

ET24-CM- PLAN-200

Baseline

August 2005



**National Aeronautics and
Space Administration**

**George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812**

**ENVIRONMENTAL TEST FACILITY
CONFIGURATION MANAGEMENT PLAN**

**ENVIRONMENTAL TEST BRANCH
STRUCTURAL AND ENVIRONMENTAL TEST
DIVISION
TEST LABORATORY
ENGINEERING DIRECTORATE**

ENVIRONMENTAL TEST FACILITY
CONFIGURATION MANAGEMENT PLAN

ET24-CM- PLAN-200 BASELINE

SIGNATURE SHEET

Originator:

Sharon F. Caselberry, Test Engineer
Environmental Test Branch

Date

Approved by:

James R. Stephens, Technical Assistant
Environmental Test Branch

Date

Alan Patterson, Division Chief
Structural and Environmental Test Division

Date

TABLE OF CONTENTS
ET24-CM-PLAN-200 BASELINE

SECTION	PAGE
1.0 Introduction	1
2.0 Applicable Documents and Forms	2
3.0 Safety	3
4.0 Facility Baseline Specification	3
5.0 Configuration Control	3
6.0 Configuration Verification/Audits	14
7.0 Quality Records	14
APPENDIX A Acronyms	15
APPENDIX B Definitions	16

LIST OF TABLES

Table 5.2-1	System Overview	6
Table 5.3-1	Test Procedure Approval Requirements	9
Table 5.3-2	Test Preparation Sheet Approval Req.	10

LIST OF FIGURES

Figure 5.1-1	CCB Change Process	11
Figure 5.3-1	Test Procedure Processing Flow	12
Figure 5.3-2	Test Preparation Sheet Processing Flow	13

1.0 INTRODUCTION

1.1 Purpose

In order to assure that the facility configuration and test conditions are known, it is necessary to implement a configuration control system. This configuration management plan provides the necessary information to define, develop, establish authorities, implement, operate, and maintain a system that will provide the necessary change control over facility configuration and related operational hardware.

1.2 Scope

This plan has been specifically tailored to include requirements of the Environmental Test Facility (ETF), Bldg. 4619[west end]. This plan shall apply to and include, the systems listed in Table 5.2-1. The related documentation shall include all drawings, manuals, schematics and other data required to operate and maintain the systems. Other systems may be added to the plan as determined by the ET24 Branch Chief.

NOTE: None of the systems listed are brick and mortar.

1.3 Facility Description

The Environmental Test Facility (ETF) provides facilities and engineering technical support for thermal, humidity, altitude, vacuum, and out-gassing tests on space systems and components.

1.4 Organization

The Environmental Test Facility (ETF) organization includes MSFC civil service, who prepare and operate chambers; ICRC/Qualis, who prepare, operate, and maintain chambers and drawings, also produces the schedule for the facility and coordinates with the customer to fill out the customer task agreement and the customer satisfaction survey; Sverdrup/Total Solutions, who maintains and generates documentation, manages the ETF document library and also marketing of the facility and any other appropriate paperwork.

2.0 APPLICABLE DOCUMENTS AND FORMS

The following documents and forms of the latest issue or revision and all changes thereto are applicable to the extent specified herein.

2.1 Applicable Documents

MPR 8715.1C	Marshall Safety, Health and Environment Program
ET24-ETF- OWI-001	ETF Test Operations
4619M000	ETF Drawing Tree

2.2 Forms

MSFC Form 248	Test Preparation Sheet (TPS)
MSFC Form 248-1	TPS Continuation Sheet
MSFC Form 2312	Configuration Control Board Directive (CCBD)
MSFC Form 3209A	Specification Change Notice (SCN)/Document Change Notice (DCN) Continuation Sheet

3.0 SAFETY

All ETF personnel and contractors shall follow the safety guidelines described in MPR 8715.1C.

4.0 FACILITY BASELINE SPECIFICATION

The ETF Master List identifies the documents and the ETF drawing tree, 4619-M000, identifies the drawings associated with the test facility's baseline configuration. The latest version of the master list is in the ISO 9000 document library. The latest version of the ETF drawing tree is in building 4619 in the hallway on the board. Once the ETF Facility baseline has been established, ET24 shall maintain a current configuration status during facility preparation and testing operations.

