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Facility Construction
Maintenance Plan

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1.0 FACILITIES CONSTRUCTION AND OPERATION

The section contains information relative to the four **essential phases** of facility activities. For the purposes of this document the phases will be identified as follows:

1.1 Construction Surveillance Plan contains an outline of the functions and responsibilities of TMC relative to RP construction and RPIE installation.

1.2 Facility Validation Tests contains brief summaries of the tests performed on the facility systems prior to acceptance.

1.3 Facilities Acceptance and Turnover Plan outlines the methods and procedures used to transfer the custodial responsibilities to TMC for interim operation during the I & C phase. This plan also outlines the procedures used for turnover of the facilities to the Air Force at the completion of Complex Activation.

1.4 Operation Maintenance Policy contains information relative to the policies used by TMC for the maintenance and operations of the Facilities and GOE during Installation and Checkout of the operational bases.



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1.1.0 CONSTRUCTION SURVEILLANCE PLAN, TITAN I

PURPOSE

The purpose of this plan is to establish a unified Construction Surveillance effort to assure interface compatibility between the Weapons System Facility and the requirements of all associate contractors. For the purpose of this document, interface shall be defined as follows:

Interface is the critical area or condition affecting a system and/or structure installed during facility construction to which the weapons system integrating contractor, or an associate contractor, connects for system or facility continuation, and includes those weapons system areas wherein the contractor assumes the responsibility for operation maintenance, safety, and installation.

SCOPE

This plan includes a description of the work, the organization necessary for its implementation, and the responsibilities of the participating agencies with respect to:

1. Status reporting of facility construction
2. Qualitative examination of facility construction as to compliance with:
 - a. A & E drawings and specifications
 - b. Test procedures and specifications
 - c. Calibration requirements
 - d. Component certification
3. Review of applicable shop drawings
4. Interface inspection and documentation
5. Facility change initiation and control
6. Reviewing, monitoring and supervising, at the direction of SATAF, facility system test plan procedures and activities.

The activities of the Construction Surveillance Team shall commence at the inception of facility construction and continue until final acceptance of the weapons system by the customer.



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ORGANIZATION

The Construction Surveillance Team shall consist of representatives from each associate contractor, the A & E, SATAF, inter-complex communications contractor, and chaired by The Martin Company. The chairman shall actively direct and control (excluding SATAF) duties assigned and procedures required.



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1.1.1 DESCRIPTION OF WORK

1.1.1.1 Air Force Document Requirements

SATF shall fulfill Construction Surveillance Team document requirements in accordance with, but not necessarily limited to, the following:

- a. A & E Drawings and Specifications
- b. Shop Drawings and Contractor Field Construction Drawings
- c. Facility Acceptance Test Procedures
- d. PLPS Test Specifications and Procedures
- e. Analytical results of all tests (as available) including documentary certification of compliance to cleanliness as specified on all vessels, equipment, components, piping and test media.
- f. Construction Contractor's Schedules of C of E Program Schedules
- g. C of E Modification Packages, Change Orders and Letters of Clarification.

1.1.1.2 Facility Construction Schedules and Progress

A. The Construction Surveillance Team shall:

- 1) Identify in detail, increments of work as related to mechanical and electrical systems, structural, utilities, and backfill within incremental areas of the facility such as, but not limited to:
 - a. Missile Silo
 - b. Utility Tunnel
 - c. Propellant Terminal
 - d. Equipment Terminal
 - e. Personnel Tunnels and Junctions
 - f. MAMS
 - g. Control Center
 - h. Power House
- 2) Analyze the aforementioned increments of work to establish confidence in actual progress, trend in incremental area completion, and projected completion.



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3) Provide and maintain narrative reports and progress charts to reflect the results of the above effort.

4) Provide and maintain facility isometric drawings detailing components, cable runs, piping, etc., for each of the various systems. These drawings shall be maintained to provide a uniform method depicting current status of work progress in incremental areas.

System isometrics shall be provided for but not be limited to the following:

- a. Heating and Ventilating - Launcher Area
- b. Heating and Ventilating - Powerhouse
- c. Heating and Ventilating - Control Center Area
- d. Firewater, Domestic Water, and Raw Water - Launcher Area
- e. Firewater, Domestic Water and Raw Water - Control Center and Powerhouse Area
- f. Sanitation Waste and Drain - Launcher Area
- g. Sanitation Waste and Drain - Control Center and Powerhouse Area
- h. Diesel System - Powerhouse or Launch Silo
- i. Lube Oil System - Powerhouse
- j. Utility and Starting Air - Powerhouse Area
- k. Utility Air - Control Center Area
- l. Alarm System - Launcher Area
- m. Alarm System - Control Center and Powerhouse Area
- n. Electrical Equipment - Powerhouse
- o. Electrical Equipment - Launcher Area
- p. Electrical Equipment - Control Center Area
- q. Cable Tray - Launcher Area
- r. Cable Tray - Control Center - Powerhouse Area
- s. Communications - Launcher Area
- t. Communications - Control Center - Powerhouse Area
- u. PLPS Piping
- v. All Tunnels and Cable Ways



