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

Chemical Stockpile Disposal Project

Programmatic Process Functional Analysis Workbook (FAWB)

Book 32

Treaty Compliance Equipment

TCE

Revision 0
October 1, 1999

NOTE: The TCE 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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REVISION LOG

REV.#	PAGE(S)	REFERENCE AND DESCRIPTION OF CHANGE
0	NA	Initial Issue

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 Chemical Stockpile Disposal (CSD) project sites. The CSD project baseline technology consists of mechanical disassembly or puncturing the munitions to remove chemical agent and any explosives or propellant, followed by 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 represents the first generation of a full-scale facility that implements the baseline technology. JACADS continues to operate and dispose of the remaining chemical agent and munitions stockpiled at Johnston Atoll.

The second generation plants implementing the baseline technology include the Tooele Chemical Agent Disposal Facility (TOCDF) located at the Deseret Chemical Depot (DCD) in Tooele, Utah, the Anniston Chemical Agent Disposal Facility (ANCDF) located at the Anniston Army Depot (ANAD) near Anniston, Alabama, the Umatilla Chemical Agent Disposal Facility (UMCDF) located at the Umatilla Chemical Depot near Hermiston, Oregon, and the Pine Bluff Chemical Agent Disposal Facility (PBCDF) located at the Pine Bluff Arsenal (PBA) 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 (UE&C) 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 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, consolidation of some systems, and the inclusion of additional systems. The TOCDF systems contractor (SC) received the FAWBs and assumed responsibility to maintain the set current with the TOCDF plant configuration and the evolution of the operational strategy of the facility. Sets of FAWBs for utility systems were also developed for ANCDF and UMCDF (and are being developed for PBCDF) to assist the sites during procurement of utility systems equipment to understand the use of the utility systems in the operation of the facility.

In September 1997 PM-CSD decided that it would be beneficial to develop a set of programmatic FAWBs for the process systems that are shared between the sites rather than have each site maintain its own set of process system FAWBs. 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 will 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.

FAWBs for utility systems, which are more site specific and consist predominantly of equipment procured by the SC, are or will be maintained by each of the individual demilitarization sites.

1.3 PROGRAMMATIC PROCESS FAWB SYSTEMS

Sixteen process systems at the baseline facilities were designated as programmatic systems whose FAWBs can be maintained as a single reference rather than maintained at each site. The difference between the sites for these systems is minimal which supports the development of a single set of programmatic process FAWBs. Minor configuration differences between the sites are highlighted in the FAWB discussions and tables. Fourteen of these sixteen systems were included in the original 28 plant system FAWBs developed by the DSIC. For conciseness, the DUN and DUN PAS FAWBs were to be combined into a single FAWB in order to have a total of fifteen programmatic process FAWBs. Development of a programmatic FAWB for the DUN and DUN PAS, however, has been suspended indefinitely at the direction of the PM-CSD Operations Team (See FAWB Note B-1). In addition, FAWBs for the wet pollution abatement system (PAS) and the PAS filter system were combined into a single FAWB (see FAWB Note B-2). Therefore, a total of thirteen programmatic FAWBs are being developed for the process systems. The HVAC FAWB, considered a utility system when utility FAWBs were produced for ANCDF in 1996 (HVAC FAWB was Book 9 for ANCDF Utility FAWBs), has since been recategorized as a process system and is included in the set of programmatic process FAWBs.

The programmatic FAWBs have been numbered in accordance with a numbering convention established during production of the FAWBs for utility systems for ANCDF and UMCDF. Under the numbering convention, books numbered 1 through 19 are reserved for utility systems; the process FAWBs are numbered from 20 through 34. Table 1.1 lists the book numbers and titles for the programmatic process FAWBs. The chapter numbers from the original TOCDF FAWBs are shown for reference.

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

Each programmatic process FAWB contains a subsection that defines the system boundaries and identifies the interfaces with other plant process systems and with the utility systems.

The two remaining systems from the originally planned 28 plant system FAWBs are the acid and caustic storage and wash (5.20) and the residue handling area (5.24). The acid and caustic storage and wash system FAWB at TOCDF is no longer maintained and has not been developed for follow-on sites (see FAWB Note B-3). A FAWB for the residue handling area was never produced due to the lack of automatic control features.

Table 1.1 Programmatic Process FAWBs

FAWB Book #	FAWB Title (TOCDF FAWB Chapter #)
20	MDB Heating, Ventilation and Air Conditioning (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 (5.5)
26	Liquid Incinerator System (5.6)
27	Metal Parts Furnace System (5.7)
28[1]	DFS, LIC, and MPF Pollution Abatement System and PAS Filter System (5.9)
29	Brine Reduction Area 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]	Dunnage Incinerator 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 PROCESS FAWB PHILOSOPHY

The programmatic FAWBs for process systems serve multiple purposes:

- The FAWB operational descriptions serve as one of the source documents for the facility control system's programmable logic controller (PLC) and computer systems programming.
- The FAWBs are a technical reference that supports programmatic training of operators on how to operate the baseline technology facilities.
- The FAWBs serve as a ready reference during operation of each facility to enhance operational consistency among all sites.
- The FAWBs serve as a programmatic reference document that defines how the process systems operate and captures the differences between operational configurations at the facilities.

The FAWB is a living document subject to configuration control under the CSD project Participant Quality Assurance Plan (PQAP). Changes to the process FAWBs are implemented in accordance with the process FAWB revision philosophy discussed 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. The programmatic process FAWBs are meant to be updated continuously with input from its users whenever modifications are made or as needed to enhance the information presented. The FAWBs serve as a repository for all control information for the automated aspects of the baseline technology demilitarization process systems.

1.4.1 Programmatic Process FAWB Limitations

Even though the FAWBs contain detailed descriptions of the configuration and control for each process system, the FAWBs 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. References are provided with each FAWB to direct the user to the programmatic and site-specific documentation (e.g., SOPs, drawings) that supports the information presented in the FAWBs.

Because of the revision cycle time there will be a slight lag time between recent changes and their reflection in the FAWB. The FAWB maintenance philosophy, however, will be to update the FAWBs on a regular basis (review for revision every 6 months) or more frequently if needed to reflect significant modifications that are made.

The FAWB maintenance program relies heavily on receiving input from each of the baseline technology demilitarization sites. Timely and accurate information is needed to ensure 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 4 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 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 also differ slightly from the format previously maintained at TOCDF. The information from earlier versions of the process system FAWBs, however, 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.

Table 1.3 Organization of the Programmatic Process FAWBs

Section	Title	Contents
Front Matter		Contains title page, table of contents, lists of tables and figures, and revision log.
1	Introduction	Discusses the general FAWB philosophy, background, organization, and revision method.
2	System Overview	Discusses the purpose of the system and presents an operational and process design basis summary. System boundaries and interfaces are also provided.
3	Process Description	Presents a detailed process description.
4	Component Summary	Presents tables listing parameters for primary components at each of the sites for the specific system. Power source listings for system components are also listed.
App. A	Acronyms and Abbreviations	Contains acronyms and abbreviations used in the programmatic process FAWBs.
App. B	FAWB Notes	Contains notes that provide additional detail or background information related to a discussion in the text of the FAWB.
App. C	Alarm and Interlock Matrices	Contains matrices for each of the sites. Parameters and interlocks that are unique to each site are highlighted in the matrices.
App. D	PLC Automatic Control Sequences	Presents the automatic logic contained in the code for the PLCs that monitor and control the specific system. Burner management system automatic controls are included for furnace systems and sequencer logic is included for demil systems. Site-specific differences are highlighted.
App. E	Operator Screens	Contains the Advisor PC screens for each site associated with the specific system with all indicators showing.
App. F	Instrument Ranges	Presents tables for each of the sites showing instrument ranges and setpoints for the instrumentation in the specific system. Instruments with ranges or setpoints unique to each site are highlighted in the tables.
App. G	Intercontroller Communications	Contains tables listing the digital intercontroller outputs (DICOs) for the PLCs associated with the specific system.
App. H	References	Listing of reference documents, including drawings, that are used to prepare and maintain the FAWB.

1.6 PROCESS FAWB REVISION PHILOSOPHY

The programmatic process FAWBs will be maintained by the SCT to reflect the operational and control system configuration at each of the CSD sites that implement the baseline destruction technology. Each of the programmatic process FAWBs will be reviewed and revised as required on a semi-annual basis. Individual process system FAWBs may be revised more frequently if needed to reflect significant configuration changes. Programmatic process FAWB modifications may be generated by:

- ECPs 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 identifies the responsibilities of each organization to supply information that may result in revision to the FAWB. All organizations have representatives on the FAWB Evolvement/Evaluation Team (FEET) and are involved with review of each FAWB revision to ensure that the FAWBs accurately reflect the current configuration and operating strategy for the sites.

SECTION 2
SYSTEM OVERVIEW

2.1 PURPOSE AND FUNCTION

The treaty compliance equipment (TCE) processes are designed to satisfy the requirements of the Chemical Weapons Convention (CWC) for the identification of chemical agents and the deformation of metal chemical weapons parts at the chemical agent disposal facilities. The TCE processes are comprised of the following three systems: munitions sampling system (MSS), automatic agent sampling system (AASS), and projectile deformation equipment (PDE). The MSS and AASS allow verification inspectors to retrieve multiple agent samples from preselected munitions or storage containers and observe the sample collection and analysis process via remote monitors and observation windows. The PDE is designed to visibly render each chemical munition projectile irreversibly unfit for military use.

2.2 OPERATIONAL SUMMARY

The MSS consists of remotely operated sampling systems to support the rocket shear machine/mine machine (RSM/MIN), the bulk drain station (BDS), and the multipurpose demil machine (MDM) systems. Each sampling system in the MSS uses an automatic sampler to collect multiple samples of agent from munitions agent drain lines and place the samples in containers. A DPE worker retrieves the samples and carries them to gloveboxes where dilute samples are prepared. The dilute agent samples are removed from the glovebox and transported outside the munitions demilitarization building (MDB) for treaty verification analysis in a laboratory. The MSS configurations for the RSM/MIN and BDS are identical at ANCDF, PBCDF, and UMCDF. ANCDF and UMCDF have similar MSS configurations for the MDM (PBCDF is not equipped with projectile processing equipment). The MSS configuration at the TOCDF is unique to that site.