5.0 CONFIGURATION CONTROL

The objectives of this system are to ensure the establishment and implementation of an effective system for configuration control and to provide uniform requirements for all MSFC elements and contractors to follow when proposing, submitting, and processing changes to the ETF, with associated configuration baselines and changes thereto.

5.1 Configuration Change Control and Approval

Once the configuration baseline has been established, Facility Configuration Control Board (FCCB) approved changes to that configuration shall be processed according to Figure 5.1-1. Interfaces between the ETF and another system shall not be changed without the approval of the FCCB and the organization in control of the other system.

5.1.1 Change Documentation

A MSFC initiated request to change any ETF system shall be submitted in a TPS. The Configuration Control Monitor (CCM) will develop the change request, Specification Change Notice (SCN)/Document Change Notice (DCN) on MSFC Form 3209A. The CCM will provide the SCN/DCN number, the document number, under the Description of Change section provide "Title", "Justification", "CURRENT" and "PROPOSED" Fields, Configuration Control Board Directive (CCBD) number and all documents and/or drawings effected by the change.

5.1.2 FCCB Directive

The disposition of each change proposal shall be formally documented. The disposition shall be documented via a MSFC Form 2312, CCB Directive (CCBD). Each directive shall be dispositioned as follows:

- a. Approved as written
- b. Approved with changes (with changes delineated)
- c. Disapproved

As required, the directive shall include assigned action items and proposed deadline.

5.2 FCCB

5.2.1 Authorities and Responsibilities

The ET24 Branch Chief will establish policies and provide the overall management direction required to conduct configuration control for the ETF in such a manner as to achieve the objectives set forth in Paragraph 5.0 of this plan.

Responsibilities of the Branch Chief shall include, but are not limited to, the following:

- a. Identify all the systems to be placed under configuration control in the ETF as shown in Table 5.2-1. Additional systems may be placed under control at a later time.
- b. Assign single-point technical responsibility for each system identified. Also, designate an alternate to aid in the test engineer's absence as shown in Table 5.2-1.
- c. Establish a ETF document library for documentation control functions, such as data entry duties and appoint an ETF document librarian.

Responsibilities of the ETF document librarian shall be to:

- (1) Assign and maintain indexes for ETF related documents.
- (2) Review documents for details to ensure that sufficient information is entered into the computer to reflect a complete system status at all times.
- (3) Maintain the official completed hard copy files.

- (4) Maintain one of two controlled copies of documents.
- d. Appoint a Configuration Control Secretariat (CCS) to manage TPS's and maintain the master file.
- e. Appoint a Configuration Control Monitor (CCM) to manage and operate the Configuration Control System.
- f. Establish a ETF Facility Configuration Control Board (FCCB) to approve the ETF baseline and changes thereto.

5.2.2 ETF FCCB Membership

The ETF FCCB shall consist of the following membership:

- a. Chairman – Branch Chief
- b. CCM - Sharon F. Caselberry, ETF Test Engineer
- c. CCS - Manuel Schultz, ETF Test Technician
- d. Members -
 - 1. David Kelley, ETF Test Technician
 - 2. Mark Norman, ETF Test Technician
 - 3. Jerome Pitts, ETF Test Technician
 - 4. James R. Powers, ETF Test Engineer
 - 5. Jimmy Sisco, ETF Test Engineer
 - 6. Tony Williams, ETF Test Engineer

