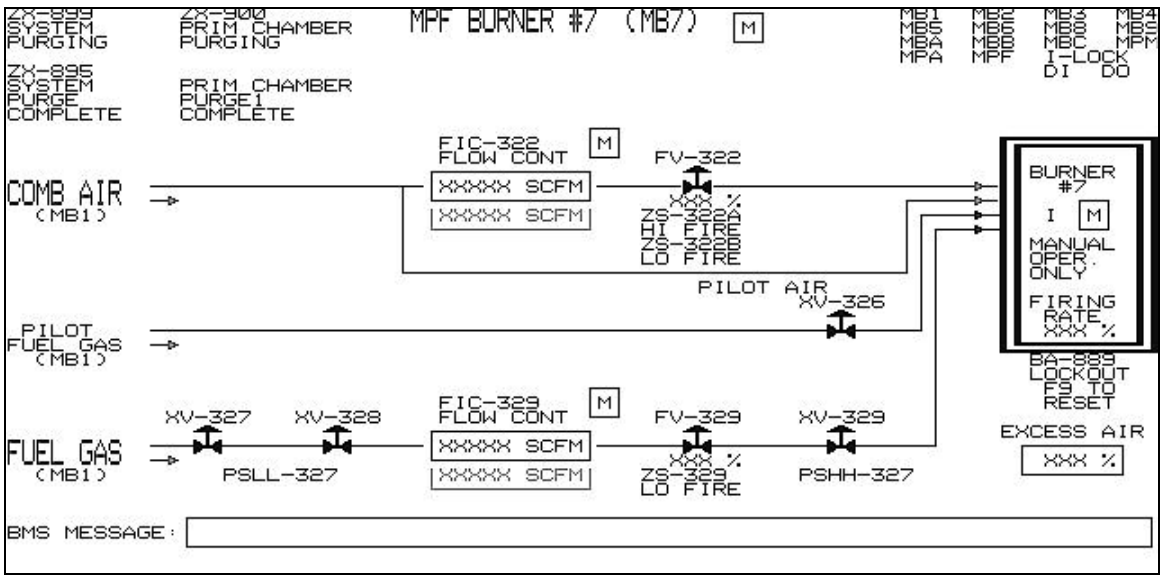

Figure E-*26*. TOCDF Advisor PC Screen MPF Burner #7 (MB7)

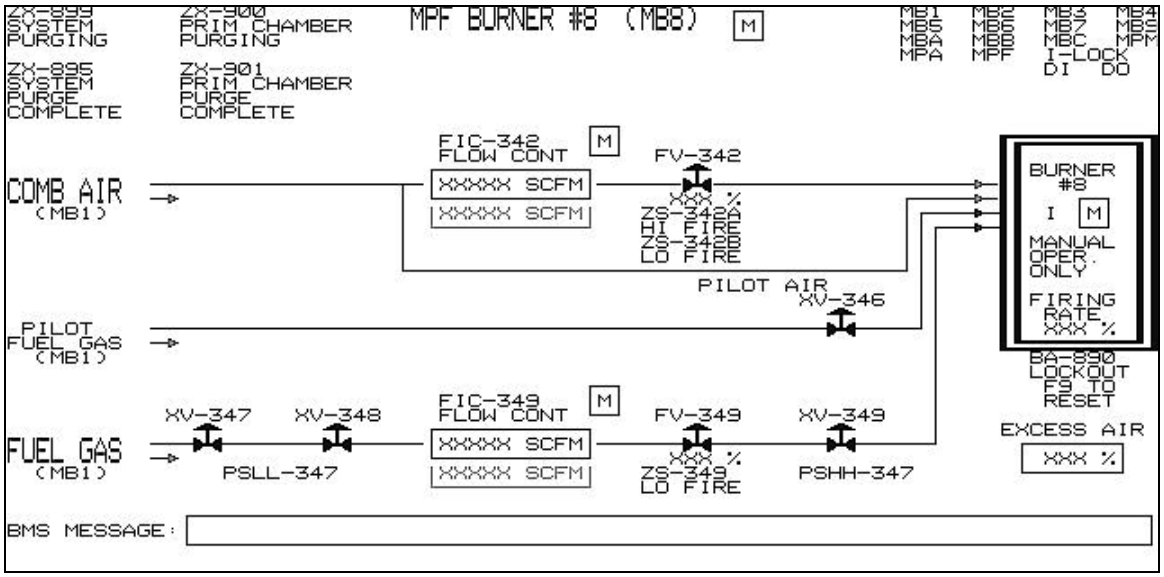

Figure E-*27*. TOCDF Advisor PC Screen MPF Burner #8 (MB8)

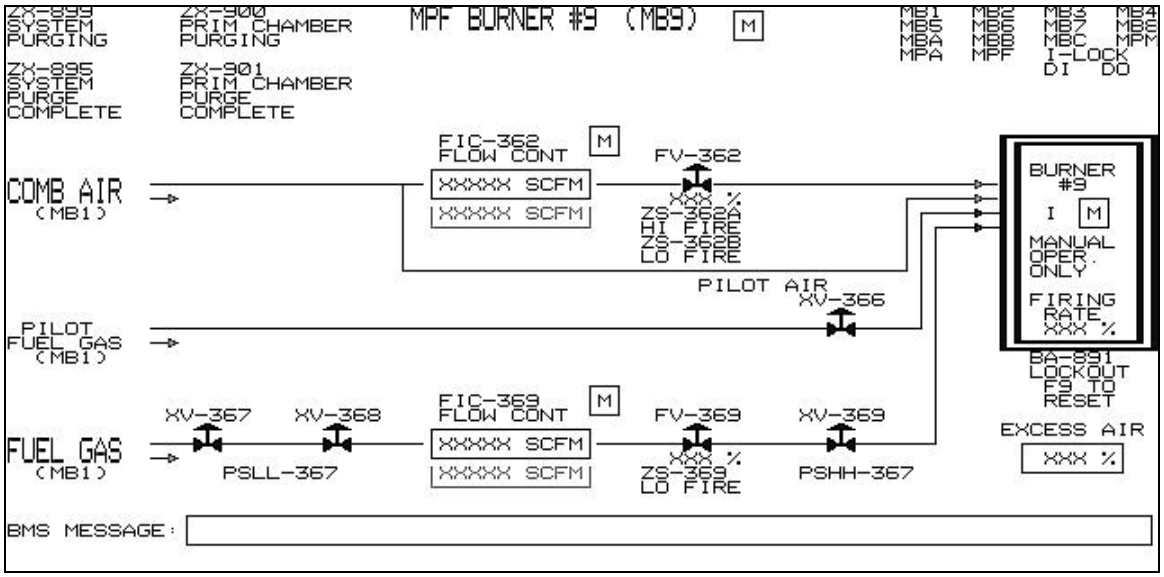

Figure E-*28*. TOCDF Advisor PC Screen MPF Burner #9 (MB9)

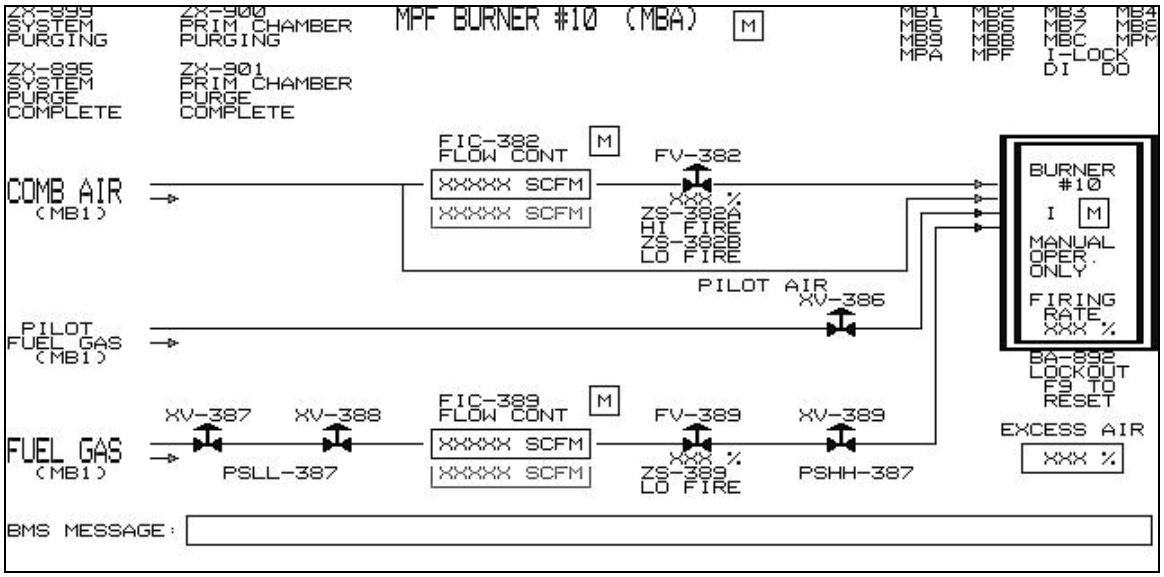

Figure E-*29*. TOCDF Advisor PC Screen MPF Burner #10 (MBA)

