409-CD-001-004

EOSDIS Core System Project

ECS Overall System Acceptance Test Plan for Release A

September 1995

Hughes Information Technology Corporation
Upper Marlboro, MD

ECS Overall System Acceptance Test Plan for Release A

September 1995

Prepared Under Contract NAS5-60000
CDRL Item 069

SUBMITTED BY

Robert E. Clinard /s/ 9/6/95
Robert E. Clinard, ECS CCB Chairman Date
EOSDIS Core System Project

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Hughes Information Technology Corporation
Upper Marlboro, Maryland

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Preface

This document presents the Acceptance Test Plan (ATP) for the EOSDIS CoreSystem (ECS). It is a formal contract deliverable with an approval code 1, which requires Government review and approval prior to acceptance and use. This submittal of the document incorporates comments received from the Government concurrent with their approval. Major changes include modifying text to reflect test dependencies identified for acceptance testing; adding appropriate references to ECS Acceptance Test Procedures and citing planning activities to be included in same; clarifying references to the ECS Verification Specification as a parent document to this document; providing further information for ECS TRMM Release Interfaces and referencing IRDs and ICDs in Table 7-1; and adding sequence section numbers to all Scenario Group figures. Additionally editorial changes were made and the document was repaginated for better flow.

The document is under ECS contractor configuration control and contractor-approved changes are handled in accordance with Class I and Class II change control requirements described in the EOS Configuration Management Plan. Changes to this document shall be made by document change notice (DCN) or by complete revision. Any questions should be addressed to:

Data Management Office
The ECS Project Office
Hughes Information Technology Corporation
1616 McCormick Dr.
Upper Marlboro, MD 20774

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Change Information Page

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1. Introduction

1.1 Identification

The Acceptance Test Plan, Contract Data Requirements List (CDRL) item 069, whose requirements are specified in Data Item Description (DID) 409/VE1, is a required deliverable under the Earth Observing System Data and Information System (EOSDIS) Core System (ECS), Contract (NAS5-60000).

This ECS Overall System Acceptance Test Plan for the ECS Project (ATP) describes in greater detail the Independent Acceptance Test Organization's (IATO) test plan, which was outlined in the Acceptance Testing Management Plan for the ECS Project (DID 415/VE1). The plan describes the strategy for verifying baselined requirements documented in the Verification Specification for the ECS Project (DID 403/VE1). The ATP provides the basis for development of the ECS System Acceptance Test Procedures (DID 411/VE1) and the ECS System Acceptance Test Report (DID 412/VE2).

This is the final delivery of DID 409/VE1. It was previously submitted for SDR as 194-409-VE1-001.

1.2 Scope

This ATP describes how the system acceptance testing for ECS will be conducted by the IATO. It describes the ECS formal TRMM Releases test scheduled for use at the following facilities: EOS Operations Center (EOC); System Monitoring and Coordination Center (SMC); Goddard Space Flight Center (GSFC), Marshall Space Flight Center (MSFC); Langley Research Center (LaRC); and the EROS Data Center (EDC).

1.3 Purpose and Objective

The ATP specifies how the independent acceptance testing of the ECS will be accomplished. It defines the plan that will be used to formally verify that the TRMM Release meets all of the specified operational, functional, performance and interface requirements. Further, the ATP ensures that the integrated system produces and optimal environment for ECS operations. The ATP also serves as a guide in the development of the ECS System Acceptance Test Procedures (DID 411/VE1) document.

1.4 Status and Schedule

The schedule for delivery of the Acceptance Test Plan is based on the following ECS Master Schedule review milestones: System Design Review; Preliminary Design Review; Release Initiation Reviews; and Incremental Design Reviews. Table 1-1, the Acceptance Test Plan Delivery Schedule, shows the ATP delivery schedule and content description in relationship to the ECS review milestones.

The first delivery of the ATP, scheduled two week prior to ECS SDR, includes an overview of the IATOs itinerary for test preparation and execution, a summary of the ECS TRMM Release plus descriptions of the test scenarios. The test scenarios serve as the basis for the development of the test sequences and test cases for the testing of the TRMM Release.

The second delivery of the ATP, scheduled two week prior to ECS PDR, includes complete descriptions of the test scenarios, sequences and test cases.

Following the PDR delivery of the ATP, the ATP is updated for future ECS formal Releases. These sub documents are delivered two weeks prior to each IDR and RIR.

Table 1-1. Acceptance Test Plan Delivery Schedule

ECS Release Milestones	ATP Delivery Schedule	Content Description
SDR	2 weeks prior to ECS SDR	Complete detailed descriptions of the overall acceptance test plan activities. Completed scenario descriptions to be used for the TRMM Release.
PDR	2 weeks prior to ECS PDR	Completed test scenario, sequence and test case descriptions to be used for the TRMM Release.
RIR	2 weeks prior to ECS RIR	Complete detailed descriptions of the test plan activities. Completed scenario descriptions to be used for the release in review.
IDR	2 weeks prior to IDR	Completed test scenarios, sequence and test case descriptions for the release in review.

1.5 Document Organization

This ATP describes the tests used in the conduct of the AT to ensure that the EOSDIS Core System software meets all of the functional and performance requirements scheduled for the TRMM Release.

This document is composed of twelve sections, an acronym list and glossary.

Section 1 — Introduction, describes the scope, purpose, objectives, schedule, and organization of the ATP.

Section 2 — Related Documentation, lists documents related to this ATP and the nature of their relationship.

Section 3 — Test Plan Overview, defines and describes the ECS AT test philosophy, test characteristics and scope of test scenarios.

Section 4 — System Acceptance Test Criteria, presents the IATO's judgment of what criteria each ECS release must meet in order to be acceptable to the Government.

Section 5	Test Responsibilities, outlines the roles and responsibilities of organizations supporting acceptance testing.
Section 6	Resource Requirements, defines acceptance testing in terms of data, facilities and test tools.
Section 7	TRMM Release Acceptance Test Overview, provides a summary of the TRMM release capabilities.
Section 8	System Management Scenario Group, specifies the AT plans that demonstrate ECS readiness to perform system and site management functions.
Section 9	Push Scenario Group, specifies AT plans for evaluating ECS ingest and preprocessing procedures.
Section 10	Pull Scenario Group, specifies AT plans for evaluating ECS services necessary to search, access and retrieve TRMM release data holdings at each site.
Section 11	Flight Operations Scenario Group, specifies AT plans for evaluating TRMM release functions that apply to EOS AM-1 flight operations.
Section 12	End-to End Scenario Group, specifies AT plans for evaluating ECS capabilities for supporting inter-site communications, scientist data handling and processing, system management and coordination, and system performance.

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2. Related Documentation

2.1 Parent Documents

The following documents are the parents from which the scope and content of this document derives:

107-CD-002-012	Level 1 Master Schedule for the ECS Project
194-219-SE1-001	Interface Requirements Document Between EOSDIS Core System (ECS) and the NASA Science Internet (NSI)
194-219-SE1-002	Interface Requirements Document Between EOSDIS Core System (ECS) and MITI ASTER GDS Project
219-CD-003-002	Interface Requirements Document Between EOSDIS Core System (ECS) and the Landsat 7 System, Final
194-219-SE1-004	Interface Requirements Document Between EOSDIS Core System (ECS) and the Version 0 System
194-219-SE1-005	Interface Requirements Document Between EOSDIS Core System (ECS) and Science Computing Facilities
219-CD-006-003	Interface Requirements Document Between the EOSDIS Core System (ECS) and the National Oceanic and Atmospheric Administration (NOAA) Affiliated Data Center (ADC), Final
193-219-SE1-008	Interface Requirements Document Between EOSDIS Core System (ECS) and Program Support Communications Network, Draft
194-219-SE1-015	Interface Requirements Document Between EOSDIS Core System (ECS) and International Partners for Data Interoperability, Preliminary (formerly Interface Requirements Document Between EOSDIS Core System (ECS) and The European Space Agency)
194-219-SE1-018	Interface Requirements Document Between EOSDIS Core System (ECS) and Tropical Rainfall Measuring Mission (TRMM) Ground System
194-219-SE1-019	Interface Requirements Document Between EOSDIS Core System (ECS) and Earth Observing System (EOS) AM-1 Flight Operations
194-219-SE1-020	Interface Requirements Document Between EOSDIS Core System (ECS) and NASA Institutional Support Systems
194-401-VE1-002	Verification Plan for the ECS Project, Final

423-41-01	Goddard Space Flight Center, EOSDIS Core System (ECS) Statement of Work
423-41-02	Goddard Space Flight Center, Functional and Performance Requirements Specification for the Earth Observing System Data and Information System (EOSDIS) Core System (ECS)
560-EDOS-0211.0001	Interface Requirements Document (IRD) Between the Earth Observing System (EOS), Data and Operations System (EDOS), and the EOS Ground System (EGS) Elements

2.2 Information Documents

The following documents, although not directly applicable, amplify or clarify the information presented in this document, but are not binding:

222-TP-003-006	Release Plan Content Description
none	EOSDIS Integration and Certification Presentation

3. Test Plan Overview

3.1 Acceptance Testing Approach

Test scenarios are the driving mechanism for the overall approach of the IATO to evaluate ECS software and hardware against established acceptance test criteria. Acceptance testing addresses the broadest scope of requirements, while lower levels of verification address requirements that satisfy functions fully contained within builds that make up releases. The acceptance testing objective is to verify that the end-to-end ECS operations satisfies ECS requirements in the following categories:

Operational Requirements: ensure that the ECS operates in accordance with forward and return link data, flight operations, data capture, data archive, and data distribution requirements, thereby verifying full end-to-end capabilities of the ECS.

Functional Requirements: ensure that the required tasks are accomplished and that the needs and objectives of users are met.

Performance Requirements: ensure that performance objectives with respect to throughput, delay, and number of simultaneous transactions in progress are satisfied. These requirements include speed, accuracy, frequency, reliability, maintainability, and availability.

Interface Requirements: ensure that external and internal systems pass information or control to one another in accordance with specifications.

Requirements are mapped to test scenarios, which are defined in this ATP. The requirements and the scenarios through which they are verified are tracked and maintained through the Requirements & Traceability Management (RTM) Computer Aided Software Engineering (CASE) tool and later published in the Verification Specification for the ECS Project (DID 403/VE1).

3.1.1 Acceptance Test Plan Structure

The construction of the acceptance test plan is based on a hierarchical approach which consists of: scenario group, scenario, sequence, and test case. Figure 3-1 is an Acceptance Test Plan hierarchy block diagram, which includes as hierarchical levels: scenario group, scenario, sequence and test cases.

Scenario group, scenario, sequence, and test case are characterized as follows:

Scenario Group is a collection of scenarios which form the highest level subdivision of the system for the purpose of acceptance testing. The Section 7 provides an introduction which defines the groups' functional objectives and the type of scenarios that are included in the scenario group.

Scenario is a subdivision of the group which can be executed independently of any other scenario identified within that scenario group. Each scenario is sub-divided into two or more test sequences. Section 7 provides a high level description and a stated purpose of the scenario.