The AASS collects a series of samples from a LIC agent feed line. The agent samples are diluted, placed in containers for retrieval, and transported outside the MDB for treaty verification analysis. The AASS configurations at the ANCDF, PBCDF, and UMCDF sites are similar with the exception that at UMCDF, the AASS can sample from either of the two LIC agent feed lines. ANCDF and PBCDF have only one LIC furnace system. The AASS configuration at the TOCDF is unique to that site.

The PDE uses interchangeable modular presses to deform 4.2-in. mortar, 105-mm, 155-mm, and 8-in. projectiles. Hydraulic punches on each press are designed to deform each type of projectile to a minimum indentation and outside diameter standard. The PDE for ANCDF, TOCDF, and UMCDF are similar. Each site, however, will only have modular presses to deform the munition sizes at that site. PBCDF has no projectiles to process, therefore does not require the PDE.

2.3 PROCESS DESIGN BASIS SUMMARY

The TCE processes are designed to satisfy the requirements of the CWC for the identification of chemical agents and the irreversible deformation of chemical weapons at the chemical agent disposal facilities.

The MSS is designed to automatically collect multiple samples of agent from preselected munitions and place the samples in containers for retrieval.

The AASS is designed to collect a series of samples from the LIC agent feed lines and provide composite samples for site laboratory analysis, analysis by the inspection team, and for archiving.

The MSS and AASS gloveboxes are leaktight and helium leak tested.

The PDE is designed to mechanically render the metal casings of each munition irreversibly unfit for military use.

2.4 SYSTEM BOUNDARIES AND INTERFACES

The TCE systems include equipment that interface with the RSM, MIN, BDS, MDM, LIC, and MPF process systems. All TCE controls are local with interlocks and CON controls for specific operations. Major system interfaces include the following:

(1) RHS/MHS: The MSS extracts samples from the agent collection system associated with the RSM/MIN.

(2) BCHS: The MSS extracts samples from the agent collection system associated with the BDS.

(3) PHS: The MSS extracts samples from the agent collection system associated with the MDMs.

(4) TSHS/LIC: The AASS extracts samples from the agent feed lines to the LIC system from the agent holding tank in the TOX.

(5) MPF: Projectiles/mortars are moved from the MPF discharge cooling conveyor to a cleaning table by local operators using the MPF overhead crane with hoist. After vacuum cleaning to prevent fugitive emissions, munitions are transferred from the cleaning table to the PDE using the same crane (see FAWB Note B-4).

(6) RHA: Deformed projectiles/mortars are removed from the PDE by a dedicated overhead crane and transferred into a roll-off container for transport to the RHA for disposal (see FAWB Note B-4).

(7) Utilities: TCE components require electric power, plant air, instrument air, process water, HVAC, decon supply, and life support air to operate.

SECTION 3
PROCESS DESCRIPTION

3.1 INTRODUCTION

The TCE system is comprised of the following three subsystems: munitions sampling system (MSS), automatic agent sampling system (AASS), and projectile deformation equipment (PDE). The MSS includes a sampling system for rockets/mines, a sampling system for bulk items, and a sampling system for projectiles.

Where the same sampling subsystems exist, the same TCE systems configurations are used for three of the four CSD sites (ANCDF, PBCDF, and UMCDF). The PBCDF munitions stockpile does not include projectiles; therefore, PBCDF does not have a sampling system for projectiles or the PDE. TOCDF currently implements treaty compliance sampling requirements by manually sampling. Retrofit designs also exist that were going to implement unique MSSs and AASS at TOCDF. These retrofit systems are no longer planned to be used (see FAWB Note B-5), but brief descriptions are included for information only.

3.2 MUNITIONS SAMPLING SYSTEM

The same MSS configurations are used for the ANCDF, PBCDF and UMCDF sites, except that PBCDF does not have a sampling system for projectiles. The existing and retrofit MSS configurations at TOCDF are unique to that site.

3.2.1 MSS at ANCDF, PBCDF and UMCDF

The MSS at ANCDF and UMCDF consists of three remotely operated systems that require assistance from personnel in demilitarization protective ensemble (DPE). One sampling system is located in explosive containment room (ECR) A [03-211] to support the rocket shear machine (RSM) [RHS-RSM-101] and mine machine (MIN) [MHS-MIN-101], and two sampling systems are located in the munitions processing bay (MPB) [10-205] to support the line-A bulk drain station (BDS) [MMS-BDS-101] and multipurpose demilitarization machine (MDM) 101 [PHS-MDM-101].

The MSS at PBCDF consists of only two similar systems. One sampling system is located in ECR–A [03-210] to support the RSM (RHS-RSM-101) and MIN (MHS-MIN-101), and one sampling system is located in the BDS room [49-151] to support the BDS (MMS-BDS-101). Because of the different building layout at PBCDF, there are some logistical differences noted in the following subsections between PBCDF and the other follow-on sites regarding handling of samples and waste from sampling activities.

At all three sites, each MSS has a UPS-powered automatic sampler that collects multiple samples of agent from preselected munitions and places the samples in sample containers. The sampling systems are located near the agent quantification systems (AQSs) for the RSM, MIN, and MDM, and near the agent drain line for the BDS. The sampling systems connect to the AQS piping and redirect agent from the AQS line to the sampler.

An individual in DPE retrieves the sample containers from the local sampler and carries them to an MSS glovebox. The sample containers are transferred into the MSS glovebox via a pass-through port.

When a sample is received in a glovebox, a glovebox operator dilutes a portion of the sample to a research, development, test, and evaluation (RDT&E) level and places the diluted sample bottle in a container. The container is removed from the glovebox and hand-carried to the lab for analysis.

3.2.1.1 Sampling System for Rockets/Mines

The sampling system for rockets/mines at ANCDF, PBCDF and UMCDF is located in ECR-A and consists of a sight flow indicator (51-FG-61), a sampler (51-SMPL-76), an agent supply valve (51-XV-101), an agent return valve (51-XV-103), a vent valve (51-XV-102), and ½-inch tubing sampling lines. The sampling system supply line draws agent from the piping between the AQS verification tank (ACS-TANK-103) and its discharge valve (51-XV-53). The sampling system returns agent to the AQS line on the opposite side (i.e., downstream) of the AQS verification tank discharge valve.

The agent supply valve and the vent valve are interlocked so that they cannot both be open at the same time. The vent valve and the sampler are interlocked in remote so that the control room operator (CRO) cannot sample unless the vent valve is open.

Sequence of Operation

The following steps are taken for agent sampling of a rocket/mine:

A. A CRO opens the agent supply (51-XV-101) and return valves (51-XV-103) and closes AQS verification tank (ACS-TANK-103) discharge valve (51-XV-53) to direct agent into the sight flow indicator (51-FG-61).

B. When agent is observed in the sight flow indicator, a local operator in observation corridor 09-204 (observation corridor 09-203 at PBCDF) closes the agent supply (51-XV-101) and return valves (51-XV-103). These valves can also be closed remotely by the CRO.

C. The sampling cycle is initiated by the local operator or CRO by opening the vent valve (51-XV-102) to allow air to enter the system when the sampler pump is running. The local operator or CRO engages the sampler pump to draw multiple samples into 125-ml sample bottles (see subsection 3.1.2.4 for sampler operation).

D. The AQS verification tank discharge valve (51-XV-53) can remain closed until the local operator verifies that the MSS has collected samples, or the valve can be opened remotely by the CRO to continue normal agent drainage to the TOX.

E. After samples are taken, a DPE worker removes the sample containers from the sampler and carries them to the pass-through port to the MSS glovebox (RHS-GLBX-101). At ANCDF and UMCDF, samples taken in ECR-A from RHS-RSM-101 and MHS-MIN-101 are carried from ECR-A to the upper munitions corridor (COR) [05-210] and passed to the MSS glovebox (RHS-GLBX-101) in observation corridor 09-204. At PBCDF, samples taken in ECR-A from RHS-RSM-101 and MHS-MIN-101 are carried from ECR-A to the corridor [05-211] and passed to the MSS glovebox (RHS-GLBX-101) in observation corridor 09-203.

F. The glovebox operator receives the samples in the MSS glovebox, prepares RDT&E dilute samples for analysis (MSS glovebox operations are described in subsection 3.2.1.5), and places the diluted sample bottles in the interchange compartment of the glovebox

G. The sample containers and residual agent from the samplers in ECR-A are taken to the munitions corridor for disposal in the MPF (see FAWB Note B-6).

H. A worker in the observation corridor removes the diluted sample bottles from the interchange compartment of the glovebox and hand carries the samples to the lab for analysis.

3.2.1.2 Sampling System for Bulk Items

The sampling system for bulk items is located in the MPB at ANCDF and UMCDF, and in the BDS room at PBCDF. The sampling system for bulk items is similar at all three sites and consists of a sight flow indicator (51-FG-38), a sampler (51-SMPL-77), a three-way valve for supplying agent and venting the sample line (51-XV-44), a return valve (51-XV-40), ½-inch tubing sampling lines, and a 1-inch (reduced to ½-inch) supply line. The sampling system supply line draws agent from the agent drain line piping just downstream of the BDS drain tube block valve (51-XV-396). The sampling system returns agent to the agent transfer pump (ACS-PUMP-114) suction line.

The three-way valve operates to ensure that the agent supply and vent path cannot both be open at the same time. The three-way valve and the sampler are interlocked in remote so that the CRO cannot sample unless the three-way valve is in the vent position.

Sequence of Operation

The following steps are taken for agent sampling of a bulk item:

A. A CRO places the three-way valve (51-XV-44) in the agent supply position and opens the return valve (51-XV-40) to direct agent into the sight flow indicator (51-FG-38).

B. When agent is observed in the sight flow indicator, a local operator in observation corridor 09-219 (observation corridor 09-157 at PBCDF) closes the return valve (51-XV-40) and repositions the three-way valve to the vent position. These valves can also be repositioned remotely by the CRO.

C. With the three-way valve in the vent position, the sampling cycle is initiated by the local operator or CRO by engaging the sampler pump to draw multiple samples into 125-ml sample bottles (see subsection 3.1.2.4 for sampler operation).

D. After samples are taken, a DPE worker removes the sample containers from the sampler and carries them to the pass-through port to the MSS glovebox (PHS-GLBX-101). At ANCDF and UMCDF, samples taken in the MPB from MMS-BDS-101 are carried from the MPB to the COR and passed to the MSS glovebox

(PHS-GLBX-101) in observation corridor 09-219. At PBCDF, samples taken in the BDS room from MMS-BDS-101 are passed from the BDS room to the MSS glovebox (PHS-GLBX-101) in observation corridor 09-157.