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1.1.1.3 Qualitative Examination and Analysis

A. The Construction Surveillance Team shall:

- 1) Accomplish qualitative examination, at interfaces, of facility construction and installation to A & E Drawings, Facility Change Orders, Letters of Clarification, modification packages, contractor shop drawings, contractor field construction drawings, and Corps of Engineers specifications.
- 2) Submit trouble reports, showing deviations with recommended solutions to COG for resolution. Problems not resolved at COG level will be received by Construction Surveillance Chairman for resolution at top base management level.
- 3) Establish and maintain trouble report files and present all noncompleted items as a "punch list" prior to the JOD and/or BOD "Walk-through".
- 4) Accomplish at the direction of the Air Force, PLPS Acceptance Test Procedures review, design interpretation, system cleanliness validation, acceptance testing and buy-off.
- 5) Prepare and maintain PLPS Validation Log.
- 6) Participate in JOD and/or BOD "Walk-Through".

1.1.1.4 Shop Drawings

A. The Construction Surveillance Team shall:

- 1) Perform a distribution and screening function of all shop drawings to provide each associate with copies affecting his interface. A central file shall be provided and maintained by Construction Surveillance at each base.
- 2) Review all applicable shop drawings to assure compatibility with associate contractor-supplied equipment. Drawings will be stamped to indicate date of review and by whom reviewed. A shop drawing log will be maintained indicating shop drawings received, Sub-Contractor forwarded from, status of review and any pending action resulting from review.



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3) Transmit all discrepancies disclosed by Engineering members of the Construction Surveillance Team to the C/S Chairman for resolution

1.1.1.5 Interface Inspection and Documentation

A. Permanent members of the Construction Surveillance Team, reporting to the Construction Surveillance Chairman, will be provided by each associate to:

1) Perform a progressive physical inspection of construction to insure adequacy of their respective interfaces in accordance with the provisions of an interface certification log.

2) Prepare trouble reports on problem items encountered during surveillance.

B. Periodic control meetings shall be held at each Site to monitor interface status for physical and scheduled completion adequacy. The times of said meetings shall be at the discretion of the Construction Surveillance Chairman or at the request of SATAF.

C. Each associate is responsible for providing the necessary tools and equipment to perform physical inspection in accordance with the above Item Number A.1.

D. The final buy-off of the associate interface will be approved by the Associate Representative to the Construction Surveillance Team and certified by the respective associate Quality Control organization.

E. Each associate is responsible for providing and maintaining, within his area of responsibility, an interface certification log. Interface information is to include definition of location, physical, **spatial**, and access conditions.

F. The Construction Surveillance Chairman is responsible for approving format and utility of said interface documents and compiling copies of all interface documents into a composite interface certification log.

I. The Construction Surveillance Chairman is further responsible for obtaining and interpreting schedule completion date by the Corps of Engineers of the facility portion of the interface.



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1.1.1.6 Facility Changes

A. The Construction Surveillance Team shall:

- 1) Recommend preliminary construction completion schedules for all initiated Facility Change Requests (FCR's) and make recommendations for alleviations of adverse conditions, if necessary.
- 2) Initiate and coordinate facility changes, as a result of Construction Surveillance Team activity. Accomplish qualitative examination of all approved facility changes applicable to the Site to assure adequacy as related to safety, maintenance and operation.

1.1.1.7 Real Property Installed Equipment (RPIE) Log

A. The Construction Surveillance Team shall:

- 1) Prepare a complete RPIE Log comparing all Corps of Engineers specified equipment versus installed equipment at each complex and MAMS building.
- 2) Identify, record and evaluate all items of discrepancy between specified and installed material and make necessary recommendations to SATAF using T/R to transmit information.

1.1.1.8 Calibration of Facility Equipment

A. Prepare a calibration description log which will include, but not be limited to component identification by number, component function, range of operation, setting, range of calibration, and frequency of calibration required. Perform qualitative examination to determine compliance with said log and report discrepancies to the SATAF.

1.1.1.9 Facility Systems and Equipment Tests

A. The Construction Surveillance Team shall:

- 1) Supervise, at the direction of SATAF, Facility Acceptance Test Procedures review, design interpretations and acceptance tests to assure compatibility between facility systems and sub-systems.

1.1.1.10 Master Equipment List

A. The Martin Company shall provide a Master Equipment List detailing complete vendor catalogue data on RPIE including all pertinent information, changes and deviations.