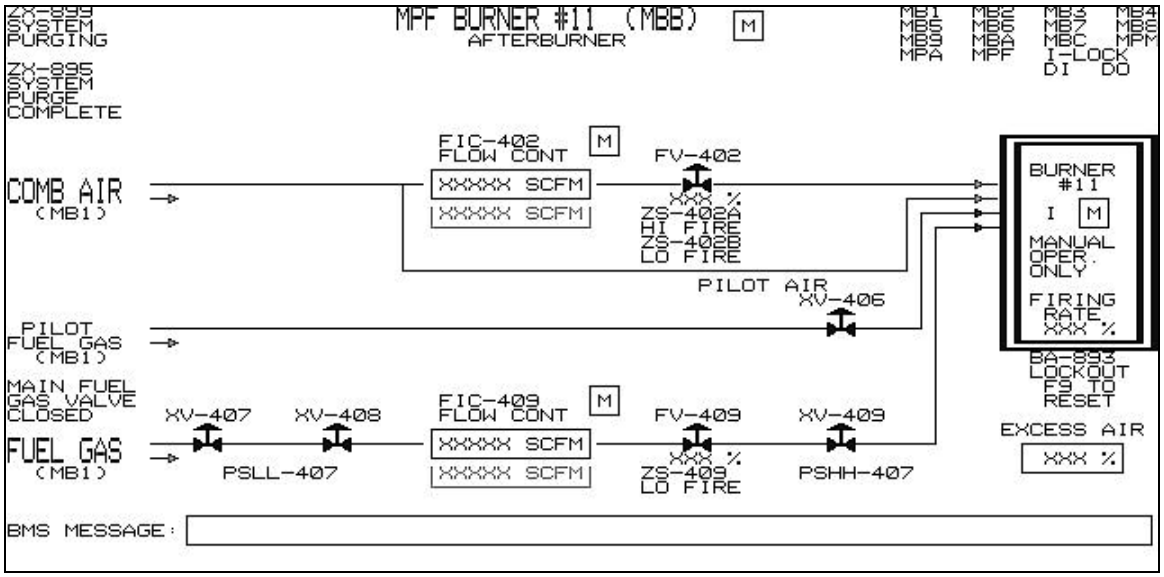

Figure E-*30*. TOCDF Advisor PC Screen MPF Burner #11 (MBB)

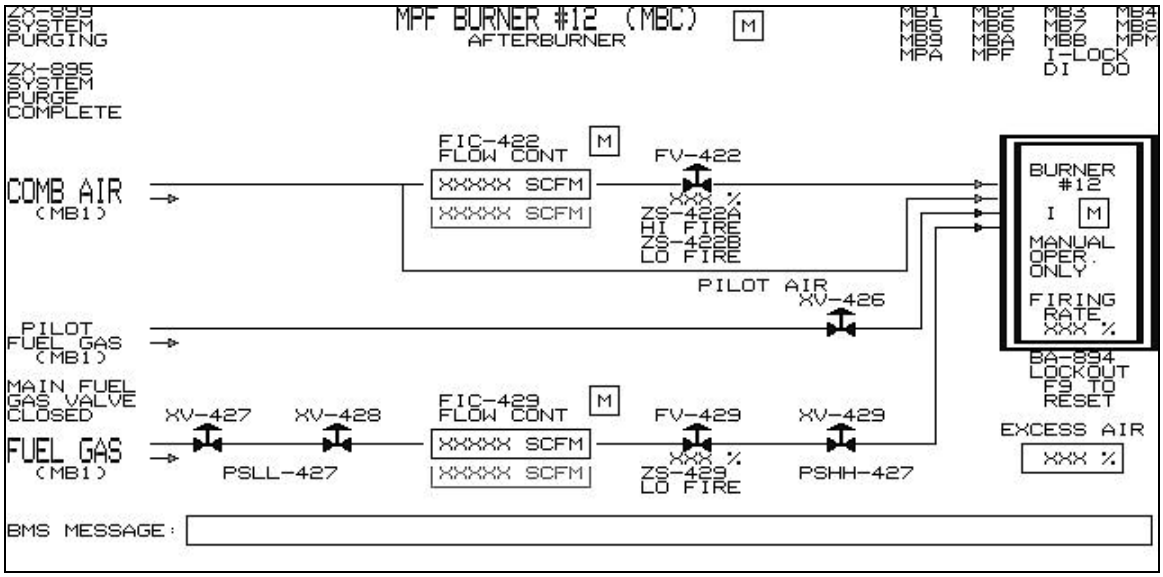

Figure E-*31*. TOCDF Advisor PC Screen MPF Burner #12 (MBC)

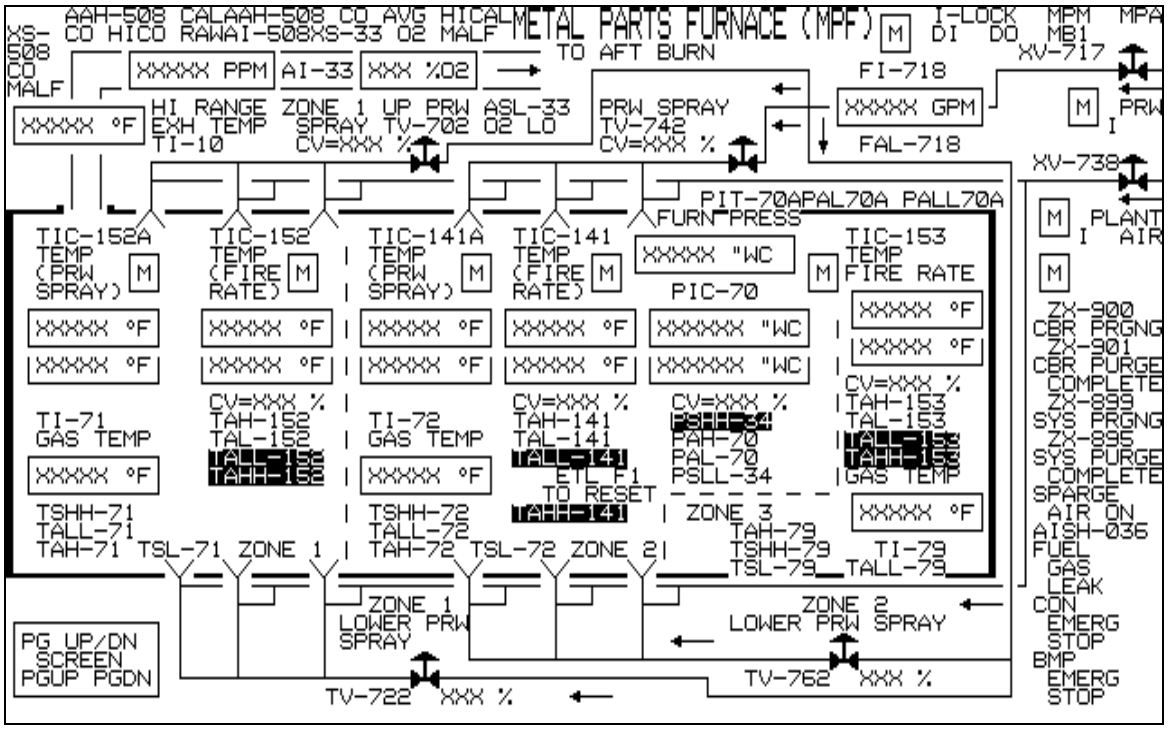

Figure E-*32*. TOCDF Advisor PC Screen MPF Furnace Temperature Control (MPF)