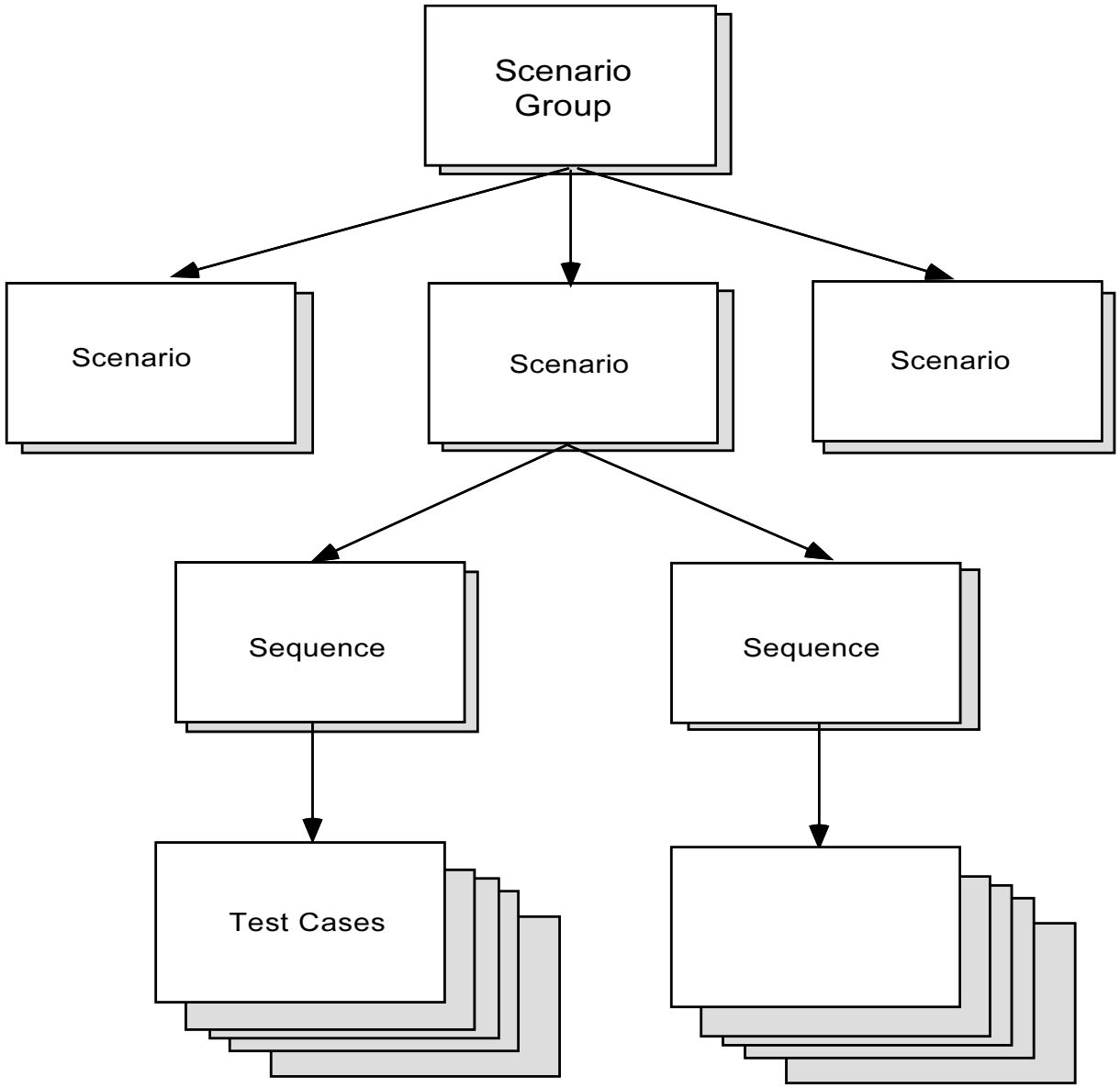

Figure 3-1. Acceptance Test Plan Hierarchy

Sequence is a subdivision of a scenario which is designed to verify a number of related requirements in a logical sequence. For example, operations related to data browse might be contained in one test sequence.

Test Case is a small grouping of actions that form the building blocks of the test sequence. An example of a test case might be the data ingest portion of the Data Ingest, Processing and Archive Sequence for a specific dataset. The purpose of creating test cases is two fold: first, it provides a limited area of functionality for the development of test procedures, and second, it reduces requirements verification problems created by anomalous test results or errors since each test case is short and contains only a few requirements. Since test cases are relatively short, they provide a convenient breakpoint for the Acceptance Test Team (ATT) to review the results and determine if the requirements were met. Each test case identifies the test objective, test inputs, and test expected results.

Each Test Case describes how the requirements are verified. The test case specifies the inputs (in terms of data sets, simulated interface data, etc.) needed to stimulate the system under test. The test cases also describes the outputs and expected results from the test. Comparison of the expected results to the actual outputs provides the basis for a pass/fail determination of the test.

These test cases form the basis for the development of the ECS System Acceptance Test Procedures (ATPR) (DID 411/VE1). The ATPR contains the following information required to perform the test cases: test preparation and setup procedures describing the operating system configuration, and any special initialization instructions; identification of the input data sources and files; step-by-step procedures and detailed expected results for each step; descriptions of the acceptance test criteria; and schedules describing dependencies between particular test cases and when each test is conducted.

Generating scenarios, preparing scenario sequences, analyzing requirements, and conducting test runs are discussed in more detail in the following sections.

3.1.2 Test Scenarios

Test scenarios are developed from two viewpoints: users and operations. Both user and operations scenarios are developed to verify the requirements compliant operation of ECS components within the fully integrated ECS environment. These scenarios also verify the correct operation of interfaces between ECS segments (internal interfaces) and between the ECS and external entities (external interfaces). A spacecraft control telemetry data interface between command and control elements, and a user interface to a science data archive are examples of the internal and external interfaces, respectively, that are incorporated in operational and user scenarios. Scenarios are developed primarily by the science user community and the ECS contractor.

User test scenarios illustrate typical user interactions with the ECS. These scenarios are based primarily on user model scenarios obtained from the science user community via the ECS Science Office and the Maintenance and Operation (M&O) Team.

Operations test scenarios are oriented towards ECS operations and management requirements. These scenarios are developed primarily by the IATO and address various operational concepts without focusing on a specific user group. Operations test scenarios focus on such areas as spacecraft command and control, problem reporting and correcting, schedule adjudication, resource tracking, and security control.

The test scenarios provide the basic framework for ECS system-level acceptance testing. They describe a representative chain of events that entail science user and operations interactions with the ECS. They are modeled as stimulus/response patterns which form a logical sequence of operations. By using scenarios in acceptance testing, typical events that can occur during ECS operations are tested for proper system response prior to Government acceptance. Since the scenarios are mapped to their underlying requirements, in the Requirements Matrix documented in the ECS Verification Specification (DID 403/VE1), the requirements that are linked to a particular scenario are tested by virtue of executing the scenario. Completeness in scenario definition is confirmed in the requirements matrix, which maps level-3 requirements to the acceptance test scenarios described in Sections 7 through 12. When taken together, these scenarios can be traced to all ECS Level 3 requirements. Thus, Level 3 requirements are verified during acceptance testing with assurance that the required level of testing completeness has been attained.

Scenarios are categorized into five groups. Four of the groups – System Management, Push, Pull, and Flight Operations represent ECS functionality based on operations at the functional level. The fifth group, End-to-End, is designed to test user and mission related themes at the ECS system level. The first four scenario groups were chosen to ensure complete coverage of ECS capabilities, while limiting the number of functions to selected areas, the grouping of which tends to provide more control in the initial test environment and provide for improved isolation in regression testing.

ECS fundamental capabilities are characterized by the following scenario groups:

ECS System Management Scenarios: include verification of sustaining functions for engineering maintenance, routine data center operations, scheduling, resource allocation, configuration management, fault management, upgrades, contingency operations, and security.

Push Scenarios: include verification of product processing and reprocessing which includes ingesting instrument data and associated activities such as production of higher-level data, calibration, quality assurance.

Pull Scenarios: include verification of user access to the system for data acquisition, data search, selection, and access; it also involves verification of procedures for using science data.

Flight Operations Scenarios: include verification of planning, scheduling, commanding, management and operation of instruments, telemetry processing, monitoring spacecraft and instrument health and safety, resource management, data management, user interface, inter-process communication, Instrument Support Terminal (IST) toolkits, and interfaces with external systems.

End-to-End Scenarios: include verification of interactive functionality among the ECS and multiple external systems, interoperability among the DAAC sites to perform system required operations, and end-end-mission support.

3.1.3 Test Sequences and Test Cases

A test scenario is sub-divided into two or more sequences. Individual sequences may isolate the functions that a given individual performs or may simply divide an especially long scenario into manageable pieces. Scenario sequences are sub-divided into specific test cases. Each test case

describes a test objective, test methodology, test inputs, and test expected results. The test sequence identifies start-up conditions required prior to executing a test case. User guides, requirement documents, design specifications, and interface control documents are the sources for identifying inputs and output for a particular test case. The RTM tool contains the test scenario, test sequence, and test case numbers traced to requirements by release. This information is captured in the Requirements Matrix found in the ECS Verification Specification (DID 403/VE1).

3.1.4 Test Requirements Analysis

The Level 3 requirements are documented in the Functional and Performance Requirements Specification (F&PRS) for ECS (423-41-02) and Interface Requirements Documents (IRDs). The Requirements Matrix in the Verification Specification is the basis for correlating test scenarios with the Level 3 requirements by release. This matrix is maintained using the RTM tool to provide the ECS project with a central database containing a current and complete composite of all Level 3 requirements.

The method of verification for each requirement is identified and tracked by RTM. For a given requirement, multiple verification methods might be employed. The method(s) chosen is (are) determined by the nature of the requirement.

The four standard methods that are used to verify that ECS requirements are met, are as follows:

Inspection. The visual, manual examination of the verification item and comparison to the applicable requirement or other compliance documentation, such as engineering drawings.

Analysis. Technical or mathematical evaluation based on calculation, interpolation, or other analytical methods. Analysis involves the processing of accumulated data obtained from other verification methods.

Demonstration. Observation of the functional operation of the verification item in a controlled environment to yield qualitative results without the use of elaborate instrumentation or special test equipment.

Test. A procedure or action taken to determine, under real or simulated conditions the capabilities, limitations, characteristics, effectiveness, reliability, or suitability of a material device, system, or method.

3.1.4.1 Requirements Verification Matrix

The requirements verification matrix also tracks the relationships between requirements and their respective releases. The matrix is updated for each formal release to reflect any changes in the system requirements.

Figure 3-2 shows a sample page of the Requirements Matrix. Fundamentally, this matrix depicts the traceability between Level-3 requirements and formal release acceptance tests, i.e., the matrix maps requirements to scenario sequences and test cases. Specifically, the matrix contains the following items, which are shown as column headings. Each item is contained in the RTM requirements traceability CASE tool:

a. Requirement-by-Release Source ID - The Level-3 requirement identifier, obtained from the Functional and Performance Requirements Specification for the ECS (423-41-02). Example: “IMS0160”

b. Requirement Text - The text of the Requirements-by-Release requirement. Example: "ECS shall use and support the Space Network (SN), via the EDOS/Ecom interface, to obtain the forward and return link data communications needed to archive full end-to-end ECS functionality.

c. Requirement Category - The priority of each requirement. The options include mission (critical), mission (essential), mission (fulfillment).

d. Verification Method - The method by which the requirement is verified. Options are inspection, analysis, demonstration, and test.

e. System Test Assignment - Not applicable to acceptance testing.

f. Acceptance Test Assignment - The Acceptance Test codes, extracted from the Acceptance Test Class in RTM, to identify the scenarios and test cases used to verify each requirement. The format of the code includes:

R - ATP Release identification
GG - Scenario Group number
ss - Scenario number
SS - Sequence number
xxx - Test Case number

These items, documented in the Verification Specification and maintained by RTM, provide the traceability necessary to ensure that the ECS is tested for compliance with every requirement associated with a given release.

3.1.5 Acceptance Test Planning

The acceptance test process involves the planning, preparation, execution and reporting on the acceptance test activities that lead up to bringing a release into operational status at the ECS sites. Acceptance test planning is formally presented in the publication of three major documents: the Verification Plan (DID 401/VE1), the Acceptance Testing Management Plan (DID 415/VE1) and the Acceptance Test Plan (DID 409/VE1). The acceptance tests themselves are conducted in accordance with the prescriptions and expected results contained in the ATPR document. Both the ATP and ATPR documents reference the requirements verification matrix contained in the Verification Specification (DID 403/VE1). Contents of the Verification Specification are, in turn, imported from the requirements matrix data base maintained by the RTM tool. Results of the acceptance tests are recorded in a release Acceptance Test Report (DID 412/VE1) published one month after the presentation of the RRR.

The publication of the ATP and ATPR documents are keyed to major ECS reviews associated with each release as shown in Figure 3-3. The plan depicted in Figure 3-3 shows the availability of a Preliminary ATP for Release-A (TRMM Release) coincident with the SDR presentation. It shows the availability of a Final ATP for the TRMM Release during the PDR time frame. The plan includes the publication of a Preliminary TRMM Release ATPR document at the Test Readiness Review (TRR), with a final version of the document delivered one month prior to the Consent to Ship Review (CSR). Following the successful completion of the acceptance test phase, which begins at CSR, an RRR is held. The RRR presents the results of the TRMM Release acceptance testing. The information presented at the RRR is followed-up by a written TRMM Release Acceptance Test Report which will be delivered one month later.