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1.1.2 RESPONSIBILITIES

1.1.2.1 THE MARTIN COMPANY

A. Site Manufacturing

- 1) Site Manufacturing will have the prime responsibility of establishing and maintaining all Construction Surveillance status report forms, and/or charts relative to construction progress. These reports shall be utilized by planning organizations as milestone checks of integrated schedules for follow-on installation and check-out activities and analysis of program completion status.
- 2) By the use of standardized isometric drawings, Site Engineering Representative on the Construction Surveillance Team shall provide a quick look presentation to show progressive incremental construction status information and identification of end to end system completion and readiness. These isometric drawings are as itemized in the Description of Work under Item 1.1.2.A.4.
- 3) Site Manufacturing will have the prime responsibility for all physical construction surveillance, relative to safety, maintenance and systems operation. Problems pertaining to technical incompatibilities will be referred to Engineering for the recommended resolution.
- 4) A Construction Surveillance Representative assigned by the Construction Surveillance Chairman to each complex and MAMS will be the recipient of all trouble reports for proper interpretation and definition of the problem, logging, numbering, and transmitting to COG for resolution. Copies of all trouble reports with attendant resolution will be transmitted to the Construction Surveillance Chairman for compilation into a master log and distribution to follow-on areas and cognizant groups. Problems not resolved at the COG level will be received by the chairman on an expedited basis for resolution at top base management level. All problems unresolved or pending resolution at the time of BOD/JOD walk-through will be submitted on a punch list to a walk-through committee composed of members of a SAC Missile Squadron, Host Base Engineers, C of E, C of E Contractor, BMD, Complex Operations Chief, and Construction Surveillance Chairman for final determination of actions to be taken.



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- 5) The Construction Surveillance team will receive and screen all shop drawings for segregation into respective cognizant associate areas.
- 6) TMC, as one of the Associate Contractors, will prepare and maintain interface certification log on a format approved by the Construction Surveillance Chairman. This shall include, but will not be limited to, the following:
 - a. Brief written description
 - b. Sketch of interface
 1. Area and dimension location
 2. Permissible tolerance
 3. Reference to A & E and Associate drawings
 4. Space envelope
 - c. In line functional requirements, i.e., temperature, pressure, voltage, etc.
 - d. Prerequisite requirements
 - e. Change Data
 - f. Remarks
 - g. Quality Control buy-off block.
- 7) The Construction Surveillance Chairman shall be responsible for approval of format and utility of all logs and forms submitted by the Associate Contractors.
- 8) In order to establish compatibility between the associates requirements for their interface completion dates and the COE scheduled completions, the Construction Surveillance Team will perform a periodic, comparative analysis, and take necessary action to resolve all differences.
- 9) All changes (FCR's, LFCR's, CO's, MOD Packages, and Letters of Clarification) to the facility shall be reviewed by the CRCC to ascertain the following:
 - a. Adverse effect on interfaces in consideration of existing field conditions
 - b. Schedule impact
 - c. Schedule for implementation during I & C



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d. Specification compliance

e. Technical Correctness

10) All above indicated changes will be processed as shown in Exhibit "F".

11) The actual complex monitoring and coordination of facility changes will be performed by Construction Surveillance Representatives. Facility changes accomplished by an Associate Contractor will be certified by the associates Quality Control organization.

12) Site Manufacturing shall supervise, at the direction of SATAF and in coordination with others, the performance of Facility Systems and Equipment Tests. The Test Specifications and Procedures will be provided by SATAF and reviewed and evaluated by TMC Engineering. The Construction Surveillance Chairman will certify the satisfactory completion of each test following engineering review of data and test observance.

13) Site Manufacturing shall provide a Master Equipment List detailing complete vendor catalogue references and data of RPIE, including all pertinent information, changes and deviations.

B. Engineering

1) All Facility Changes requested or otherwise found to be necessary will be evaluated and coordinated with affected associates by TMC Engineering. All comments denoting incompatibilities will be entered as Trouble Reports to be submitted to the Construction Surveillance Chairman for resolution.

2) TMC Engineering, as an integrated responsibility, will review all interface questions, to provide cognizance of possible interassociate conflict.

3) Engineering will review all applicable shop drawings for compatibility to system design and specification requirements. All comments denoting incompatibility will be entered as trouble reports to be submitted to the Construction Surveillance Chairman.

4) Engineering will provide data for the interface certification log.



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- 5) Problems pertaining to technical incompatibilities as a result of physical Construction Surveillance, relative to safety, maintenance and systems operations, will be referred to Engineering for the recommended resolution.
- 6) TMC Engineering shall record and observe Facility System Tests and analyze results for compliance to test specification and procedures. Trouble reports will be submitted to the Construction Surveillance Chairman for corrective action as required.
- 7) Engineering will review and evaluate test specifications and procedures as provided by SATAF.