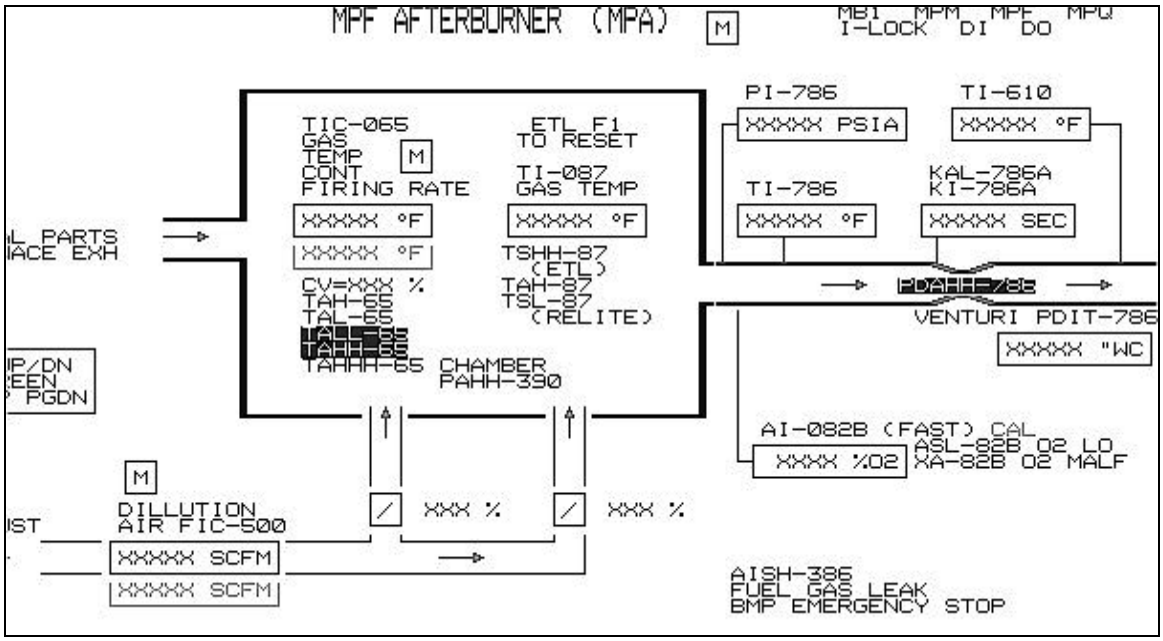

Figure E-*33*. TOCDF Advisor PC Screen MPF Furnace Afterburner (MPA)

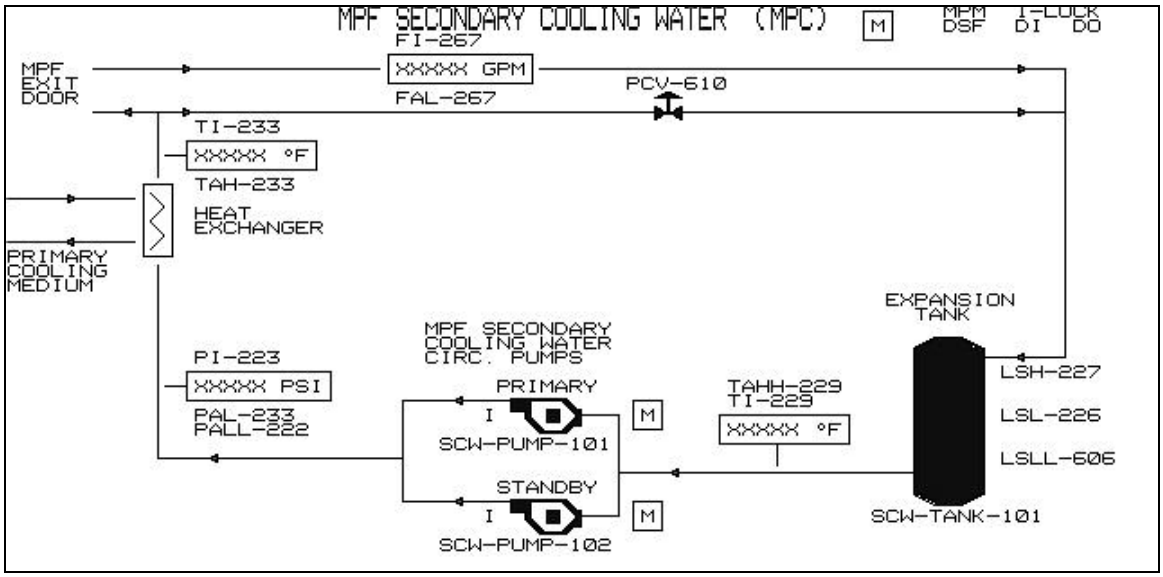

Figure E-*34*. TOCDF Advisor PC Screen MPF Secondary Cooling (MPC)

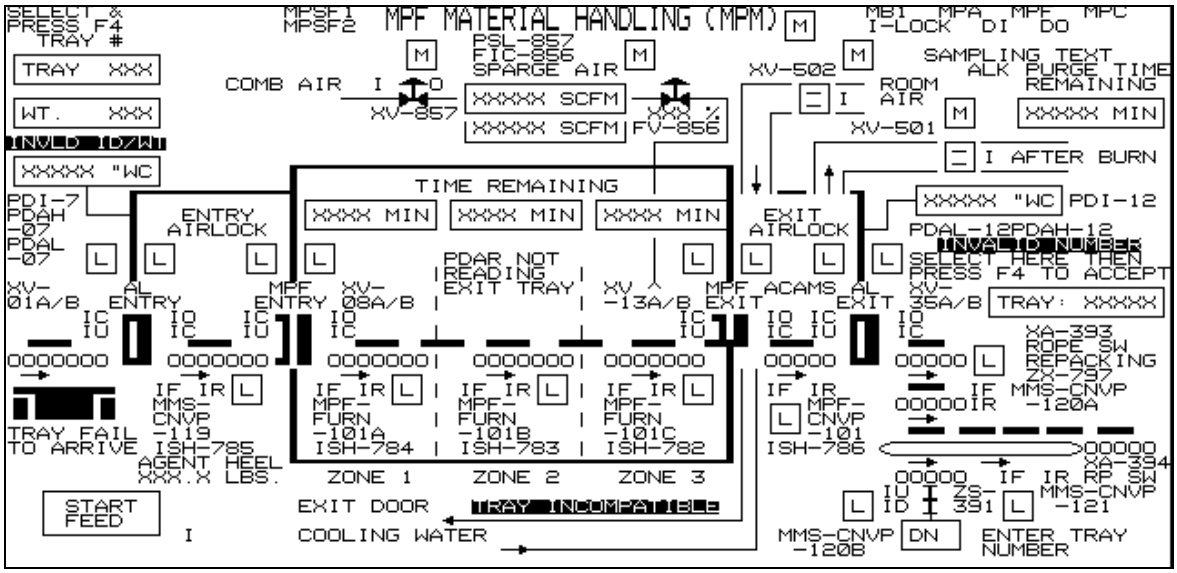

Figure E-*35*. TOCDF Advisor PC Screen MPF Furnace Material Handling (MPM)

