

**TECHNICAL MANUAL**

**OPERATION AND MAINTENANCE INSTRUCTION MANUAL**

**AIRCRAFT FIRE TRAINING FACILITY**

TRW SYSTEMS  
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F09603-99-D-0382

BASIC AND ALL CHANGES HAVE BEEN MERGED TO MAKE THIS A COMPLETE PUBLICATION

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**LIST OF EFFECTIVE PAGES**

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NOTE: The portion of the text affected by the changes is indicated by a vertical line in the margins of the page. Changes to illustrations are indicated by miniature pointing hands. Changes to wiring diagrams are indicated by miniature pointing hands or by shaded areas. A vertical line running the length of a figure in the outer margin of the page indicates that the figure is being added.

Dates of issue for original and changed pages are:

Original . . . . .0 . . . . .1 June 2002                      Change . . . . . 1 . . . . . 1 March 2004

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## NUMERICAL INDEX OF EFFECTIVE WORK PACKAGES

### NOTE

- Only those work packages and subordinate work packages assigned to this manual are listed in this index, therefore, WP/SWP numbers may not be sequential.
- Insert Change No. 1, work packages and subordinate work packages, dated 1 March 2004. Dispose of superseded work packages and subordinate work packages. If changed pages are issued to a work package or subordinate work package. The portion of the text affected in a change or revised WP or SWP is indicated by change bars in the outer margin of each column of text. Changes to illustrations and diagrams are indicated by pointing hands or shaded areas.

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010 01	1		THULE AB GREENLAND WINTERIZATION PROCEDURES

## SAFETY SUMMARY

### 1 GENERAL.

The following are general safety precautions, not related to any specific procedures and therefore do not appear elsewhere in this publication. These are recommended precautions that personnel must understand and apply during various phases of operation and maintenance.

### 2 CERTIFICATION.

All fire department personnel who inspect and operate the AFTF are required to be certified. To become certified, personnel are required to study the multimedia course material, entitled AFTF Inspection, Operation and Maintenance and pass the 50-question final exam with a minimum score of 80%. The test is called Liquid Propane Aircraft Fire Training Facility and is located in the most current version of CerTest.

### 3 PROTECTIVE CLOTHING.

When cleaners and primers are being applied, approved equipment shall be used. Make sure fire fighting equipment is readily available and in working order. Maintain minimum quantities required to accomplish tasks. Solvents will be contained in approved containers.

### 4 ELECTRICAL CIRCUITS.

Operating personnel must think safety at all times. Do not replace components or make adjustments inside of equipment with the electrical power supply turned on. To avoid injuries, always remove power from, discharge and ground a circuit before touching it. If a test connection to energized equipment is required, make the test connection ground connection before probing the voltage or signal to be tested. Do not attempt internal service or adjustment of equipment unless another person capable of rendering aid and resuscitation is present.

### 5 WARNINGS, CAUTIONS AND NOTES.

WARNING, CAUTION AND NOTE statements have been strategically placed throughout this text prior to operating or maintenance procedures, practices, conditions or statements considered essential to the protection of personnel (WARNING), or equipment and property (CAUTION) or when

essential to highlight a practice (NOTE). A WARNING, CAUTION or NOTE will apply each time the step to which it refers is repeated. Prior to starting any task the WARNINGS, CAUTIONS, and NOTES for that task will be reviewed and understood.

#### WARNING

Calls attention to an essential operating or maintenance procedure, practice, condition statement, etc., which if not strictly observed could result in injury to or death of personnel or long term health hazards.

#### CAUTION

Calls attention to an essential operating or maintenance procedure, practice, condition, statement, etc., which if not strictly observed could result in damage to or destruction of equipment or loss of mission effectiveness.

#### NOTE

An essential or unusual procedure, condition or statement which will be highlighted.

### 6 LIVE FIREFIGHTER TRAINING.

The need for safe firefighter training must be balanced with sufficient challenge to prepare firefighters for the unpredictable nature of the fireground. Training must not be so controlled as to give firefighters a false sense of security, nor can it disregard established safety procedures for the sake of increased realism. To maintain an effective cadre of firefighters and officers, the fire service must find new and dynamic ways to train personnel to act in a safe, decisive manner that best supports the fire service's mission to protect lives, property, and the environment. <sup>1</sup>

<sup>1</sup> This information is taken from USFA-TR-100 May 2003 Trends and Hazards in Firefighter Training - Special Report which is available on-line at: <http://www.usfa.fema.gov/downloads/txt/publications/tr-100.txt>

**NOTE**

This system is a live fire trainer intended to expose the firefighter/trainee to the same thermal and direct fire exposure experienced in an actual uncontrolled fire emergency. The system is not a fire simulator; there is nothing simulated about the fires in the system. The potential for the training system fires to cause thermal injury is no less than that in an actual uncontrolled fire emergency.

6.1 Although generally considered an essential part of firefighter training, practical evolutions utilizing live fire or smoke pose a significant risk to both trainees and instructors. The potential for injury is very real during this type of training and prudent instructors take numerous precautions to ensure the safety of the participants.<sup>2</sup>

6.2 Modern protective clothing may make life-threatening fire conditions less obvious; fire fighters and instructors must be constantly alert to recognize the visual and physical clues to impending danger.<sup>2</sup>

6.3 Firefighting is, without question, a highly physical and demanding activity. The intensity and prolonged duration of firefighter training evolutions place substantial physical stress on trainees and instructors. Injuries that commonly occur during training evolutions involve knees, lower back, strains, and sprains. The best means for preventing these potential injuries is by promoting physical fitness and proper lifting techniques. Although it is impossible to completely prevent these types of injuries, increased fitness and conditioning helps to reduce the incidence of injury and enable firefighters to cope with the intense physical demands of practical training and tactical operations. Simple techniques, such as warm-up exercises to prevent muscle injuries, although not routinely employed, should be done prior to any training.<sup>2</sup>

**NOTE**

During training, firefighters physical stress level should be monitored continuously to reduce training-related heart attacks, strokes and heat stress emergencies.<sup>2</sup>

6.4 The discipline and supervision applied during training can rarely be matched in actual firefighting operations. In many ways, training can and should constitute one of the safest aspects of a firefighter's job. However, training is sometimes compromised by complacency or by the dimin-

ished sense of danger suggested in a controlled training environment.<sup>2</sup>

6.5 The decrease in the incidence of fires, coupled with improvements in building construction and detection/suppression systems, has led to a shortage of instructors with extensive experience under actual fire conditions. As experienced instructors retire, especially those in career fire departments serving urban areas, they are being replaced with younger, less seasoned instructors. New instructors are often well educated and have usually achieved instructor certifications through organizations that meet or exceed NFPA standards for teaching and training. However, many of these instructors do not have the same level of fireground experience as more seasoned fire instructors. While well-trained and competent leaders, they may not have the fire combat experience of many of their predecessors that can help them to quickly recognize dangerously changing fire conditions. Limited experience makes it even more imperative that firefighting instruction adheres strictly to established policies and standards.<sup>2</sup>

**NOTE**

Fire service instructors should ensure that training standards and procedures be followed closely, especially when challenging tasks are assigned to recruits. To prevent injuries, instructors must know their material well, maintain a high ratio of instructors to students and be vigilant about ensuring strict adherence to safety procedures. Instructors should familiarize themselves with the backgrounds and experience of their students, and care should be taken to avoid situations for which the students are not yet prepared.<sup>2</sup>

6.6 Attitude and the Training Academy Way. One of the cornerstones of fire service training is to impart the correct attitude towards firefighting from instructor to student. Failure to pass on the appropriate attitudes and force unit discipline in fire training can have a lasting effect on students. One problem consistently voiced by experienced fire service personnel is the attitude that there is a training academy way of doing things, and the real way of doing things (outside of training). The training academy way should be synonymous with the right way.

**7 STRUCTURAL FAILURE REPORTING.**

Any structural failure, collapse, damage, or significant deformation in the physical shape of the trainer mock-up, control/safety tower, or propane storage facility shall be reported within 24 hours of occurrence to HQ AFCESA/

<sup>2</sup> This information is taken from USFA-TR-100 May 2003 Trends and Hazards in Firefighter Training - Special Report which is available on-line at: <http://www.usfa.fema.gov/downloads/txt/publications/tr-100.txt>

CESM/CEXF, 139 Barnes Drive, Tyndall AFB, FL. DSN 523-6315/523-6155, Commercial 850-283-6315/6155, e-mail HQAFCESA.CES@tyndall.af.mil and HQAFCESA.CEXF@tyndall.af.mil. General warping of decks and panels which do not result in the deformation or shifting of the trainer's general shape are considered normal in the course of use of the trainer.

#### 8 COMPONENT FAILURE REPORTING.

Any component failure or malfunction which occurs in other than a safe mode shall be reported within 24 hours of occurrence to HQ AFCESA/CESM/CEXF, 139 Barnes Drive, Tyndall AFB, FL. DSN 523-6315 / 523-6155, Commercial 850-283-6315/6155, e-mail HQAFCESA.CES@tyndall.af.mil and HQAFCESA.CEXF@tyndall.af.mil. All the

components are designed to fail or not function in a safe mode - off, shut-down or not operate - any other failure condition must be reported.

#### 9 CAUSALITY REPORTING.

Any injury or death occurring during or following a training exercise using the an Air Force Fire Training Facility shall be reported within 12 hours using the Fire Incident Notification reporting process in AFI 32-2001. Copies of the final incident/accident investigation shall be provided to HQ AFCESA/CESM/CEXF, 139 Barnes Drive, Tyndall AFB, FL. DSN 523-6315/523-6155, Commercial 850-283-6315/6155, e-mail HQAFCESA.CES@tyndall.af.mil and HQAFCESA.CEXF@tyndall.af.mil.

**WORK PACKAGE**

**OPERATION AND MAINTENANCE INSTRUCTIONS**

**ALPHABETICAL INDEX**

**EFFECTIVITY: AIRCRAFT FIRE TRAINING FACILITY**

**LIST OF EFFECTIVE WP PAGES**

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**LIST OF EFFECTIVE WORK PACKAGES**

**NOTE**

Only those work packages and subordinate work packages assigned to this manual are listed in this index.

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Fault Isolation .....	007 01	Standard Operating Procedures .....	005 00
General Maintenance .....	007 00	Thule AB Greenland Operating Procedures ...	010 00
Goodfellow AFB Texas Operating Procedures .....	009 00	Thule AB Greenland Winterization Procedures .....	010 01
Introduction .....	002 00	Winterization Procedures .....	005 02
Master List of Special Tools, Test Equipment and Consumables.....	003 00	Winterization Facility Operating Procedures .....	005 01



**WORK PACKAGE**

**OPERATION AND MAINTENANCE INSTRUCTIONS**

**INTRODUCTION**

**EFFECTIVITY: AIRCRAFT FIRE TRAINING FACILITY**

**LIST OF EFFECTIVE WP PAGES**

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1 PURPOSE.

This manual contains a series of Work Packages (WP) and Subordinate Work Packages (SWP) which provide operating instructions and instructions for intermediate and field level maintenance of the Aircraft Fire Training Facility. The intent of this system is to create a safe live fire training environment for fire fighters.

2 SCOPE.

The complete set of work packages covers all approved operations, inspection, and fault isolation.

3 ABBREVIATIONS/ACRONYMS.

The following abbreviations/acronyms are used in this manual.

LIST OF ABBREVIATIONS/ACRONYMS

<u>TERM</u>	<u>DEFINITION</u>
AFCESA	Air Force Civil Engineering Support Agency
AFOSH	Air Force Occupational Safety and Health
AFTF	Aircraft Fire Training Facility
APU	Auxiliary Power Unit
ARFF	Aircraft Rescue Firefighting (vehicle)
ASME	American Society of Mechanical Engineers
BTU	British Thermal Unit
COTS	Commercial-Off-the-Shelf
HDPE	High Density Polyethylene
kvac	Kilovolts Alternating Current
LPG	Liquid Propane Gas
N <sub>2</sub>	Nitrogen
NFPA	National Fire Protection Association
NPGA	National Propane Gas Association
OS&Y (valve)	Outside Screw and Yoke
PSI	Per Square Inch
SCBA	Self Contained Breathing Apparatus
SWP	Subordinate Work Package
vac	Volts Alternating Current
WP	Work Package

4 RELATED PUBLICATIONS.

The following publications are referenced in and used in conjunction with this manual.

AFM 91-201	Explosive Safety Standards
NFPA	Standard on Fire Department Occupational Safety and Health Program

00-105E-9 Aircraft Emergency Rescue Information (Fire Protection)

5 USE OF SHALL, WILL, SHOULD AND MAY.

Use of the word "shall" indicates a mandatory provision that is binding. Use of the words "should" and "may" express non-mandatory provisions. The word "will" is used to express a declaration of purpose. "Will" may also be used to show simple futurity, e.g., "Power for the meter will be provided by the ship".

6 TIME COMPLIANCE TECHNICAL ORDERS (TCTO).

The following TCTOs are applicable to the Aircraft Fire Training Facility.

LIST OF TIME COMPLIANCE TECHNICAL ORDERS

None

7 MANUAL STRUCTURE.

This manual is divided into WPs and SWPs. Each WP is an independent, task-oriented unit. Only essential information is provided. WPs cover the subjects of alphabetical indexes, foreword, theory of operation, operating instructions, troubleshooting, inspection, and repair. A WP is subdivided into SWPs when one division by WP is not sufficient to maintain a logical sequence of data, for clarity, or to isolate specific maintenance level requirements.

8 WP BREAKOUT.

The Alphabetical Index (WP 001 00) provides a complete list of all WPs and SWPs.

9 LOCATING INFORMATION.

The Numerical Index of Effective Work Packages lists, in numerical order, all WPs and SWPs contained in this manual and provides the model application for each WP/SWP. The Alphabetical Index WP lists, in alphabetical order, all WPs and SWPs contained in this manual. Each WP/SWP contains a table of contents which lists all procedures contained in that WP/SWP. Reference to paragraphs, tables, or figures within a WP are made by number, e.g. "paragraph 7, table 2, or figure 3." A reference to another WP merely includes the WP or SWP number, e.g., "WP 004 00 or SWP 004 01." To find a particular procedure or topic, it is necessary to refer to that WP or SWP.

## 10 LEADING PARTICULARS.

Due to the nature and geographic diversity of each site, it would be impractical to list all leading particulars in this manual. Wherever possible those items with a high probability of site specific installation will be identified by the words, "if applicable".

## 11 PRINCIPLES OF OPERATION.

11.1 Description. The Air Force Aircraft Fire Training Facility is a generic site adaptable design. The design incorporates a lined burn area and conservation pond for water conservation and recycling, a pneumatic emergency shut-down system, an ignition system, and a liquid propane fuel system. A view of a generic facility is shown in Figure 1. The design provides quality training to maintain firefighting proficiency while meeting all necessary operational and safety standards.

11.2 Configuration. A 100-foot (30-meter) lined burn area with an aircraft mock-up and 10,000 water gallon (38,000 liters) liquid propane fuel tank provide the live fires necessary to simulate multi-aircraft type fires. A typical training scenario includes filling the burn area to one inch (2.54 cm) above the aggregate level, supplying propane to the burn area through underground pipes, and igniting the fuel by activating 10,000 volt, 23 milliampere, ignitors located in 15 burners. Various switches and valves located on the control stand are used to control fire(s) during training. The fully lined facility completely protects the environment from ground water contamination.

## 12 MAINTENANCE CONCEPT.

Civil Engineering or contractor personnel will maintain this facility. The replacement of valves, piping, etc., and cleaning, painting, lubricating and corrosion control will be accomplished utilizing established Civil Engineering procedures and per the manufacturer's instruction. WP 007 00 contains excavation procedures for gaining access to and subsequent back fill of underground components. Inspection criteria for specific components will be as per this manual and manufacturer's instruction.

## 13 TOLERANCES, CLEARANCES AND WEAR LIMITS.

13.1 Wear Limits. Two kinds of limits are identified, serviceable and repairable. A limit is the condition beyond which deterioration of a part necessitates repair or replacement. The SERVICEABLE LIMITS column defines the maximum departure from manufacturer's established standard that will not materially reduce the usability of the part.

If a part is within serviceable limits, no corrective action is required. The REPAIRABLE LIMITS column defines the maximum deterioration of a part from manufacturer's established standard that is repairable. If a part is within repairable limits but exceeds serviceable limits, it must be repaired in accordance with the CORRECTIVE ACTION column. If a part exceeds repairable limits, it is not repairable and must be replaced. If a part is not serviceable and not repairable, it must be replaced.

## 14 PART IDENTIFICATION.

All training facility parts must be identified at disassembly. Identification may include part number, serial number (when applicable), or physical description.

## 15 ONE TIME USE ITEMS.

The following listed items shall be considered as consumable and shall be discarded upon disassembly to prevent reuse unless manufacturer authorized rebuild/repair kits are available: Solenoids, regulators, valves, switches, and ignitors.

## 16 IMPROVEMENT REPORTS.

Recommendations proposing changes to this manual should be submitted on AFTO Form 22 in accordance with TO 00-5-1 and forwarded to HQ AFCESA/CEXF, 139 Barnes Drive Suite 1, Tyndall AFB, Florida 32403-5319.

## 17 THEORY OF OPERATION - GENERAL.

This theory of operation is based on the generic design. Individual sites' configurations may vary. The Aircraft Fire Training Facility (AFTF) consists of an aircraft mock-up, burn area, control stand, and the following systems: liquid propane fuel, cathodic protection, nitrogen and water conservation. Refer to Figure 1 for specific site configurations. General maintenance procedures are described in WP 007 00. The aircraft mock-up, located in the burn area, is constructed of uncoated/unpainted carbon steel. It is approximately 72 feet long, 25 feet high at tip of tail, with a wingspan of 72 feet. The mock-up is configured with three simulated aircraft engines, two on the high wing and one located on the vertical stabilizer. Each engine contains a burner assembly and two ignitors. The wiring to all mock-up ignitors is enclosed in water jackets to protect from extreme heat generated by ground burner fires. Water injection is located in both wing engines and at some sites in the tail engine. The wing engines also have dams and plumbing installed to simulate running fuel fires. Wheel well and auxiliary power unit fires are simulated on the high wing side of the fuselage adjacent to the inboard engine. In the interior of

the mock-up, ignitors and burners are installed to simulate cockpit, battery box, passenger compartment, and cargo fires. A water sprinkler system is installed along the top of the fuselage to cool and wash out the mock-up. An expansion joint is located midway on the fuselage to allow for expansion and contraction during training. Cutout panels are located on the left and right sides of the fuselage. These replaceable panels are constructed of 0.031 inch sheet metal. The panels are used to simulate emergency entrance into an aircraft. Two steel hinged doors are located at the left side of the fuselage and one hinged steel door is located on the right side of the fuselage. (See Figures 2, 3, 4, and 5.)

17.1 **Burn Area.** The burn area is 100 feet in diameter. It is recessed and lined with either one or two 80-mil thick high-density polyethylene (HDPE) liner(s). The liner(s) is sandwiched between 6-inch thick layers of sand and covered by an 18-inch thick layer of 1-1/2 inch rock. There are six ignitors and burners installed in the burn area to simulate exterior ground fires. The energy output, British Thermal Unit (BTU), of these six burners operated simultaneously is equal to or greater than a 100 ft. diameter JP-type fuel spill fire. The burner positioning is based on actual suitable aircraft fire events (military and civil) where the fire was found to be linear and close to the fuselage, not a circular spill. No documented evidence was found to support a circular spill fire in any survivable aircraft fire event. They are located on the left and right sides of the front fuselage, under the right and left wings, and on the left and right sides of the rear fuselage. A weir is used to maintain the proper water level in the burn area. Opening the burn area drain valve allows all the water in the burn area to drain to the water conservation pond.

17.2 **Control Stand.** Valves, regulators, solenoids, and switches used to control water, propane and ignitors during training events are located on the control stand. Pushing the emergency shutdown switch IN will deactivate all ignitors, close all coaxial and solenoid valves in propane lines to burners, and close the internal valve located on the propane tank via a pneumatic control system, if applicable. Propane and water piping, and electrical conduits from the control stand to the burn area are located in an underground HDPE lined trench. Regulators in propane lines to mock-up burners are adjusted to increase or decrease flame size and set maximum fire size for each burner. There are no regulators in lines to ground burners. All burners are equipped with pneumatically operated high-speed emergency shut off coaxial valves.

17.3 **Liquid Propane System.** The liquid propane system supplies fuel for training exercises. Propane is supplied from a 10,000 water gallon or larger tank to the various burners in the burn area through a series of pipes and valves.

It is recommended to reservice the tank when 25% of its capacity remains. (Liquid flow from the tank will stop when the tank capacity drops below 10% to 20% because the excess flow valve extends 6 to 10 inches (depending on manufacturer) up inside the tank.) A vapor return line is required to properly/completely fill the tank to 80% to 85% to avoid pumping against unnecessary vapor pressure in the tank. The tank should be reserviced to a level of 80% to 85% to provide vapor space above the liquid and prevent over-pressurizing the tank. Vapor pressure (Table 1) will vary with ambient temperature. Liquid propane has a boiling point of -44° Fahrenheit. A propane pump may be installed, in parallel to the main supply line, to obtain adequate pressure, if applicable. Safety features of the propane system are provided to stop the flow of fuel to the burners, and include a pneumatic emergency shutdown system, a manual shutdown system, and a seismic sensor shutdown system (if applicable). Pressure relief valves are installed as required by National Fire Protection Association (NFPA) Standard 58. Cathodic protection is used to protect below ground piping from corrosion.

**Table 1. Temperature and Pressure Relation**

AMBIENT TEMPERATURE	VAPOR PRESSURE POUNDS PER SQUARE INCH (PSIG)
100° Fahrenheit	196
70° Fahrenheit	127
0° Fahrenheit	30
-40° Fahrenheit	2

17.3.1 The purpose of the Liquid Propane Gas (LPG) AFTFs is to prepare and train firefighters to experience and extinguish simulated liquid fuel fires and, as an added value, different engine, landing gear, APU and four different internal aircraft fires not available with the older fossil fuel training facilities. It is the responsibility of the Training Officer and the Ignition Officer to make sure the LPG fire reacts to agent application similar to how liquid fuel fire would react under the same circumstances. This requires the manipulation of the fuel valves for the desired effect. Emphasis on the appropriate training methods of these facilities is essential for a successful training session. Trainers must make sure trainees use the appropriate agent application techniques for liquid fuel fires and not LPG fires when these scenarios are specifically selected.

17.4 Water Conservation Pond. A typical water conservation pond is a 72 feet x 72 feet square area, 9 feet deep. The pond is lined with either one or two layers of 80 mil thick HDPE. Unlike the burn area, the pond liner is not covered. A pump located in the pond is used to supply water to the training area. Pump design and location may vary.

18 AFTF MODIFICATION.

**WARNING**

No modification of any aircraft fire training facility shall be made without prior coordination and approval of the respective MAJCOM fire protection offices, HQ AFCESA/CESM (Fire Engineering), and HQ AFCESA/CEXF (Fire Operations) Division offices.

19 COMMERCIAL-OFF-THE-SHELF (COTS) TRAINING SYSTEMS.

This Technical Order does not cover the operations and maintenance of COTS products built by manufacturing firms such as ProSafe, Inc, International Code Services and Symtron Systems, Inc. Such COTS training systems shall be operated and maintained in strict accordance with the manufacturer's operations and maintenance instructions. Modification of a COTS training system shall be coordinated with and approved by the manufacturer. COTS still require approval by HQ AFCESA before being placed in service.

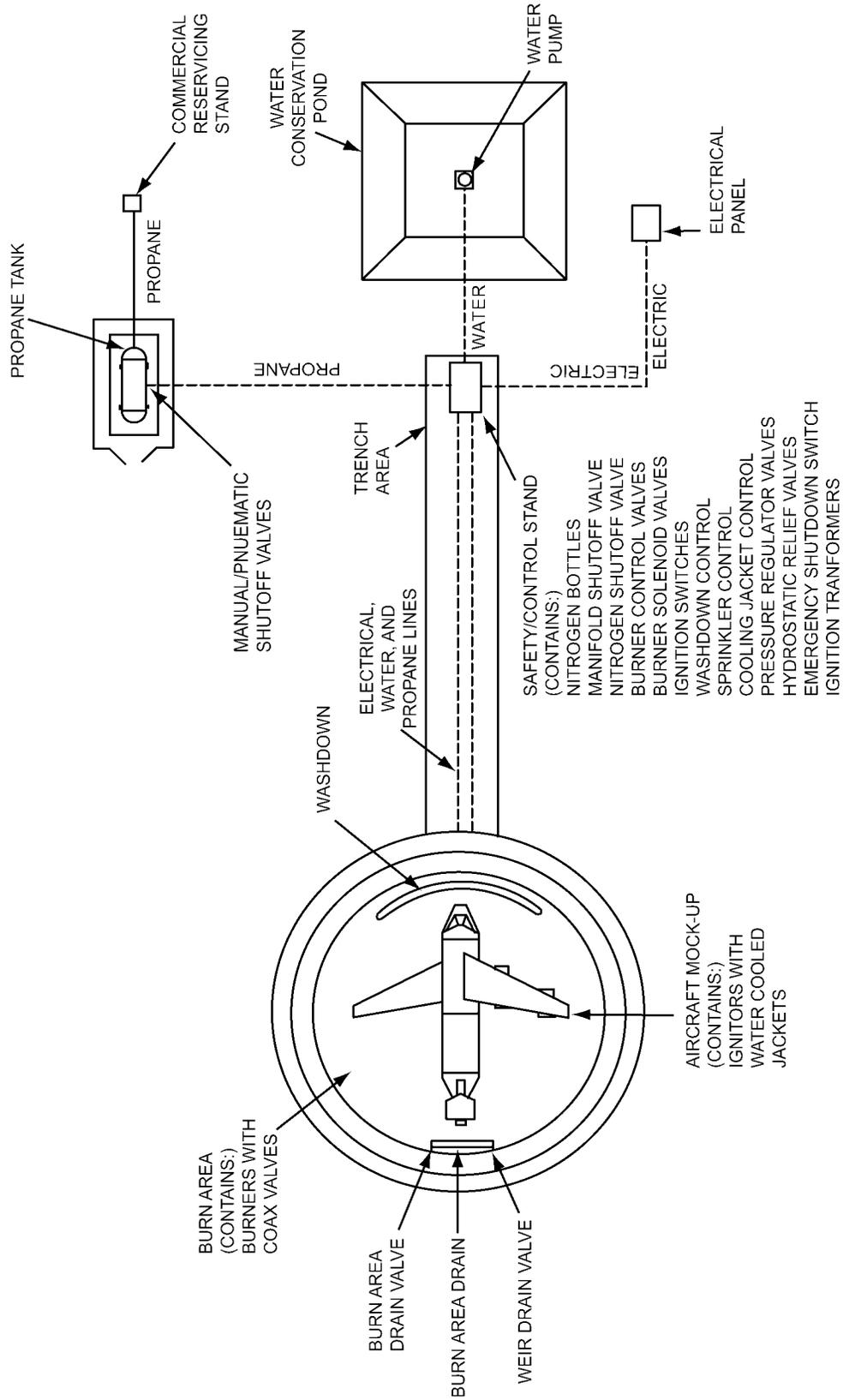
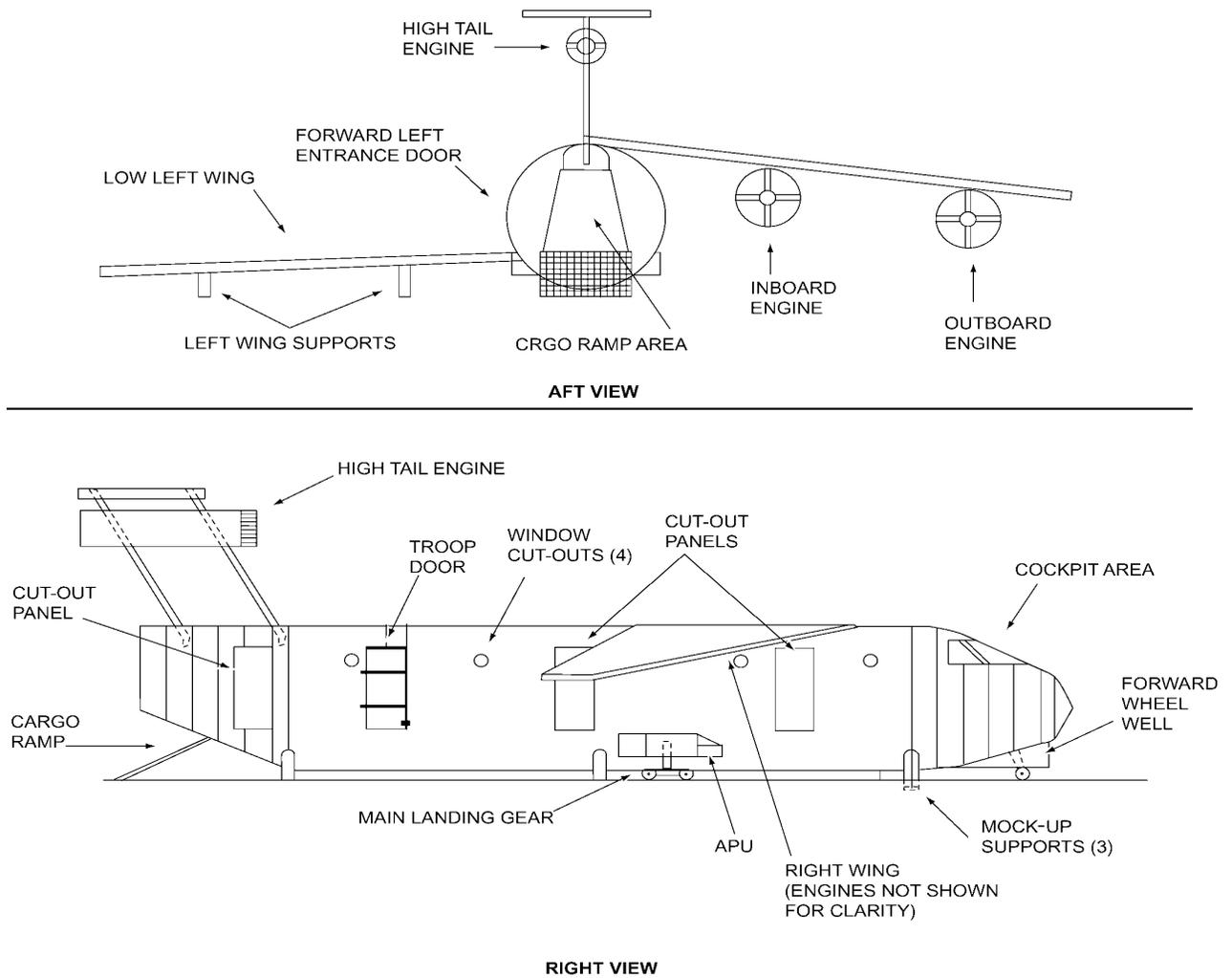


Figure 1. Generic AFTF

**NOTE**

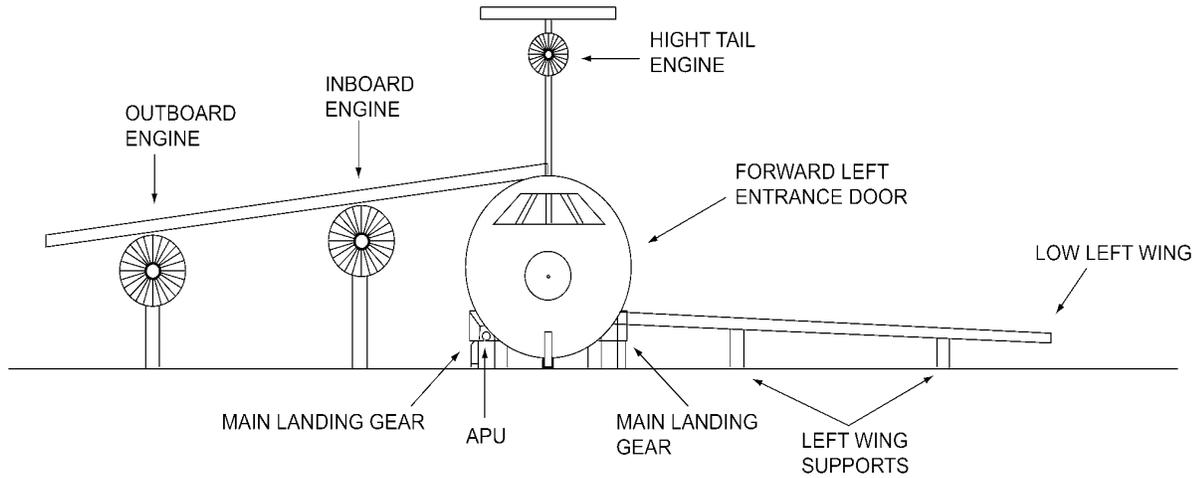
THE MOCK-UP DEPICTED IS TYPICAL, BUT NOT ALL INCLUSIVE. MOCK-UPS CAN VARY FROM ONE LOCATION TO ANOTHER.



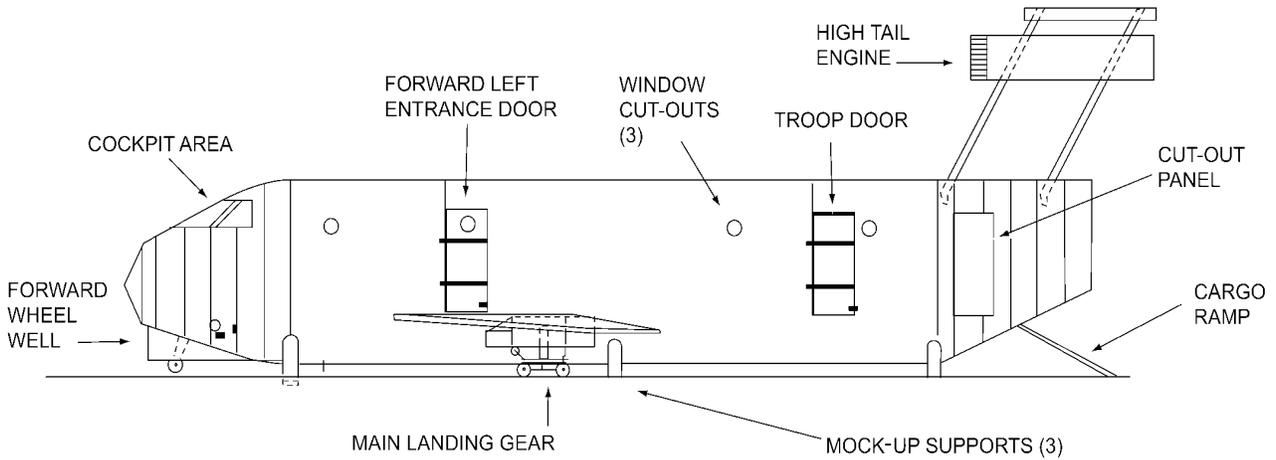
**Figure 2. Mock-up Right Side and Aft View**

**NOTE**

THE MOCK-UP DEPICTED IS TYPICAL, BUT NOT ALL INCLUSIVE. MOCK-UPS CAN VARY FROM ONE LOCATION TO ANOTHER.



**FORWARD VIEW**



**LEFT VIEW**

**Figure 3. Mock-up Left Side and Forward View**

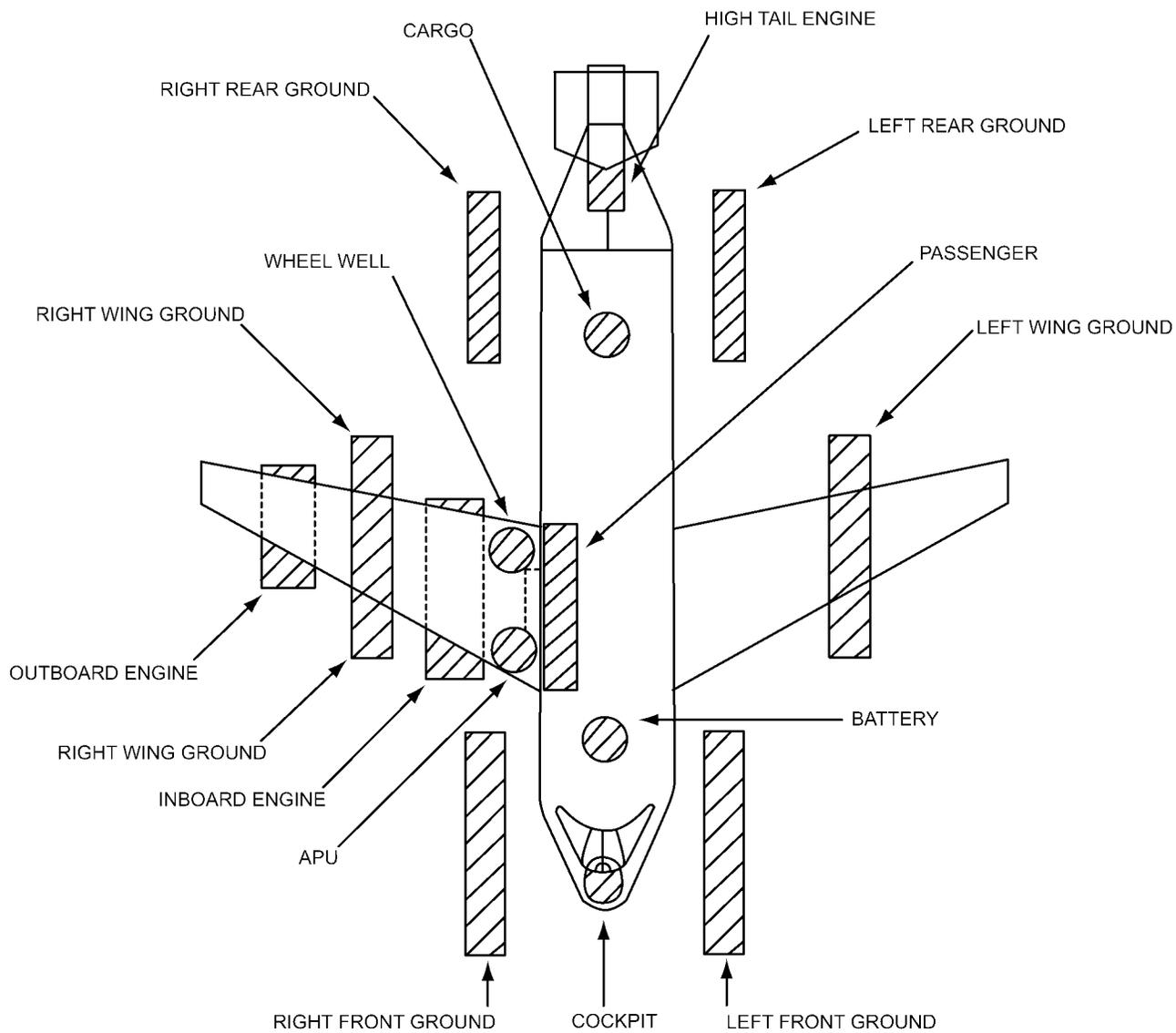


Figure 4. LPG Burner Locations

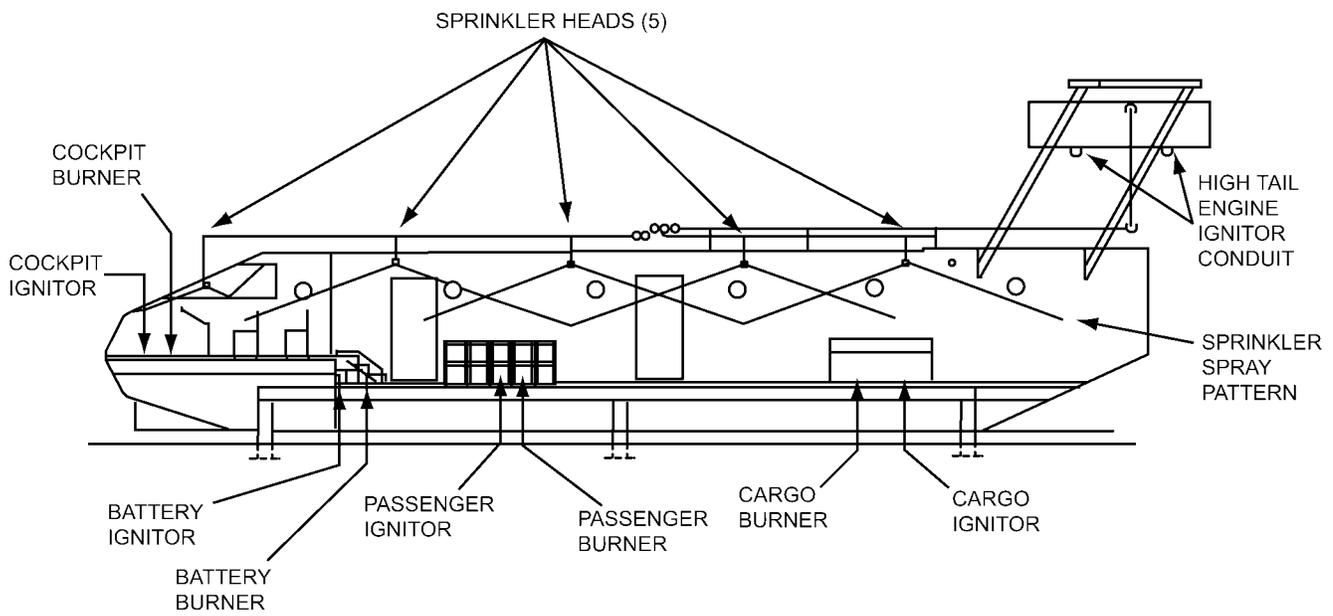


Figure 5. LPG Burner, Ignitor and Sprinkler Locations

**WORK PACKAGE**

**OPERATION AND MAINTENANCE INSTRUCTIONS**  
**MASTER LIST OF SPECIAL TOOLS, TEST EQUIPMENT AND CONSUMABLES**  
**EFFECTIVITY: AIRCRAFT FIRE TRAINING FACILITY**

**LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 6 Consisting of the Following:

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2 Master List of Test Equipment .....	2	Expendable Materials .....	3

**Table 1. Master List of Special Tools**

Part No./Specification No./NSN	CAGE Code	Figure/Index No.	Nomenclature	Use
GSE Part Number 3668 (GSE Lining Technology, Inc. 19103 Gundle Road Houston, Texas 77073)	N/A	N/A	GSE Extrusion Welder, 120V	Repair tears, holes in liner
GSE Part Number 0128 (GSE Lining Technology, Inc. 19103 Gundle Road Houston, Texas 77073)	N/A	N/A	Grinder, Black and Decker, 4 1/ 2 inch, 120V	Repair tears, holes in liner.
GSE Part Number 0127 (GSE Lining Technology, Inc. 19103 Gundle Road Houston, Texas 77073)	N/A	N/A	Hot Air Blower, 120V	Repair tears, holes in liner.

**Table 2. Master List of Test Equipment**

Part No./Specification No./NSN	CAGE Code	Figure/Index No.	Nomenclature	Use
Any manufactured gas detector capable of detecting flammable atmospheres	N/A	N/A	Flammable Gas Detector	Inspect LPG Plumbing
GSE Part Number 2999 (GSE Lining Technology, Inc. 19103 Gundle Road Houston, Texas 77073)	N/A	N/A	Vacuum Box, small	Used to Quality Check liner repairs
GSE Part Number 2938 (GSE Lining Technology, Inc. 19103 Gundle Road Houston, Texas 77073)	N/A	N/A	Portable Electric Vacuum Pump with Hose	Used to Quality Check liner repairs

**Table 3. Master List of Consumable Items and Expendable Materials**

Nomenclature	Specification/Part No./NSN	CAGE Code	Use	Reference
Door Panels 36" x 84" 26 gauge (sheet metal cutout panels on mock up)	N/A	N/A	Practice cut-in and skin penetration with appropriate tools.	N/A
Lock out tags	N/A	N/A	Lock out inoperable components.	WP 004 00: 6.g WP 005 00: 2. Caution SWP 005 01: 2. Caution SWP 005 02: 1.e
Propane Liquid Propane Gas	BB-G-110A Type II NSN 6830-00-261-7445	81348	Fuel.	WP 002 00: 11.1, 11.2, 17 WP 010 00: 1.
Nitrogen	BB-N411C Type 1, Grade A, Class 1, NSN 6830-00-656-1596 (231 SCF)	81348	Powers emergency shutdown system.	WP 002 00: 17.3 WP 005 00: 1.c, 1.l, 1.q, 2.e, 2.f, 4.h SWP 005 01: 1.c, 1.k, 1.n, 2.c, 2.d, 4.f WP 006 00: 1.i, 1.o WP 009 00: 2.m, 2.v, 4.f
N <sub>2</sub> Bottle Cylinder, Com- pressed Gas	RR-C-901 and 901/1 NSN 8120-00-985-7275 or 8120-00-286-8592 (200 cu. ft.)	81348	Powers emergency shutdown system.	WP 005 00: 1.q SWP 005 01: 1.n
Jet Fuel, (JP-8) (JET A-1 ASTMD 1655)	MIL-T-83133D NSN 9130-01-031-5816	81349	Turbine Fuel. (Thule/Goodfellow only)	WP 009 00: 2.c, 2.j, 3.i, 3.l.c WP 010 00: 8., 8.2, 8.3, 8.4
Ignition Cable	NSN 6145-00-197-8166 or 6145-00-845-1861 MIL-C-3702-U5MC and MIL-C-3702-U7MC	81349	Connects ignition transformer to ignitor.	SWP 007 01: 1. Note
Ignitor (3 Electrodes)	NSN: None Assigned Champion CH31917	11583	Ignites fuel.	WP 007 00: Figure 5
Ignitor (Mushroom Tip Electrode)	NSN None Assigned ICS Int'l Code Services 7860030	11583	Ignites fuel.	WP 007 00: Figures 3 and 4
Pigtail	Champion 204085	N/A	Connects ignition cable to ignitor. (Unique to AF Fire Trainers)	WP 007 00: 1.c, Table 2, Figure 2, Figure 6 SWP 007 01: 1.j
Ignition Transformer	NSN 5950-00-962-9875 Illinois Capacitor Inc. 638-171 NSN 5950-00-243-1603 Dongan Elec. Manf. Co. A10-LA2	N/A	Step up transformer secondary power for ignitors 10 KV 23 MAmp. (Secondary can not exceed 23 MAmp)	WP 007 00: Table 2 SWP 007 01: 1. Note, 1.h, 1.i SWP 010 01: 1.u, 2.c

Table 3. Master List of Consumable Items and Expendable Materials - Continued

Nomenclature	Specification/Part No./NSN	CAGE Code	Use	Reference
Water Pump *	Goulds Gorman-Rupp (or equal)	N/A	300 gallon per minute or greater. Supplies water to emergency sprinkler system, washout system, water jackets & cooling system. TDH (PT): 75, HP: 15	WP 005 00: 2.b SWP 005 02: 1.c, 2.a WP 007 00: 8 WP 010 00: 4.f, 4.j, 6.d, 6.g SWP 010 01: 1.a, 1.i, 1.l, 1.p, 1.t
COAX Valve 3/4" Brass Steel 316 Stainless	VMK202C140VTN3/4ZX7G1A VMK202C240VTN3/4ZX7G1A VMK202C640VTN3/4ZX7G1A	N/A	Normally closed coaxial valves. High speed emergency propane shut-off. (no substitution permitted)	WP 006 00: Table 1 WP 007 00: Table 2
COAX Valve 1" NPT Brass Steel 316 Stainless	VMK252C140VTN1ZX7G1A VMK252C240VTN1ZX7G1A VMK252C640VTN1ZX7G1A	N/A	Normally closed coaxial valves. High speed emergency propane shutoff. (no substitution permitted)	WP 006 00: Table 1 WP 007 00: Table 2
COAX Valve 3/4" Flanged Steel 316 Stainless	VFK202C240VTA3/4ZX7G1A VFK202C640VTA3/4ZX7G1A	N/A	Normally closed coaxial valves. High speed emergency propane shutoff. (no substitution permitted)	WP 006 00: Table 1 WP 007 00: Table 2
COAX Valve 1" Flanged Steel 316 Stainless	VFK252C240VTA1ZX7G1A VFK252C640VTA1ZX7G1A	N/A	Normally closed coaxial valves. High speed emergency propane shutoff. (no substitution permitted)	WP 006 00: Table 1 WP 007 00: Table 2
Pilot Valves	Norgren PVAF 1024C ASCO 8344G74 (or equal)	1NGM3 1HAR9	4 way valve. High speed emergency propane shut-off. Control COAX valves.	WP 007 00: Table 2 SWP 007 01: 1. Note, 2.d
Solenoid Valves	ASCO 8210G3B (or equal) ICS 6301559 (or equal)	1HAR9	2 way valve switch. Interlock with ignitor.	WP 002 00: 17.2 WP 007 00: Table 2 SWP 007 01: 2.c WP 009 00: 3.i, 3.j WP 010 00: 8.3
Liquid Propane Regulators	Fisher 627 Series Rego 1586Y (or equal)	26819	Liquid propane pressure/flow control. Controls flame height.	WP 002 00: 15, 17.2 WP 005 00: 1.c, 1.l SWP 005 01: 1.c, 1.k WP 006 00: 1.i, 1.j WP 009 00: 2.m, 5 WP 010 00: 3.c, 3.e
Heat Shrink Tubing	Mil-1-23053/S Class 1	N/A	Plastic protective tubing. Protects ignitor pigtail.	WP 007 00: Table 2, Figure 6
Teflon Tubing	Mil-1-22129	N/A	Teflon protective tubing. Protects ignitor cable.	WP 007 00: Table 2, Figure 6

\* See footnote at end of table

**Table 3. Master List of Consumable Items and Expendable Materials - Continued**

Nomenclature	Specification/Part No./NSN	CAGE Code	Use	Reference
Solder	Sn63	N/A	Joins ignitor cable splice.	WP 007 00: Table 2, Figure 6
RTV Adhesive	G.E. #122, 6702 (or equal)	N/A	Pasty adhesive. Covers ignitor pigtail splice, teflon tubing, cable, and solder splice.	WP 007 00: Table 2, Figure 6
Ball Valves 3/4" and 1"	Conbraco 83-500 and 86-500 (or equal)	72219	3-Piece high pressure full port ball valve. Propane flow control valve.	WP 004 00: 7.c.(2), 7.c.(3)(a) WP 005 00: 3.d.(2), 3.d.(3)(a) SWP 005 01: 3.d.(2), 3.d.(3)(a) WP 007 00: 10, 10 Note 1, 10.a, 10.b, 10.c, Figure 10 SWP 007 01: 2 WP 009 00: 3.c, 3.g WP 010 00: 8.2
Remote Emergency Stop (ESTOP) Transmitter	NSN Non Assigned Remtron Model 22T09 900 MHz radio remote control transmitter for use in electrically Classified areas (Class 1 group D)	N/A	Activate emergency shutdown/stop fuel flow	WP 007 00: Figure 14
Remote Emergency Stop (ESTOP) Receiver/Relay	NSN Non Assigned Remtron Model 22R04 900 MHz radio remote control receiver and relay in a NEMA 9 for use in electrically classified areas (Class 1 group D)	N/A	Activate emergency shutdown/stop fuel flow	WP 007 00: Figure 14
	NSN Non Assigned Remtron Model 22R04 900 MHz radio remote control receiver and relay in a NEMA 4 enclosure for use in electrically unclassified areas.	N/A	Activate emergency shutdown/stop fuel flow	WP 007 00: Figure 14

\* The water pump shall be equipped with a seal leak detection probe and warning control system.



**WORK PACKAGE**

**OPERATION AND MAINTENANCE INSTRUCTIONS**

**SAFETY AND ACCIDENT PREVENTION**

**EFFECTIVITY: AIRCRAFT FIRE TRAINING FACILITY**

**LIST OF EFFECTIVE WP PAGES**

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**LIST OF ILLUSTRATIONS**

NONE

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NONE

**REFERENCE MATERIAL REQUIRED**

DOCUMENT NUMBER	TITLE
TO 00-105E-9	Aerospace Emergency Rescue And Mishap Response Information (Emergency Services)
AFM 91-201	Explosive Safety Standards
NFPA 1500	Standard on Fire Department Occupational Safety and Health Program

**APPLICABLE TCTOS**

NONE

**CONSUMABLE MATERIALS**

NONE

**APPLICABLE SUPPORT EQUIPMENT**

NONE

**ILLUSTRATED SUPPORT EQUIPMENT**

NONE

**FOREWORD**

This work package contains setup and operating procedures for the Aircraft Fire Training Facility (AFTF) in all climatic conditions and the AFTF is not winterized. These proce-

dures include pre-exercise inspection, pre-exercise setup, training exercise, and system shutdown and clean up.

## 1 GENERAL.

Safety requirements will be complied with during all operations. All personnel engaged in operations involving hazardous material shall be thoroughly trained in safety. They shall be capable of recognizing hazardous situations and conditions. Thinking safety and working safely must become a habit when working with or near items that can create a hazard because of their explosive, thermal, flammable, or toxic characteristics.

1.1 Hazardous Materials. When an abnormal condition is noted and procedures are not available in this manual, training shall be stopped and authorized personnel shall be called for help in eliminating the hazard. Operations shall not be resumed until the hazard has been eliminated. Hazardous material information can be found in TO 00-105E-9, Chapter 3 and hazardous material publications used to determine relative toxicity, flammability, thermal stability, permissible extinguishing agents and other pertinent data for a given substance.

1.2 Protective Clothing. Once firefighters enter the burn area, no additional fires shall be ignited. Protective clothing in accordance with National Fire Protection Association (NFPA) 1971, 1972, 1973, 1974, and 1976 shall be used to prevent burns from extensive heat and hot surfaces. Self Contained Breathing Apparatus (SCBA) shall be worn for all fires.

## 2 REQUIREMENTS.

The explosive safety standards of AFM 91-201, Air Force Occupational Safety and Health (AFOSH) and NFPA 1500 Fire Department Occupational Safety and Health Program standards will be followed. Lack of a safety requirement in this TO or the above reference does not indicate that no safeguards are needed. If a dangerous situation is encountered, other than expected dangers addressed during the exercise pre-brief, all operations shall be terminated. Personnel shall evacuate the training area. Authorized personnel shall be notified to correct hazard. Operations shall not be resumed until the hazard has been eliminated.

## 3 ABNORMAL CONDITIONS.

When an abnormal condition is noted and correction procedures are not available in this manual, training shall be terminated. Personnel will be evacuated from the training area. Authorized personnel shall be notified to eliminate the hazard. Operations shall not be resumed until the hazard has been eliminated.

## 4 EXPLOSIVE HAZARDS.

Liquid propane used in the facility is a potential explosive. If hazardous conditions are encountered all operations shall be terminated. Personnel will be evacuated to a safe site. Authorized personnel shall be called to eliminate the hazard. Operations shall not resume until the hazard has been eliminated.

## 5 RESUSCITATION.

Personnel working with or near high voltage equipment should be familiar with modern methods of resuscitation. Such information can be obtained from the base medical facility.

## 6 EMERGENCY PROCEDURES.

The procedures under this heading shall be used in case of an emergency. Personnel directly and indirectly related to any training exercise using the Aircraft Fire Training Facility shall be thoroughly familiar with the procedures contained herein. During any phase of training, if an unsafe or emergency condition is observed, any member of the training evolution can declare an emergency. Upon declaration of an emergency, the Ignition Officer on the control stand shall perform the following:

- a. PUSH emergency shutdown switch IN. (Off position)
- b. CLOSE all burner control ball valves.
- c. Position all ignitor switches to OFF.
- d. Verify that all personnel have evacuated the burn area.
- e. Notify appropriate agency for correction of problem.
- f. Tag inoperable components out of service, if applicable.
- g. If emergency shut down was initiated while burners are operating, LPG will be trapped in lines from the control stand ball valves to individual burner emergency shutdown coaxial valves. These lines shall be purged prior to troubleshooting/maintenance actions. Under these conditions, the Ignition Officer on the control stand shall perform the following:
  - (1) Position appropriate ignitor switch to the ON position.
  - (2) PULL emergency shutdown switch OUT.

- (3) Allow trapped LPG to burn off.
- (4) Position appropriate ignitor switch to the OFF position.
- (5) PUSH emergency shutdown switch IN.

**NOTE**

Tag and lock out valves and switches to any inoperable burners or ignitors.

7 PROCEDURES.

**WARNING**

- Extremely high temperatures and hot surfaces will be encountered during training exercises. It is imperative to wear appropriate protective clothing. Failure to comply may cause serious injury or death to personnel. SCBA shall be utilized for all exercises.
- While attempting to ignite fires, flames should be present within a reasonable time (5-10 seconds), if not, close manual propane valve(s), shut off appropriate ignitors, and allow LPG in burn area to dissipate before attempting re-ignition. Failure to comply could pose a serious risk of explosive gas build-up.
- If firefighters extinguish any fires while LPG is flowing to burner(s), push emergency shutdown switch IN, close all burner control ball valves, and turn all ignitor switches to OFF.
- Make sure ignitor-cooling water jackets are properly operating.
- All distractions during all training exercises are strictly prohibited. Any type of distraction can cause inattention to detail with personnel engaged in the training exercise. With LP-gas flowing and fire present, personnel may inadvertently be injured, burned, or both, resulting in extreme burns or death.

7.1 Training Instructor. Training Instructor responsibilities include:

- a. Shall be in control of the training exercise and have sole responsibility for the training exercise, to include all students, instructors and equipment. Dedicated radio communication shall be established between Training Instructor in Charge, Safety Officer, and Ignition Officer.
- b. Shall confirm all Pre-Exercise Inspection and Set Up procedures have been completed.
- c. Shall pre-brief, assign personnel duties, initiate, oversee, evaluate, terminate, and de-brief the training exercise.

7.2 Safety Officer. Safety Officer responsibilities include:

- a. Shall make sure the Ignition Officer has properly configured the control stand for emergency shutdown and normal operation.
- b. Shall report to the Training Officer in Charge that the training exercise may commence.

**NOTE**

Pre-burn time will not exceed 3 minutes (180 seconds) during warm or cold weather and with the beginning of fire suppression operations. If these times are exceeded, execute normal shut down, wait at least 5 minutes and resume training. Actual exercise burn time will be determined by the Training Instructor in Charge. After manual control valves are closed, fire will burn an additional 15 to 25 seconds.

7.2.1 At the prompt of the Training Instructor in Charge, the Ignition Officer shall:

- a. Slowly open the propane manifold shutoff valve.
- b. Ignite selected burners by activating the appropriate ignitor switch and slowly opening the corresponding burner control ball valve until flame is present. Repeat steps until all required burners are ignited.
- c. Exercise Shut Down Procedures:
  - (1) Close burner control ball valve(s).
  - (2) Position all ignitor switches to OFF.

7.3 Ignition Officer. The responsibilities of the Ignition Officer include:

**WARNING**

All distractions during all training exercises are strictly prohibited. Any type of distraction can cause inattention to detail with personnel engaged in the training exercise. With LP-gas flowing and fire present, personnel may inadvertently be injured, burned, or both, resulting in extreme burns or death.

- a. Ensuring the elimination of all distractions.
- b. Termination of the training exercise if a distraction presents itself.

7.4 Training Disciplines. All Officers and Instructors responsibilities include:

**WARNING**

- No one other than the Ignition Officer and Ignition Officers in training are permitted on the Control Stand during the training exercise in order to maintain proper discipline and be wholly dedicated to the training exercise. Inattention to this warning can cause injury or death to personnel participating in the training event.

- Distractions that are strictly prohibited are: cell phones of any type; pagers; radios turned to frequencies other than the training exercise; and any other devices that may distract the attention of the Ignition Officer.

- a. Ensuring only specified personnel are present on the Control Stand.
- b. Terminating the training exercise if incorrect personnel are present on the Control Stand and/or a distraction presents itself.

8 AFTF MODIFICATION.

**CAUTION**

No modification of any AFTF shall be made without prior coordination and approval of the respective MAJCOM fire protection offices, HQ AFCESA/CESM (Fire Engineering), and HQ AFCESA/CEXF (Fire Operations) Division offices.

9 COMMERCIAL-OFF-THE-SHELF (COTS) TRAINING SYSTEMS.

This TO does not cover the operations and maintenance of COTS products built by manufacturing firms such as Pro-Safe, Inc., International Code Services and Symtron Systems, Inc. Such COTS training systems shall be operated and maintained in strict accordance with the manufacturer's operations and maintenance instructions. Modification of a COTS training system shall be coordinated with and approved by the manufacturer. COTS still require approval by HQ AFCESA before being placed in service.



**WORK PACKAGE**

**OPERATION AND MAINTENANCE INSTRUCTIONS**  
**STANDARD OPERATING PROCEDURES**  
**EFFECTIVITY: AIRCRAFT FIRE TRAINING FACILITY**

**LIST OF EFFECTIVE WP PAGES**

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**LIST OF ILLUSTRATIONS**

NONE

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NONE

**REFERENCE MATERIAL REQUIRED**

DOCUMENT NUMBER	TITLE
WP 004 00	(Paragraph 6-7) Emergency Procedures

**APPLICABLE TCTOS**

NONE

**CONSUMABLE MATERIALS**

NONE

**APPLICABLE SUPPORT EQUIPMENT**

NONE

**ILLUSTRATED SUPPORT EQUIPMENT**

NONE

## FOREWORD

This work package contains setup and operating procedures for the Aircraft Fire Training Facility (AFTF) in all climatic conditions and the AFTF is not winterized. These proce-

dures include pre-exercise inspection, pre-exercise setup, training exercise, and system shutdown and clean up.

## SAFETY SUMMARY

Various steps in this work package may require personnel to be exposed to extremely high temperatures, open flames, liquid propane vapor and fumes, and hot surfaces. It is imperative to wear appropriate protective clothing and to be aware of the EMERGENCY PROCEDURES in Work Package 004 00, paragraphs 6 and 7. High voltage will be present

at burn area ignitors. All personnel shall remain clear of ignitors while in use. Failure to comply may cause serious injury. Use of Self Contained Breathing Apparatus (SCBA) is required for all fires. Exposed skin areas may result in burns by heat/steam.

1 PRE-EXERCISE INSPECTION.

**WARNING**

If an obvious unsafe or unserviceable condition is noted, halt operations and rectify condition prior to proceeding. Failure to halt and correct conditions may cause injury or death to personnel.

**CAUTION**

- The entire training facility is a no smoking area.
- Make sure propane tank level is sufficient for scheduled training exercise. Re-service tank, as required.

Pre-exercise procedures shall be performed by the following authorized personnel immediately prior to commencement of training exercise: Training Instructor In Charge, Safety Officer, and Ignition Officer.

- a. Inspect the propane storage tanks, associated gauges, piping and valves.

**WARNING**

Gloves and face shield shall be worn during Roto Gauge operation.

- b. Take tank level reading. Accurate tank level readings can be obtained using the tank Roto Gauge. To read the gauge:
  - (1) Rotate the lever to the 12 o'clock position.
  - (2) Open the petcock valve on the end of the gauge, cold propane vapor will escape.
  - (3) Turn the lever to the left or right slowly until liquid propane escapes through the open petcock. The corresponding reading on the gauge under the lever is the percentage of LPG in the storage tank.
  - (4) Close the petcock valve.
  - (5) Return the lever to the 12 o'clock position.

- c. Inspect the control stand/mock-up to include electrical and mechanical components, piping, valves, regulators, and nitrogen system.
- d. Inspect burn area. Make sure rock is level.
- e. Make sure rock level is no higher than top of weir.
- f. Make sure burn area drain valve inside weir is closed and weir drain valve outside of weir is open.

**NOTE**

This is the normal position for the valve during warm weather operations.

- g. Inspect exterior and interior burners and ignitors, and make sure that burner grates are not excessively corroded or warped and ignitor protective covers and burner baffles are in place.
- h. Inspect mock-up. Make sure expansion joint bolts are finger tight. Inspect mock-up doors for freedom of operation and excessive corrosion.
  - i. Inspect fuel, water piping and water jackets.
  - j. Inspect drive around burn area for ruts. Level all ruts before proceeding.
  - k. Inspect exterior lighting for proper operation, if applicable.
  - l. Inspect propane system to include tank, gauges, valves, piping, nitrogen system, and regulators. Notify appropriate personnel to repair leaks before proceeding with any training exercise.
  - m. Inspect control stand electrical, piping, valves, and regulators. Examine for corrosion, wear, and serviceable limits. Make sure that all valves are closed and all switches are off.
  - n. Inspect water conservation pond area. Check visible portion of liner for damage. Make sure pump is completely submerged and sufficient water is available to complete training exercise. Remove debris that may cause damage to pump.
  - o. On electrical service rack, position all main circuit breakers to ON.
  - p. Open the appropriate water valves and apply power to water conservation pond pump and test for adequate

water pressure. Close valves when testing is complete. Low water pressure may indicate pump malfunction or unseated pump housing.