C. Quality Control

- 1) Quality Control will review and certify interface certification logs as related to compliance with applicable engineering and specifications. The final buy-off of associate interfaces will be approved by the associate representative to the Construction Surveillance Team and certified by the respective associate Quality Control organization. Two copies of the certified log will then be transmitted to the Construction Surveillance Chairman who will retain one copy and transmit the other to TMC Quality Control.
- 2) Quality Control will prepare the calibration document, after receipt of Technical Data from Engineering. Quality Control will perform Qualitative Examination of Facility Systems Test Equipment and RPIE. Trouble reports shall be submitted to the Construction Surveillance Chairman for corrective action as required.
- 3) Accomplish validation of the PLPS System Installation and Acceptance Tests at the direction of the Air Force.
- 4) Prepare and maintain a PLPS Validation Log.
- 5) Facility changes accomplished by TMC will be certified by the Quality Control organization.
- 6) Quality Control shall verify the compliance to test specifications and procedures.



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1.1.2.2 Associate Contractors

- A. Each associate contractor will prepare and maintain an interface certification log on a format approved by the Construction Surveillance Chairman. The items to be included in this log are itemized in 1.1.2.1.A.6.
- B. Each associate will review all applicable shop drawings for compatibility to system design and specification requirements and submit comments to TMC Engineering. All comments denoting incompatibility will be entered as trouble reports to be submitted to the Construction Surveillance Chairman.
- C. The Associate Contractor will furnish a member to the Construction Surveillance Team.
- D. The Associate Contractors shall submit interface logs and/or check lists to the Construction Surveillance Chairman for approval of format and utility and for inclusion into a Master Interface Log.
- E. The Associate Contractor shall perform physical surveillance of his interface and provide the necessary tools and equipment.
- F. The Associate Contractor will prepare Trouble Reports on a reproducible form listing all discrepancies affecting his interface. Forms, when completed, will be transmitted to The Martin Company Construction Surveillance representatives for assignment of serial numbers, action, reproduction and distribution.
- G. Associate Contractor will submit to Quality Control for review and certification, interface certification logs as related to compliance with applicable engineering and specifications. The final buy-off of associate interfaces will be approved by the associate representative to the Construction Surveillance Team and certified by the respective associate Quality Control organization. Two copies of the certified log will then be transmitted to the Construction Surveillance Chairman who will retain one copy and transmit the other to TMC Quality Control.
- H. Facility changes accomplished by an Associate Contractor will be certified by the Associate Quality Control organization.



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1.1.2.3 SATAF

- A. Direct the participating agencies with respect to reviewing, monitoring, and supervising facility system test plan, procedures and activities.
- B. Appoint a member to the Construction Surveillance Team.
- C. Provide direction to Site Manufacturing in the resolution of trouble report items.
- D. Fulfill Construction Surveillance Team document requirements as itemized in 1.1.1.1.
- E. Act as the coordinating agent between the C of E and all Associate Contractors having power to transmit all information and to direct any corrective action necessary to be taken by the C of E to resolve construction and installation deficiencies.



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TITLE: FACILITIES TEST PLAN WS 107A-2 OPERATIONAL BASE FACILITIES

PURPOSE: The purpose of the Facility Test Plan is to test essential facility items and to provide assurance that the items tested will:

1. Perform their design functions
2. Meet the requirements of the Weapon System
3. Meet the requirements of the construction contract

RESPONSIBILITY: Test Document - Prepared by Daniel, Mann, Johnson and Mendenhall and Associates. Implementation - The test will be: accomplished by the facilities construction contractor, conducted by the Corps of Engineers, monitored by the USAF/TAT & TMC, evaluated by the Corps of Engineers and the USAF/TAT & TMC

FACILITY TESTS:

The Facilities Test Plan contains a detailed test procedure for each of the following systems. A summary of each test is included in this section:

<u>Test Number</u>	<u>Test Title</u>	<u>Page</u>
E1	Central Battery System	1.2.1.1
E2	2.4 KV Switchgear	1.2.2.1
E3	Unit Sub-stations	1.2.3.1
E4	Motor Control Centers	1.2.4.1
E5	Motor Protection Test	1.2.5.1
E6	Normal Lighting System	1.2.6.1
E7	Emergency Lighting System	1.2.7.1
E8	Missile Silo Fire Sensors & Assoc. Circuits	1.2.8.1
E9	Propellant Terminal Fire Sensing System	1.2.9.1
E10	Equipment Terminal Fire Sensing System	1.2.10.1
E11	Fuel Storage Area Fuel Vapor Detection	1.2.11.1
E12	Missile Silo Fuel Vapor Detection	1.2.12.1
E13	Facility Elevator System	1.2.13.1
E14	Closed Circuit TV System	1.2.14.1