E. The glovebox operator receives the samples in the MSS glovebox, prepares RDT&E dilute samples for analysis (MSS glovebox operations are described in subsection 3.2.1.5), and places the diluted sample bottles in the interchange compartment of the glovebox.

F. At ANCDF and UMCDF, sample containers and residual agent from the samplers in the MPB are taken to the munitions corridor for disposal in the MPF. At PBCDF, sample containers and residual agent from the samplers are placed in cradles in the BDS room for processing in the MPF (see FAWB Note B-6).

G. A worker in the observation corridor removes the diluted sample bottles from the interchange compartment of the glovebox and hand carries the samples to the lab for analysis.

3.2.1.3 Sampling System for Projectiles (ANCDF and UMCDF only)

The sampling system for projectiles at ANCDF and UMCDF is similar to the sampling system for rockets/mines. The sampling system for projectiles is located in the MPB and consists of a sight flow indicator (51-FG-62), a sampler (51-SMPL-78), an agent supply valve (51-XV-110), an agent return valve (51-XV-112), a vent valve (51-XV-111), and ½-inch tubing sampling lines. The sampling system supply line draws agent from the piping between the AQS verification tank (ACS-TANK-105) and its discharge valve (51-XV-75). The sampling system returns agent to the AQS line downstream of the agent filter (ACS-FILT-105).

The agent supply valve and the vent valve are interlocked so that they cannot both be open at the same time. The vent valve and the sampler are interlocked in remote so that the CRO cannot sample unless the vent valve is open.

Sequence of Operation

The following steps are taken for agent sampling of a projectile/mortar:

A. A CRO opens the agent supply (51-XV-110) and return valves (51-XV-112) and closes AQS verification tank (ACS-TANK-105) discharge valve (51-XV-75) to direct agent into the sight flow indicator (51-FG-62).

B. When agent is observed in the sight flow indicator, a local operator in observation corridor 09-219 closes the agent supply (51-XV-110) and return valves (51-XV-112). These valves can also be closed remotely by the CRO.

C. The sampling cycle is initiated by the local operator or CRO by opening the vent valve (51-XV-111) to allow air to enter the system when the sampler pump is running. The local operator or CRO engages the sampler pump to draw multiple samples into 125-ml sample bottles (see subsection 3.1.2.4 for sampler operation).

D. The AQS verification tank discharge valve (51-XV-75) can remain closed until the local operator verifies that the MSS has collected samples, or the valve can be opened remotely by the CRO to continue normal agent drainage to the TOX.

E. After samples are taken, a DPE worker removes the sample containers from the sampler and carries them to the pass-through port to the MSS glovebox (PHS-GLBX-101). Samples taken in the MPB from PHS-MDM-101 are carried from the MPB to the COR and passed to the MSS glovebox (PHS-GLBX-101) in observation corridor 09-219.

F. The glovebox operator receives the samples in the MSS glovebox, prepares RDT&E dilute samples for analysis (MSS glovebox operations are described in subsection 3.2.1.5), and places the diluted sample bottles in the interchange compartment of the glovebox

G. The sample containers and residual agent from the samplers in the MPB are taken to the munitions corridor for disposal in the MPF (see FAWB Note B-6).

H. A worker in the observation corridor removes the diluted sample bottles from the interchange compartment of the glovebox and hand carries the samples to the lab for analysis.

3.2.1.4 MSS Samplers

The samplers used for each of the MSSs at all three follow-on sites are identical. Each sampler is the primary component in the sampling system connected to AQSs for each of the demilitarization machines (i.e., the RSM, MIN, BDS, and MDM). The samplers are programmed to take one 10-ml sample in a single cycle and are capable of performing up to 24 cycles before replacement sample bottles are needed. The sampler intake line is air purged back to the sight flow indicator by reversing the sampler pump before and after each sample. The sampler uses a high-speed peristaltic, dual-roller pump with a 0.95-cm ID TYGON pump tube. The sampler power requirement is 12 VDC supplied by a 12 VDC battery or 120 VAC power converter.

3.2.1.5 MSS Gloveboxes

The MSS gloveboxes, RHS-GLBX-101 and PHS-GLBX-101, allow standing personnel to dilute liquid samples of chemical agent for laboratory analysis. The gloveboxes consist of glove ports, an observation window, interchange compartments, lighting window(s), lighting fixture(s), light(s), glovebox stands, removable backplates, drain connections, glove port plugs or lockable glove port covers, glove port accessories to maintain glovebox integrity during glove changeout, differential pressure indicator, and air intakes with carbon filters. A drain line is connected to a bottom-mounted flange connection and drains to a sump in the Category A or B area of the munitions demilitarization building (MDB). Each glovebox has an ACAMS sampling port for monitoring.

The HVAC system is connected to each glovebox by top-mounted flanges. An inlet air filter, sized for 60 air changes per hour, is provided on the glovebox for purging. The filter pad is replaceable and contains activated carbon. The bottom of each glovebox is the work surface that also acts as a 5-gallon sump. The interior of each glovebox is designed to facilitate cleaning, and is free of gaps, voids, pockets, and sharp corners.

The glovebox is equipped with an interchange compartment for transfer of items in and out of the glovebox. The interchange compartment is leaktight and has an ACAMS sampling port for monitoring. The exhaust duct from the interchange compartment is connected to the HVAC system

MSS Glovebox Operations

Operations in the two MSS gloveboxes, RHS-GLBX-101 and PHS-GLBX-101, are identical. After receiving the samples in the glovebox via the pass-through port, the glovebox operator extracts four samples of agent from each sample container using a manual micropipette. The micropipette has a calibrated disposable tip to allow the glovebox operator to easily extract the precise amount of agent (approximately 50 microliters) to be used in the RDT&E solution. Each extracted sample is placed into a 100-ml bottle containing isopropyl alcohol. Each bottle (4 total) is capped, tested for surface contamination, paraffin sealed, and placed in a secondary canister that is then partially filled with vermiculite. The sealed bottles and canisters are passed out of the glovebox through the interchange compartment.

3.2.2 MSS at TOCDF

Sampling of drained agent from munitions at the RSM/MIN, BDS, and MDM at TOCDF is currently performed manually by drawing samples from the agent collection system associated with each of the drain locations. Retrofit designs also exist that were going to implement a unique MSS for the RSM/MIN, BDS, and MDM at TOCDF. These retrofit systems are no longer intended to be used (see FAWB Note B-5), but brief descriptions are included for information only.

3.2.2.1 RSM Munitions Sampling at TOCDF

At TOCDF, sampling of drained agent from rockets at the RSM/MIN is currently performed manually by drawing a sample from a ¼” drain line through sampling valve, ¼”-V-251B, downstream of the RSM/MIN AQS verification tank (ACS-TANK-103).

Sequence of Operations

The following is a summary of the steps that are taken to obtain sample(s) of agent drained from rockets/mines (refer to Operation 9 in TOCDF SOP, TE-SOP-055, Agent Collection System Procedures, for more detail).

A. DPE entrants (Operators “A” and “B”) enter ECR A with appropriate materials and set up a worktable, workstation spill tray, and decon container.

B. Operator “A” opens the block valve (¼”-V-251A) and then slowly opens the sample valve (¼”-V-251B) to allow 10 to 12 ml of agent to flow into an agent flush tube.

C. Operator “A” closes the block and sample valves, caps the agent flush tube and places it in a work rack.

D. Operator “A” opens the block valve again and then slowly opens the sample valve to allow 4 to 5 ml of agent to flow into an agent collection tube.

E. Operator “A” closes the block and sample valves, caps the agent collection tube and places it in a work rack.

F. Operator “A” carries the work rack to the workstation.

G. Operator "B" uses a 750-microliter (µl) pipette with pipette tip to extract agent from the agent collection tube. Agent is placed in a 5-ml sample analysis tube. Filled sample analysis tube(s) are placed in a plastic agent sample overpack container, which is then placed into a Lab Carryall.

H. Operator "B" carries the Lab Carryall to the Sample Surety Box. After verifying XXX decontamination of the Lab Carryall, the sample(s) are taken to the Lab for analysis.

I. Residual agent in the agent collection tube and agent flush tube is poured into the decon container and solid wastes (e.g., agent collection tube and agent flush tube) are rinsed in the decon container. Liquid waste (spent decon) is poured into the sump for processing by the spent decon system (SDS) and solid wastes are bagged for MPF processing as miscellaneous waste (see FAWB Note B-6).

TOCDF Retrofit Design

The TOCDF RSM retrofit design (see FAWB Note B-5) consists of a sample trap interface (51-FG-253), sample injection valve (51-XV-253), diluent carrier line, 1000 ml sample tank (Tank 203), and sampling glovebox with pneumatic sampler to 20 ml sample containers.

The RSM sample system collects a series of 10 µl samples from the RSM agent drain line through an orifice in the sample injection valve (51-V-253). The injection valve traps the sample and diverts it into an isopropyl alcohol carrier stream (diluent). The diluent is then conveyed by metered tubing to a one-liter sample tank (Tank-203). The correct sample tank volume is verified by the local operator. The sample tank and a pneumatic sampling valve (51-V-203) are contained in a glovebox (RHS-HOOD-101). The local PLC control system for agent sampling is located next to the glovebox. At the conclusion of the sampling cycle, three independent 10-ml dilute agent samples are withdrawn for analysis by the chemical assessment laboratory (CAL), visiting inspection team, and for archiving purposes. After agent sample removal, the remaining diluent in the sample tank is drained back to ACS-TANK-101. After draining the sample tank, the local operator initiates a flushing operation of the sample collection tank. After flushing, three independent 10-ml "blank" samples are withdrawn from the sample tank in the same manner as the agent samples.

3.2.2.2 BDS Munition Sampling at TOCDF

At TOCDF, sampling of drained agent from bulk items at the BDS is currently performed manually by drawing a sample from a ¼" drain line downstream of the BDS filter through sampling valve, ¼"-V-450S.

Sequence of Operations

The following is a summary of the steps that are taken to obtain sample(s) of agent drained from bulk items (refer to Operation 8 in TOCDF SOP, TE-SOP-055, Agent Collection System Procedures, for more detail).

A. DPE entrants (Operators "A" and "B") enter the MPB (BDS Line A sample area) with appropriate materials and set up a worktable, workstation spill tray, and decon container.