- q. Inspect nitrogen bottle(s), gauge(s), valve(s) and line(s) for serviceability. Make sure adequate nitrogen pressure is available before operating facility.

## 2 PRE-EXERCISE SETUP.



The entire training facility is a no smoking area.

These procedures shall be performed by the following authorized personnel immediately prior to commencement of training exercise: Training Instructor in Charge, Safety Officer, and Ignition Officer.

- a. Configure mock-up for exercise scenario.
- b. Check water pump circuit breaker at water conservation pond is in the ON position.
- c. Check fire department connection is closed (if provided).
- d. Position master power switch to ON.
- e. Open valves on nitrogen cylinder(s). Make sure system vent valve is closed. A minimum of 500 psi is required to make sure emergency shut down valves work properly.
- f. Pre-charge nitrogen system to 60 to 120 psi.
- g. Check all water drain valves are closed.
- h. Position water conservation pond pump switch to ON.
- i. Open washdown system and bring water level to top of weir drain. Make sure water level covers ground burner grates but is 1 to 2 inches below ground burner ignitor tips. Turn washout off when water level begins to flow into weir drain.
- j. Open ignitor cooling water jacket control valve on the control stand. Make sure water continuously flows to all water jackets on the mock-up.
- k. Slowly open globe valve in LPG line from propane tank to control stand.

## NOTE

Rapidly opening the globe valve may cause the excess flow valve inside the tank to operate and shut off all propane flow.

1. Pull emergency shutdown switch OUT.



Tag and lock out valves and switches to any inoperable burners or ignitors.

- m. Check for proper ignitor operation by firing each ignitor in turn.
- n. Slowly open LPG manifold shutoff valve on control stand.

## 3 TRAINING EXERCISE.

### WARNING

- Extremely high temperatures and hot surfaces will be encountered during training exercise. It is imperative to wear appropriate protective clothing. Failure to comply may cause serious injury or death to personnel. SCBA shall be utilized for all exercises.
- While attempting to ignite fires, flames should be present within a reasonable amount of time (5-10 seconds), if not, close manual propane valve(s), shut off appropriate ignitors, and allow LPG in burn area to dissipate before attempting re-ignition. Failure to comply could pose a serious risk of explosive gas build-up.
- Make sure ignitor-cooling water jackets are properly operating prior to igniting ground fires. Failure to comply will result in damage to equipment and pose a hazard to personnel.
- The following are considered abnormal conditions and/or emergency situations requiring activation of the system E-Stop switch for emergency shutdown anytime a firefighter: appears to have blown out or extinguished the fire; fails to follow any direction of the Instructor-in-Charge or the Safety Officer; falls down inside

the AFTF; or enters inside the AFTF standing completely upright with fire operating.

- Since the fires are intended to simulate a solid object fire event, the following actions are inappropriate and constitute an emergency condition requiring activation of the system E-Stop switch for emergency shutdown anytime the nozzle or any firefighter including his PPE: breaks the vertical plane of the cargo box; breaks the plane of the control surfaces in the cockpit; breaks the plane of any passenger fire burner shield or the area above the burner itself; breaks either end plane of an engine; enters the area under the cockpit stairs; enters the area under the passenger seats or breaks the plane of the front surface of the passenger seat backs; enters an area above an operating burner; or enters the area directly below the APU or Wheel fire when the burner is operating.

- a. The Training Instructor in Charge shall be in control of the training exercise. Dedicated radio communication shall be established between Ignition Officer, Training Instructor in Charge, and Safety Officer.
- b. The Training Instructor in Charge shall confirm all Pre-Exercise Inspection and Set Up procedures have been completed.
- c. The Training Instructor in Charge initiates, oversees, and terminates the training exercise.

#### NOTE

Pre-burn time will not exceed 3 minutes (180 seconds). Actual exercise burn time will be determined by the Training Instructor in Charge. After manual control valves are closed fire will burn an additional 15 to 25 seconds.

- d. At the prompt of the Training Instructor in Charge, the Ignition Officer shall:
  - (1) Slowly open the propane manifold shutoff valve.
  - (2) Ignite selected burners by activating the appropriate ignitor switch and slowly opening the corresponding burner control ball valve until flame is present. Repeat steps until all required burners are ignited.
  - (3) Exercise Shut Down Procedures (At prompt of the Training Instructor in Charge):

- (a) Close individual burner control ball valve(s).
- (b) Visually confirm all flames are extinguished.
- (c) Position all ignitor switches to OFF when all burner control valves have been closed.

#### 4 SYSTEM SHUTDOWN AND CLEAN UP.

When training is complete the Training Instructor in Charge shall direct the Ignition Officer to:

- a. Close manifold shutoff valve.
- b. Burn off all gas in the propane manifold by activating selected ignitors and opening corresponding burner control ball valves.
- c. Once fire has burned out, close all LPG burner control ball valves.
- d. Position all ignitor switches to OFF.
- e. Determine the area is safe.
- f. Push emergency shutdown switch into the OFF position.
- g. Activate sprinkler and make sure ignitor cooling water jackets-remain ON while mock-up cools for a minimum of 15 minutes.

#### NOTE

The sprinkler system shall run for a minimum of 15 minutes after the last fire event. Washdown and flushing the AFTF for a minimum of 1 hour clears unburned hydrocarbons and residue from the burn area and assists in maintaining suitable water quality. Facilities experiencing algae growth or blooms will need additional flushing time. Stagnant water promotes the growth of algae.

- h. Close globe valve in line from propane tank to control stand.
- i. Close valves on nitrogen system cylinders.
- j. Activate washdown system to flush burn area for a minimum of 1 hour.
- k. Position master power switch to OFF.
- l. Position all circuit breakers to OFF on electrical service rack.
- m. Level drive around area.



**SUBORDINATE WORK PACKAGE**

**OPERATION AND MAINTENANCE INSTRUCTIONS  
WINTERIZED FACILITY OPERATING PROCEDURES  
EFFECTIVITY: AIRCRAFT FIRE TRAINING FACILITY**

**LIST OF EFFECTIVE WP PAGES**

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NONE

**LIST OF TABLES**

NONE

**REFERENCE MATERIAL REQUIRED**

DOCUMENT NUMBER	TITLE
WP 004 00	(Paragraph 6-7) Emergency Procedures

**APPLICABLE TCTOS**

NONE

**CONSUMABLE MATERIALS**

NONE

**APPLICABLE SUPPORT EQUIPMENT**

NONE

**ILLUSTRATED SUPPORT EQUIPMENT**

NONE

## **FOREWORD**

This work package contains setup and operating procedures for the Aircraft Fire Training Facility (AFTF) to be followed during the times the facility is winterized. These procedures

include pre-exercise inspection, pre-exercise setup, training exercise, system shutdown and clean up.

## **SAFETY SUMMARY**

Various steps in this work package may require personnel to be exposed to extremely high temperatures, open flames, liquid propane vapor and fumes, and hot surfaces. It is imperative to wear appropriate protective clothing and to be aware of the EMERGENCY PROCEDURES in Work Package 004 00, paragraphs 6 and 7. High voltage will be present

at burn area ignitors. All personnel shall remain clear of ignitors while in use. Failure to comply may cause serious injury. Use of Self Contained Breathing Apparatus (SCBA) is required for all fires. Exposed skin areas may result in burns by heat/steam.

1 PRE-EXERCISE INSPECTION.

**WARNING**

If an obvious unsafe or unserviceable condition is noted, halt operations and rectify condition prior to proceeding. Failure to halt and correct conditions may cause injury or death to personnel.

**CAUTION**

- The entire training facility is a no smoking area.
- Make sure propane tank level is sufficient for scheduled training exercise. Reservice tank, as required.

**NOTE**

Ground, wheel well, and APU burners will not be used during cold weather operations. Only engine and interior burners will be used during winter operations.

Pre-exercise procedures shall be performed by the following authorized personnel immediately prior to commencement of training exercise: Training Instructor in Charge, Safety Officer, and Ignition Officer.

- a. Inspect the propane storage tanks, associated gauges, piping and valves.

**WARNING**

Gloves and face shield shall be worn during Roto Gauge operation.

- b. Take tank level reading. Accurate tank level readings can be obtained using the tank Roto Gauge. To read the gauge:
  - (1) Rotate the lever to the 12 o'clock position.
  - (2) Open the petcock valve on the end of the gauge, cold propane vapor will escape.

- (3) Turn the lever to the left or right slowly until liquid propane escapes through the open petcock. The corresponding reading on the gauge under the lever is the percentage of LPG in the storage tank.
  - (4) Close the petcock valve.
  - (5) Return the lever to the 12 o'clock position.
- c. Inspect the control stand/mock-up to include electrical and mechanical components, piping, valves, regulators, and nitrogen system.
  - d. Inspect burn area. Make sure rock is level.
  - e. Make sure rock level is no higher than top of weir.
  - f. Inspect exterior and interior burners and ignitors, and make sure that burner grates are not excessively corroded and ignitor protectors are in place.
  - g. Inspect mock-up. Make sure expansion joint bolts are finger tight. Inspect mock-up doors for freedom of operation and excessive corrosion.
  - h. Inspect fuel, water piping and water jackets.
  - i. Inspect drive around area for ruts. Level all ruts before proceeding.
  - j. Inspect exterior lighting for proper operation, if applicable.
  - k. Inspect propane system to include tank, gauges, valves, piping, nitrogen system, and regulators. Notify appropriate personnel to repair leaks before proceeding with any training exercise.
  - l. Inspect control stand electrical, piping, valves, and regulators. Examine for corrosion, wear, and serviceable limits. Make sure that all valves are closed and all switches are off.
  - m. On electrical service rack, position all main circuit breakers to ON.
  - n. Inspect nitrogen bottle(s), gauge(s), valve(s) and line(s) for serviceability. Make sure adequate nitrogen pressure is available before operating facility.

2 PRE-EXERCISE SETUP.



The entire training facility is a no smoking area.

These procedures shall be performed by the following authorized personnel immediately prior to commencement of training exercise: Training Instructor in Charge, Safety Officer, and Ignition Officer.

- a. Configure mock-up for exercise scenario.
- b. Position master power switch to ON.
- c. Open valves on nitrogen cylinder(s). Make sure system vent valve is closed. A minimum of 500 psi is required to make sure emergency shut down valves work properly.
- d. Pre-charge nitrogen system to 60 to 120 psi.
- e. Slowly open globe valve in LPG line from propane tank to control stand.
- f. Pull emergency shutdown switch OUT.



Tag and lock out valves and switches to any inoperable burners or ignitors.

- g. Check for proper ignitor operation by firing each ignitor in turn.
- h. Slowly open LPG manifold shutoff valve on control stand.

3 TRAINING EXERCISE.



- Extremely high temperatures and hot surfaces will be encountered during training exercise. It is imperative to wear appropriate protective clothing. Failure to comply may cause serious injury or death to personnel. SCBA shall be utilized for all exercises.
- While attempting to ignite fires, if flames are not present within a reasonable amount of time (5 to 10 seconds), close burner valve(s) and allow area to vent before attempting re-ignition. Failure to comply could pose a serious risk of explosive gas build up.

- The following are considered abnormal conditions and/or emergency situations requiring activation of the system E-Stop switch for emergency shutdown anytime a firefighter: appears to have blown out or extinguished the fire; fails to follow any direction of the Instructor-in-Charge or the Safety Officer; falls down inside the AFTF; or enters inside the AFTF standing completely upright with fire operating.

- Since the fires are intended to simulate a solid object fire event, the following actions are inappropriate and constitute an emergency condition requiring activation of the system E-Stop switch for emergency shutdown anytime the nozzle or any firefighter including his PPE: breaks the vertical plane of the cargo box; breaks the plane of the control surfaces in the cockpit; breaks the plane of any passenger fire burner shield or the area above the burner itself; breaks either end plane of an engine; enters the area under the cockpit stairs; enters the area under the passenger seats or breaks the plane of the front surface of the passenger seat backs; enters an area above an operating burner; or enters the area directly below the APU or Wheel fire when the burner is operating.

- a. The Training Instructor in Charge shall be in control of the training exercise. Dedicated radio communication shall be established between Ignition Officer, Training Instructor in Charge, and Safety Officer.
- b. The Training Instructor in Charge shall confirm all Pre-Exercise Inspection and Set Up procedures have been completed.
- c. The Training Instructor in Charge initiates, oversees, and terminates the training exercise.

**NOTE**

Pre-burn time will not exceed 3 minutes (180 seconds). Actual exercise burn time will be determined by the Training Instructor in Charge. After manual control valves are closed, fire will burn an additional 15 to 25 seconds.

- d. At the prompt of the Training Instructor in Charge, the Ignition Officer shall:
  - (1) Slowly open the manifold shutoff propane valve.
  - (2) Ignite selected burners by activating the appropriate ignitor switch and slowly opening the corresponding burner control ball valve until flame is present. Repeat steps until all required burners are ignited.

- (3) Exercise Shut Down Procedures:
- (a) Close manual propane burner control ball valve(s).
  - (b) Position all ignitor switches to OFF.

4 SYSTEM SHUTDOWN AND CLEAN UP.

When training is complete the Training Instructor in Charge shall direct the Ignition Officer to:

- a. Close manifold shutoff valve.
  - b. Burn off all gas in the propane manifold by activating selected ignitors and opening corresponding burner control ball valves.
- c. Once fire has burned out, close all LPG burner control ball valves.
  - d. Position all ignitor switches to OFF.
  - e. Push Emergency shutdown switch IN.
  - f. Close globe valve in line from propane tank to control stand.
  - g. Close valves on nitrogen system cylinders.
  - h. Position master power switch to OFF.
  - i. Position all circuit breakers to OFF on electrical service rack.
  - j. Level drive around area.



**SUBORDINATE WORK PACKAGE**

**OPERATION AND MAINTENANCE INSTRUCTIONS**  
**WINTERIZATION PROCEDURES**  
**EFFECTIVITY: AIRCRAFT FIRE TRAINING FACILITY**

**LIST OF EFFECTIVE WP PAGES**

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**REFERENCE MATERIAL REQUIRED**

DOCUMENT NUMBER	TITLE
WP 004 00	(Paragraph 6-7) Emergency Procedures
WP 005 00	(Table 1) Quarterly System Safety Inspections and Operational checks

**APPLICABLE TCTOS**

NONE

**CONSUMABLE MATERIALS**

NONE

**APPLICABLE SUPPORT EQUIPMENT**

NONE

**ILLUSTRATED SUPPORT EQUIPMENT**

NONE

## **FOREWORD**

This work package contains winterization procedures for the Aircraft Fire Training Facility (AFTF).

## **SAFETY SUMMARY**

Various steps in this work package may require personnel to be exposed to liquid propane vapor and fumes. It is imperative to be aware of the EMERGENCY PROCEDURES in

Work Package 004 00, paragraphs 6 and 7. Failure to comply may cause serious injury.

1 WINTERIZE.

**WARNING**

If an obvious unsafe condition is noted, halt operations and rectify condition prior to proceeding. Failure to halt and correct conditions may cause injury.

**CAUTION**

The entire training facility is a no smoking area.

**NOTE**

- Winterization procedures shall be performed by authorized personnel.
- No vehicles are allowed in burn area.
- Perform quarterly inspection in accordance with WP 006 00 prior to performing these procedures.
- a. Flush burn area for not less than 1 hour.
- b. Open the burn area drain valve (Figure 1), weir drain valve, water manifold drain valve, trench drain valve and fire department connection. These valves must remain open to drain for not less than 72 hours.
- c. Remove water pump from the water conservation pond and place in storage, if applicable.
- d. Remove other existing water pumps, if applicable, and place in storage.
- e. Tag and lock out all ignitor switches and propane valves used to control ground burners, APU, and wheelwell. Tag and lockout the washdown, ignitor cooling, engine water and sprinkler controls/switches.
- f. Visually verify all water has drained from burn area and close the burn area drain valve and weir drain valve.

2 DE-WINTERIZE.

**WARNING**

If an obvious unsafe condition is noted, halt operations and rectify condition prior to proceeding. Failure to halt and correct conditions may cause injury.

**CAUTION**

The entire training facility is a no smoking area.

**NOTE**

- De-winterization procedures shall be performed by authorized personnel.
- No vehicles are allowed in burn area.
- a. Install water pump, if applicable.
- b. Make sure fire department connection, water manifold drain, trench drain, and burn area drain valves are closed.
- c. Turn on main circuit and appropriate breakers for water pump.
- d. Remove lockouts from ground, APU, and wheelwell switches and valves, and water controls and switches.
- e. Open weir drain valve.
- f. Open ignitor cooling, engine, washdown, and sprinkler system valves.
- g. Operate ignitor cooling, engine, sprinkler, and wash-down systems for one hour.
- h. Perform quarterly system safety inspection in accordance with WP 006 00.

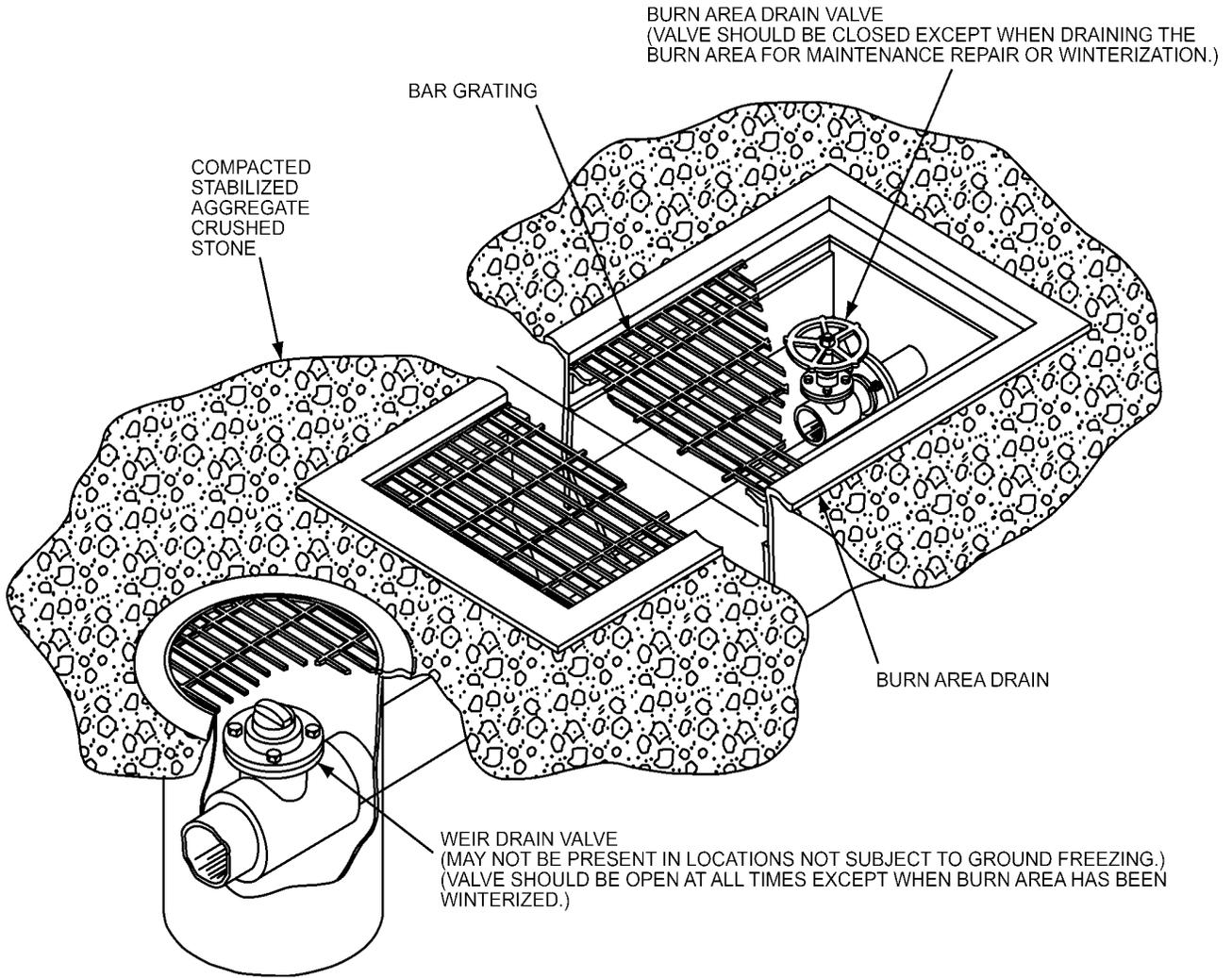


Figure 1. Burn Area Drain

**WORK PACKAGE**

**OPERATION AND MAINTENANCE INSTRUCTIONS**  
**QUARTERLY SYSTEM SAFETY INSPECTION**  
**AND OPERATIONAL CHECKS**  
**EFFECTIVITY: AIRCRAFT FIRE TRAINING FACILITY**

**LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 12 Consisting of the Following:

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**REFERENCE MATERIAL REQUIRED**

DOCUMENT NUMBER	TITLE
WP 004 00	(Paragraph 6-7) Emergency Procedures

**APPLICABLE TCTOS**

NONE

## **CONSUMABLE MATERIALS**

NONE

## **APPLICABLE SUPPORT EQUIPMENT**

NONE

## **ILLUSTRATED SUPPORT EQUIPMENT**

NONE

## **FOREWORD**

This work package contains quarterly system safety inspection and operational checks procedures for the Aircraft Fire Training Facility (AFTF).

## **SAFETY SUMMARY**

Various steps in this work package may require personnel to be exposed to liquid propane vapor and fumes. It is imperative to be aware of the EMERGENCY PROCEDURES in Work Package 004 00, paragraphs 6 and 7. Failure to comply may cause serious injury. In the interest of safety and to maintain AFTFs in a manner that will ensure its serviceability and prevent deterioration in operational effectiveness, installations will make sure all maintenance and repair work shall comply with AFTO 35E1-2-13-1 Operation and Maintenance Instructions for AFTFs, manufacturer's recommendations and procedures, and local, state, and federal guidelines as applicable to the work involved.

Installation, testing and replacement of gas piping, gas utilization equipment or accessories, repair and servicing equipment, shall be performed only by qualified agencies. After major repair or a major problem is discovered, the owner must contact HQ AFCESA/CEXF to determine the need to recommission the AFTF. HQ AFCESA/CEXF will determine if the AFTF will remain out-of-service and if a site visit is necessary. Installations shall have the option to have prime vendors, in-house, or other means to perform required inspection and maintenance. Periodic reviews of the AFTFs will be conducted by HQ AFCESA/CEXF to determine the effectiveness of the quarterly inspection procedures.

1 QUARTERLY SYSTEM SAFETY INSPECTION  
AND OPERATIONAL CHECKS.

**WARNING**

If an obvious unsafe or unserviceable condition is noted, halt operations and rectify condition prior to proceeding. Failure to comply may cause injury or death to personnel.

**CAUTION**

The entire training facility is a no smoking area.

**NOTE**

The Quarterly System Safety Inspection and Operational Checks procedures shall be performed by qualified personnel.

- a. Inspect burn area. Make sure rock is level so when flooded a continuous film of water covers area from side to side. Make sure rock level is no higher than top of weir.
- b. Inspect burn area drain valve and weir drain valve for freedom of operation and absence of obstructions.
- c. Inspect exterior and interior burners and ignitors, and make sure that burner grates are not excessively corroded or warped and that ignitor protective covers and burner baffles are in place.
- d. Inspect ignitors and make sure electrode is clean and ceramic insulator is not cracked or damaged.
- e. Inspect mock-up. Make sure expansion joint bolts are finger tight.
- f. Inspect mock-up doors for freedom of operation and excessive corrosion.
- g. Inspect dual liner leak detection point, if applicable, for evidence of liner leaks. Some accumulation of liquid may be present due to normal rate of condensation.
- h. Inspect exterior lighting for proper operation.

- i. Inspect propane system to include tank, gauges, valves, piping, nitrogen or manual safety system, and regulators for corrosion, wear, or serviceable limits.
- j. Inspect control stand to include electrical and mechanical components, piping, valves, and regulators. Check for corrosion, wear, or serviceable limits. Inspect markings on valves and switches for legibility.
- k. Inspect water conservation pond area. Examine visible portion of liner for damage.
- l. Inspect transformer enclosure, transformers, and ignition cable for corrosion, wear, or serviceability limits.
- m. Inspect electrical service rack for corrosion, wear, or serviceability limits.
- n. Open the washdown, ignitor cooling, sprinkler, and engine water valves and apply power to water conservation pond pump. Test for adequate operation and water pressure. Turn pump off and close all valves when testing is complete.
- o. Charge applicable nitrogen systems for operation and examine for leaks.
- p. Function ignition and emergency shutdown systems to ensure proper operation.
- q. Pressurize propane piping for one (1) hour and examine for leaks with flammable gas detector. Depressurize propane piping.
- r. Inspect cathodic system, if applicable.
- s. Inspect drive around burn area for ruts. Level all ruts before proceeding.
- t. Obtain water sample for environmental testing, if applicable.

2 DOCUMENTATION.

The Maintenance Inspection and Test Schedule on pages 5 through 11 will be documented and filed. Records will be maintained for a minimum of 3 years.



Table 1. Quarterly System Safety Inspection and Operational Checks

SUBSYSTEM	ITEM	INSPECTION INTERVAL	INSPECT OPS CHECK	OPS CHECK INTERVAL	OPS CHECK HOW	REQ'D ACTION	ACTION TAKEN
PROPANE STORAGE	ASME TANK	QUARTERLY	CORROSION CRACKS LEAKAGE	N/A	N/A	REPAIR REPLACE	
	FOUNDATION, CRADLE, AND SADDLE PADS	QUARTERLY	CORROSION CRACKS	N/A	N/A	REPAIR REPLACE	
	AREA INSIDE FENCE	QUARTERLY	FREE OF DEBRIS AND VEGETATION	N/A	N/A	REMOVE DEBRIS	
	WELDED, FLANGED, THREADED CONNECTIONS	QUARTERLY	CORROSION CRACKS LEAKAGE	N/A	N/A	REPAIR REPLACE	
	FLOAT GAUGE	QUARTERLY	CORROSION CRACKS LEAKAGE READABLE	QUARTERLY	COMPARE TO ROTO GAUGE READING	REPLACE	
	ROTO GAUGE	QUARTERLY	CORROSION CRACKS LEAKAGE READABLE	QUARTERLY	FUNCTION IN ACCORDANCE WITH TECH ORDER. COMPARE TO FLOAT GAUGE	REPAIR REPLACE	
	PRESSURE GAUGE (250 PSIG SERVICE)	QUARTERLY	CORROSION CRACKS LEAKAGE READABLE	QUARTERLY	COMPARE WITH VAPOR PRESSURE DATA	REPLACE	
	TEMPERATURE GAUGE	QUARTERLY	CORROSION CRACKS LEAKAGE READABLE	QUARTERLY	COMPARE WITH VAPOR PRESSURE DATA	REPLACE	
	RELIEF VALVES IN TANK	QUARTERLY	CORROSION CRACKS LEAKAGE CLEAN AND CLEAR				
	MANUAL VALVES IN LPG LINES (250 PSIG SERVICE)	QUARTERLY	CORROSION CRACKS LEAKAGE	QUARTERLY	FREELY OPENS AND CLOSES AND SEALS	REPAIR REPLACE	

Table 1. Quarterly System Safety Inspection and Operational Checks - Continued

SUBSYSTEM	ITEM	INSPECTION INTERVAL	INSPECT OPS CHECK	OPS CHECK INTERVAL	OPS CHECK HOW	REQ'D ACTION	ACTION TAKEN
PROPANE STORAGE Continued	EXCESS FLOW VALVES LPG LINES	QUARTERLY	CORROSION CRACKS LEAKAGE			REPLACE	
	3" PROPANE FILL LINE FROM TRUCK STATION (BOLLARDS)	QUARTERLY	CORROSION CRACKS LEAKAGE LABELED	N/A	N/A	REPAIR REPLACE	
	2" VAPOR RETURN LINE TO TRUCK STATION (BOLLARDS)	QUARTERLY	CORROSION CRACKS LEAKAGE LABELED	N/A	N/A	REPAIR REPLACE	
	EMERGENCY SHUTOFF VALVES (250 PSIG SERVICE)	QUARTERLY	CORROSION CRACKS LEAKAGE	QUARTERLY	FREELY OPENS CLOSES AND SEALS	REPLACE	
	PNEUMATIC SHUTOFF VALVES (250 PSIG SERVICE)	QUARTERLY	CORROSION CRACKS LEAKAGE	QUARTERLY	FREELY OPENS CLOSES AND SEALS	REPAIR REPLACE	
	HYDROSTATIC RELIEF VALVES IN LINES	QUARTERLY	CORROSION CRACKS LEAKAGE CLEAN AND CLEAR	N/A	N/A	REPLACE	
	PROPANE LINE TO STAND	QUARTERLY	CORROSION CRACKS LEAKAGE LABELED	N/A	N/A	REPAIR REPLACE	
	FENCE	QUARTERLY	CORROSION CONDITION FREE OF DEBRIS	N/A	N/A	REPAIR CLEAR DEBRIS	
	PAINT	QUARTERLY	CRACKS PEELING FLAKING	N/A	N/A	REPAIR	
	STENCILING, LABELING AND MARKING (PLATE DATA)	QUARTERLY	CLEAN READABLE	N/A	N/A	REPAIR	

Table 1. Quarterly System Safety Inspection and Operational Checks - Continued

SUBSYSTEM	ITEM	INSPECTION INTERVAL	INSPECT OPS CHECK	OPS CHECK INTERVAL	OPS CHECK HOW	REQ'D ACTION	ACTION TAKEN
WATER CON-SERVATION POND	INFLOW TO POND FROM BURN AREA	QUARTERLY	CRACKS LEAKAGE FREE OF DEBRIS	QUARTERLY	FREE FLOWING	REPAIR	
	OUTFLOW FROM POND TO BURN AREA	QUARTERLY	CRACKS LEAKAGE FREE OF DEBRIS	QUARTERLY	FREE FLOWING	REPAIR	
	OUTFLOW PUMP	QUARTERLY	CORROSION CRACKS LEAKAGE CLEAN AND CLEAR	QUARTERLY	FREE FLOWING SMOOTH AND QUIET RUNNING	REPAIR REPLACE	
	80 MIL LINERS <80 MIL LINERS	QUARTERLY	CRACKS TEARS	N/A	N/A	REPAIR IN ACCOR-DANCE WITH TECH ORDER	
	LINER NOTICE SIGN	QUARTERLY	CLEAN READABLE	N/A	N/A	REPLACE	
	FENCE	QUARTERLY	CORROSION CONDITION FREE OF DEBRIS	N/A	N/A	REPAIR CLEAR DEBRIS	
SAFETY/ CONTROL STAND	LPG MANIFOLD SHUTOFF VALVE	QUARTERLY	CORROSION CRACKS LEAKAGE	QUARTERLY	FREELY OPENS CLOSES AND SEALS	REPAIR REPLACE	
	LPG MANIFOLD	QUARTERLY	CORROSION CRACKS LEAKAGE	N/A	N/A	REPAIR REPLACE	
	LP LINES TO BURN AREA	QUARTERLY	CORROSION CRACKS LEAKAGE	N/A	N/A	REPAIR REPLACE	
	BURNER CONTROL BALL VALVES	QUARTERLY	CORROSION CRACKS LEAKAGE	QUARTERLY	FREELY OPENS CLOSES AND SEALS	REPAIR REPLACE	
	SOLENOID VALVES IN LPG LINES	QUARTERLY	CORROSION CRACKS LEAKAGE	QUARTERLY	OPENS CLOSES SEALS NO CHATTER	REPAIR REPLACE	

Table 1. Quarterly System Safety Inspection and Operational Checks - Continued

SUBSYSTEM	ITEM	INSPECTION INTERVAL	INSPECT OPS CHECK	OPS CHECK INTERVAL	OPS CHECK HOW	REQ'D ACTION	ACTION TAKEN
SAFETY/ CONTROL STAND Continued	MOMENTARY IGNITOR SWITCHES	QUARTERLY	CORROSION CLEARLY LABELED READABLE	QUARTERLY	FREELY MOVES TO THREE POSITIONS	REPLACE	
	CONTINUOUS IGNITOR SWITCHES	QUARTERLY	CORROSION CLEARLY LABELED READABLE	QUARTERLY	FREELY MOVE TO BOTH POSITIONS	REPLACE	
	EMERGENCY SHUTDOWN SWITCH	QUARTERLY	CORROSION CLEARLY LABELED READABLE	QUARTERLY	FREELY MOVE TO BOTH POSITIONS	REPLACE	
	HYDROSTATIC RELIEF VALVES	QUARTERLY	CORROSION CRACKS LEAKAGE CLEAN AND CLEAR	N/A	N/A	REPLACE	
	TEMPLATE	QUARTERLY	CLEAN READABLE	N/A	N/A	REPLACE	
	VALVE LABELING	QUARTERLY	CLEAN READABLE	N/A	N/A	REPLACE	
	SWITCH LABELING	QUARTERLY	CLEAN READABLE	N/A	N/A	REPLACE	
	LPG LINE REGULATOR	QUARTERLY	CORROSION CRACKS LEAKAGE	QUARTERLY	FREELY OPENS CLOSES	REPLACE	
	SPRINKLER CONTROL VALVE	QUARTERLY	CORROSION CRACKS LEAKAGE	QUARTERLY	FREELY OPENS CLOSES	REPAIR REPLACE	
	WASHDOWN CONTROL	QUARTERLY	CORROSION CRACKS LEAKAGE	QUARTERLY	FREELY OPENS CLOSES AND SEALS	REPAIR REPLACE	
	COOLING WATER CONTROL	QUARTERLY	CORROSION CRACKS LEAKAGE	QUARTERLY	FREELY OPENS CLOSES AND SEALS	REPAIR REPLACE	

Table 1. Quarterly System Safety Inspection and Operational Checks - Continued

SUBSYSTEM	ITEM	INSPECTION INTERVAL	INSPECT OPS CHECK	OPS CHECK INTERVAL	OPS CHECK HOW	REQ'D ACTION	ACTION TAKEN
SAFETY/ CONTROL STAND Continued	244 SCF N <sub>2</sub> BOTTLES	QUARTERLY	SECURE IN PLACE	QUARTERLY	PRESSURE AVAILABLE 500 - 2200 PSI	REPAIR REPLACE	
	NITROGEN PILOT VALVES	QUARTERLY	CORROSION CRACKS	QUARTERLY	OPENS CLOSES SEALS	REPAIR REPLACE	
	N <sub>2</sub> ACCUMULATOR	QUARTERLY BY USER	CORROSION CRACKS LEAKAGE	N/A	N/A	REPAIR REPLACE	
	PNEUMATIC RELIEF VALVE	QUARTERLY	CORROSION CRACKS LEAKAGE CLEAN AND CLEAR	N/A	N/A	REPLACE	
	WARNING SIGN	QUARTERLY	CLEAR READABLE	N/A	N/A	REPLACE	
BURN AREA	WASHDOWN HEADER	QUARTERLY	CORROSION CRACKS LEAKAGE CLEAN AND CLEAR	N/A	N/A	REPAIR REPLACE	
	WEIR	QUARTERLY	CORROSION CRACKS LEAKAGE CLEAN AND CLEAR	N/A	N/A	REPAIR REPLACE	
	AGGREGATE 80 MIL LINER <80 MIL LINER	QUARTERLY	LEVEL CRACKS TEARS	N/A N/A	N/A N/A	LEVEL REPAIR IN ACCOR- DANCE WITH TECH ORDER	
	LINER SIGNS	QUARTERLY	CLEAN READABLE	N/A	N/A	REPLACE	
	6" WEIR DRAIN VALVE	QUARTERLY	CORROSION CRACKS LEAKAGE	QUARTERLY	FREELY OPENS CLOSES AND SEALS	REPAIR REPLACE	

Table 1. Quarterly System Safety Inspection and Operational Checks - Continued

SUBSYSTEM	ITEM	INSPECTION INTERVAL	INSPECT OPS CHECK	OPS CHECK INTERVAL	OPS CHECK HOW	REQ'D ACTION	ACTION TAKEN
BURN AREA Continued	2" BURN AREA DRAIN VALVE	QUARTERLY	CORROSION CRACKS LEAKAGE	QUARTERLY	FREELY OPENS CLOSES AND SEALS	REPAIR REPLACE	
	GROUND BURNERS AND GRATES	QUARTERLY	CORROSION CRACKS WARPED HOLES OPEN	QUARTERLY	FULL FLAME	REPAIR REPLACE	
	COAX VALVES IN PROPANE LINES	N/A	N/A	QUARTERLY	FREELY OPENS CLOSES AND SEALS	REPAIR REPLACE	
	DRIVE AROUND	QUARTERLY	LEVEL RUT-FREE DEBRIS-FREE	N/A	N/A	LEVEL REPAIR REMOVE DEBRIS	
	LEAK DETECTION DUAL LINER	QUARTERLY	CRACKS LEAKAGE CLEAN AND CLEAR	QUARTERLY	DRY	REFER TO TECH ORDER	
AIRCRAFT MOCK-UP	ENGINE BURNERS	QUARTERLY	CORROSION CRACKS WARPED HOLES OPEN	QUARTERLY	FULL FLAME	REPAIR REPLACE	
	WING ENGINE RUNNING FUEL PLUMBING	QUARTERLY	CORROSION CRACKS LEAKAGE CLEAN AND CLEAR	QUARTERLY	N/A	REPAIR	
	IGNITOR COOLING JACKETS	QUARTERLY	CORROSION CRACKS LEAKAGE CLEAN AND CLEAR	QUARTERLY	CHECK WATER FLOW	REPAIR	
	WHEEL WELL BURNER	QUARTERLY	CORROSION CRACKS WARPED HOLES OPEN	QUARTERLY	FULL FLAME	REPAIR REPLACE	

Table 1. Quarterly System Safety Inspection and Operational Checks - Continued

SUBSYSTEM	ITEM	INSPECTION INTERVAL	INSPECT OPS CHECK	OPS CHECK INTERVAL	OPS CHECK HOW	REQ'D ACTION	ACTION TAKEN
AIRCRAFT MOCK-UP Continued	APU BURNER	QUARTERLY	CORROSION CRACKS WARPED HOLES OPEN	QUARTERLY	FULL FLAME	REPAIR REPLACE	
	FLIGHT DECK BURNER	QUARTERLY	CORROSION CRACKS WARPED HOLES OPEN	QUARTERLY	FULL FLAME	REPAIR REPLACE	
	BATTERY BURNER	QUARTERLY	CORROSION CRACKS WARPED HOLES OPEN	QUARTERLY	FULL FLAME	REPAIR REPLACE	
	PASSENGER BURNER	QUARTERLY	CORROSION CRACKS WARPED HOLES OPEN	QUARTERLY	FULL FLAME	REPAIR REPLACE	
	CARGO BURNER	QUARTERLY	CORROSION CRACKS WARPED HOLES OPEN	QUARTERLY	FULL FLAME	REPAIR REPLACE	
	SPRINKLER SYSTEM	QUARTERLY	CORROSION CRACKS WARPED HEADS CLEAN AND CLEAR	QUARTERLY	ALL HEADS FULL FLOW	REPAIR REPLACE	
	EXPANSION JOINT BOLTS	QUARTERLY	CORROSION	QUARTERLY	MAKE SURE FINGER TIGHT	REPAIR REPLACE	
	MOCK-UP WELDS & SURFACES	QUARTERLY	CORROSION CRACKS WARPED	N/A	N/A	REPAIR REPLACE	
IGNITION	CH31723/CH31615/CH31917 IGNITORS	QUARTERLY	CRACKS CLEAN AIR GAP	QUARTERLY	CRISP SPARK	REPLACE	
	CH20485 PIGTAILS	N/A	N/A	QUARTERLY	CRISP SPARK	REPLACE	
	CHAMPION SPLICES	N/A	N/A	QUARTERLY	CRISP SPARK	REPLACE	

Table 1. Quarterly System Safety Inspection and Operational Checks - Continued

SUBSYSTEM	ITEM	INSPECTION INTERVAL	INSPECT OPS CHECK	OPS CHECK INTERVAL	OPS CHECK HOW	REQ'D ACTION	ACTION TAKEN
IGNITION Continued	M3702-U5MC/U7MC IGNITION CABLES	N/A	N/A	QUARTERLY	CRISP SPARK	REPLACE	
	110V PRIMARY; 10kV, 23 MA SECONDARY TRANSFORMERS	QUARTERLY	CORROSION CABLE CONNECTION	QUARTERLY	CRISP SPARK	REPAIR REPLACE	
INSPECTED BY							DATE

**WORK PACKAGE**

**OPERATION AND MAINTENANCE INSTRUCTIONS**  
**GENERAL MAINTENANCE**  
**EFFECTIVITY: AIRCRAFT FIRE TRAINING FACILITY**

**LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 24 Consisting of the Following:

\*Zero in this column indicates an original page.

Page No.	*Change No.	Page No.	*Change No.	Page No.	*Change No.
1 - 2 .....	1	4 - 18 .....	1	24 Blank Added .....	1
3 .....	0	19 - 23 Added .....	1		

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4 Liner Maintenance .....	4	14 Corrosion Prevention System .....	7
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6 Locating Liner Leak - Water Conservation Pond .....	5	16 Radio Remoter Control Emergency Stop System (ESTOP) .....	7
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**REFERENCE MATERIAL REQUIRED**

DOCUMENT NUMBER	TITLE
WP 003 00	(Table 3) Master List of Consumable Items and Expendable Materials
WP 004 00	(Paragraph 6-7) Emergency Procedures
WP 005 00	Standard Operating Procedures
WP 006 00	(Table 1) Quarterly System Safety Inspections and Operational Checks
WP 007 01	Fault Isolation

**APPLICABLE TCTOS**

NONE

**CONSUMABLE MATERIALS**

NOMENCLATURE	SPECIFICATIONS/PART NO./NSN	CAGE CODE	DESCRIPTION
Ball Valves 3/4" and 1"	Conbraco 83-500 and 86-500 (or equal)	72219	3- Piece high pressure full port ball valve Propane flow control valve
Door Panels	N/A	N/A	36" x 84" 26 gauge (sheet metal cut-out panels)
Ignitor	Champion CH31917	11583	Ignitor (3 Electrodes)
Ignitor	NSN Non Assigned ICS Int'l Code Services 7860030	11583	Ignitor (Mushroom Tip Electrode)
Water Pump	Goulds Gorman-Rupp (or equal)		300 Gallon per minute or greater. Supplies water to emergency sprinkler system, washout system, water jackets & cooling system

**APPLICABLE SUPPORT EQUIPMENT**

NONE

**ILLUSTRATED SUPPORT EQUIPMENT**

NONE

## FOREWORD

This work package contains maintenance procedures for the Aircraft Fire Training Facility (AFTF). These procedures include liner maintenance, locating liner leak, cutout panel replacement, ignitor replacement, excavation procedures, regulator adjustment (Table 1), water pump replacement, and inspection criteria table (Schedule 1).

Each installation shall maintain a record of all maintenance and inspection actions conducted on the AFTF. AFTF documented records will consist of actions over the past three years. Any significant action over three years may be retained as historical data in a separate file as determined by the facility manager.

The Quarterly System Safety Inspection and Operational Checks (WP 006 00) is an integral element of the general maintenance procedures of the AFTF. In the interest of safety and to maintain AFTFs in a manner that will ensure its serviceability and prevent deterioration in operational effectiveness, installations will make sure all maintenance and repair work shall comply with Air Force Technical Order 35E1-2-13-1 Operation and Maintenance Instructions for AFTFs, manufacturer's recommendations and procedures, and local, state, and federal guidelines as applicable to the work involved. Installation, testing and replacement of gas piping, gas utilization equipment or accessories,

repair and servicing equipment, shall be performed only by qualified agencies. After major repair or a major problem is discovered, the owner must contact HQ AFCESA/CEXF to determine the need to recommission the AFTF. HQ AFCESA/CEXF will determine if the AFTF will remain out-of-service and if a site visit is necessary. Installations shall have the option to have prime vendors, in-house, or other means to perform required inspection and maintenance. Periodic reviews of the AFTFs will be conducted by HQ AFCESA/CEXF to determine the effectiveness of the quarterly inspection procedures.

It is advantageous to schedule maintenance action at one time to eliminate duplication of efforts. For example, the Quarterly System Safety Inspection, Operational Checks, and the general maintenance requirements should be conducted at the same time as Winterization or De-Winterization actions. This is especially true if a contractor is used to winterize or de-winterize the facility. Also, bases may elect to have a contractor annually or semi-annually do the Quarterly System Safety Inspection, Operational Checks and general maintenance independent of cold weather issues while doing the remainder of the Quarterly System Safety Inspection and Operational Checks using in-house resources.

## SAFETY SUMMARY

Various steps in this work package may require personnel to be exposed to liquid propane vapor and fumes, and high voltage - low current electricity. It is imperative to wear appropriate protective clothing and to be aware of the EMERGENCY PROCEDURES in Work Package 004 00, paragraphs 6 and 7. Failure to comply may cause serious injury. Use of Self Contained Breathing Apparatus (SCAB) is required for all fires. Exposure to any skin areas may result in burns by heat and/or steam. Installation, testing, and replacement of gas piping, gas utilization equipment or accessories, and repair and servicing of equipment, shall be performed only by qualified agency. In the interest of safety, all persons employed in handling LP Gases shall be trained in proper handling and operating procedures, which the employer shall document. After major repair or a major problem is discovered, the owner is obligated to contact HQ Air Force Civil Engineering Support Agency (AFCESA), the commissioning authority to determine what actions will be taken. HQ AFCESA will determine if the AFTF will remain out-of-service, and if a site visit is necessary. Examples of major problems include any safety related condition that could lead to an imminent hazard such as:

- LPG piping or tank corrosion that has reduced the wall thickness to less than that required for the maximum allowable operating pressure.
- Any crack or other material defect that impairs the structural integrity or reliability of a LPG tank or piping.
- Any abnormal movement by environmental causes, such as earthquakes, landslides, or floods that may impair the serviceability of a pipeline, tank, or controls.
- Any malfunction or operating error that causes the pressure of a LPG pipeline or tank to rise above its maximum allowable working pressure.
- A leak in the LPG pipeline or tank that constitutes an emergency.

## 1 IGNITOR REPLACEMENT - CH31917.

There are 6 ignitors located in ground burners and 12 ignitors located in mock-up burners (Figure 6).

### WARNING

Make sure all electrical power to ignitors is off. Serious injury to personnel may result.

### CAUTION

The entire training facility is a no smoking area.

### NOTE

- Ignitor replacement procedures shall be performed by qualified personnel only.
- No vehicles are allowed in burn area.
- a. Remove ignitor cover bolts (Figure 1).
- b. Remove ignitor cover.
- c. Disconnect ignitor pigtail.
- d. Remove ignitor mounting bolts (Figure 1).
- e. Remove ignitor.
- f. Reverse procedures to replace ignitor.
- g. Once ignitor is replaced, functionally verify its operation by energizing the ignitor without applying propane. If spark is still not present, refer to Fault Isolation, WP 007 01.

## 2 IGNITOR REPLACEMENT- ICS 7860030.

There are 6 ignitors located in ground burners and 12 ignitors located in mock-up burners (Figures 3 and 4).

### WARNING

Make sure all electrical power to ignitors is off. Serious injury to personnel may result.

### CAUTION

The entire training facility is a no smoking area.

### NOTE

- Ignitor replacement procedures shall be performed by qualified personnel only.
- No vehicles are allowed in burn area.
- a. Remove ignitor cover bolts (Figure 1).
- b. Remove ignitor cover.
- c. Disconnect ignitor pigtail and cut off pigtail.
- d. Mount ignitor to cabinet or housing. Seal around all cabinet penetrations as appropriate. Ensure that ignitor body is well grounded to cabinet or housing (Figure 2).
- e. Connect high voltage lead to terminal at base of ignitor using a high-tension Rajah connector or equivalent.
- f. Apply shrink tube over connection from ceramic insulator over the terminal and onto the high voltage lead by ~2 inches, using high voltage shrink tube.
- g. Apply second layer of shrink tube over the first layer extending ~1/2 inch beyond the first layer.
- h. Connect ground lead to housing or cabinet in closest proximity to ignitor mounting point as possible.
- i. Set air gap to 0.100 inches by adjusting insulator position up or down. Once gap is set, tighten gland nut in position. Ensure electrode tip is centered in relation to body prior to setting gland nut.
- j. Once ignitor is replaced, functionally verify its operation by energizing the ignitor without applying propane. If spark is still not present, refer to Fault Isolation, WP 007 01.

## 3 CUTOUT PANEL REPLACEMENT.

Cutout panels may be located on the left and right sides of the mock-up. The panels are 36 inches wide x 84 inches high and constructed of 0.031 inch sheet metal. If training scenario includes forced entry extrication through cutout panels, panels should be installed prior to training exercise.

## 4 LINER MAINTENANCE.

The 80-mil thick high-density polyethylene (HDPE) liners are located in the water conservation pond, burn area, and trench. Sites may incorporate either a single liner or a dual liner. Instructions in this manual refer to a dual lined facility.

The liners in the trench and burn area are buried, see EXCAVATION PROCEDURES for excavation details.

#### 5 LOCATING LINER LEAK - BURN AREA.

##### **WARNING**

If an obvious unsafe or unserviceable condition is noted, halt operations and rectify condition prior to proceeding. Failure to halt and correct conditions may cause injury.

##### **CAUTION**

The entire training facility is a no smoking area.

##### **NOTE**

- Liner maintenance procedures shall be performed by qualified personnel only.
  - No vehicles are allowed in burn area.
- a. Fill burn area and mark water level.
  - b. After 72 hours, water will leak down to level where leak is located.
  - c. Repair liner in accordance with manufacturer's specifications.

#### 6 LOCATING LINER LEAK - WATER CONSERVATION POND.

##### **WARNING**

If an obvious unsafe or unserviceable condition is noted, halt operations and rectify condition prior to proceeding. Failure to halt and correct conditions may cause injury or death to personnel.

##### **CAUTION**

The entire training facility is a no smoking area.

##### **NOTE**

Liner leak location procedures shall be performed by qualified personnel only.

- a. Fill water conservation pond and mark water level.
- b. After 72 hours, water will leak down to level where leak is located.
- c. Repair liner in accordance with manufacturer's specifications.

#### 7 EXCAVATION PROCEDURES.

Excavation may be required to repair buried items in the trench or burn area (Figure 9 and Figure 10).

##### **CAUTION**

The entire training facility is a no smoking area. Be observant for yellow plastic warning tape buried 12 inches below surface. This warning tape indicates underground wiring, anodes, grounding cells, or reference electrodes. Prior to backfill make sure warning tape is properly replaced.

##### **NOTE**

- Excavation procedures shall be performed by qualified personnel only.
  - No vehicles are allowed in burn area.
- a. Remove required amount of fill to expose item to be repaired, make sure to keep different fill types separated (Figure 11).
  - b. After repair is complete, backfill materials in appropriate order.

#### 8 REGULATOR ADJUSTMENT.

##### **WARNING**

It is the responsibility of the Ignition Officer, Training Instructor, and the Safety Officer to immediately terminate any training exercise where personnel are placed at risk of injury.

- a. Regulator pressure shall be adjusted in accordance with Table 1.
- b. Loosen lock nut, adjust to proper flame height for appropriate burner, tighten lock nut.

**Table 1. Burner Regulator Settings**

BURNER LOCATION	OPTIMAL FLAME HEIGHT
Ground Burners	Not Regulated
Engine Burners	Fully Engulfed
Internal Burners	4-6 Feet

**9 REGULATOR REPLACEMENT.**

Regulator replacement will be with stainless steel braid reinforced hose (Figure 8).

The existing LP-Gas regulators for the engines, cockpit, battery, passenger, cargo, APU and wheel fires will be replaced with a flexible section of hose. This will eliminate the problem experienced at some locations with leaking regulators and reduce the number of potential component failures affecting system reliability. This 18 inch long (457.2 mm) stainless steel braid reinforced hose, in compliance with NFPA 58 Paragraph 2.4.6, will function as a fixed orifice and limit the maximum liquid propane flow to each burner. The three engines, cockpit, battery, APU and wheel fire regulators will be replaced by a 18 inch long section (1/4 inch) hose and for the passenger and cargo fire regulators will be replaced by a 18 inch long section of (1/8 inch) hose.

In reference to NFPA 58 the hose, quick connectors, hose connections, and flexible connectors shall be approved and fabricated of materials that are resistant to the action of LP-Gas both as liquid and vapor. If wire braid is used for reinforcement, it shall be of corrosion-resistant material such as stainless steel. Hose, hose connections, and flexible connectors used for conveying LP-Gas liquid or vapor at pressures in excess of 5 psig (34 Kpag), shall comply with the following: hose shall be designed for a working pressure of 350 psig (2.4 Mpag) with a safety factor of 5 to 1 and shall be continuously marked with LP-GAS, PROPANE, 350 PSI WORKING PRESSURE, and with the manufacturer's name or trademark. Hose assemblies, after the application of connections, shall have a design capability of not less than 700 psig (4.8 Mpag). If a bench field test is performed, such assemblies shall be leak tested at pressures between the operating pressure and 120% of the maximum working pressure [350 psig (24 Mpag) minimum] of the hose.

**10 REPLACEMENT OF GROUND BURNER GRATING.**

Remove the existing upper expanded metal grating and replace with a 3'x10' (2 1/2"x3/8") open bar grating (Figure 13). Original design grating corrodes at a high rate depreciation due to water submergence. Open bar grating will last longer and provide better stability around ground burner location.

**11 WATER PUMP REPLACEMENT.**

- a. Gain access to water pump.
- b. Disconnect applicable piping and wiring.
- c. Remove pump.

**12 SPARE PARTS STOCK.**

The following spares should be maintained in stock to support ready replacement of non-functional items. Specific information on parts is in WP 003 00.

**Table 2. Spare Parts Stock**

SPARE	QUANTITY
heat shrink tubing	2 feet
teflon tubing	4 feet
RTV adhesive	1 tube
Sn63 solder	1 spool
ignitor	6 each
ignitor pigtail	6 each
ignitor transformer	1 each
COAX valve	1 each
pilot valve	1 each
solenoid valve	2 each
3 position ignition switch * (off-on-momentary)	2 each
2 position ignition switch * (off-on)	2 each
burner control ball valves	2 each

\* each site has different switches.

### 13 BALL VALVE REPLACEMENT.

There are 15 propane burner control ball valves located in the safety/control tower (Figure 12).

#### WARNING

- Make sure all propane down steam of the propane storage tank has been burned off.
- Make sure all electric power to the safety/control stand is de-energized.

#### NOTE

- Ball valve replacement procedure shall be performed by qualified personnel only.
  - All replacement ball valves shall be three part fire-safe ball valves as listed in Work Package 003 00 Master List of Consumable Items and Expendable Materials. Existing non-compliant ball valves shall be replaced on an attrition basis.
- a. Remove the existing ball valve(s).
  - b. Install the replacement ball valve(s).
  - c. Once the ball valve(s) is replaced, functionally verify its operation by following the procedures in Work Package 005 00 Standard Operating Procedures.

### 14 CORROSION PREVENTION SYSTEM.

There are two types of Cathodic Systems: (1) Sacrificial zinc anode bed and (2) Impressed current. Whichever system is employed will be added to the Civil Engineer's Corrosion Prevention Program.

### 15 ALGAE GROWTH CONTROL.

Most facilities will have some algae growth in the burn area and the water conservation pond under normal conditions. Limited algae on the water conservation pond liner and in the burn area should not be considered a problem and no corrective action is required. Excessive growth beginning to fill the water or float on the water does require action. Excessive growth may clog pumps, sprinkler heads, water jackets, and/or the wash-out header. When excessive algae growth is observed the following actions should be initiated at least weekly:

- a. Activate the wash-out system.
- b. Using the wash-out control valve on the safety/control stand, balance the water flowing into the burn area with the water leaving the burn area through the weir.
- c. Observe the system operations not less than once every 4 hours.
- d. Operate the system for a minimum of 24 hours.

#### NOTE

It may take more than 24 hours operation to achieve initial control of an algae bloom in the water conservation pond. In some climatic locations use of the wash-out system even with extended operating times may not be sufficient to control the algae. In these cases a floating pond aeration pump will need to be added to the water conservation pond. The use of chemical algacides is not recommended.

- e. One recommendation is a product called AquaShade® which is an aquatic blue dye colorant that can be added to the water conservation pond to reduce the amount of light available to aquatic plants and algae. This product is a blend of non-corrosive, non-toxic blue and yellow dyes. Expect oxidation in chlorinated water systems. When poured into the water conservation pond, it will naturally disperse over a few hours, imparting a blue color to water. The dye reduces light penetration, particularly in the blue range (blue and red wavelengths of light are most efficient for driving photosynthesis). The dye is quite long lasting and is expected to slow the growth of submersed plants where water is more than 60cm (approx. 2 feet) deep. If elected to use, apply at the rate of one gallon per four acre-feet of water (an acre-foot is a volume equivalent to one acre of water one foot deep or ½ acre two feet deep, etc.). Where rubber gloves when handling the product. Solid product when unpackaged can simply be placed in the water unwrapped. Wrapper will dissolve in water. If the liquid product is used, pour container out at water's edge. AquaShade® is available at Sales@Great-Fountains.com.

### 16 RADIO REMOTE CONTROL EMERGENCY STOP SYSTEM (ESTOP).

The ESTOP System is a license free 900MHz Radio Remote Control System. The 22T09 Transmitter with a large ESTOP control pushbutton mounted in a rugged, reinforced poly case. It includes a self test and battery status LED, custom faceplate, built-in internal antenna, AA alkaline batteries, shoulder strap and a leather holster. The 22R04 Receiver Assembly with custom high current (30 amp) mechanical

relay. It includes a receiver RF/Microprocessor/Relay board, a 115 VAC power supply and external long range “Remtenna” antenna in a NEMA 4 steel enclosure.

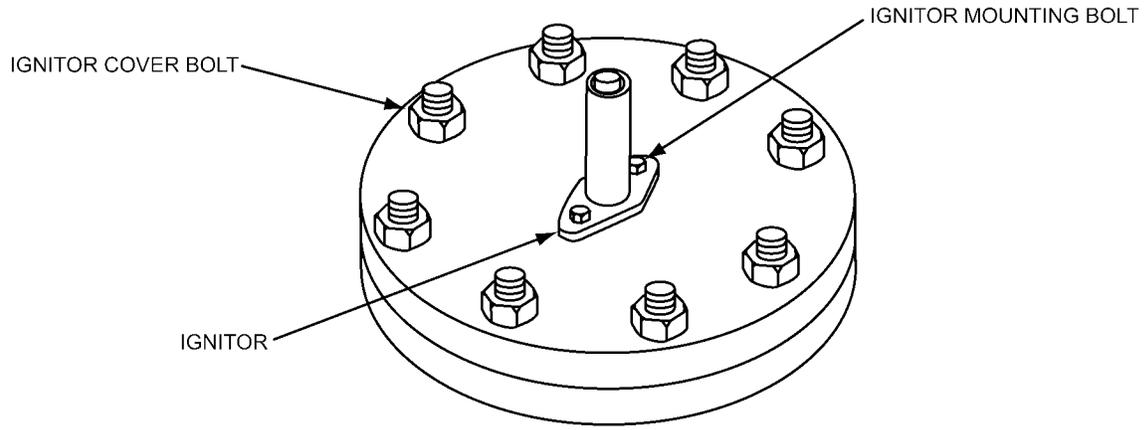
- a. During a training exercise, if a situation occurs that places personnel at risk, the designated officer to carry the ESTOP, will use the ESTOP to remotely shut down the flow of LP gas to the mock-up. This can be accomplished by pressing the pushbutton on the Transmitter (Figure 14).
- b. Before proceeding with the training exercise, the risk in the training exercise must be eliminated whether

the problem is with personnel or the facility and its systems.

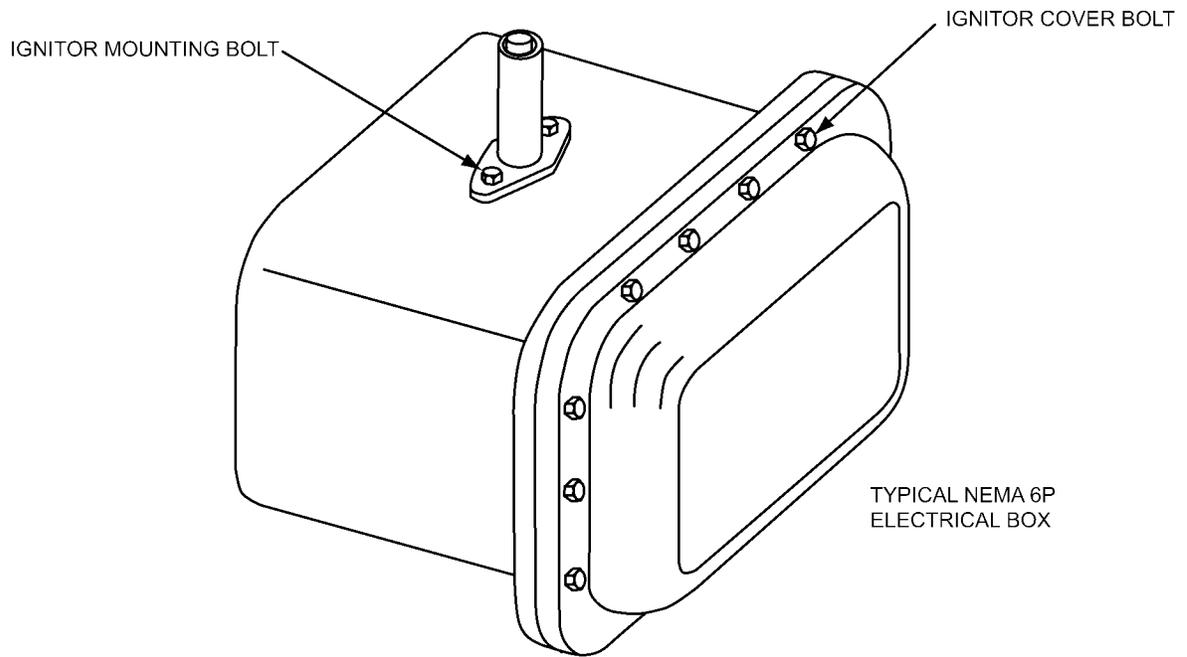
- c. The emergency stop button on the control stand will require reset as well as the ESTOP pushbutton in order to allow the flow of LP gas to resume.

## 17 DOCUMENTATION.

The Maintenance Inspection and Test Schedule on page 23 will be documented and filed. Records will be maintained for a minimum of 3 years.