MPF STOP FEED STATUS (MPSF1) PG 1 OF 2 MPSF2 MPM

24-TSHH-223	71-XS-03,TO,83	14CNVP120A	14-BSLL-883
#01 GNCH TWR OVHD	#18 CONSOLE E-STOP	#35 EXIT CONV ALM	#52 #1 E100 ALARM
24-FAL-218	14-XV-001A	14CNVP120B	14-BSLL-884
#02 BRINE TO VENTU	#19 CHG AIRLOK DR	#36 EXIT CONV LIFT	#53 #2 E100 ALARM
24-LAHH-242	14-XV-001B	14-AAL-082	14-BSLL-885
#03 SUMP HI HI ALM	#20 CHG AL DR R/L	#37 EXH O2 ALARM	#54 #3 E100 ALARM
24-FALL-248	14-XV-035A	14-XS-082/670	14-BSLL-886
#04 CL LIQ LO LO	#21 DISH AIRLOK DR	#38 EXH O2 ALARM	#55 #4 E100 ALARM
24-PALL-258	14-XV-035B	14-PSLL-138	14-BSLL-887
#05 LIQ DISCH LOLO	#22 DISH AIRLOK DR	#39 COMB AIR EXH	#56 #5 E100 ALARM
24-PDAHH-291	14-XV-013A	14-TALL-065	14-BSLL-888
#06 DP @ CAND HIHI	#23 EXIT DOOR ALM	#40 AB TEMP LO LO	#57 #6 E100 ALARM
24-TSHHH-510	14-XV-013B	61-PSLL-222	14-BSLL-889
#07 GNCH TWR OVHD	#24 EXIT DOOR ALM	#41 SEC COOL WTR	#58 #7 E100 ALARM
24-PDALL-222	14-XV-008A	14-TALL-141	14-BSLL-890
#08 VENTURI LO LO	#25 ENTRY DOOR ALM	#42 ZONE 2 TEMP	#59 #8 E100 ALARM
24-LALL-246	14-XV-008B	14-TALL-152	14-BSLL-891
#09 SCRUB SUMP ALM	#26 ENTRY DOOR ALM	#43 ZONE 1 TEMP	#60 #9 E100 ALARM
24-LAHH-244	14CNVP101	14-TALL-153	14-BSLL-892
#10 SCRUB SUMP ALM	#27 DISH AL CONVEY	#44 ZONE 3 TEMP	#61 #10 E100 ALARM
24-AALL-224	14CNVP119		14-BSLL-893
#11 BRINE PH LO LO	#28 CHG AL CONVYER	#45	#62 #11 E100 ALARM
24-DAHH-216	14-PSHH-034	14-XS-384/669	14-BSLL-894
#12 BRINE DEN HIHI	#29 FURN PRES HIHI	#46 EXH CO ALARM	#63 #12 E100 ALARM
24-XV-949	14BLOW101	14-ASH-384	14-BSLL893/894
#13 INTAKE DAMPER	#30 COMB AIR ALM	#47 EXH CO ALARM	#64 #11 & #12 ALM
24-XV-950	14FURN101A	14-AAH-384	14FN102B1/12
#14 EXH DAMP MALF	#31 ZONE 1 CONVYER	#48 EXH CO HR AVG	#65 AB WARMUP TIME
24-LALL-513	14FURN101B	14-AISH-386	14-PDAHH-786
#15 PACKED BED ALM	#32 ZONE 2 CONVYER	#49 ROOM GAS LEAK	#66 EXH GAS HI HI
14-XS-902A	14FURN101C	14-PSHH-390	14-FV-786
#16 LOCAL E-STOP	#33 ZONE 3 CONVYER	#50 CHAMBER ALARM	#67 GAS HEADER ALM
14-XS-902B	14-ASH-036	14-KAL-786A	
#17 LOCAL E-STOP	#34 ROOM GAS LEAK	#51 EXH GAS LO ALM	#68

Figure E-36. TOCDF Advisor PC Screen MPF Stop Feed Status, Page 1 (MPSF1)

MPF STOP FEED STATUS (MPSF2) PG 2 OF 2 MPSF1 MPM

	61-TAHH-229		61-LSLL-606		PAS703AR		24-TAHHH-509
#01	SEC COOL WTR	#18	SEC COOL WTR	#35	PAS ACAMS ALM	#52	QNCH TWR OVHD
	24-FSLL-674		24-BW-102A/B/6		24-TAHH-509		
#02	OIL 2ND STAGE	#19	NO BLOWERS RUN	#36	QNCH TWR OVHD	#53	
	24-TSH-307A/F		24-TSH-446A/B		24-PAL-258		
#03	2ND STAGE MTR	#20	BEARING TEMP	#37	LIQ DISCH LO	#54	
	24-XSH-306		24-TSH-447A/B		HS-082, -670		
#04	2ND STAGE VIB	#21	BEARING TEMP	#38	EXH O2 IN CAL	#55	
	PAS703		24-FSLL-667		HS-384, -669		
#05	ACAMS OFFLINE	#22	NFPA BURN S/D	#39	EXH CO IN CAL	#56	
			24-BLOW-102A		14-AAH-082		
#06		#23	1ST STAGE MALF	#40	EXH O2 HI	#57	
	24-AAH-670		24-BLOW-102B		24-AAL-670		
#07	STACK O2 ALM	#24	2ND STAGE MALF	#41	STACK O2 LO	#58	
			24-IAH-500		14-TALL-071		
#08		#25	2ND STAGE I AL	#42	ZONE 1 LO LO	#59	
	24-ASH-669		24-IAH-972		14-TAHH-152		
#09	CO STACK ALM	#26	1ST STAGE I AL	#43	ZONE 1 HI HI	#60	
	24-AAH-669				14-TALL-072		
#10	CO HR AVG ALM	#27		#44	ZONE 2 LO LO	#61	
	24-FSLL-673		PAS701AR		14-TAHH-141		
#11	OIL 1ST STAGE	#28	STACK ACAMS ALM	#45	ZONE 2 HI HI	#62	
	14-XS-393A/B				14-TALL-079		
#12	CNVP PULL CORD	#29		#46	ZONE 3 LO LO	#63	
	24-TSH-971A/F		BRA TANK		14-TAHH-153		
#13	1ST STAGE MTR	#30	BRA TANK LVL	#47	ZONE 3 HI HI	#64	
					14-TAHH-065		
#14		#31		#48	AFB TEMP HIHI	#65	
	24-XSH-973		14-TALL-152		24-PALL-233		
#15	1ST STAGE VIB	#32	ZONE1 TMP LOLO	#49	BR DISCH LO LO	#66	
	14-XV-501		14-TALL-141		24-AI-224A&B		
#16	DAL EXH TO AB	#33	ZONE2 TMP LOLO	#50	PH BOTH IN CAL	#67	
	14-XV-502		14-TALL-153		24-TAHH-509		
#17	DAL INLET AIR	#34	ZONE3 TMP LOLO	#51	QNCH TWR OVHD	#68	

Figure E-37. TOCDF Advisor PC Screen MPF Stop Feed Status, Page 2 (MPSF2)

MPF RCRA ALARM SUMMARY (RCB) MPF PAGE 3 OF 5

	14-XS-082/670		24-FAL-218				
#01	EX GAS O2 MAL	#18	BRINE FLOW	#35		#52	
	14-AAH-384		PAS701				
#02	EXH CO AVG HI	#19	ACAM COM STK	#36		#53	
			24-PALL-258				
#03		#20	CLN LIQ PRES	#37		#54	
	14-TALL-065		24-AAH-670				
#04	AB TEMP LO LO	#21	EXH GAS O2 HI	#38		#55	
	24-TSHH-223		23-BRA-TNKS				
#05	QUENCH TEMP	#22	BRA TNKS HI	#39		#56	
	14-TALL-152		24-AAL-670				
#06	ZONE 1 TEMP	#23	EXH GAS O2 LO	#40		#57	
	14-TALL-141		14-AAH-082				
#07	ZONE 2 TEMP	#24	EXH GAS O2 HI	#41		#58	
	14-TALL-153		24-AAH-669				
#08	ZONE 3 TEMP	#25	EXH CO AVG HI	#42		#59	
	14-PSHH-034						
#09	PRI PRES HI	#26		#43		#60	
	14-PDAHH-786		14-TAHH-065				
#10	AB EXHST DP	#27	AB TEMP HI HI	#44		#61	
	24-PDALL-222		14-TAHH-152				
#11	VENTURI DP	#28	ZONE 1 TEMP	#45		#62	
	24-FALL-248		14-TAHH-141				
#12	CLN LIQ FLO	#29	ZONE 2 TEMP	#46		#63	
	14-AAL-082		14-TAHH-153				
#13	EXH GAS O2 LO	#30	ZONE 3 TEMP	#47		#64	
	PAS703		24-PALL-233				
#14	ACAM MPF	#31	QUENCH PR LOLO	#48		#65	
	14-XS-384/669						
#15	EX GAS CO MAL	#32		#49		#66	
	24-AALL-224		24-STGR-701				
#16	BRINE PH	#33	STAGGER ACAMS	#50		#67	
	24-DAHH-216						
#17	BRINE DNSTY	#34		#51		#68	

Figure E-38. TOCDF Advisor PC Screen MPF RCRA Alarm Summary (RCB)