Facility Systems

<u>System</u>	<u>Manager</u>	<u>Alternate</u>
Thermal/Vacuum Chamber 2 (V-2)	Jimmy Sisco	Randy Powers
Thermal/Vacuum Chamber 3 (V-3)	Jimmy Sisco	Randy Powers
Thermal/Vacuum Chamber 4 (V-4)	Jimmy Sisco	Randy Powers
Thermal/Vacuum Chamber 5 (V-5)	Jimmy Sisco	Randy Powers
Thermal/Vacuum Chamber 6 (V-6)	Jimmy Sisco	Randy Powers
Thermal/Vacuum Chamber 7 (V-7)	Jimmy Sisco	Randy Powers
Thermal/Vacuum Chamber 8 (V-8)	Jimmy Sisco	Randy Powers
Thermal/Vacuum Chamber 9 (V-9)	Jimmy Sisco	Randy Powers
Thermal/Vacuum Chamber 11 (V-11)	Jimmy Sisco	Randy Powers
ROME Thermal/Vacuum Chamber	Jimmy Sisco	Randy Powers
SUNSPOT Thermal/Vacuum Chamber (SS)	Jimmy Sisco	Randy Powers
“20 FOOT” Thermal/Vacuum Chamber (V-20)	Jimmy Sisco	Randy Powers
Thermal/Humidity Chamber 1 (TH-1)	Tony Williams	Jimmy Sisco
Thermal/Humidity Chamber 2 (TH-2)	Tony Williams	Jimmy Sisco
Thermal/Humidity Chamber 3 (TH-3)	Tony Williams	Jimmy Sisco
Thermal/Humidity Chamber 4 (TH-4)	Tony Williams	Jimmy Sisco
Thermal/Humidity Chamber 5 (TH-5)	Tony Williams	Jimmy Sisco
Thermal/Humidity Chamber 6 (TH-6)	Tony Williams	Jimmy Sisco
Thermal/Humidity Chamber 7 (TH-7)	Tony Williams	Jimmy Sisco
Thermal/Humidity Chamber 8 (TH-8)	Tony Williams	Jimmy Sisco
Thermal/Humidity Chamber 9 (TH-9)	Tony Williams	Jimmy Sisco
Thermal/Attitude Chamber 1 (TA-1)	Tony Williams	Jimmy Sisco
Liquid Nitrogen System (LN2)	Jimmy Sisco	Randy Powers

TABLE 5.2-1 SYSTEM OVERVIEW

5.3 Documentation Process

5.3.1 Test Procedure

Test Procedures shall be required to authorize and perform scheduled operations of the facility. Test Procedures include Facility Operating Procedures (FOP), Facility Activation Procedures (FAP), and Standard Operating Procedures (SOP). Test procedures shall be prepared in accordance with ET24-ETF- OWI-001.

5.3.1.1 Instructions

A flow chart for processing the Test Procedure is shown in Figure 5.3-1. Instructions are as follows:

- a. The test procedure originator will prepare and issue preliminary copies of the procedure for review to personnel directly involved in procedure execution. Upon completion of the table-top review, the procedure shall be typed in final form for approval. An approval/signature sheet shall be prepared for the final issues.
- b. After all the necessary approvals are obtained by the originator, see Table 5.3-1, the Test Procedure shall get all signatures to be baselined by the Branch Chief and maintained on file in the ETF document library and at the specified test chamber. There are two controlled copies.
- c. Test procedures, which require facility configuration changes, that impact interfaces with hardware supplied by others, shall be coordinated with the ETF and the organization who controls the other hardware.

5.3.1.2 Test Procedure Closure

Test Procedure closure is as follows:

- a. After completion of requirements outlined in the test procedure, the "as-run" procedure shall be routed to room 106 for file updates.
- b. A copy of the "as-run" procedure shall be filed in the Master file located in room 106.

5.3.2 Test Preparation Sheet (TPS)

A TPS shall be required to perform any work operation on a system.

- a. Type "A" TPS authorizes the accomplishment or deletion of work and changes which affect permanent configuration of the system. Type "A" TPS requires CCB approval and the CCB number shall be recorded on MSFC Form 248/248-1.

- b. Type "B" TPS authorizes the accomplishment of all work or testing which does not affect the permanent configuration of the system.