Req. Source ID	Requirement Text	Req. Category	Verify. Method	System Test Number	Acceptance Test Number
DADS0010	Each DADS shall receive updated metadata for products that have been QA'd.	essential	test	T15-01.01.04 T15-01.02.04 T15-01.03.04 T15-01.04.04 T15-01.05.04 T15-01.09.04	A090310.050 A090320.100 A090310.100 A090320.050
DADS0020	Each DADS shall, upon receipt of updated metadata for products which have been QA'd, store the metadata in its inventory.	essential	demo	T12-02.09.00	A090310.050 A090320.100 A090310.100 A090320.050 A120530.020
DADS0100	Each DADS shall receive management directives from the SMC.	essential	test	T10-03.05.00 B10.01.00	A090530.020
DADS0145	Each DADS shall be capable of receiving from the ADCs, at a minimum, the following for the purpose of product generation: a._L0-L4 equivalent data sets b._Metadata c._Ancillary data d._Calibration data e._Correlative data f._Documents g._Algorithms	essential	test	T15-04.07.00 T15-04.07.05 T15-04.07.06 T15-04.07.07 T15-04.07.08 T15-04.07.09 T15-04.07.10	A100140.020
					A120510.010 A120510.030 A120540.010 A120540.020 A090260.030 A120510.020
DADS0170	Each DADS shall be capable of receiving from designated EPDSs and ODCs, at a minimum, the following: a._L0-L4 data sets b._Metadata c._Ancillary data d._Calibration data e._Correlative data f._Documents g._Algorithms	essential	test	T10-02.01.01	A090540.010
					A090540.020 A090540.030 A090250.020 A090250.030 A090230.020 A090230.030 A090240.020 A090240.030

Figure 3-2. Sample Page from Requirements Verification Matrix

The Preliminary ATP delivered for SDR was operating under an approach which would have necessitated the updating of the ATP for each release by adding release-specific material to an appendix of the document. The Preliminary ATP delivered for SDR contained test planning information of a general nature that was applicable to all formal releases. It also contained information specific to the Release-A (the TRMM Release) in Appendix A. For the Preliminary ATP, Appendix A contained an overview of the Release-A capabilities that were to be tested and a description of each scenario to be used during the acceptance test process. It also contained a sample scenario and a single test case within that scenario that was completed to the lowest level of detail.

The ATP delivered for PDR initiates an approach that will result in new ATP documents for each release. The TRMM Release ATP contains a complete breakdown of the testing approach to be used for the TRMM Release in Sections 7 through 12. The breakdown is detailed from scenarios down through sequences and test case levels.

The TRMM Release ATPR document is delivered in two versions. A Preliminary TRMM Release ATPR document is completed in the TRR time frame, with a final version delivered one month prior to CSR. The ATPR document is organized in site-specific volumes for each release. The Preliminary TRMM Release ATPR document will consist of a typical volume containing material of a general nature that applies to all sites, acceptance test schedules, a complete description of test tools, data recording procedures to properly record actual test results, sample test logs, and a sample step-by-step test procedure. The Preliminary TRMM Release ATPR document provides the ESDIS Project Office and each site with an early view of the test procedure structure for review and comment before it is detailed in the final TRMM Release ATPR document.

The final ATPR document contains a set of site-specific volumes used to conduct acceptance testing of the TRMM Release. Each volume is complete with the following information: test preparation and setup procedures; test environment descriptions; identification of test input files; step-by-step procedures and expected results for each step; and a description of acceptance test criteria for the test.

The same series of events will occur in the preparation of ATP and ATPR documents for subsequent releases. The ATP for each release will be updated and specifically tailored to verify new release capabilities.

Separate ATPR documents will be published by release and be organized as separate site-specific volumes. Activities associated with The AM-1/L-7 Release through Release-D ATP documents will be keyed to the RIRs and IDRs instead of the SDR and PDR respectively. ATPR document delivery will continue to be keyed to TRRs and CSRs.

The sequence of activities that lead up to the completion of the TRMM Release acceptance testing is shown in Figure 3-4. It shows the series of acceptance test activities that will take place, how they relate to the major ECS reviews, and their relationship with the documents produced. It also shows the activities and their relationships with the System I&T, and Operations Phases of the TRMM Release acceptance testing life cycle.

Figure 3-5 shows, in a similar way, the sequence of acceptance test activities for subsequent releases.

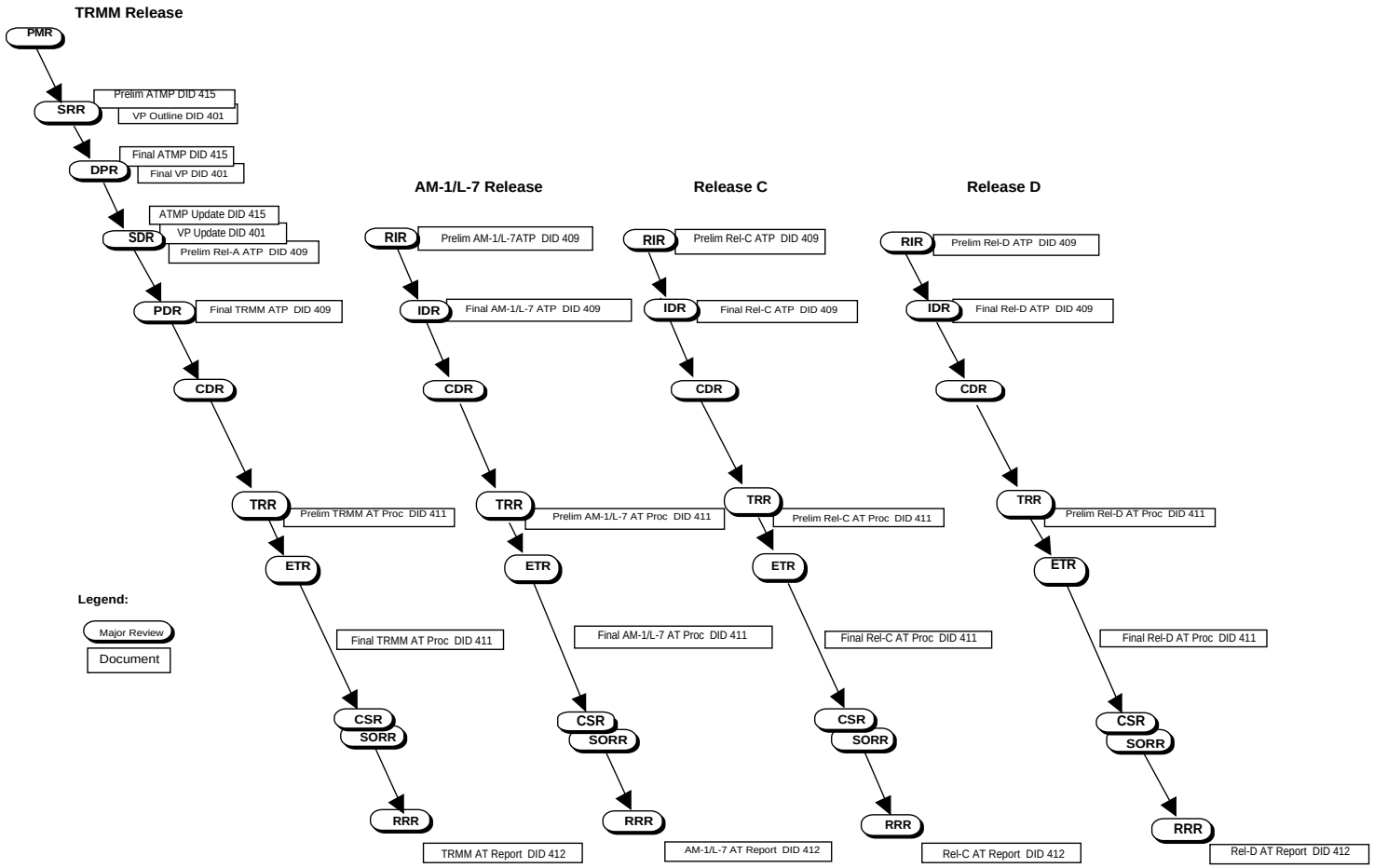

Figure 3-3. Acceptance Test Documentation Correlated Major Review Life Cycle

3.1.6 Acceptance Test Preparation

The acceptance test preparation is conducted at the ECS Development Facility (EDF). First, an inventory of all resources needed to perform acceptance tests is taken. Items to be inventoried include test input data, automated test tools, and technical documentation. Early in this phase, an attempt is made to execute critical acceptance test sequences and test cases to insure that any major problems are found at the EDF where they are most easily corrected. In the final phases of integration and testing prior to CSR, additional walk-throughs of the entire test procedure are conducted at the EDF to ensure proper format, contents, and completeness of the test scenario coverage. Discrepancies observed during the acceptance test preparation phase are formally filed as Non Conformance Reports (NCRs) and entered into the Non conformance Reporting and Corrective Action (NRCA) system.

The Configuration Management (CM) process tracks the product changes and versions that result from correcting NCRs. After all NCRs are successfully dispositioned and integration and test acceptance criteria have been met, the system integration and test team reports on the results of their test activity at a CSR. At the completion of a successful CSR, the release is declared ready for shipment to the operational sites for formal acceptance testing.

All acceptance test procedures are completed prior to CSR. After a successful CSR is completed, a Segment Operational Readiness Review (SORR) is conducted to determine each site's availability and readiness for acceptance testing activities. CM then packages all elements of the release for transfer to the site's CM library. These elements include the source code, object code, executable elements, load modules, documentation, hardware configuration, test data sets, and test tools.

The Configuration Management activities related to transferring software code is described in the ECS Configuration Management Plan (DID 102/MG1) and the Configuration Management Procedures (DID 103/MG3).

Once the release is successfully installed, regression tests are conducted to assure system stability. Next, a dry run of the procedures is conducted to identify any issues, which are tracked via the NCRA system. Once issues are resolved, the formal run of the procedures is conducted with the Customer witnessing the event.

As a precursor to beginning formal acceptance testing at the test sites, three final checks are performed: The first check consists of a survey of the operational sites where the release is to be tested. This pre-test site check is to provide confidence that each operational site is properly configured for formal acceptance testing. The next pre-test check consists of performing regression tests to ensure that existing operations at a site are not adversely affected by the installation of the new release. The final check consists of a walk-through of the entire set of acceptance test procedures to ensure site compatibility for the release. In the event that any discrepancies are observed during these three checks, the discrepancies are formally filed as NCRs in the NRCA system.