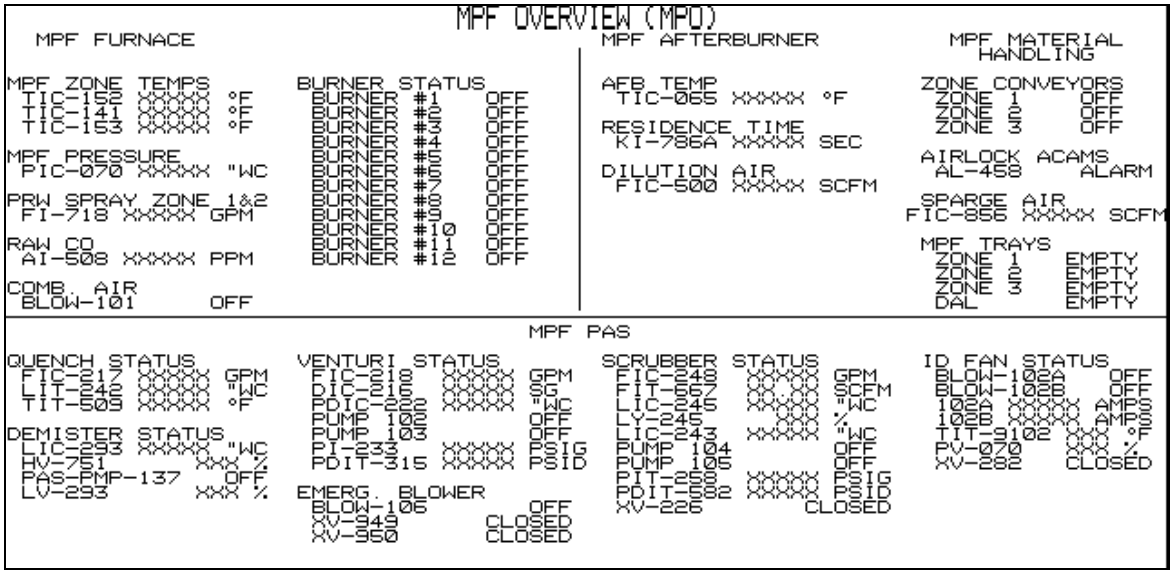

Figure E-39. TOCDF Advisor PC Screen MPF Overview (MPO)

APPENDIX F

Instrument Ranges

Table F.1 shows the MPF system instrument data extracted from the TOCDF Loveland calibration database as of *August*, *2000*. Not all instrument tag numbers listed are part of the design at ANCDF, PBCDF, and UMCDF.

Table F.1 MPF Instrumentation in the TOCDF Loveland Instrument Calibration Database

INSTRUMENT TAG	RCRA	INPUT			OUTPUT			SET POINT	LOOP DEFINITION
		LOW	HI	UNIT	LOW	HI	UNIT		
14-FIT-202	No	0	6.81	in. wc.	4	20	mA		MPF-FURN-101 Combustion Air Control Burner 1
14-FIT-209	No	0	20	in. wc.	4	20	mA		MPF-FURN-101 Burner 1 Fuel Gas
14-FIT-222	No	0	6.81	in. wc.	4	20	mA		MPF-FURN-101 Combustion Air Control Burner 2
14-FIT-229	No	0	20	in. wc.	4	20	mA		MPF-FURN-101 Burner 2 Fuel Gas
14-FIT-242	No	0	6.81	in. wc.	4	20	mA		MPF-FURN-101 Combustion Air Control Burner 3
14-FIT-249	No	0	20	in. wc.	4	20	mA		MPF-FURN-101 Burner 3 Fuel Gas
14-FIT-262	No	0	*6.81*	*in. wc.*	4	20	mA		MPF-FURN-101 Combustion Air Control Burner 4
14-FIT-269	No	0	20	in. wc.	4	20	mA		MPF-FURN-101 Burner 4 Fuel Gas
14-FIT-282	No	0	6.81	in. wc.	4	20	mA		MPF-FURN-101 Combustion Air Control Burner 5
14-FIT-289	No	0	20	in. wc.	4	20	mA		MPF-FURN-101 Burner 5 Fuel Gas
14-FIT-302	No	0	6.81	in. wc.	4	20	mA		MPF-FURN-101 Combustion Air Control Burner 6
14-FIT-309	No	0	20	in. wc.	4	20	mA		MPF-FURN-101 Burner 6 Fuel Gas
14-FIT-322	No	0	6.81	in. wc.	4	20	mA		MPF-FURN-101 Combustion Air Control Burner 7
14-FIT-329	No	0	20	in. wc.	4	20	mA		MPF-FURN-101 Burner 7 Fuel Gas

Table F.1 (Cont'd)

INSTRUMENT TAG	RCRA	INPUT			OUTPUT			SET POINT	LOOP DEFINITION
		LOW	HI	UNIT	LOW	HI	UNIT		
14-FIT-342	No	0	6.81	in. wc.	4	20	mA		MPF-FURN-101 Combustion Air Control Burner 8
14-FIT-349	No	0	20	in. wc.	4	20	mA		MPF-FURN-101 Burner 8 Fuel Gas
14-FIT-362	No	0	6.81	in. wc.	4	20	mA		MPF-FURN-101 Combustion Air Control Burner 9
14-FIT-369	No	0	20	in. wc.	4	20	mA		MPF-FURN-101 Burner 9 Fuel Gas
14-FIT-382	No	0	6.81	in. wc.	4	20	mA		MPF-FURN-101 Combustion Air Control Burner 10
14-FIT-389	No	0	20	in. wc.	4	20	mA		MPF-FURN-101 Burner 10 Fuel Gas
14-FIT-402	No	0	7.37	in. wc.	4	20	mA		MPF-FURN-102 Combustion Air Control Burner 11
14-FIT-409	No	0	20	in. wc.	4	20	mA		MPF-FURN-102 Burner 11 Fuel Gas
14-FIT-422	No	0	7.37	in. wc.	4	20	mA		MPF-FURN-102 Combustion Air Control Burner 12
14-FIT-429	No	0	20	in. wc.	4	20	mA		MPF-FURN-102 Burner 12 Fuel Gas
14-FIT-500	No	0	14.2	in. wc.	4	20	mA		MPF-FURN-102 Combustion Air
14-FIT-718	No	0	100	in. wc.	4	20	mA		Process Water Flow to Zone Spray Nozzles
14-FIT-856	No	0	20	in. wc.	4	20	mA		MPF-FURN-101 Sparge Air
14-PDIT-007	No	-10	0	in. wc.	4	20	mA		MPF-FURN-101 MPF Charge Airlock
14-PDIT-012	No	-10	0	in. wc.	4	20	mA		MPF-FURN-101 MPF Discharge Airlock
14-PDIT-786	Yes	0	2	in. wc.	4	20	mA		MPF-FURN-101 MPF Exhaust Refrac. Venturi
14-PIT-034	No	-10	0	in. wc.	4	20	mA		MPF-FURN-101 Furnace Chamber Pressure
14-PIT-070	Yes	-10	0	in. wc.	4	20	mA		MPF-FURN-101 Furnace Chamber Pressure

Table F.1 (Cont'd)