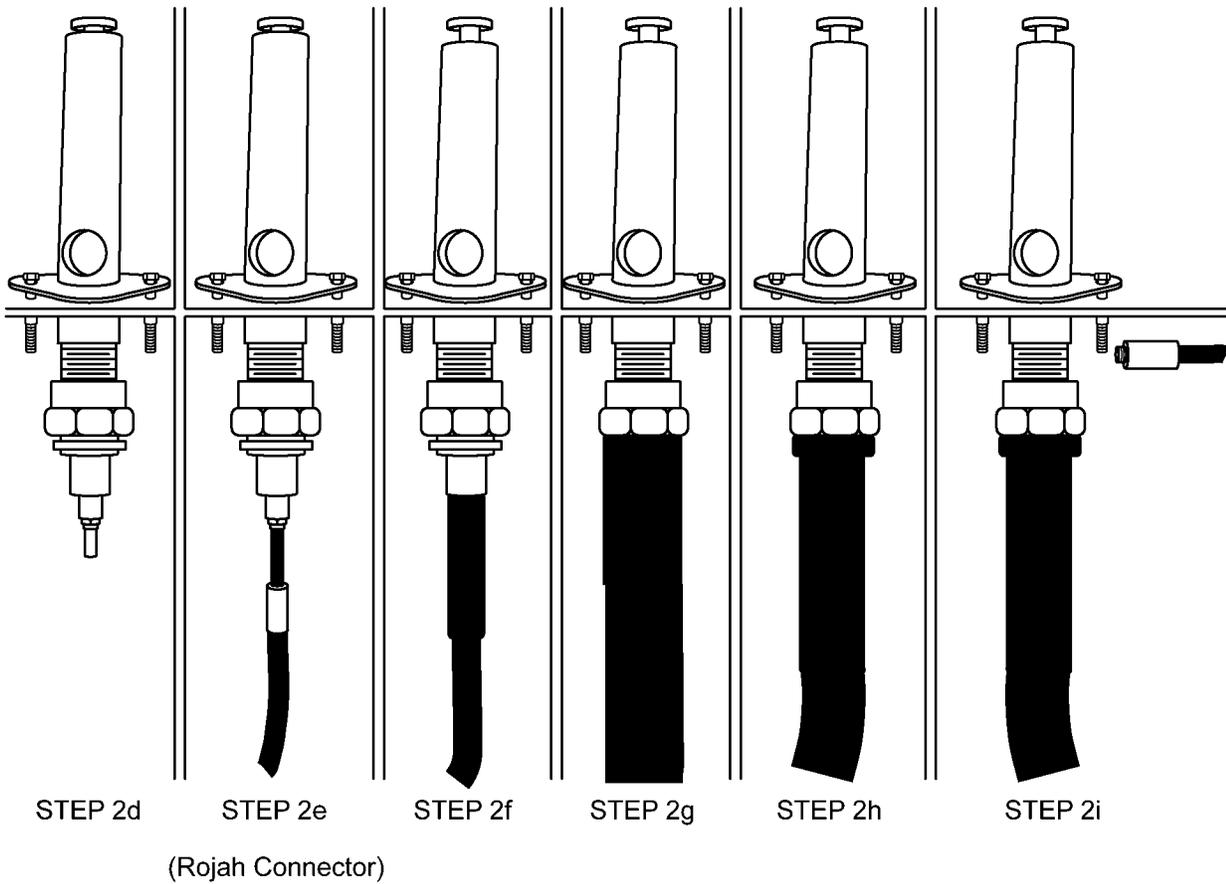


MOCK-UP IGNITOR ASSEMBLY



GROUND IGNITOR ASSEMBLY

Figure 1. Ignitor Assemblies



NOTE

Refer to WP 007 00 paragraph 2 for Igniter Replacement - ICS 7860030.

Figure 2. ICS 7860030 Igniter Assembly Installation Steps

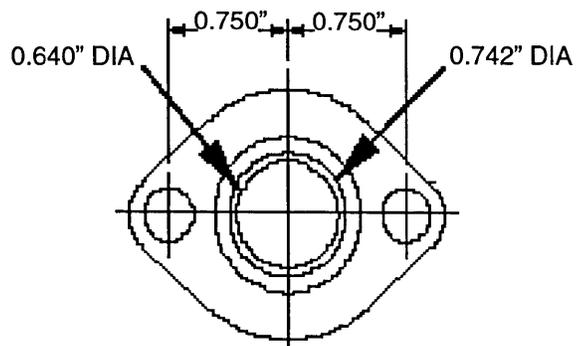
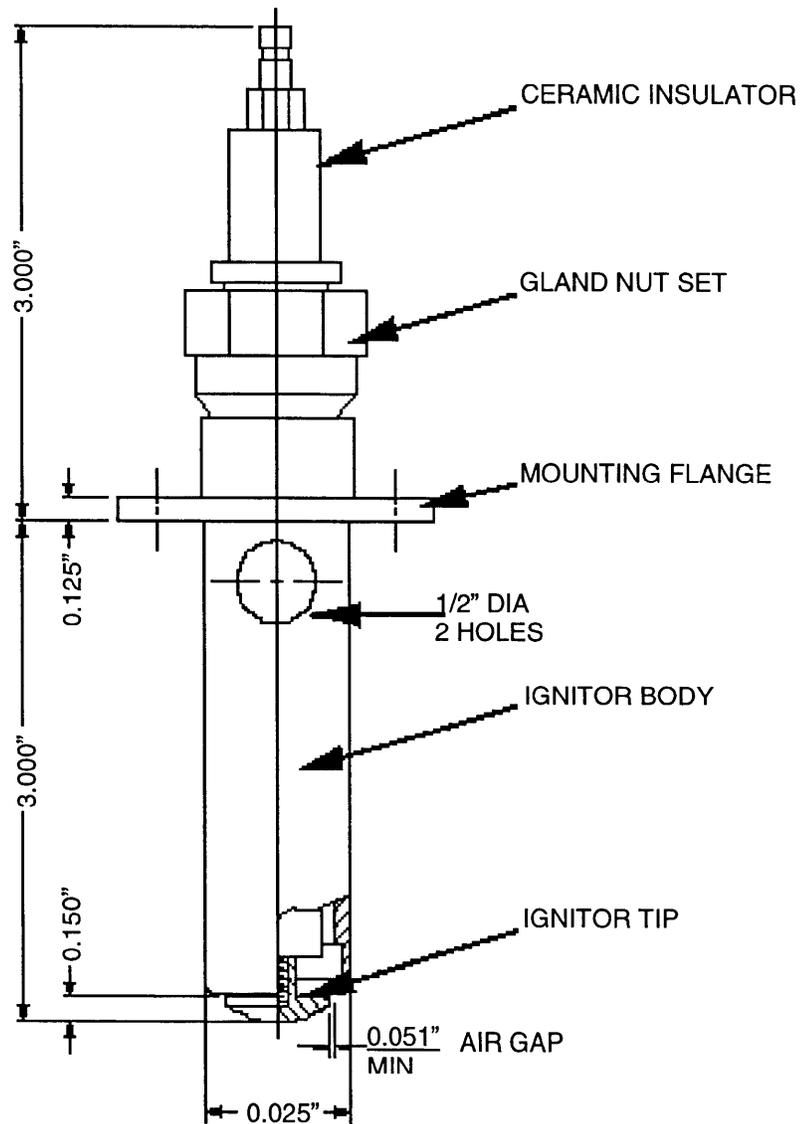


Figure 3. ICS 7860030 Ignitor Dimensions

NOTE

The design features of the ICS Ignitor No. 3860030 are designed for direct spark ignition of main flame applications for outdoor applications. Constructed from stainless steel, this unit is suitable for harsh environments and working conditions. This unit is designed for use with variable ignition lead lengths of up to 400 degrees. To be used in conjunction with high output ignition transformer (10KV, 23 mA). This Ignitor has an adjustable air gap setting. In order to compensate for varying line voltage drops due to cable length and condition. With variable settings from 0.050" to 0.200" optimum performance can be easily achieved.

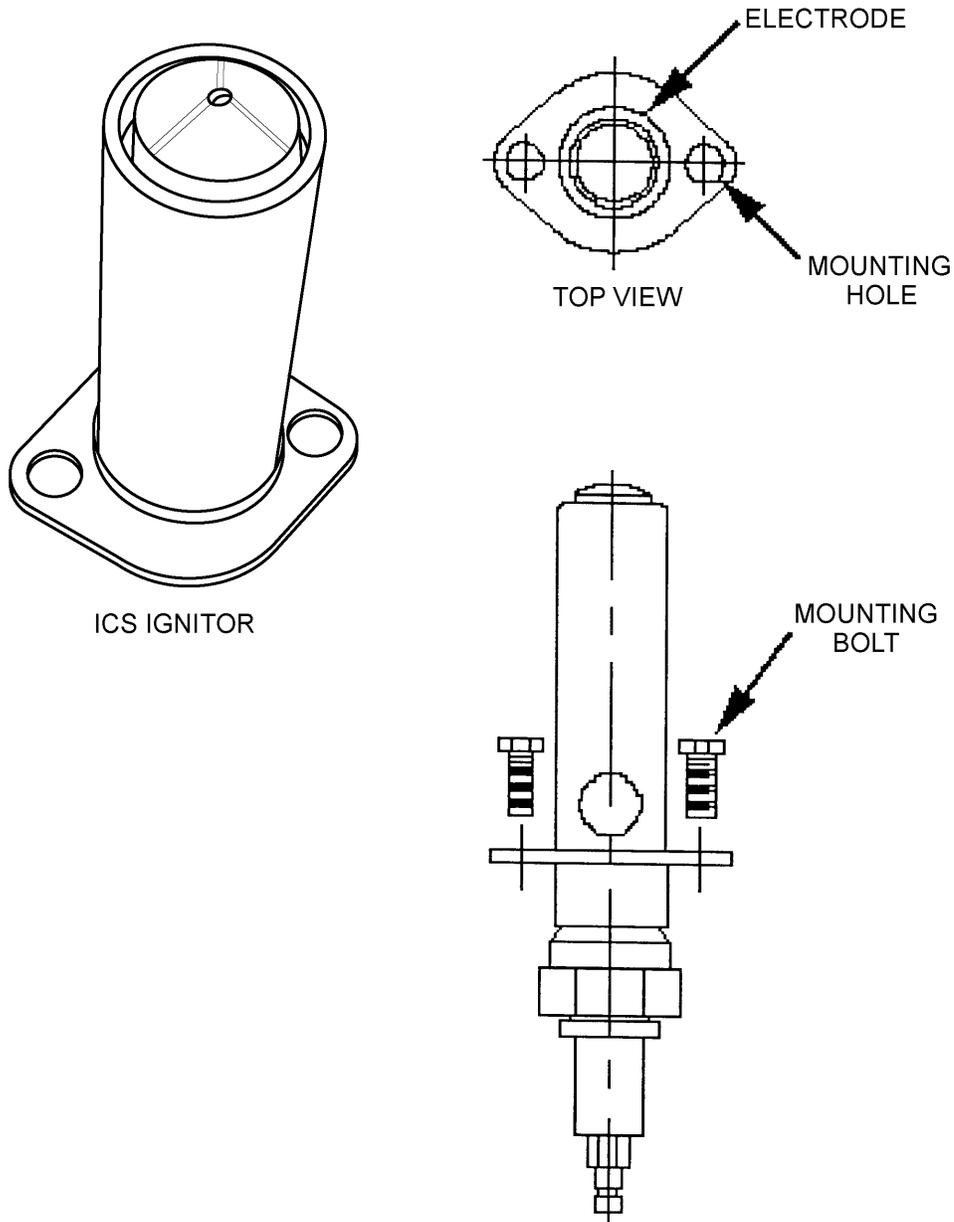


Figure 4. ICS 7860030 Ignitor

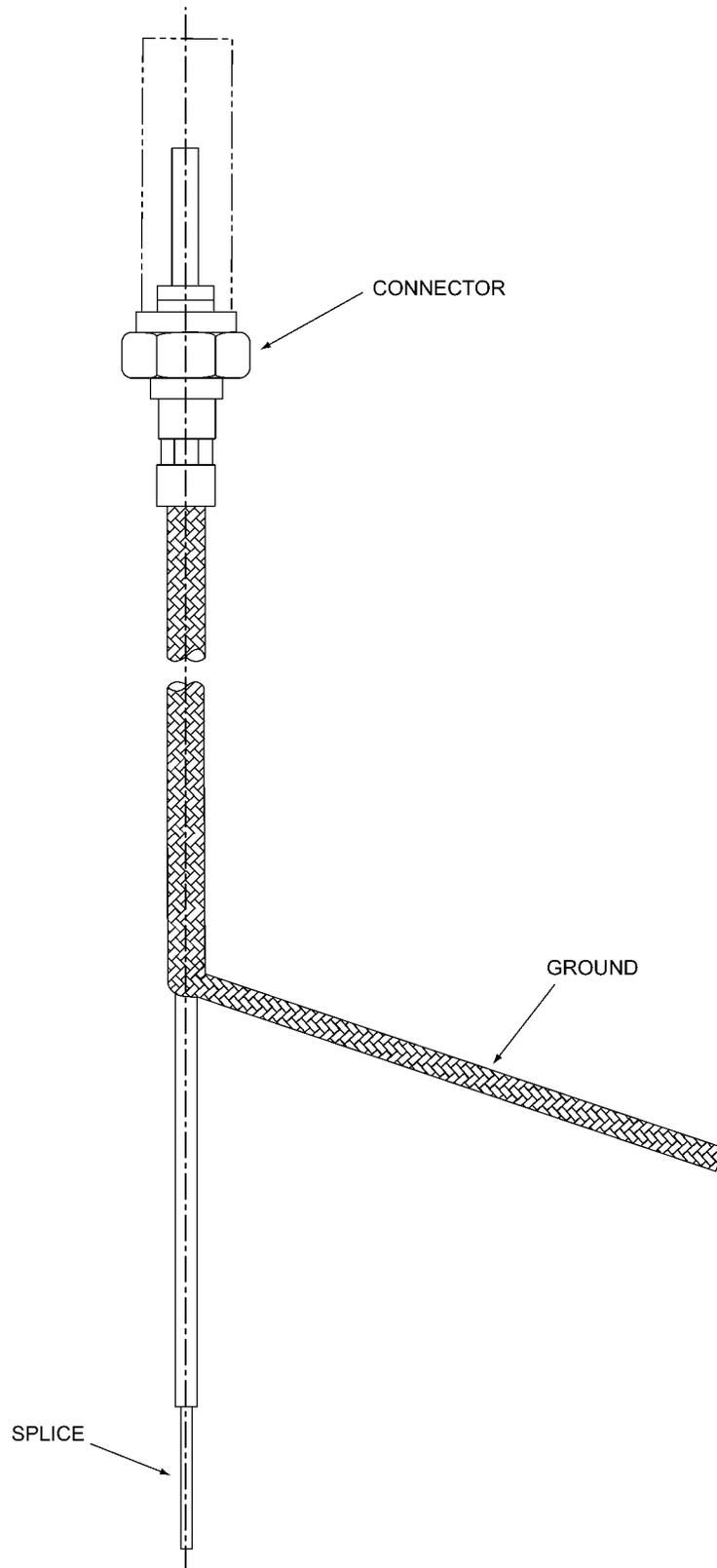


Figure 5. Champion 31917 Ignitor Connector and Pigtail

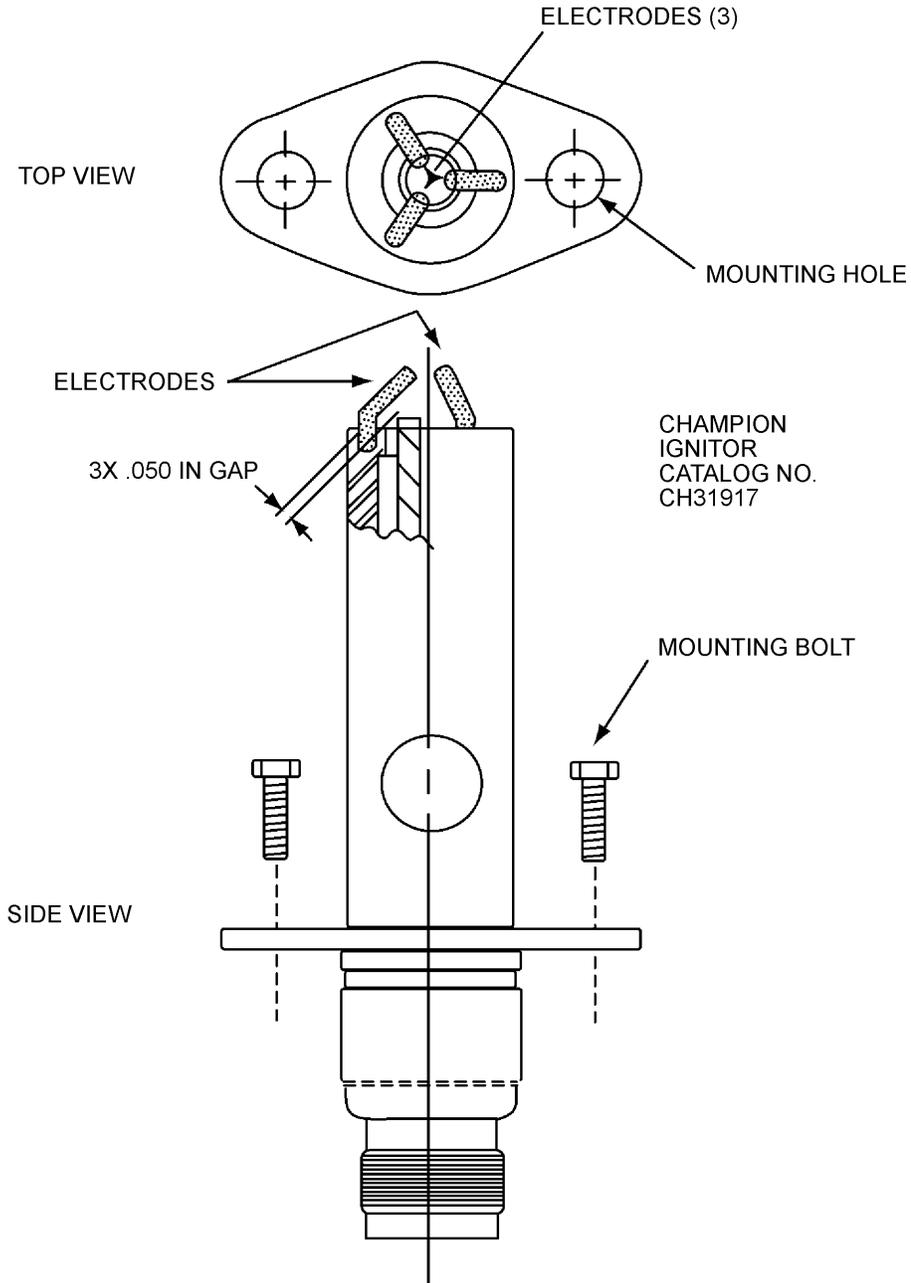
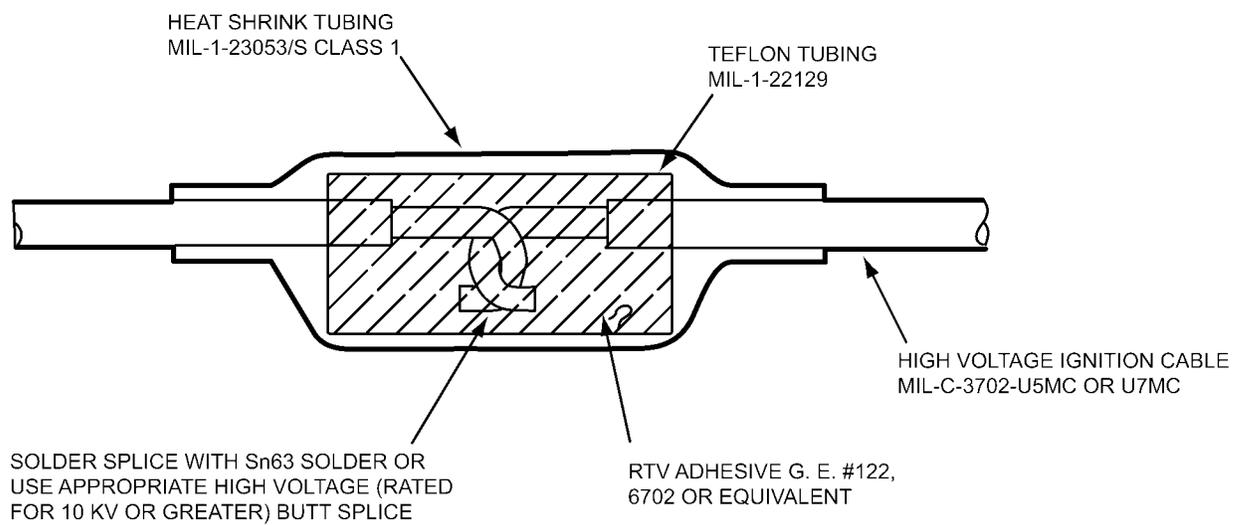


Figure 6. Champion 31917 Ignitor



**NOTE**

THIS IS A WATERPROOF CONNECTION. THE CONNECTION CONTAINS (1) SPLICE, (2) RTV COATING, (3) TEFLON TUBING COVERING AND RTV COATING AND (4) HEAT SHRINK COVERING THE WHOLE CONNECTION. REFER TO MANUFACTURER SPECIFICATIONS FOR RTV CURE TIME.

**Figure 7. Champion Ignitor Pigtail Splice Detail**

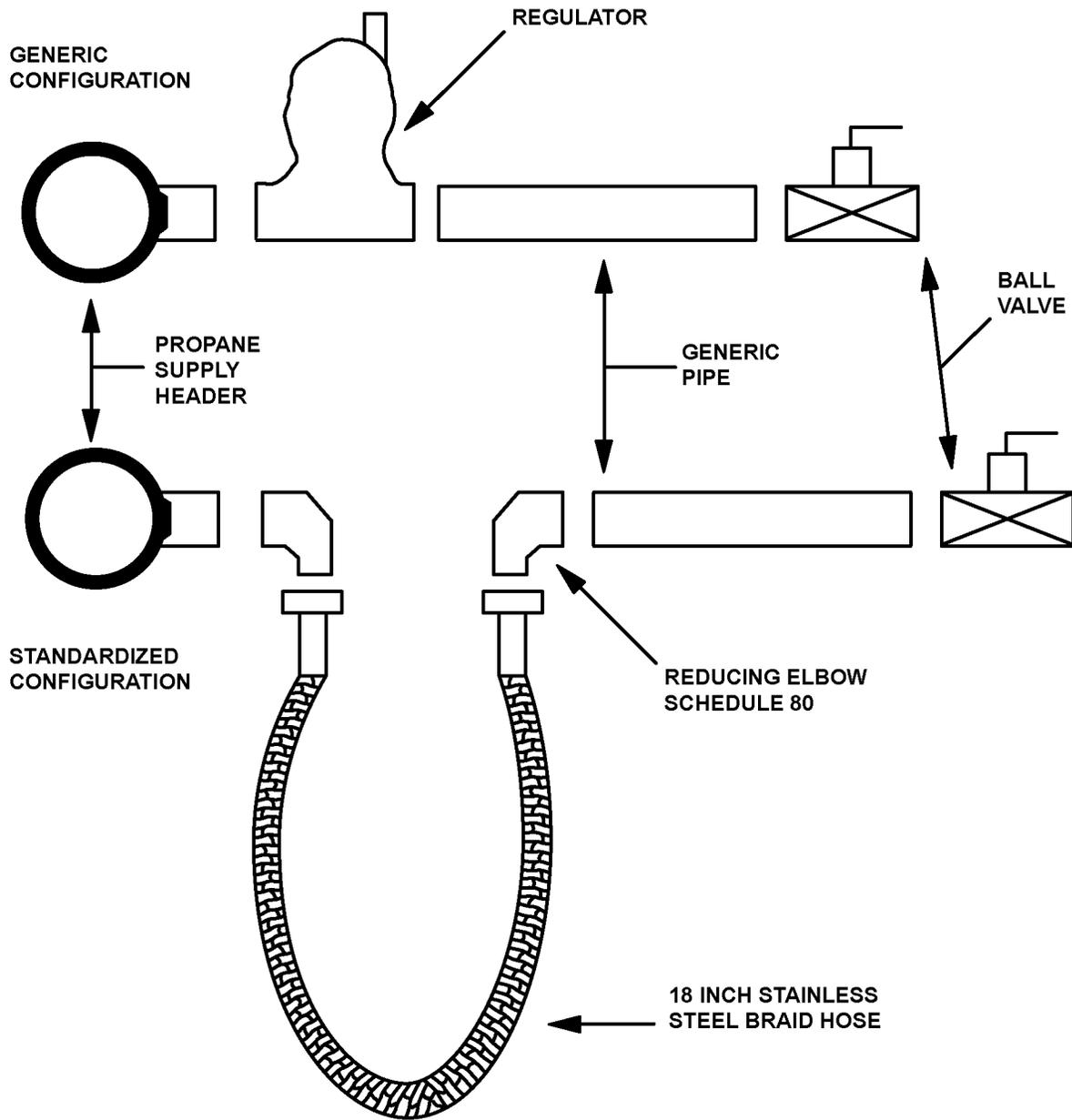


Figure 8. Stainless Steel Braid Replacement Hose

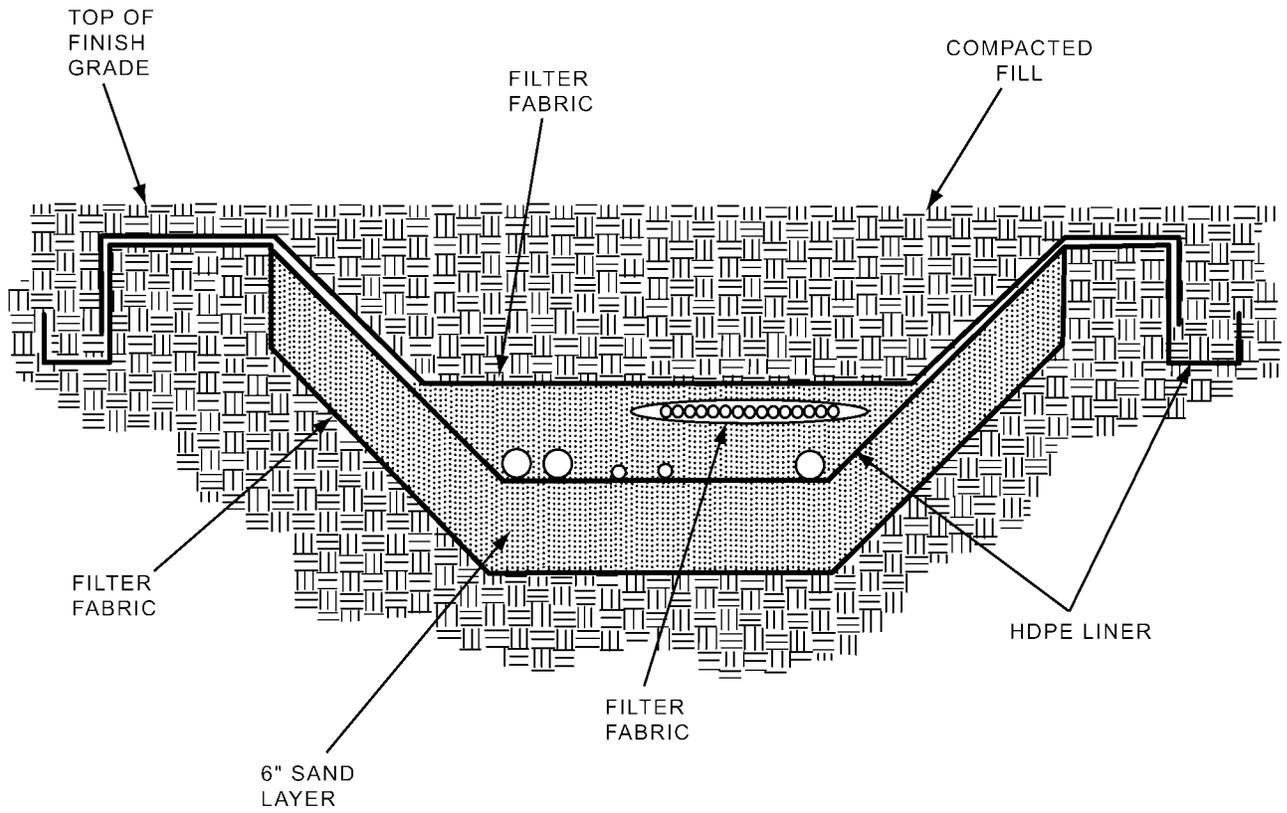


Figure 9. Trench Area Detail

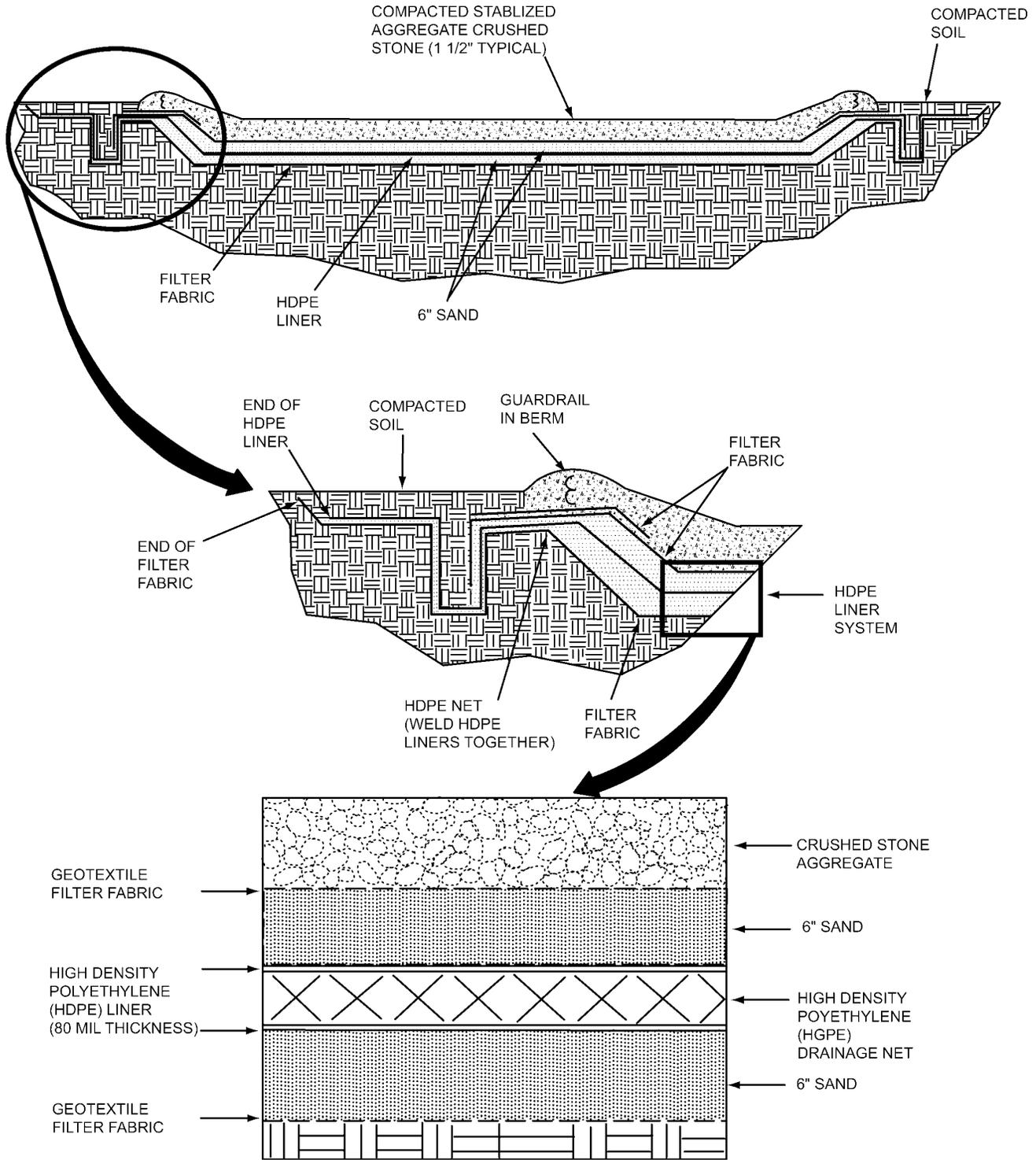


Figure 10. Burn Area Detail



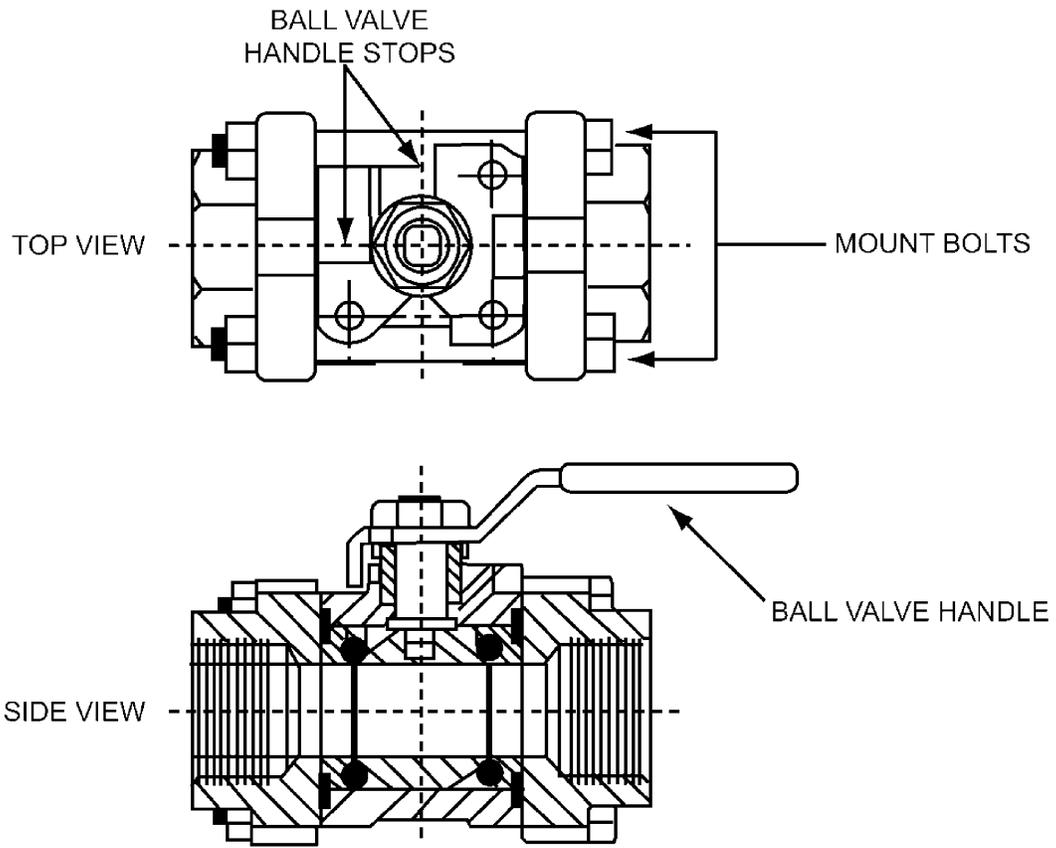


Figure 12. Burner Control Ball Valve

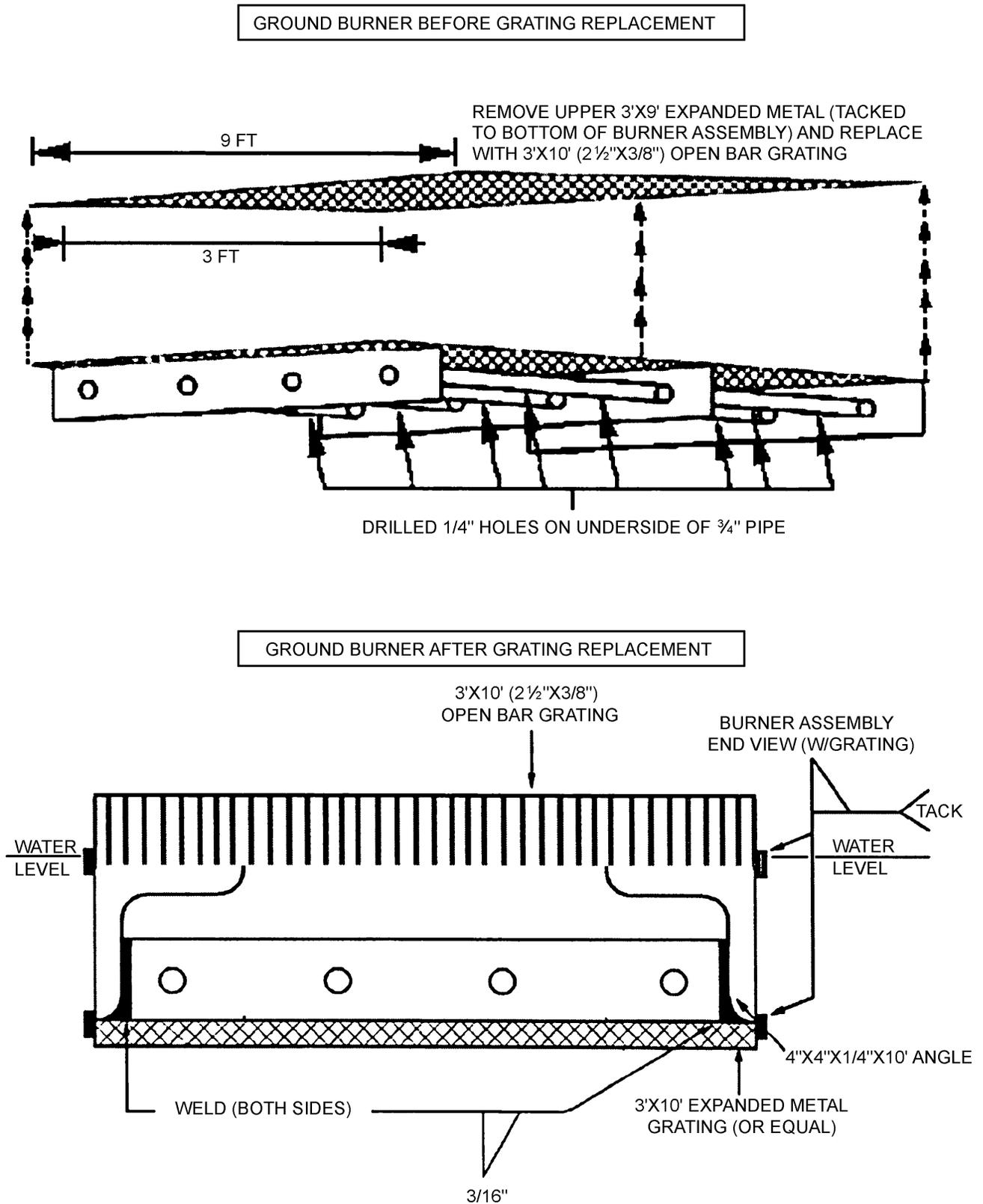


Figure 13. Ground Burner Grating Replacement

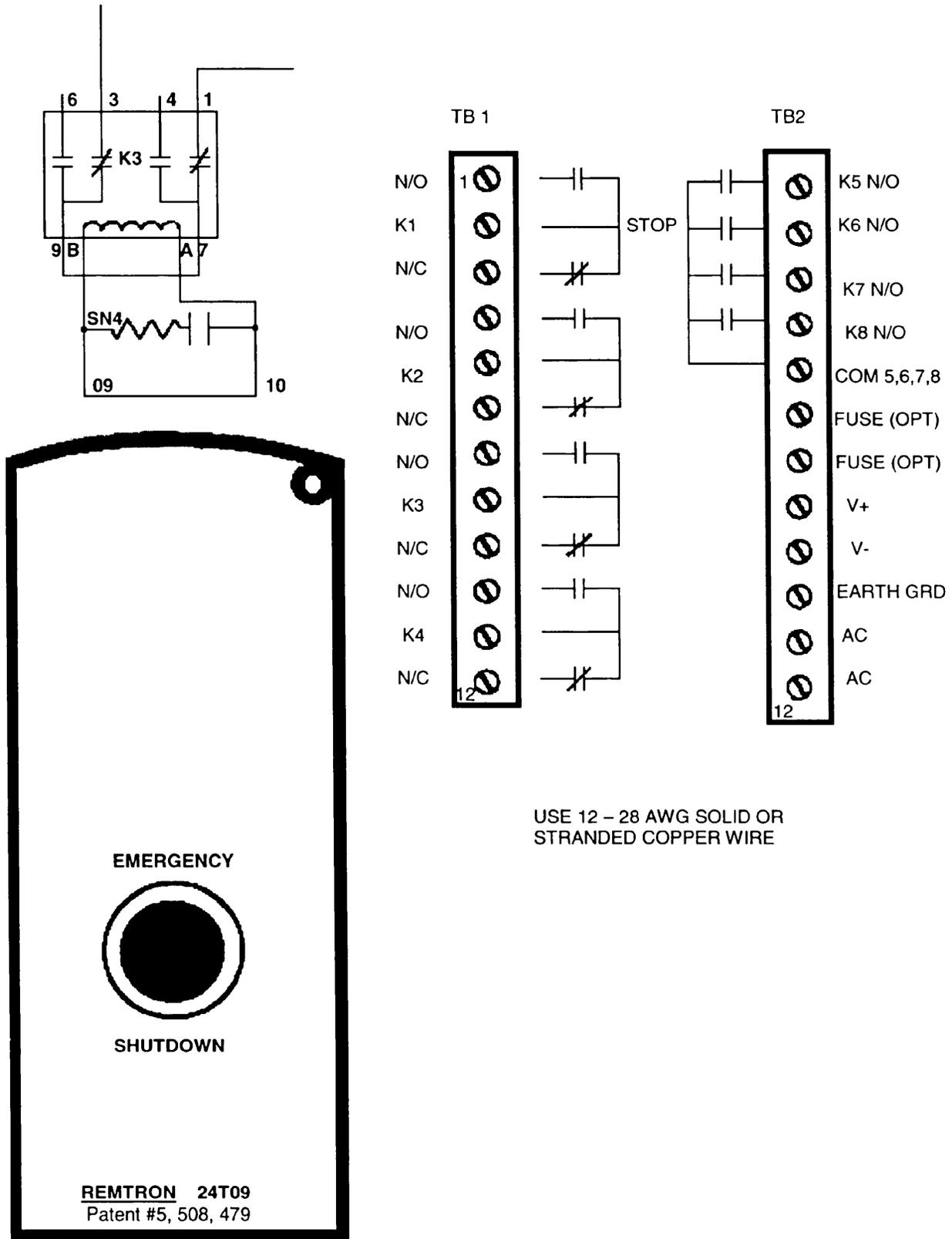


Figure 14. Radio Remote Control Emergency Stop System

Table 3. Maintenance Inspection and Test Schedule

SUBSYSTEM	ITEM	INSPECTION INTERVAL	INSPECT TEST	TEST INTERVAL	TEST HOW	REQ'D ACTION	ACTION TAKEN
PROPANE STORAGE (Modified version of NPGA * Bulletin # 106-83)	ASME TANK	EVERY 3 YEARS BY INSPECTOR	CORROSION CRACKS LEAKAGE	N/A	N/A	REPAIR REPLACE	
	EXCESS FLOW VALVES LPG LINES	N/A	N/A	ONCE A YEAR	MAKE SURE VALVE CYCLES	REPLACE	
	RELIEF VALVES IN TANK	N/A	N/A	EVERY 10 YEARS	BENCH TEST TO MANUFACTURERS SPECIFICATIONS	REPLACE	
	SESMIC SENSOR, IF APPLICABLE	SEMIANNUAL	CORROSION CRACKS LEAKAGE	SEMIANNUAL	ACTUATES AND CLOSES PNEUMATIC SHUTOFF	REPLACE	
SAFETY CONTROL STAND	N <sub>2</sub> ACCUMULATOR	EVERY 3 YEARS BY INSPECTOR	CORROSION CRACKS LEAKAGE	N/A	N/A	REPAIR REPLACE	
BURNER AREA	LEAK DETECTION SINGLE LINER	SEMIANNUAL	CORROSION CRACKS LEAKAGE	SEMIANNUAL	SAMPLE - IF DETECTION WELLS	CEASE OPS DETERMINE SOURCE	
IGNITION	CABLE SLEEVE/2000 BRAIDED CERAMIC	N/A	N/A	EVERY 5 YEARS	N/A	REPLACE WITH NEW CABLE SLEEVE	
WATER CON-SERVATION POND	Pumps (3) **	MANUFACTURER'S REQUIREMENTS	PROPER OPERATION	MANUFACTURER'S REQUIREMENTS	MANUFACTURER'S REQUIREMENTS	REPAIR REBUILD REPLACE	
* NATIONAL PROPANE GAS ASSOCIATION							
** No commonality among numerous pumps							
INSPECTED BY					DATE		



**SUBORDINATE WORK PACKAGE**

**OPERATION AND MAINTENANCE INSTRUCTIONS**

**FAULT ISOLATION**

**EFFECTIVITY: AIRCRAFT FIRE TRAINING FACILITY**

**LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 4 Consisting of the Following:

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SAFETY SUMMARY .....	2	Pond Pump Switch On and Appropriate Valves	
1 No Spark At Ignitor When Ignitor Switch Is On . . .	3	On Control Stand Open.....	4
2 No Propane At Burner When Appropriate Ignitor Switch Is On and Appropriate Burner Control Ball Valve Is Open. ....	3		

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NONE

**APPLICABLE TCTOS**

NONE

**CONSUMABLE MATERIALS**

NONE

## **APPLICABLE SUPPORT EQUIPMENT**

NONE

## **ILLUSTRATED SUPPORT EQUIPMENT**

NONE

## **FOREWORD**

This work package contains fault isolation procedures for Aircraft Fire Training Facility (AFTF). These procedures include electrical system, propane system, and water system fault isolation.

## **SAFETY SUMMARY**

Various steps in this work package may require personnel to be exposed to extremely high temperatures and open flames. It is imperative to wear appropriate protective clothing and to locate and be familiar with the operation of the auxiliary lockout switch. Failure to comply may cause serious injury or death to personnel.

1 NO SPARK AT IGNITOR WHEN IGNITOR SWITCH IS ON.

**NOTE**

- Make sure ignitor switches are wired to correct ignitors, solenoids, or pilot valves, if applicable.
  - Ignition cable which is not MIL-3702, improper cable splices, transformer connections that are not made with lug/spade connectors, and ignitor connections which are not made with proper pigtailed, will cause ignitor failures.
- a. Check power available to Services Rack. Have power provided if not.
  - b. At Services Rack, position main disconnect and all other switches ON. Also position all applicable circuit breakers ON.
  - c. Check if power is available from Services Rack to Transformer Cabinet and Control Stand. Repair either, or both, if necessary.
  - d. Position auxiliary lockout switch on Control Stand to ON, if applicable.
  - e. Position Main Ignition Switch on Control Stand to ON, if applicable.
  - f. Pull Emergency Shutdown Palm Switch OUT.
  - g. Turn and hold appropriate ignitor switch ON.
  - h. Record voltage available to the primary side of appropriate transformer. Repair if not 120 vac.
  - i. Check and record voltage available on secondary side of appropriate transformer. Repair if not 10 kvac.
  - j. Check and record voltage available to appropriate ignitor pigtail. Will be lower than 10 kvac, but higher than zero. Repair if zero.

- k. Check and record voltage available at appropriate ignitor. Will be lower than 10 kvac, but higher than zero. Repair if zero.

- l. Check physical condition of ignitor. Replace if damaged.

2 NO PROPANE AT BURNER WHEN APPROPRIATE IGNITOR SWITCH IS ON AND APPROPRIATE BURNER CONTROL BALL VALVE IS OPEN.

**NOTE**

Make sure storage tank contains a minimum of 2500 gals of propane. Liquid flow from the tank will stop when the tank capacity drops below 10% to 20% because the excess flow valve extends 6 to 10 inches (depends on manufacturer) up inside the tank.

- a. Check globe and excess flow valve in propane line from tank to control stand are open. Slowly OPEN globe valve if closed. If excess flow valve is closed, observe frost downstream, CLOSE globe valve and listen for excess flow valve to “clunk” open. Slowly REOPEN globe valve.
- b. Check manifold shutoff valve is OPEN. Slowly OPEN manifold shutoff valve if closed.
- c. Check solenoid valve in propane line to burner is opening. Cycle ignitor switch and listen for solenoid valve clicks. Look for frost downstream of solenoid valve and listen for solenoid valve humming or chattering. Replace solenoid if necessary.
- d. Check pilot valve for COAX valve in propane line to burner is functioning. Cycle emergency shutdown switch IN and OUT, or ignitor switch ON and OFF, listen for pilot valve clicking and N<sub>2</sub> gas venting. Make sure 60-120 psig N<sub>2</sub> is available for COAX functioning. Replace pilot if necessary or replace N<sub>2</sub> bottles if empty.

**3 NO WATER IN BURN AREA WITH CONSERVATION POND PUMP SWITCH ON AND APPROPRIATE VALVES ON CONTROL STAND OPEN.**

**NOTE**

Make sure conservation pond water level is at design freeboard.

- a. Check power available to pump switch and pump. Provide power to switch, from switch, and to pump if required.
- b. Check pump is running. If not, repair/replace pump.
- c. Check pump suction and discharge lines are clear. Remove obstructions if necessary.
- d. Check bypass valve is CLOSED. Close bypass valve, if open.
- e. Cycle each water control valve in turn to make sure valves are OPENING/CLOSING as required. Make note of change in water flow, if any. Repair/replace valve(s) controls if necessary.

**WORK PACKAGE**

**OPERATION AND MAINTENANCE INSTRUCTIONS**  
**FACILITY OVERVIEWS**  
**EFFECTIVITY: AIRCRAFT FIRE TRAINING FACILITY**

**LIST OF EFFECTIVE WP PAGES**

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4 Andrews AFB Camp Spring, Maryland	7	24 Fargo ANGB Fargo, North Dakota *(3)	27
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16 Dyess AFB Abilene, Texas *(4)	19	36 Incirlik AB Turkey *	39
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20 Ellsworth AFB Rapid City, South Dakota *(4)	23	40 Kirtland AFB Albuquerque, New Mexico	43

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\* Drawing not submitted. (See FOREWORD)

- (1) COTS Mobile Fire Training System
- (2) Unique designs not covered by this TO
- (3) COTS Fixed Fire Training System

- (4) JP-8 Fueled not covered by this TO
- (5) Other DOD AFTF Sites:
- (6) Not Projected

**LIST OF TABLES**

NONE

**REFERENCE MATERIAL REQUIRED**

DOCUMENT NUMBER	TITLE
WP 009 00	GOODFELLOW AFB TEXAS OPERATING PROCEDURES
WP 010 00	THULE AFB GREENLAND OPERATING PROCEDURES

**APPLICABLE TCTOS**

NONE

**CONSUMABLE MATERIALS**

NONE

**APPLICABLE SUPPORT EQUIPMENT**

NONE

**ILLUSTRATED SUPPORT EQUIPMENT**

NONE

## FOREWORD

This work package contains the site drawings and their locations for the Aircraft Fire Training Facility (AFTF). This work package does not include Goodfellow AFB TX and Thule AB Greenland due to their distinct engineering differences and operations. Those site drawings are located elsewhere in WP 009 00 and WP 010 00 respectively.

Missing site drawings are attributed to various reasons such as site under construction, site construction not started, site under modification, or site under engineering review. These sites will be annotated by an asterisk (\*). Numbers in parenthesis ( ) in the List of Illustrations of this WP indicate various facilities not covered in this TO.

## SAFETY SUMMARY

NONE

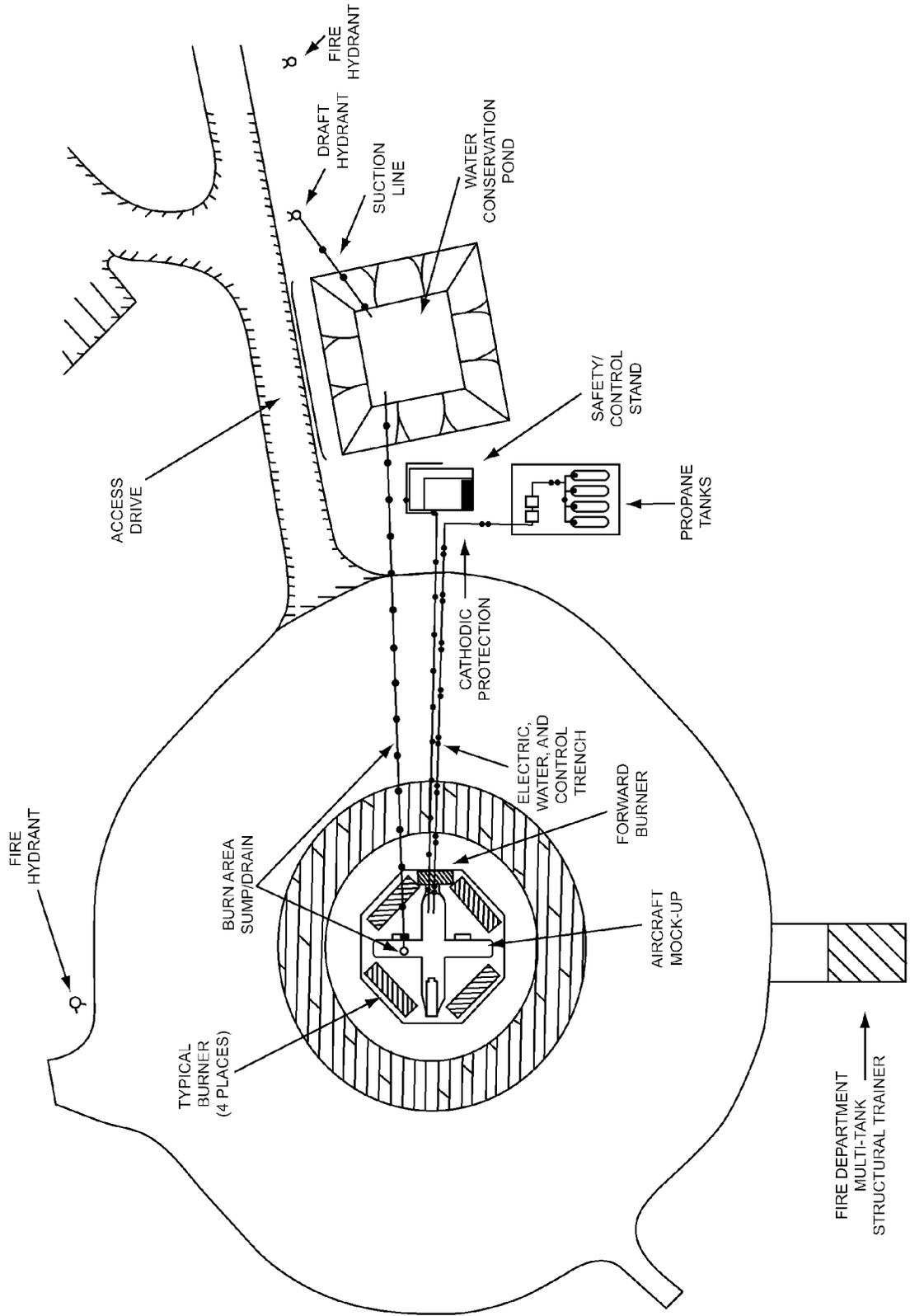


Figure 1. Alpena ANG  
Alpena CRTC, Michigan

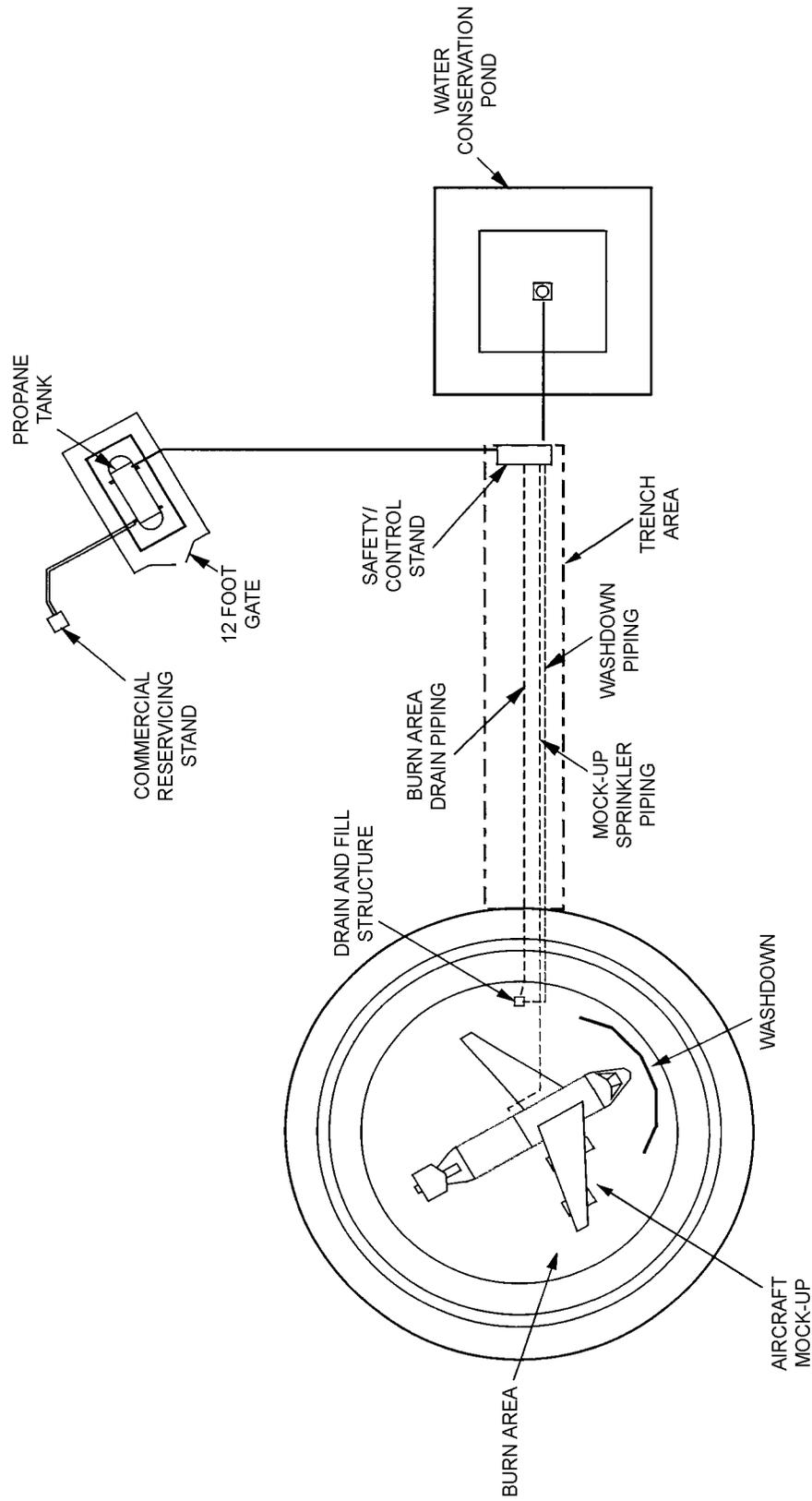


Figure 2. Altus AFB  
Altus, Oklahoma

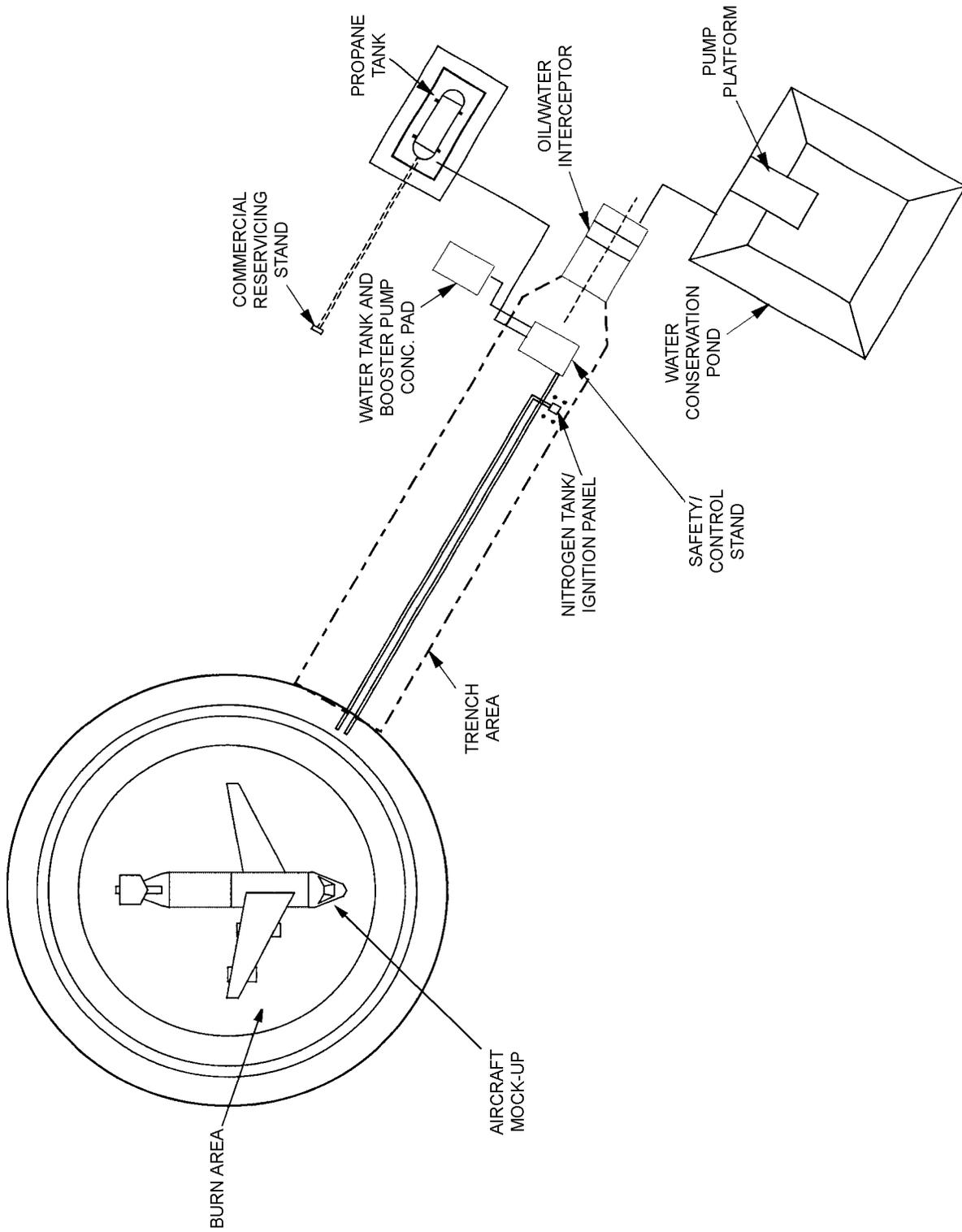
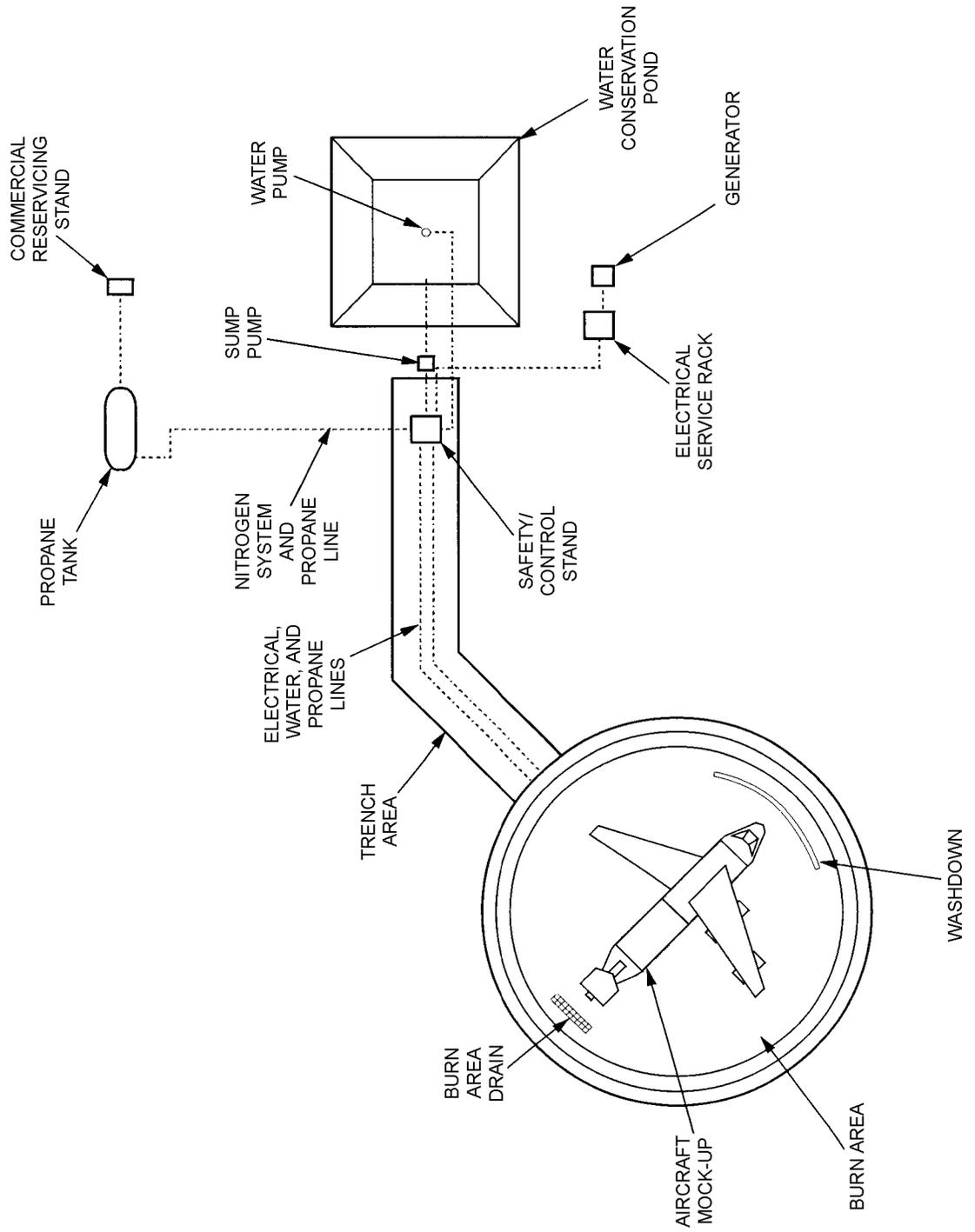