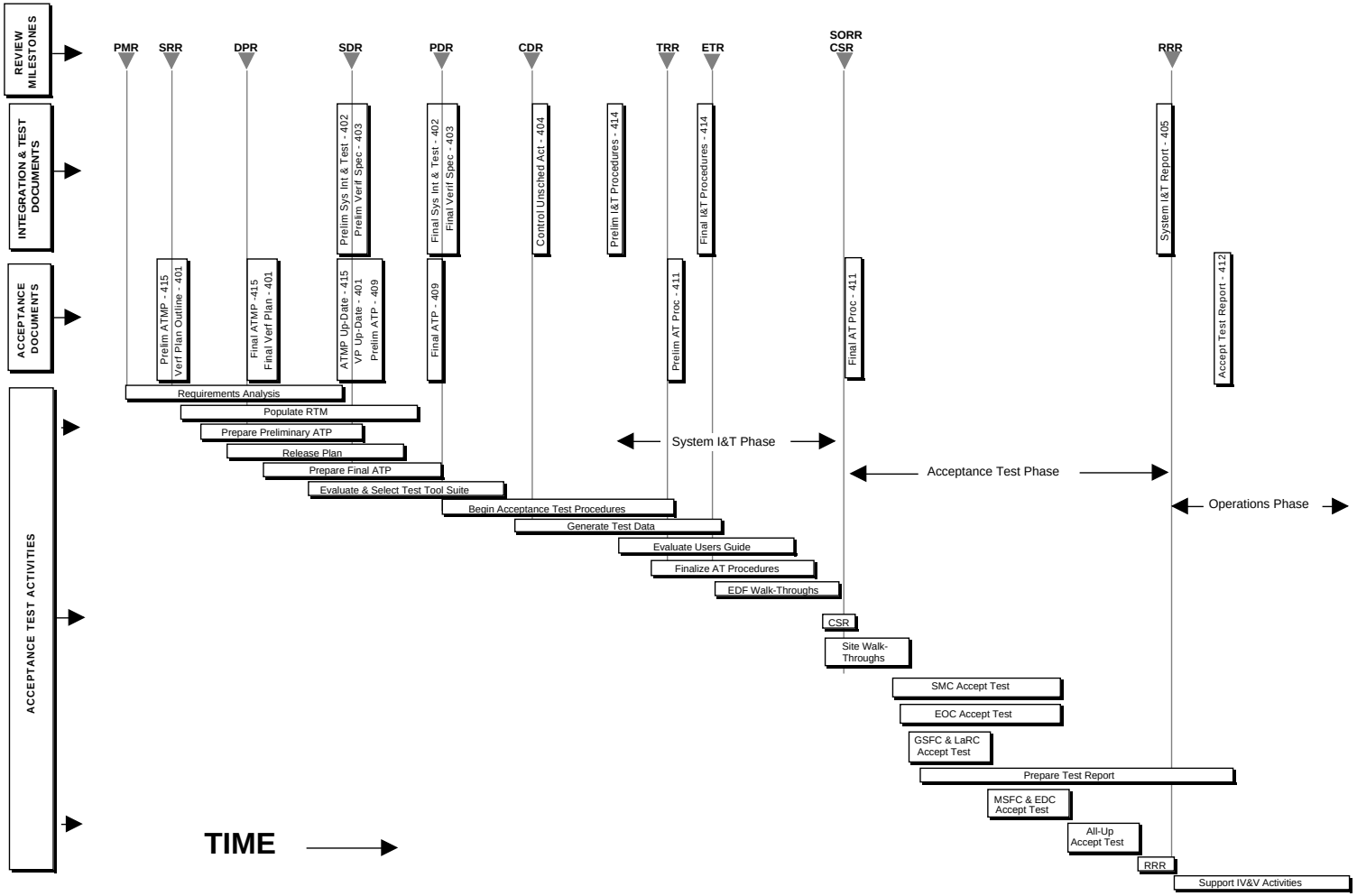

Figure 3-4. TRMM Release Acceptance Test Life Cycle

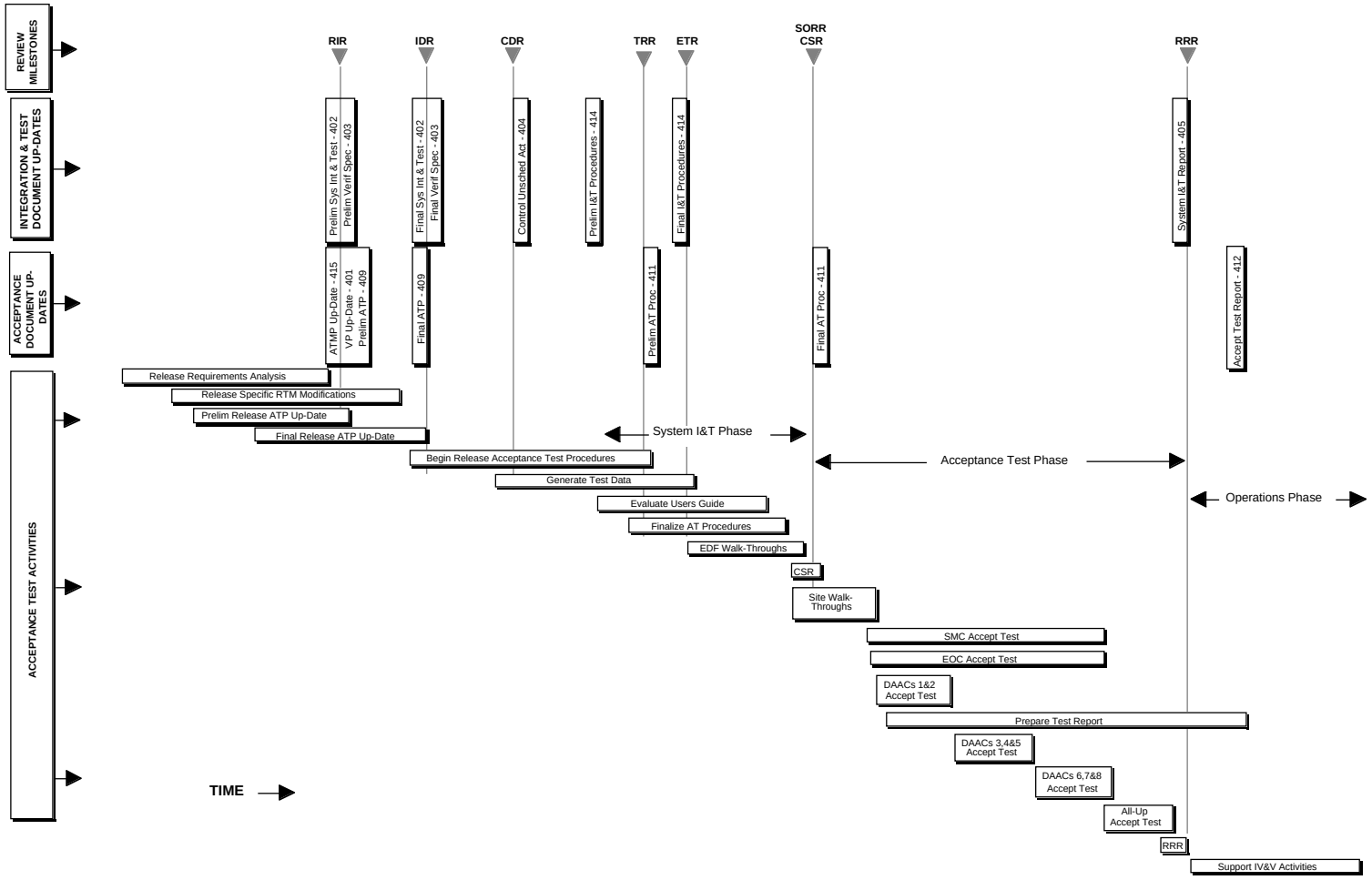

Figure 3-5. AM-1/L-7 Release Through Release-D Acceptance Test Life Cycle

When the final checks have been successfully executed the actual commencement of the formal acceptance test will be coordinated with the Site Manager by the Test Manager. A high level illustration of the acceptance test installation activities is shown in Figure 3-6, Acceptance Installation Process.

3.1.7 Test Execution

All acceptance tests are conducted under the direction of a Test Manager who has absolute authority regarding all aspects of the execution of the acceptance test. This authority includes the assignment of priority to NCRs, NCR disposition and their impact on ongoing testing. This authority is vested in him/her by the Project Manager, but may be delegated by the Test Manager to Test Conductors at specific times (off-shifts) and/or sites or during his absence. For further information concerning duties of other acceptance test participants, see the Verification Plan (DID 401/VE1).

Two phases of acceptance testing are executed at specified sites. These phases are: site-specific testing, where the focus is on each individual site; and "all up" testing, where all sites and elements are tested simultaneously as a system. In each case, the final scenario to be executed is an acceptance test demonstration, which exercises a comprehensive sequence of events verifying the overall site-specific and ECS-wide capabilities of the release. Formal acceptance testing is performed at the EOC; and the Distributed Active Archive Centers (DAACs) at Goddard Space Flight Center (GSFC), Langley Research Center (LaRC), Marshall Space Flight Center (MSFC), the Earth Resources Observation System (EROS) Data Center (EDC), the Oak Ridge National Laboratory (ORNL), the Jet Propulsion Laboratory (JPL), the National Snow and Ice Data Center (NSIDC), and the Alaska Synthetic Aperture Radar (SAR) Facility (ASF). The sites that are tested for a given release are defined by the test schedules associated with a given release in the ATP for that release. Details concerning the test environment and procedures to be followed at test sites involved in a release acceptance test are described in the ATPR document.

After all test preparation and site checks have been successfully executed, formal acceptance testing may begin. Testing for the new release commences in accordance with the site-specific approved procedures documented in the ATPR document in accordance with the schedule established with the Site Manager. These tests will be carried out on a day-to-day basis until the conclusion of the acceptance tests. A typical test day will be divided into four segments: test set up, test execution, test wrap-up and a post test review.

During the test set-up segment, the basic test environment is initialized and confirmed. All test data sets, test tools, and simulators are put in place, and the system and resources made ready for commencement of testing at the next sequence in the Acceptance Test Procedure.

Test execution begins with starting the first test case delineated in the next test sequence and continuing the process on a test case-by-test case basis in accordance with the test procedure. A detailed log will be kept of each test case executed and the results obtained. When there is a discrepancy between actual and expected test results, exhibits concerning the discrepancy will be captured and documented in an NCR. Barring the occurrence of any discrepancy that may dictate halting the test, the testing will continue until its scheduled completion.

Upon completion of testing, the system will be saved and secured for orderly resumption of tests on the following day.

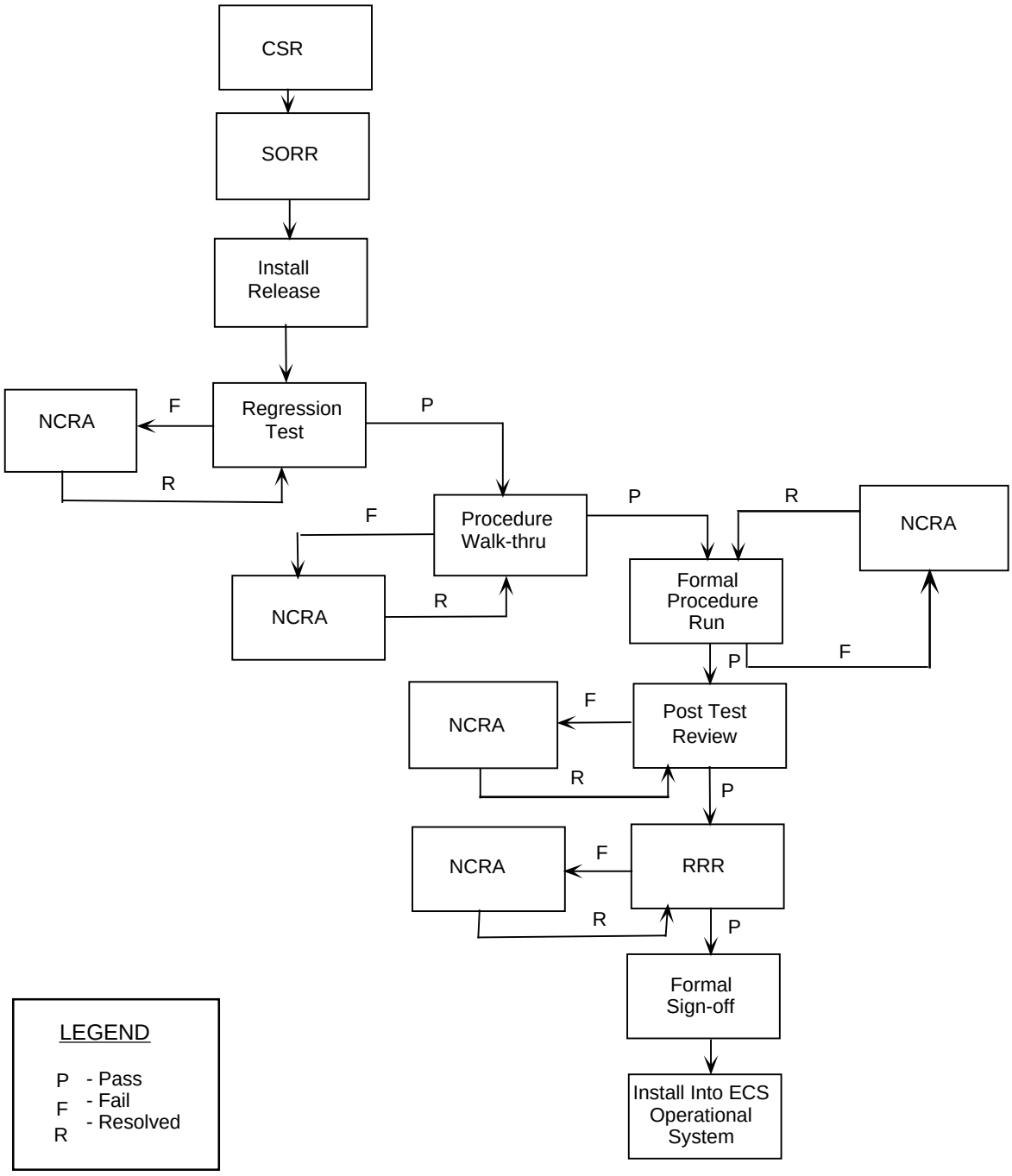

Figure 3-6. Acceptance Installation Process

At the completion of each day of testing, a post test review meeting will held to review the events of the day. If acceptance testing involves simultaneous activities at multiple sites, as indeed the all-up acceptance test, this post test review meeting will be held in a teleconference mode. During this meeting, overall testing status will be assessed. The status of previous NCRs filed will be reviewed and categorized. NCRs will be grouped into those open, fixed (but not tested), closed,

withdrawn, and elevated to Configuration Change Request (CCR) status. Problems encountered during the day will be reviewed, and actions for resolution determined. All NCRs recorded during the day will be analyzed, classified for severity and given a priority for corrective action. NCRs will be filed in the NRCA system for corrective action to be taken by the responsible developing segment. A daily log of statistics will be kept citing the number of test cases executed, number of NCRs filed, their classification and other test metrics for status reporting purposes.

If, during the daily post test review meeting, it is determined that an NCR documents an instance that impedes further testing, acceptance testing may be halted and at the discretion of the Test Manager, the test version will be returned to the responsible development organization.

As acceptance testing continues, the severity and number of unresolved NCRs will be monitored on a daily basis, and compared with the established acceptance test criteria. As circumstances dictate, it may be necessary to halt testing based on the number and severity of open NCRs and resume testing when they have been corrected and incorporated in a new test version. The new test version will be released by CM after it tracks the product changes and revisions that result from correcting non conformances and returns the revised version to the test site. The acceptance test conductor then retests the new version using the scenarios that uncovered the original discrepancy, to determine if the non conformance was corrected and that the system provides the expected test results. In addition, regression testing is conducted to make sure that the fix has not adversely affected other functions previously tested. The correction of NCRs that document an operator inconvenience and have no real impact on actual system operations may be deferred for correction in follow-on formal releases.

As the acceptance testing proceeds from site to site, discrepancies may be uncovered which were not observed during tests at previous sites. If the mitigation of these discrepancies requires the generation of a new release version, retesting of the new version at each site will be the first order of business during the all-up ECS acceptance test.