INSTRUMENT TAG	RCRA	INPUT			OUTPUT			SET POINT	LOOP DEFINITION
		LOW	HI	UNIT	LOW	HI	UNIT		
14-PIT-070A	*No*	*-40*	*10*	*in. wc.*	*4*	*20*	*mA*		*MPF-FURN-101 Furnace Chamber Pressure (wide range)*
14-PIT-118	No	0	100	in. wc.	4	20	mA		MPF Blower-101 Combustion Air Blower Discharge
14-PIT-155	No	0	10	psig	4	20	mA		MPF-FURN-101 MPF Pilot Fuel Gas
14-PIT-159	No	0	10	psig	4	20	mA		MPF-FURN-101/102 MPF Main Fuel Gas
14-PIT-786	No	0	20	psia	4	20	mA		MPF-FURN-101 MPF Exhaust Refrac. Venturi
14-PSHH-034	Yes	4	20	mA	0	0		19.84	MPF-FURN-101 Furnace Chamber Pressure
14-PSLL-034	*No*	4	20	mA	0	0		9.6	MPF-FURN-101 Furnace Chamber Pressure
14-PSHH-160	No	0	100	in. wc.	0	0		83.1	MPF-FURN-101/102 MPF Pilot Fuel Gas
14-PSHH-207	No	0	150	in. wc.	0	0		125	MPF-FURN-101 Burner 1 Fuel Gas
14-PSHH-227	No	0	150	in. wc.	0	0		125	MPF-FURN-101 Burner 2 Fuel Gas
14-PSHH-247	No	0	150	in. wc.	0	0		125	MPF-FURN-101 Burner 3 Fuel Gas
14-PSHH-267	No	0	150	in. wc.	0	0		125	MPF-FURN-101 Burner 4 Fuel Gas
14-PSHH-287	No	0	150	in. wc.	0	0		125	MPF-FURN-101 Burner 5 Fuel Gas
14-PSHH-307	No	0	150	in. wc.	0	0		125	MPF-FURN-101 Burner 6 Fuel Gas
14-PSHH-327	No	0	150	in. wc.	0	0		125	MPF-FURN-101 Burner 7 Fuel Gas
14-PSHH-347	No	0	150	in. wc.	0	0		125	MPF-FURN-101 Burner 8 Fuel Gas
14-PSHH-367	No	0	150	in. wc.	0	0		125	MPF-FURN-101 Burner 9 Fuel Gas
14-PSHH-387	No	0	150	in. wc.	0	0		125	MPF-FURN-101 Burner 10 Fuel Gas
14-PSHH-390	No	-15	15	in. wc.	0	0		-0.1	MPF-FURN-102 Afterburner Chamber Press
14-PSHH-407	No	0	150	in. wc.	0	0		125	MPF-FURN-102 Burner 11 Fuel Gas

Table F.1 (Cont'd)

INSTRUMENT TAG	RCRA	INPUT			OUTPUT			SET POINT	LOOP DEFINITION
		LOW	HI	UNIT	LOW	HI	UNIT		
14-PSHH-427	No	0	150	in. wc.	0	0		125	MPF-FURN-102 Burner 12 Fuel Gas
14-PSL-857	No	0	100	in. wc.	0	0		20	MPF-FURN-101 Sparge Air
14-PSLL-138	No	0	100	in. wc.	0	0		20	MPF Blower-101 Combustion Air Blower Discharge
14-PSLL-207	No	0	150	in. wc.	0	0		83.1	MPF-FURN-101 Burner 1 Fuel Gas
14-PSLL-227	No	0	150	in. wc.	0	0		83.1	MPF-FURN-101 Burner 2 Fuel Gas
14-PSLL-247	No	0	150	in. wc.	0	0		83.1	MPF-FURN-101 Burner 3 Fuel Gas
14-PSLL-267	No	0	150	in. wc.	0	0		83.1	MPF-FURN-101 Burner 4 Fuel Gas
14-PSLL-287	No	0	150	in. wc.	0	0		83.1	MPF-FURN-101 Burner 5 Fuel Gas
14-PSLL-307	No	0	150	in. wc.	0	0		83.1	MPF-FURN-101 Burner 6 Fuel Gas
14-PSLL-327	No	0	150	in. wc.	0	0		83.1	MPF-FURN-101 Burner 7 Fuel Gas
14-PSLL-347	No	0	150	in. wc.	0	0		83.1	MPF-FURN-101 Burner 8 Fuel Gas
14-PSLL-367	No	0	150	in. wc.	0	0		83.1	MPF-FURN-101 Burner 9 Fuel Gas
14-PSLL-387	No	0	150	in. wc.	0	0		83.1	MPF-FURN-101 Burner 10 Fuel Gas
14-PSLL-407	No	0	150	in. wc.	0	0		83.1	MPF-FURN-102 Burner 11 Fuel Gas
14-PSLL-427	No	0	150	in. wc.	0	0		83.1	MPF-FURN-102 Burner 12 Fuel Gas
14-PY-070	No	4	20	mA	3	15	psig		MPF-FURN-101 Burner 12 Fuel Gas
14-TIT-010	*Yes*[2]	0	2,282	°F	4	20	mA		MPF-FURN-101/102 Zone 1 Exhaust To Afterburner
14-TIT-065	Yes[1]	*32*	*2700*	°F	4	20	mA		MPF-FURN-102 MPF Afterburner Average Temp
14-TIT-069	Yes[1]	*32*	*2700*	°F	4	20	mA		MPF-FURN-102 MPF Afterburner Average Temp
14-TIT-071	No[1]	0	2,000	°F	4	20	mA		MPF-FURN-101 MPF Zone 1 Temp
14-TIT-072	No[1]	0	2,000	°F	4	20	mA		MPF-FURN-101 MPF Zone 2 Temp

Table F.1 (Cont'd)

INSTRUMENT TAG	RCRA	INPUT			OUTPUT			SET POINT	LOOP DEFINITION
		LOW	HI	UNIT	LOW	HI	UNIT		
14-TIT-073	No	0	300	°F	4	20	mA		MPF-FURN-101 Combustion Air Burner Discharge
14-TIT-079	No[1]	0	2,000	°F	4	20	mA		MPF-FURN-101 MPF Zone 3 Temp
14-TIT-087	No[1]	*32*	*2700*	°F	4	20	mA		MPF-FURN-102 Afterburner Temp
14-TIT-141	Yes[1]	0	2,000	°F	4	20	mA		MPF-FURN-101 Zone 2 Temperature Control
14-TIT-152	Yes[1]	0	2,000	°F	4	20	mA		MPF-FURN-101 Zone 1 Temperature Control
14-TIT-153	Yes[1]	0	2,000	°F	4	20	mA		MPF-FURN-101 Zone 3 Temperature Control
14-TIT-391	Yes[1]	0	2,000	°F	4	20	mA		MPF-FURN-101 Zone 1
14-TIT-392	Yes[1]	0	2,000	°F	4	20	mA		MPF-FURN-101 Zone 2
14-TIT-393	Yes[1]	0	2,000	°F	4	20	mA		MPF-FURN-101 Zone 3
14-TIT-610	No	0	2,282	°F	4	20	mA		MPF Flue Gas to PAS Temp
14-TIT-786	No	0	2,282	°F	4	20	mA		MPF-FURN-102 MPF Afterburner Flue Gas Vapor
14-TSL-071	*No*[1]	0	2,000	°F	0	0		1400	MPF-FURN-101 MPF Zone 1 Temp
14-TSHH-071	*No*[1]	0	2,000	°F	0	0		1800	MPF-FURN-101 MPF Zone 1 Temp (ETL)
14-TSL-072	*No*[1]	0	2,000	°F	0	0		1400	MPF-FURN-101 MPF Zone 2 Temp
14-TSHH-072	*No*[1]	0	2,000	°F	0	0		1800	MPF-FURN-101 MPF Zone 2 Temp (ETL)
14-TSL-079	*No*[1]	0	2,000	°F	0	0		1400	MPF-FURN-101 MPF Zone 3 Temp
14-TSHH-079	*No*[1]	0	2,000	°F	0	0		1800	MPF-FURN-101 MPF Zone 3 Temp (ETL)
14-TSL-087	*No*[1]	*32*	*2700*	°F	0	0		1400	MPF-FURN-102 Afterburner Temp
14-TSHH-087	*No*[1]	*32*	*2700*	°F	0	0		*2400*	MPF-FURN-102 Afterburner Temp (ETL)

Table F.1 (Cont'd)

INSTRUMENT TAG	RCRA	INPUT			OUTPUT			SET POINT	LOOP DEFINITION
		LOW	HI	UNIT	LOW	HI	UNIT		
14-TY-702	No	4	20	mA	3	15	psig		Process Water Flow to Zone 1
14-TY-722	No	4	20	mA	3	15	psig		Process Water Flow to Zone 1
14-TY-742	No	4	20	mA	3	15	psig		Process Water Flow to Zone 2
14-TY-762	No	4	20	mA	3	15	psig		Process Water Flow to Zone 2
61-FIT-267	No	0	33.8	in. wc.	4	20	mA		SCW Flow from MPF
61-PIT-223	No	0	100	psig	4	20	mA		MPF SCW Pump Discharge Pressure
61-PSLL-222	No	0	100	psig	0	0		30	MPF SCW Pump Discharge Pressure
61-TIT-229	No	0	200	°F	4	20	mA		MPF SCW Pump Inlet Temperature
61-TIT-233	No	0	200	°F	4	20	mA		MPF SCW to MPF Temperature

[1] ECP TEMP-2277-MPF changed the MPF RCRA temperature instruments from 14-TIT-071 (zone 1), 14-TIT-072 (zone 2), 14-TIT-079 (zone 3), and 14-TIT-087 (afterburner) to 14-TIT-152 & -391 (zone 1), 14-TIT-141 & -392 (zone 2), 14-TIT-153 & -393 (zone 3), and 14-TIT-065 & -069 (afterburner)[see FAWB Note B-9].