Figure 3. Anderson AFB  
Guam



**Figure 4. Andrews AFB  
Camp Spring, Maryland**

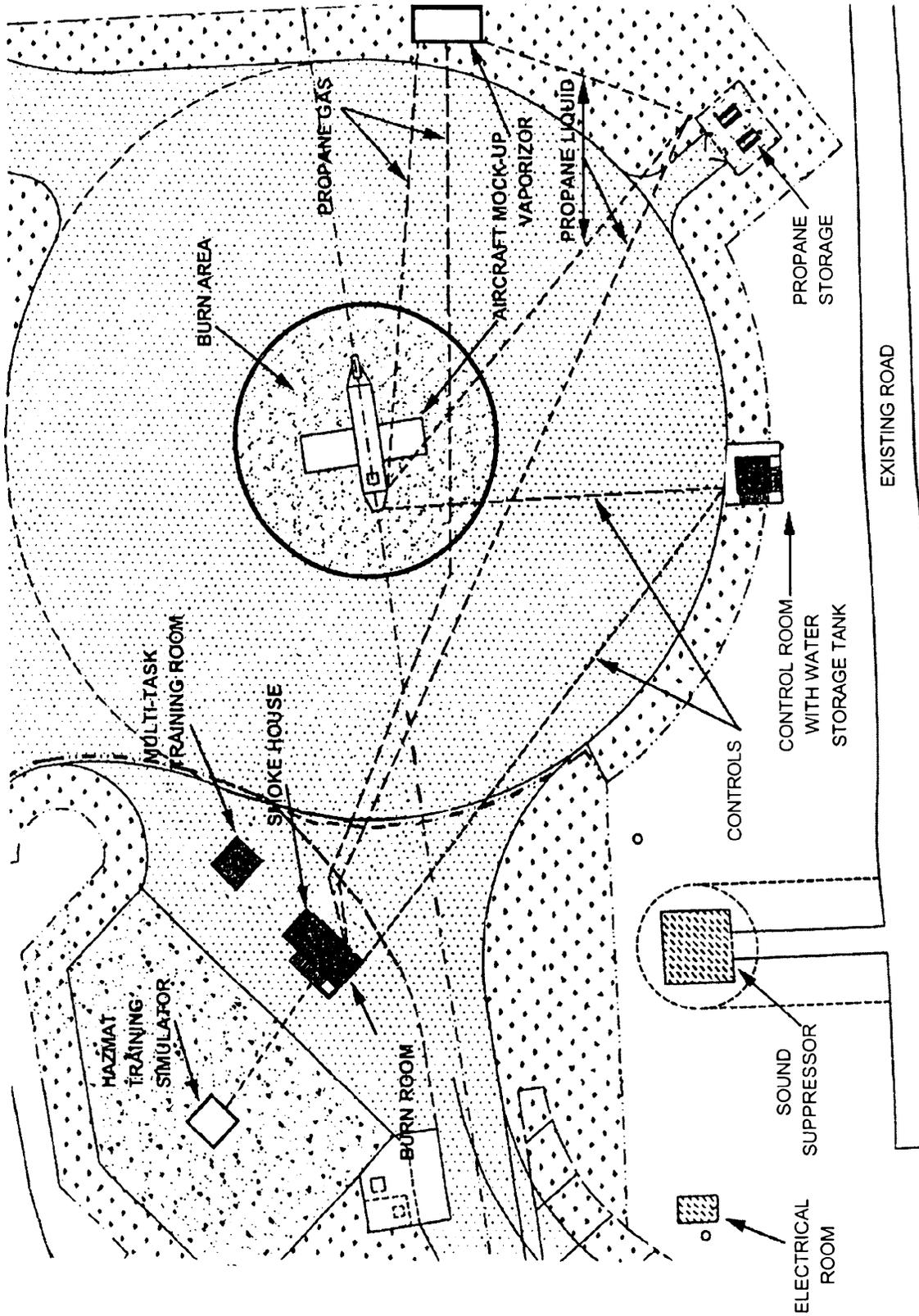
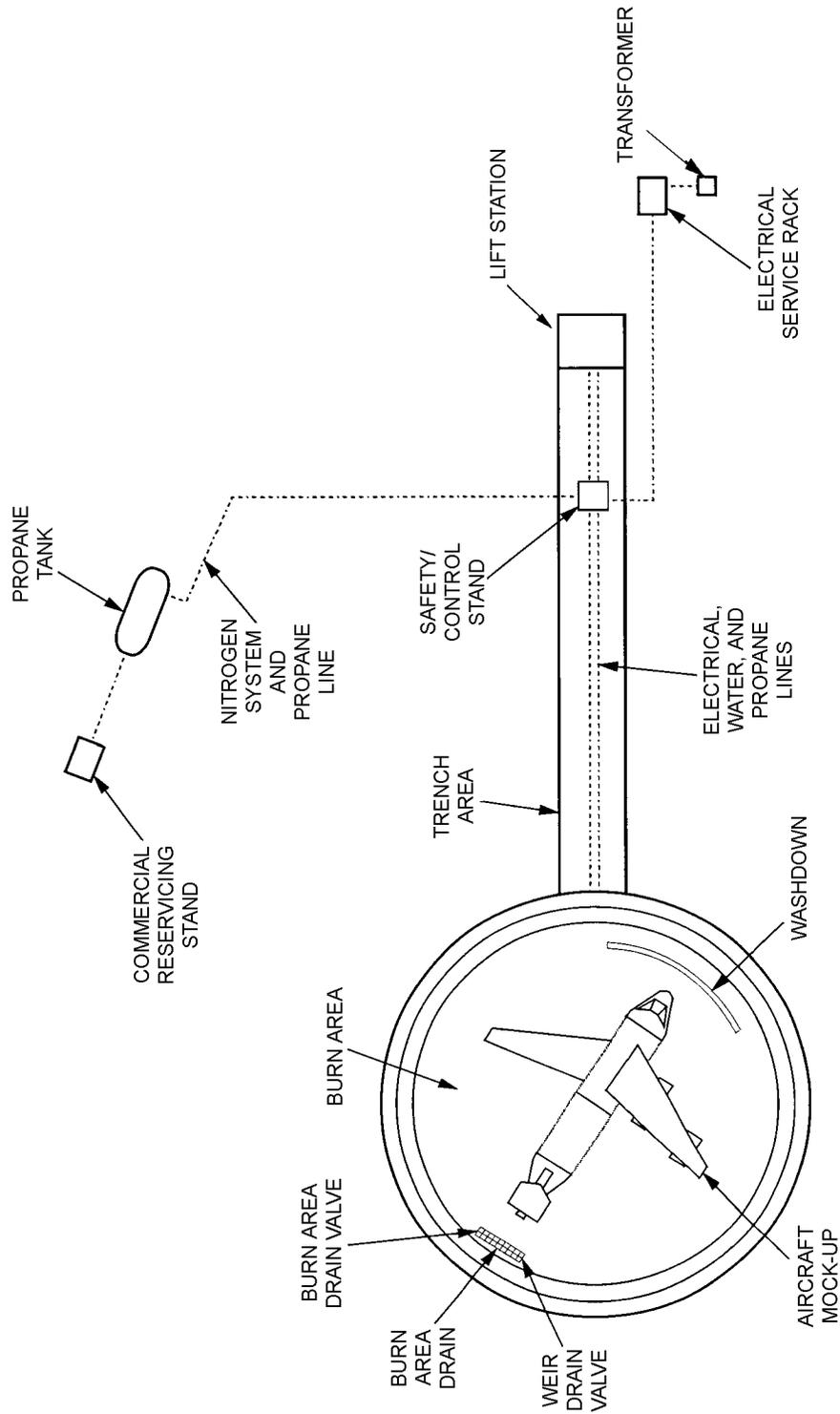


Figure 5. Aviano AB  
Aviano, Italy



**Figure 6. Barksdale AFB  
Shreveport, Louisiana**

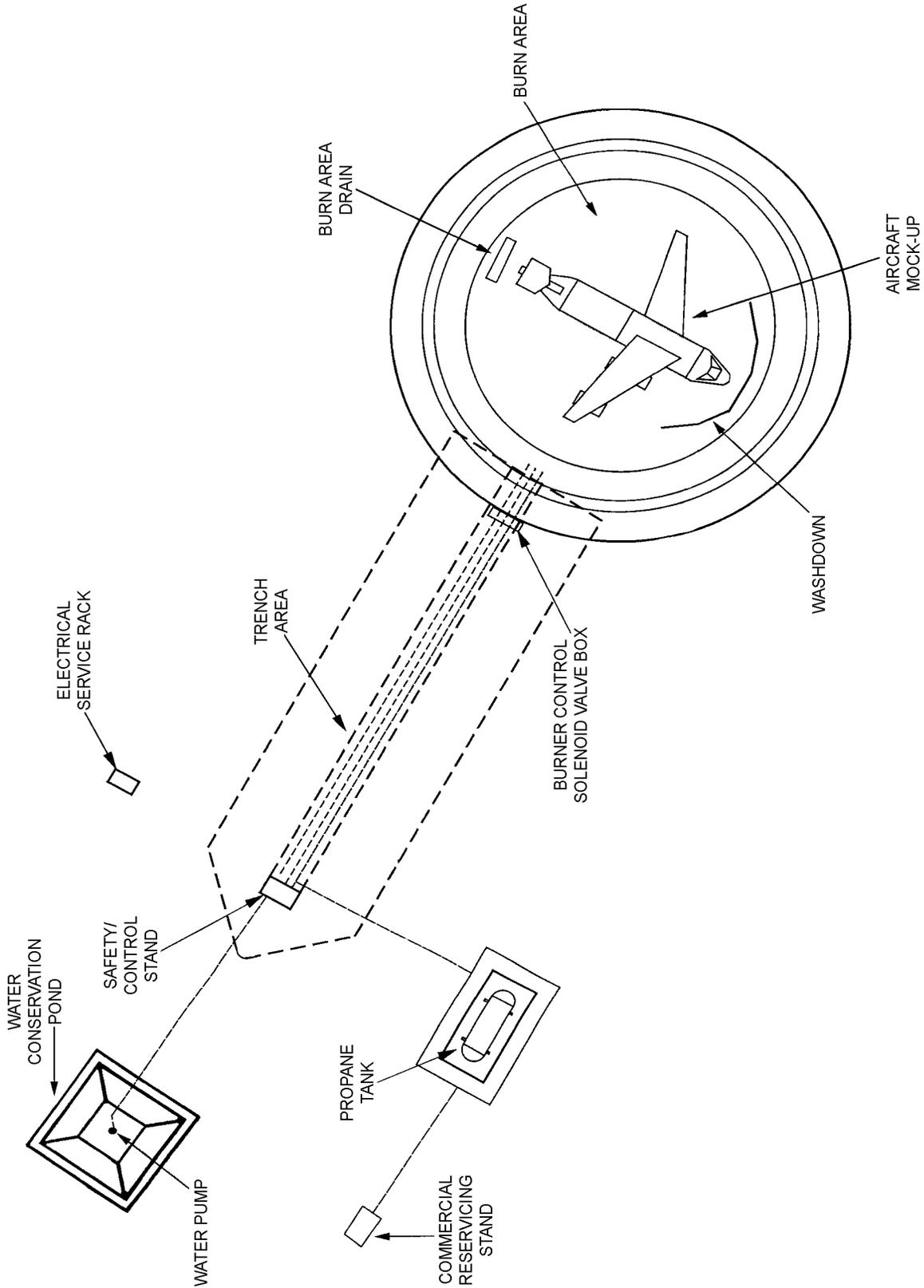


Figure 7. Beale AFB  
Marysville, California

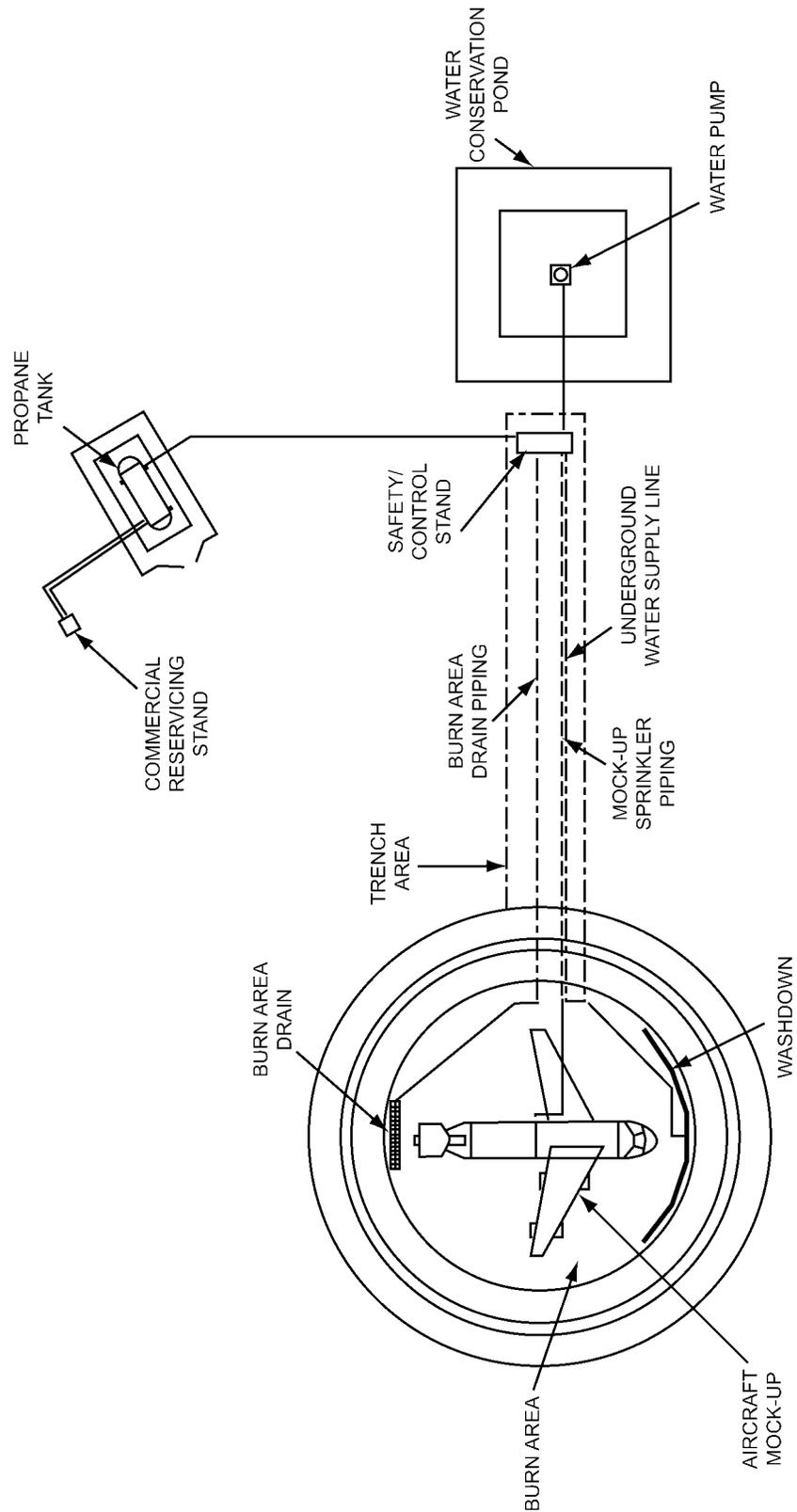
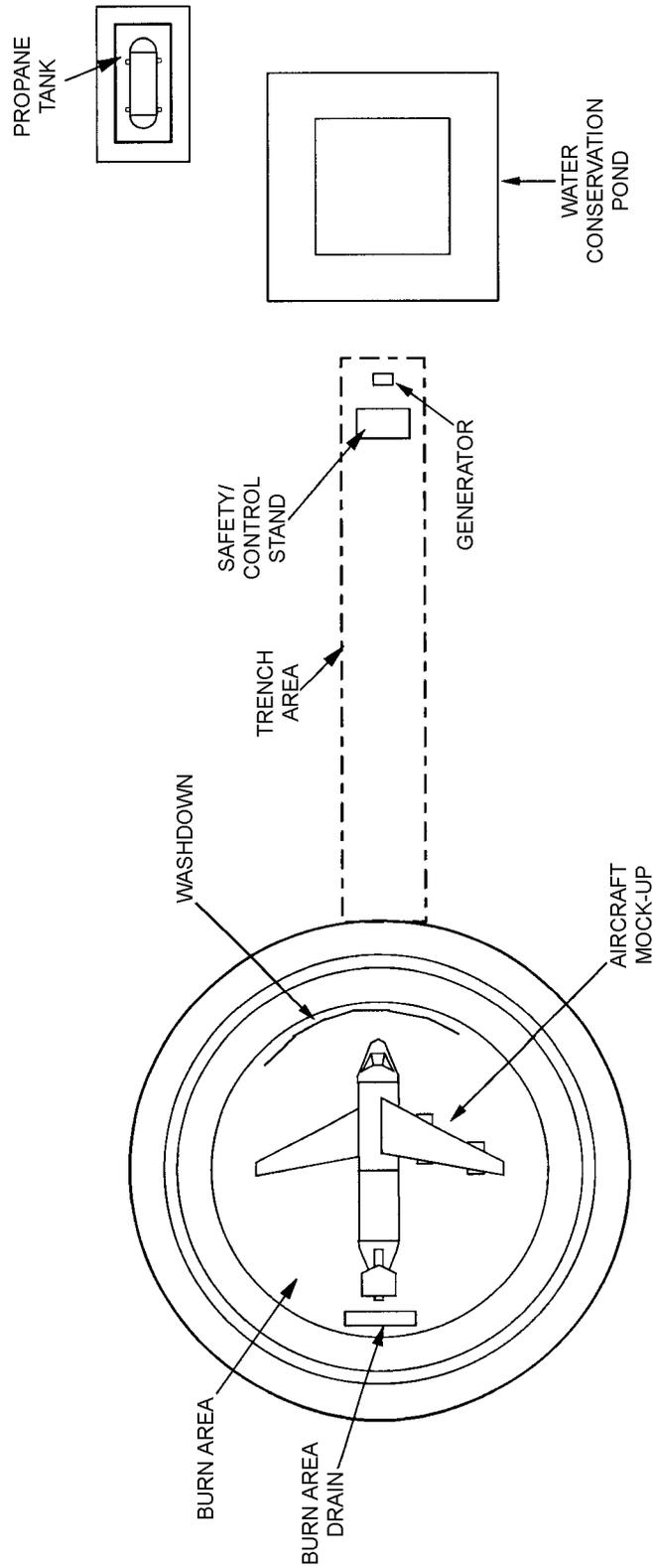
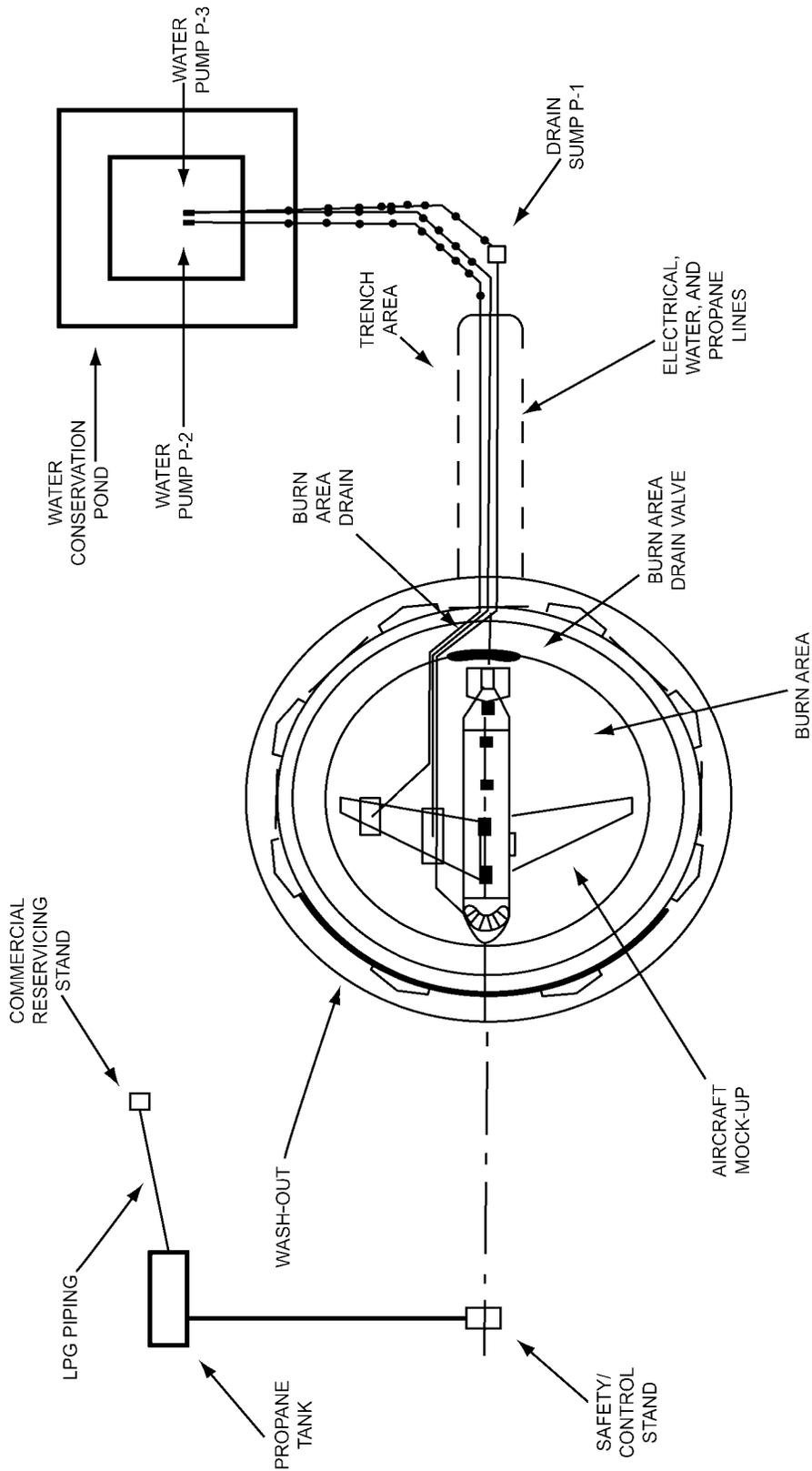


Figure 8. Cape Canaveral AS  
Cape Canaveral, Florida



**Figure 9. Cannon AFB  
Clovis, New Mexico**



**Figure 10. Charleston AFB  
Charleston, South Carolina**

**DRAWING NOT SUBMITTED**

**Figure 11. Charlotte ANGB  
Charlotte, North Carolina**

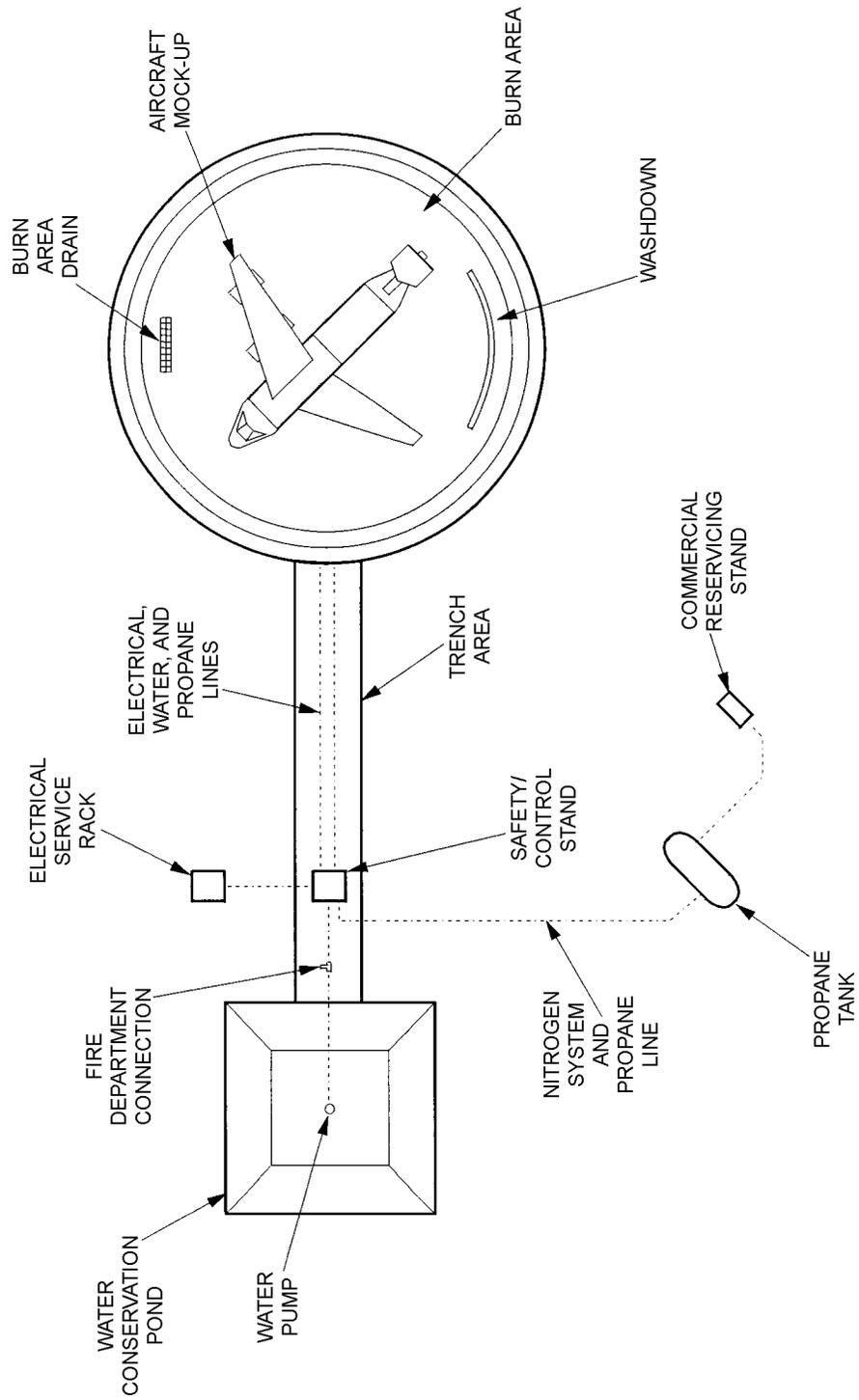


Figure 12. Columbus AFB  
Columbus, Mississippi

**DRAWING NOT SUBMITTED**

**Figure 13. Davis-Monthan AFB  
Tucson, Arizona**

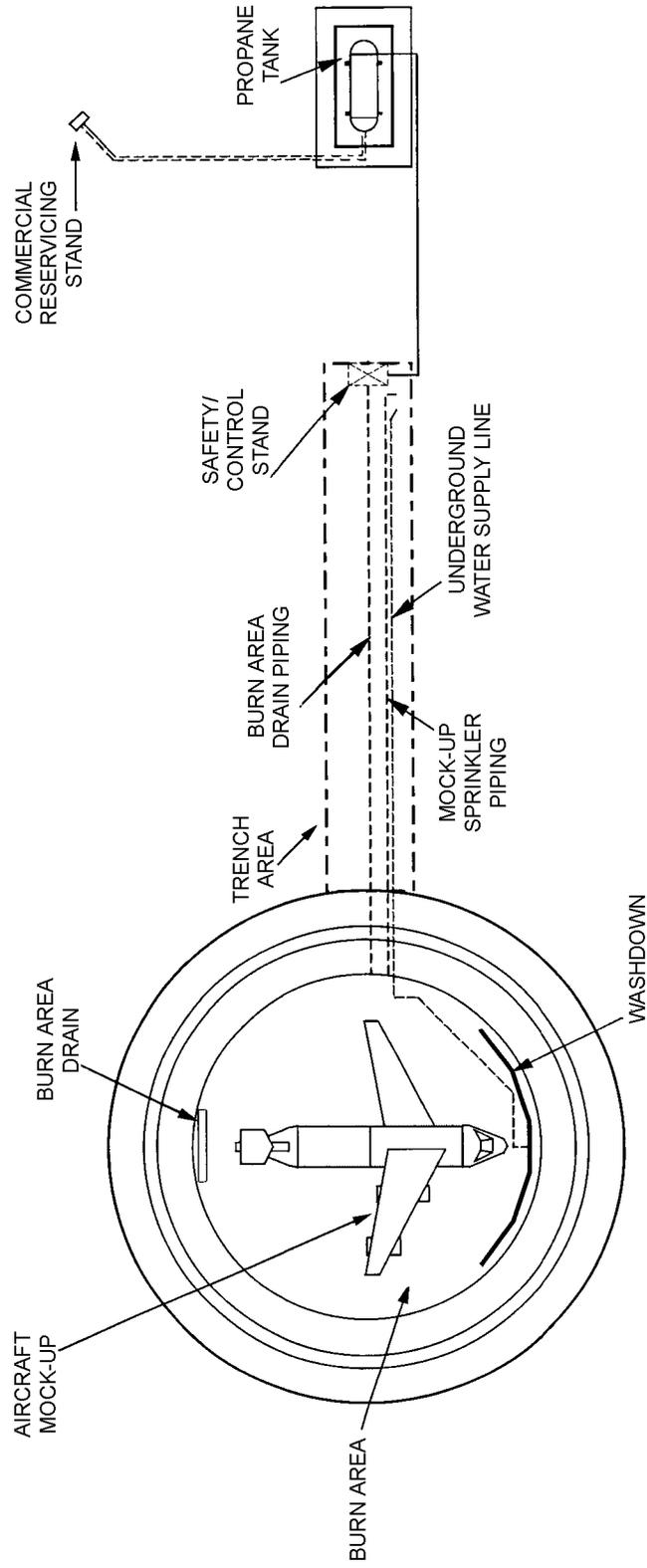


Figure 14. Dobbins AFB  
Marietta, Georgia

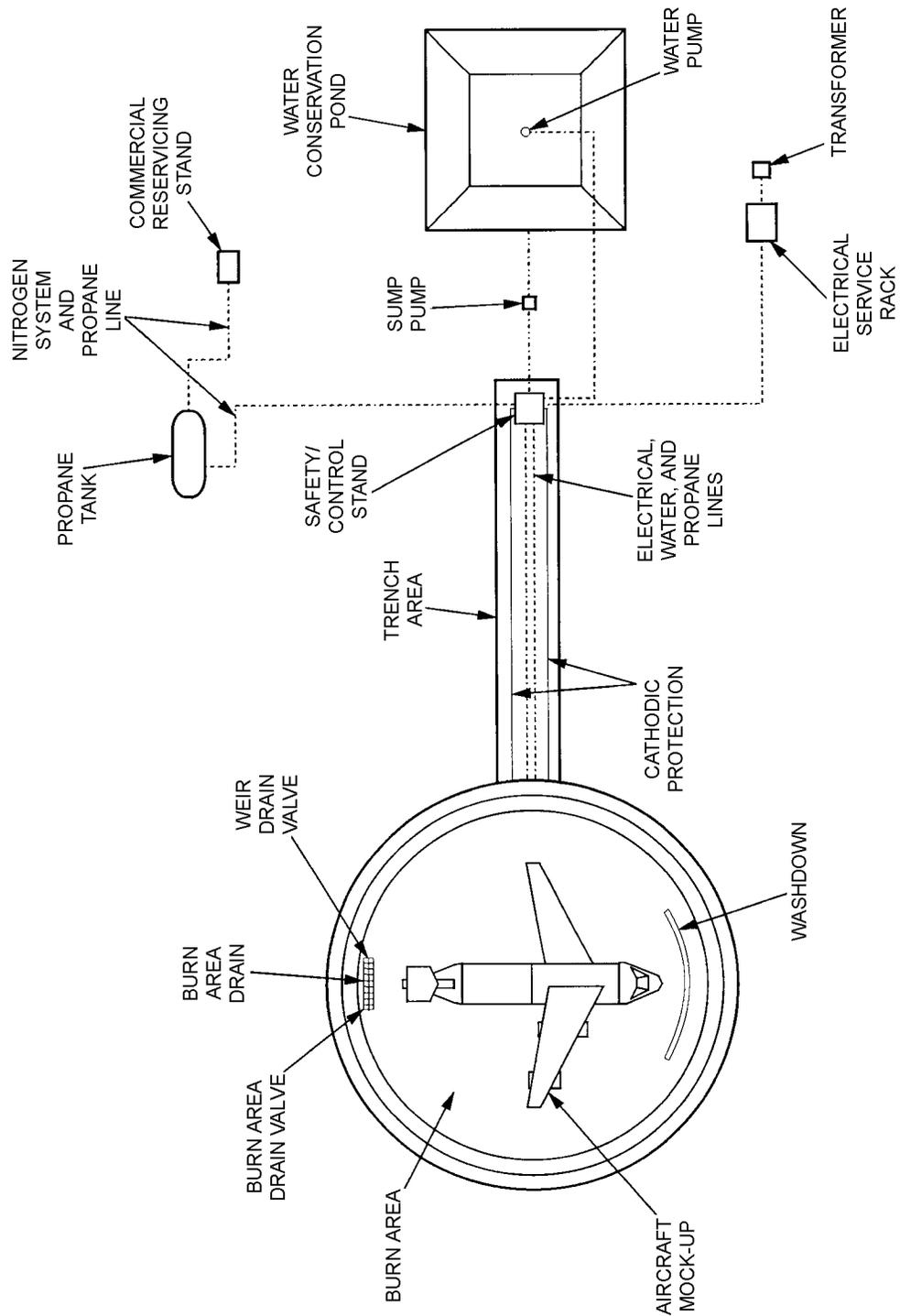
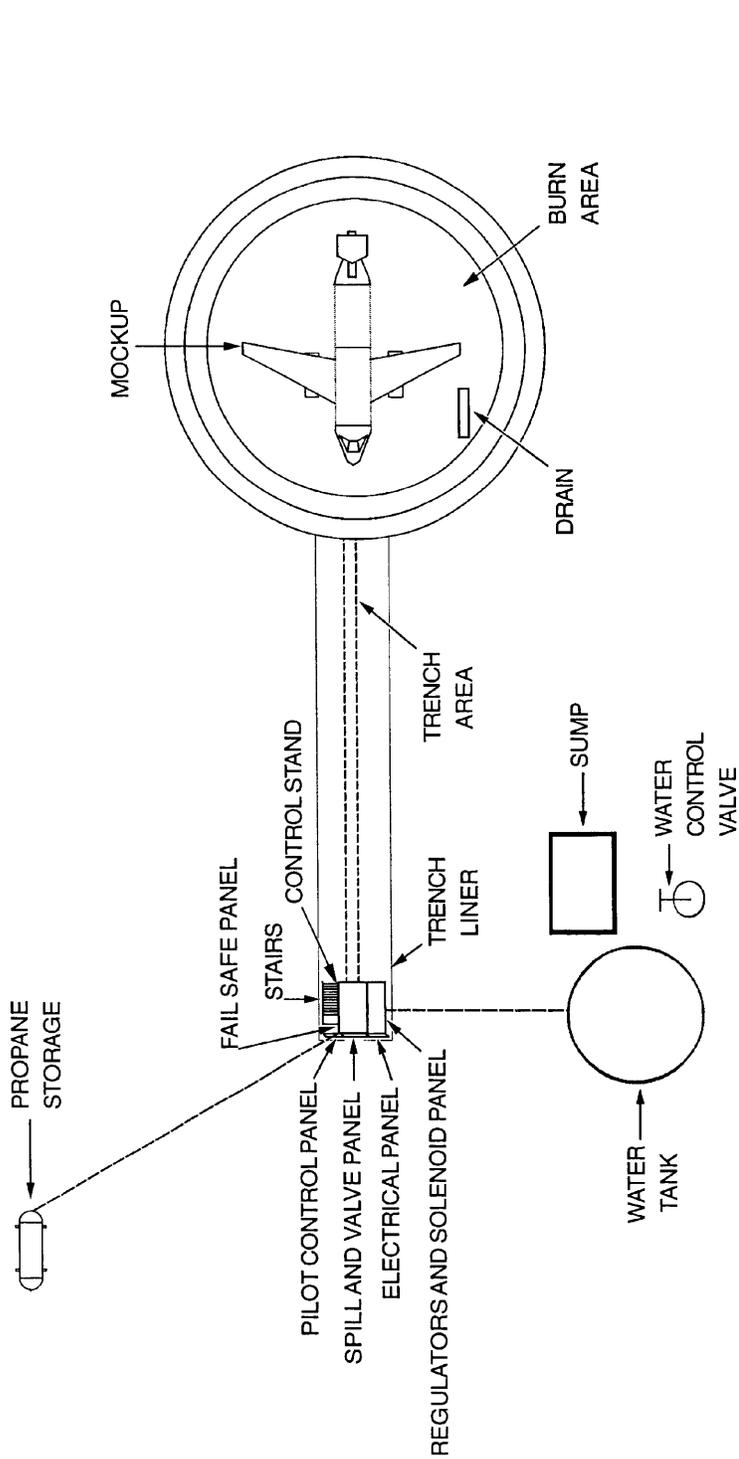


Figure 15. Dover AFB  
Dover, Delaware

**DRAWING NOT SUBMITTED**

**Figure 16. Dyess AFB  
Abilene, Texas**



- INTERNAL BURNERS:  
 FLIGHTDECK  
 CABIN  
 APU
- EXTERNAL BURNERS:  
 6 GROUND  
 RH WING ENGINE  
 LH WING ENGINE  
 HIGH TAIL ENGINE  
 RH WHEEL BRAKE  
 LH WHEEL BRAKE

NOTE:  
 This AFTF is a partially local manufactured and partially ICS designed site. Operating this site will be operated under the established ICS operating and maintenance procedures.

Figure 17. Edwards AFB  
 Rosamond, California

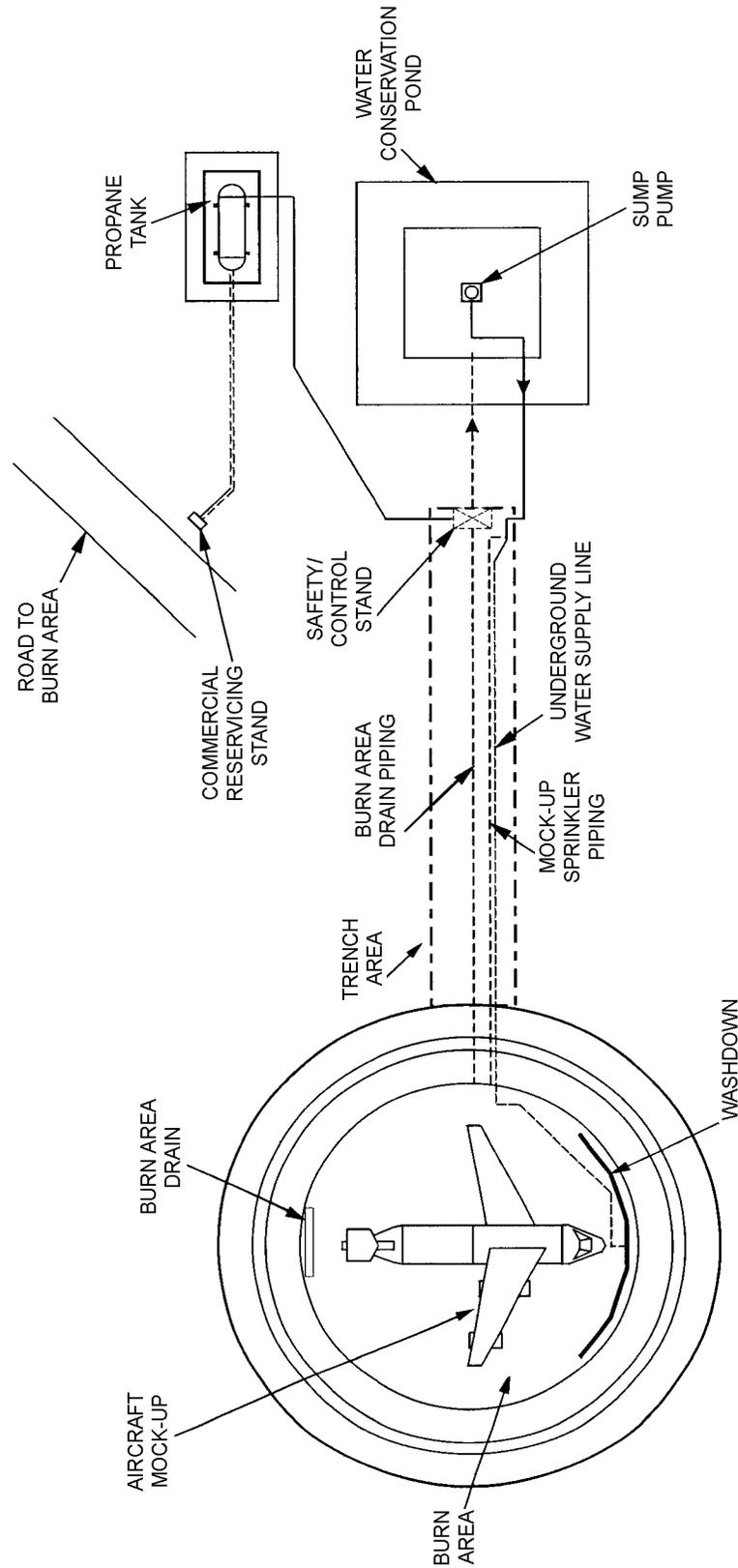


Figure 18. Eglin AFB  
Fort Walton Beach, Florida

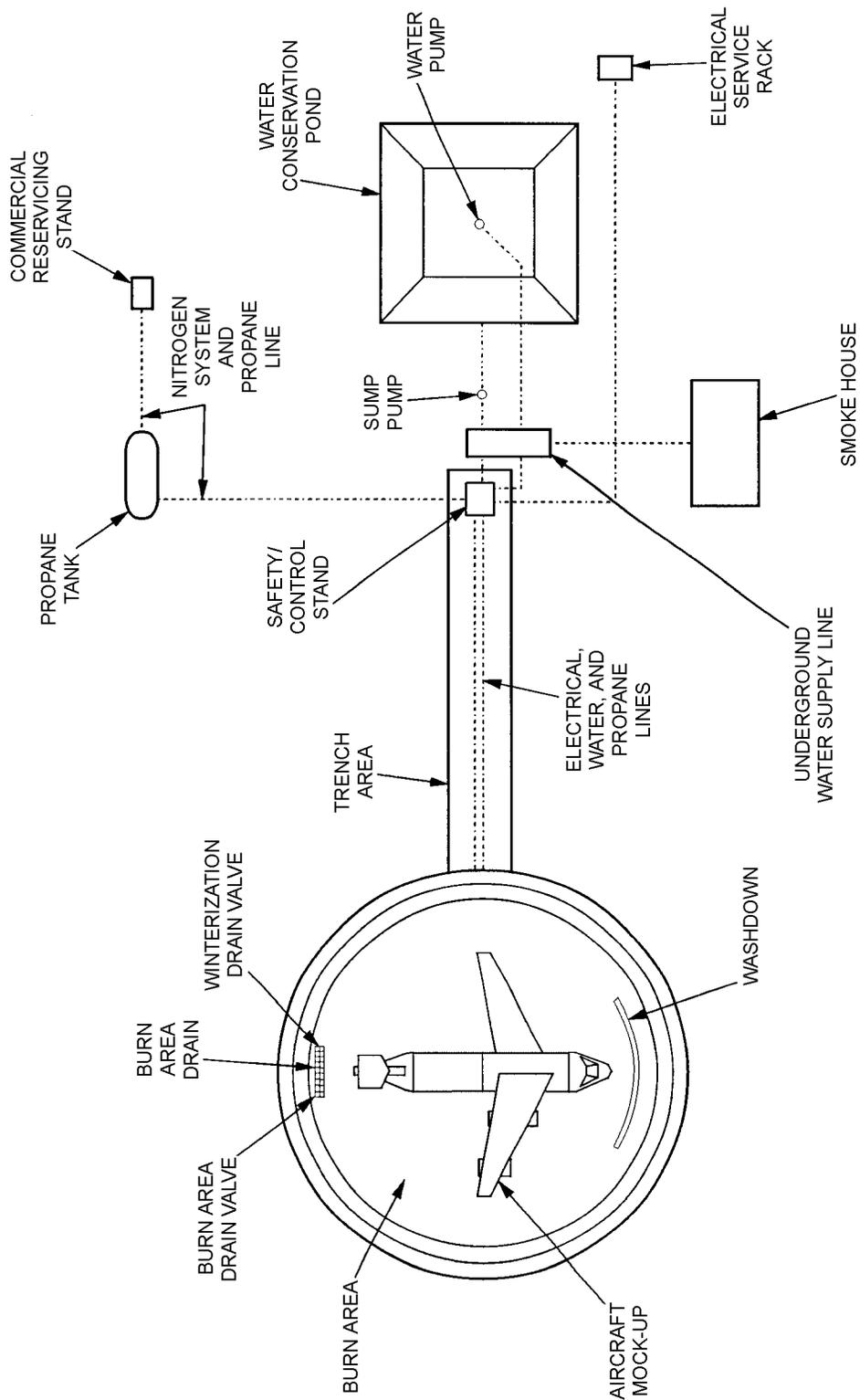
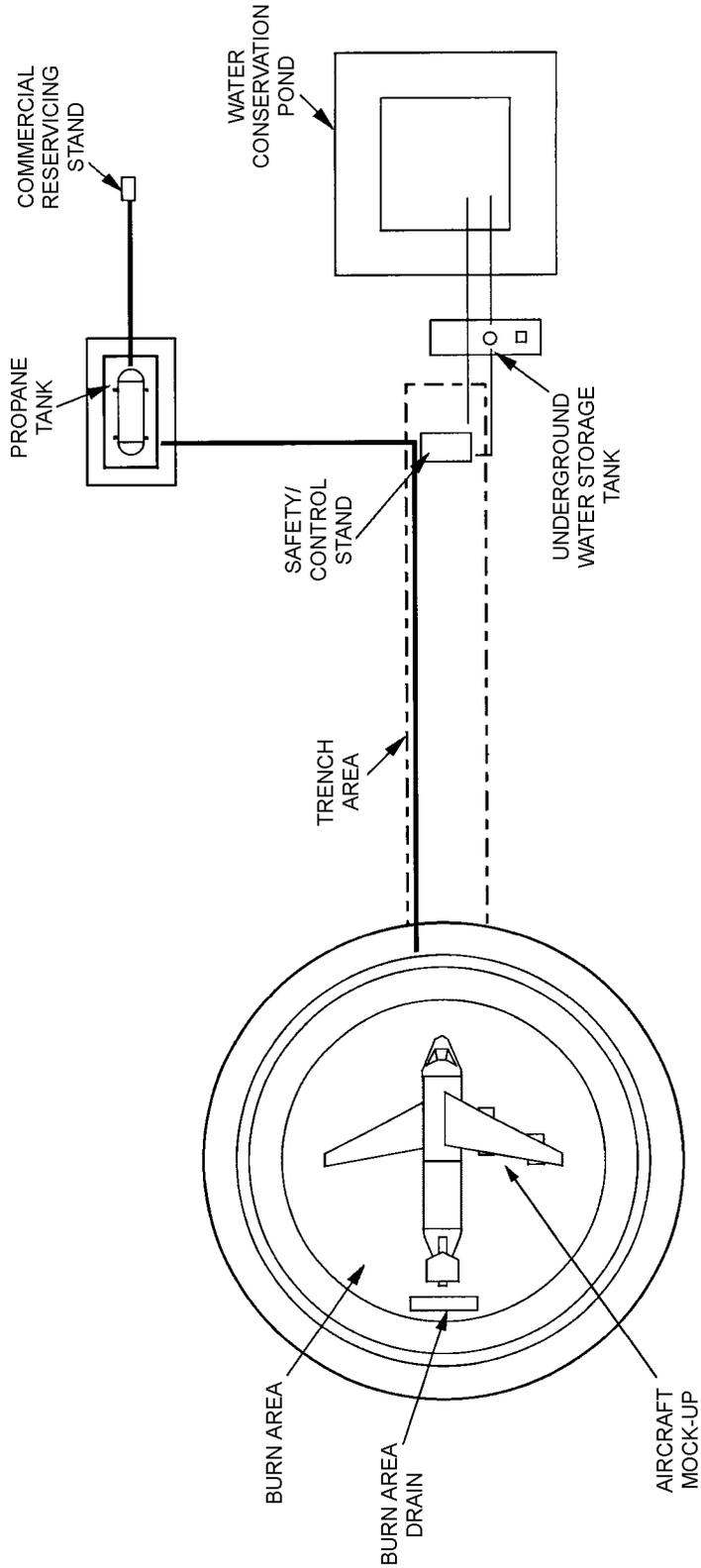


Figure 19. Eielson AFB  
Fairbanks, Alaska

**DRAWING NOT SUBMITTED**

**Figure 20. Ellsworth AFB  
Rapid City, South Dakota**



**Figure 21. Elmendorf AFB  
Anchorage, Alaska**

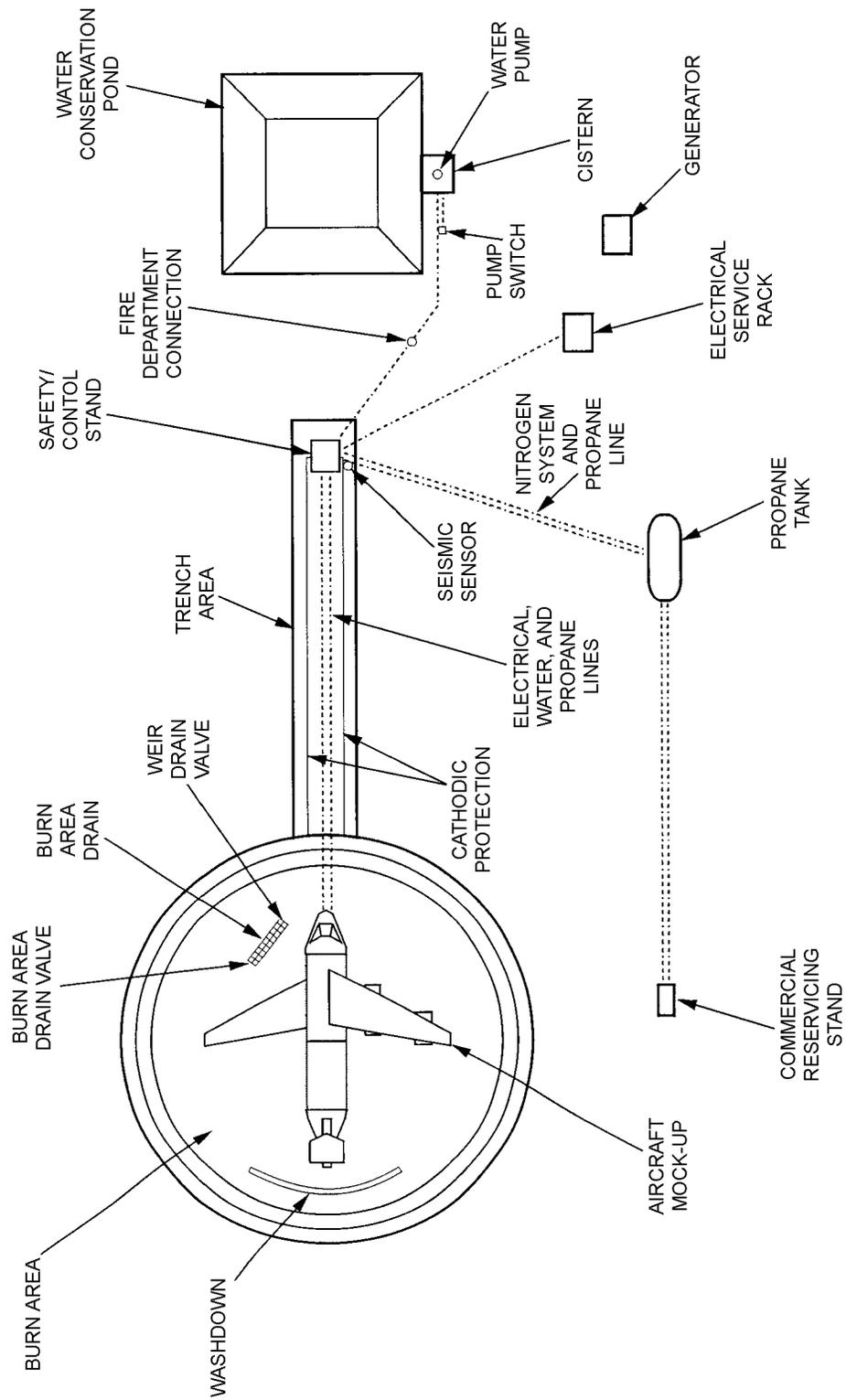


Figure 22. Fairchild AFB  
Spokane, Washington

**THIS SITE USES AN ICS MOBILE TRAINER  
NO DRAWING REQUIRED**

**Figure 23. Fairford AB  
United Kingdom**

**DRAWING NOT SUBMITTED**

**Figure 24. Fargo ANGB  
Fargo, North Dakota**

**DRAWING NOT SUBMITTED**

**Figure 25. F.E. Warren AFB  
Cheyenne, Wyoming**

**DRAWING NOT SUBMITTED**

**Figure 26. Fort Smith ANGB  
Van Buren, Arkansas**

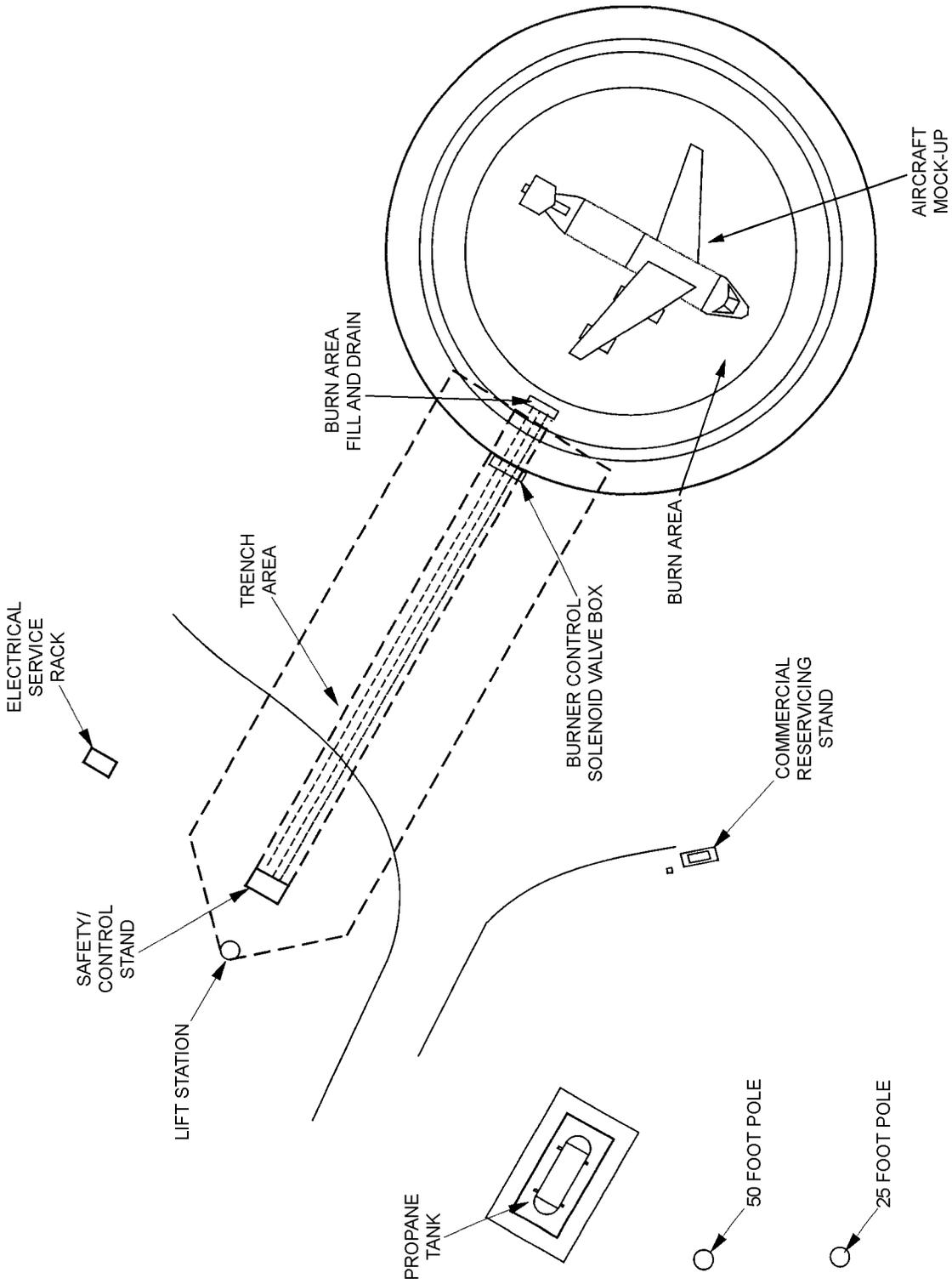
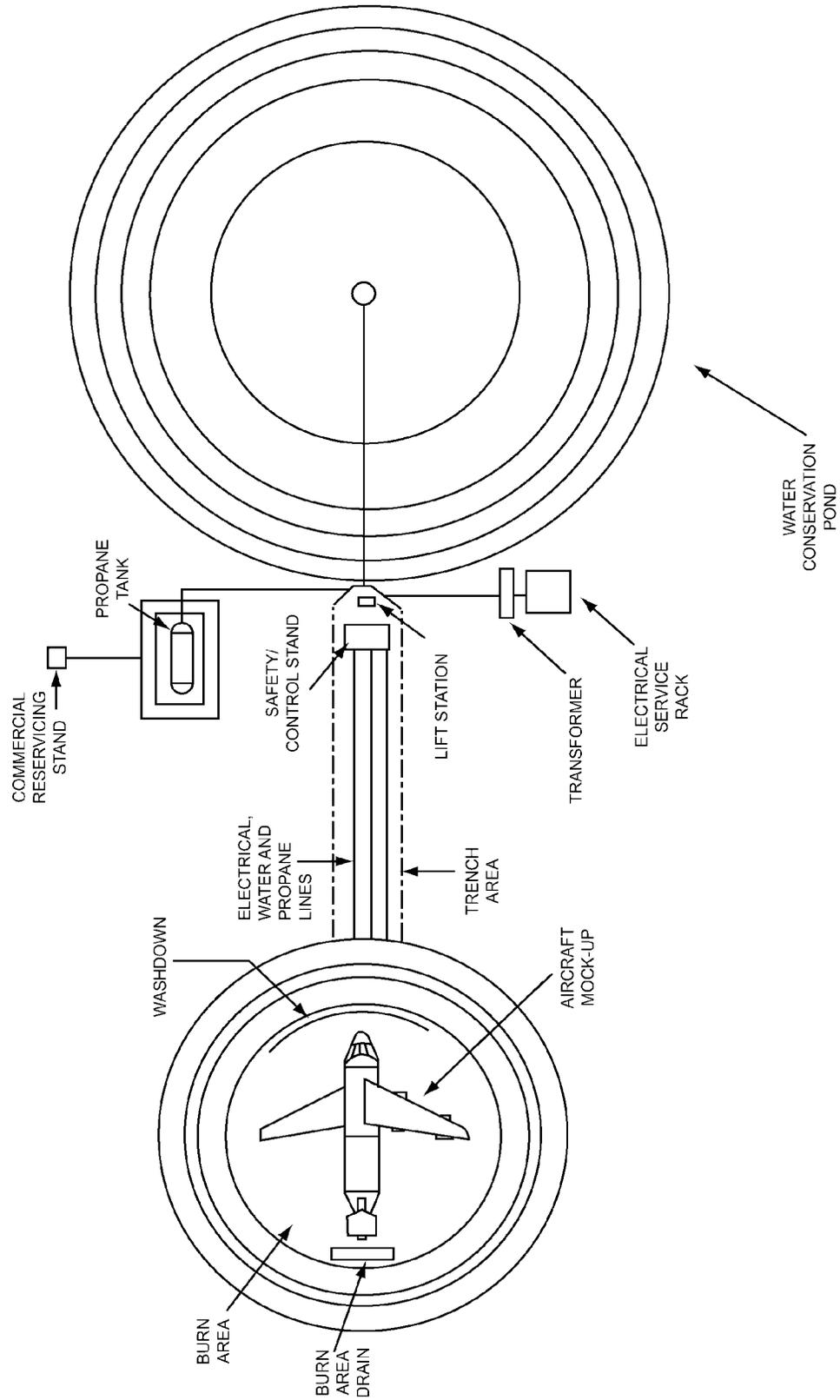