5.3.2.1 Instructions

A flow chart for processing the TPS is shown in Figure 5.3-2. Instructions are as follows:

- a. The Test Engineer shall initiate a TPS or a Customer Test Agreement (CTA). Safety hazards and procedures shall be specified on the TPS. These shall include control of hazardous energy (lockout/tagout), lifting safety, electrical safety, pressure and vacuum systems safety, protective clothing and equipment, hazardous operations, and other operational safety concerns outlined in MPR 8715.1C.
- b. When a TPS-A is originated, an electronic copy is generated by the test engineer for data entry and number assignment. When a TPS-B is originated, an electronic copy is generated by the configuration control secretariat for data entry and number assignment.
- c. All changes which are safety critical must have Safety approval. The originator is responsible for obtaining any additional required signatures, see Table 5.3-2.
- d. The original TPS will be used for performing the work, in case of a loss of the original, an electronic copy is kept. Work steps will be signed off in the "Tech. Column" by the individual performing the work. The TPS-A will be presented to the Configuration Control Monitor for final acceptance and filing in the master file in room 104. The TPS-B will be presented to the Configuration Control Secretariat for final acceptance and filing in the master file in room 106. If a Quality stamp is needed then the original TPS will follow the test article to Quality.
- e. For a type "A" TPS, a SCN/DCN shall be prepared, as applicable, to update the facility documentation and drawings to reflect the change. The originator of the TPS shall be responsible for recording the SCN/DCN number on the applicable TPS.

5.3.2.2 TPS Closure

TPS closure is as follows:

- a. The original TPS-A shall be returned to the CCM for data updating after completion of work. The original TPS-B shall be returned to the CCS for data updating after completion of work.
- b. A copy of the original shall be filed in Master file.

Table 5.3-1 TEST PROCEDURE (TP) APPROVAL REQUIREMENTS

Requirements for the TP are obtained from ET24-ETF- OWI-001.

The responsibility for reviewing or approving test operational procedures is dependent upon the type of test program and type of procedure. Approvals shall be obtained prior to implementation of procedures. The following tabulation reflects the minimum signatures required for initial procedure issuance and revisions.

All Test Programs	SOP	FAP	FOP
Test Engineer	P	P	P
Branch Chief /Deputy	A	A	A
Quality Assurance	(1)	(1)	(1)
Industrial Safety	(2)	(2)	(2)
Environmental Health	(3)	(3)	(3)

P = Prepare A = Approve

NOTES:

- (1) Although Quality Assurance approval is not required for the procedure, Quality Assurance acceptance on the procedure's As-run Buy-off Sheet and acceptance on the TPS is required for quality sensitive tests.
- (2) Industrial Safety approval is required for potentially safety critical tests and operations, as determined by ETF safety personnel or the customer.
- (3) Environmental Health approval is required for hazardous operations which involve unique and unusual environmental hazards, as determined by ETF safety personnel.

Table 5.3.2 TEST PREPARATION SHEET (TPS) APPROVAL REQUIREMENTS

Requirements for the TPS are obtained from ET24-ETF- OWI-001.

The initiating organization will be responsible for obtaining the required signatures and approvals before distribution of the TPS. The required signatures and approvals will be as tabulated:

All Test Programs	TPS-A	TPS-B
Configuration Control Secretariat	P	P
Test Engineer	P/A(1)	P/A(1)
Marshall Lead Representative	(2)	(2)
Quality Assurance	(3)	(3)
Industrial Safety	(4)	(4)
Environmental Health	(5)	(5)

P = Prepare A = Approve

NOTES:

- (1) The TPS-A requires approval from the test engineer, the CCM, the scheduler and if applicable, the ETF safety monitor. The TPS-B requires only one approval.
- (2) The Marshall Lead Representative approval is required for Customer Supplied Product hardware if specified in the CTA.
- (3) Quality Assurance acceptance is required at the completion of quality sensitive tests.
- (4) Industrial Safety approval is required for safety critical tests, as determined by ETF safety personnel or the customer.
- (5) Environmental Health approval is required for hazardous operations which involve unique and unusual environmental hazards, as determined by ETF safety personnel.