[2] *14-TIT-010 is identified in the Loveland database as a RCRA instrument because 14-TI-010 is displayed on the RSTrend for the DSHW to monitor the temperature. It is not used, however, for any RCRA alarms.*

APPENDIX G

Intercontroller Communications

MPF operations are or will be controlled by the same PLC, ICS-CONR-113, at all four sites.

The MPF is self-protecting when plant air, instrument air, process water, fuel gas, or feed loss occurs, so intercontroller communication with these utility systems is not required. No intercontroller communication is provided for HVAC, which requires CON operator response.

Table *G.1* lists the digital intercontroller inputs and outputs (DICIs/DICOs) for ICS-CONR-113 at *ANCDF and* TOCDF. The DICIs/DICOs listed are based on the *ANCDF and TOCDF control code as of April 2001.* The *ANCDF and* TOCDF code*s were* used since site-specific code *was available* for *these sites* only. *DICIs/DICOs apply to both ANCDF and TOCDF unless otherwise noted in the description.*

NOTE: Table G.1 includes DICIs/DICOs extracted directly from the ANCDF code. A number of changes are expected, however, based on the ANCDF site-specific configuration. These include:

- *DICIs/DICOs associated with ICS-CONR-119 are listed. Since ANCDF will not have ICS-CONR-119, these DICIs/DICOs will be deleted.*
- *Descriptions for ICS-CONR-114 DICIs/DICOs have tag numbers associated with LIC #1 at TOCDF and UMCDF. These descriptions will be revised to reflect the ANCDF tag numbers.*
- *Descriptions for DICIs/DICOs associated with ACAMS have TOCDF identifiers (e.g. PAS702). Where applicable, these TOCDF identifiers will be replaced with the ANCDF tag numbers.*

Table *G.1 ANCDF and* TOCDF MPF ICS-CONR-113 DICIs and DICOs

To Controller			From Controller				Interpretation		
CONR	Input Word (B4:)	Safe Mask (B4:)	CONR	Output Word	Bit	Description	0	1	Safe
107	034	134	113	072	00	Request from MPF for a Tray		Ready	0
107	034	134	113	072	01	Tray Arrived on Charge Airlock Controller		OK	0
107	034	134	113	072	02	14-CNVP-119 MMS-CNVP-101 Tray Fail to Arrive		Failed	0
107	034	134	113	072	03	Request to Transfer Tray from Charge Car to Charge Airlock		OK	0
107	034	134	113	072	04	MPF Received Tray from Charge Car		Received	0
107	034	134	113	072	05	MPF-FURN-101 Charge Airlock Door Raised		Raised	0
107	034	134	113	072	06	14-ZS-600 MMS-CNVP-119 Charge Airlock – Tray at Mid Position		Tray Present	0
107	034	134	113	072	07	MMS-CNVP-119 Charge Airlock Conveyor Running Reverse		Reverse	0
109	033	133	113	075	00	*(TE only)* PAS-BLOW-102A 1ST Stage ID Fan Running		On	0
109	033	133	113	075	01	PAS-BLOW-102A 1ST Stage ID Fan Not Running		Off	0
109	033	133	113	075	02	*(TE only)* PAS-BLOW-102B 2ND Stage ID Fan Running		On	0
109	033	133	113	075	03	PAS-BLOW-102B 2ND Stage ID Fan Not Running		Off	0
110	033	133	113	077	15	Received Campaign Select Data		Received	0
110	033	133	113	077	16	Request for Campaign Select Update		Request	0
110	034	134	113	078	00	Screen D13 Diagnostic Adv Alarm		Alarm	0
110	034	134	113	078	01	Screen D13 Screen D13 Diagnostic Adv Unack		Unack	0
112	033	133	113	081	00	24-HS-293 PAS-DMIS-103 MPF Controls Spare Demis		MPF Using Spare	0
112	033	133	113	081	01	24-LSLL-061 DFS Pump Shutdown Lock	OK	Alarm	0

Table *G.1* (Cont'd)

To Controller			From Controller				Interpretation		
CONR	Input Word (B4:)	Safe Mask (B4:)	CONR	Output Word	Bit	Description	0	1	Safe
112	033	133	113	081	02	PAS703 Duct from MPF to PAS Not on Line	OK	Alarm	0
112	033	133	113	081	03	PAS702B Duct from DFS to PAS Oper		Normal	0
112	033	133	113	081	04	PAS702B Duct from DFS to PAS Acams Alarm		Alarm	0
112	033	133	113	081	05	PAS702 = PAS703B		Activated	0
112	033	133	113	081	06	PAS702 = PAS703B Chal/Serv/Rep		Offline	0
112	*034*	*134*	*113*	*082*	*02*	*(AN only) XV-094/095A FILT-113 Access Dampers*		*Open*	*0*
112	*034*	*134*	*113*	*082*	*03*	*(AN only) XV-094/095B FILT-113 Access Dampers*		*Closed*	*0*
112	*034*	*134*	*113*	*082*	*04*	*(AN only) XV-438/439A FILT-110 In/Out Dampers*		*Open*	*0*
112	*034*	*134*	*113*	*082*	*05*	*(AN only) XV-438/439B FILT-110 In/Out Dampers*		*Closed*	*0*
112	*034*	*134*	*113*	*082*	*06*	*(AN only) XV-487/488A FILT-113 In/Out Dampers*		*Open*	*0*
112	*034*	*134*	*113*	*082*	*07*	*(AN only) XV-487/488B FILT-113 In/Out Dampers*		*Closed*	*0*
112	*034*	*134*	*113*	*082*	*11*	*(AN only) XV-131/132B PAS /ID Fan Access Dampers*		*Closed*	*0*
113	021	121	107	083	00	Loaded Charge Car at Airlock	Not Present	Present/ Full	0
113	021	121	107	083	01	Unloaded Charge Car at Airlock	Not Present	Present/ Empty	0
113	021	121	107	083	02	Charge Car at Airlock and Transferring Tray		Start Transfer	0
113	021	121	107	083	03	Charge Car Inline at Airlock		Inline	0
113	021	121	107	083	04	Tray Present on Charge Car		Present	0
113	021	121	107	083	05	Charge Car Conv Running Forward		Running Forward	0
113	021	121	107	083	06	Charge Car Received Tray from MPF		Present	0
113	023	123	108	083	01	Waste Water Treatment Common Alarm	Alarm	OK	0
113	023	123	108	083	02	Selected BRA Tank Not Hi-Hi		Available	0
113	025	125	109	083	00	Elec. System OK		Normal	0
113	025	125	109	083	01	Elec. System Power Loss		Power Lost	0

Table *G.1* (Cont'd)