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<u>Test Number</u>	<u>Test Title</u>	<u>Page</u>
E15	Explosion Detecting and Blast Valve Systems	1.2.15.1
E16	Missile Silo Gaseous O ₂ Detector	1.2.16.1
E17	Propellant Terminal Gaseous O ₂ Detector	1.2.17.1
E18	Fuel Storage Area Fire Sensing and CO ₂ System	1.2.18.1
E19	Radiation Sensing System	1.2.19.1
E20	Missile Lox Spillage Detection System	1.2.20.1
E21	Nuclear Blast Detectiving Circuits & Blast Valves	1.2.21.1
E22	Antenna Silo #1 and #2 Blast and Silo Door Control	1.2.22.1
E23	Portal Silo and Blast Door Interlock Control	1.2.23.1
E24	Tunnel Blast Locks Blast Door Control	1.2.24.1
E25	Fuel Transfer Panel and Associated Circuits	1.2.25.1
E26	Grounding Systems	1.2.26.1
M1	Powerhouse Starting Air Compressor	1.2.27.1
M2	Powerhouse Utility Air Compressor	1.2.28.1
M3	Powerhouse Fuel Oil System	1.2.29.1
M4	Raw Water Supply and Storage System	1.2.30.1
M5	Powerhouse Diesel Generator	1.2.31.1
M6	Hot Water Heating System	1.2.32.1
M7	Ice Bank	1.2.33.1
M8	Chilled Water System	1.2.34.1
M9	Water Chiller	1.2.35.1
M10	Plant and PLS Instrument Air Compressor	1.2.36.1
M11	Heating, Ventilating and Air Conditioning System	1.2.37.1
M12	Missile Silo Smoke Test	1.2.38.1
M13	Propellant Terminal Smoke Test	1.2.39.1
M14	Control Air Compressor	1.2.40.1
M15	Door Seal De-icing System for Entry Portal	1.2.41.1
M16	Door Seal De-icing System for Antenna Silo	1.2.42.1
M17	Water Treatment System	1.2.43.1



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<u>Test Number</u>	<u>Test Title</u>	<u>Page</u>
P1	Jockey Pump and Fire Protection Pumps	1.2.44.1
P2	Domestic, Hot and Chilled Water Excess Flow Valves	1.2.45.1
P3	Fire Water Excess Flor Control Valve	1.2.46.1
P4	Equipment Terminal Seepage Water & Wash Down System	1.2.47.1
P5	Missile Silo Fog System	1.2.48.1
P6	Missile Silo Seepage Water System	1.2.49.1
P7	Pneumatic Sewage Ejector System in Equipment Terminal	1.2.50.1
P8	Domestic Water Hydro-Pneumatic	1.2.51.1
P9	Missile Silo Contaminated Waste System	1.2.52.1
P10	RP-1 Fuel System	1.2.53.1
D1	Portal Hydraulic System	1.2.54.1
D2	Portal Instrument Tube Test	1.2.55.1
D3	Escape Hatches	1.2.56.1
D4	TV Camera Elevating and Lowering Mechanism	1.2.57.1
D5	Portal Revolving Blast Door	1.2.58.1

NOTE: The test numbers assigned to the above facility systems are applicable to Site "T-1" and may vary for subsequent sites.



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FACILITY PLS TESTS

<u>Test</u>	<u>System</u>	<u>Page</u>
	<u>Gaseous Nitrogen</u>	
a	2800 psig Nitrogen Storage and Piping	1.2.59.1
b	1600 psig Nitrogen Piping	1.2.60.1
c	750 and 150 psig Nitrogen Piping	1.2.61.1
	<u>Gaseous Oxygen</u>	
d	Oxygen Storage and Piping	1.2.62.1
	<u>Liquid Oxygen</u>	
e	Oxygen Storage and Piping	1.2.63.1
	<u>Liquid Nitrogen</u>	
f	Liquid Oxygen Subcooler	1.2.64.1
	Helium Cooler	
	Nitrogen Piping	
	<u>Helium Pressure Test</u>	
g	6000 psig Storage and Piping	1.2.65.1
h	3200 psig Piping	1.2.66.1
	<u>Vent Systems</u>	
i	Oxygen and Nitrogen Vent Systems	1.2.67.1
j	Helium and Nitrogen Vent Systems	1.2.68.1
	<u>Helium Leak Test</u>	
k	6000 psig and 3200 psig Storage and Piping	1.2.69.1
	<u>Cold and Flush Tests</u>	
l	Liquid Oxygen Tank and Piping (Stage II)	1.2.70.1
m	Liquid Oxygen Tank and Piping (Stage I)	1.2.71.1
n	Liquid Oxygen Return Piping	1.2.72.1
o	Liquid Nitrogen System	1.2.73.1



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TEST SUMMARY

TEST TITLE: CENTRAL BATTERY SYSTEMS

TEST NUMBER: E-1

OBJECTIVE: The purpose of this test is to verify the operability of the central battery systems in the Powerhouse, Control Center and Equipment Terminals.