B. Operator "A" opens the block valve (½"-V-302A) and then slowly opens the sample valve (¼"-V-450S) to allow 10 to 12 ml of agent to flow into an agent flush tube.

C. Operator "A" closes the block and sample valves, caps the agent flush tube and places it in a work rack.

D. Operator "A" opens the block valve again and then slowly opens the sample valve to allow 4 to 5 ml of agent to flow into an agent collection tube.

E. Operator "A" closes the block and sample valves, caps the agent collection tube and places it in a work rack.

F. Operator "A" carries the work rack to the workstation.

G. Operator "B" uses a 750-µl pipette with pipette tip to extract agent from the agent collection tube. Agent is placed in a 5-ml sample analysis tube. Filled sample analysis tube(s) are placed in a plastic agent sample overpack container, which is then placed into a Lab Carryall.

H. Operator "B" carries the Lab Carryall to the Sample Surety Box. After verifying XXX decontamination of the Lab Carryall, the sample(s) are taken to the Lab for analysis.

I. Residual agent in the agent collection tube and agent flush tube is poured into the decon container and solid wastes (e.g., agent collection tube and agent flush tube) are rinsed in the decon container. Liquid waste (spent decon) is poured into the sump for processing by the SDS and solid wastes are bagged for MPF processing as miscellaneous waste (see FAWB Note B-6).

If samples cannot be obtained due to plugging in the sample port, local operators are permitted to use portable stairs and take samples directly from a munition.

TOCDF Retrofit Design

The TOCDF BDS retrofit design (see FAWB Note B-5) consists of a BDS sample trap interface (51-FG-453), sample injection valve (51-XV-453), and subsystems shared with the MDM sample system including: diluent carrier line, 1000 ml sample tank (Tank 303), and sampling glovebox (PSH-HOOD-101) with pneumatic sampler to 20 ml sample containers.

The BDS sample system collects a series of 10 µl samples from the BDS agent drain line through an orifice in the sample injection valve (51-V-453). The injection valve traps the sample and diverts it into an isopropyl alcohol carrier stream (diluent). The diluent is then conveyed by metered tubing to a one-liter sample tank (Tank-303). The correct sample tank volume is verified by the local operator. The sample tank and a pneumatic sampling valve (51-V-303) are contained in a glovebox (PHS-HOOD-101). The local PLC control system for agent sampling is located next to the glovebox. At the conclusion of the sampling cycle, three independent 10-ml dilute agent samples are withdrawn for analysis by the CAL, visiting inspection team, and for archiving purposes. After agent sample removal, the remaining diluent in the sample tank is drained back to ACS-TANK-101. After draining the sample tank, the local DPE operator initiates a flushing operation of the sample collection tank. After flushing, three independent 10-ml "blank" samples are withdrawn from the sample tank in the same manner as the agent samples.

3.2.2.3 MDM Munitions Sampling at TOCDF

At TOCDF, sampling of drained agent from projectiles/mortars at the MDMs is currently performed manually by drawing a sample from a ¼” drain line downstream of any one of the three MDM AQS verification tanks (ACS-TANK-105/106/107) through a sampling valve, ¼”-V-73E/83E/93E.

Sequence of Operations

The following is a summary of the steps that are taken to obtain sample(s) of agent drained from projectiles/mortars (refer to Operation 11 in TOCDF SOP, TE-SOP-055, Agent Collection System Procedures, for more detail).

A. DPE entrants (Operators “A” and “B”) enter the MPB with appropriate materials and set up a worktable, workstation spill tray, and decon container in a location convenient to the PHS-MDM-101/102/103 sampling area.

B. Operator “A” opens the block valve (¼”-V-73D/83D/93D) and then slowly throttles the sample valve (¼”-V-73E/83/E/93E) to allow 10 to 12 ml of agent to flow into an agent flush tube.

C. Operator “A” closes the block and sample valves, caps the agent flush tube and places it in a work rack.

D. Operator “A” opens the block valve again and then slowly throttles the sample valve to allow 4 to 5 ml of agent to flow into an agent collection tube.

E. Operator “A” closes the block and sample valves, caps the agent collection tube and places it in a work rack.

F. Operator “A” carries the work rack to the workstation.

G. Operator “B” uses a 750-µl pipette with pipette tip to extract agent from the agent collection tube. Agent is placed in a 5-ml sample analysis tube. Filled sample analysis tube(s) are placed in a plastic agent sample overpack container, which is then placed into a Lab Carryall.

H. Operator “B” carries the Lab Carryall to the Sample Surety Box. After verifying XXX decontamination of the Lab Carryall, the sample(s) are taken to the Lab for analysis.

I. Residual agent in the agent collection tube and agent flush tube is poured into the decon container and solid wastes (e.g., agent collection tube and agent flush tube) are rinsed in the decon container. Liquid waste (spent decon) is poured into the sump for processing by the SDS and solid wastes are bagged for MPF processing as miscellaneous waste (see FAWB Note B-6).

TOCDF Retrofit Design

The TOCDF MDM retrofit design (see FAWB Note B-5) consists of an MDM sample trap interface (51-FG-353), sample injection valve (51-XV-353), and subsystems shared with the BDS sample system including: diluent carrier line, 1000 ml sample tank (Tank 303), and sampling glovebox (PSH-HOOD-101) with pneumatic sampler to 20 ml sample containers.

The MDM sample system collects a series of 10-µl samples from the MDM agent drain line through an orifice in the sample injection valve (51-V-353). The injection valve traps the sample and diverts it into an isopropyl alcohol carrier stream (diluent). The diluent is then conveyed by metered tubing to a one-liter sample tank (Tank-303). The correct sample tank volume is verified by the local operator. The sample tank and a pneumatic sampling valve (51-V-303) are contained in a glovebox (PHS-HOOD-101). The local PLC control system for agent sampling is located next to the glovebox. At the conclusion of the sampling cycle, three independent 10-ml dilute agent samples are withdrawn for analysis by the CAL, visiting inspection team, and for archiving purposes. After agent sample removal, the remaining diluent in the sample tank is drained back to ACS-TANK-101. After draining the sample tank, the local operator initiates a flushing operation of the sample collection tank. After flushing, three independent 10-ml “blank” samples are withdrawn from the sample tank in the same manner as the agent samples.

3.3 AUTOMATIC AGENT SAMPLING SYSTEM

The AASS at the four CSD sites interfaces with the agent feed lines to the LIC. At TOCDF and UMCDF, which have two LIC furnaces, the AASS can draw a sample from the feed to either LIC. At ANCDF and PBCDF, which have only one LIC furnace, the AASS is used to extract a sample from the single feed line to the LIC. The configuration of the AASS at ANCDF, PBCDF and UMCDF is similar with the only difference being that at UMCDF, the AASS can sample from either of the two LIC agent feed lines. Sampling of agent feed to the LIC at TOCDF is currently performed manually by sampling from the duplex strainer at the discharge of the agent holding tank (ACS-TANK-101) in the toxic cubicle (TOX). A retrofit design also exists that was going to implement a unique AASS at TOCDF. This retrofit system is no longer planned to be used (see FAWB Note B-5), but a brief description is included for information only.

Because agent is routed directly to the AASS glovebox, a security door is incorporated at each site to control access to the AASS glovebox. At ANCDF, TOCDF, and UMCDF, the AASS glovebox is located in monitor room 09-123. The security door (door 114) partitions the room so that the portion housing the glovebox cannot be accessed except through the security door. A security grill is fitted in the conduit and pipe area above the door to allow ventilation air (approximately 950 acfm) to pass through with minimal pressure drop.

At PBCDF the AASS glovebox is located in observation corridor 09-138. The corridor configuration does not permit easy partitioning so the entire glovebox is enclosed in a security enclosure. The enclosure has a rolling grilles door that is used to access the glovebox. The grill allows ventilation air (approximately 950 acfm) to pass through with minimal pressure drop.

3.3.1 AASS at ANCDF, PBCDF and UMCDF

The AASSs at ANCDF, PBCDF and UMCDF are functionally identical, however, due to the unique physical layout of PBCDF, the locations of the PBCDF AASS equipment are different. At ANCDF and UMCDF, the AASS consists of a duplex strainer (ACS-FLTR-001), auto agent sampling pump (ACS-PUMP-121), agent supply and return valves, and ¾-inch supply and return piping located in the first floor munition corridor (05-153), and the AASS glovebox (ACS-GLBX-101) located in monitor room 09-123. Inside the glovebox is an agent sampling station (09-SMPL-001). Control panels for the duplex strainer (ICS-

PANL-199) and the sampler (ICS-PANL-195) are also located in monitor room 09-123. The sampling system supply line draws agent directly from the LIC agent feed-line piping in the lower munitions corridor, and returns agent to the same line.

At PBCDF the duplex strainer, auto agent sampling pump, and agent supply and return valves are located in the primary LIC room (13-146), and the AASS glovebox is located in observation corridor 09-138. Control panels for the duplex strainer and the sampler are also located in observation corridor 09-138.

At all three sites the auto agent sampling pump and all sampling controls are powered by the UPS.

Sequence of Operations

The following sequence of operations describes the operation of the AASS when extracting a sample. Tag numbers correspond to those for LIC #1 at UMCDF. LIC #2 tag numbers are enclosed in brackets. PBCDF tag numbers are the same as the UMCDF LIC #1 tag numbers and ANCDF tag numbers are the same as those in brackets.

A. A glovebox operator opens the agent supply, 05-XV-245 [05-XV-243], and return valve, 05-XV-246 [05-XV-244] for the LIC agent feed line and runs the sample pump for 20 minutes to flush the system prior to sampling.

B. The glovebox operator uses the manual cycle control on the sampler to obtain four 5-ml agent samples.

C. The glovebox operator prepares RDT&E dilute samples for analysis and places the diluted sample bottles in the interchange compartment of the glovebox. Preparation of samples in the AASS glovebox is identical to sample preparation in the MSS gloveboxes (see subsection 3.2.1.5).

D. The sample containers and residual agent from the agent sampling station are taken to the munitions corridor for disposal in the MPF (see FAWB Note B-6).

E. A worker in the monitor room (observation corridor at PBCDF) removes the diluted sample bottles from the interchange compartment of the glovebox and hand carries the samples to the lab for analysis.

3.3.2 AASS at TOCDF

Sampling of agent feed to the LIC at TOCDF is currently performed manually by drawing samples from one of two sets of sampling valves (51-V-9501A & 51-V-9501B) on the duplex strainer downstream from the agent holding tank (ACS-TANK-101), on the east side of the TOX.