After all testing is complete, the IATO leads the Release Readiness Review (RRR) and reports on the results of the Release Acceptance Test. The results presented in the RRR will provide the basis by which the Government Acceptance Test Team (GATT) and the Contracting Officer's Technical Representative (COTR) will determine if the release is ready to be incorporated into the operational system. The ECS System Acceptance Test Report (DID 412/VE2) and the Acceptance Data Package (DID 535/PA1) are delivered to the GATT four weeks after RRR to provide detailed test results, their analysis and a summary of open items to be corrected in the next version.

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4. System Acceptance Test Criteria

Determination of the components of an acceptable release is a process that requires joint agreement between the contractor, the GATT and the COTR. This section presents the IATO's judgment of what criteria each ECS release must meet in order to be acceptable to the Government. The IATO believes that ECS must be held to a high standard in order to meet the diverse needs of the intended user community, while at the same time realizing that the timely delivery of the system is important. The criteria outlined in this section are intended to ensure that the Government gets a high quality product.

4.1 Requirements Verification

Level 3 Requirements verification through the use of operational scenarios, is the key element in the IATO's acceptance testing program. The Level 3 requirements are documented in the F&PRS and IRDs. For level 3 requirements, each ECS release must meet all requirements applicable to that release, plus it must be demonstrated (through regression testing) that requirements fulfilled during previous releases have not been invalidated by the addition of the new system release. Requirements will be validated through execution of the scenarios described in this ATP, and implemented in the ATPR.

The IATO will be involved in overseeing segment and system level tests and in reviewing and evaluating the results and thoroughness of these tests. The IATO will confirm that all level 4 requirements have been tested and results documented by the segment level testing. Particular attention will be paid to verification that the mission specific Flight Operations level 4 requirements have been fully tested. The process of confirmation will involve selective review of test plans, test results and test script documentation.

Documentation related to operation of the system (i.e., Users Manuals, Operators Manuals, etc.) will be a part of acceptance testing. All documents will be analyzed to determine that they are complete, accurate and detailed. Any document deficiencies will be noted for correction. However, document errors, in that they do not cause any serious threat to the operation of the system, will not in and of themselves be a basis for rejection of the release.

4.2 Special Case Acceptance Testing

This section discusses the approach to perform acceptance testing to verify two special types of requirements - those involving system faults or error handling conditions and those involving 'expandability' and 'evolutionary' type requirements. Sections 4.2.1 and 4.2.2 discuss each of these cases, respectively.

4.2.1 Verifying and Accepting Error Handling Type Requirements

System acceptance testing will verify all functionality and error handling conditions in cases where there are site specific modifications to software and hardware. These site specific tests will be documented in the ATPR for the applicable site.

System level acceptance testing will not verify that all possible fault conditions, error conditions, or incorrect system inputs are properly handled by the system. System acceptance testing will review, evaluate and build upon lower level element, segment and system level testing of these special cases, and assure that there are no changes in environment which would result in different system handling of such conditions.

As examples, consider two types of requirements to be verified: 1) a user request for access to stored data; and 2) a system detection of a hardware fault, subsequent system fault handling and automated system failover to a replacement capability.

In the first case, system acceptance testing need not verify and re-test the wide variety of user log in errors or to verify that they are screened and properly rejected by the system. Evaluation of lower level tests, in conjunction with analysis of similarity of the environment and stability of the software code, should prove adequate for acceptance. Likewise, repeats of multiple erroneous data request operations is not feasible. System acceptance test personnel check that such comprehensive testing has been performed during lower level tests and they analyze whether any possible changes in environment resulting from testing with real equipment and interfaces, e.g., at an actual DAAC, will affect the test outcome or result. In cases where different environmental factors or test conditions may affect the results, or new software has been integrated into the item under test, then re-testing will be required at the system acceptance test level.

In the second case, detection of a hardware fault will likely be simulated in early tests, probably at the EDF, due to the unavailability of actual equipment. Here, acceptance test personnel will need to evaluate the adequacy of the hardware fault emulation, the comparability of the system error signal detection, and the types of software processing performed during lower level tests. Some special case hardware fault situations may need to be generated to confirm fault detection and fault handling capabilities, but an extensive re-test of fault detection and fault handling capabilities cannot be feasibly re-tested at the system acceptance level.

System acceptance test criteria for these situations may not be relevant for most cases since the verification of the requirement(s) will be based primarily on analysis and a preset 'number' will not be meaningful. In cases where testing is required, the criteria for this type of requirement is not especially different from many others. This is also the case for 'evolutionary' type of requirements, as discussed in the next subsection.

4.2.2 Verifying System Growth Requirements

A number of ECS requirements state that the system must accommodate new technologies, be capable of expansion and be upgradeable. In most cases these types of requirements will be verified by analysis, e.g., by showing that the system, segment, element, etc. can accommodate the growth anticipated, evolve gracefully as technology or standards mature, and be capable of expansion without disruption to existing capabilities or design. In some cases, simulation or results using prototypes may be needed to ensure that the requirement is satisfied.

The acceptance criterion in this case is normally a binary situation, e.g., yes or no. Alternatively, by analysis, the test personnel determines the feasible growth or capacity limit and compares it to the required. In cases where it is not feasible to project the system's performance or accommodation capability, evaluation of comparable existing systems are adequate, or in some

cases, the requirement may just not be verifiable at the time of the test. In this latter case, a process and time frame by which the requirement can be verified is established by the Acceptance Test Team.

4.3 Determination of Acceptability

Final determination of the acceptability of a release is made by the COTR, based on the recommendation of the GATT. The IATO participates in the RRR which takes place after testing at all DAACs has been completed. At the RRR, the IATO presents the results of the testing.

After the results of the acceptance test effort are analyzed and NCRs have been prepared, each ECS release shall be evaluated against acceptance criteria to provide the GATT with a recommendation on the acceptability of the release. Release acceptance will be based on the systems ability to operate properly in the operational environment. NCR's will provide a measure of the number and severity of discrepancies in the system. Four levels of discrepancies will be used, as shown in Table 4-1.

Table 4-1. Discrepancy Classification and Priority

Classification	Description
Level 1	Critical. A discrepancy which prevents the accomplishment of an of operational or mission critical capability specified requirement.
Level 2	Urgent. A discrepancy which adversely effects the accomplishment of an opera-tional or mission essential capability specified requirements so as to degrade performance and for which an alternative work-around solution is known.
Level 3	Routine. A discrepancy which is an operator inconvenience and does not effect a required operation.
Level 4	Documentation. A discrepancy which is identified in documentation which is required for clarity or effects operational or mission essential capability specified requirements.

Recognizing that a zero defect system is unrealistic, the IATO proposes to use a system employed on previous GSFC projects: That the release will not be accepted until all Level 1 (Critical) discrepancies have been corrected. Discrepancies classified as Urgent or Routine will be reviewed at the RRR to determine if they are serious enough to prevent acceptance of the release. The focus of this review will be on Urgent and Routine discrepancies that are in functionally related areas, and which taken together might prevent the accomplishment of a mission critical capability. Table 4-2 summarizes this preliminary set of acceptance criteria. It is expected that these will be modified in conjunction with the GATT and the COTR.

Table 4-2. Acceptance Criteria

Classification	Number of allowable Discrepancies
Level 1 (Critical)	None.
Level 2 (Urgent)	Urgent discrepancies will be reviewed at the RRR to determine if they are serious enough to prevent acceptance of the release.
Level 3 (Routine)	Routine discrepancies will be reviewed at the RRR when they are related to other discrepancies which are classified as Urgent.
Level 4 (Documentation)	Not Applicable to Release Acceptance.

5. Test Responsibilities

Acceptance testing is a formal process that requires well defined roles and responsibilities for each of the participating organizations. This section provides a outline of these roles and responsibilities. They will be defined (through coordination with the Government Acceptance Test Team and the ECS Quality Office) in greater detail during the development of the ATPR.

Independent Acceptance Test Organization (IATO): The IATO will assign a test manager to coordinate and run acceptance testing. The IATO will also provide test conductors to execute the step by step procedures that are defined in the ATPR. Test conductors will also write, collect, and track non conformance reports and determine the impact of these reports on test plans, scenarios, test cases, and procedures.

Quality Office (QO): The QO will provide a representative to witness the execution of acceptance testing. The QO will also track the status of non conformance reports and review them prior to closure to ensure that all required actions have been completed.

Configuration and Data Management Organization: The Configuration Management office (CMO) coordinates with the IATO to capture the test configuration of software, hardware, test data, test tools, and documentation prior to test execution to ensure repeatability. They will also capture and retain test outputs, (e.g., test logs, data, and modified procedures), and distribute copies for test analysis. The product baseline, which is established prior to the RRR and includes test reports, is maintained by the CMO.

Government Acceptance Test Team (GATT): The GATT is responsible for independently assessing the acceptability of each ECS release. In doing so, the GATT will be present, as desired, to witness acceptance testing performed by the IATO. All IATO documents are reviewed by the GATT, to ensure that the IATO develops thorough acceptance test plans, procedures, and reports.

Maintenance & Operations (M&O) Organization: As part of acceptance testing at the test site, the site manager will assign M&O personnel who will be integrated into the test team to help execute acceptance tests. The early first-hand involvement of the site manager and his operations personnel in site acceptance testing provides the M&O Team with early visibility into each new release and hastens a smooth transition. This involvement and familiarity with ECS software in the stages before release to the user base greatly enhance the effectiveness and productivity of the M&O staff and positions a highly competent and responsive user support staff on-site at the DAACs. In addition, during the M&O phase, the IATO assists by providing benchmark tests to verify operational performance of the ECS system. The IATO provides acceptance testing procedures for use during the verification of approved changes and enhancements.

ESDIS Contractor: The ESDIS Integration Contractor and the Independent Verification and Validation (IV&V) Contractor witness and monitors acceptance testing, as directed by the ESDIS Integration and Operation Offices and the GATT.

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6. Resource Requirements

This section defines the resources required by the IATO, in order to conduct acceptance testing for each Release.

6.1 Test Tools

Automated test planning, management, and testing tools are software packages and/or databases which will assist in the development and tracking of test cases, test data, mapping of requirements to tests scenarios, executing test procedures, and tracking test results. The following sections describe each of these types of tools.

6.1.1 Requirements Traceability & Management

The mapping of ECS requirements to test scenarios is done using the RTM tool. This tool has already been selected and is in use by the project. One of the outputs of this tool is contained in the Verification Specification (DID 403/VE1).

6.1.2 Automated Testing Tools

Automated Testing Tools are tools which will automate the execution of test procedures/scenarios. Included in this definition are Graphic User Interface (GUI) Capture/Playback and Remote Terminal Emulators (these tools, referred to as Computer Aided Software Test (CAST) tools, are used to emulate live users), data generators (for generating simulated input data), and programmable test languages.

The ECS contractor has conducted an evaluation of COTS CAST tools and has procured (with Government approval) Mercury Interactive's XRunner and LoadRunner tools. XRunner is capable of replaying user sessions for regression testing. The LoadRunner tool is specifically designed to emulate multiple simultaneous user sessions and will be used to emulate the maximum numbers of users that ECS is required to support concurrently (for performance testing). Furthermore, the scripts developed with XRunner are compatible with and can be reused by the LoadRunner tool. The XRunner and LoadRunner tools are currently installed in the EDF.

For data generators, simulated data sets from each of the instruments will be produced. For the TRMM Release this includes simulated Tropical Rainfall Measurement Mission (TRMM), Cloud and Earth's Radiant Energy System (CERES), and Lightning Imaging Scanner (LIS).

6.1.3 External Interface Simulators

External interfaces are interfaces to systems outside of the scope of the ECS contract (i.e., not being developed by the ECS contractor). The interfaces may be to systems already in existence, systems that are being built as a part of the overall Earth Science Data and Information System (ESDIS) project, or systems being built by other Government agencies or other countries. Simulators for external interfaces are computer programs which transmit data in the identical format as the real system. Simulators may be very simple (i.e., send a canned message) or complex

(i.e., dynamic message generation/response). For ECS it is assumed that all simulated interfaces will be developed by the ECS project (with the exception of the Code 421 Ground Spacecraft (S/C) simulator and the EOSDIS Test System (ETS)).

The scenarios described in Sections 8 through 12 often identify external interfaces by their real world names, e.g., EDOS, even though simulators, e.g., the ETS, might be utilized when verifying the interfaces. By using real-world names for interfaces and minimizing references to simulators during initial scenario development, the scenario descriptions are simplified and easier to understand. Furthermore, the means of emulating external interfaces is often not known in the early stages of developing scenarios. As more information on simulators for acceptance testing becomes known, the acceptance test procedures will identify specific simulators where appropriate.