ITEMS TO BE TESTED:

Batteries

Battery Chargers

Undervoltage relay (powerhouse only)

Appurtenant fuses, wiring and DC distribution panels

Ground indicator lights

SUPPORT EQUIPMENT:

Portable DC voltmeter, 0-150 volts

Portable clamp-on DC ammeters, 0-10 and 0-25 amperes

Portable 2000-watt, 125-volt load bank

Battery hygrometer

Mercury bulb thermometer, strap on type, 0-100° C

Portable wire-wound rheostat, 150 ohm, 100 watt

PREREQUISITES:

Prior testing of the electrical distribution system which feeds the battery charger.

TEST DESCRIPTION:

Battery voltage and specific gravity is measured. Loads are applied to battery and operation of the charger is verified. Undervoltage relays are tested and Annunciator Alarm System response is verified. Examination of circuits is performed and proper workmanship of installation is verified.



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TEST SUMMARY

TEST TITLE: 2.4 KV SWITCHGEAR

TEST NUMBER: E2

OBJECTIVE:

The purpose of this test is to verify the compatibility of the components of the powerhouse main switchgear with the electrical power source and loads, and to verify the operability of components and their associated relaying.

ITEMS TO BE TESTED:

Generator, exciter and feeder circuit breaker and controls disconnecting fuses.

Reduced voltage starters

Appurtenant protective relaying

Annunciator alarm system, as applicable

SUPPORT EQUIPMENT:

Portable AC and DC voltmeters; 0-300V, 0-150V and 0-2500VAC; 0-1500VDC

Portable megohmmeters; 500 and 2500 volt DC

Portable Protective-relay test set, "load box with ammeter and controls"

Portable AC ammeter; 0-1 and 0-5 amp

Portable high potential test set; 0-15,000 volts DC

PREREQUISITES:

The following facility systems must be tested prior to the start of this test:

Diesel Generators

Central Battery System

TEST DESCRIPTION:

Insulation resistance of all wiring shall be tested.

Operation of main and feeder circuit breaker cubicles including over current or voltage relays and indicating lights or meters is verified.

The reduced voltage starter cubicals shall be tested to verify free operation of the H-O-A switches and proper alignment of starting contacts.

The generator and exciter cubical functions shall be tested to verify compatibility with the overcurrent, differential and inverse power relays, indicating lights and meters, synchronizing switches and field control switches.



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TEST SUMMARY

TEST TITLE: UNIT SUBSTATIONS

TEST NUMBER: E3

OBJECTIVE:

The purpose of this test is to verify the compatibility of the components of the unit substations with the electrical equipment to be served, and to verify their operation.

ITEMS TO BE TESTED:

Power transformers

Main circuit breakers

Feeder circuit breakers

Ground indicator lights

Wiring

SUPPORT EQUIPMENT:

Portable A.C. voltmeters; 0-600 V and 0-2500 volts

Portable megohmmeter; 500 VDC

Portable High Potential Set; 0-15,000 VDC

PREREQUISITES:

The following facility systems must be tested prior to the start of this test:

Diesel Generators

Switchgear

TEST DESCRIPTIONS:

The unit substations will be tested for insulation resistance, ground indicating lights, proper operation of feeder circuit breakers and to verify that the transformers deliver the proper voltages with rated input voltage to the primary side.



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TEST SUMMARY

TEST TITLE: MOTOR CONTROL CENTERS

TEST NUMBER: E4

OBJECTIVE:

The purpose of this test is to verify the compatibility of MCC components with the electrical equipment to be served, and to verify operation of the Motor Control Centers.

ITEMS TO BE TESTED:

Circuit breakers

Starters

Switches

Control Transformers

Relays

Indicator lights

Pushbuttons

Wiring

SUPPORT EQUIPMENT:

Portable AC Voltmeter; 0-150, 0-300 and 0-600 volts

Portable Megohmmeter; 500 VDC

PREREQUISITES:

The following facility systems must be tested prior to the start of this test:

Diesel generators

Main switchgear

Unit substations

TEST DESCRIPTION:

Inspect all wiring for obvious defects and verify proper installation and insulation resistance. Verify operation of starters, H-O-A switches, circuit breakers, and control relays for positive operation and contact alignment where applicable. Apply power to the MCC and verify proper voltages and automatic operations (where applicable) of the components of the motor control centers. Verify that the starting inrush current and load current is proportional to the load connected when the load is energized.



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TEST SUMMARY

TEST TITLE: MOTOR PROTECTION TEST

TEST NUMBER E5

OBJECTIVE:

The purpose of this test is to verify operation, motor sizes for loads being driven, correct starter components and controls.

ITEMS TO BE TESTED:

All electric motors except those for powerhouse water chillers, supply fans and fire pumps.