Figure 27. General Mitchell AFRB  
Milwaukee, Wisconsin



**Figure 28. Grand Forks AFB  
Grand Forks, North Dakota**

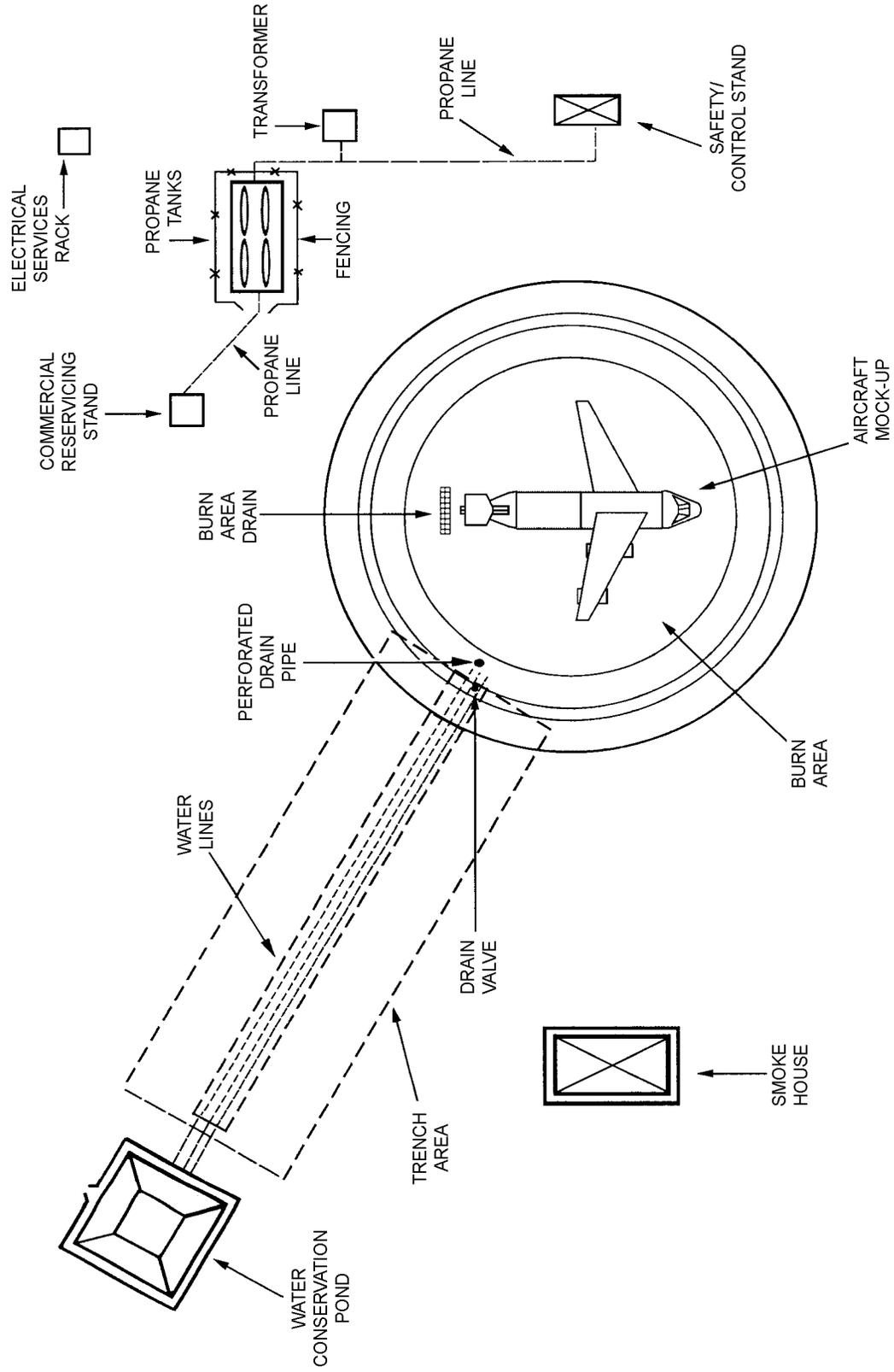


Figure 29. Grissom AFRB  
Kokomo, Indiana

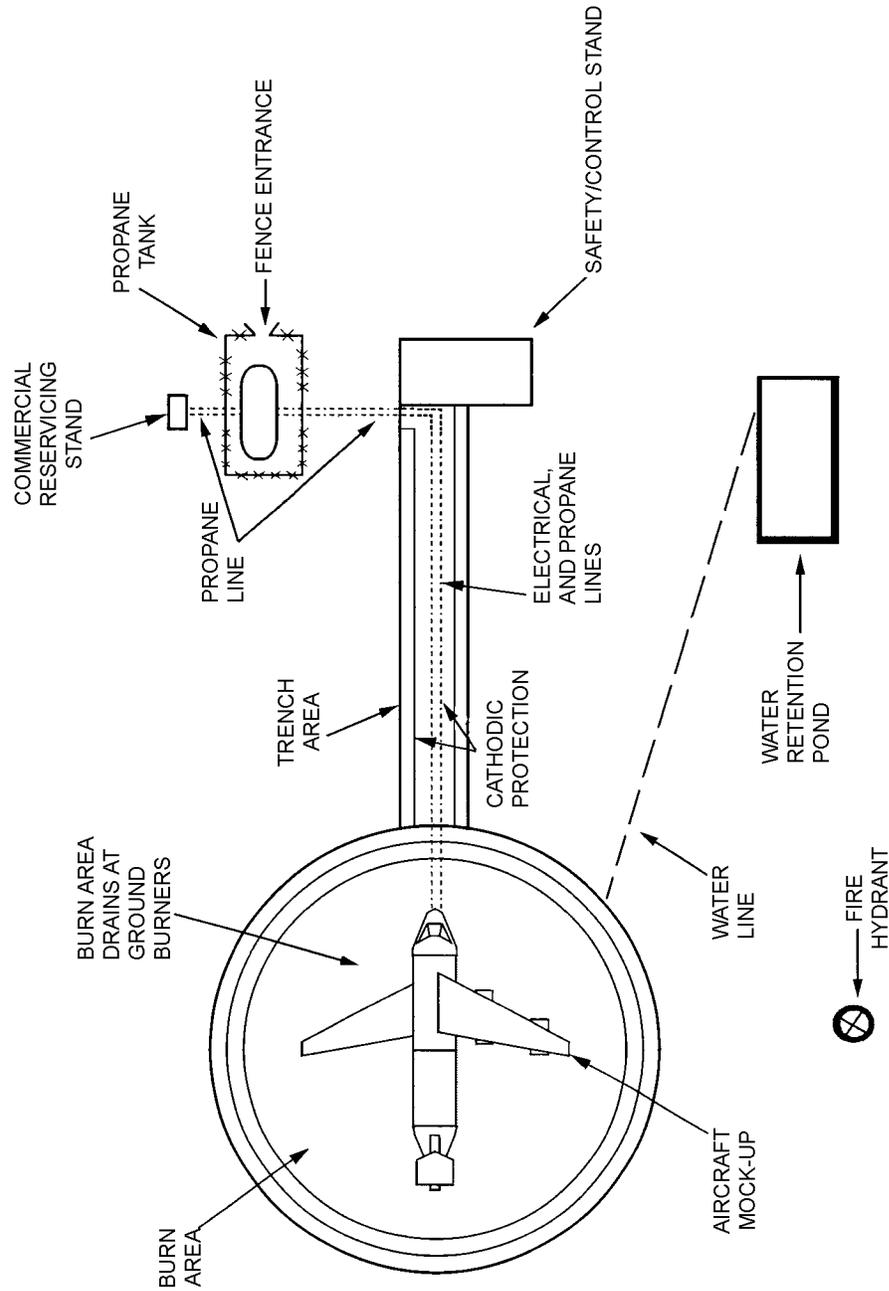


Figure 30. Gulfport ANGB  
Gulfport, Mississippi

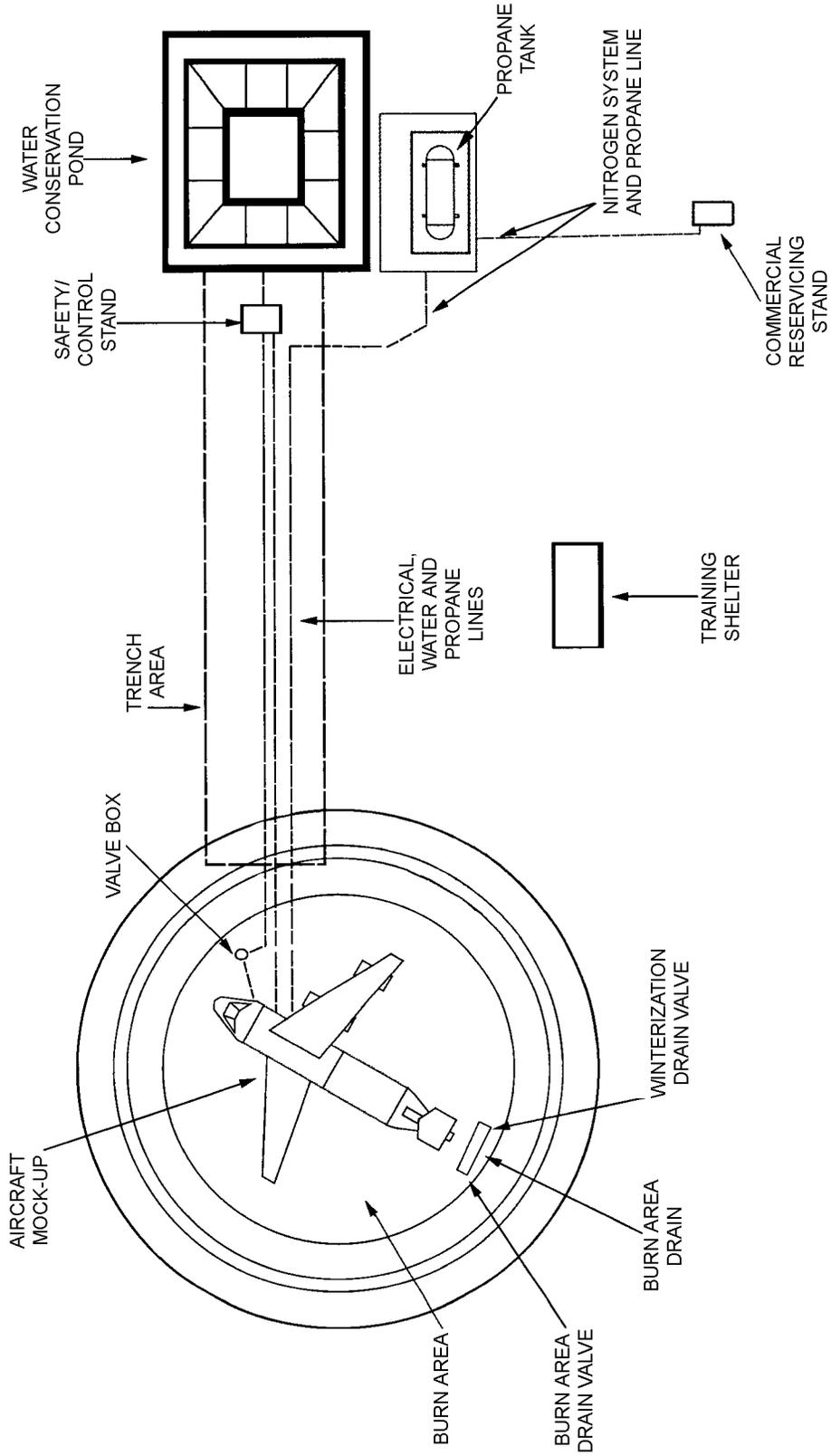


Figure 31. Hickam AFB  
Honolulu, Hawaii

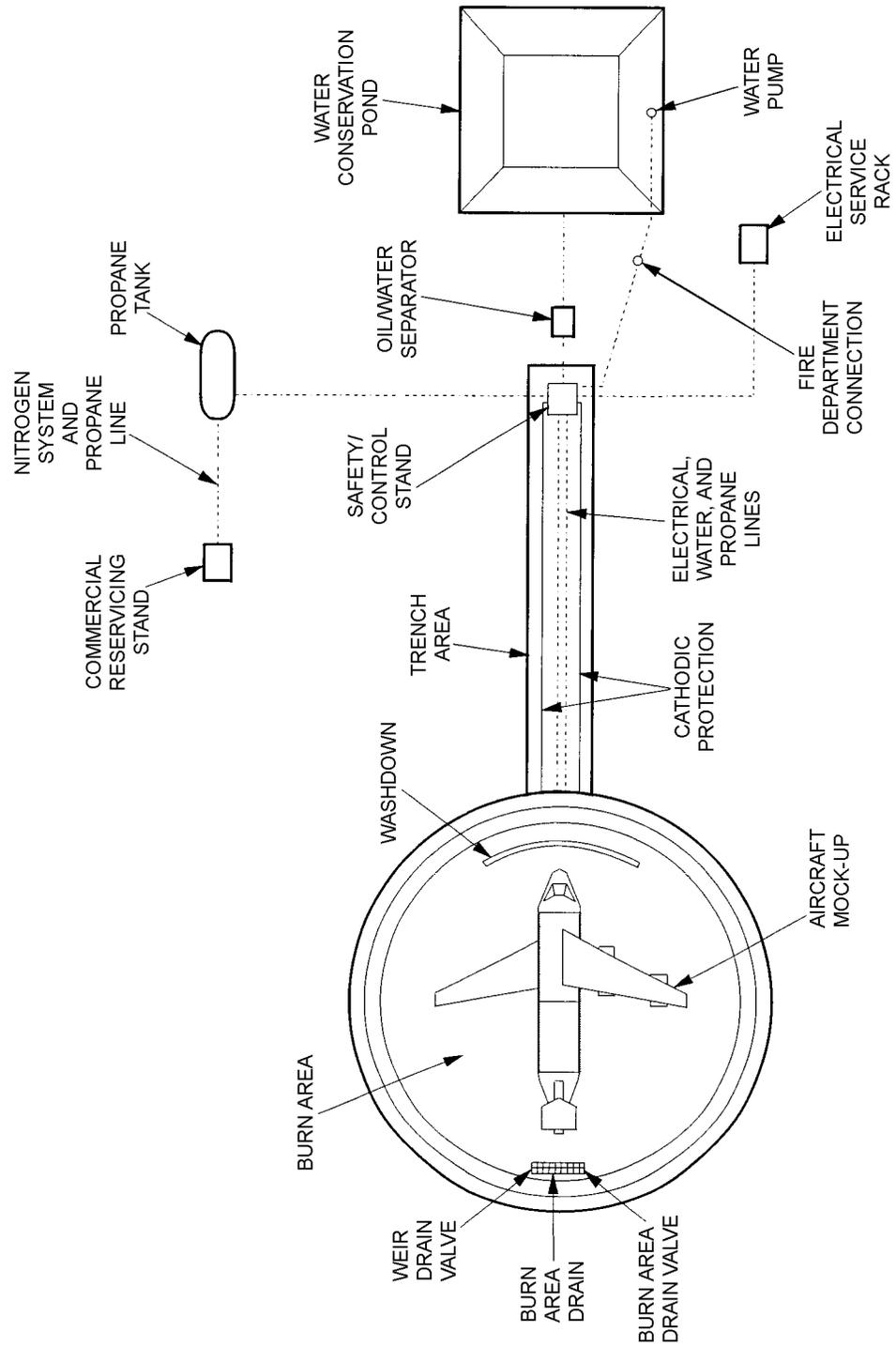
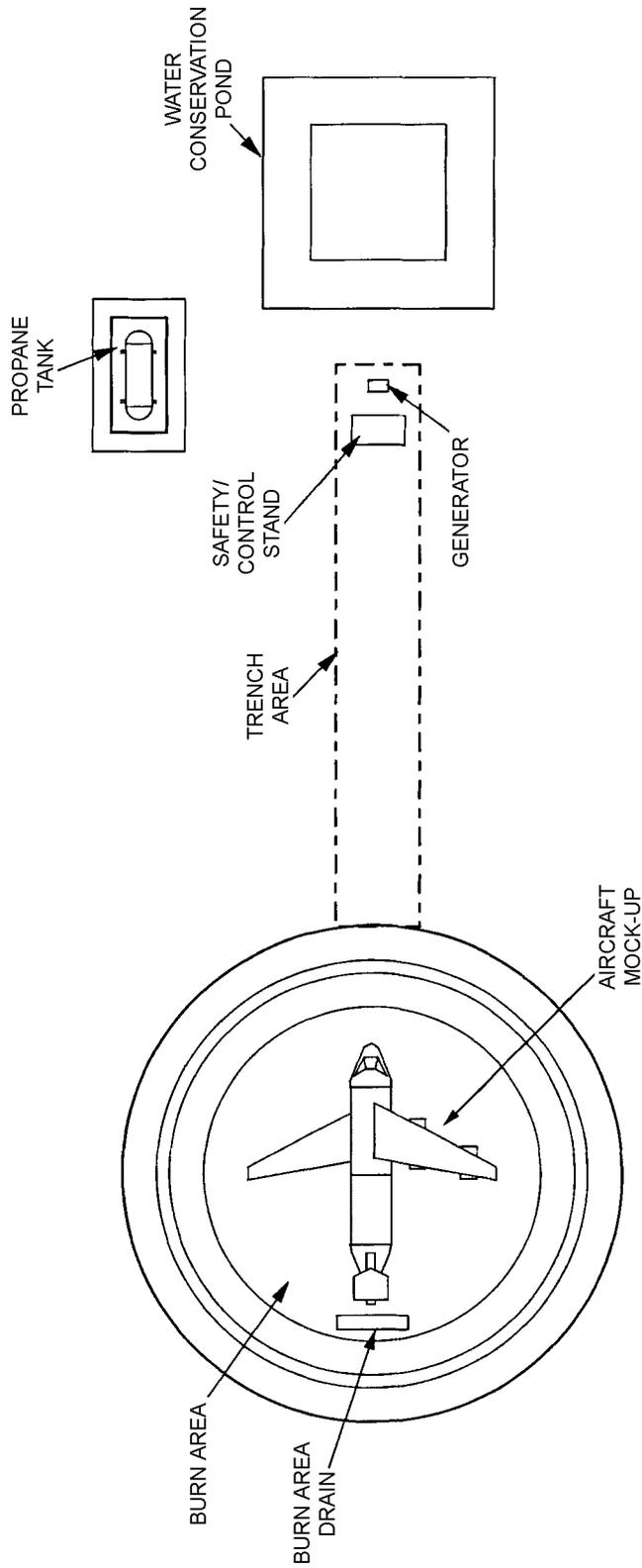


Figure 32. Hill AFB  
 Ogden, Utah



**Figure 33. Holloman AFB  
Alamagordo, New Mexico**

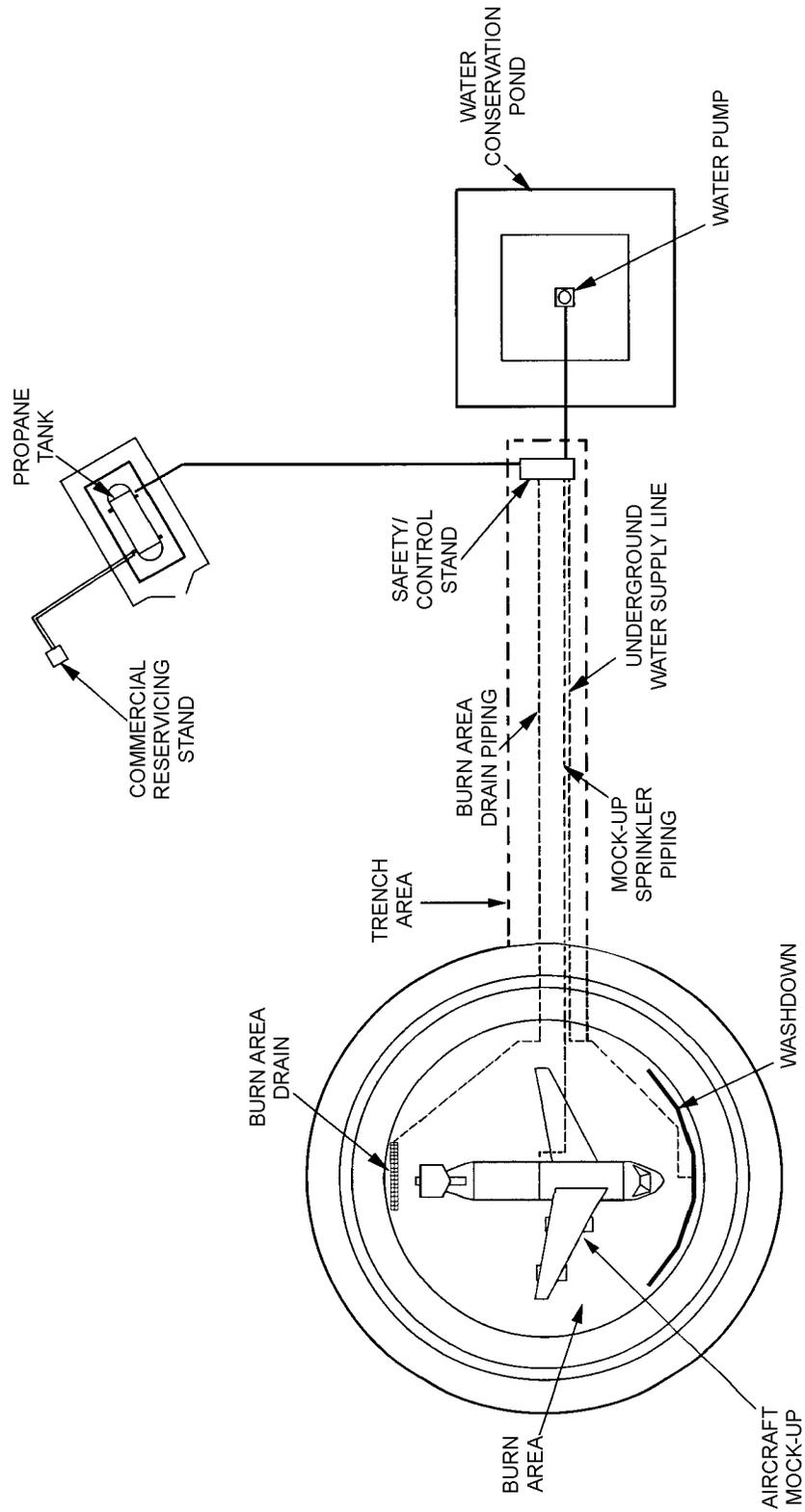
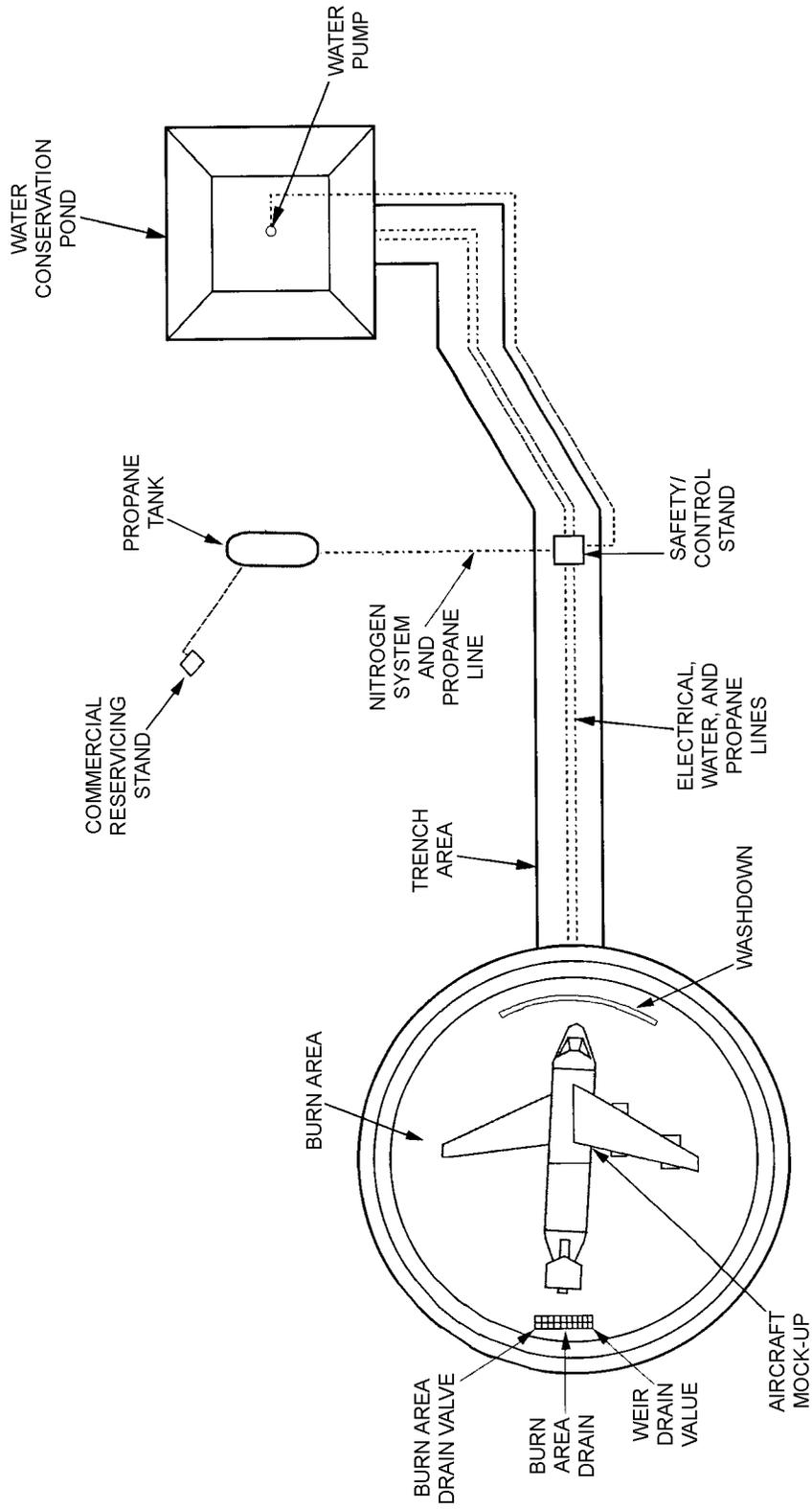


Figure 34. Homestead AFRB  
Homestead, Florida



**Figure 35. Hurlburt Field AFB  
Fort Walton, Florida**

**DRAWING NOT SUBMITTED**

**Figure 36. Incirlik AB  
Turkey**

**THIS SITE USES A PROSAFE MOBILE TRAINER  
NO DRAWING REQUIRED**

**Figure 37. Kadena AB  
Okinawa, Japan**

**SITE NOT PROJECTED  
GULFPORT, MS AFTF IS USED**

**Figure 38. Keesler AFB  
Biloxi, Mississippi**

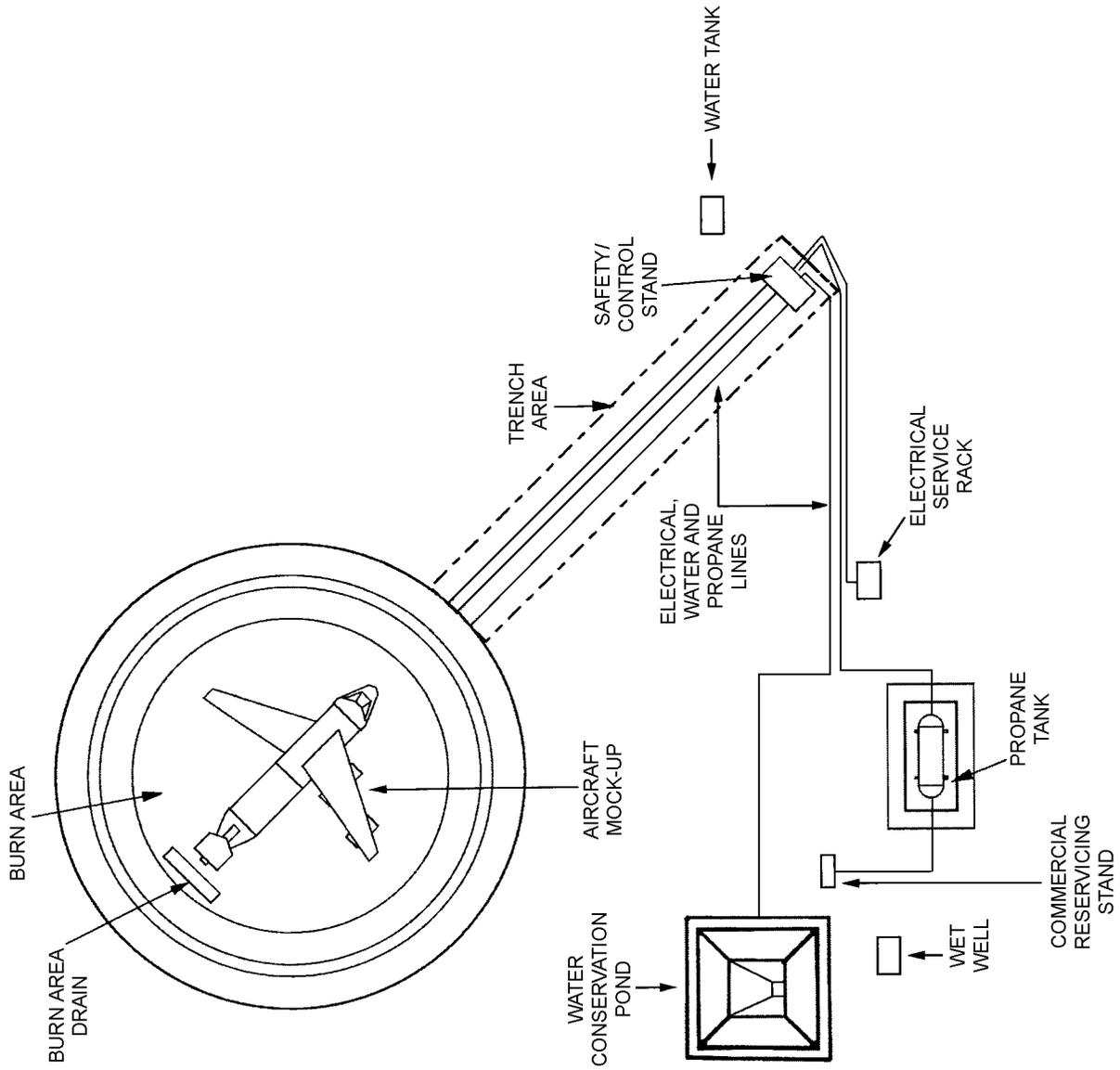
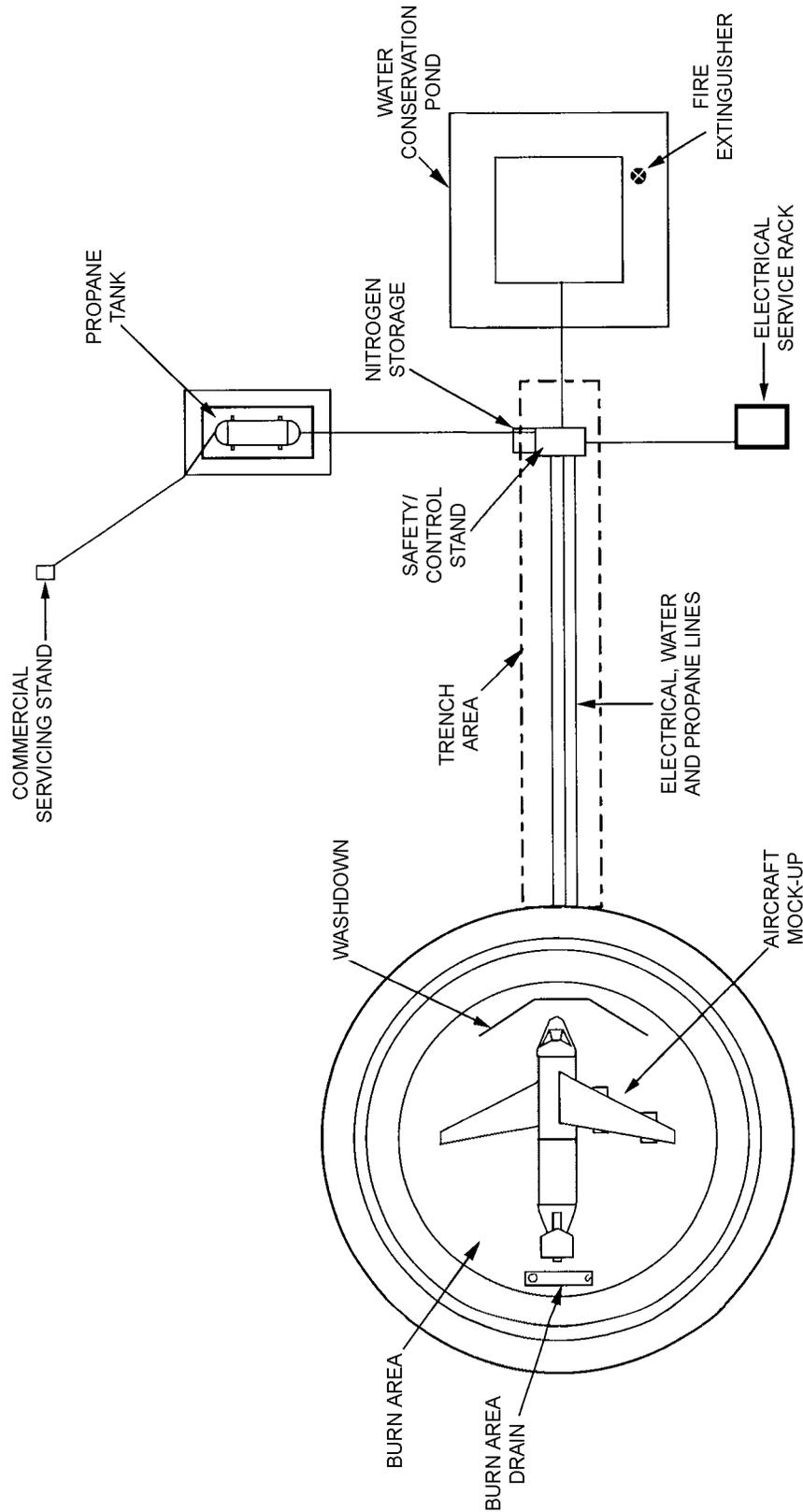


Figure 39. Kelly AFB  
San Antonio, Texas



**Figure 40. Kirtland AFB  
Albuquerque, New Mexico**

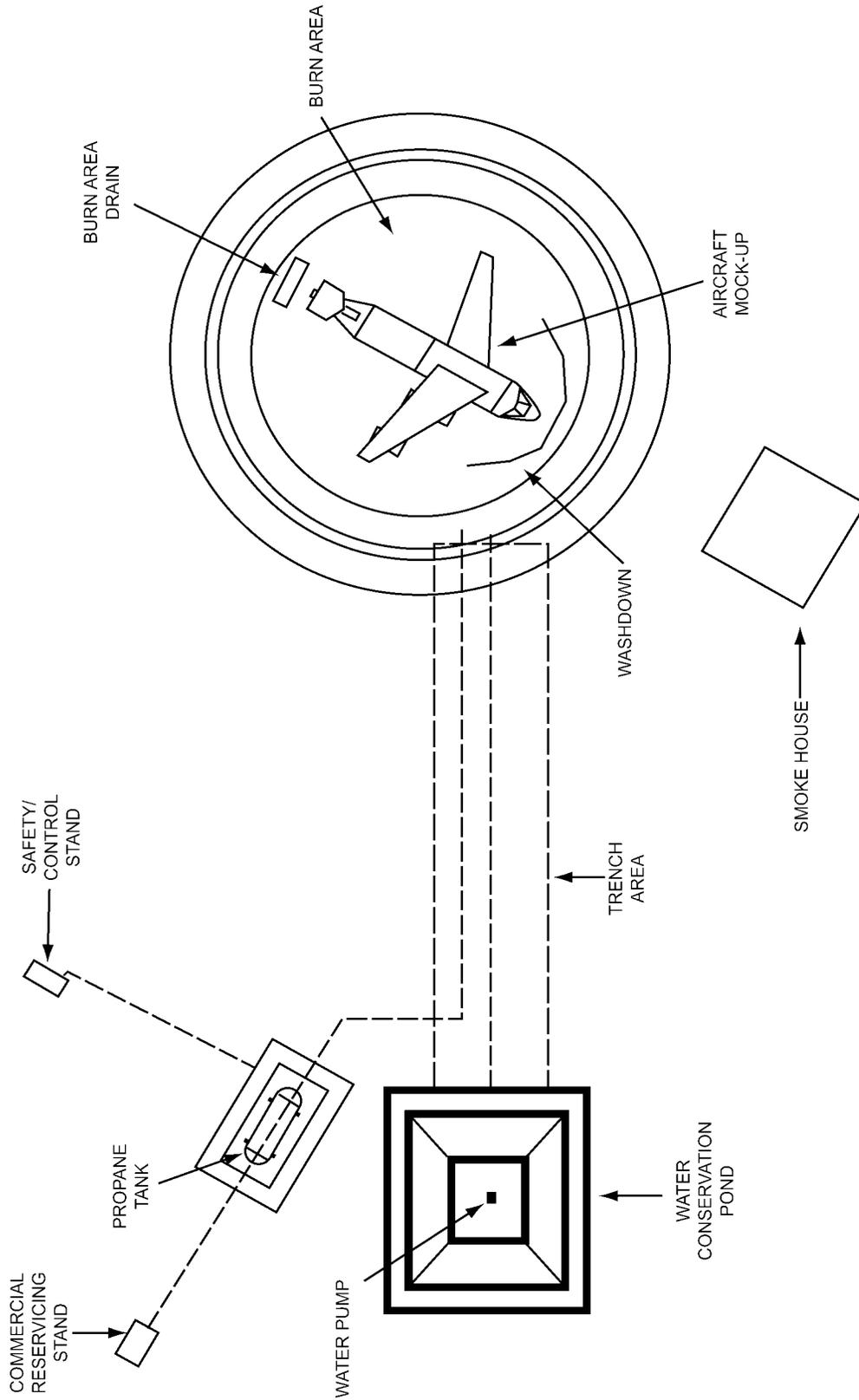


Figure 41. Kunsan AB  
Kunsan, Korea

**THIS SITE USES A PROSAFE MOBILE TRAINER  
NO DRAWING REQUIRED**

**Figure 42. Lajes Field AFB  
Azores, Portugal**

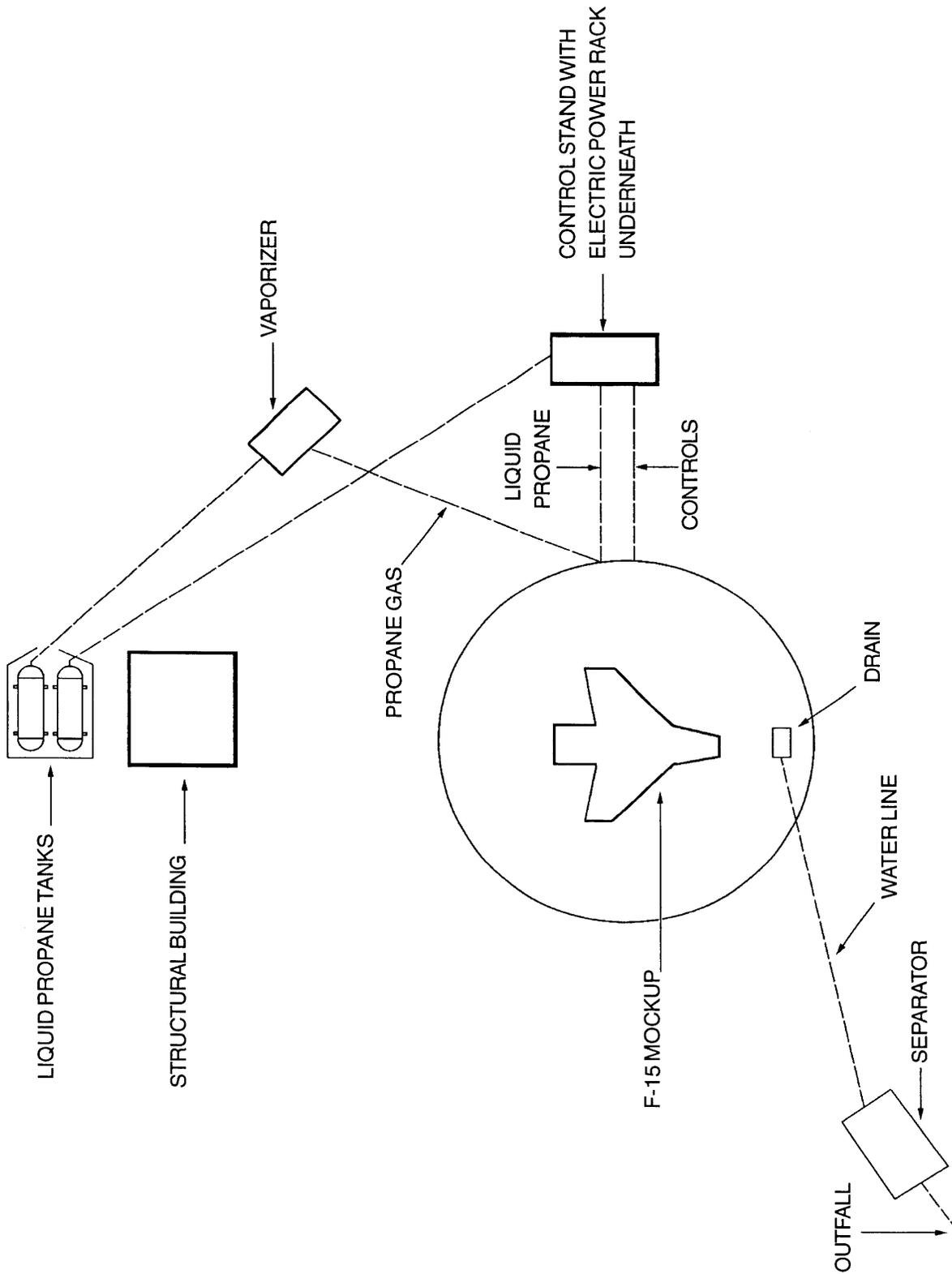


Figure 43. Lakenheath AB  
United Kingdom

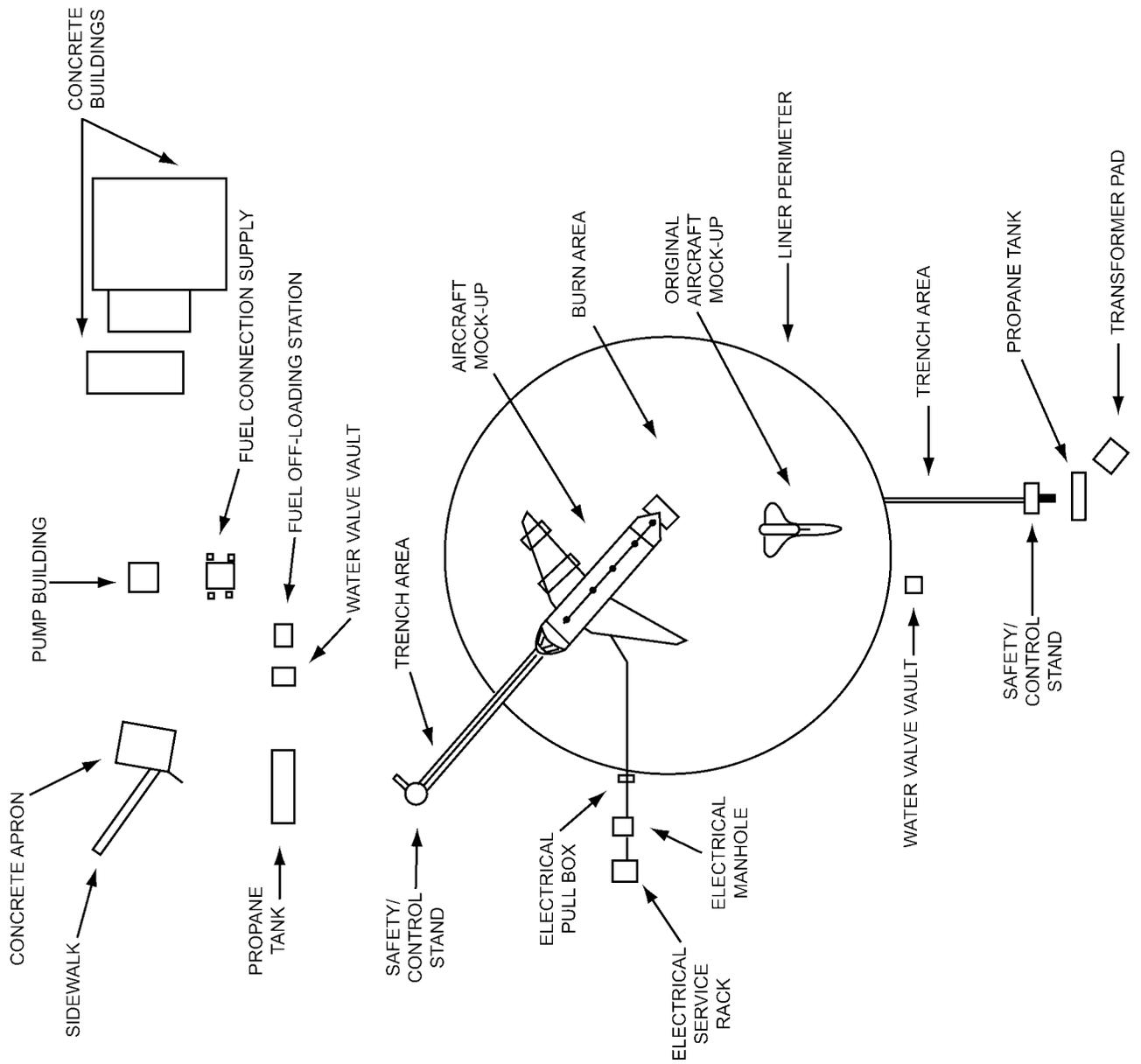


Figure 44. Langley AFB  
Norfolk, Virginia

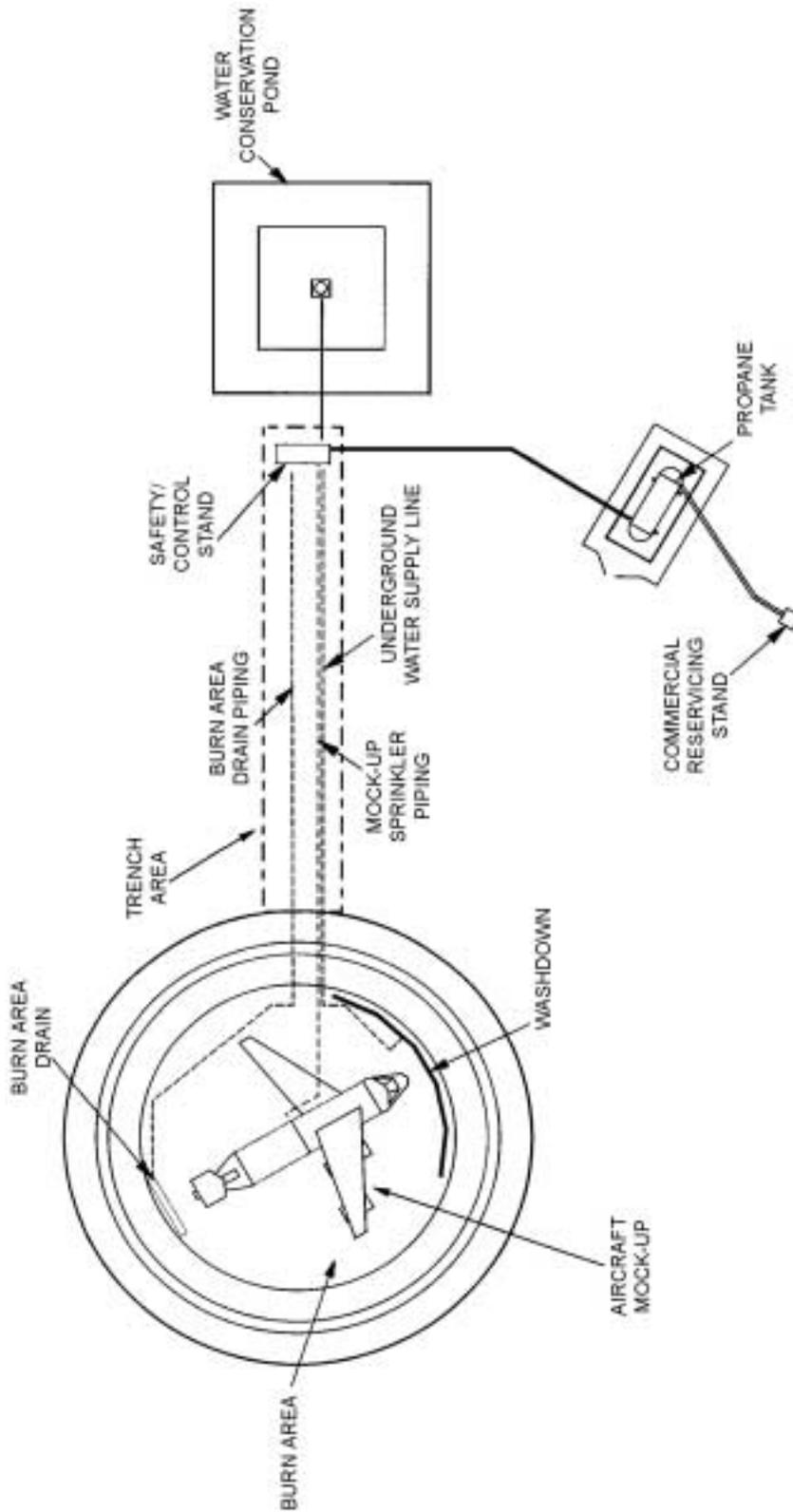


Figure 45. Laughlin AFB  
Del Rio, Texas

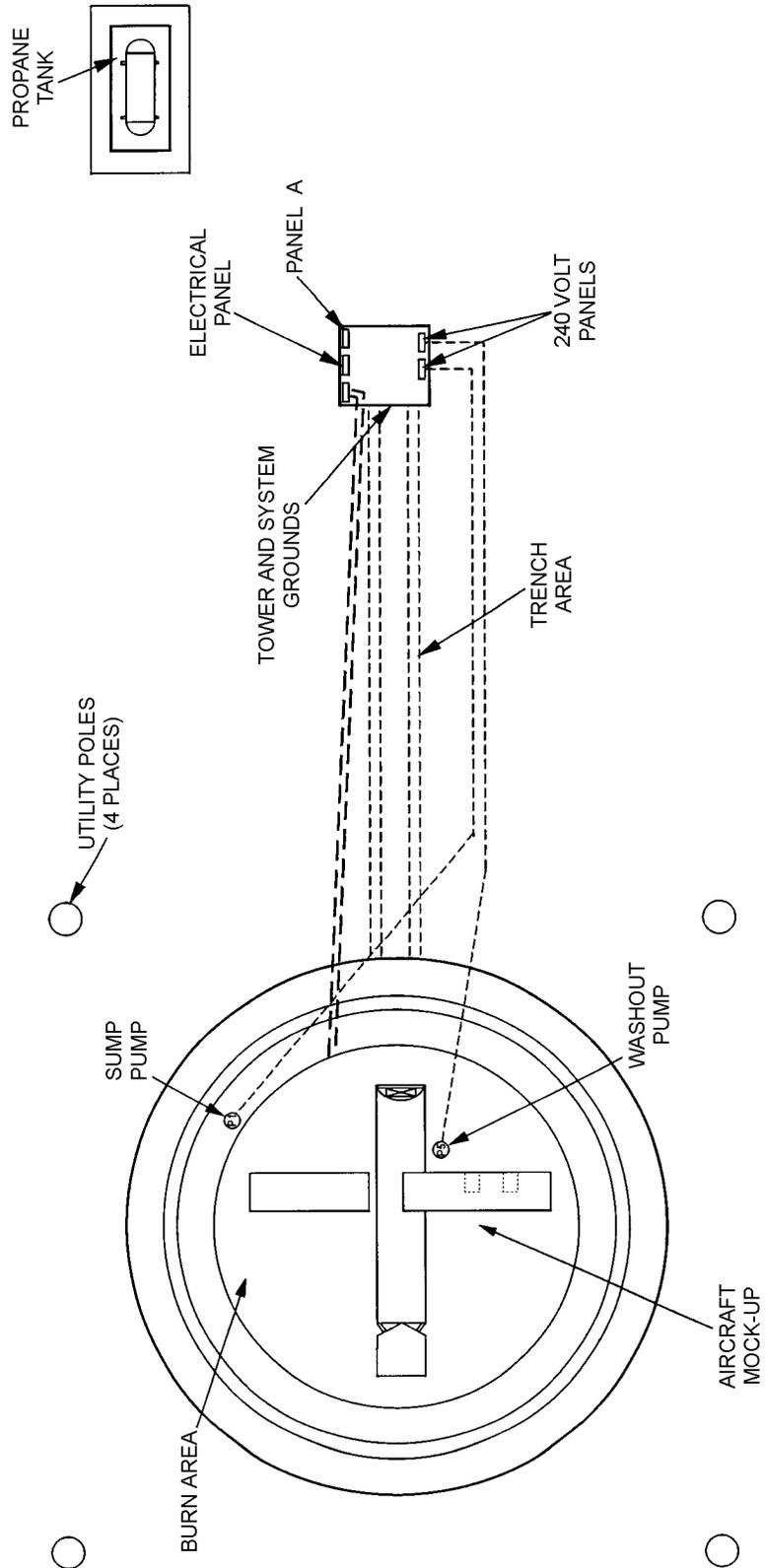


Figure 46. Little Rock AFB  
Little Rock, Arkansas

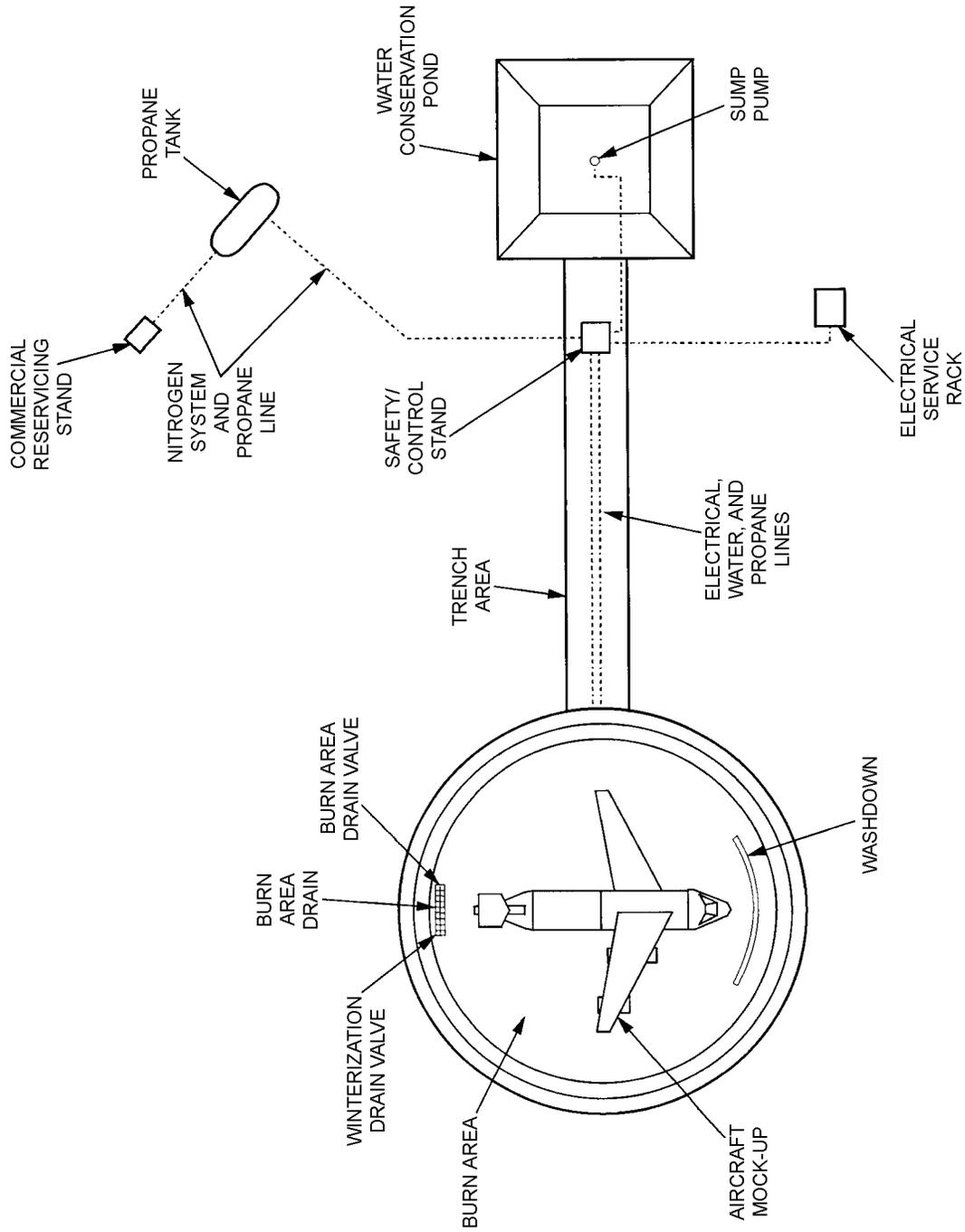
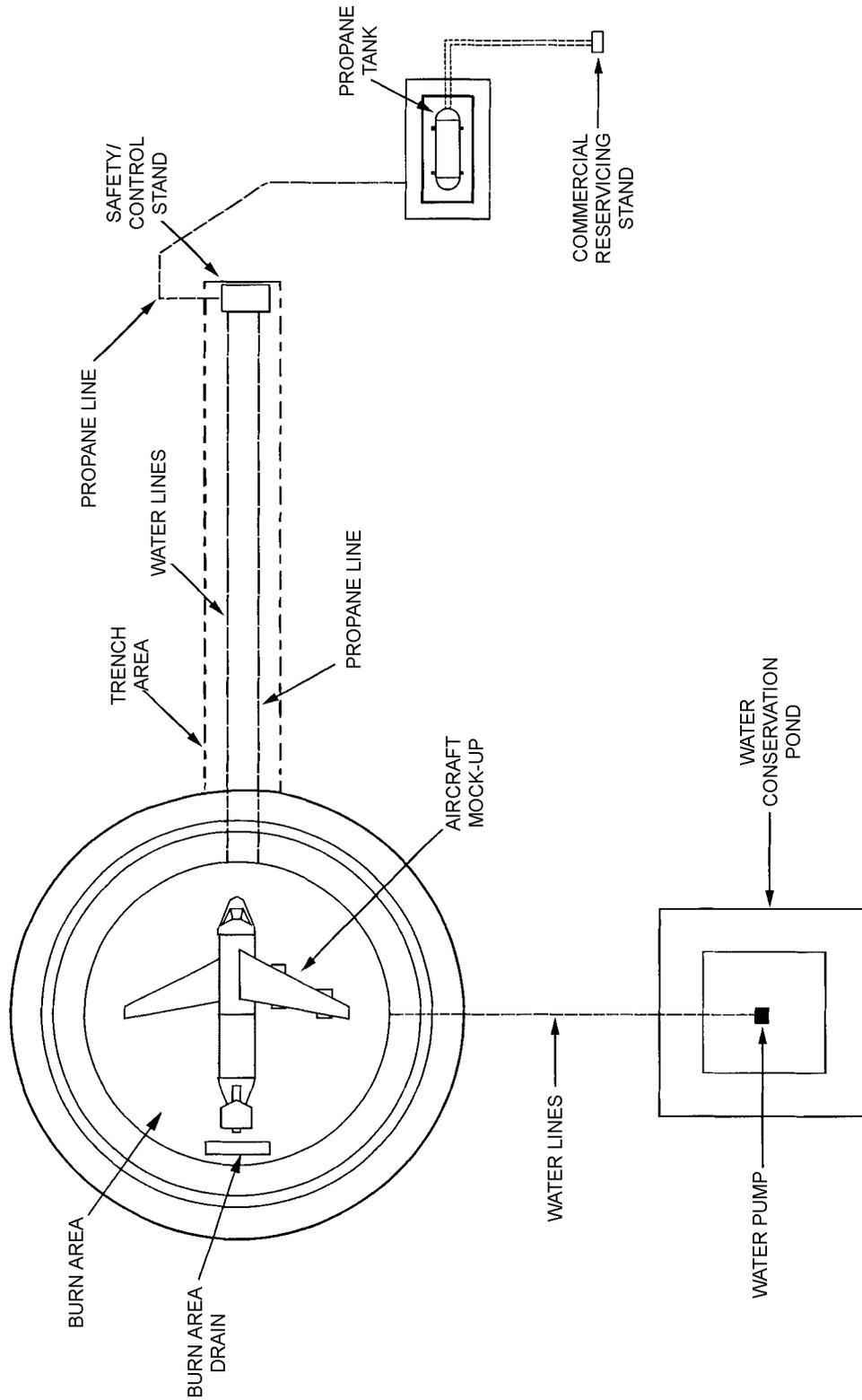