6.1.4 Integration of Tools in the EDF Test Bed

Figure 6-1 shows the test tools used to exercise the system under test. For each release, the appropriate external interface simulators (EOS Data and Operations System (EDOS), Affiliated Data Centers (ADC)/Other Data Centers (ODC), Internet Protocol (IP)) are developed. Data generators (or simulated data) will be used to test ingest, archive and distribute data, especially for the TRMM Release.

Data reduction and analysis tools are utilities designed to analyze test output data, including utilities to compare test output to benchmark data. File compare utilities will be used to compare expected to actual test results. A data reduction utility will be used to reduce large amounts of output data (such as output data from the Data Processing Subsystem) to some meaningful evaluation of the data's quality.

6.1.5 Use of Test Tools During Acceptance Testing

The IATO will use data generators, HP Openview, CAST tools and interface simulators during acceptance testing. Access to tools not located at a DAAC may be accomplished through use of ECS networks. Details on specific usage of tools during acceptance testing will be provided in the ATPR.

6.1.6 Use of Standard Test Data During Acceptance Testing

Since the TRMM satellite is not launched prior to this Release, the system is populated with a subset of the Version 0 datasets and small amounts of simulated data for TRMM instruments for use during the acceptance test.

The Version 0 data migration to ECS is planned to occur during the acceptance test for the TRMM Release. This provides an opportunity to run queries against datasets known to be in the ECS and Version 0 archives.

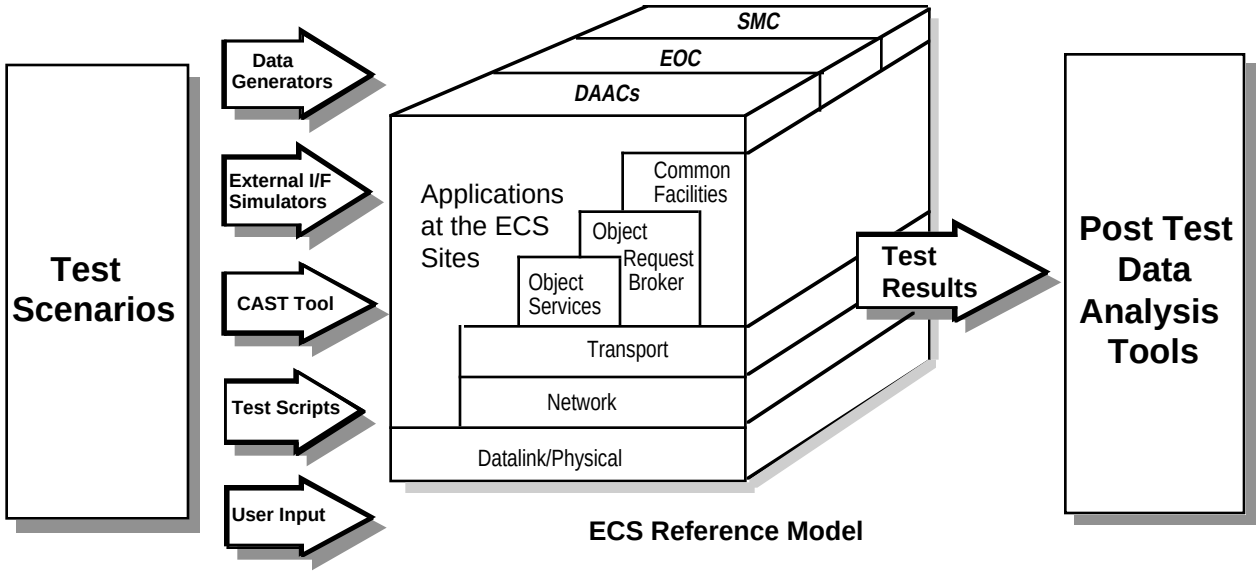

Figure 6-1. Test Tool Integration

6.2 Hardware and Software Environment

Acceptance testing of the ECS releases will exist at the following operational sites:

System Monitoring and Coordination Center (SMC), GSFC

The EOC Operations Center, GSFC

The eight Distributed Active Archive Centers (DAAC):

Alaska SAR Facility (ASF), Fairbanks, AL

EROS Data Center (EDC), Sioux Fall, SD

Goddard Space Flight Center (GSFC), Greenbelt, MD

Jet Propulsion Laboratory (JPL), Pasadena, CA

Langley Research Center (LaRC), Hampton, VA

Marshall Space Flight Center (MSFC), Huntsville, AL

National Snow and Ice Data Center (NSIDC), Boulder, CO

Oak Ridge National Laboratory (ORNL), Oak Ridge, TN

The hardware/software configurations are DAAC specific. The hardware configuration will be detailed in the ATPR.

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7. TRMM Release Acceptance Test Overview

7.1 TRMM Release Capabilities

The Earth Observing System (EOS) Data Information System (EOSDIS) Core System (ECS) capabilities are developed in terms of four formal releases. The first of the four formal releases will include capabilities necessary to fully support the scheduled launch and ongoing operations for Tropical Rainfall Measurement Mission (TRMM), interface testing for Landsat-7, and command and control interface testing for AM-1. This first release, called the TRMM Release, will support data operations that follow at the EOS Operations Center (EOC), System Management Center (SMC) and four Distributed Active Archive Centers (DAACs) for TRMM. The DAACs that will be activated for the TRMM Release are located at Goddard Space Flight Center (GSFC), Marshall Space Flight Center (MSFC), Langley Research Center (LaRC), and the EROS Data Center (EDC).

Additionally, it is currently planned that the TRMM Release will be installed at the remaining four ECS DAACs by May 1997 to provide those sites with ECS operations experience prior to the fielding of the follow-on release - the AM-1/Landsat-7 (AM-1/L-7) Release. The AM-1/L-7 Release will be acceptance tested using the full complement of eight DAACs. The National Snow and Ice Data Center (NSIDC), Jet Propulsion Laboratory (JPL), Oak Ridge National Laboratory (ORNL), and the Alaska Synthetic Aperture Radar (SAR) Facility (ASF) will first undergo acceptance testing during the fielding of the AM-1/L-7 Release. The Consortium for International Earth Science Information Network (CIESIN), NSIDC, JPL, ORNL and ASF will not participate in the acceptance testing of the TRMM Release.

7.2 TRMM Release Acceptance Test Approach

Acceptance testing will verify system compliance to Level-3 requirements by focusing on the objectives and capabilities specified for the TRMM Release. These capabilities are tested for functionality and performance within the boundaries of the interfaces defined for the release. The external boundary of ECS is typically at communications, data medium or graphic interfaces. For communications, these interfaces act as conduits through which input (Level-0) and output data (Level-1, Level-2, etc.), and stimuli (commands, requests, etc.) and responses (acknowledgments, data, etc.) flow. The communications interfaces to be verified in the TRMM Release include National Aeronautics and Space Administration (NASA) Science Internet (NSI), NASA Communications (NASCOM) Operational Local Area Network (NOLAN), and EOS Communications (Ecom) where they terminate at the applicable ECS sites. At the ECS, these interfaces are physically located at the SMC and EOC; and the ECS GSFC, MSFC, LaRC and EDC DAAC sites. The communications networks that are connected to the ECS terminate at two classes of external systems: data providers (whose data are later referred to as push data) and data users (whose requests result in what later are referred to as pull data). The data providers for the TRMM Release are the Sensor Data Processing Facility (SDPF), ECS Data and Operation System (EDOS), Flight Dynamics Facility (FDF), Network Communications Center (NCC), the Landsat

Processing System (LPS), and the TRMM Science Data and Information System (TSDIS). The data users for the TRMM Release are the science user community at the four DAACs, the SCFs and the NOAA ADC Figure 7-1 depicts the interconnection of external systems with ECS.

Acceptance testing of interfaces for the TRMM Release will verify the capability of the ECS to communicate and transfer data over all external interfaces in accordance with the F&PRS for the ECS. Simulators will be used for verifying external interfaces except in those cases where the system on the other side of the interface is mature and available to support the acceptance test when needed. Data content flowing across TRMM Release interfaces include real time and routine TRMM, and AM-1 Level-0 data from SDPF and EDOS; ancillary data from FDF; schedule data to/from NCC, SDPF, and EDOS; Level-0 through Level-4 TRMM data from TSDIS; Landsat-7 Level-0, metadata and browse data from the Landsat LPS; and selected Level-0 through Level-4 to the SCFs and the NOAA ADC. A summary of the content and carriers associated with the data flowing across ECS interfaces is shown in Table 7-1. A more complete account of each interface may be found in Interface Requirements Documents 219/SE1-001 through 020.

Acceptance testing of the system within the boundaries of the ECS TRMM Release will verify the capability of the ECS to provide TRMM and AM-1 pre-launch ground system end-to-end test support, and Landsat-7 interface testing support. The TRMM Release will also verify that requirements are met to provide Version-0 inter-operability.

Acceptance testing will also verify that the complete set of ECS functions allocated to The TRMM Release meets those requirements needed to support TRMM and AM-1 mission operations. This will include verifying that the requirements for all features needed to support the ECS TRMM Release objectives for spacecraft operations and control, scheduling, data operations, information management and archive, science processing, networks, and system management are met.

Acceptance testing will include the verification of certain ECS features needed to support TRMM. These features are: the ingest and archive processing of Level-1 through Level-3 of Precipitation Radar (PR), TRMM Microwave Imager (TMI), and Visible Infrared Scanner (VIRS) instrument data; and TRMM Ground Verification (GV) data transmitted from the TSDIS, which is a production system provided by the TRMM project. ECS will provide for storage of TRMM data. PR and TMI data will be archived at the MSFC DAAC and VIRS at the GSFC DAAC. Additionally, ECS will provide the production facilities for Level 1 and higher level processing for two other instruments of opportunity on TRMM, Clouds and Earth's Radiant Energy System (CERES) and Lightening Imaging Scanner (LIS), at the LaRC and MSFC DAACs respectively. ECS will provide the data archive for these data as well. The ECS GSFC DAAC will provide the TSDIS with National Meteorological Center (NMC) Ancillary/Correlative data, and VIRS Level 1A through Level-3 data products for reprocessing. The ECS MSFC DAAC will provide TSDIS with Special Sensor for Microwave/Imaging (SSM/I) Ancillary/Correlative data, and PR and TMI Level-1A through Level-3 data products for reprocessing. ECS also will provide data search, order and distribution services to science users for data stored in the archives from all five instruments.

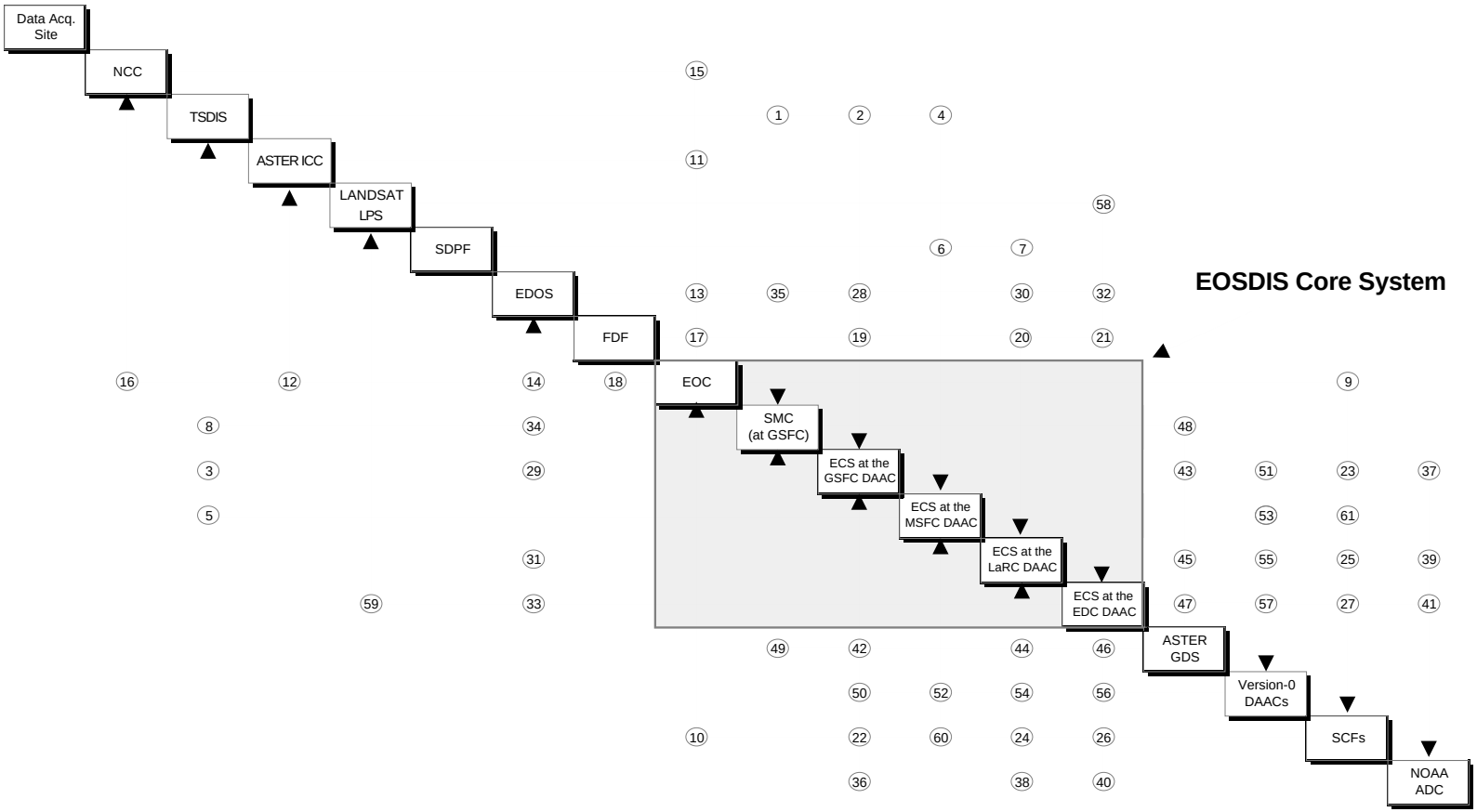

Figure 7-1. ECS TRMM Release Interfaces with the EOS Ground System.

note: "O" denotes interface nodes whose characteristics are discribed in Table 7-1.