To Controller			From Controller				Interpretation		
CONR	Input Word (B4:)	Safe Mask (B4:)	CONR	Output Word	Bit	Description	0	1	Safe
113	025	125	109	083	02	Start Essential Power Equip.		Start	0
113	031	131	112	083	00	PAS 701 Common Stack ACAMS Stop Feed		Alarm	0
113	031	131	112	083	01	PAS 701 Common Stack Agent Alarm		Alarm	0
113	031	131	112	083	03	Use of MPF/DFS Spare Demister	Not Using	Using Spare	0
113	031	131	112	083	04	ACAMS PAS703 = PAS702B		Activate	0
113	031	131	112	083	05	ACAMS PAS702 = PAS703		Activate	0
113	031	131	112	083	06	ACAMS PAS702 = PAS703 Normal Operation		Normal	0
113	031	131	112	083	07	ACAMS PAS702 = PAS703 Agent Alarm		Alarm	0
113	031	131	112	083	10	ACAMS PAS702 = PAS703B Normal Operation		Normal	0
113	031	131	112	083	11	ACAMS PAS702 = PAS703B Agent Alarm		Alarm	0
113	031	131	112	083	12	ACAMS PAS702 = PAS703B Chal/Serv/Rep		Offline	0
113	*032*	*132*	*112*	*084*	*00*	*(AN only) XV-449A Bypass Damper*		*Open*	*0*
113	*032*	*132*	*112*	*084*	*02*	*(AN only) XV-440/441A FILT-111 In/Out Dampers*		*Open*	*0*
113	*032*	*132*	*112*	*084*	*04*	*(AN only) XV-442/443A FILT-112 In/Out Dampers*		*Open*	*0*
113	*032*	*132*	*112*	*084*	*06*	*(AN only) XV-413/414A FILT-113 Access Dampers*		*Open*	*0*
113	*032*	*132*	*112*	*084*	*07*	*(AN only) XV-413/414B FILT-113 Access Dampers*		*Closed*	*0*
113	*032*	*132*	*112*	*084*	*10*	*(AN only) Request for FILT-113*		*Request*	*0*
113	*032*	*132*	*112*	*084*	*11*	*(AN only) Request for FILT-110*		*Request*	*0*
113	035	135	114	083	00	ACAMS PAS703 = PAS704B, PAS705=704C		Activate	0
113	035	135	114	083	01	ACAMS PAS704 = PAS703C Normal Operation		Normal	0
113	035	135	114	083	02	ACAMS PAS704 = PAS703C Agent Alarm		Alarm	0
113	035	135	114	083	03	ACAMS PAS704 = PAS703C Chal/Serv/Rep		Offline	0
113	*036*	*136*	*114*	*084*	*00*	*(AN only) XV-450A Bypass Damper*		*Open*	*0*

Table *G.1* (Cont'd)

To Controller			From Controller				Interpretation		
CONR	Input Word (B4:)	Safe Mask (B4:)	CONR	Output Word	Bit	Description	0	1	Safe
113	*036*	*136*	*114*	*084*	*02*	*(AN only) XV-515/516A FILT-113 Access Dampers*		*Open*	*0*
113	*036*	*136*	*114*	*084*	*03*	*(AN only) XV-515/516B FILT-113 Access Dampers*		*Closed*	*0*
113	*036*	*136*	*114*	*084*	*04*	*(AN only) XV-454/455A FILT-112 In/Out Dampers*		*Open*	*0*
113	*036*	*136*	*114*	*084*	*06*	*(AN only) XV-583/584A PAS /ID Fan Access Dampers*		*Open*	*0*
113	*036*	*136*	*114*	*084*	*07*	*(AN only) XV-583/584B PAS /ID Fan Access Dampers*		*Closed*	*0*
113	*036*	*136*	*114*	*084*	*10*	*(AN only) Request for FILT-113*		*Request*	*0*
113	039	139	117	083	00	PDAR Unable to Read Tray Data		Not Read	0
113	039	139	117	083	01	AL 468 ACAMS Not Normal		Alarm	0
113	041	141	119	083	00	ACAMS PAS703 = PAS704B, PAS705=704C		Activate	1
113	*042*	*142*	*119*	*084*	*00*	*(AN only) XV-450A Bypass Damper*		*Open*	*0*
113	*042*	*142*	*119*	*084*	*02*	*(AN only) XV-415/416A FILT-113 Access Dampers*		*Open*	*0*
113	*042*	*142*	*119*	*084*	*03*	*(AN only) XV-415/416B FILT-113 Access Dampers*		*Closed*	*0*
113	*042*	*142*	*119*	*084*	*04*	*(AN only) XV-436/437A FILT-209 In/Out Dampers*		*Open*	*0*
113	*042*	*142*	*119*	*084*	*06*	*(AN only) XV-410/409A PAS /ID Fan Access Dampers*		*Open*	*0*
113	*042*	*142*	*119*	*084*	*07*	*(AN only) XV-410/409B PAS /ID Fan Access Dampers*		*Closed*	*0*
113	*042*	*142*	*119*	*084*	*10*	*(AN only) Request for FILT-113*		*Request*	*0*
114	*033*	*133*	*113*	*085*	*00*	*(AN only) OK to Open Quench Tower Recovered Water Valve*		*OK*	*0*
114	033	133	113	085	01	PAS 704B Duct from LIC No. 1 to PAS Operating		OK	0
114	033	133	113	085	02	PAS 704B Duct from LIC No. 1 to PAS ACAMS Alarm		Alarm	0
114	033	133	113	085	03	PAS702 = PAS 703B		Activated	0

Table *G.1* (Cont'd)

To Controller			From Controller				Interpretation		
CONR	Input Word (B4:)	Safe Mask (B4:)	CONR	Output Word	Bit	Description	0	1	Safe
114	033	133	113	085	04	PAS702 = PAS 703B Chal/Serv/Rep		Offline	0
114	*034*	*134*	*113*	*086*	*00*	*(AN only) XV-093A Bypass Damper*		*Open*	*0*
114	*034*	*134*	*113*	*086*	*01*	*(AN only) XV-093B Bypass Damper*		*Closed*	*0*
114	*034*	*134*	*113*	*086*	*02*	*(AN only) XV-094/095A FILT-113 Access Dampers*		*Open*	*0*
114	*034*	*134*	*113*	*086*	*03*	*(AN only) XV-094/095B FILT-113 Access Dampers*		*Closed*	*0*
114	*034*	*134*	*113*	*086*	*04*	*(AN only) XV-438/439A FILT-110 In/Out Dampers*		*Open*	*0*
114	*034*	*134*	*113*	*086*	*05*	*(AN only) XV-438/439B FILT-110 In/Out Dampers*		*Closed*	*0*
114	*034*	*134*	*113*	*086*	*06*	*(AN only) XV-487/488A FILT-113 In/Out Dampers*		*Open*	*0*
114	*034*	*134*	*113*	*086*	*07*	*(AN only) XV-487/488B FILT-113 In/Out Dampers*		*Closed*	*0*
114	*034*	*134*	*113*	*086*	*10*	*(AN only) XV-131/132A PAS /ID Fan Access Dampers*		*Open*	*0*
114	*034*	*134*	*113*	*086*	*11*	*(AN only) XV-131/132B PAS /ID Fan Access Dampers*		*Closed*	*0*
119	*033*	*133*	*113*	*091*	*00*	*(AN only) OK to Open Quench Tower Recovered Water Valve*		*OK*	*0*
119	033	133	113	091	01	PAS703 = PAS705B Normal		Normal	0
119	033	133	113	091	02	PAS703 = PAS705B Agent Alarm		Agent Alarm	0
119	033	133	113	091	03	PAS703 = PAS705B Chal/Serv/Rep		Offline	0
119	*034*	*134*	*113*	*092*	*00*	*(AN only) XV-093A Bypass Damper*		*Open*	*0*
119	*034*	*134*	*113*	*092*	*01*	*(AN only) XV-093B Bypass Damper*		*Closed*	*0*
119	*034*	*134*	*113*	*092*	*02*	*(AN only) XV-094/095A FILT-113 Access Dampers*		*Open*	*0*
119	*034*	*134*	*113*	*092*	*03*	*(AN only) XV-094/095B FILT-113 Access Dampers*		*Closed*	*0*
119	*034*	*134*	*113*	*092*	*04*	*(AN only) XV-438/439A FILT-110 In/Out Dampers*		*Open*	*0*
119	*034*	*134*	*113*	*092*	*05*	*(AN only) XV-438/439B FILT-110 In/Out Dampers*		*Closed*	*0*

Table *G.1* (Cont'd)

To Controller			From Controller				Interpretation		
CONR	Input Word (B4:)	Safe Mask (B4:)	CONR	Output Word	Bit	Description	0	1	Safe
119	*034*	*134*	*113*	*092*	*06*	*(AN only) XV-487/488A FILT-113 In/Out Dampers*		*Open*	*0*
119	*034*	*134*	*113*	*092*	*07*	*(AN only) XV-487/488B FILT-113 In/Out Dampers*		*Closed*	*0*
119	*034*	*134*	*113*	*092*	*10*	*(AN only) XV-131/132A PAS /ID Fan Access Dampers*		*Open*	*0*
119	*034*	*134*	*113*	*092*	*11*	*(AN only) XV-131/132B PAS /ID Fan Access Dampers*		*Closed*	*0*

APPENDIX H

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AN-1-E-911, *Rev.3, 5-8-98*	SPS-MCC-107 480V MCC-MPF/LIC, Single Line Diagram
AN-1-F-503, *Rev.3, 5-8-98*	Metal Parts Furnace System (MPF), Process Flow Diagram

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