Motor controllers

Disconnect switches

SUPPORT EQUIPMENT:

Portable AC voltmeter; 0-150, 0-300 and 0-600 volts

Portable clamp-on ammeter; 0-15, 0-60 and 0-150 amperes

PRE-TESTING:

The following facility systems must be tested prior to the start of this test:

Diesel generators

Main switchgear

Unit substations

Motor control centers

TEST DESCRIPTION:

Each motor is loaded with its normal load. The motors are started and the voltage drops, load currents and motor operating temperatures are measured. Proper starter operation and overload heater sizing is verified.



MASTER ACTIVITIES PLAN

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TEST SUMMARY

TEST TITLE: NORMAL LIGHTING SYSTEM

TEST NUMBER: E6

OBJECTIVE:

The purpose of this test is to verify that adequate lighting is available for personnel requirements throughout the facility.

ITEMS TO BE TESTED:

Lighting circuits, panel, controllers, fixtures, and transformer
Illumination levels

Relays, circuit breakers, switches and appurtenant system components

SUPPORT EQUIPMENT:

Portable A.C. voltmeter; 0-150, 0-300 and 0-600 volts

Portable "clamp-on" ammeter; 0-15, 0-300 amperes

Portable illumination level meter; 0-100 foot candles

Mercury bulb thermometer, strap type; 0-100°C

PREREQUISITES:

The following facility systems must be tested prior to the start of this test:

Diesel generators

Lighting panel

Unit sub-stations

Switchgear

Motor Control Centers

TEST DESCRIPTION:

Contactor and circuit breaker operation is verified. Phase load balance to each feeder panel is confirmed. Proper operation, operating temperature and current load of each lighting fixture is verified. Illumination levels in all areas are measured and verified to be adequate.



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TEST SUMMARY

TEST TITLE: EMERGENCY LIGHTING SYSTEM

TEST NUMBER: E7

OBJECTIVE:

The purpose of this test is to verify adequate emergency lighting for safe movement of personnel upon failure of normal lighting.

ITEMS TO BE TESTED:

Emergency lighting fixtures

Emergency self-contained battery operated lighting units

Emergency lighting contactors and appurtenant system components

SUPPORT EQUIPMENT:

Portable DC voltmeter; 0-150 volts

Battery hygrometer

PREREQUISITES

The following facility systems must be tested prior to the start of this test:

Central battery systems

Normal lighting system

TEST DESCRIPTION:

Circuit breakers feeding emergency lighting contactors are opened and proper contactor operation, fixture illumination and adequate illumination levels are verified.

Battery charger operation is verified and battery specific gravity is measured at full charge. Emergency battery-powered lamps are illuminated and operation verified.



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TEST SUMMARY

TEST TITLE: MISSILE SILO FIRE SENSORS AND ASSOCIATED CIRCUITS

TEST NUMBER E8

OBJECTIVE:

The purpose of this test is to verify the operation of the missile silo fire sensors, associated fire sensor circuits and air handling equipment shut-off as a result of missile silo fire.

ITEMS TO BE TESTED:

Missile Silo Fire Sensors

Fire sensor circuits

Audible and visual fire alarm indication

Corrective action responses

SUPPORT EQUIPMENT:

Infra-red heat lamp; 250 volts

Thermometer; Simpson 388

Stop watch

Boatswain's chair

Multimeter; Simpson 269

Heat lamp kit assembly

PREREQUISITES:

The following facility systems must be tested prior to the start of this test:

Heating Ventilating and Air Conditioning Systems

Equipment Terminal and Missile Silo Area

TEST DESCRIPTION:

Proper reaction of each missile silo fire sensor to "Temperature rate-of rise" and "Set point temperature" tests is verified. Proper display of Alarm Panel indicators and function of warning devices is verified. Missile Silo fire corrective action functions are confirmed. Heat is removed from the fire sensors and the Sensor Reset pushbutton is depressed and Normal Alarm Panel indications are verified. Fire signals to Control Center Circuits are measured at the E. T. Alarm Panel.



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TEST SUMMARY

TEST TITLE: PROPELLANT TERMINAL FIRE SENSING SYSTEM

TEST NUMBER: E9

OBJECTIVES:

The purpose of this test is to verify the operation of the propellant terminal fire sensor and associated circuits.

ITEMS TO BE TESTED:

Propellant terminal fire sensors

Fire sensor circuits

Alarm panels and alarm horns

SUPPORT EQUIPMENT:

Infra-red heat lamp; 250 watts

Thermometer; Simpson 388

Stop watch

Heat lamp kit assembly

Multimeter; Simpson 269

PREREQUISITES:

The following facility systems must be tested prior to the start of this test:

Control battery system

Equipment Terminal Level IV

TEST DESCRIPTION:

Heat is applied individually to each fire sensor from the heat lamps to verify sensor stimulation for "Temperature Rate-of-Rise" and "Set Point Temperature" tests. Alarm Horn and Alarm Panel indicator lamp response is verified. Sensor Manual Reset buttons are pressed and Alarm Panel indication return to Normal is verified. Silencing of Alarm Horns is verified from Alarm Panel controls. Fire signals to the Control Center Circuits are measured at the E. T. Alarm Panel.