Table 7-1. ECS TRMM Release Interfaces (1 of 2)

Node	Mission	Source	Destinition	Carrier/Media	Data Content	Source Document
1	TRMM	TSDIS	SMC at GSFC	EMail/Phone	Schedule Coordination & Adjudication for Data Exchange with DAACs; and Status Information	209-CD-007-001 ICD Between ECS and TSDIS 1/95 Section 4
2	TRMM	TSDIS	ECS at the GSFC DAAC	Exchange LAN	VIRS Level-1A through Level-3 Data Products; Request For Ancillary/Correlative Data; and TRMM Product Delivery Schedules.	222-TP-003-005 Release Plan Content Description 12/94 Section 5
3	TRMM	ECS at the GSFC DAAC	TSDIS	Exchange LAN	VIRS Level-1A through Level-3 Data Products for Reprocessing; and NMC Ancillary/Correlative Data.	222-TP-003-005 Release Plan Content Description 12/94 Section 5
4	TRMM	TSDIS	ECS at the MSFC DAAC	ESN	PR and TMI Level-1A through Level-3 Data Products; GV Data; Request For Ancillary/Correlative Data; and TRMM Product Delivery Schedules.	222-TP-003-005 Release Plan Content Description 12/94 Section 5 and 209-CD-007-001 ICD Between ECS and TSDIS 1/95 Section 4
5	TRMM	ECS at the MSFC DAAC	TSDIS	ESN	PR & TMI Level-1A through Level-3 Data Products for Reprocessing; and SSM/I Ancillary/Correlative Data.	222-TP-003-005 Release Plan Content Description 12/94 Section 5 and 209-CD-007-001 ICD Between ECS and TSDIS 1/95 Section 4
6	TRMM	SDPF	ECS at the MSFC DAAC	NOLAN	LIS Level-0, Housekeeping, Quicklook and Definitive Orbit Data.	222-TP-003-005 Release Plan Content Description 12/94 Section 5
7	TRMM	SDPF	ECS at the LaRC DAAC	NOLAN	CERES Level-0, Housekeeping, Quicklook and Definitive Orbit Data.	222-TP-003-005 Release Plan Content Description 12/94 Section 5
8	TRMM	SMC at GSFC	TSDIS	EMail/Phone	Schedule Coordination & Adjudication for Data Exchange with DAACs; and Status Information	209-CD-007-001 ICD Between ECS and TSDIS 1/95 Section 4
9	AM-1	EOC	SCF	NSI	IST Toolkit Delivery; and Instrument Software Dumps.	222-TP-003-005 Release Plan Content Description 12/94 Section 5
10	AM-1	SCF	EOC	NSI	Instrument software loads.	222-TP-003-005 Release Plan Content Description 12/94 Section 5
11	AM-1	Aster ICC	EOC	NSI	Planning; Scheduling ; Instrument Commanding; Coordination; and Status.	222-TP-003-005 Release Plan Content Description 12/94 Section 5
12	AM-1	EOC	Aster ICC	NSI	Planning; Scheduling; Status; and Coordinaton.	222-TP-003-005 Release Plan Content Description 12/94 Section 5
13	AM-1	EDOS	EOC	Ecom	Real-Time Telemetry; Quick Look, Status; and Accounting.	222-TP-003-005 Release Plan Content Description 12/94 Section 5
14	AM-1	EOC	EDOS	Ecom	Command; Coordination; and Status.	222-TP-003-005 Release Plan Content Description 12/94 Section 5
15	AM-1	NCC	EOC	NOLAN	TDRSS Schedule; and Real-Time Coordination.	222-TP-003-005 Release Plan Content Description 12/94 Section 5
16	AM-1	EOC	NCC	NOLAN	TDRSS Schedule Requests; and Real-Time Coordination.	222-TP-003-005 Release Plan Content Description 12/94 Section 5
17	AM-1	FDF	EOC	NOLAN	Orbit; and Attitude Information.	222-TP-003-005 Release Plan Content Description 12/94 Section 5
18	AM-1	EOC	FDF	NOLAN	Orbit; and Attitude Observation.	222-TP-003-005 Release Plan Content Description 12/94 Section 5
19	AM-1	FDF	ECS at the GSFC DAAC	NOLAN	Repaired & Refined Orbit and Attitude Information.	222-TP-003-005 Release Plan Content Description 12/94 Section 5
20	AM-1	FDF	ECS at the LaRC DAAC	NOLAN	Repaired & Refined Orbit and Attitude Information.	222-TP-003-005 Release Plan Content Description 12/94 Section 5
21	AM-1	FDF	ECS at the EDC DAAC	NOLAN	Repaired & Refined Orbit and Attitude Information.	222-TP-003-005 Release Plan Content Description 12/94 Section 5
22	AM-1	SCFs	ECS at the GSFC DAAC	NSI	Algorithms.	222-TP-003-005 Release Plan Content Description 12/94 Section 5
23	AM-1	ECS at the GSFC DAAC	SCFs	NSI	Algorithm Insertion Coordination.	222-TP-003-005 Release Plan Content Description 12/94 Section 5
24	AM-1	SCFs	ECS at the LaRC DAAC	NSI	Algorithms.	222-TP-003-005 Release Plan Content Description 12/94 Section 5
25	AM-1	ECS at the LaRC DAAC	SCFs	NSI	Algorithms Insertion Coordination.	222-TP-003-005 Release Plan Content Description 12/94 Section 5
26	AM-1	SCFs	ECS at the EDC DAAC	NSI	Algorithms.	222-TP-003-005 Release Plan Content Description 12/94 Section 5
27	AM-1	ECS at the EDC DAAC	SCFs	NSI	Algorithms Insertion Coordination	222-TP-003-005 Release Plan Content Description 12/94 Section 5
28	AM-1	EDOS	ECS at the GSFC DAAC	Ecom	Level-0;Quick Look, Status; and Coordination Data.	222-TP-003-005 Release Plan Content Description 12/94 Section 5
29	AM-1	ECS at the GSFC DAAC	EDOS	Ecom	Status; and Coordination Data.	222-TP-003-005 Release Plan Content Description 12/94 Section 5
30	AM-1	EDOS	ECS at the LaRC DAAC	Ecom	Level-0;Quick Look, Status; and Coordination Data.	222-TP-003-005 Release Plan Content Description 12/94 Section 5
31	AM-1	ECS at the LaRC DAAC	EDOS	Ecom	Status; and Coordination Data.	222-TP-003-005 Release Plan Content Description 12/94 Section 5
32	AM-1	EDOS	ECS at the EDC DAAC	Ecom	Level-0;Quick Look, Status; and Coordination Data.	222-TP-003-005 Release Plan Content Description 12/94 Section 5
33	AM-1	ECS at the EDC DAAC	EDOS	Ecom	Status; and Coordination Data.	222-TP-003-005 Release Plan Content Description 12/94 Section 5

Table 7-1. ECS TRMM Release Interfaces (2 of 2)

Node	Mission	Source	Destinition	Carrier/Media	Data Content	Source Document
34	AM-1	SMC at GSFC	EDOS	Ecom	Status; and Coordination Data.	222-TP-003-005 Release Plan Content Description 12/94 Section 5
35	AM-1	EDOS	SMC at GSFC	Ecom	Status; and Coordination Data.	222-TP-003-005 Release Plan Content Description 12/94 Section 5
36	AM-1	NOAA ADC	ECS at the GSFC DAAC	Landsat Network	Ancillary and Correlative Data.	209-CD-006-001 IRD Between ECS and NOAA ADC 1/95 Section 4
37	AM-1	ECS at the GSFC DAAC	NOAA ADC	Landsat Network	Coordination of Data Transfer.	209-CD-006-001 IRD Between ECS and NOAA ADC 1/95 Section 4
38	AM-1	NOAA ADC	ECS at the LaRC DAAC	Landsat Network	Ancillary and Correlative Data.	209-CD-006-001 IRD Between ECS and NOAA ADC 1/95 Section 4
39	AM-1	ECS at the LaRC DAAC	NOAA ADC	Landsat Network	Coordination of Data Transfer.	209-CD-006-001 IRD Between ECS and NOAA ADC 1/95 Section 4
40	AM-1	NOAA ADC	ECS at the EDC DAAC	Landsat Network	Ancillary and Correlative Data.	209-CD-006-001 IRD Between ECS and NOAA ADC 1/95 Section 4
41	AM-1	ECS at the EDC DAAC	NOAA ADC	Landsat Network	Coordination of Data Transfer.	209-CD-006-001 IRD Between ECS and NOAA ADC 1/95 Section 4
42	AM-1	Aster GDS	ECS at the GSFC DAAC	NSI	Algorithms;DAR Dialog; Level-1A&1B Data; Quick Look Products; Product Status; and User Data Search&Order Dialog.	194-219-SE1-002 IRD Between ECS & MITI ASTER GDS 10/94 Section 4
43	AM-1	ECS at the GSFC DAAC	Aster GDS	NSI	Algorithm Insertion Coordination; DAR Dialog; Ancillary & Coorelative Data; Product Request & Status; and User DataSearch & Order Dialog.	194-219-SE1-002 IRD Between ECS & MITI ASTER GDS 10/94 Section 4
44	AM-1	Aster GDS	ECS at the LaRC DAAC	NSI	Algorithms;DAR Dialog; Level-1A&1B Data; Quick Look Products; Product Status; and User Data Search&Order Dialog.	194-219-SE1-002 IRD Between ECS & MITI ASTER GDS 10/94 Section 4
45	AM-1	ECS at the LaRC DAAC	Aster GDS	NSI	Algorithm Insertion Coordination; DAR Dialog; Ancillary & Correlative Data; Product Request & Status; and User DataSearch & Order Dialog.	194-219-SE1-002 IRD Between ECS & MITI ASTER GDS 10/94 Section 4
46	AM-1	Aster GDS	ECS at the EDC DAAC	NSI	Algorithms;DAR Dialog; Level-1A&1B Data; Quick Look Products; Product Status; and User Data Search&Order Dialog.	194-219-SE1-002 IRD Between ECS & MITI ASTER GDS 10/94 Section 4
47	AM-1	ECS at the EDC DAAC	Aster GDS	NSI	Algorithm Insertion Coordination; DAR Dialog; Ancillary & Correlative Data; Product Request & Status; and User DataSearch & Order Dialog.	194-219-SE1-002 IRD Between ECS & MITI ASTER GDS 10/94 Section 4
48	AM-1	SMC at GSFC	Aster GDS	NSI	Schedule; and Status Information.	194-219-SE1-002 IRD Between ECS & MITI ASTER GDS 10/94 Section 4
49	AM-1	Aster GDS	SMC at GSFC	NSI	Schedule; and Status Information.	194-219-SE1-002 IRD Between ECS & MITI ASTER GDS 10/94 Section 4
50	All Missions	Version-0 DAACs	ECS at the GSFC DAAC	ESN	Inter DAAC and Cross DAAC Communications; Inter-Operability; and Data Transfer.	194-219-SE1-004 IRD Between ECS and Version 0 11/94 Section 4 and 209-CD-011-001 ICD Between ECS and Version 0 1/95 Section 4
51	All Missions	ECS at the GSFC DAAC	Version-0 DAACs	ESN	Inter DAAC and Cross DAAC Communications; Inter-Operability; and Data Transfer.	194-219-SE1-004 IRD Between ECS and Version 0 11/94 Section 4 and 209-CD-011-001 ICD Between ECS and Version 0 1/95 Section 4
52	All Missions	Version-0 DAACs	ECS at the MSFC DAAC	ESN	Inter DAAC and Cross DAAC Communications; Inter-Operability; and Data Transfer.	194-219-SE1-004 IRD Between ECS and Version 0 11/94 Section 4 and 209-CD-011-001 ICD Between ECS and Version 0 1/95 Section 4
53	All Missions	ECS at the MSFC DAAC	Version-0 DAACs	ESN	Inter DAAC and Cross DAAC Communications; Inter-Operability; and Data Transfer.	194-219-SE1-004 IRD Between ECS and Version 0 11/94 Section 4 and 209-CD-011-001 ICD Between ECS and Version 0 1/95 Section 4
54	All Missions	Version-0 DAACs	ECS at the LaRC DAAC	ESN	Inter DAAC and Cross DAAC Communications; Inter-Operability; and Data Transfer.	194-219-SE1-004 IRD Between ECS and Version 0 11/94 Section 4 and 209-CD-011-001 ICD Between ECS and Version 0 1/95 Section 4
55	All Missions	ECS at the LaRC DAAC	Version-0 DAAC	ESN	Inter DAAC and Cross DAAC Communications; Inter-Operability; and Data Transfer.	194-219-SE1-004 IRD Between ECS and Version 0 11/94 Section 4 and 209-CD-011-001 ICD Between ECS and Version 0 1/95 Section 4
56	All Missions	Version-0 DAACs	ECS at the EDC DAAC	ESN	Inter DAAC and Cross DAAC Communications; Inter-Operability; and Data Transfer.	194-219-SE1-004 IRD Between ECS and Version 0 11/94 Section 4 and 209-CD-011-001 ICD Between ECS and Version 0 1/95 Section 4
57	All Missions	ECS at the EDC DAAC	Version-0 DAACs	ESN	Inter DAAC and Cross DAAC Communications; Inter-Operability; and Data Transfer.	194-219-SE1-004 IRD Between ECS and Version 0 11/94 Section 4 and 209-CD-011-001 ICD Between ECS and Version 0 1/95 Section 4
58	Landsat-7	Landsat LPS	ECS at the EDC DAAC	Landsat Network	Level-0R Data; Level-0R Inventory Metadata; and Level-0R Browse Data.	219-CD-003-002 IRD Between ECS and Landsat 7 System 1/95 Section 4
59	Landsat-7	ECS at the EDC DAAC	Landsat LPS	Landsat Network	Data Transfer Acknowledgement	219-CD-003-002 IRD Between ECS and Landsat 7 System 1/95 Section 4
60	AM-1	SCFs	ECS at the MSFC DAAC	NSI	Algorithms.	222-TP-003-005 Release Plan Content Description 12/94 Section 5
61	AM-1	ECS at the MSFC DAAC	SCFs	NSI	Algorithm Insertion Coordination.	222-TP-003-005 Release Plan Content Description 12/94 Section 5