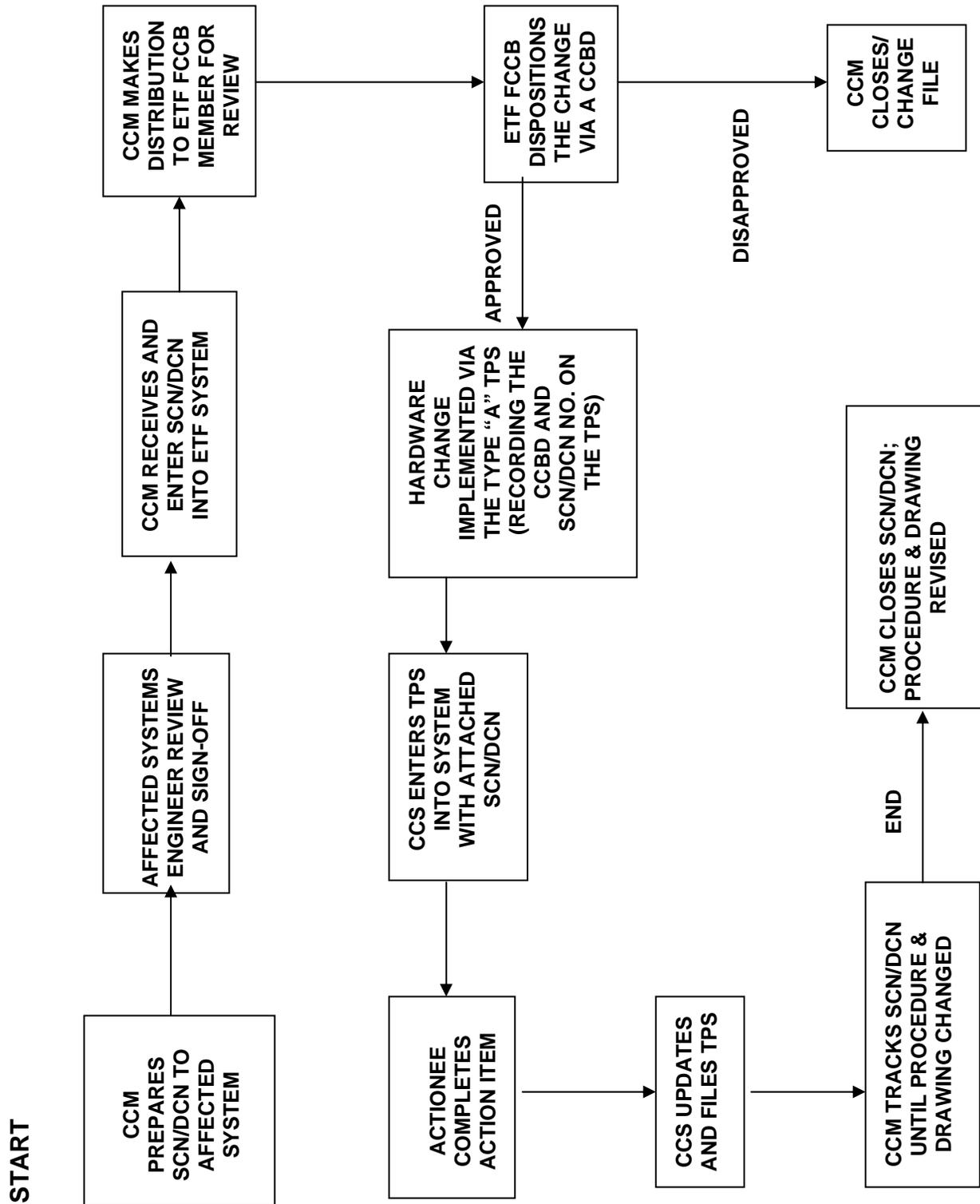


FIGURE 5.1-1 CCB CHANGE PROCESS

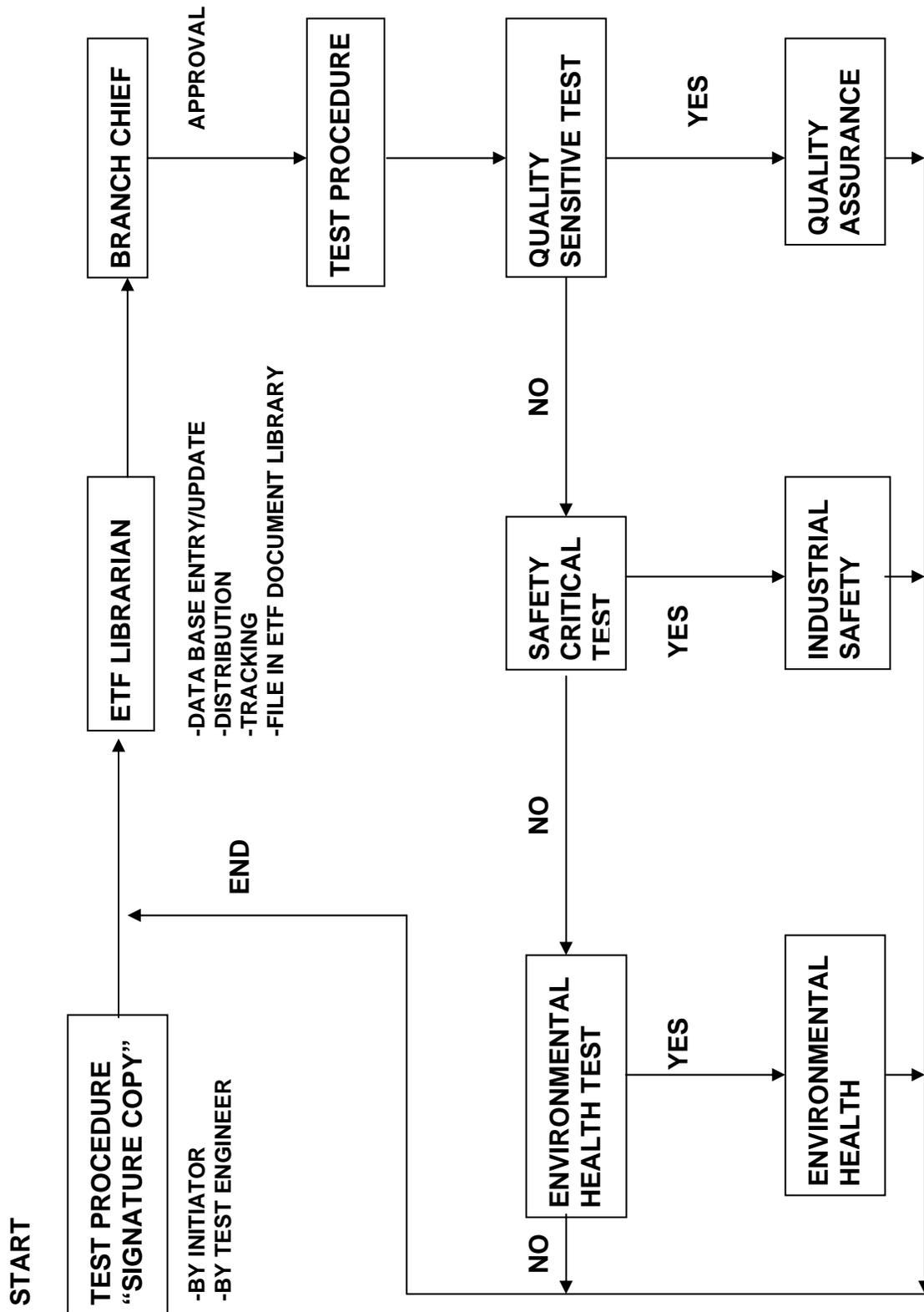


FIGURE 5.3-1 TEST PROCEDURE PROCESSING FLOW

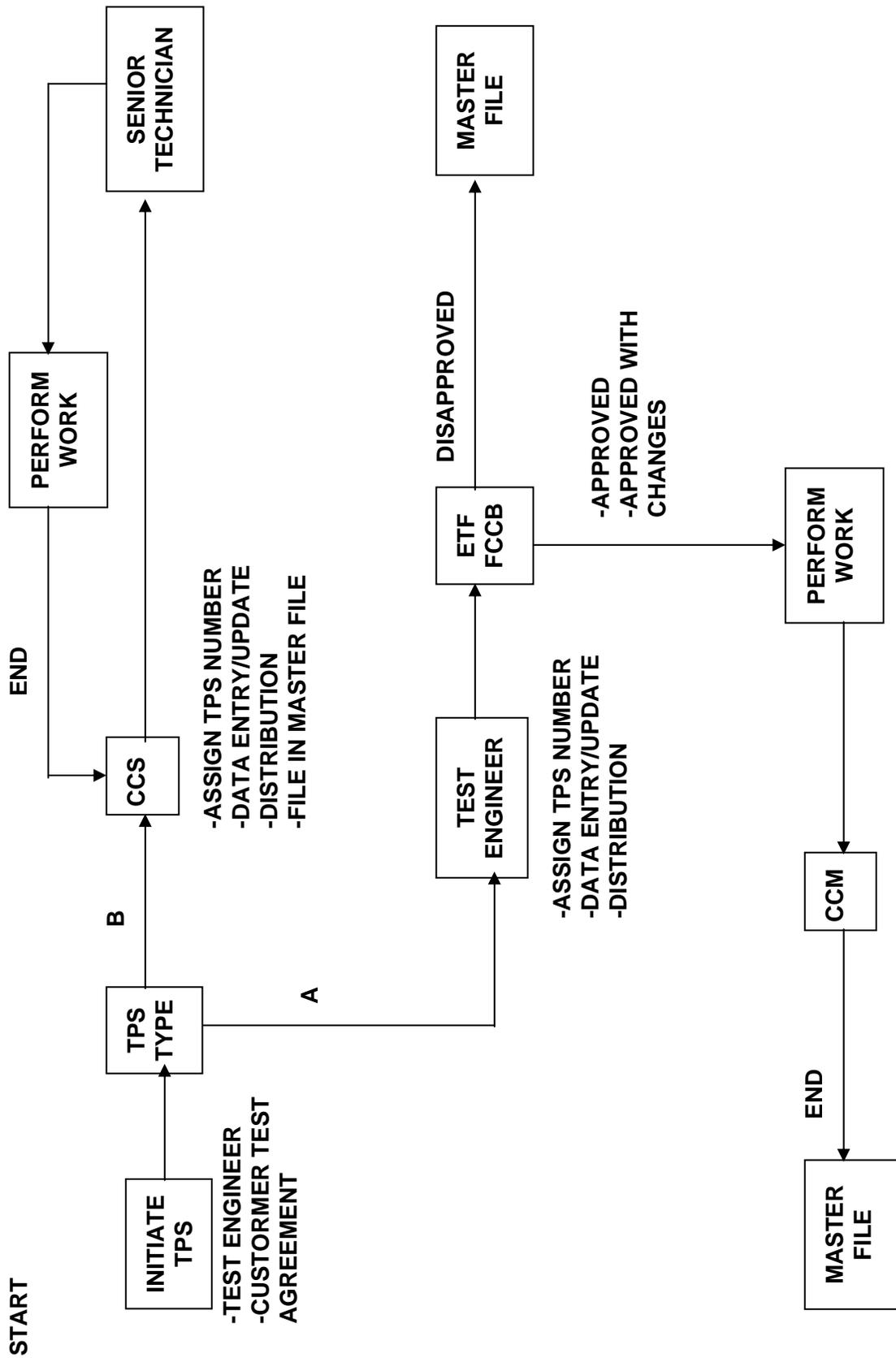


FIGURE 5.3-2 TPS PROCESSING FLOW

6.0 CONFIGURATION VERIFICATION/AUDITS

A Facility Activation Procedure (FAP) is required only when a facility modification to a chamber is so unique, that it would require a new step-by-step procedure.

The Configuration Management Plan shall be implemented upon activation of the system. This plan will be applied to all personnel interfacing with the ETF, and to hardware, systems, and test equipment placed under configuration control.

7.0 QUALITY RECORDS

ET24 quality records are identified in the Organizational Work Instruction (OWI), ET24-ETF- OWI-001, in Section 8.

APPENDIX A

<u>ACRONYM</u>	<u>DEFINITION</u>
CCBD	Configuration Control Board Directive
CCM	Configuration Control Monitor
CCS	Configuration Control Secretariat
CMP	Configuration Management Plan
CTA	Customer Task Agreement
DCN	Document Change Notice
ETF	Environmental Test Facility
FAP	Facility Activation Procedure
FCCB	Facility Configuration Control Board
FOP	Facility Operating Procedure
MSFC	Marshall Space Flight Center
PCH	Program Critical Hardware
SCN	Specification Change Notice
SOP	Standard Operating Procedure
TP	Test Procedure
TPS	Test Preparation Sheet

APPENDIX B

DEFINITIONS

Baseline

A configuration identification document or set of documents (regardless of media) formally designated and fixed at a specific time during configuration item's life cycle. Baseline plus approved changes from those baselines constitute the current configuration identification.