Sequence of Operations

The following is a summary of the steps that are taken to obtain sample(s) of agent from the LIC agent feed lines (refer to Operation 7 in TOCDF SOP, TE-SOP-055, Agent Collection System Procedures, for more detail).

A. DPE entrants (Operators “A” and “B”) enter the TOX with appropriate materials and set up a worktable, workstation spill tray, and decon container in a location convenient to the duplex strainer.

B. Operator “A” opens the sample valve closest to the strainer (¼”-V-9501A or 9501C) and then slowly opens the downstream sample valve (¼”-V-9501B or 9501D) to allow 10 to 12 ml of agent to flow into an agent flush tube.

C. Operator “A” closes the both sample valves (valve closest to the strainer is closed first), caps the agent flush tube and places it in a work rack.

D. Operator “A” opens the sample valve closest to the strainer again and then slowly opens the downstream sample valve to allow 4 to 5 ml of agent to flow into an agent collection tube.

E. Operator “A” closes the block and sample valves, caps the agent collection tube and places it in a work rack.

F. Operator “A” carries the work rack to the workstation.

G. Operator “B” uses a 750-µl pipette with pipette tip to extract agent from the agent collection tube. Agent is placed in a 5-ml sample analysis tube. Filled sample analysis tube(s) are placed in a plastic agent sample overpack container, which is then placed into a Lab Carryall.

H. Operator “B” carries the Lab Carryall to the Sample Surety Box. After verifying XXX decontamination of the Lab Carryall, the sample(s) are taken to the Lab for analysis.

I. Residual agent in the agent collection tube and agent flush tube is poured into the decon container and solid wastes (e.g., agent collection tube and agent flush tube) are rinsed in the decon container. Liquid waste (spent decon) is poured into the sump for processing by the SDS and solid wastes are bagged for MPF processing as miscellaneous waste (see FAWB Note B-6).

TOCDF Retrofit Design

The TOCDF AASS retrofit design (see FAWB Note B-5) consists of a sample trap interface (51-FG-153), sample injection valve (51-XV-153), diluent carrier line, 1000 ml sample tank (Tank 113), and sampling glovebox with pneumatic sampler to 20 ml sample containers.

The AASS retrofit design at TOCDF collects a series of 10-µl samples from either the LIC-1 or LIC-2 agent feed lines through an orifice in the sample injection valve (51-V-153). The injection valve traps the sample and diverts it into an isopropyl alcohol carrier stream (diluent). The diluent is then conveyed by metered tubing to a one-liter sample tank (Tank-113). The correct sample tank volume is verified by the local operator. The sample tank and a pneumatic sampling valve (51-V-103) are contained in a glovebox (ACS-HOOD-101). The local PLC control system for agent sampling is located next to the glovebox. An interlock to the low-low pressure switch (51-PSLL-112 & 51-PSLL-733) on the LIC feed line assures that process sample is available. At the conclusion of the sampling cycle, three independent 10-ml dilute agent samples are withdrawn for analysis by the CAL, visiting inspection team, and for archiving purposes. After agent sample removal, the remaining diluent in the sample tank is drained back to ACS-TANK-101. After draining the sample tank, the local operator initiates a flushing operation of the sample collection tank. After flushing, three independent 10-ml “blank” samples are withdrawn from the sample tank in the same manner as the agent samples.

3.4 PROJECTILE DEFORMATION EQUIPMENT (ANCDF, TOCDF, and UMCDF)

Since PBCDF will not be processing projectiles, the PDE will be used at ANCDF, TOCDF and UMCDF only. The PDE is located adjacent to the metal parts furnace (MPF) discharge cooling conveyor (MMS-CNVP-121). Projectiles are delivered to and removed from the PDE using cranes in the MPF discharge conveyor area. At ANCDF and UMCDF, two cranes are used: one to deliver projectiles to the PDE and another to remove them. At TOCDF, a single crane can be used for both functions. Currently TOCDF is not using the PDE (see FAWB Note B-4).

The PDE uses interchangeable modular presses to deform 4.2-in. mortar, 105-mm, 155-mm, and 8-in. projectiles. The PDE is mounted on a stationery steel I-beam support structure. ANCDF is the only site requiring all four presses. TOCDF does not have 8-inch projectiles to process; therefore they do not have a press module for them. Similarly, UMCDF does not have 4.2-in. mortars or 105-mm projectiles to process, so they do not have the press modules for them.

The press module for mortars and 105-mm projectiles has 6 vertical projectile guides and a horizontal, 10,000-psi, 50-ton hydraulic punch for each projectile guide. The press module for 155-mm projectiles has 4 projectile guides and a horizontal, 10,000-psi 100-ton hydraulic punch for each projectile guide. The press module for 8-in. projectiles has 3 projectile guides and a horizontal, 10,000-psi, 150-ton hydraulic punch for each projectile guide. Each hydraulic cylinder includes a local inductive sensor to indicate the extension/retraction position of the hydraulic punch. A local proximity sensor is mounted across from the hydraulic punch in each projectile guide to indicate the presence of a projectile. The sensor signals are used by the PLC to count the projectiles loaded into the press to ensure that all processed projectiles are deformed.

The PDE has a local operator control station. This station includes a control system master power switch, emergency stop push button, hydraulic supply pressure indicator, infrared interruption-type switches, and status indication lights including hydraulic pump, common trouble, common shutdown, cycle in progress, and cycle complete.

A scale receptacle is located below the press to collect loose paint and scale that falls from the munitions during the deformation process.

Sequence of Operations

TOCDF does not currently use the PDE (see FAWB Note B-4). The following steps describe the sequence of operations at ANCDF and UMCDF for transferring projectiles/mortars from the MPF discharge cooling conveyor to the PDE and operation of the PDE.

A. The operator uses the MPF overhead crane with hoist (MPF-CRAN-401) and electromagnetic end-effector to lift and transfer the projectiles/mortars one row at a time (6 each for mortars and 105-mm projectiles, 4 each for 155-mm projectiles, and 3 each for 8-in. projectiles) from the munition trays to the PDE cleaning table (PDE-

TABL-101). Care must be taken during transfer operations since projectiles/mortars could drop from the end-effector upon loss of power[1].

B. The projectiles/mortars are left hanging over the PDE cleaning table. Using a local vacuum system, the operator removes paint peeling from the exterior surface of the projectiles/mortars.

C. Using the MPF overhead crane with hoist the row of projectiles is lifted and transferred from the cleaning table and loaded into the projectile deformation press (PDE-PRES-101). Proximity sensors associated with each projectile guide are used to indicate the presence of a projectile and the PLC counts the projectiles loaded into the press.

D. While the projectiles are held in place by the projectile guides, horizontal hydraulic punches deform each projectile to the indentation and outside diameter (O.D.) deformation standards shown in Table 3.1 below:

Table 3.1 Projectile Deformation Standards

Projectile	Minimum Indentation (in.)	Minimum O.D. (in.)[1]
4.2-in. Mortar	0.340	4.220
105-mm	0.279	4.154
155-mm	0.342	6.145
8-in.	0.414	8.005

[1] From PDE Technical Data Package.

E. The operator removes the deformed projectiles from the PDE using the PDE bridge crane (PDE-CRAN-401) and transfers them into a roll-off container for offsite disposal.

[1] A standby battery is supplied to ensure that projectiles/mortars are held in place for 5 minutes following a power interruption.

SECTION 4
COMPONENT SUMMARY

4.1 TCE COMPONENTS

The TCE components are grouped by the three subsystems: the MSS, AASS, and PDE.

4.1.1 MSS

The MSS at ANCDF, PBCDF, and UMCDF consists of the valves and instrumentation associated with each sampling location, and a glovebox for the RSM/MIN sampling system (RHS-GLBX-101) and a glovebox for the MDM (ANCDF/UMCDF only) and BDS sampling systems (PHS-GLBX-101).

At TOCDF, manual valves are currently used for sampling of agent from specific munitions. The retrofit design for TOCDF consists of a glovebox for the RSM/MIN sampling system (RHS-HOOD-101) and a glovebox for the MDM and BDS sampling systems (PHS-HOOD-101). The sampling systems each have an alcohol storage tank, an alcohol supply pump, a sample tank, and associated valves and instrumentation.

4.1.2 AASS

The AASS at ANCDF, PBCDF, and UMCDF consists of a duplex strainer (ACS-FLTR-001) with a control panel (ICS-PANL-199), a sample pump (ACS-PUMP-121) located in the munition corridor, and a sampler (09-SMPL-001) with a control panel (ICS-PANL-195) and a glovebox (ACS-GLBX-101). Design parameters associated with the sample pump are listed in Table 4.1.

Table 4.1 Auto Agent Sampling Pump Design Parameters

	ANCDF	PBCDF	UMCDF
Quantity	1	1	1
Tag #(s)	ACS-PUMP-121	ACS-PUMP-121	ACS-PUMP-121
Pump Type	Motor Driven Rotary (Gear)	Motor Driven Rotary (Gear)	Motor Driven Rotary (Gear)
Rated Flow/ Δ Pressure	46 gph ΔP 11.4 psi	46 gph ΔP 11.4 psi	46 gph ΔP 11.4 psi
Motor Power	1/6 hp	1/6 hp	1/6 hp
P&IDs	AN-1-D-544	PB-1-D-544	UM-1-D-544

At TOCDF, manual valves are currently used for sampling of agent from the strainer downstream of the agent holding tank (ACS-TANK-101). The retrofit design for TOCDF consists of a glovebox for the sampling system (ACS-HOOD-101) which contains an alcohol storage tank, an alcohol supply pump, a sample tank, and associated valves and instrumentation.

4.1.3 PDE

The PDE at ANCDF, TOCDF and UMCDF consists of the stationery steel I-beam support structure and three interchangeable modular presses to deform 4.2-in. mortar, 105-mm, 155-mm, and 8-in. projectiles. TOCDF does not include a press module for 8-in. projectiles, and UMCDF does not include a press module for 4.2-in. mortars or 105-mm projectiles. At ANCDF and TOCDF, a common press is used for 105-mm projectiles and 4.2-in. mortars.

4.2 EQUIPMENT POWER SOURCES

Table 4.2 lists the equipment power sources for the major equipment used in the TCE based on TOCDF drawings as of December 31, 1997 and the following revisions for the other sites: ANCDF (through change case AN-06-18-0150), PBCDF (through change case PB-07-98-0021), and UMCDF (through change case UM-07-25-0102). 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 table; instrumentation and control power sources are not listed. In addition, hydraulically and pneumatically powered, and non-powered equipment are not included in the table.