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TEST SUMMARY

TEST TITLE: EQUIPMENT TERMINAL FIRE SENSING SYSTEM

TEST NUMBER: E10

OBJECTIVES:

The purpose of this test is to verify the operation of Equipment Terminal fire sensors, associated circuits, fire alarms and corrective action responses.

ITEMS TO BE TESTED:

Fire sensors

Alarm panels on alarm horns

E. T. air handling equipment

SUPPORT EQUIPMENT:

Infra-red heat lamp; 250 watts

Stop watch

Multimeter; Simpson 269

Thermometer; Simpson 388

Heat lamp kit assembly

PREREQUISITES:

The following facility system must be tested prior to the start of this test:

Heating, ventilating, and air conditioning systems

E. T. area

TEST DESCRIPTION:

Heat is applied to each E. T. fire sensor from the heat lamps to verify sensor stimulation for "Temperature Rate-of-Rise" and "Set Point Temperature" test. Alarm horn, Alarm Panel indicator lamp and air conditioning shutdown responses to sensor activation is verified.

Fire signals to the Control Center Circuits are measured at the E. T. Alarm Panel.



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TEST SUMMARY

TEST TITLE: FUEL STORAGE AREA FUEL VAPOR DETECTION

TEST NUMBER: E11

OBJECTIVES:

The purpose of this test is to verify the operation of the Fuel Storage area vapor detector, associated circuits and alarms.

ITEMS TO BE TESTED:

Fuel vapor detector

Alarm horn

Alarm panel

Associated circuits

SUPPORT EQUIPMENT:

Multimeter; Simpson 260

Cylinder; RP-1

Stop watch

Polyethylene bags; 2 Cu. Ft.
capacity

PREREQUISITES:

The following facility system must be tested prior to the start of this test:

Central Battery Systems

TEST DESCRIPTION:

The fuel sensor probe is exposed to a concentration of RP-1 vapor. The Hydrocarbon Analyzer response to the specified RP-1 vapor concentration is verified. Visual and audible alarm responses are confirmed. Interface "Fuel vapor" signals to the Control Center Circuits are verified.



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TEST SUMMARY

TEST TITLE: MISSILE SILO FUEL VAPOR DETECTION

TEST NUMBER: E12

OBJECTIVE:

The purpose of this test is to verify the operation of the Missile Silo fuel vapor detectors and the appropriate alarm indications and corrective action responses.

ITEMS TO BE TESTED:

Fuel vapor detectors S-3 and S-4

Missile silo A/C purge controls

Alarm panels and Alarm horns

Associated circuits

SUPPORT EQUIPMENT:

Multimeter

Cylinder; RP-1 gas

Stop watch

Polyethylene bags; 2 Cu. Ft. capacity

Fire extinguished; CO₂, 5 lbs.

PREREQUISITES:

The following facility systems must be tested prior to the start of this test:

Heating, ventilating and air conditioning systems

Central battery system

TEST DESCRIPTION:

The fuel sensor probes are exposed to a concentration of RP-1 vapor. The Hydrocarbon Analyzer response to the specified RP-1 vapor concentration is verified. Corrective action (M.S. air purge) on visual and audible alarm responses to sensor stimulation is confirmed. Missile Silo fuel vapor status signals to the Control Center Circuits are verified at the E. T. Alarm Panel.



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TEST SUMMARY

TEST TITLE: FACILITY ELEVATOR SYSTEMS

TEST NUMBER: E13

OBJECTIVE:

The purpose of this test is to verify the operability of the facility elevator systems.

ITEMS TO BE TESTED:

Passenger Elevators in the Equipment Terminals Service Elevators in the Antenna Structures Freight Elevators in the Portal Silo Applicable controls, wiring, mechanical devices, etc.

SUPPORT EQUIPMENT:

Portable A.C. Voltmeter; 0-600 volts

Portable A.C. Ammeter; 0-15, 0-60, and 0-150 amps
Strap on type mercury-bulb thermometer; 0-100°C

Tachometer (calibrated in ft/min)

PREREQUISITES:

The following facility systems must be tested prior to the start of this test:

Diesel engine-generators

Switchgear

Unit sub-stations

Motor control centers

TEST DESCRIPTION:

The tests performed on the elevators will static overload tests, normal load speed and current tests, safety equipment tests, and general operation tests which will verify the capability to control the elevator cars within and from each landing.