Figure 47. Luke AFB  
Phoenix, Arizona



**Figure 48. MacDill AFB  
Tampa Bay, Florida**

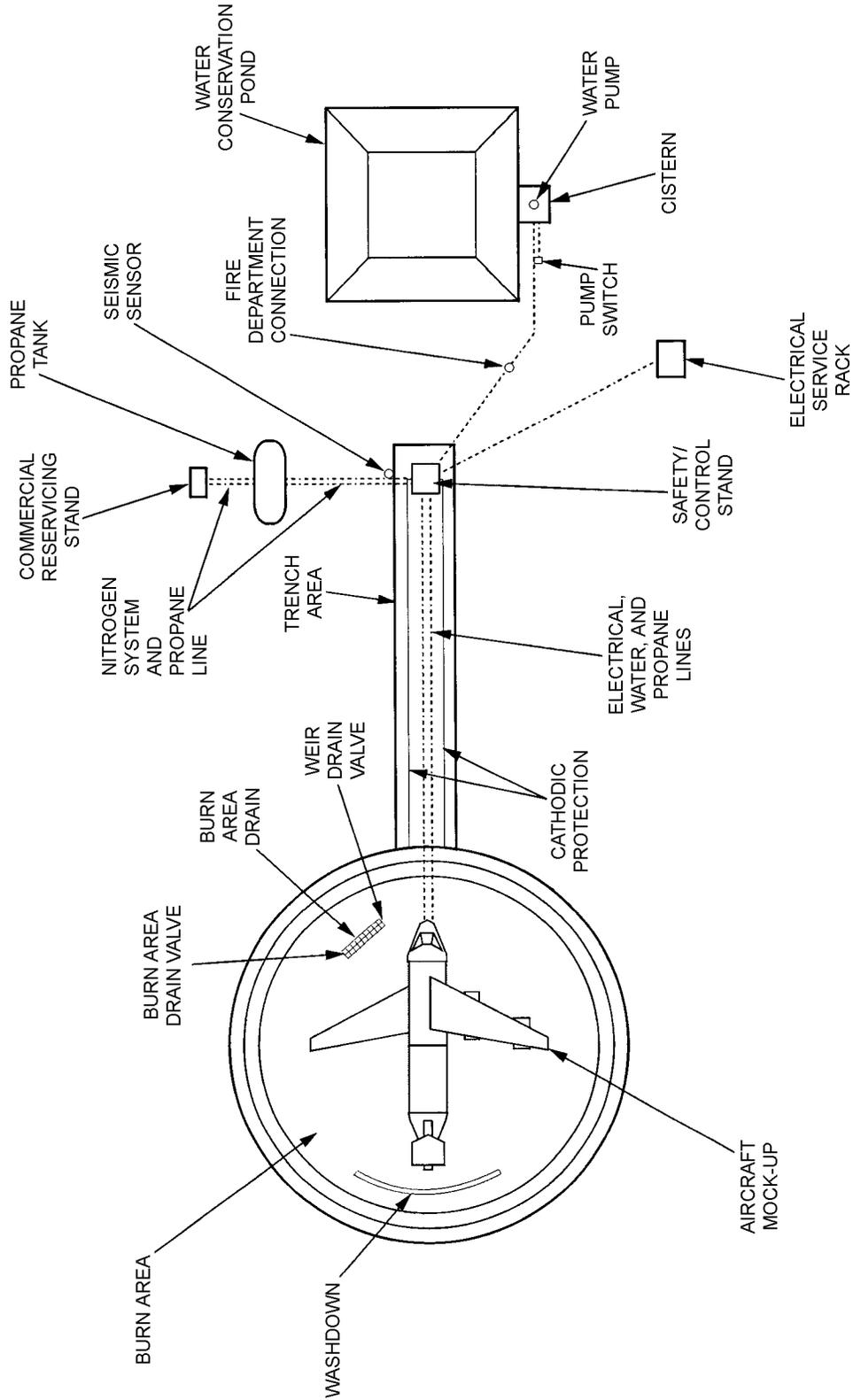
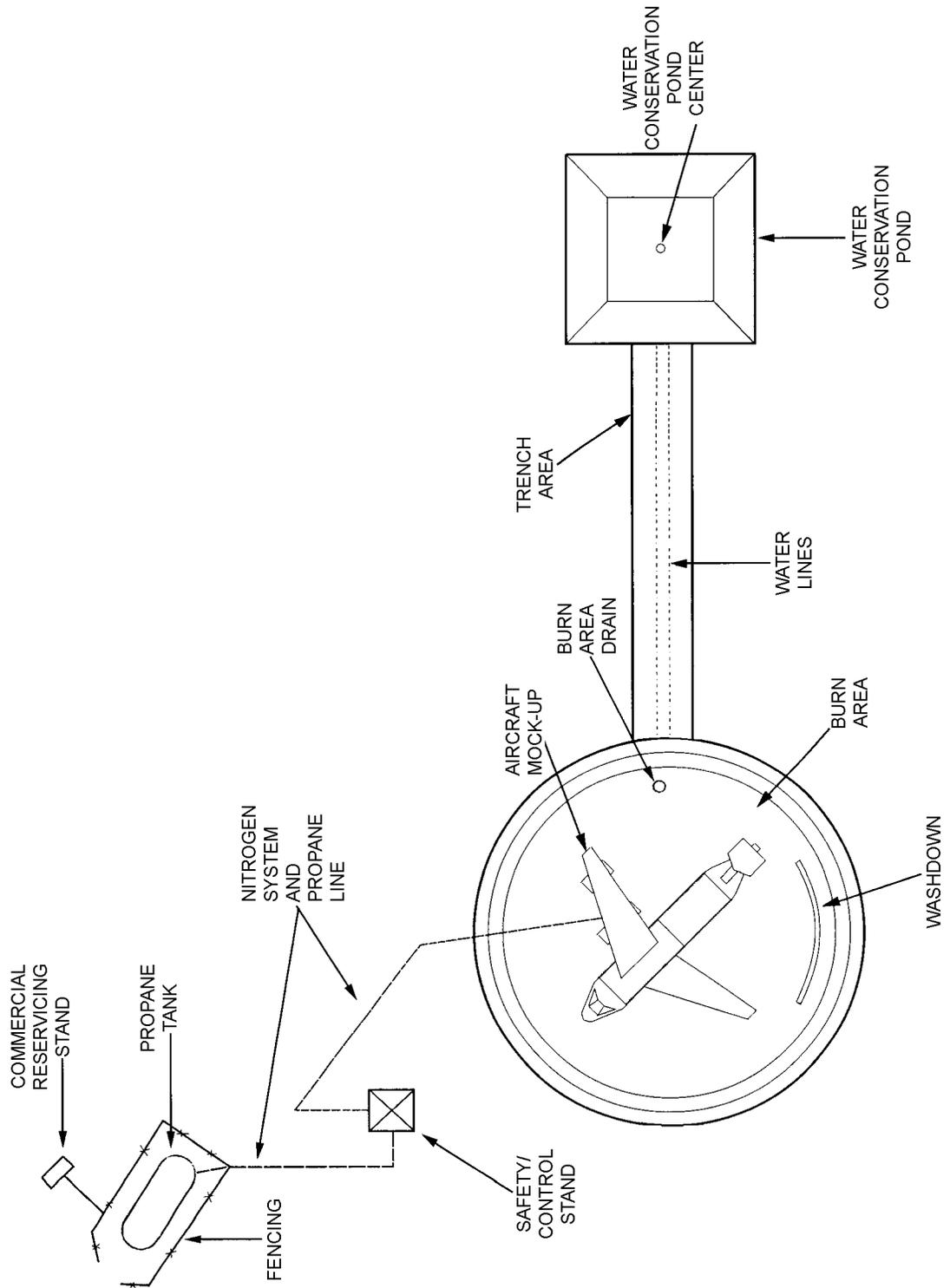
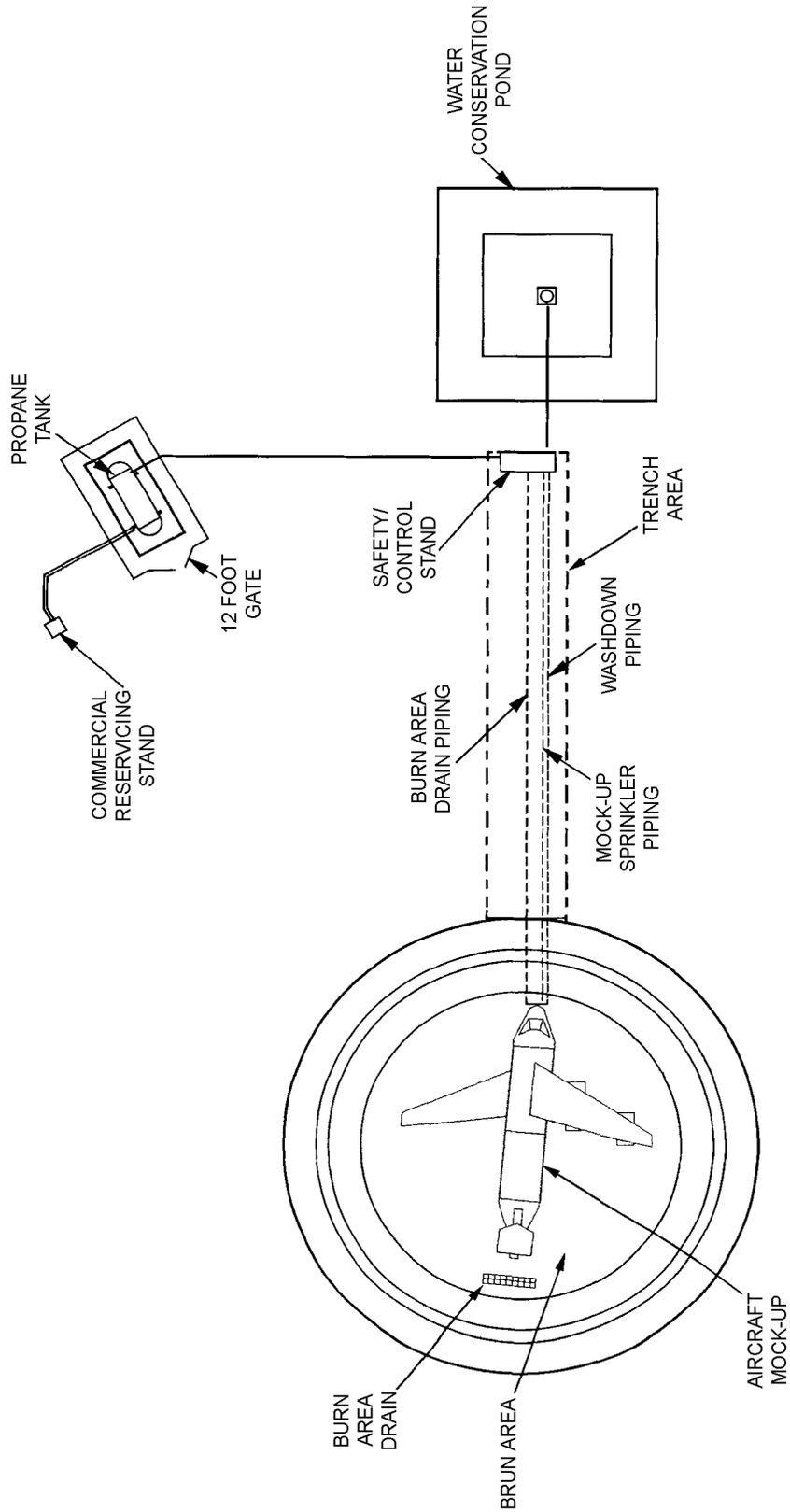


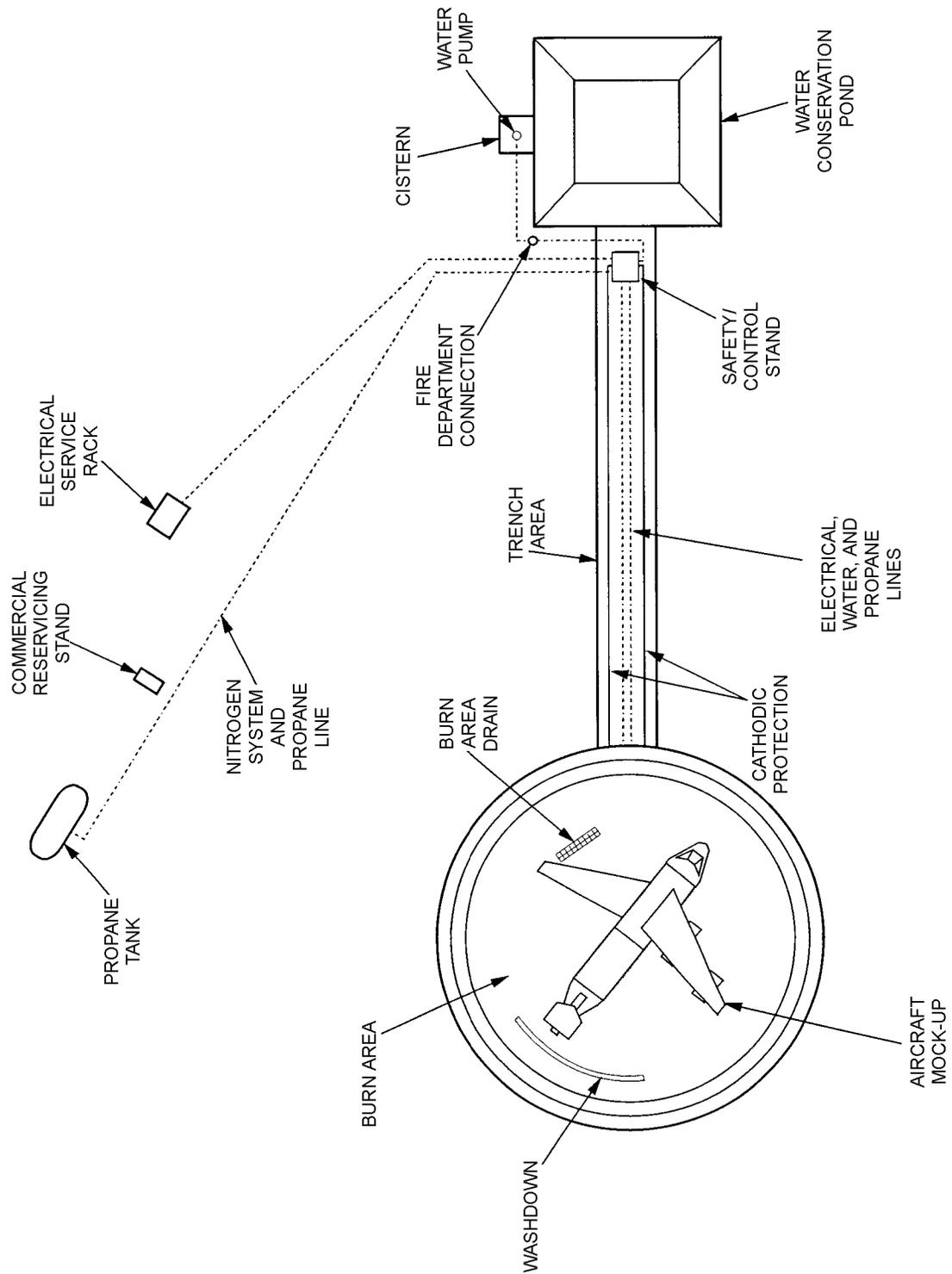
Figure 49. Malmstrom AFB  
Great Falls, Montana



**Figure 50. March AFB  
San Bernadino, California**



**Figure 51. Maxwell AFB  
Montgomery, Alabama**



**Figure 52. McChord AFB  
Tacoma, Washington**

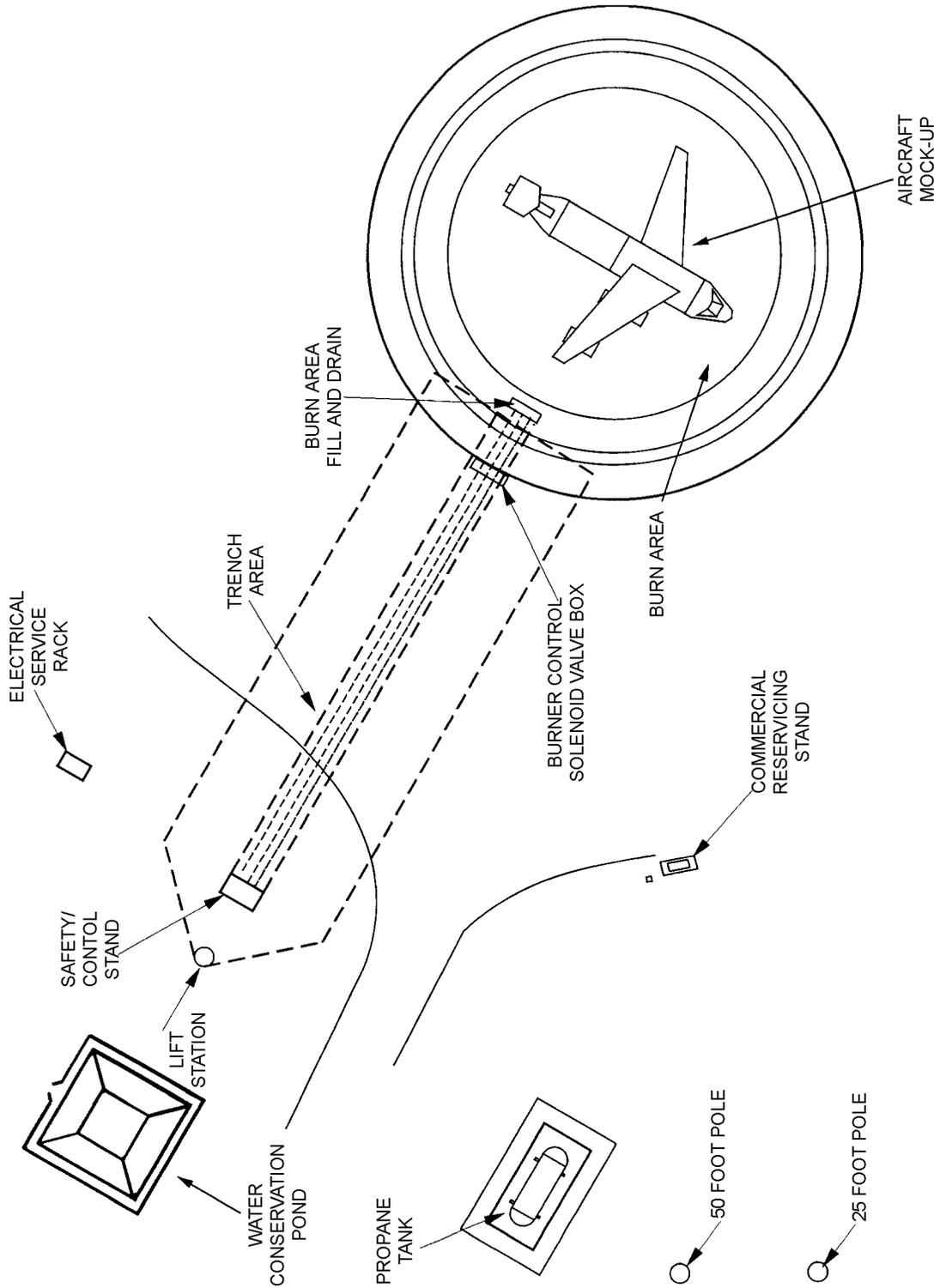
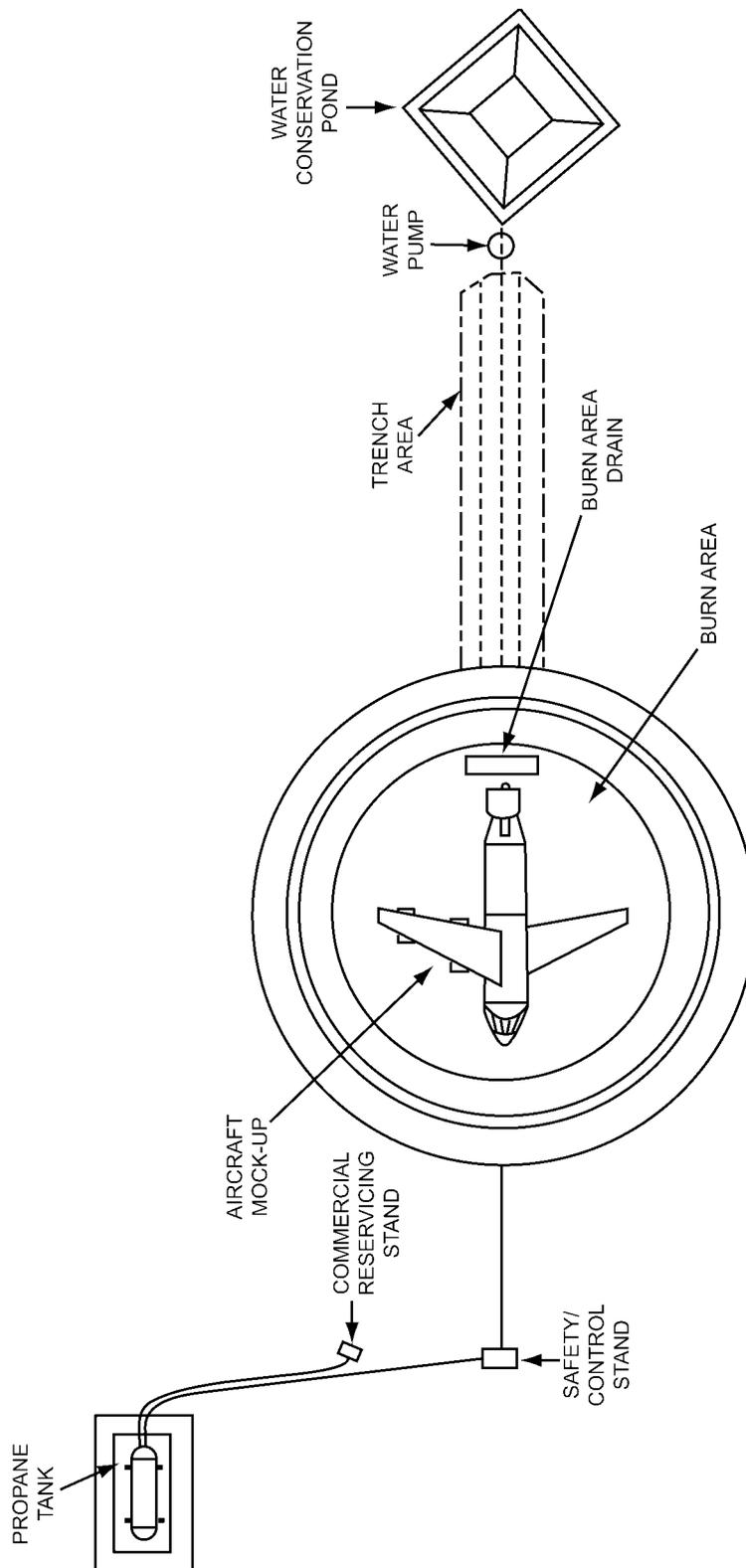


Figure 53. McConnell AFB  
Wichita, Kansas



**Figure 54. McGuire AFB  
Wrightstown, New Jersey**

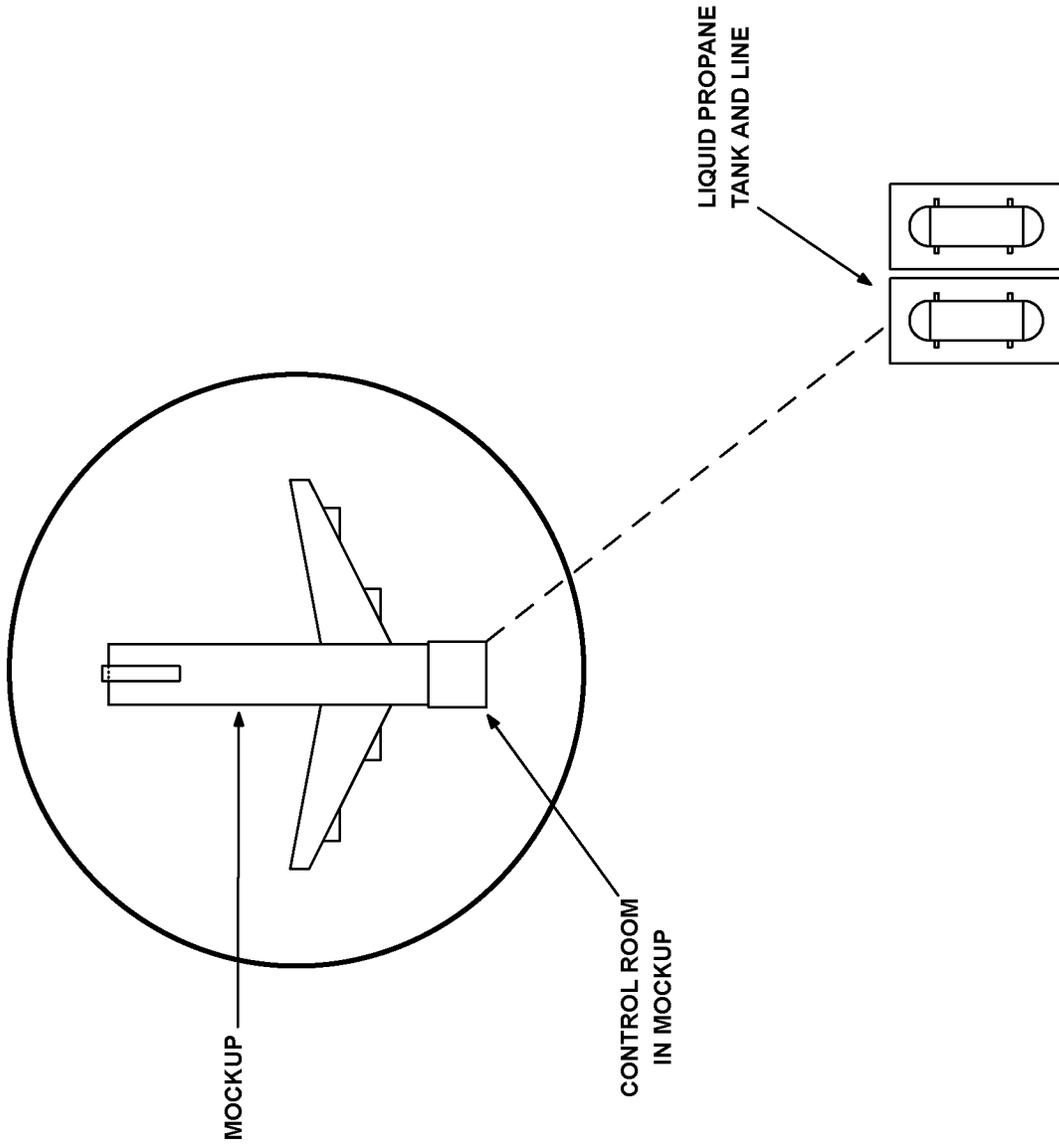


Figure 55. Mildenhall AB  
United Kingdom

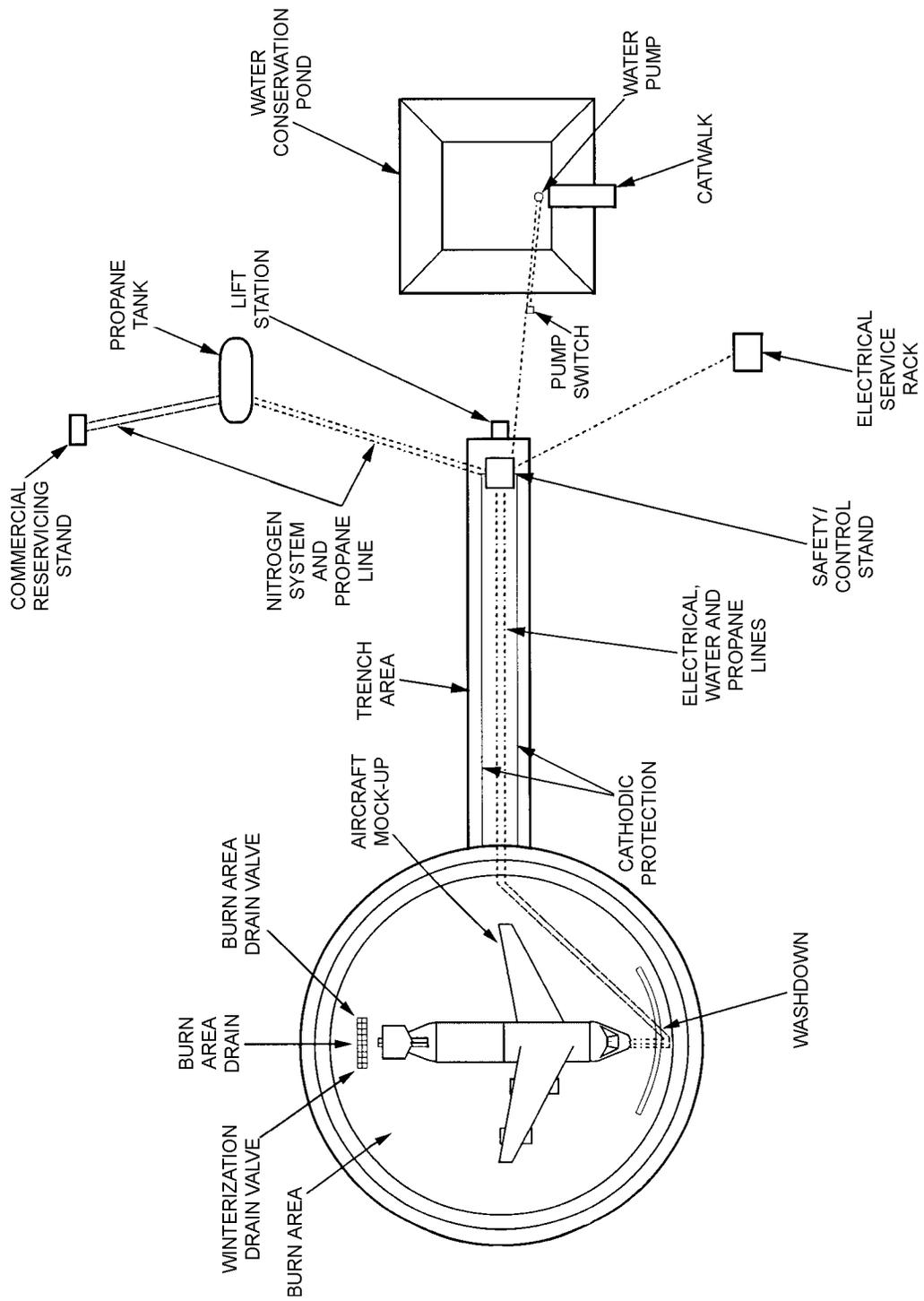


Figure 56. Minot AFB  
Minot, North Dakota

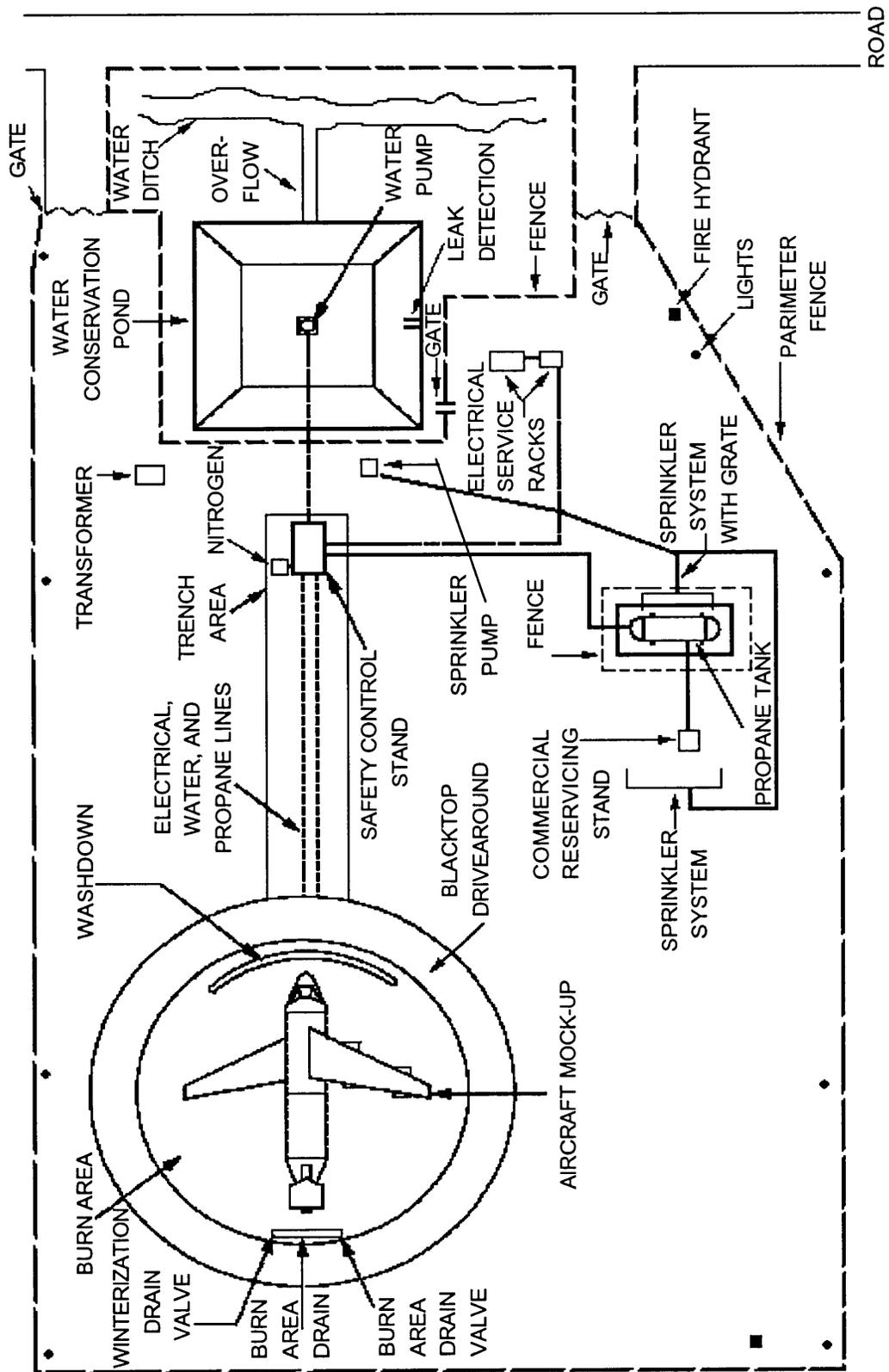


Figure 57. Misawa AB  
 Misawa, Japan

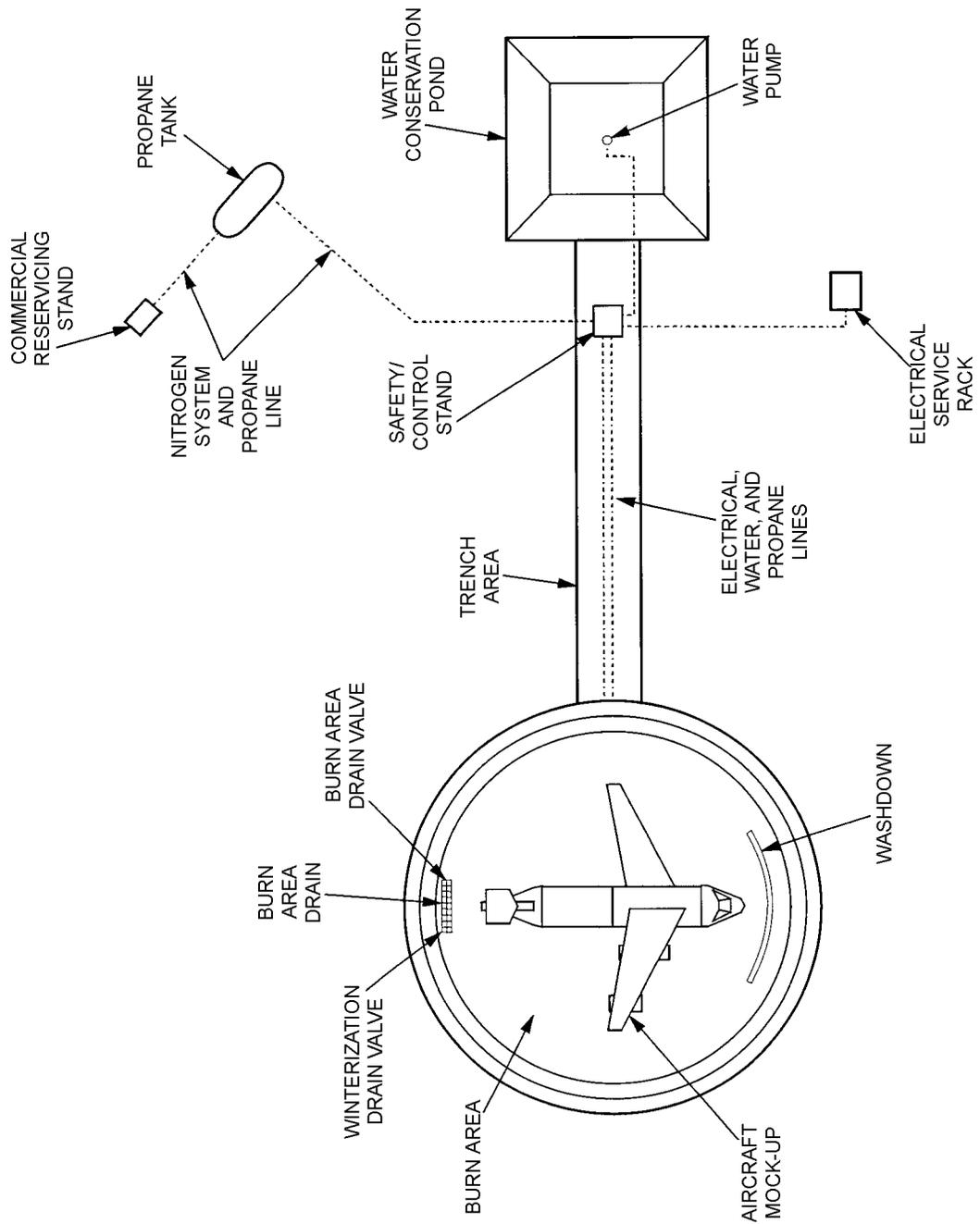


Figure 58. Moody AFB  
Valdosta, Georgia

**THIS SITE USES AN ICS MOBILE TRAINER  
NO DRAWING REQUIRED**

**Figure 59. Moron AB  
Spain**

**DRAWING NOT SUBMITTED**

**Figure 60. Mt. Home AFB  
Mt. Home, Idaho**

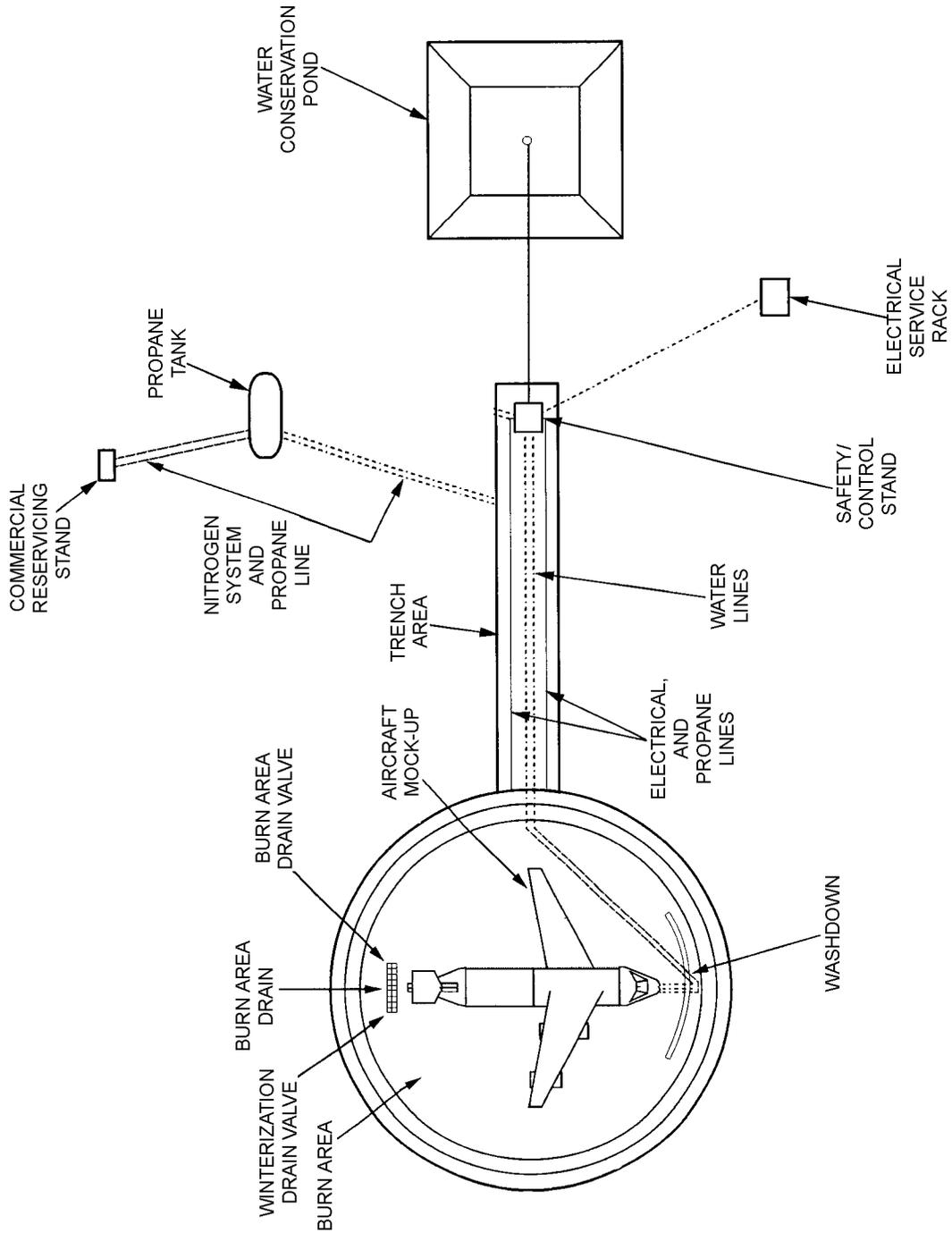


Figure 61. Nellis AFB  
Las Vegas, Nevada

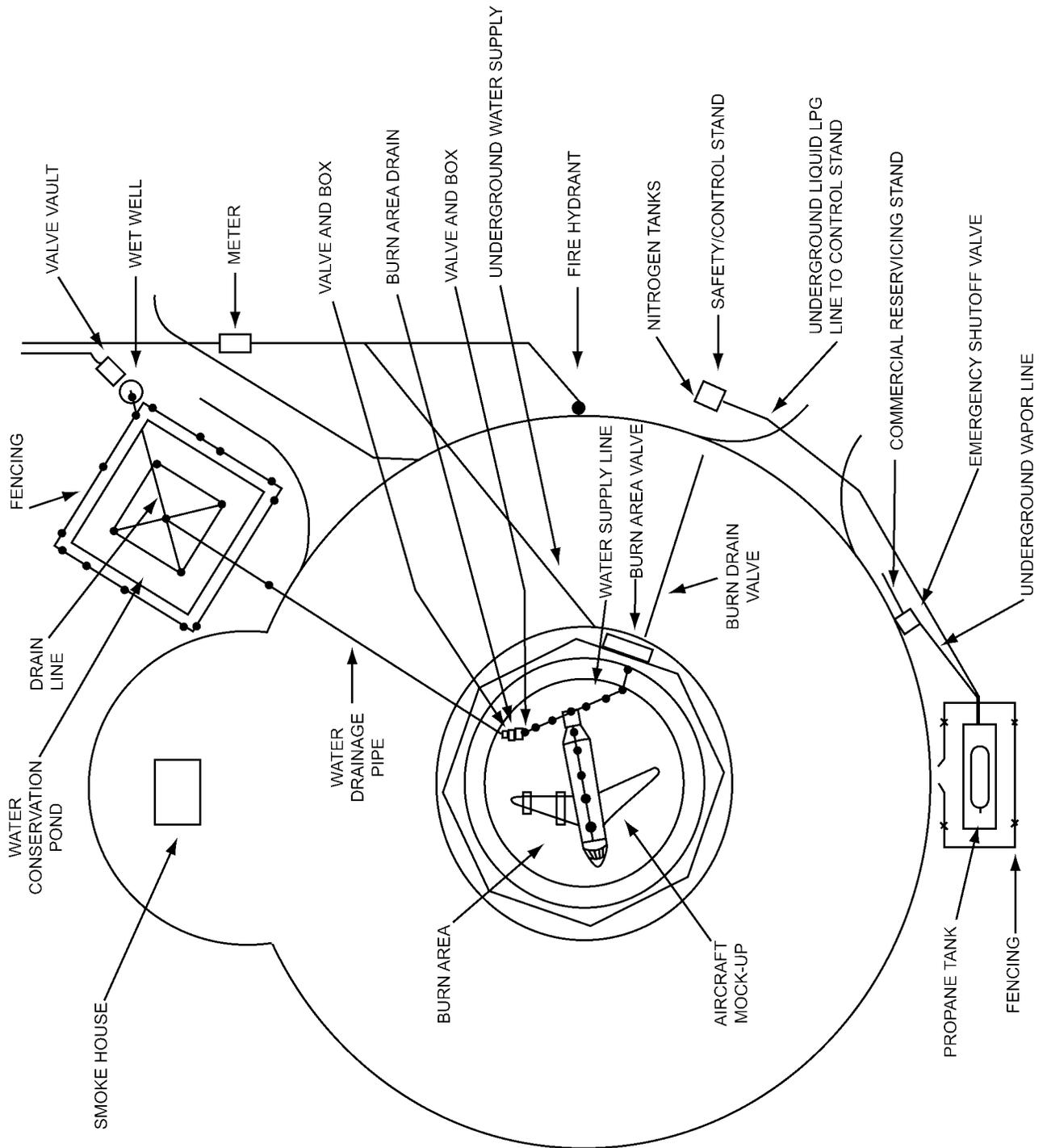


Figure 62. Niagara Falls AFRS  
Niagara Falls, New York

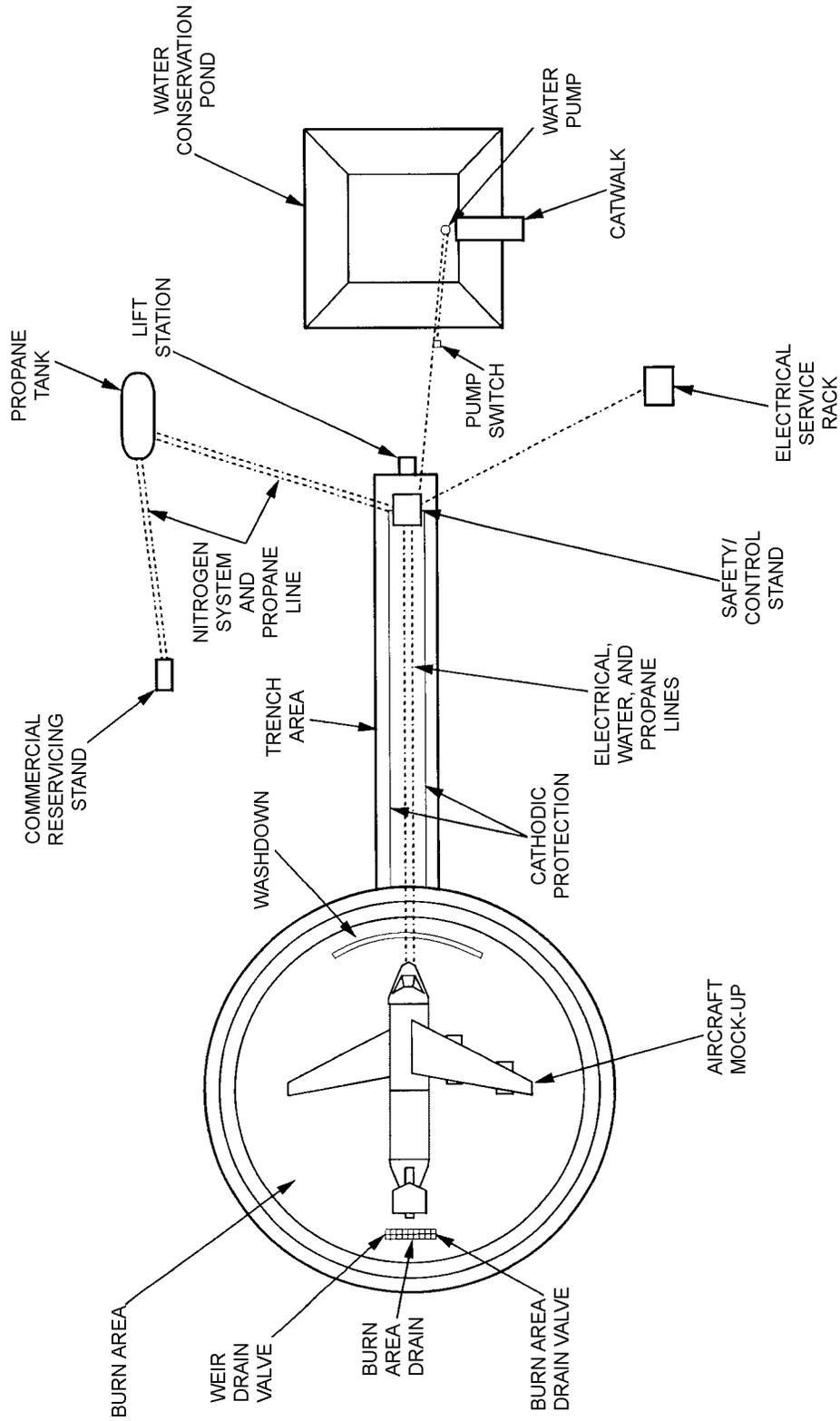


Figure 63. Offutt AFB  
Omaha, Nebraska

**THIS SITE USES A PROSAFE MOBILE TRAINER  
NO DRAWING REQUIRED**



**Figure 64. Osan AB  
Osan, Korea**

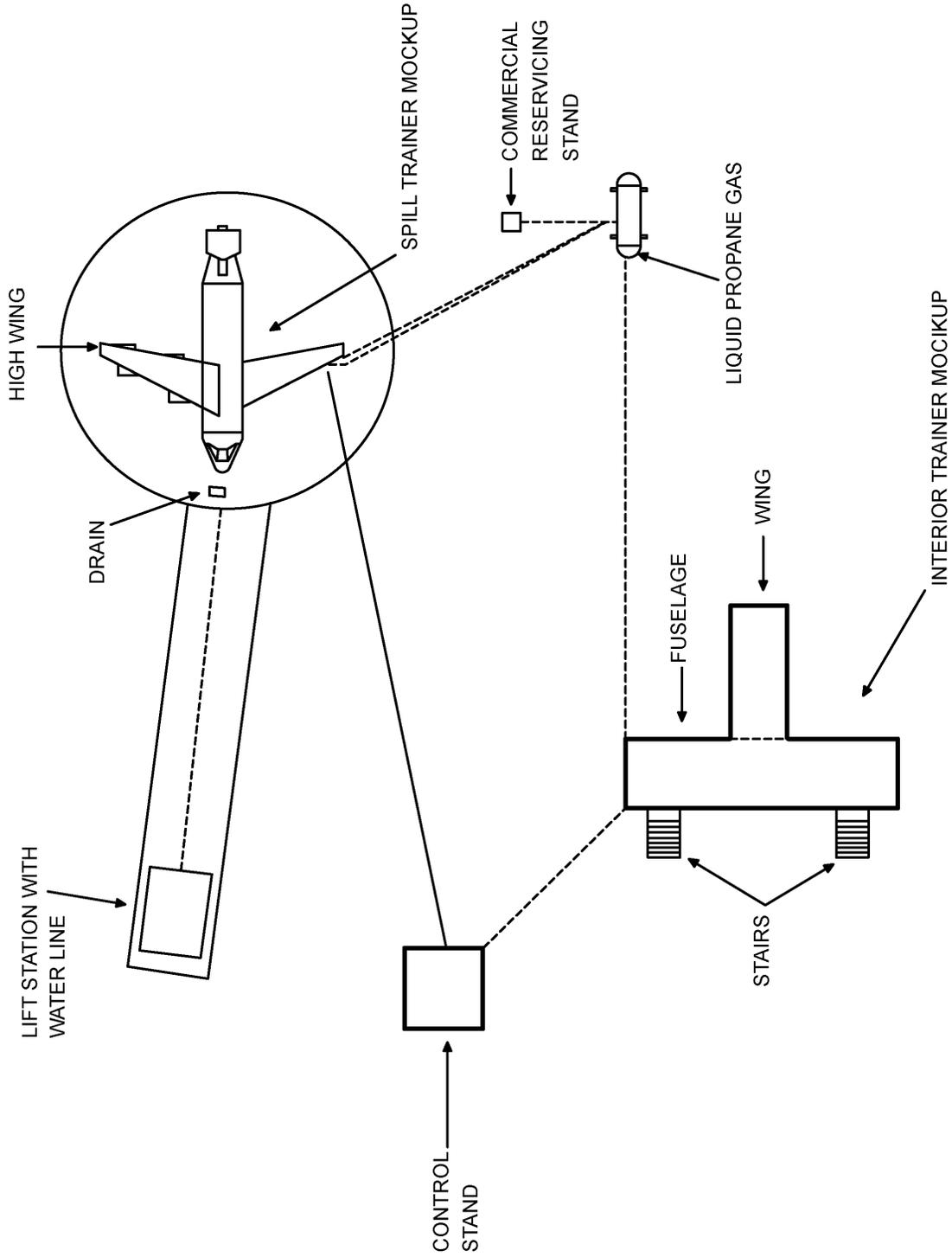
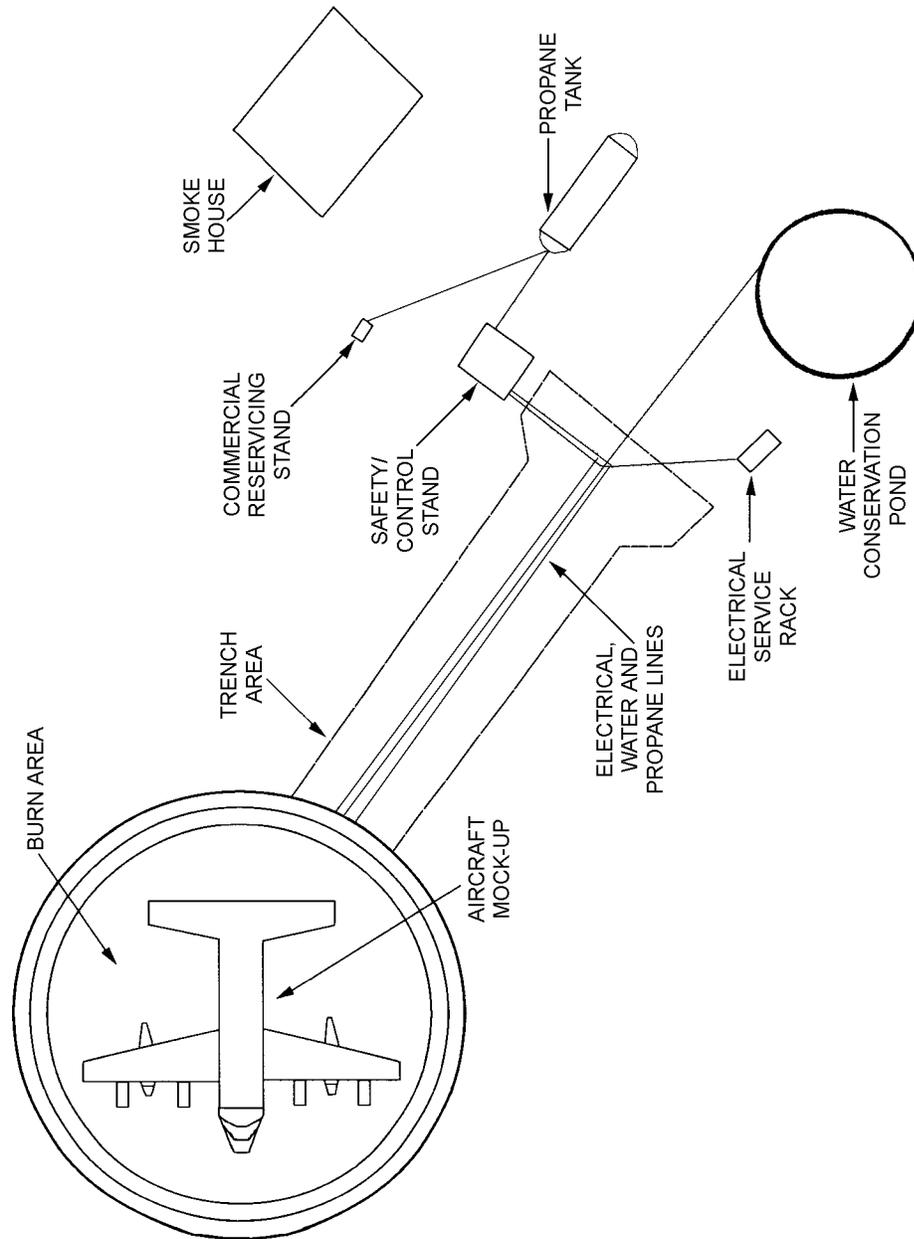