Table 4.2 TCE Equipment Power Sources.

Equipment Tag	Description	Site(s)	Power Source	Power Type
ACS-PUMP-121	Auto Agent Sampling Pump	AN/PB/UM	ICS-CRB-101 (receives power from UPS-PANB-113)	Critical
51-SMPL-76	Sampling System for Rockets/Mines	AN/PB/UM	ICS-CRB-003 (receives power from UPS-PANB-108)	Critical
51-SMPL-77	Sampling System for Bulk Items	AN/UM	ICS-CRB-002 (receives power from UPS-PANB-108)	Critical
		PB	ICS-CRB-002 (receives power from UPS-PANB-106)	Critical

Table 4.2 (Cont'd)

Equipment Tag	Description	Site(s)	Power Source	Power Type
51-SMPL-78	Sampling System for Projectiles	AN/UM	ICS-CRB-004 (receives power from UPS-PANB-108)	Critical
PDE-CRAN-401	PDE Bridge Crane	AN/UM	SPS-PANB-403	Utility
PDE-PRES-101	Projectile Deformation Press	AN/TE/UM	SPS-MCC-107	Utility
PDE-DSCN-101	PDE Magnet and Spreader Bar	AN/UM	SPS-PANB-410	Utility

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
ACI	American Concrete Institute
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
AISC	American Institute of Steel Construction
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)
CAMDS	Chemical Agent Munition Disposal System
CAB	combustion air blower

CAL	chemical assessment laboratory
CAS	compressed air system
CBR	chemical, biological, and radiological (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
CHB UPA	container handling building unpack area
CHWS	chilled water supply
CO	carbon monoxide (monitors/analyzers)
COM	communications system
CON	control room
COR	corridor (munitions)
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
DSIC	design and systems integration contractor
dscf	dry standard cubic foot
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
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
FIL	activated carbon and HEPA filter
FPD	flame photometric detector
FPM	feet per minute
FSSS	flame safety shutdown system
GA	general arrangement; nerve agent ethyl N-dimethylphosphoramidocyanidate ($C_5H_{11}N_2O_2P$)
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
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
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
L	Lewisite (blister agent)
LAB	laboratory
lb	pound
LCO	limiting condition of operation
ln	line
LIC	liquid incinerator
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
MGM3	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 hypochloride
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
PDS	pull and drain station (MDM)
	punch and drain station (MIN)
PFD	process flow diagram
PFS	PAS filter system
PHS	projectile handling system
PID	proportional integral derivative
PKPL	pick-and-place machine (also PPL)
PLA	plant air system
PLC	programmable logic controller
PLL	programmatic lessons learned (program)
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
pph	pounds per hour
PPS	primary power system
PQAP	Participant Quality Assurance Plan
PRW	process water
PSB	process support building
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
RSM	rocket shear machine
RSS	rocket shear station
SC	systems contractor
SCBA	self-contained breathing apparatus
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	standard (standing) operating procedure
SPS	secondary power system
SRS	slag removal system
TBD	to be determined
TCE	treaty compliance equipment
TEAD	Tooele Army Depot (Utah)
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
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 ANCDF, PBCDF, TOCDF, or UMCDF. A programmatic process FAWB for the DUN/DUN PAS/PFS is not being developed. Handling and disposal of dunnage is considered a site-specific activity that has not yet been determined. The DUN, however, is installed at TOCDF and remains in the designs at ANCDF and PBCDF. At UMCDF, the DUN was being removed from the design, however, its use at UMCDF is currently being studied.

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 have been combined into a single PAS/PFS FAWB that applies to ANCDF, PBCDF, TOCDF, and UMCDF.

B-3 The acid and 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 According to TOCDF SOP TE-SOP-023, Operation 14, TOCDF does not currently use the PDE. For M360 processing, after a munition tray (tray assembly and egg crate assembly) has cooled on the MPF discharge cooling conveyor, the munition tray is removed by forklift from the conveyor and moved to the munition deformation table. At the deformation table, the nose closure container is emptied and burster wells are removed from the projectiles. Nose closure and burster wells are cleaned using a vacuum system before being placed in a roll-off container. Then projectiles are deformed using an oxy-acetylene torch to make a one-inch long (minimum), 1/4-inch wide cut into the projectile to destroy the fuze threads. When all projectiles on a tray have been deformed, the interior and exterior are cleaned using the vacuum, and the overhead crane is used to move one row of projectiles at a time to the roll-off container. The SOP includes a note that reads: A method will be developed at a later time that will use the Projectile Deformation Unit (PDU) for munition deformation.

B-5 At TOCDF sampling systems were designed to remotely obtain agent samples from agent drained by the RSM/MIN Line A, BDS Line A, and the MDMs. TOCDF has indicated that these systems will not be used and an ECP will be issued to document their current configuration while noting that they are in an indefinite lay-up status.

B-6 At TOCDF residual agent from manual sampling is poured into a decon container and mixed. The spent decon solution is poured through a strainer into a sump. Solid wastes from sampling (e.g., agent collection tubes, agent flush tubes, pipette tips, and caps) are rinsed with decon and placed in a solid waste bag. Solid waste bags are collected in an empty cradle, transported to the TMA, and prepared for processing in the MPF as miscellaneous waste. For follow-on sites, it is assumed that sample containers and residual agent from agent sampling activities will be processed as miscellaneous waste in the MPF.

APPENDIX C

Alarm and Interlock Matrices

For the draft baseline TCE programmatic FAWB, no alarms or interlocks were identified at TOCDF for inclusion in an A&I matrix. If alarms and interlocks are implemented in the future, the alarms and interlocks will be included in this appendix. If applicable, alarm and interlock matrices for ANCDF, PBCDF, and UMCDF will be included in future revisions to the TCE FAWB.

APPENDIX D

PLC Automatic Control Sequences

Appendix D in the programmatic process FAWBs normally contains a summary of PLC automatic control sequences based on the current versions of the PLC code for each of the sites. The PLC automatic control sequence summaries are generated based on the control system rung ladders in the PLC code for the specific FAWB system. 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 (See the CSDP Control Systems Software Design Guide for additional information on D6-tag devices). In this appendix, automatic control for all devices with **D6** tags are described, grouped by the Advisor PC screens on which they appear.

The October 13, 1997, TOCDF control code did not include any D6-tag devices for treaty compliance equipment. A hood permissive and a sampling permissive, along with status indications, are included on LIC furnace #1, primary burner Advisor PC screen L1P (See Appendix E). This appendix will be revised to include the D6-tag devices if any are added for control of TCE system components.

APPENDIX E

Operator Screens

Appendix E contains the Advisor PC screens associated with the operation and control of the treaty compliance equipment. In the October 13, 1997 TOCDF control code used to develop the baseline programmatic FAWB for TCE, a hood permissive and a sampling permissive, along with status indications, are included on LIC furnace #1, primary burner Advisor PC screen L1P. This screen, shown in Figure E-1, is the only Advisor PC screen included in Appendix E.

Additional screens have been included for the Panel View screens associated with local operation and control of the MSS at TOCDF. Table E.1 provides an index to the screens.

Table E.1 TOCDF TCE Panel View Screens

Figure #	Panel View Process Screen
E-2	Munition Sampling System Title Page
E-3	Overview (OV)
E-4	Alcohol Loop (AL)
E-5	Agent Loop (AG)
E-6	Sample Hood (SH)
E-7	Status/Alarm (SA)
E-8	Timer Set (TMR)

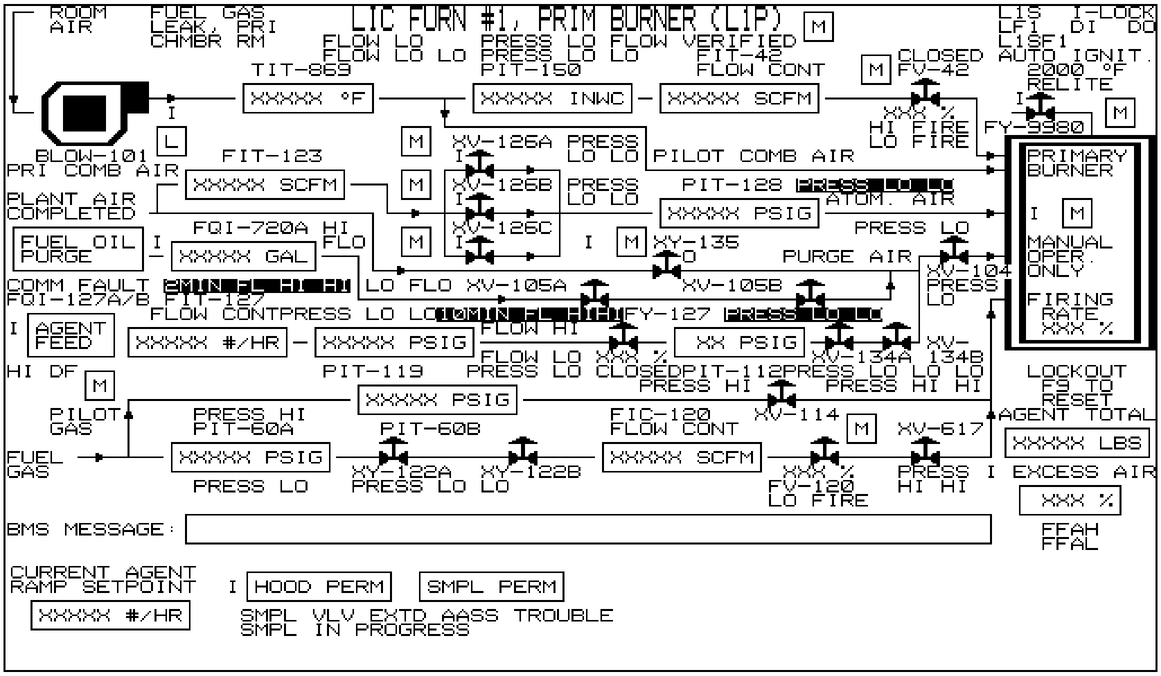

Figure E-1. TOCDF Advisor PC Screen LIC Furnace #1, Primary Burner (L1P)