Brick and Mortar

Brick and mortar comprises that portion of the facility identified by as-built drawings maintained by the Facilities Office.

Change Control

The process that maintains formal accountability and status of systems in a change-pending state.

Configuration Control

A method of applying technical and administrative direction to (1) identify and document the functional and physical characteristics of a configuration item, (2) control changes to those characteristics, and (3) record and report the status of the change process and implementation. It includes configuration, identification, control, status accounting and audits.

Configuration Status Accounting/Reporting

The recording and distribution of the information needed to effectively manage a configuration item, including a listing of the approved configuration identification, the status of changes to established configurations, and the implementation status of approved changes.

Customer Supplied Product (CSP)

Hardware, equipment, or materials supplied by an off-site customer for the purpose of fabrication, testing, storage, analysis, and/or refurbishment. Products which are purchased by MSFC, or by a MSFC on-site contractor are not considered CSP's.

Environmental Test Facility (ETF)

The test facility located in the west end of Building 4619, MSFC. The ETF is in the Environmental Test Branch; the Structural and Environmental Test Division; the Test Laboratory; Engineering Directorate at the Marshal Space Flight Center.

ETF Branch Chief

Individual responsible for the operations of the ETF.

Facility Activation Procedure (FAP)

Defines the detailed sequence of events to activate and certify test facility systems prior to initial facility operation.

Facility Configuration Control Board (FCCB)

The single authority for authorizing changes, deviations, and waivers to established baselines for the ETF (excluding brick and mortar). The FCCB's for the ETF are separate from CCB's established at the Project Level. The responsibility for the ETF FCCB remains with the ETF.

Facility Operation Procedure (FOP)

Defines the detailed sequence of events to prepare and operate a test facility system or equipment.

Hardware Configuration Item

An aggregation of hardware or any of its discrete components, which satisfies an end use function and is designated for configuration management control.

Marshall Lead Representative (MLR)

The senior MSFC person, who by assignment or by virtue of position, has responsibility for the use and control of MSFC product and CSP (i.e., Director of the MSFC Lead Organization, Project Engineer, Department Manager, etc.). This responsibility may be delegated, in writing, to another individual, upon agreement with that individual.

Program Critical Hardware (PCH)

Flight or other hardware that, because of its high value or critical importance, requires special handling. The project or program office is responsible for defining and designating appropriate hardware as PCH.

Records Center

A centralized function that establishes and maintains central records which provide control and traceability of all changes to product baseline, communicates the status of configuration identifications, and serves as a vehicle for ensuring that system documentation represents the configuration item (audits). The records center shall be maintained and operated by ETF personnel.

Safety Critical Test Program

Any test program involving the execution of operations which have a significant potential for detrimental effects on personnel or property.

Standard Operation Procedure (SOP)

Describes specific test site routines or basic operations and guidelines which do not necessarily require the execution of detailed sequences of events.

System

A group or arrangement of hardware components that relate to or interact with each other to form a whole, with specific boundaries and interfaces identified to clearly define management and control responsibilities.

Systems Test Engineer

Designated engineer with lead responsibility for defining, implementing, and controlling the test program for a project or facility. This includes test planning, test procedure development, configuration control, test readiness reviews, procedure execution, discrepancy resolution, and test reporting.

Test and Checkout Procedure (TCP)

Defines the detailed sequence of events to perform a specific test or operation on a test article or test facility system. The customer provides the TCP if required for testing at the ETF.

Test Engineer

Engineer responsible for a specific system or subsystem of an integrated systems test. Depending upon the type, complexity, and magnitude of the test program, and the organization of the test team, the test engineer may also serve as the systems test engineer and/or test conductor.

Test Preparation Sheet (TPS)

A document which directs and/or authorizes manufacturing or test operations. Type A (TPS-A) involves a permanent configuration change. Type B (TPS-B) is used to perform system maintenance and test operations, that does not involve permanent configuration changes. All testing at the ETF is authorized by a TPS-B.