Figure 65. Palmdale AFB  
Palmdale, California



**Figure 66. Peterson AFB  
Colorado Springs, Colorado**

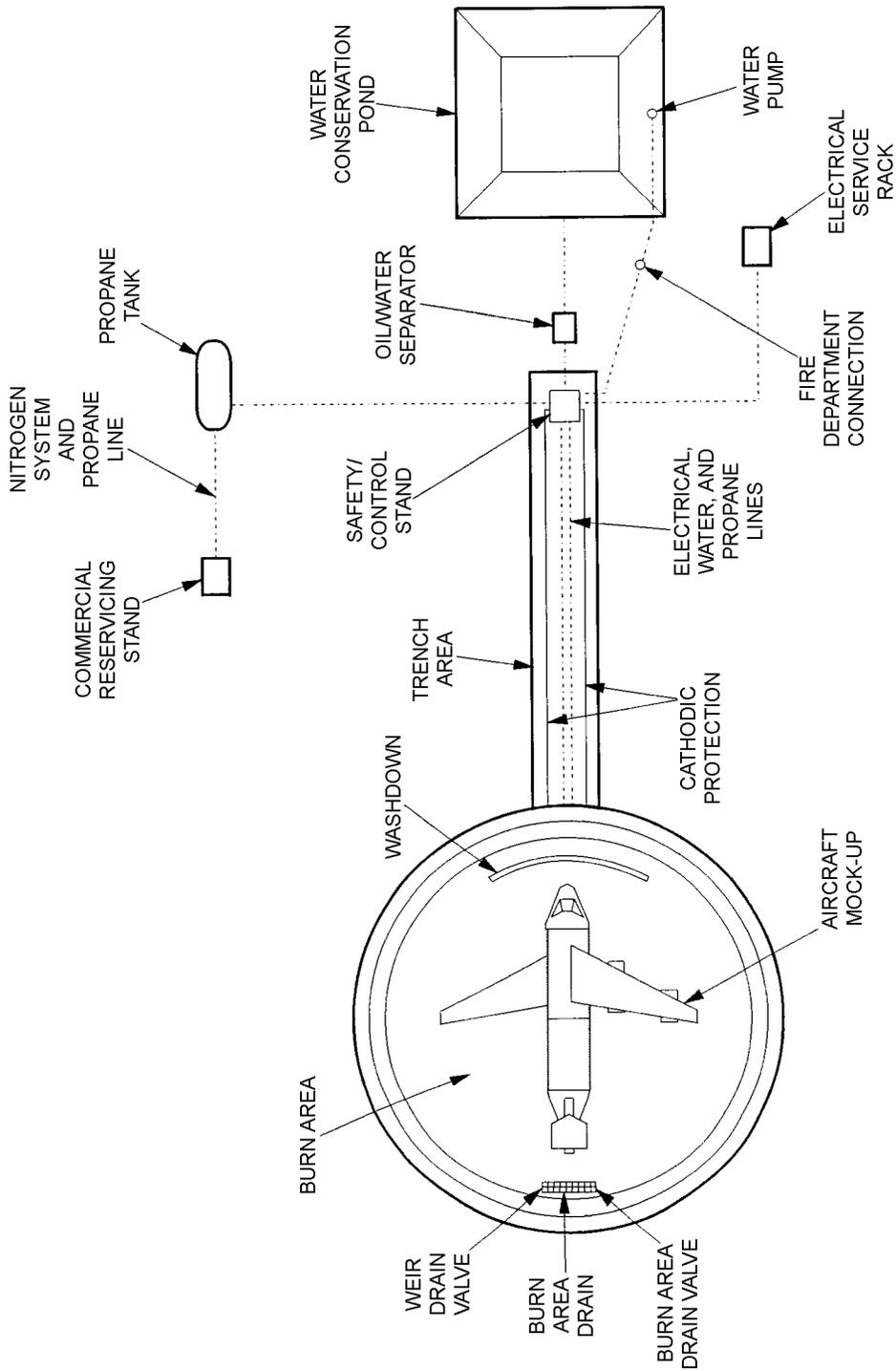


Figure 67. Pope AFB  
 Fayetteville, North Carolina

**THIS SITE USES AN ICS MOBILE TRAINER  
NO DRAWING REQUIRED**



**Figure 68. Ramstein AB  
Ramstein, Germany**

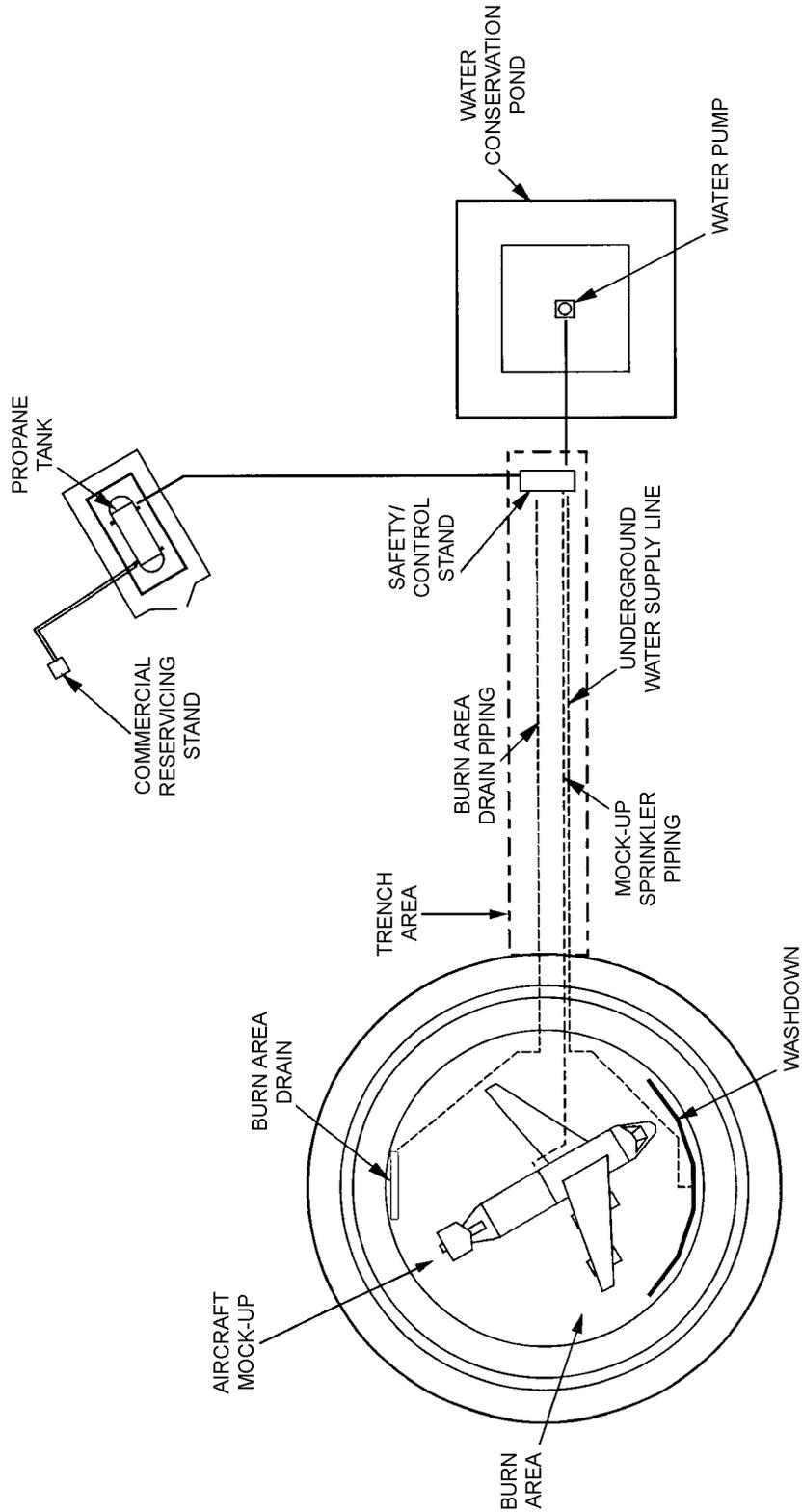


Figure 69. Randolph AFB  
San Antonio, Texas

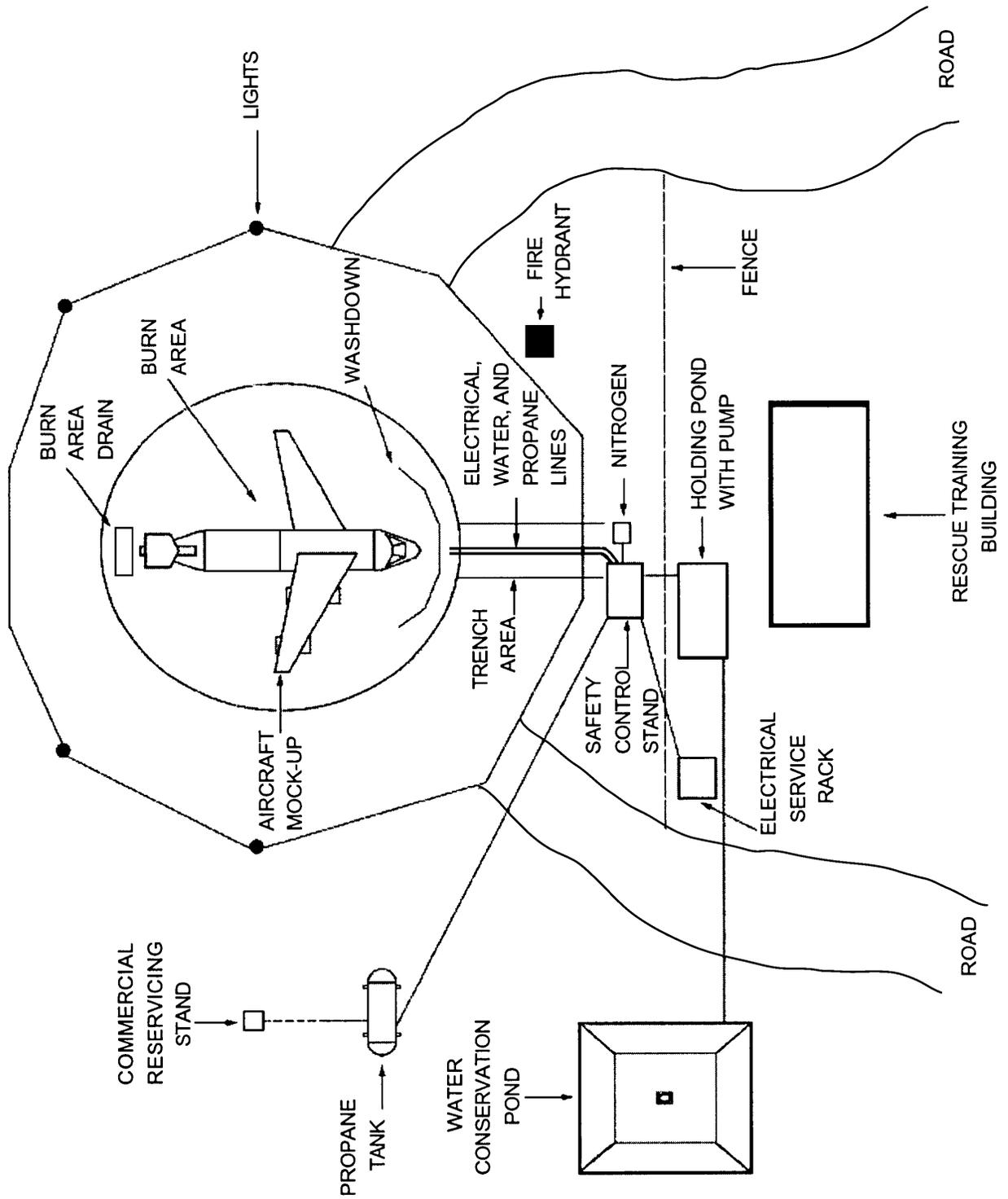


Figure 70. Robins AFB  
Warner Robins, Georgia

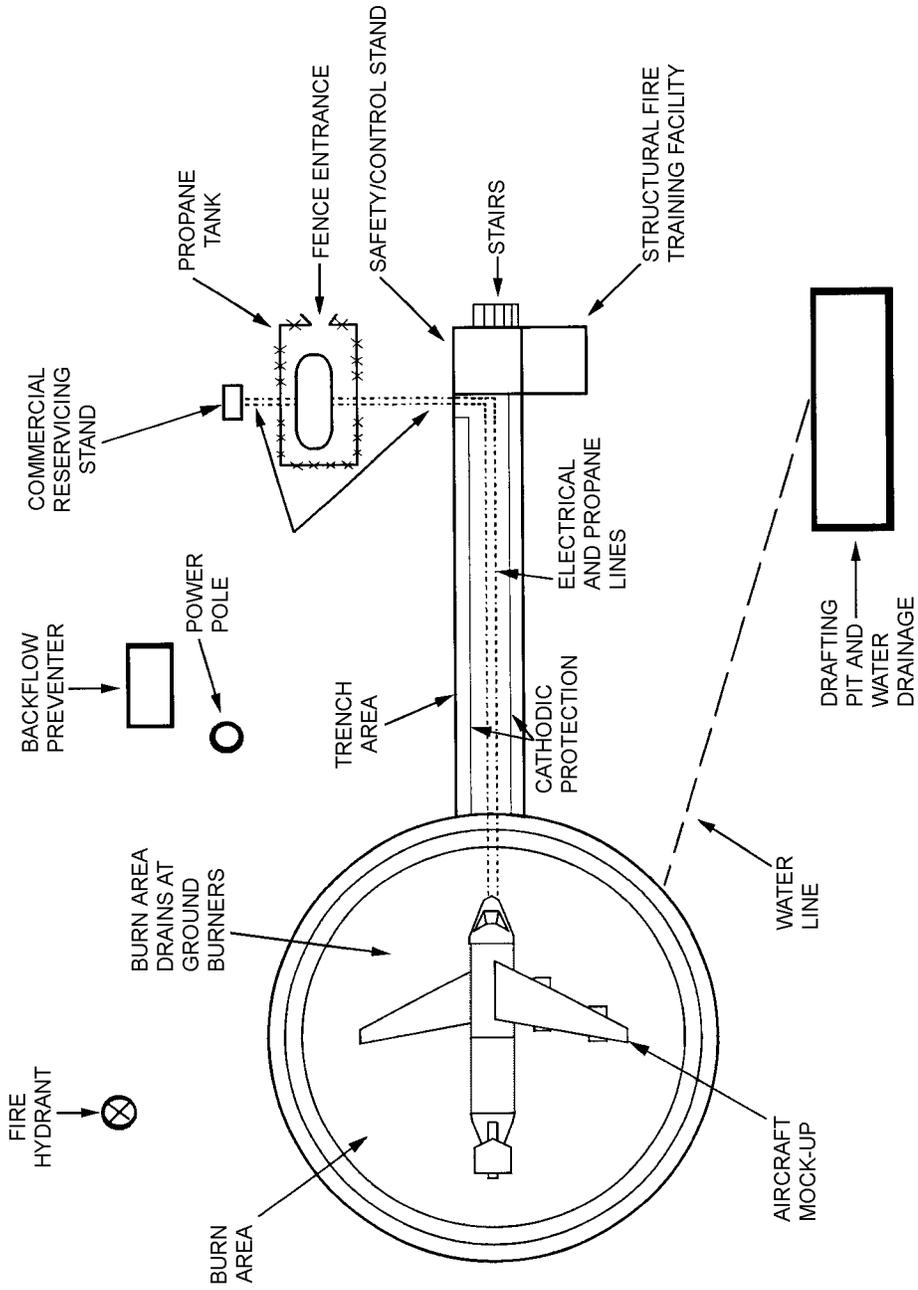


Figure 71. Savannah ANGB  
Savannah, Georgia

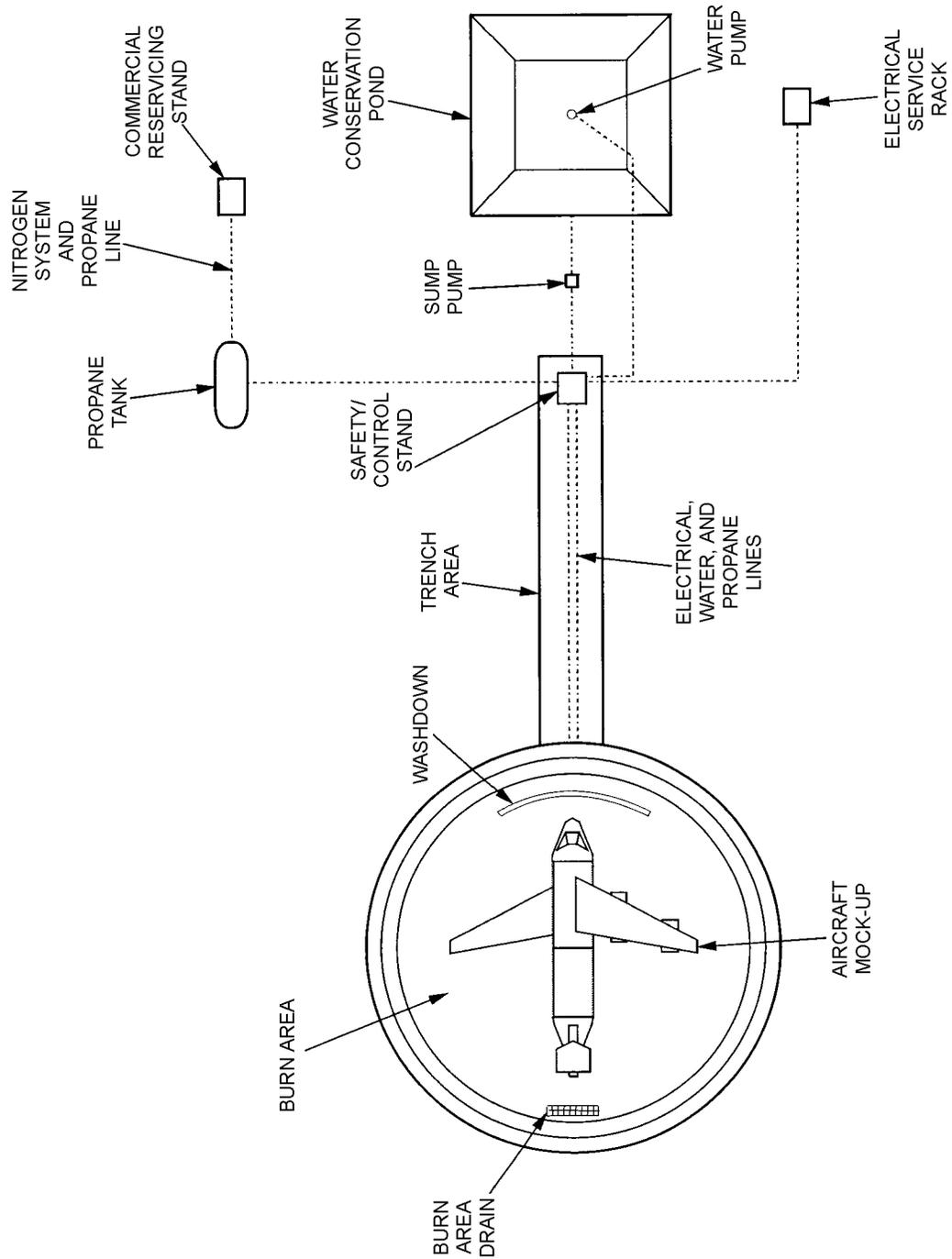


Figure 72. Scott AFB  
Belleville, Illinois

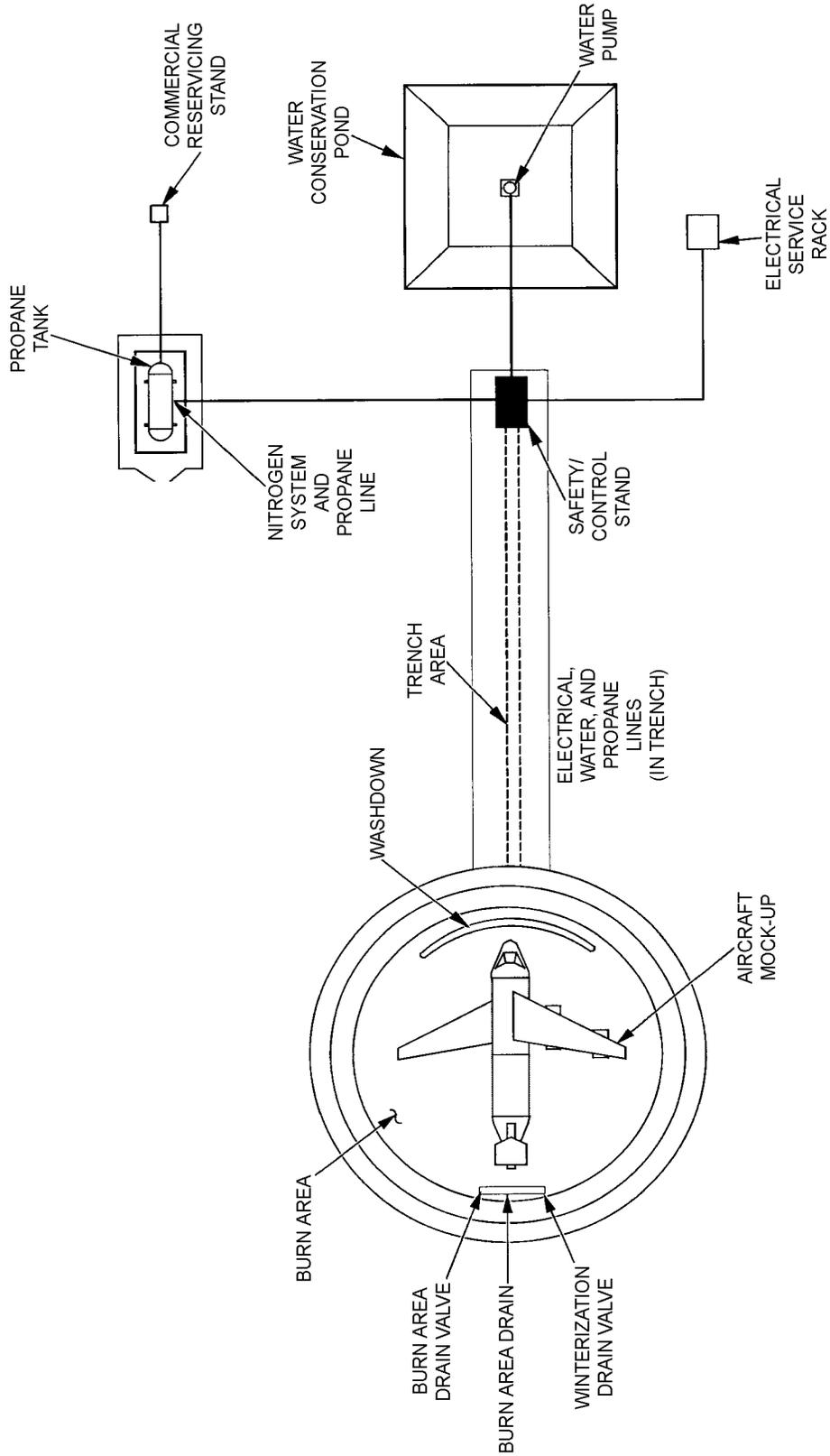


Figure 73. Seymour-Johnson AFB  
Goldsboro, North Carolina

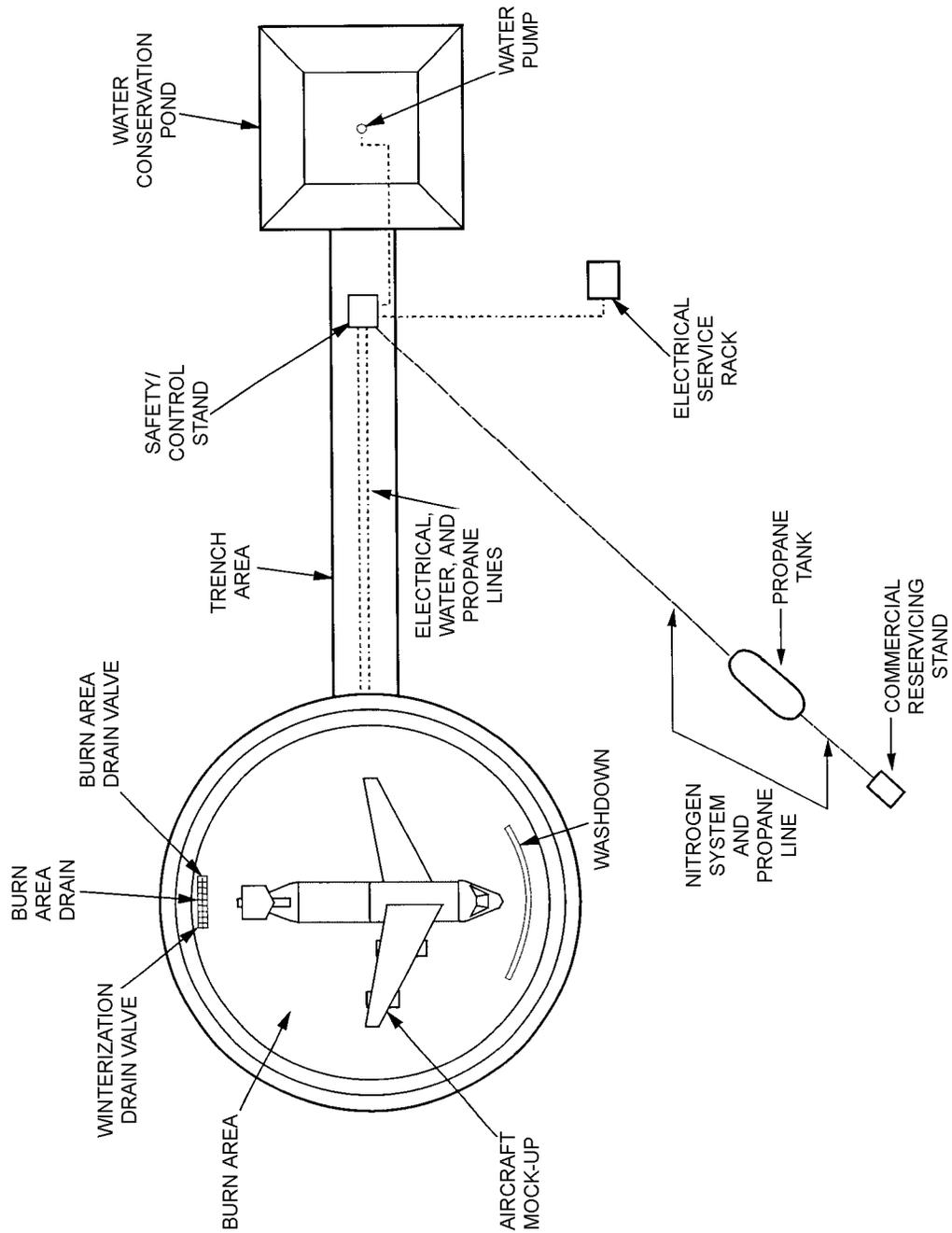
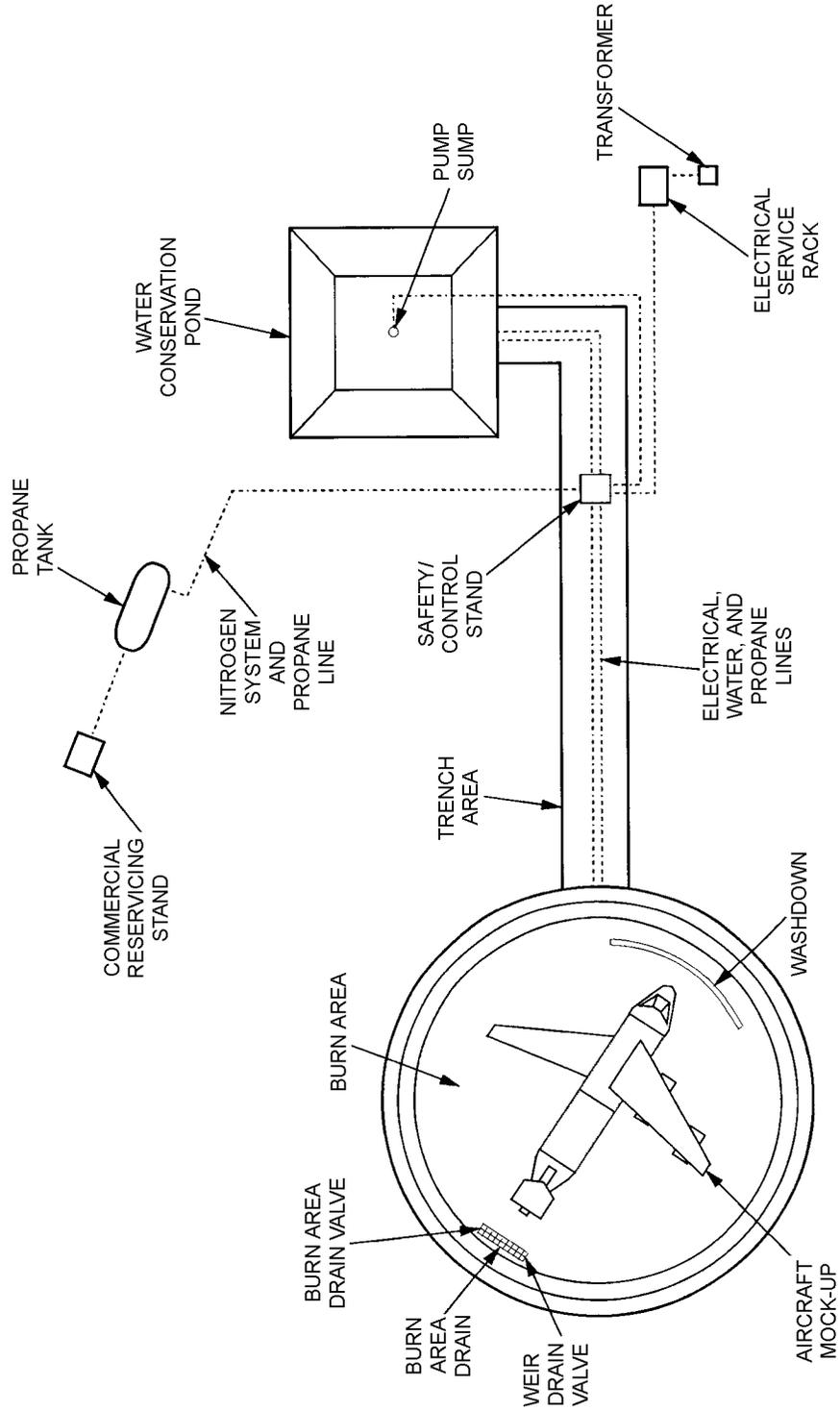


Figure 74. Shaw AFB  
Sumter, South Carolina



**Figure 75. Sheppard AFB  
Wichita Fall, Texas**

**THIS SITE USES AN ICS MOBILE TRAINER  
NO DRAWING REQUIRED**

**Figure 76. Spangdahlem AB  
Germany**

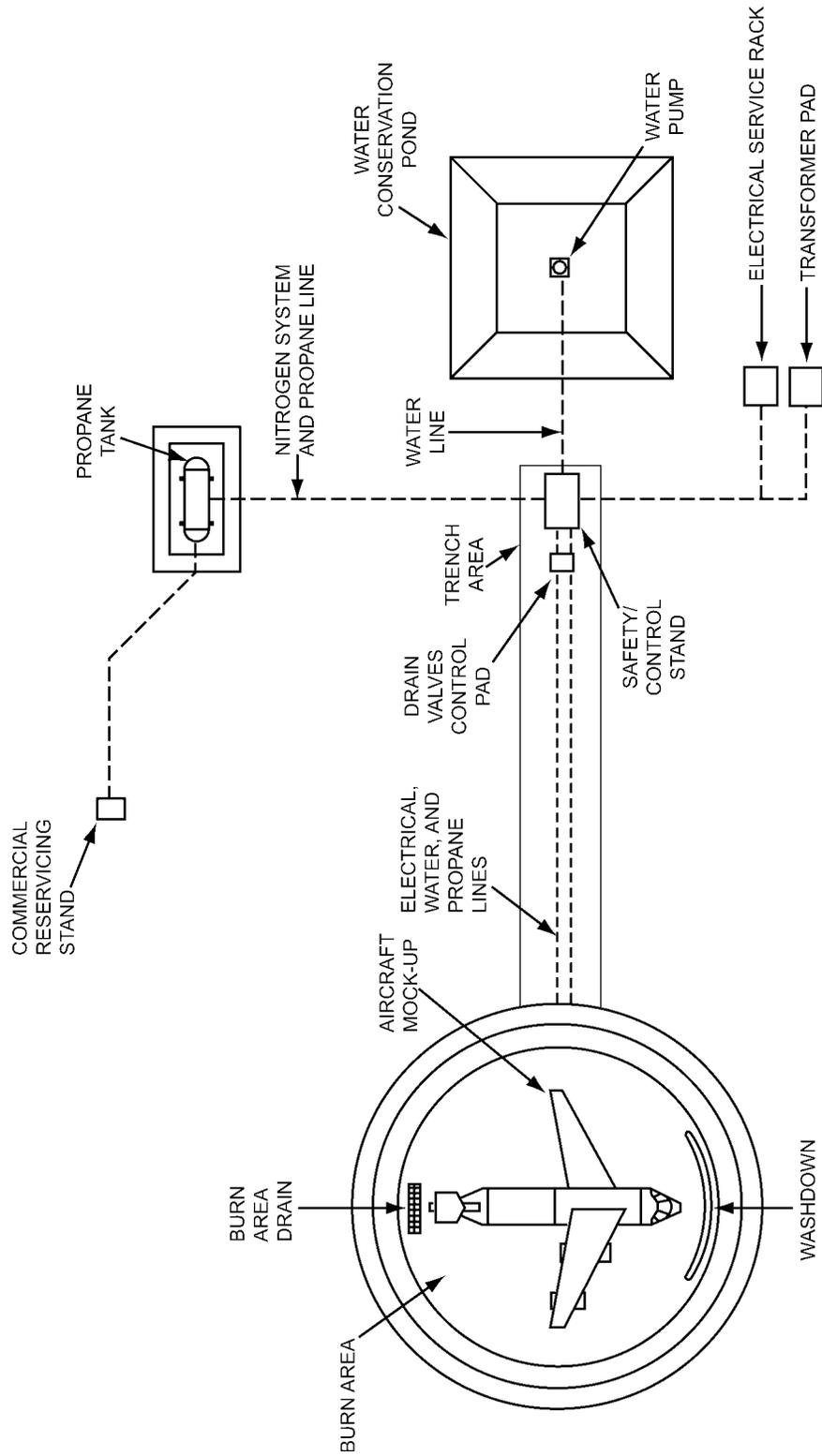


Figure 77. Tinker AFB  
Oklahoma City, Oklahoma

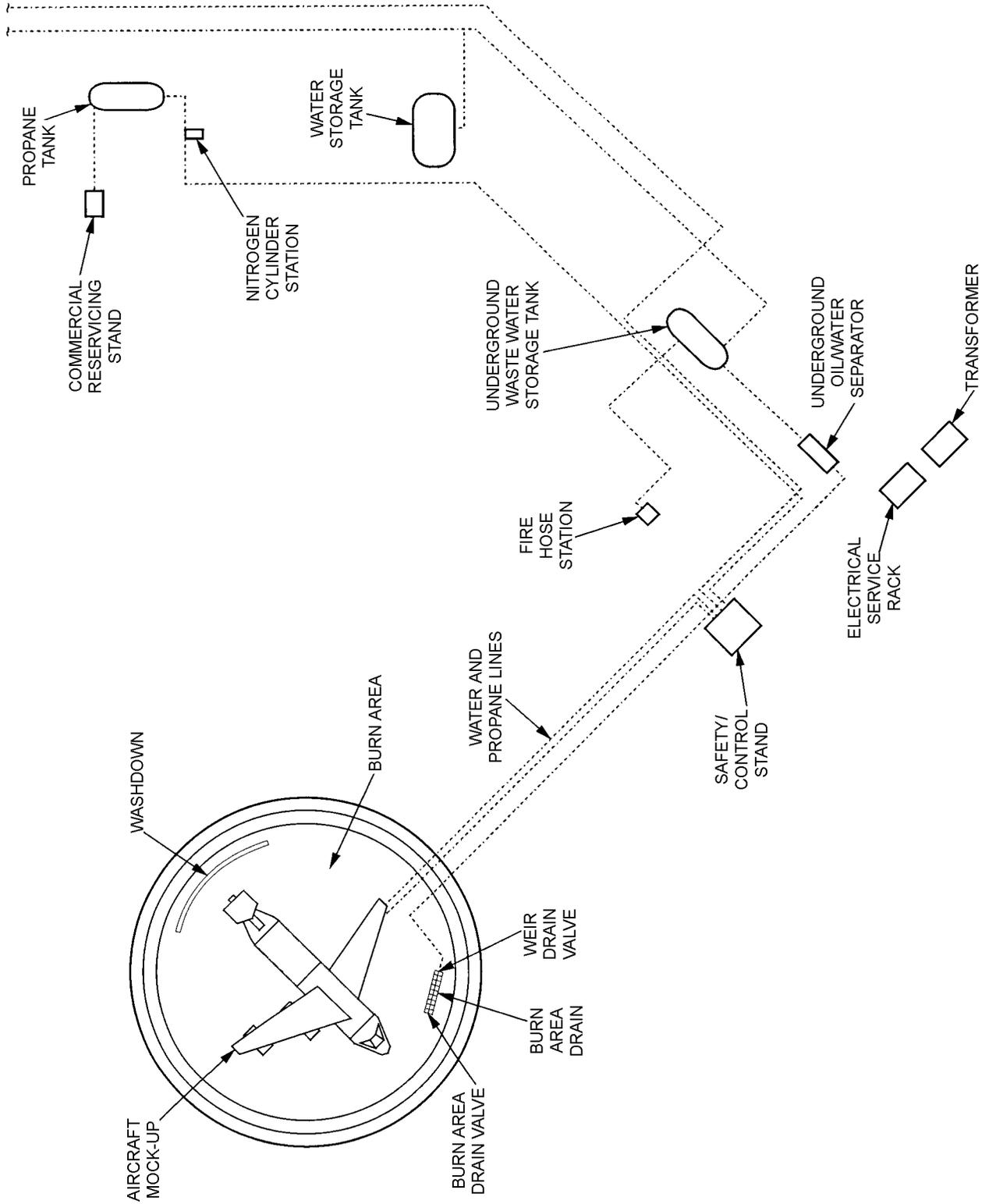


Figure 78. Travis AFB  
Fairfield, California

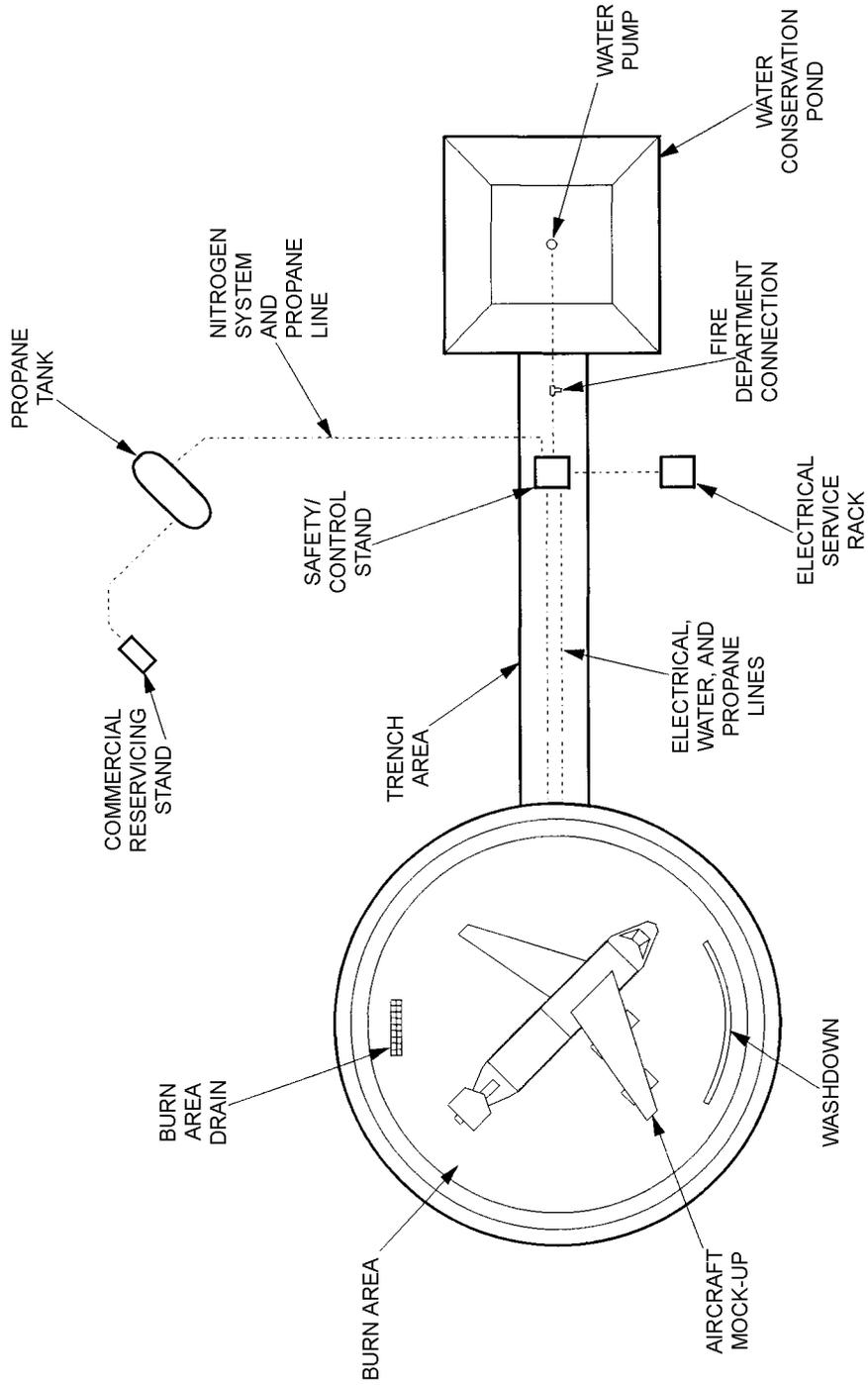


Figure 79. Tyndall AFB  
Panama City, Florida

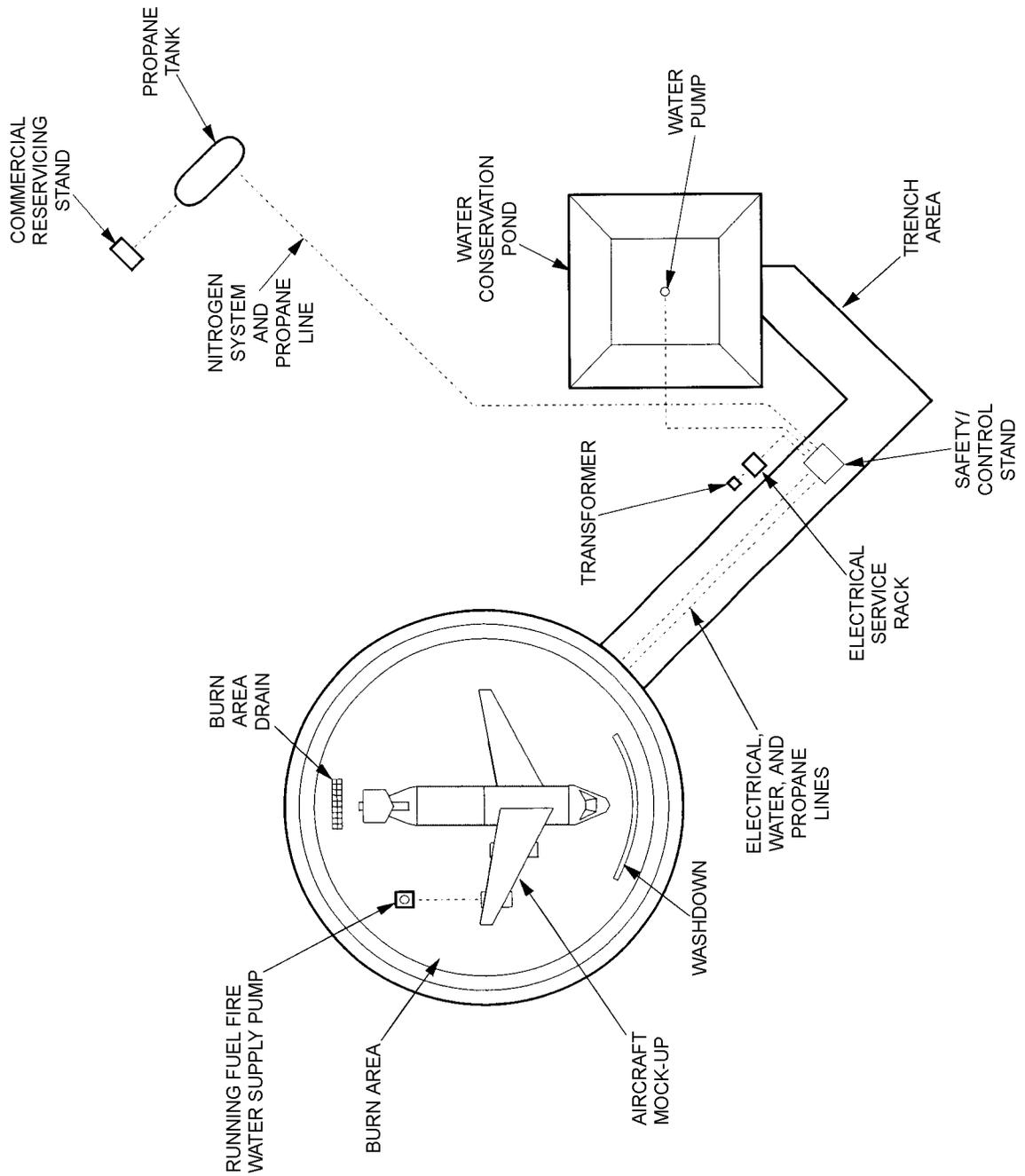


Figure 80. Vance AFB  
Enid, Oklahoma

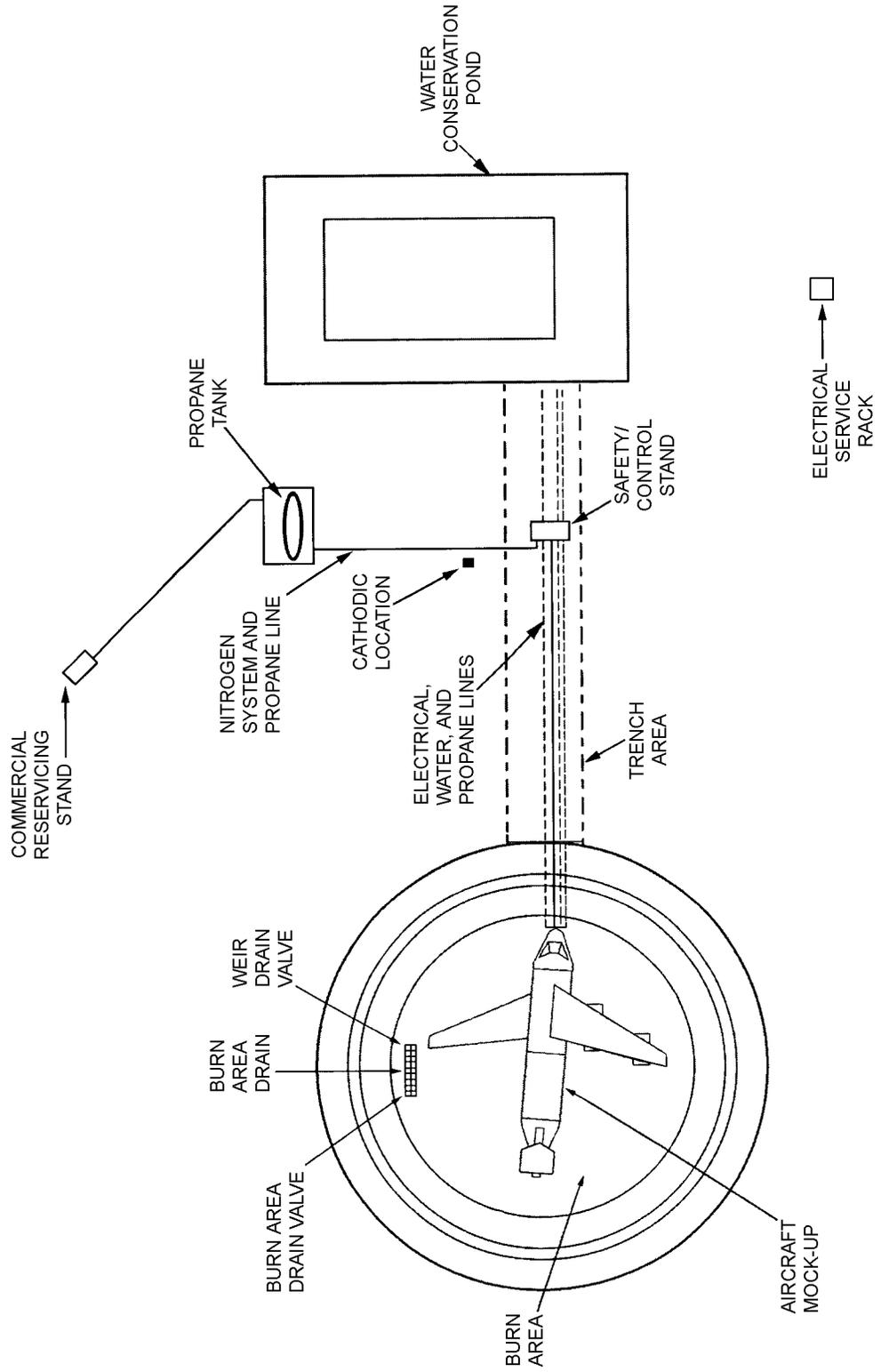


Figure 81. Vandenberg AFB  
 Lompoc, California

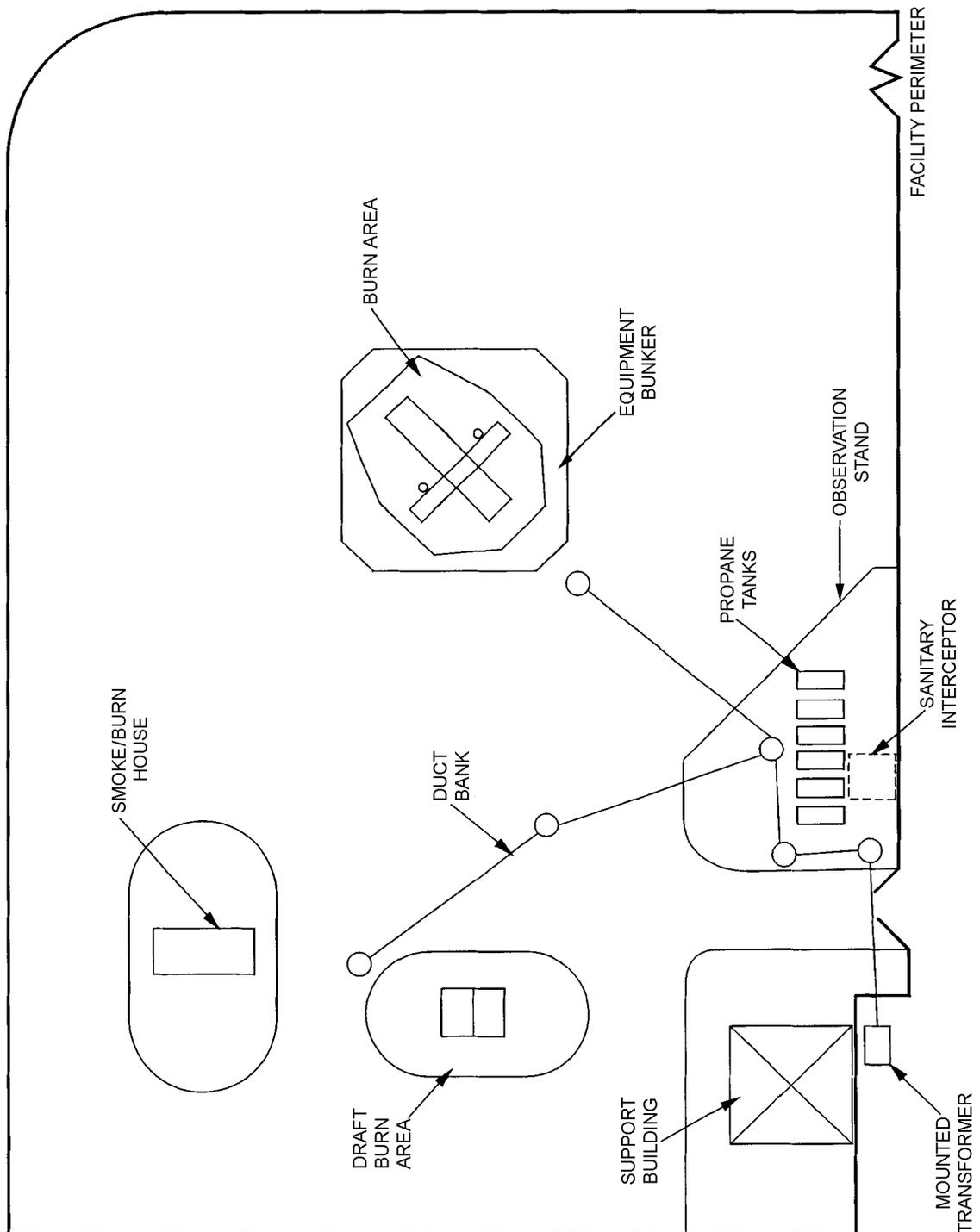


Figure 82. Volk Field ANGB  
Camp Douglas, Wisconsin

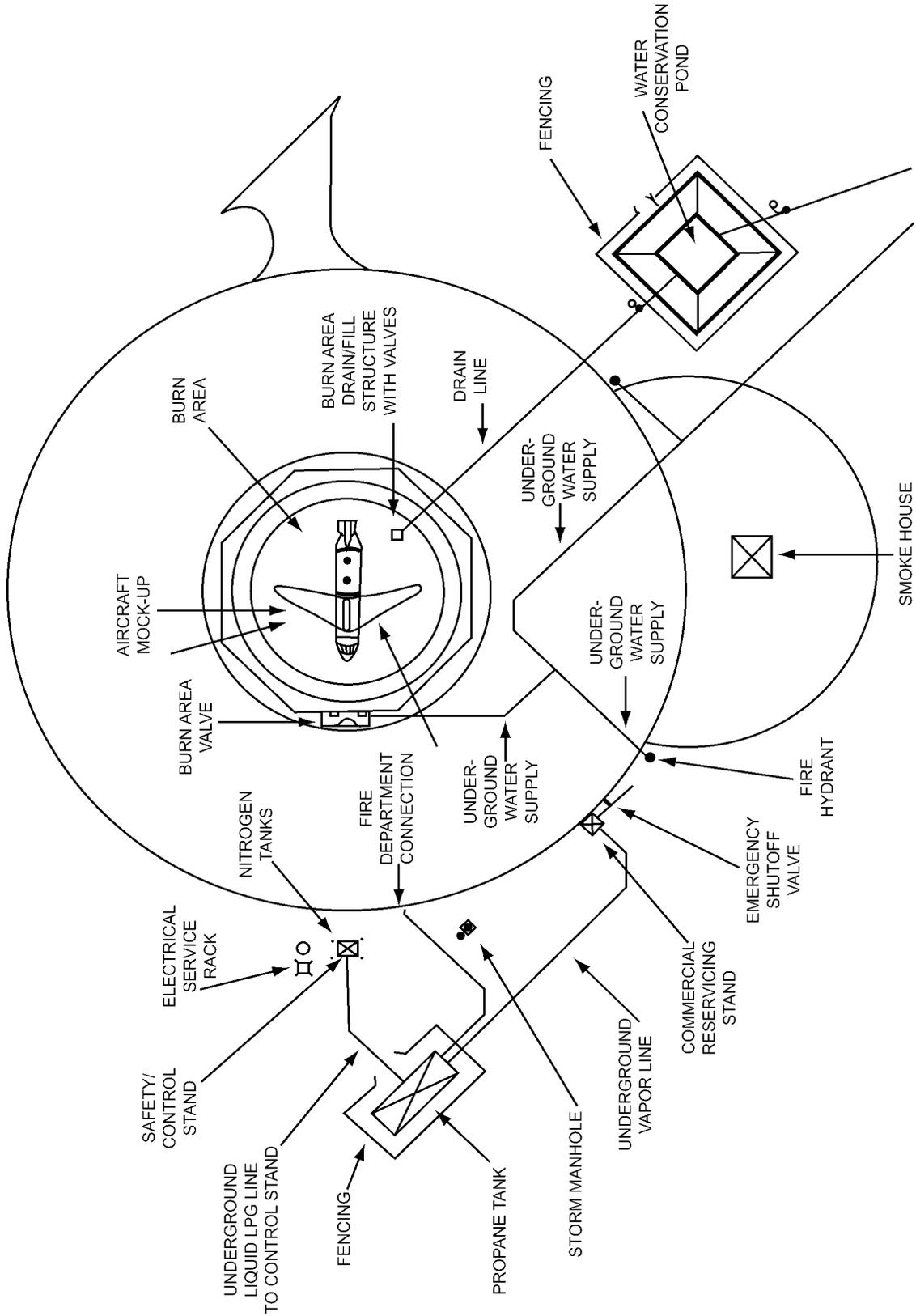


Figure 83. Westover AFRB  
Ludlow, Massachusetts

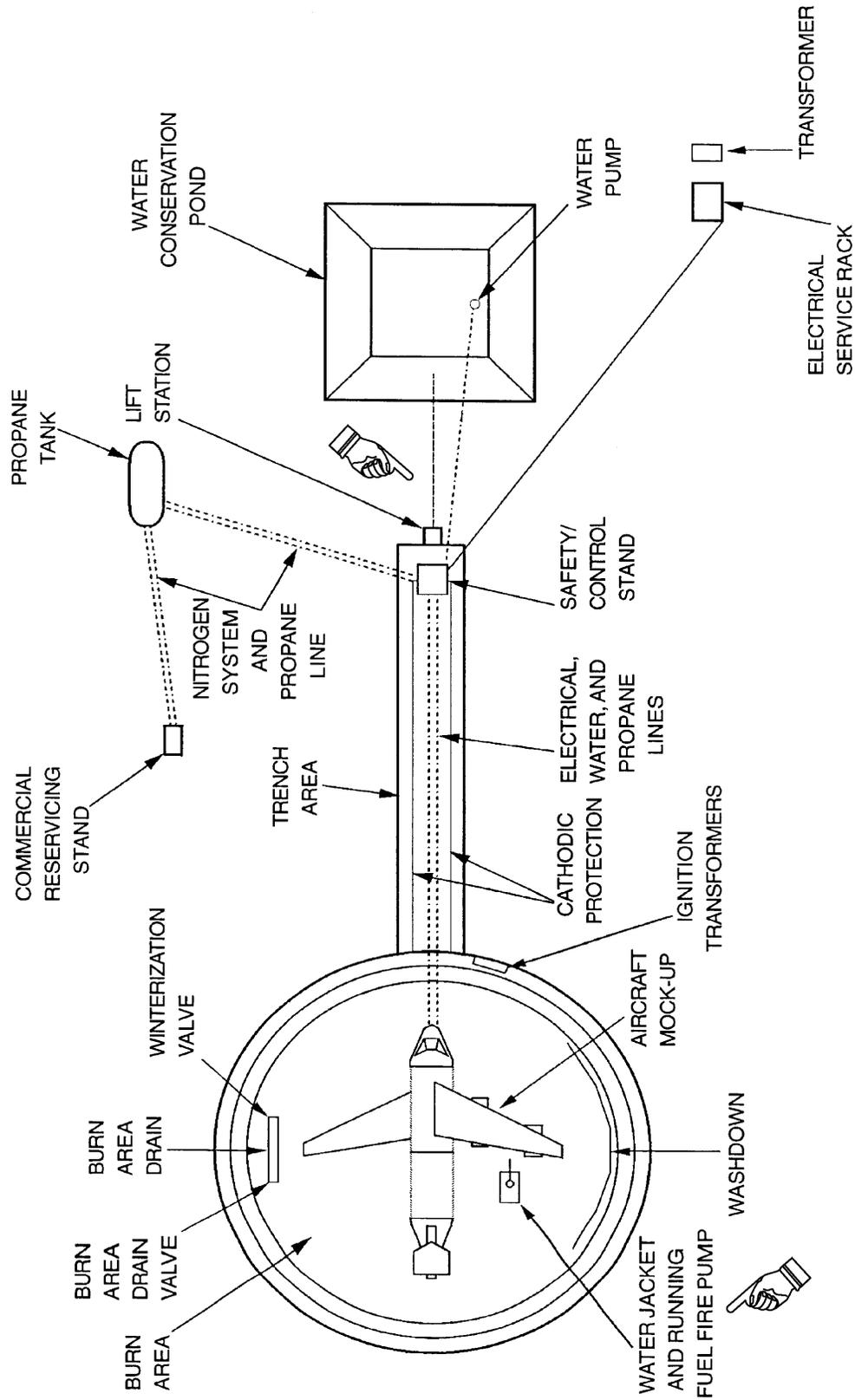


Figure 84. Whiteman AFB  
 Knob Noster, Missouri

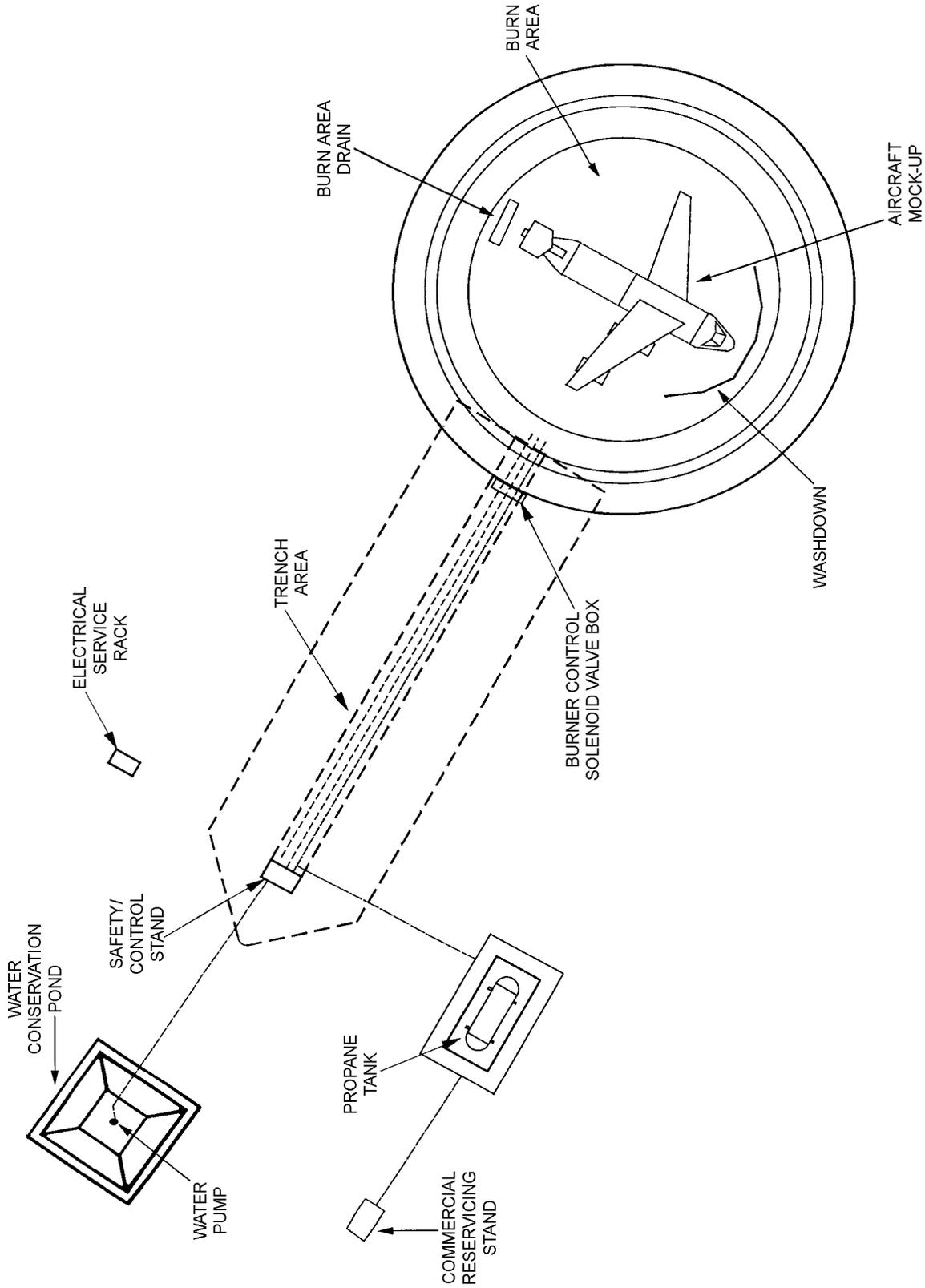


Figure 85. Wright-Patterson AFB  
Dayton, Ohio

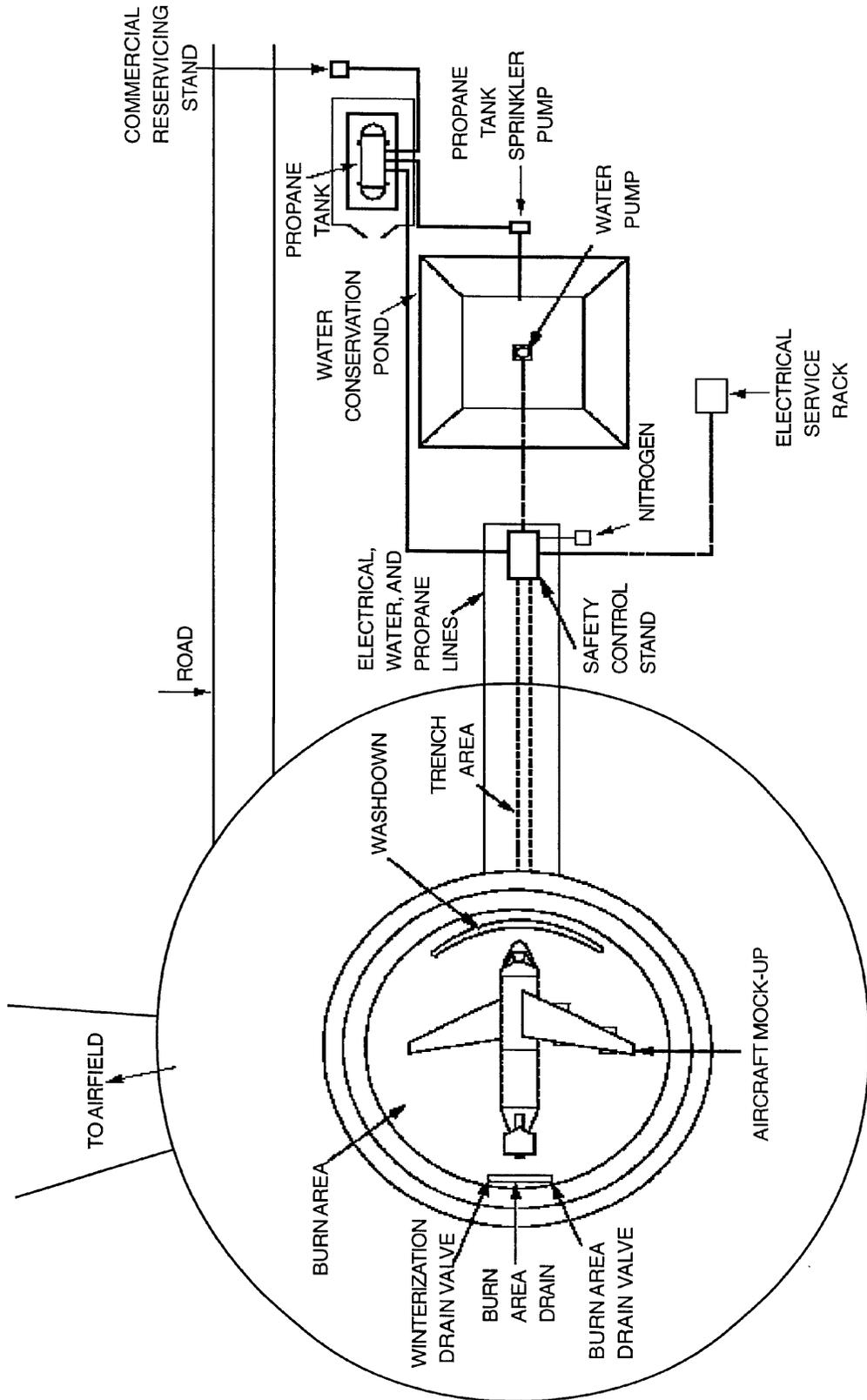


Figure 86. Yokota AB  
Fuzza, Japan

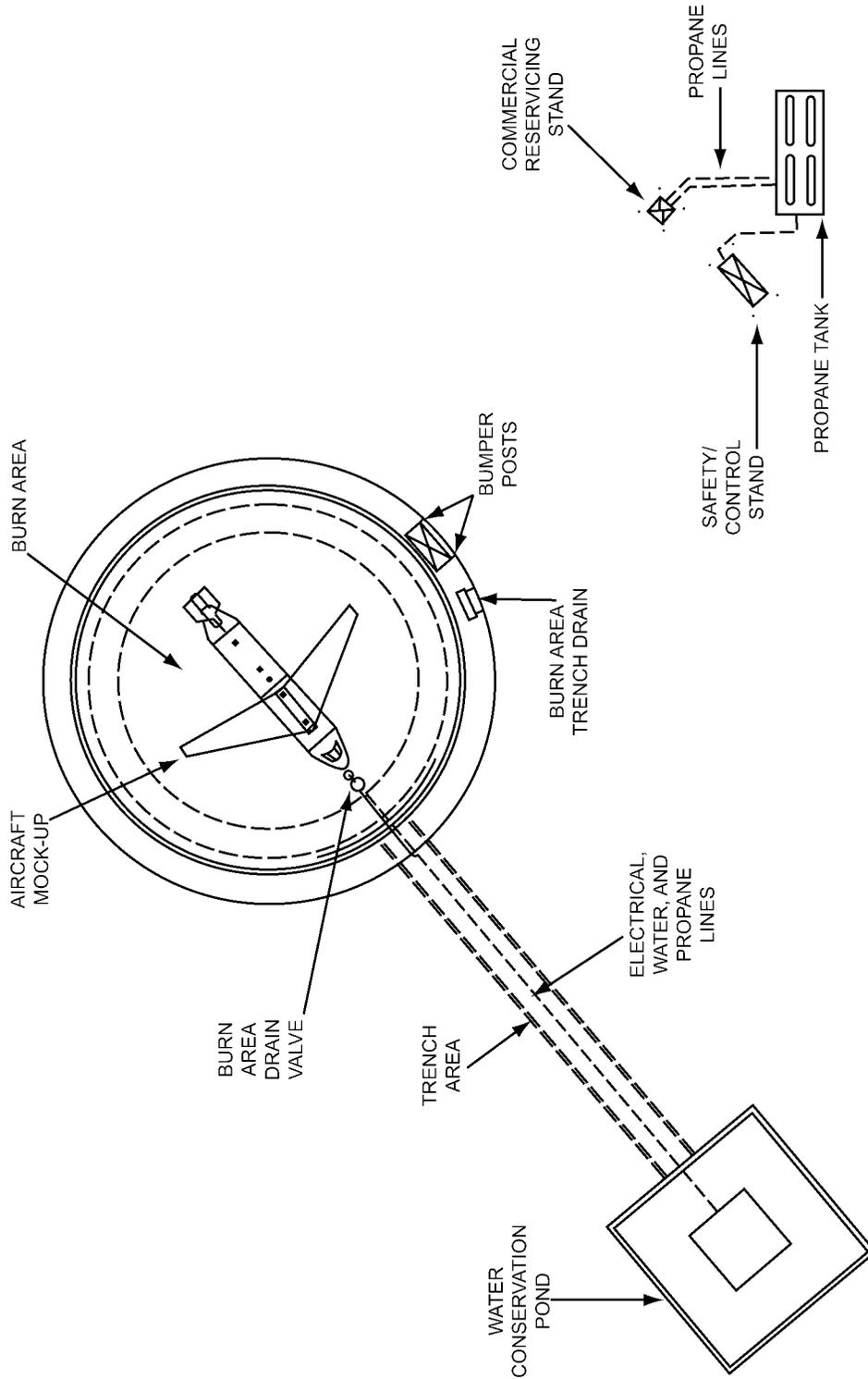
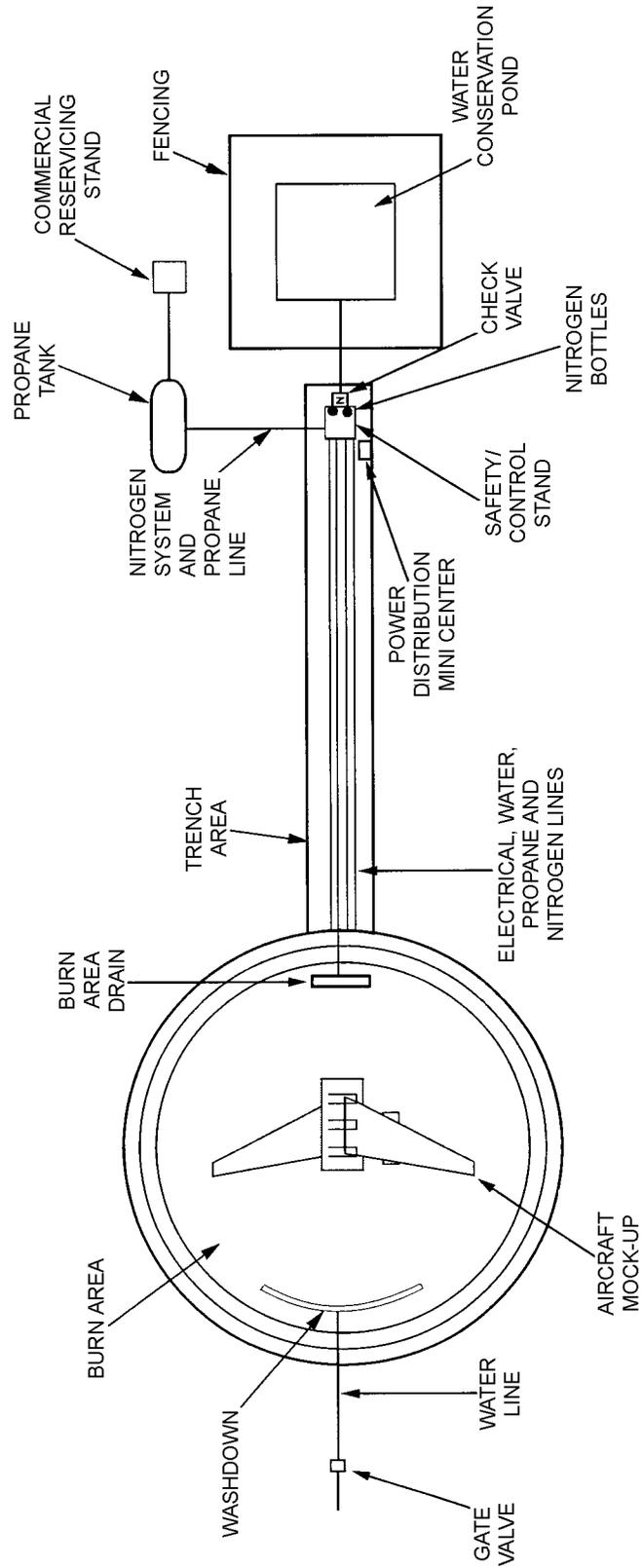


Figure 87. Youngstown AFRB  
Youngstown, Ohio

**NOTE**  
 THIS SITE EMPLOYS ONLY EXTERNAL BURNERS, SIX  
 GROUND AND ONE MIDWING ENGINE BURNERS.  
 FUSELAGE CEILING DOES NOT HAVE A SPRINKLER  
 SYSTEM, BUT USES LARGE VENT HOLES.



**Figure 88. Ft. Bliss USA  
 El Paso, Texas**



**WORK PACKAGE**

**OPERATION AND MAINTENANCE INSTRUCTIONS**  
**GOODFELLOW AFB TEXAS OPERATING PROCEDURES**  
**EFFECTIVITY: AIRCRAFT FIRE TRAINING FACILITY**

**LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 12 Consisting of the Following:

\*Zero in this column indicates an original page.