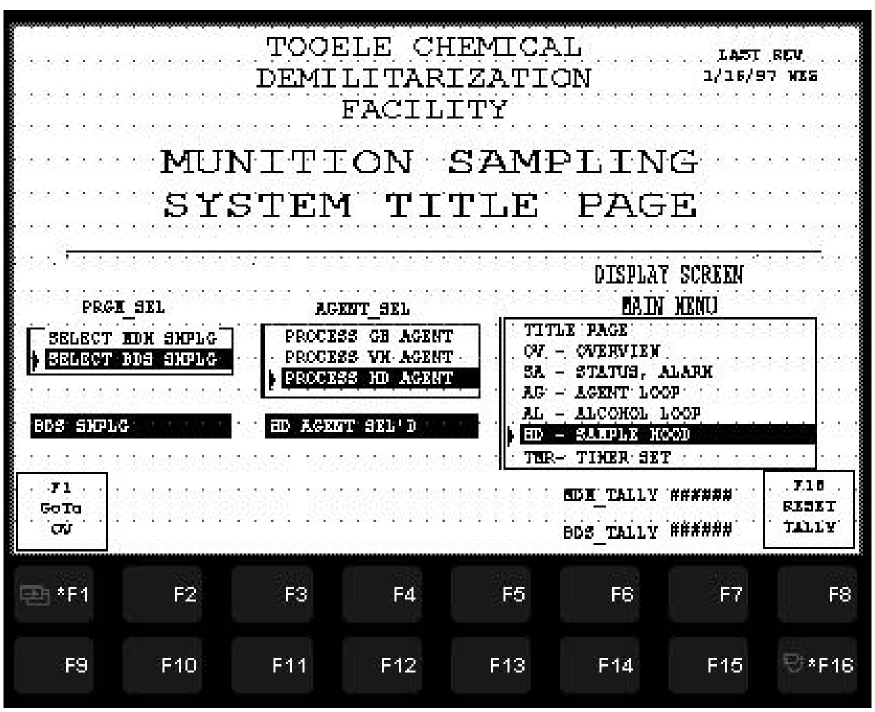

Figure E-2. Munition Sampling System Title Page

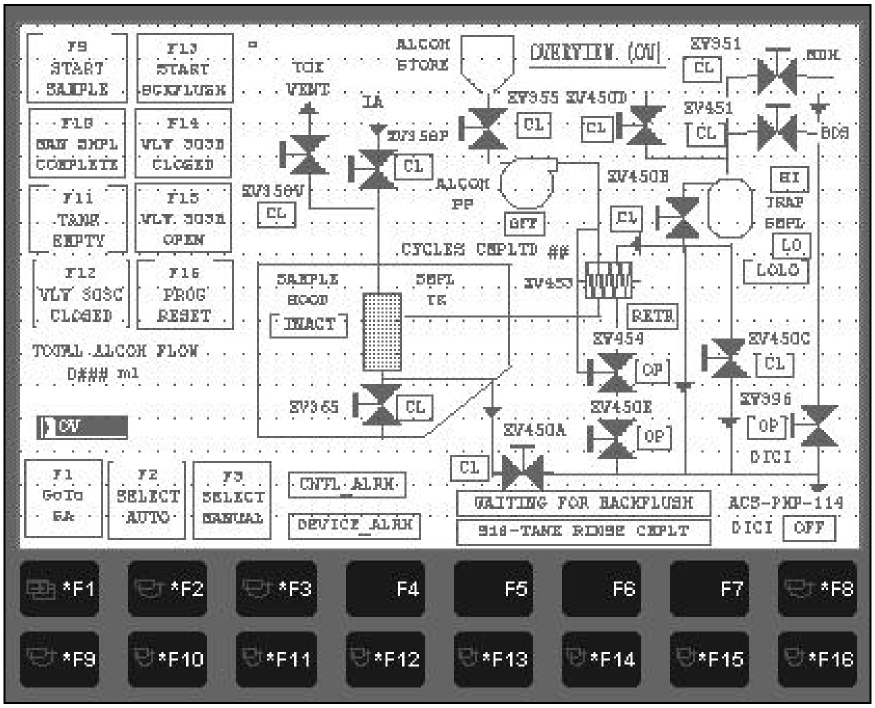

Figure E-3. Overview (OV)

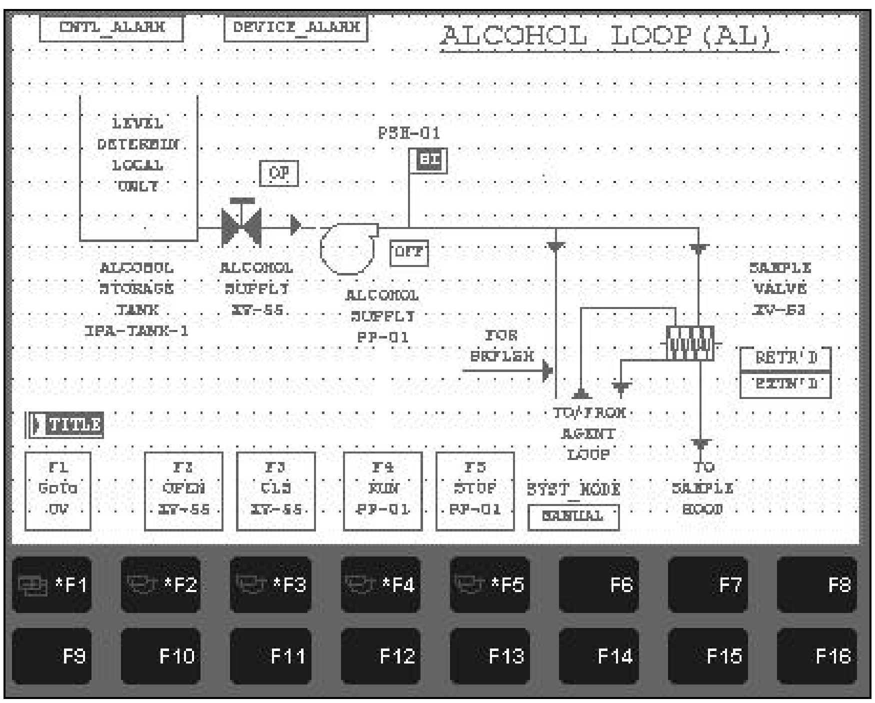

Figure E-4. Alcohol Loop (AL)

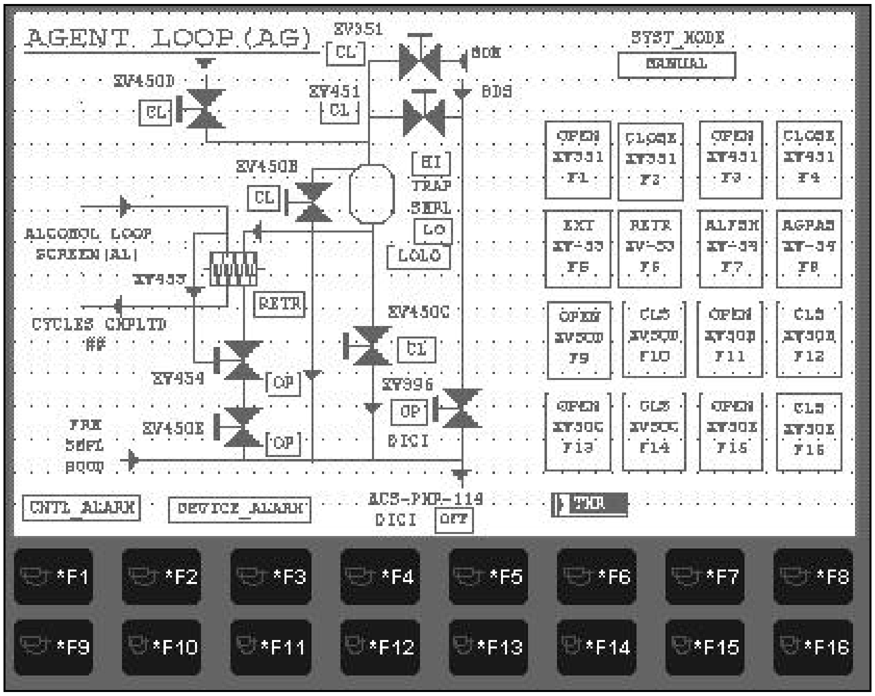

Figure E-5. Agent Loop (AG)

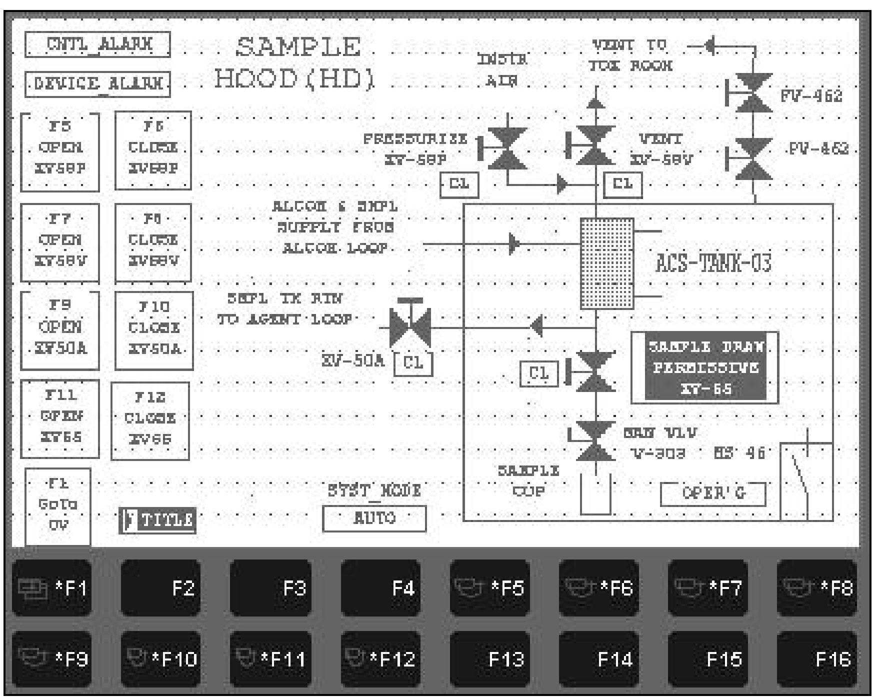

Figure E-6. Sample Hood (HD)