Page No.	*Change No.	Page No.	*Change No.	Page No.	*Change No.
1.....	1	5 - 7 .....	1	12 Blank .....	0
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1 Responsibilities .....	3	5.3 Water Jackets .....	6
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NONE

**REFERENCE MATERIAL REQUIRED**

DOCUMENT NUMBER	TITLE
WP 004 00	(Paragraph 6-7) Emergency Procedures
WP 007 00	General Maintenance

## **APPLICABLE TCTOS**

NONE

## **CONSUMABLE MATERIALS**

NONE

## **APPLICABLE SUPPORT EQUIPMENT**

NONE

## **ILLUSTRATED SUPPORT EQUIPMENT**

NONE

## **FOREWORD**

This work package contains setup and operating procedures for the Aircraft Fire Training Facility (AFTF). These proce-

dures include pre-exercise inspection, pre-exercise setup, training exercise, and system shutdown and clean up.

## **SAFETY SUMMARY**

Various steps in this work package may require personnel to be exposed to extremely high temperatures, open flames, liquid propane vapor and fumes, and hot surfaces. It is imperative to wear appropriate protective clothing and to be aware of the EMERGENCY PROCEDURES in Work Package 004 00, paragraphs 6 and 7. High voltage will be present

at burn area igniters. All personnel shall remain clear of igniters while in use. Failure to comply may cause serious injury. Use of Self Contained Breathing Apparatus (SCBA) is required for all fires. Exposed skin areas may result in burns by heat/steam.

## 1 RESPONSIBILITIES.

1.1 Ignition Team. Shall be responsible for performing the pre-exercise inspection and setup.

1.2 Training Instructor in Charge. Training Instructor responsibilities include:

- a. Shall have sole responsibility for the training exercise, to include all students, instructors and equipment.
- b. Shall have dedicated radio communications with the Safety Officer and Ignition Team.
- c. Shall pre-brief, assign personnel duties, initiate, oversee, evaluate, terminate, and de-brief the training exercise.

1.3 Safety Officer: Safety Officer responsibilities include:

- a. Shall make sure the control tower has been properly configured for emergency shutdown and normal operation.
- b. Shall make sure the Ignition Team has properly configured the control stand, for emergency shutdown and normal operation.
- c. Shall report to the training officer in charge that the training exercise may commence.
- d. Shall monitor the training evolution.

## 2 PRE-EXERCISE INSPECTION/SETUP.

### WARNING

If an obvious unsafe or unserviceable condition is noted, halt operations and rectify condition prior to proceeding. Failure to halt and correct conditions may cause injury or death to personnel.

### CAUTION

- The entire training facility is a no smoking area.
- Make sure propane tank level is sufficient for scheduled training exercise. Use adjacent small tank or reservice as required.

## NOTE

- Make sure all personnel are clear of mock-up and burn area.
- This facility operates under warm weather operational guidelines year round.

Pre-exercise inspection/setup shall be performed by the following authorized personnel immediately prior to commencement of training exercise: Training Instructor in Charge, Safety Officer, and Ignition Team.

- a. In the control tower second floor, make sure all circuit breakers are in the on position, and visually inspect the air compressor and filter/dryer for excess corrosion, wear, and serviceability.
- b. In the control tower third floor, pull OUT the propane tank emergency shutoff and control panels emergency electrical shutoff buttons.
- c. Insert keys into selected mock-up control panel master switches and activate. If jet fuel will be used in the helicopter and/or the LFA, insert the JP-8 key(s) into the control panel master switches and activate. Pull OPEN the emergency shutdown control button on the control stand.
- d. Push the JP-8 master electrical switch located on the third floor wall when JP-8 is required for training.
- e. Inspect the propane storage tanks, associated gauges, piping and valves for excessive corrosion or obvious damage.

### WARNING

Gloves and face shield shall be worn during Roto Gauge operation.

- f. Take tank level reading. Accurate tank level readings can be obtained using the tank Roto-Gauge. To read the gauge:

- (1) Rotate the lever to the 12 o'clock position.

- (2) Open the petcock valve on the end of the gauge, cold propane vapor will escape.
  - (3) Turn the lever to the left or right slowly until liquid propane escapes through the open petcock. The corresponding reading on the gauge under the lever is the percentage of LPG in the storage tank.
  - (4) Close the petcock valve.
  - (5) Return the lever to the 12 o'clock position.
- g. Open selected propane storage tank manual liquid supply valve. Open valve (1A) if utilizing tank A, or (1B) if utilizing tank B.
  - h. Open selected propane storage tank manual vapor return valve. Open valve (2A) if utilizing tank A, or (2B) if utilizing tank B.
  - i. Make sure valves 3, 4, 5, and 6 are in the open position on the associated piping.
  - j. If jet fuel fires are planned during training, visually make sure the JP-8 master power switch located near the JP-8 storage tank is on.
  - k. Make sure the JP-8 Outside Screw and Yoke (OS&Y) supply valve, located near the storage tank, is open (approximately 2 inches of threads showing above handle).
  - l. Inspect the JP-8 storage tank, associated gauges, piping and valves for excessive corrosion or obvious damage.
  - m. Inspect the control stand/mock-up to include electrical and mechanical components, piping, valves, regulators, and nitrogen system.
  - n. Inspect burn area. Make sure rock is level and that when flooded, water covers entire pit from side to side without covering ground ignitors.
  - o. Make sure that rock level is 1/2 inch to 1 inch below top of burn area drain and level throughout the pit.
  - p. Make sure burn area drain valve inside weir is closed and weir drain valve outside of weir is open.
  - q. Inspect exterior and interior burners and ignitors and make sure that burner grates are not excessively corroded and ignitor protectors are in place.
  - r. Inspect mock-up for excessive corrosion. Inspect all doors for freedom of operation and excessive corrosion.
  - s. Inspect fuel, water piping and water jackets for excessive corrosion.
  - t. Inspect exterior lighting for proper operation, if applicable.
  - u. Open water jacket(s) manual control valve on the control stand. Make sure water continuously flows to all water jackets on the mock-up.
  - v. Make sure nitrogen system vent valve next to cylinder(s) and the 2 in-line valves above cylinder(s) are closed. Open (counter clockwise) nitrogen valve on top of nitrogen cylinder. A minimum of 500 psi is required in the cylinders to ensure emergency shutdown and nitrogen valves work properly.
  - w. Turn on washout system timer switch and bring water level to top of weir drain. Select desired time as required. Turn washout off when water level begins to flow into weir drain.
  - x. Perform operational check on all ignitors by activating the appropriate ignitor switch.
  - y. Repeat procedure by slowly opening corresponding manual propane valve until fully open. If flame height is inadequate for training purposes due to low temperatures, turn the LPG transfer pump master switch on and position the transfer pump control switch to the automatic position. Close valve 3. Close manual propane valve and repeat for all burners to be utilized.

### 3 TRAINING EXERCISE.

**WARNING**

- Extremely high temperatures and hot surfaces will be encountered during training exercise. It is imperative to wear appropriate protective clothing and to locate and be familiar with the Emergency Procedures in Work Package 004 00, paragraphs 6 and 7. Failure to comply may cause serious injury or death to personnel. SCBA shall be utilized for all exercises.
- While attempting to ignite fires, if flames are not present within a reasonable amount of time (15 seconds), close burner valve(s) and allow area to

vent before attempting reignition. Failure to comply could pose a serious risk of explosive gas build up.

- The following are considered abnormal conditions and/or emergency situations requiring activation of the system E-Stop switch for emergency shutdown anytime a firefighter: appears to have blown out or extinguished the fire; fails to follow any direction of the Instructor-in-Charge or the Safety Officer; falls down inside the AFTF; or enters inside the AFTF standing completely upright with fire operating.
- Since the fires are intended to simulate a solid object fire event, the following actions are inappropriate and constitute an emergency condition requiring activation of the system E-Stop switch for emergency shutdown anytime the nozzle or any firefighter including his PPE: breaks the vertical plane of the cargo box; breaks the plane of the control surfaces in the cockpit; breaks the plane of any passenger fire burner shield or the area above the burner itself; breaks either end plane of an engine; enters the area under the cockpit stairs; enters the area under the passenger seats or breaks the plane of the front surface of the passenger seat backs; enters an area above an operating burner; or enters the area directly below the APU or Wheel fire when the burner is operating.

The Training Instructor in Charge shall confirm all Pre-Exercise Inspection and Set Up procedures have been completed by the Ignition Team and Safety Officer.

- a. Open the control stand manual shut off propane valve.
- b. Ignite selected burners by activating the appropriate ignitor switch and slowly opening the corresponding manual propane valve until fully open. Repeat step until all required burners are ignited.
- c. For running fuel fires, open the JP-8 supply ball valve on the ground control stand.
- d. Set the fuel meter by pushing the set button until it latches.
- e. Set the gallon amount for dispensing (gallons and tenths).
- f. Cock the meter valve handle.

- g. Select the desired engine and open the appropriate ball valve.
- h. Ignite the selected engine using LP procedures in step b of this section.
- i. Activate the JP-8 solenoid (white) dispense button. Once the jet fuel is ignited, shutdown the propane burner in accordance with normal procedures. Repeat as desired.
- j. Once the fuel meter flow has stopped, deactivate the JP-8 solenoid by pressing the white button.

3.1 Exercise Shutdown Procedures. Exercise Shutdown Procedures are as follows:

- a. Close manual propane valve(s) on control stand.
- b. Turn the ignitor switches off.
- c. If jet fuel burning is complete, close the JP-8 supply valve and the engine supply valve.
- d. Shut off the JP-8 transfer pump switch located in the control tower.

#### 4 SYSTEM SHUTDOWN AND CLEAN UP.

When training on a specific mock-up is complete, the Training Instructor in Charge shall direct the Ignition Team to:

- a. Close the control stand master propane valve. Flare off all gas in the propane manifold by activating the corresponding ignitor while opening a manual propane valve.
- b. Once fire has burned out, make sure all manual propane valves on the LPG distribution rack are closed.
- c. Position all ignitor control switches to OFF.
- d. Position emergency shutdown switch on control stand to OFF.
- e. Make sure water jacket control valve remains open while mock-up cools (approximately one hour).
- f. Close nitrogen system cylinder valve. Close the second in-line valve above the cylinder(s). Open drain valve next to cylinder(s). When pressure is relieved, close drain valve and first in-line valve.

- g. In control tower third floor, turn off master switch key for the appropriate mock-up and push emergency shutdown button on control panel. If JP-8 was utilized, turn off the JP-8 master switch key for the appropriate mock-up and turn off the JP-8 master electrical switch (push button located on the north east interior wall).
- h. Activate washout system control valve in control tower to flush burn area. Set washout timer for a minimum of one hour.

#### NOTE

At end of training day the Ignition Team will perform steps i through m.

- i. Push (IN) master electrical switch for JP-8 to CLOSED.
- j. Push (IN) propane tank emergency shutoff and control panel emergency electrical shutoff buttons.
- k. Close selected propane storage tank manual liquid supply valve. Close valve (1A) if utilizing tank A, or (1B) if utilizing tank B.
- l. Close selected propane storage tank manual vapor return valve. Close valve (2A) if utilizing tank A, or (2B) if utilizing tank B.
- m. Turn off master switch keys for all mock-up control panels.

### 5 THEORY OF OPERATION - GOODFELLOW AFB, TX.

This theory of operation is based on a site specific design for Goodfellow AFB LPG (Liquid Propane Gas) Aircraft Fire Training Facility (AFTF). The AFTF consists of five (5) fire training mock-ups, individual burn areas and ground control stands, a master control tower, liquid propane gas and JP-8 fuel supply systems, cathodic protection and a self contained water supply system. General maintenance procedures are described in WP 007 00.

5.1 Large Frame Aircraft Mock-up. The Large Frame Aircraft (LFA) mock-up is constructed of uncoated/unpainted carbon steel. It is approximately 72 feet long, 25 feet high at the tip of the tail and has a wing span of 75 feet. The burn area is 150 feet in diameter. The mock-up has fifteen burners with dedicated ignitors. There are six ground burners surrounding the mock-up to simulate exterior ground fires. The burners are located on the left and right sides of the front fuselage, between the right wing engines, under the left wing, and the left and right rear fuselage. The

mock-up is configured with three simulated aircraft engines, two on the right wing and one on the vertical stabilizer on the tail. Each engine contains one burner assembly with two ignitors. Water sprinklers and water dams are installed in the wing engines. Three dimensional running fuel fires can be created by injecting JP-8 into the water flowing over the water dams which in turn allows JP-8 to flow on to the ground surrounding the engines. Wheel-well and auxiliary power unit fires are simulated on the right side of the fuselage adjacent to the inboard engine. In the interior of the mock-up, ignitors and burners are installed to simulate flight deck, battery box, passenger compartment and cargo bay fires. A water sprinkler system is installed along the top of the interior to cool and washout the mock-up after training is complete. Replaceable sheet metal cut out panels are located on the left side of the mock-up. The panels are used to simulate emergency entrance into aircraft. Two hinged doors are located on the left side and one on the right side of the mock-up.

5.2 Fighter, Helicopter, Tanker and Automobile Mock-up. The Fighter, Helicopter, Tanker, and Automobile mock-ups are all constructed of uncoated/unpainted carbon steel.

5.2.1 The Fighter mock-up has six ground and one engine burner. Two are located forward of the left wing, two forward of the right wing, one left and one right on the rear of the mock-up. The engine burner is accessible from the rear of the mock-up. The burn area is 75 feet in diameter.

5.2.2 The Helicopter mock-up has four ground burners. They are located front right and left and rear right and left of the fuselage. The mock-up's interior burners simulate an under dash battery fire and a rear wall cockpit fire. An additional burner is located in the engine stack and has both LPG and JP-8 fire capabilities. The burn area is 50 feet in diameter.

5.2.3 The Tanker has two ground burners, one at the rear and one under the center. There are two burners located in the open tank accessible from the top of the mock-up, one in the dome tank and one on the left side piping assembly. The burn area is 75 feet in diameter.

5.2.4 The Automobile mock-up has one ground burner on the rear of the vehicle. There are additional burners located in the engine compartment, passenger compartment and in the trunk. The burn area is 30 feet in diameter.

5.3 Water Jackets. Water jackets are installed on all ignitor units on all mock-ups with the exception of the ground burners. The water jackets cool and protect ignitor wiring assemblies. Each burner is equipped with an emergency shutdown system. Any combination of burners may be utilized thus creating unlimited training scenarios.

5.4 Burn Areas. The burn areas are recessed and lined with an 80 mil thick high density polyethylene (HDPE) liner. The liner is back filled with a 6 inch layer of sand and then covered by 18 inches of 1 to 2 inch crushed aggregate. The burn area washout piping allows for water induction into the burn area and for washout upon completion of training. The burn area weir drain allows water to return to the water recover and distribution system and for winterizing the facility if required. Water leaving the burn area is recycled through a fuel/oil separator prior to recovery in the system water storage and distribution system.

5.5 Ground Control Stand. A ground control stand is provided for operation of the mock-up. Located on the control stand are various valves, regulators, solenoids and switches used to control LPG/JP-8 flow, ignition, emergency shut down, and extinguishment during training evolutions. A control panel displays all burner locations and corresponding ignition switches. An emergency shut down control button located on the control panel will turn off power to all ignitors and close burner propane supply valves at the mock-up. The LPG/JP-8, water piping, nitrogen tubing, and electrical conduit from the control stand to the burn area are located in an underground HDPE lined trench. Fire size can be adjusted at individual regulators for all mock-up burners. The LFA's six ground burners **do not** have regulators.

5.6 LPG Fuel System. An LPG fuel system supplies fuel for training fires. LPG is stored in two independently operated tanks. Tank A has a capacity of 30,000 water gallons and tank B has a capacity of 10,000 water gallons. LPG is distributed to each ground control stand and burn area through a series of piping and valves. LPG is directed from the control stand to selected burners by individual manual control valves. Emergency shut down safety features are incorporated at the ground control stand and the control tower for shutting off LPG flow and for shutting off electrical power. Cathodic protection is installed to protect below ground piping from corrosion through sacrificial anodes. Propane expands 1.5% for each 10 degrees of increased

temperature. As the temperature rises, the vapor pressure within the tank also rises accordingly. Propane has an octane rating of 125. It is recommended to reservice the tank(s) when 15% to 20% of capacity remains. Commercial vendors will reservice the tanks. The tank shall only be reserviced to 85% of capacity. LPG has a boiling point of minus 44 degrees Fahrenheit and flammability limits between vapor and liquid are minute. A LPG pump is available at the storage tanks for use in cold weather should tank pressure be inadequate for transferring LPG to the burn areas.

5.7 JP-8. JP-8 fuel can be used alone or combined with LPG on the LFA right wing engine burners and on the helicopter stack burner. JP-8 is stored in a 5000 water gallon tank adjacent to the LPG storage tanks. JP-8 is distributed to the burners under the same operating principle as LPG. Once JP-8 has been distributed into the burners/ground area, the fuel will burn until extinguished and can not be terminated by emergency shutdown procedures.

5.8 Safety Control Tower. A safety control tower located in the center of the training complex allows visual and audible communications with all 5 training mock-ups. The master switch for each mock-up control stand is activated on the corresponding tower control panel. JP-8, propane tank emergency shut off, and the control panels emergency electrical shut off buttons are located on the third floor of the tower. An air compressor housed on the second floor of the tower provides air pressure for opening the LPG storage tank(s) emergency shut off valves. The safety control tower also houses various circuit breakers for the entire complex.

5.9 Water System. The water system is composed of a closed loop non potable distribution system. Water discharged into the burn area(s) is recycled through a fuel/oil separator and into a 500,000 gallon water storage tank. Three in-line pumps draw water from the storage tank into a 10,000 gallon distribution tank and fire hydrant system.

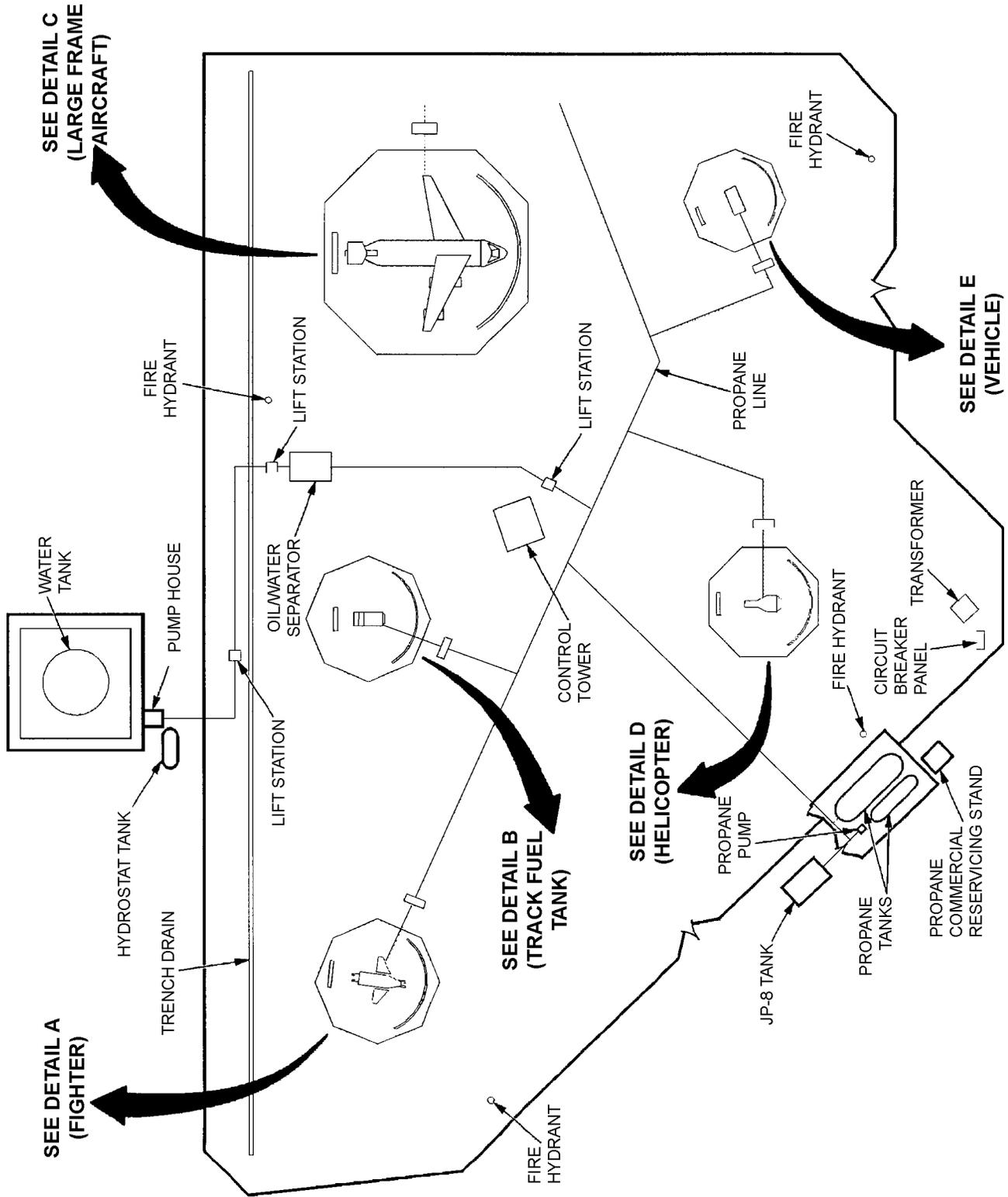


Figure 1. Goodfellow AFB  
San Angelo, Texas (Sheet 1 of 4)

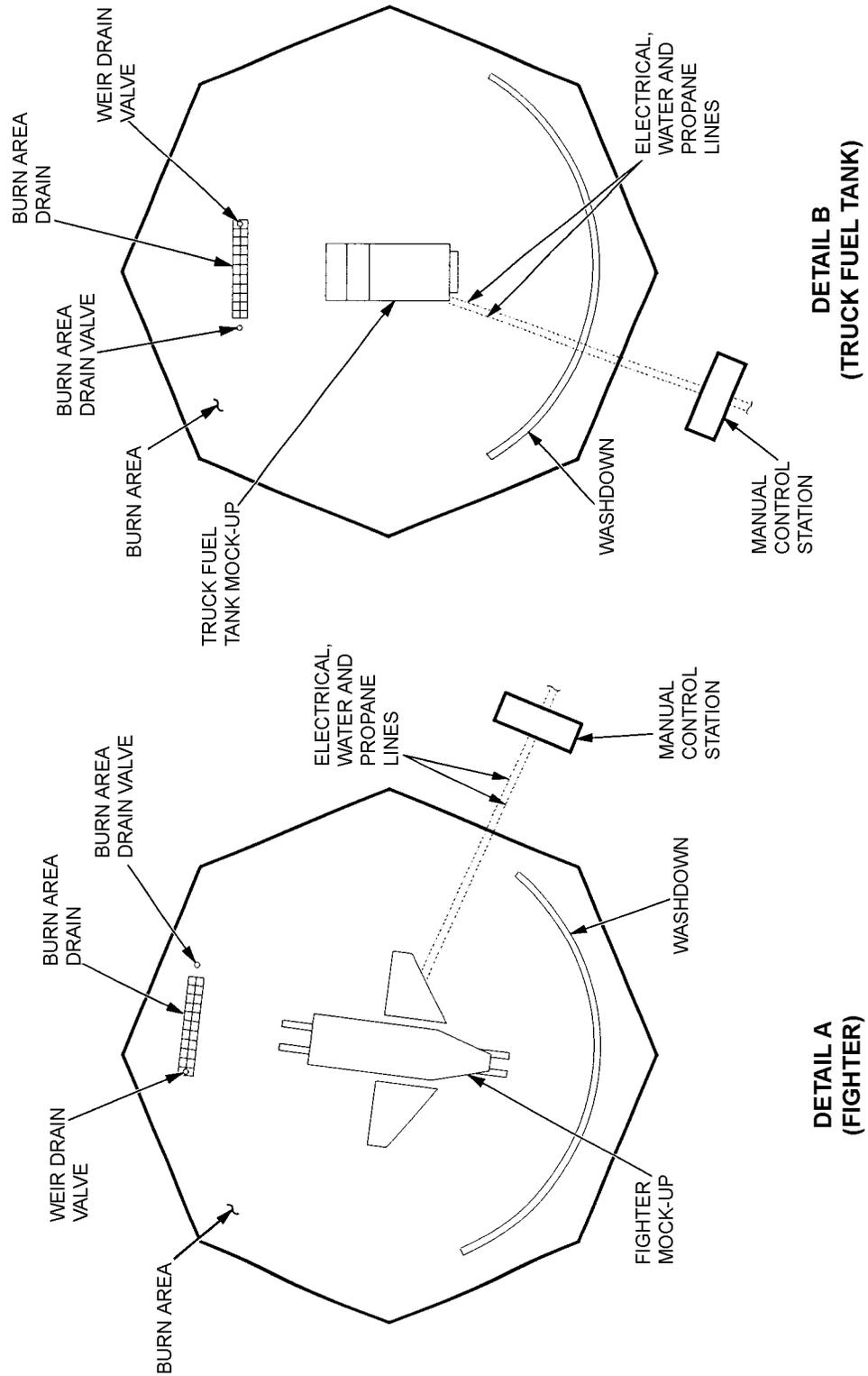


Figure 1. Goodfellow AFB  
San Angelo, Texas (Sheet 2)

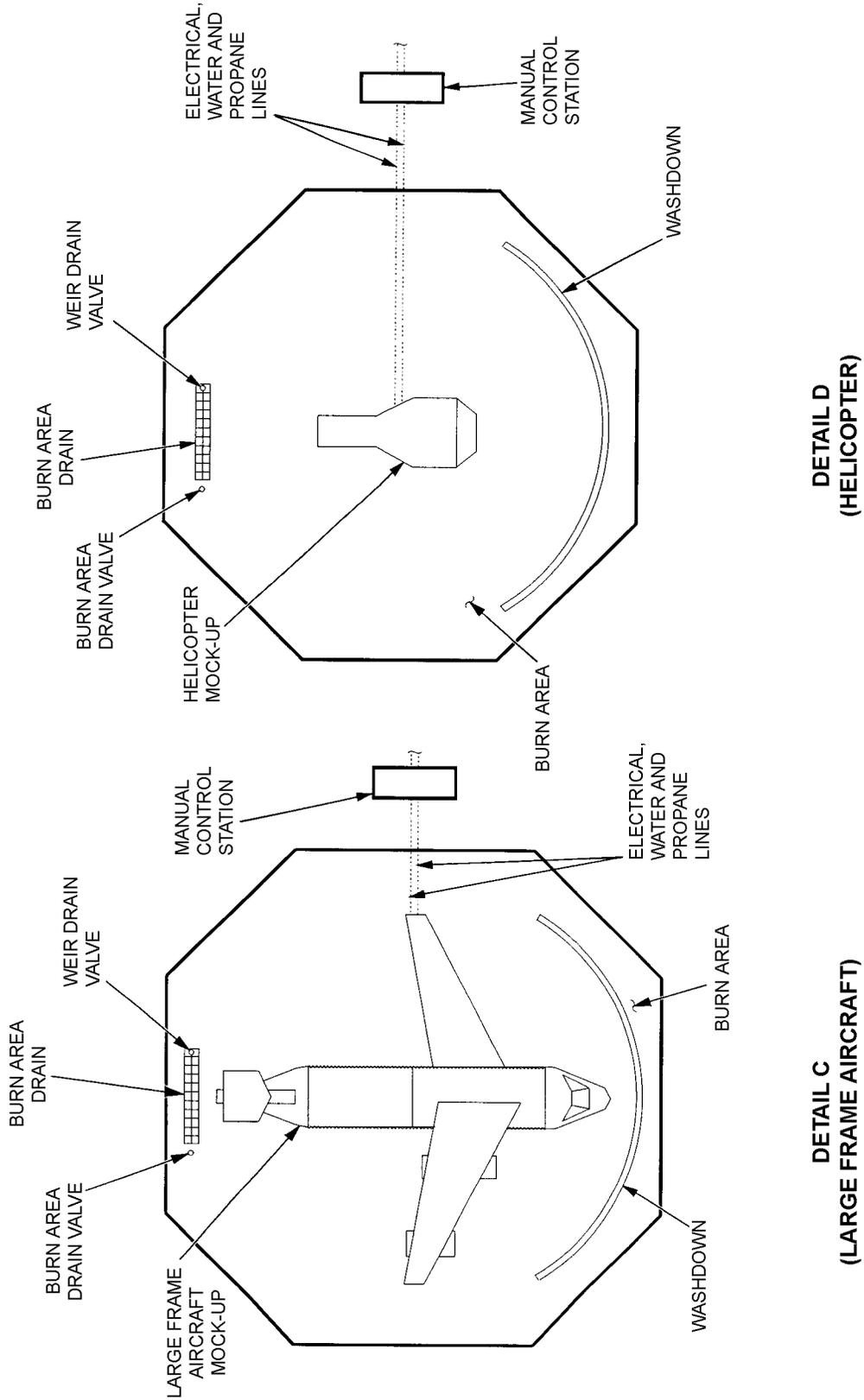
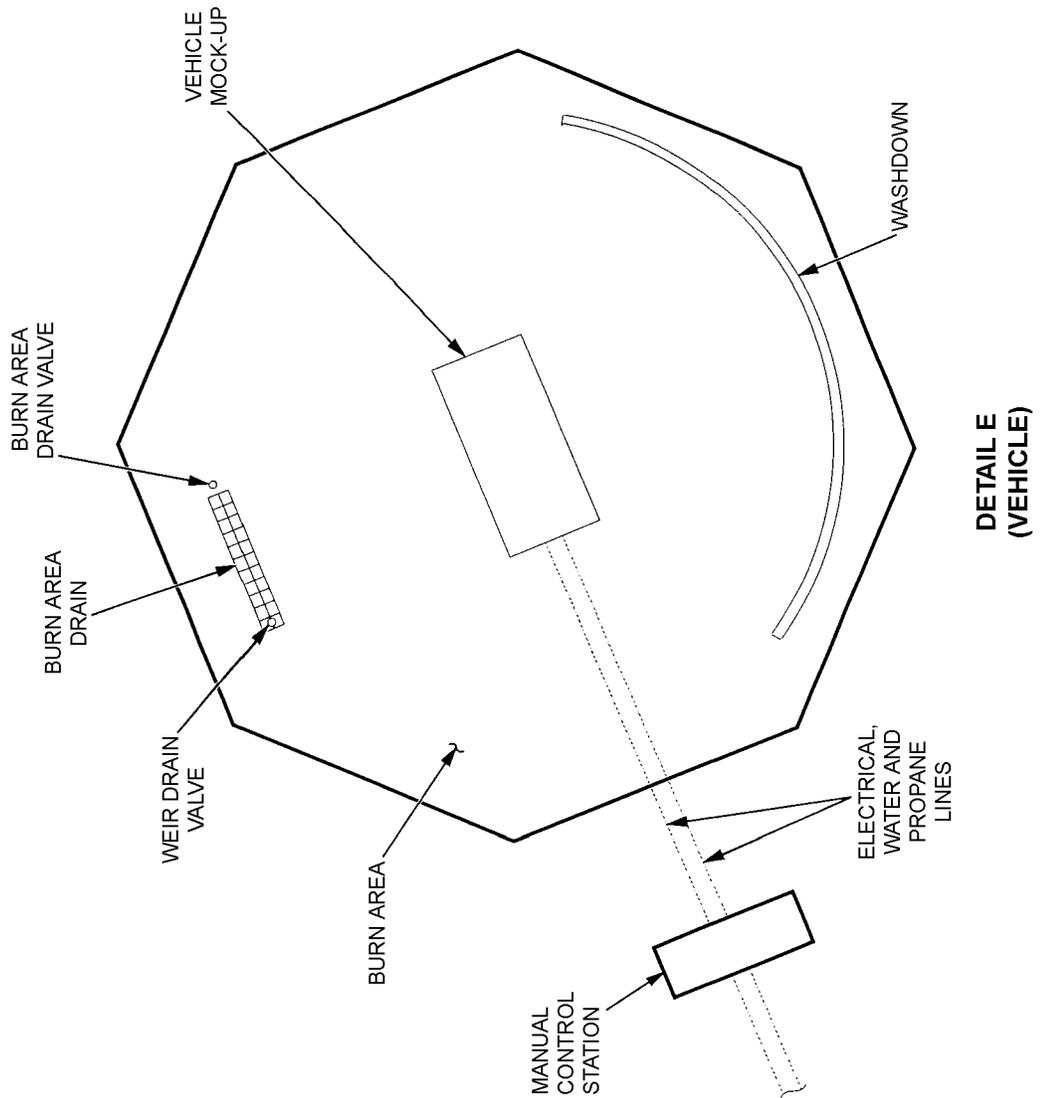


Figure 1. Goodfellow AFB  
San Angelo, Texas (Sheet 3)



**Figure 1. Goodfellow AFB  
San Angelo, Texas (Sheet 4)**



**WORK PACKAGE**

**OPERATION AND MAINTENANCE INSTRUCTIONS  
THULE AB GREENLAND OPERATING PROCEDURES  
EFFECTIVITY: AIRCRAFT FIRE TRAINING FACILITY**

**LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 10 Consisting of the Following:

\*Zero in this column indicates an original page.

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NONE

**REFERENCE MATERIAL REQUIRED**

DOCUMENT NUMBER	TITLE
WP 004 00	(Paragraph 6-7) Emergency Procedures
WP 007 00	General Maintenance

## APPLICABLE TCTOS

NONE

## CONSUMABLE MATERIALS

NONE

## APPLICABLE SUPPORT EQUIPMENT

NONE

## ILLUSTRATED SUPPORT EQUIPMENT

NONE

## FOREWORD

This work package contains setup and operating procedures for the Aircraft Fire Training Facility (AFTF) that uses JP-8 fuel. These procedures include establishing water levels, dispensing fuels into the burn pit, igniting the fuel, flushing

out the burn area and separator, skimming of unburned fuel and the reburn tank. Also explained, the facility shutdown and the reservicing of the fire vehicles from the effluent holding pond.

## SAFETY SUMMARY

Various steps in this work package may require personnel to be exposed to extremely high temperatures, open flames, JP-8 vapor and fumes, and hot surfaces. It is imperative to wear appropriate protective clothing and to be aware of the EMERGENCY PROCEDURES in Work Package 004 00, paragraphs 6 and 7. High voltage will be present at burn

area igniters. All personnel shall remain clear of igniters while in use. Failure to comply may cause serious injury. Use of Self Contained Breathing Apparatus (SCBA) is required for all fires. Exposed skin areas may result in burns by heat/steam.

## 1 GENERAL.

The Thule AB facility is the only AFTF based on the standardized Air Force design using JP-type fuel as a fire source. The fire events provided are the same as the propane fuel system except atomized JP-8 is used as the fuel source.

### **NOTE**

The Thule AB facility is a warm weather operation only. The facility can not be used for fire training while winterized.

## 2 RESPONSIBILITIES.

2.1 Ignition Team. Shall be responsible for performing the pre-exercise inspection and setup.

2.2 Training Instructor in Charge. Training Instructor responsibilities include:

- a. Shall have sole responsibility for the training exercise, to include all students, instructors and equipment.
- b. Shall have dedicated radio communications with the Safety Officer and Ignition Team.
- c. Shall pre-brief, assign personnel duties, initiate, oversee, evaluate, terminate, and de-brief the training exercise.

2.3 Safety Officer. Safety Officer responsibilities include:

- a. Shall make sure the control tower has been properly configured for emergency shutdown and normal operation.
- b. Shall make sure the Ignition Team has properly configured the control stand, for emergency shutdown and normal operation.
- c. Shall report to the training officer in charge that the training exercise may commence.
- d. Shall monitor the training evolution.

## 3 PRE-EXERCISE INSPECTION.

### **WARNING**

If an obvious unsafe or unserviceable condition is noted, halt operations and rectify condition prior to proceeding. Failure to halt and correct conditions may cause injury or death to personnel.

### **CAUTION**

The entire training facility is a no smoking area.

### **NOTE**

- Check JP-8 tank level is sufficient for scheduled training exercise. Do not begin training exercise if level is below 300 gallons. Reservice tank, as required. Do not use contaminated fuel.
- Expansion joint bolts on mock-up are to remain finger tight.

Pre-exercise procedures shall be performed by authorized personnel immediately prior to commencement of training exercise.

- a. Inspect burn area.
  - (1) Make sure rock is level and when flooded, water covers the area from side to side without covering ground igniters.
  - (2) Inspect exterior burners and igniters, and make sure that burner grates are not excessively corroded and igniter protectors are in place.
  - (3) Inspect aircraft mock-up for excessive corrosion.
  - (4) Inspect mock-up doors for freedom of operation and excessive corrosion.
  - (5) Inspect fuel piping for excessive corrosion.

**NOTE**

Ground burners will not be used during cold weather operations. They are expected to be under ice and not operational.

- b. Inspect driving area around burn area for ruts. Level all ruts before proceeding. Failure to do so could upset Aircraft Rescue Fire Fighting vehicles (ARFF).
- c. Inspect exterior lighting for proper operation, if applicable.
- d. Inspect JP-8 system to include tank, gauges, valves, piping, or manual safety system, and regulators for excessive corrosion, wear, a serviceability. Repair leaks before proceeding with any training exercise.
- e. Inspect control stand and fuel valve bank to include electrical and mechanical components, piping, valves, and regulators. Check fuel valve indicators are not lit. Check for excessive corrosion, wear, or serviceability.
- f. On electrical service rack, make sure all DISCONNECT switches are ON.
- g. Inspect Air Systems gauge(s), valve(s), and line(s) for serviceability in accordance with manufacturer's specifications.

4 PRE-EXERCISE SETUP.



The entire training facility is a no smoking area.

**NOTE**

Make sure all personnel are internally and externally clear of mock-up and burn area.

These procedures shall be performed by the following authorized personnel immediately prior to commencement of training exercise: Training Instructor in Charge, Safety Officer, Ignition Officer, and Fuel Control Officer. Dedicated radio communication shall be established by: Training Instructor in Charge, Safety Officer, Ignition Officer, and Fuel Control Officer.

- a. Press START on compressor control panel to turn on Air System compressor and let it come up to operating pressure, (90 psi +).

- b. Completely open air valve to burn area. (After punch list is complete.)

**NOTE**

Air will not be flowing to ground ignitors.

- c. Verify air is flowing to all ignition heads.
- d. Verify valve from surge tank to burn area is open.
- e. Verify valves from washdown and sprinkler lines are closed.
- f. Verify valves from surge tank to SURGE WATER pump P-6 is open.
- g. Verify valves from separator to water storage tank are open.
- h. Verify that between 10,000 to 12,000 gallons is in water storage tank.
- i. Verify valve from water storage tank to burn area is open.
- j. Position SEPARATOR WATER pump P-4 and SURGE WATER pump P-6 MODE SELECTOR switches to AUTO.
- k. Position WASHDOWN AND SPRINKLER pump P-5 PUMP SPEED switch to LOW.
- l. Allow pumps P-4 and P-6 to operate until they reach their low level cutoff. The liquid level in the third stage of the oil/water separator should be just above inlet holes from stage two.
- m. Press WASHDOWN AND SPRINKLER pump P-5 START switch and fill the burn area until water begins to flow into weir drain box. Press WASHDOWN AND SPRINKLER pump P-5 STOP switch.
- n. Position IGNITION MASTER switches to ON.

**NOTE**

The HIGHTAIL engine ignitors cannot be readily verified from ground level.

- o. Press each ignitor switch and visually verify corresponding ignitor in burn area is working.
- p. Position IGNITION MASTER switches to OFF.

- q. Check the fuel level in the JP-8 storage tank, a minimum of 300 gallons are required to conduct a fire exercise.
- r. Reset the FUEL METER counter to 00000 (zero).
- s. Make sure both fuel valves are open.
- t. Position FUEL PUMP P-1 MODE SELECTOR switch (at base of tower) to HAND.

5 TRAINING EXERCISE.

**WARNING**

- Extremely high temperatures and hot surfaces will be encountered during the training exercise. It is imperative to wear appropriate protective clothing and to locate and be familiar with the Emergency Procedures in Work Package 004 00, paragraphs 6 and 7. Failure to comply may cause serious injury or death to personnel. SCBA shall be utilized for all internal exercises.
- The following are considered abnormal conditions and/or emergency situations requiring activation of the system E-Stop switch for emergency shutdown anytime a firefighter: appears to have blown out or extinguished the fire; fails to follow any direction of the Instructor-in-Charge or the Safety Officer; falls down inside the AFTF; or enters inside the AFTF standing completely upright with fire operating.
- Since the fires are intended to simulate a solid object fire event, the following actions are inappropriate and constitute an emergency condition requiring activation of the system E-Stop switch for emergency shutdown anytime the nozzle or any firefighter including his PPE: breaks the vertical plane of the cargo box; breaks the plane of the control surfaces in the cockpit; breaks the plane of any passenger fire burner shield or the area above the burner itself; breaks either end plane of an engine; enters the area under the cockpit stairs; enters the area under the passenger seats or breaks the plane of the front surface of the passenger seat backs; enters an area above an operating burner; or enters the area directly below the APU or Wheel fire when the burner is operating.

**NOTE**

- While attempting to ignite fires, if flames are not present within a reasonable amount of time (15 seconds), close fuel valve(s).
  - The Training Instructor in Charge shall be in control of the training exercise. Dedicated radio communication shall be established between Ignition Officer, Training Instructor in Charge, Safety Officer, and Fuel Control Officer.
  - The Training Instructor in Charge initiates, oversees and terminates the training exercise.
  - Actual exercise burn time will be determined by the Training Instructor in Charge. After manual control valves are closed fire will continue to burn.
- a. Position IGNITOR MASTER switches to ON.
  - b. Press FUEL pump P-1 START switch.

5.1 Air Frame And Hightail Fire. Air Frame and Hightail fire training exercises are as follows:

**CAUTION**

If any fire is extinguished by fire fighting operations, immediately close the associated manual fuel valve.

- a. At the prompt of the training Instructor in Charge, ignite the appropriate burners by depressing and holding the appropriate ignitor switch and slowly opening the corresponding manual fuel valve until flame is present. Repeat step until all required burners are ignited.
- b. Once training objectives have been achieved, close manual fuel valve(s) on Fuel Valve Bank.

5.2 Inboard And Outboard Engine Fires. Inboard and Outboard Engine fires training exercises are as follows:

- a. At the prompt of the training Instructor in Charge, ignite the appropriate burners by depressing and holding the appropriate ignitor switch and slowly opening the corresponding manual fuel valve until flame is present.

- b. If desired, open RUNNING FUEL FIRE valves for appropriate engines.
- c. Once training objectives have been achieved, close manual fuel valve(s) on Fuel Valve Bank.

5.3 Ground Fires. Ground Fires training exercises are as follows:

- a. Open manual valves A, B, C, and D (Ground Fire Fuel valves) on Fuel Valve Bank.
- b. At the prompt of the training Instructor in Charge, open the appropriate Ground Spill valve(s) not exceeding 300 gallons of fuel in the burn area.
- c. At the prompt of the training Instructor in Charge, ignite the appropriate burners by depressing and holding the appropriate ignitor switch(s) until it is obvious that the spilled fuel is ignited.
- d. Close manual valves A, B, C, and D (Ground Fire Fuel valves) on Fuel Valve Bank.

## 6 SYSTEM SHUTDOWN AND CLEANUP.

- a. Position IGNITION MASTER switches to OFF.
- b. Press FUEL pump P-1 STOP switch and set FUEL PUMP P-1 MODE SELECTOR switch to OFF.
- c. Check that all valves on Fuel Valve Bank are closed.



Failure to operate Air System and washdown system for at least one hour after last training event may result in severe damage to the training device, especially the ignition system.

- d. Press WASHDOWN AND SPRINKLER WATER pump P-5 START switch and run for five minutes, then press P-5 STOP switch. Set WASHDOWN AND SPRINKLER pump P-5 MODE SELECTOR switch to LOW and run for one hour or until all fuel is washed from burn area, whichever is longer.
- e. One hour after last training event, press AIR COMPRESSOR STOP switch.
- f. Record the number of gallons of fuel used from the resettable counter and the fixed counter fuel meter reading on the Fire Exercise Check Sheet. These read-

ings are on the fuel meter at the JP-8 fuel storage area.

- g. Position SEPARATOR WATER pump P-4 and SURGE WATER pump P-6 MODE SELECTOR switches to AUTO.

## 7 FIRE VEHICLE RESERVICING FROM THE WATER STORAGE TANK.

### NOTE

Utilizing the water from the water storage tank to refill truck reduces the amount of new water added to the system, therefore, reducing the total amount of effluent produced.

- a. Verify there is sufficient water in the water storage tank (a minimum of 13,000 gallons) to fill the fire truck.
- b. Connect a 2-1/2 inch (or larger) hose from the fire department connection.
- c. Close the Outside Screw and Yoke (OS&Y) valve downstream of WASHDOWN AND SPRINKLER pump P-5.
- d. Position pump WASHDOWN AND SPRINKLER P-5 MODE SELECTOR switch to LOW and Press WASHDOWN AND SPRINKLER pump P-5 START switch and fill the fire truck.
- e. Press WASHDOWN AND SPRINKLER pump P-5 STOP switch when the fire truck is filled.
- f. Open the OS&Y valve downstream of WASHDOWN AND SPRINKLER pump P-5.
- g. Disconnect the 2-1/2 inch hose from the fire department connection outlet and reinstall the protective cap to the outlet.

## 8 THEORY OF OPERATION.

This theory of operation is based on the generic design. The Aircraft Fire Training Facility (AFTF) consists of an aircraft mock-up, burn area, control stand, liquid jet fuel system, cathodic protection system and water conservation system. Refer to Figures 1 and 2 for specific site configurations in this WP. General maintenance procedures are described in WP 007 00. The aircraft mock-up, located in the burn area, is constructed of uncoated/unpainted carbon steel. It is approximately 72 feet long, 25 feet high at tip of tail, with a

wingspan of 72 feet. The mock-up is configured with three simulated aircraft engines, two on the high wing and one located on the vertical stabilizer. Each engine contains a burner assembly and two ignitors. The wiring to all mock-up ignitors is enclosed in air jackets to protect from extreme heat generated by ground burner fires. The wing engines have plumbing installed to simulate running fuel fires. Wheel well and auxiliary power unit fires are simulated on the high wing side of the fuselage adjacent to the inboard engine. In the interior of the mock-up, ignitors and burners are installed to simulate flight deck, battery box, passenger compartment, and cargo fires. A water sprinkler system is installed along the top of the fuselage to cool and washout the mock-up. An expansion joint is located midway on the fuselage to allow for expansion and contraction during training. Cutout panels are located on the left and right sides of the fuselage. These replaceable panels are constructed of 0.031 inch sheet metal. The panels are used to simulate emergency entrance into an aircraft. Two steel hinged doors are located at the left side of the fuselage. (See Figures 1 and 2).

**8.1 Burn Area.** The burn area is 100 feet in diameter. It is recessed and lined with two 80-mil thick high-density polyethylene (HDPE) liner(s). The liner(s) is sandwiched between 6-inch thick layers of sand and covered by an 18-inch thick layer of 1-1/2 inch rock.

**8.2 Atomized Jet Fuel.** The system uses jet fuel pumped at a moderate pressure through atomizing nozzles across electric ignitors to create the mock-up fire events. (Atomizing the jet fuel creates an easily ignited mixture that ignites similar to propane.) Adjusting the appropriate control stand ball valve controls the fire size.

**8.3 Ground Fires.** For ground fires, the burn area is first flooded with water. A weir is used to maintain the proper water level in the burn area. Jet fuel is then pumped on to the surface of the water in the burn area. Depending on the section of the burn area where the wind pushes the jet fuel, the appropriate ignitor is activated and the associated jet fuel valve is opened to provide an ignition flame to the jet fuel floating on the water. Opening the burn area drain valve allows all the water in the burn area to drain to the water conservation system. Located on the control stand are the valves, regulators, solenoids, and switches used to control water, propane and ignitors during training events. Pushing the emergency shutdown switch IN will deactivate all ignitors and close all solenoid valves in jet fuel lines to burners. Jet fuel, water piping, and electrical conduits from the control stand to the burn area are located in an underground HDPE lined trench. Valves in jet fuel lines to mock-up burners are adjusted to increased or decreased for flame size.

**8.4 Jet Fuel System.** The jet fuel system supplies fuel for training exercises. Jet fuel is supplied from a 50,000 gallon tank to the various burners in the burn area through a series of pipes and valves. It is recommended to reservice the tank when 25% of its capacity remains.

**8.5 Water Conservation System.** The water conservation system is a three stage process. Water flows across the weir in the burn area, then by gravity drain into a holding/stabilizing tank where the water rests while the water and jet fuel come out of a mixed solution. The water is then pumped into a multi-stage oil-water separator and the remaining oil is pumped off for reuse/reburn. The water is then pumped into a heated 20,000 gallon storage tank for reuse in the burn area.

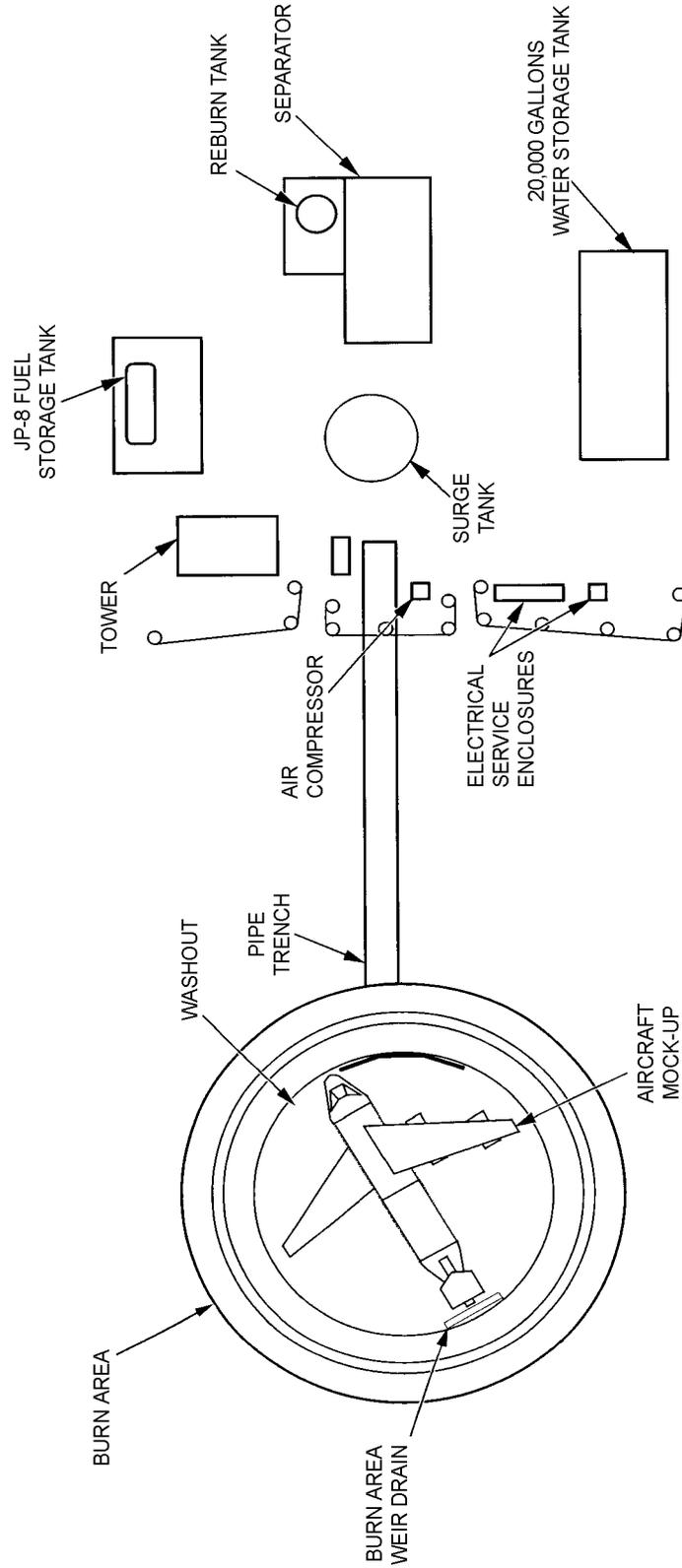


Figure 1. Thule AB  
Greenland

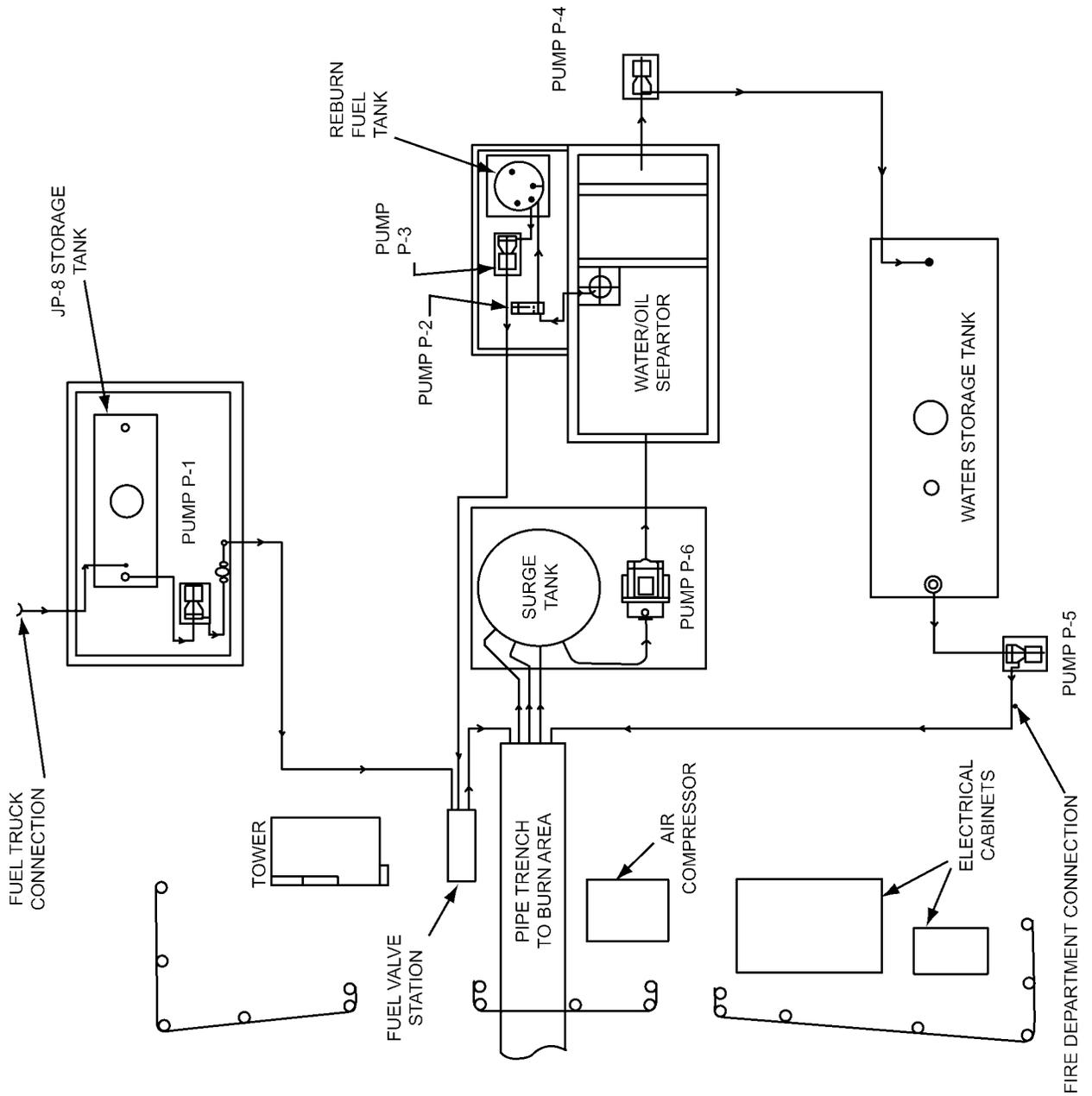


Figure 2. Control Area Layout



**SUBORDINATE WORK PACKAGE**

**OPERATION AND MAINTENANCE INSTRUCTIONS**  
**THULE AB GREENLAND WINTERIZATION PROCEDURES**  
**EFFECTIVITY: AIRCRAFT FIRE TRAINING FACILITY**

**LIST OF EFFECTIVE WP PAGES**

Total Number of Pages in this WP is 6 Consisting of the Following:

\* Zero in this column indicates an original page.

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**LIST OF ILLUSTRATIONS**

NONE

**LIST OF TABLES**

NONE

**REFERENCE MATERIAL REQUIRED**

DOCUMENT NUMBER	TITLE
WP 004 00	(Paragraph 6-7) Emergency Procedures
WP 005 02	(Figure 1) Burn Area Drain
WP 007 00	General Maintenance

**APPLICABLE TCTOS**

NONE

**CONSUMABLE MATERIALS**

NONE

**APPLICABLE SUPPORT EQUIPMENT**

NONE

## ILLUSTRATED SUPPORT EQUIPMENT

NONE

### FOREWORD

This work package contains winterization procedures for the Aircraft Fire Training Facility (AFTF) at Thule AB, Greenland.

### SAFETY SUMMARY

Various steps in this work package may require personnel to be exposed to JP-8 vapor and fumes. It is imperative to be aware of the EMERGENCY PROCEDURES in Work Pack-

age 004 00, paragraphs 6 and 7. Failure to comply may cause serious injury.

1 WINTERIZE.

**WARNING**

If an obvious unsafe condition is noted, halt operations and rectify condition prior to proceeding. Failure to halt and correct conditions may cause injury.

**CAUTION**

The entire training facility is a no smoking area.

**NOTE**

- Winterization procedures shall be performed by authorized personnel.
- No vehicles are allowed in burn area.
- Perform quarterly inspection in accordance with WP 006 00 prior to performing these procedures.
- a. Position SEPARATOR WATER PUMP P-4 and SURGE WATER PUMP P-6 MODE SELECTOR switches to AUTO and WASHDOWN AND SPRINKLER WATER PUMP P-5 SPEED switch to LOW.
- b. Position FUEL PUMP P-1 MODE SELECTOR switch at base of tower to HAND and press FUEL pump P-1 START switch.
- c. Activate each fuel line until fuel flow is seen from their respective nozzles in the burn area.
- d. Press FUEL pump P-1 STOP switch and position FUEL pump P-1 MODE SELECTOR switch to OFF.
- e. Using a portable separator, drain, collect, and process any water in the fuel storage tank.
- f. Flush burn area for not less than one hour or until all fuel is flushed from the burn area, whichever is longer.
- g. Install PORTABLE SUMP pump into burn area sump and discharge into WEIR DRAIN BOX until burn area is drained.

- h. Make sure there is no water in the lines from weir drain box to surge tank.
- i. Open the three Outside Screw and Yoke (OS&Y) valves into the surge tank and close the OS&Y valve downstream of WASHDOWN AND SPRINKLER WATER pump P-5.
- j. Install gasket and blind flange to the inlet flange of the drain pipe located in the burn area weir drain box.

**NOTE**

Water storage tank may reach high limit. If needed, discharge water from the fire department connection using a 2-1/2 inch hose to avoid erosion.

- k. Allow the system to run until surge tank and separator tank reach their low level cutoffs.
- l. Press SEPARATOR WATER PUMP P-4 and SURGE WATER PUMP P-6 STOP switches.
- m. Using a portable separator, drain and process the water in the surge tank.
- n. Using a portable separator, drain, collect, and process the water in the lines between the surge tank and separator.
- o. Using a portable separator, drain and process the water in the separator.
- p. Drain the line and SEPARATOR WATER pump P-4 located between separator and water storage tank.
- q. Position IMMERSION HEATER WATER STORAGE TANK switch to OFF. Set IMMERSION HEATER WATER STORAGE TANK circuit breaker to OFF.
- r. Drain water storage tank.
- s. Drain line and WASHDOWN AND SPRINKLER WATER pump P-5 from water storage tank to OS&Y valve downstream from WASHDOWN AND SPRINKLER WATER pump P-5.
- t. Open OS&Y valve down stream from WASHDOWN AND SPRINKLER WATER pump P-5.
- u. Position all disconnect switches on MAIN ELECTRICAL panel to OFF. Position PRIMARY disconnect located in transformer compartment to off.

- v. Disconnect air compressor and portable sump pump and store with the Fire Department.
- w. Verify all door clamps are secure.

2 DE-WINTERIZE.

**WARNING**

If an obvious unsafe condition is noted, halt operations and rectify condition prior to proceeding. Failure to halt and correct conditions may cause injury.

**CAUTION**

The entire training facility is a no smoking area.

**NOTE**

- De-winterization procedures shall be performed by authorized personnel.
- No vehicles are allowed in burn area.
- a. Conduct all annual maintenance requirements on the air compressor in accordance with the manufacturer's manual.
- b. Reinstall air compressor.
- c. Position PRIMARY disconnect located in transformer compartment to ON. Position all disconnects switches on MAIN ELECTRICAL panel to ON.
- d. Make sure that all heat tape is working for one week prior to charging the system with water.
- e. Verify that MODE SELECTION switches for pumps P1, P-4, and P-6 are in OFF position.
- f. Make sure power is present at all control panels and pumps.

**NOTE**

A ladder will be required to check functions in HIGHTAIL area. The air compressor should run continually for 24 hours to remove any moisture in

the lines.

- g. Press START on air compressor control panel and let it come up to operating pressure. Verify air is flowing to all ignitors heads.
- h. Press each ignitor switch and visually verify corresponding ignitor in burn area is working.
- i. Remove gasket and blind flange to the inlet flange of the drain pipe located in the burn area.
- j. Verify OS&Y valves at surge tank from washdown and sprinkler are closed.
- k. Verify OS&Y valve from weir drain box to surge tank is open.
- l. Verify OS&Y valves from surge tank to separator are open.
- m. Verify all OS&Y valves are open from separator to water storage tank and all drains are closed.
- n. Verify separator stage drain valves are closed and plugs installed.
- o. Verify OS&Y valves between separator and water storage tank are open and all drain valves closed.
- p. Verify OS&Y valves between water storage tank and burn area are open and all drain valves are closed.
- q. Set pumps P-4 and P-6 MODE SELECTOR switches to AUTO.

**CAUTION**

Once high limit is reached on surge tank, a light in the control panel will illuminate.

- r. Charge system with water at weir drain box or surge tank until high limit on water storage tank, separator, and surge tank activate.
- s. Set IMMERSION HEATER WATER STORAGE TANK circuit breaker to ON. Position IMMERSION HEATER WATER STORAGE TANK switch to ON.
- t. Position pump P-5 PUMP SPEED switch to LOW and press pump P-5 START switch.

**NOTE**

10,000 gallons in the water storage tank allows additional capacity for water to be added during the fire department exercises.

- u. Run system until low level limits on separator, surge, and water storage tank are activated. Then add additional water until burn area is full to top of weir, surge tank is at its low level limit, separator is at its low level limit, and water storage tank is between 10,000 and 12,000 gallons.
- v. Open OS&Y valves between fuel tank and Fuel Valve Bank.
- w. Position Fuel pump P-1 MODE SELECTOR switch to HAND and press P-1 START switch.
- x. Activate each fuel line until fuel flow is seen from their respective nozzles in the burn area.
- y. Open manual valves A, B, C, and D on Fuel Valve Bank.

**NOTE**

The fuel nozzles may require adjustments.

- z. Ignite each burner by depressing and holding the appropriate ignitor switch and slowly opening the cor-

responding manual fuel valve until flame is present. Repeat step until all burners are tested.

- aa. Open the appropriate Ground Spill valves and ignite the burner by depressing and holding the appropriate ignitor switch until it is obvious that the spilled fuel is ignited.
- ab. Position IGNITION MASTER switches to OFF.
- ac. Press FUEL pump P-1 STOP switch and set FUEL pump MODE SELECTOR switch to LOW.
- ad. Press WASHDOWN AND SPRINKLER pump P-5 START switch and run for five minutes then press STOP switch for pump P-5. Set WASHDOWN AND SPRINKLER pump P-5 MODE SELECTOR switch to LOW and press START switch for pump P-5 and let it run for one hour or until all fuel is washed from burn area, whichever is longer.
- ae. Press Air Compressor STOP switch.
- af. Record the number of gallons of fuel used from the resettable counter and the fixed counter fuel meter reading on the Fire Exercise Check sheet. These readings are on the fuel meter at the JP-8 fuel storage tank.

**NOTE**

Refer to WP 005 02, Figure 1 to view the Burn Area Drain.