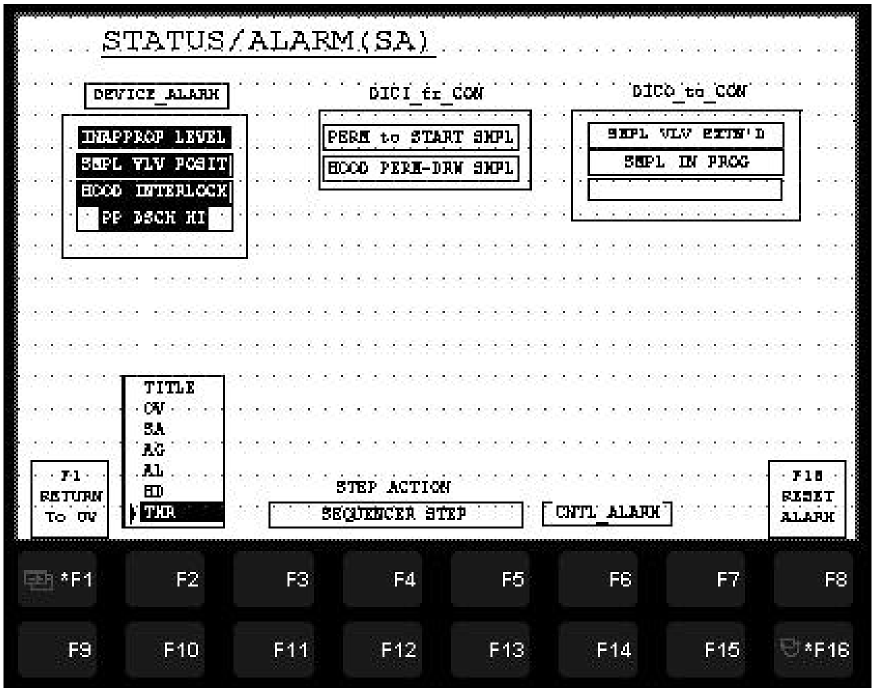

Figure E-7. Status/Alarm (SA)

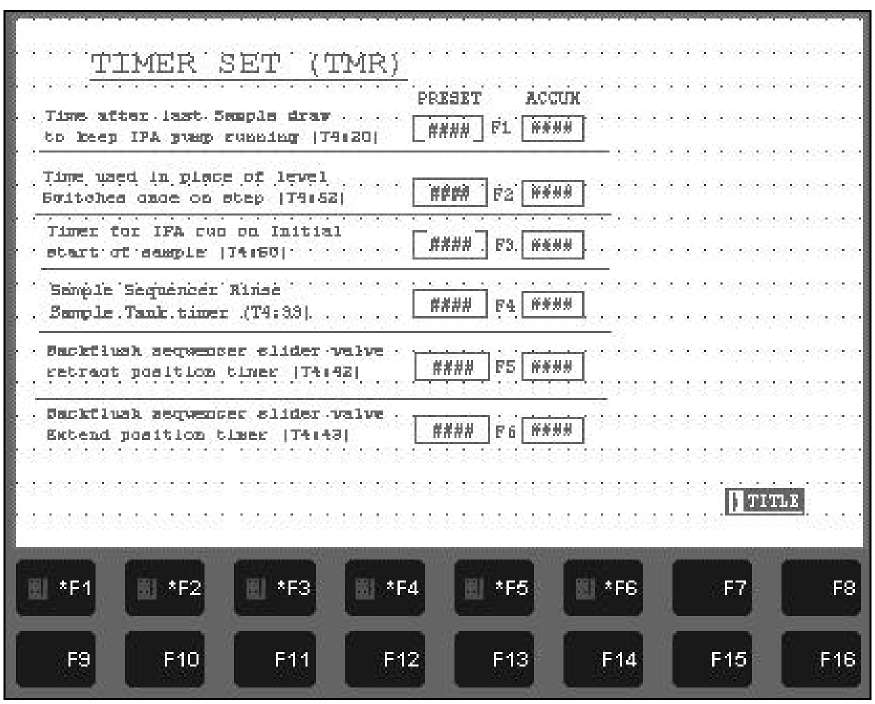

Figure E-8. Timer Set (TMR)

APPENDIX F

Instrument Ranges

None of the instruments listed in the TOCDF Loveland calibration database as of October 15, 1997 were identified as instrumentation in the TCE system; therefore there is no instrumentation listed in this appendix. The TOCDF database was reviewed since it is the only site-specific calibration database. Instrumentation associated with the TCE system from the site-specific calibration databases at ANCDF, PBCDF, and UMCDF will be included in a future revision of the TCE FAWB.

APPENDIX G

Intercontroller Communications

There were no DICOs in the October 13, 1997 TOCDF control code that were identified associated with the TCE system; therefore, there are no DICOs listed in this appendix. The TOCDF code was reviewed since site-specific code currently exists for TOCDF only. DICOs associated with the TCE system at ANCDF, PBCDF, and UMCDF will be included in a future revision of the TCE FAWB.

APPENDIX H

References

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AN-1-D-503, Rev.6, 10-2-98	Mine Processing System, P&ID
AN-1-D-515, Rev.6, 10-2-98	Multipurpose Demil & Bulk Drain System (A), P&ID
AN-1-D-522, Rev.3, 7-2-98	Agent Collection System, P&ID
AN-1-D-544, Rev.2, 5-8-98	Auto Agent Sampling System, P&ID
AN-1-D-545, Rev.0, 1-2-96	Munition Sampling System, P&ID
AN-1-D-549, Rev.2, 5-8-98	Munition Sampling System Details, P&ID
AN-1-E-73 Sh.1, Rev.1, 5-8-98	MDB Electrical, Panel Schedules
AN-1-E-73 Sh.2, Rev.2, 5-8-98	MDB Electrical, Panel Schedules
AN-1-E-74 Sh.1, Rev.7, 3-12-99	MDB Electrical, Panel Schedules
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AN-1-E-911, Rev.3, 5-8-98	SPS-MCC-107 480V MCC-MPF/LIC, Single Line Diagram

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PB-1-D-503, Rev.2, 7-10-98	Mine Processing System, P&ID
PB-1-D-515, Rev.3, 4-30-99	Bulk Drain System, P&ID
PB-1-D-544, Rev.1, 6-6-97	Auto Agent Sampling System, P&ID
PB-1-D-545, Rev.0, 6-2-97	Munition Sampling System, P&ID
PB-1-D-549, Rev.2, 7-10-98	Munition Sampling System Details, P&ID
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TE-1-D-521, Rev.19, 1-11-99	Agent Collection System – PHS-MDM-101, P&ID
EG-1-D-521/1, Rev.18, 12-16-98	Agent Collection System – PHS-MDM-102, P&ID
EG-1-D-521/2, Rev.20, 12-16-98	Agent Collection System – PHS-MDM-103, P&ID
TE-1-D-536, Rev.22, 4-19-99	Toxic Cubicle – Agent, P&ID
TE-1-E-911, Rev.18, 7-20-98	SPS-MCC-107 480V MCC-MPF/LIC, Single Line Diagram
EG-51-843-1 of 25.	Agent Sample System: Sample Stations General Locations
EG-51-843-2 of 25.	Agent Sample System: MDM Sample System P&ID
EG-51-843-3 of 25.	Agent Sample System: BDS Sample System P&ID
EG-51-843-4 of 25.	Agent Sample System: RSM Sample System P&ID
EG-51-843-5 of 25.	Agent Sample System: LIC Sample System P&ID
EG-51-843-6 of 25.	Agent Sample System: MDM Sample Station Gen Arrangement
EG-51-843-7 of 25.	Agent Sample System: BDS Sample Station Gen Arrangement
EG-51-843-8 of 25.	Agent Sample System: RSM Sample Station Gen Arrangement
EG-51-843-9 of 25.	Agent Sample System: LIC Sample Station Gen Arrangement
EG-51-843-10 of 25.	Agent Sample System: LIC Sample Station Sections & Details

TOCDF (cont'd)

EG-51-843-11 of 25.	Agent Sample System: LIC Sample Station Pipe, Spools & Tanks
EG-51-843-12 of 25.	Agent Sample System: MDM/BDS Sample Station Hood
EG-51-843-13 of 25.	Agent Sample System: RSM Sample Station Hood
EG-51-843-14 of 25.	Agent Sample System: LIC Sample Station Hood
EG-51-843-15 of 25.	Agent Sample System: Glove Box Layout & Details
EG-51-843-16 of 25.	Agent Sample System: Sample Locations Parts Identification
EG-51-843-17 of 25.	Agent Sample System: Sample Hood Locations Parts Identification
EG-51-843-18 of 25.	Agent Sample System: MDM/BDS Sample Systems Elec Layout
EG-51-843-19 of 25.	Agent Sample System: RSM Sample Systems Elec Layout
EG-51-843-20 of 25.	Agent Sample System: LIC Sample Systems Elec Layout
EG-51-843-21 of 25.	Agent Sample System: MDM/BDS Sample Systems Interconnection Diagram
EG-51-843-22 of 25.	Agent Sample System: RSM Sample Systems Interconnection Diagram
EG-51-843-23 of 25.	Agent Sample System: LIC Sample Systems Interconnection Diagram
EG-51-843-24 of 25.	Agent Sample System: Sample System Control Panel
EG-51-843-25 of 25.	Agent Sampling System

UMCDF (through Change Case UM-07-25-0102)

UM-1-D-501, Rev.3, 4-17-98	Rocket Processing System (A), P&ID
UM-1-D-503, Rev.3, 4-17-98	Mine Processing System, P&ID
UM-1-D-515, Rev.3, 4-17-98	Multipurpose Demil & Bulk Drain System (A), P&ID
UM-1-D-522, Rev.1, 4-17-98	Agent Collection System, P&ID
UM-1-D-544, Rev.1, 1-9-98	Auto Agent Sampling System, P&ID
UM-1-D-545, Rev.0, 1-30-97	Munition Sampling System, P&ID
UM-1-D-549, Rev.2, 1-9-98	MSS & BDS Drill Details, P&ID
UM-1-E-73 Sh.1, Rev.3, 4-17-98	MDB Electrical, Panel Schedules
UM-1-E-73 Sh.2, Rev.1, 4-17-98	MDB Electrical, Panel Schedules
UM-1-E-74 Sh.1, Rev.4, 3-5-99	MDB Electrical, Panel Schedules
UM-1-E-74 Sh.2, Rev.3, 8-21-98	MDB Electrical, Panel Schedules
UM-1-E-911, Rev.3, 4-17-98	SPS-MCC-107 480V MCC-MPF/LIC, Single Line Diagram