Acceptance testing will also include the verification of the command and control interfaces that must be operational to support AM-1 launch. This includes EOC planning, scheduling, command, control and monitoring of the AM-1 spacecraft; and CSMS system management and communications infrastructure.

Acceptance testing will include the verification of interfaces needed to support early Landsat-7 interface testing. These interfaces are those needed for: the receipt and storage of Landsat-7 level 0R data (view-able image data with radiometric and geometric information appended but not applied) at the EDC DAAC; and the receipt and storage of Landsat-7 metadata and browse data at the EDC DAAC. The interfaces needed for data search, order and distribution services to Landsat 7 data users; and those interfaces needed for the distribution of Landsat-7 data products will not be tested as part of the TRMM Release.

ECS will also be tested to verify two-way inter-operability with the Version-0 system and migration and/or access of Version 0 data archives. Only ECS's one-way inter-operability with National Oceanic and Atmospheric Administration (NOAA) will be tested.

Acceptance testing will be conducted through the use of scenarios which are based on science, modeling, and operations scenarios documented in various ECS CDRLs and White Papers. These scenarios have been grouped into five major categories called: System Management, Push, Pull, Flight Operations, and End-to-End. The test objectives of each scenario group are defined in Sections 8 through 12 of this document.

The objectives and capabilities for each release are recorded in Table 10-1 of the Release Plan Content Description Technical White Paper (222-TP-003-005). The objectives and capabilities listed in Table 10-1 for the TRMM Release were extracted and mapped into the five major scenario acceptance test groups as shown in the following Tables 7-2 and 7-3. In these tables, a reference is made to the section in the ATP where a discussion of the process for verifying the TRMM objective or capability will be found. These tables demonstrate how planned TRMM Release objectives and capabilities are mapped to acceptance test cases and ultimately to Level-3 requirements.

7.3 TRMM Release Test Environment

The TRMM Release will provide capabilities to six ECS sites. These sites are the EOC, SMC and the ECS at the GSFC DAAC located in Greenbelt, MD; the ECS at the LaRC DAAC in Hampton, VA; the ECS at the MSFC DAAC in Huntsville, AL; and the ECS at the EDC DAAC in Sioux Falls, SD. Detailed plans that include the site coordination between ECS and existing site operations, and site platform layouts will be addressed in the Acceptance Test Procedures (DID 411/VE1) document, which will be published prior to the ECS Consent to Ship Review (CSR). These detailed plans are the results of ongoing weekly operation planning teleconferences, site visits, and coordination between all DAAC liaisons, Maintenance and Operations managers, and key development engineers leading up to the site initialization for the TRMM Release.

Table 7-2. TRMM Release Objectives

Objectives	System Management Group	Push Group	Pull Group	Flight Operations Group	End-to-End Group
SDPF (TRMM) Interface Testing with MSFC/LaRC	8.1.8	9.1.1 9.1.2			12.2.1
TSDIS (TRMM) Interface Testing with GSFC, MSFC	8.1.8	9.4.2 9.4.3			12.2.2
Support to TRMM Version 1 Algorithm I & T		9.5.2			
Support to EOS AM - 1 Beta Version 1 Algorithm I & T		9.5.2			
Version 0 Interoperability	8.1.8		10.1.3		
Data Search/Access			10.1, 10.2		
Support TRMM Preparations			10.1.1		12.2
Support TRMM Data Operations		9.1.1, 9.1.2			12.2
Landsat Interface Testing with EDC	8.1.8	9.2.4			12.3.1
Support EOS-AM1 Interface Testing				11.1.3	12.1.2, 12.4
Provide Core Flight Operations Functionality of Planning and Scheduling, CMS, Telemetry, Command, Instrument and Spacecraft Analysis, User Interface, and Data Management Functions Required for AM-1 Spacecraft as well as IST Toolkit	8.2, 8.4, 8.5, 8.6,	9.1, 9.2, 9.3, 9.4		11.1, 11.2, 11.3	12.1.2, 12.4.1
Support of TRMM CERES & LIS Version 2 Algorithm I & T		9.5.2			
Support to EOS AM-1 Version 2 Algorithm I & T		9.5.2			

7.4 TRMM Release Test Descriptions

The acceptance testing of TRMM Release capabilities is divided into five major scenario groups: System Management, Push, Pull, Flight Operations, and End-to-End. These scenario groups identify high level ECS functionality from a users and operations viewpoint. Each group is further sub-divided into scenarios that emulate the operations and user environment. Scenarios are further broken down into more manageable test sequences in which test cases that trace to Level-3 requirements are executed. Sections 8 through 12, that follow, describe the nature of each scenario, the test sequences within them, and their individual test cases.

The traceability of individual scenarios, sequences, and test cases to Level-3 requirements are provided in The Verification Specification (DID 403/VE1).

7.5 TRMM Release Test Schedule

Our current plans call for conducting TRMM Release acceptance testing during the two month period following the TRMM Release CSR, which is scheduled to occur October 1, 1996. The plan calls for conducting acceptance tests in three sessions. The first session will occur during the first three week period following CSR at SMC, EOC, GSFC, and LaRC. The second session will occur the following two weeks at MSFC and EDC, with SMC and EOC remaining involved to participate where mutual testing is required. The final session will occur during the remaining three weeks of period. During the final three weeks an All-Up End-to-End session will occur with all six sites participating.

The final detailed schedule will be coordinated with each DAAC site, to minimize disruption to ongoing operations (if any) at that DAAC. The final schedule will include dates, times and durations for all formal acceptance testing that may occur at each DAAC site.

The order in which testing activities will be conducted during each session is shown in Figure 7.2.

Table 7-3. TRMM Release Capabilities (1 of 4)

Capabilities	System Management Group	Push Group	Pull Group	Flight Operations Group	End-to-End Group
SDPF/ECS(LaRC) Data Transfer		9.1.1			12.2.1
SDPF/ECS(MSFC) Data Transfer		9.1.2			12.2.1
TSDIS/ECS(MSFC) Data Transfer		9.2.2, 9.4.1			12.1.2, 12.2.2 12.2.3, 12.2.4
TSDIS/ECS(GSFC) Data Transfer		9.2, 9.4.2.3, 9.4.1, 9.4.3			12.1.2, 12.2.2 12.2.3, 12.2.4
Basic Ingest Services at 3 sites (GSFC, MSFC & LaRC)		9.2.1, 9.2.2, 9.2.3, 9.4.2 9.4.3			12.2.5
TRMM CERES & LIS Level 0 Ingest		9.1.1, 9.1.2			12.2.1

Table 7-3. TRMM Release Capabilities (2 of 4)

Capabilities	System Management Group	Push Group	Pull Group	Flight Operations Group	End-to-End Group
TRMM TSDIS Data Product Ingest		9.4.2, 9.4.3			12.2.2
SCF/ECS Data Transfer (Algorithms, Algorithm Support Data)		9.5.2			
Full PGS Toolkit Support TRMM Data		9.5.2			
Algorithm Integration Support		9.5.2			
Algorithm Execution/Test Support		9.5.2			
TRMM-LIS Version 1 Algorithm I & T Support		9.5.2			
TRMM CERES & LIS Data (L0) Ingest and Archive and Archive Services at 2 Sites (LaRC and MSFC)		9.1.1 9.1.2			12.2.1
TRMM data (L1-L4, ancillary etc.) Ingest and Archive services at 3 sites (GSFC,MSFC,LaRC)		9.1.1, 9.1.2 9.2.1, 9.2.4 9.4			12.2.5
Testbed for EOS-A1 Flight Operations				11.1, 11.2	
Landsat LPS/ECS(EDC) Data Transfers		9.2.4			12.3.1, 12.3.2
Landsat L0R Data Ingest		9.2.4			12.3.2
Basic Ingest Services at EDC		9.2.4			
Interoperable with CIESIN (ECS to CIESIN)			N.A.		
Two-way Interoperability with V0			10.1.3		
APIs for Information Management			10.1.2		
General Scientist Access	8.4.7, 8.4.9, 8.6.2		10.1, 10.2		12.5.1, 12.2.6 12.3.1

Table 7-3. TRMM Release Capabilities (3 of 4)

Capabilities	System Management Group	Push Group	Pull Group	Flight Operations Group	End-to-End Group
On-line Archive of TBD TB (Aggregate)			10.1.1		
Algorithm-Development Support		**9.5.2**			
Information Management Services Available to CIESIN SEDAC	**N.A.**				
Client/Server Access	8.1.7, 8.4.7 8.3.1		10.1		12.6.2
Coincident Data Search at Individual Sites			10.1 10.2		12.2.5
On-line Browse/Data Visualization			10.1.1		
Full PGS Toolkit Support for TRMM Data Processing (CERES, LIS)		9.1.1, 9.1.2			
TRMM (CERES, LIS) Version 2 Algorithm I & T Support		9.5.2			
Test Support for TRMM End-to-End Processing	8.1.8				12.1.2
Basic SDPS Scheduling	8.2		10.1		12.1.2
Ancillary Data Ingest, Validation, Reformatting, and Regridding for TRMM		9.1.1, 9.1.2 9.2.5			12.2.3
Migrate and/or Access V0 Data Archives		9.2.1			
FOS Interface Components Needed to Send and Receive Data To/From EDOS and Ecom	8.1.8			11.2	12.4.1
FOS Infrastructure Components like User Interface Shell, Interprocess Communi-cation, Database tables, Communication Interface with Externals(e.g., NCC, FDF, Ecom, EDOS)	8.1.8			11.2	12.1.2

Table 7-3. TRMM Release Capabilities (4 of 4)

Capabilities	System Management Group	Push Group	Pull Group	Flight Operations Group	End-to-End Group
FOS Core Functionality and Integration of All FOS Services	8.1.8 8.4.9			11.1, 11.2 11.3	
TRMM-CERES Version 1 Algorithm I&T Support		9.5.2			
AM-1 Beta and Version 1 Algorithm I & T Support		9.5.2			
EOS AM - 1 Version 2 Algorithm I & T Support		9.5.2			
TRMM Data Access			10.1, 10.2		12.2.6
TRMM-CERES/LIS Data Processing		9.1.1, 9.1.2, 9.3			12.2.1, 12.2.6

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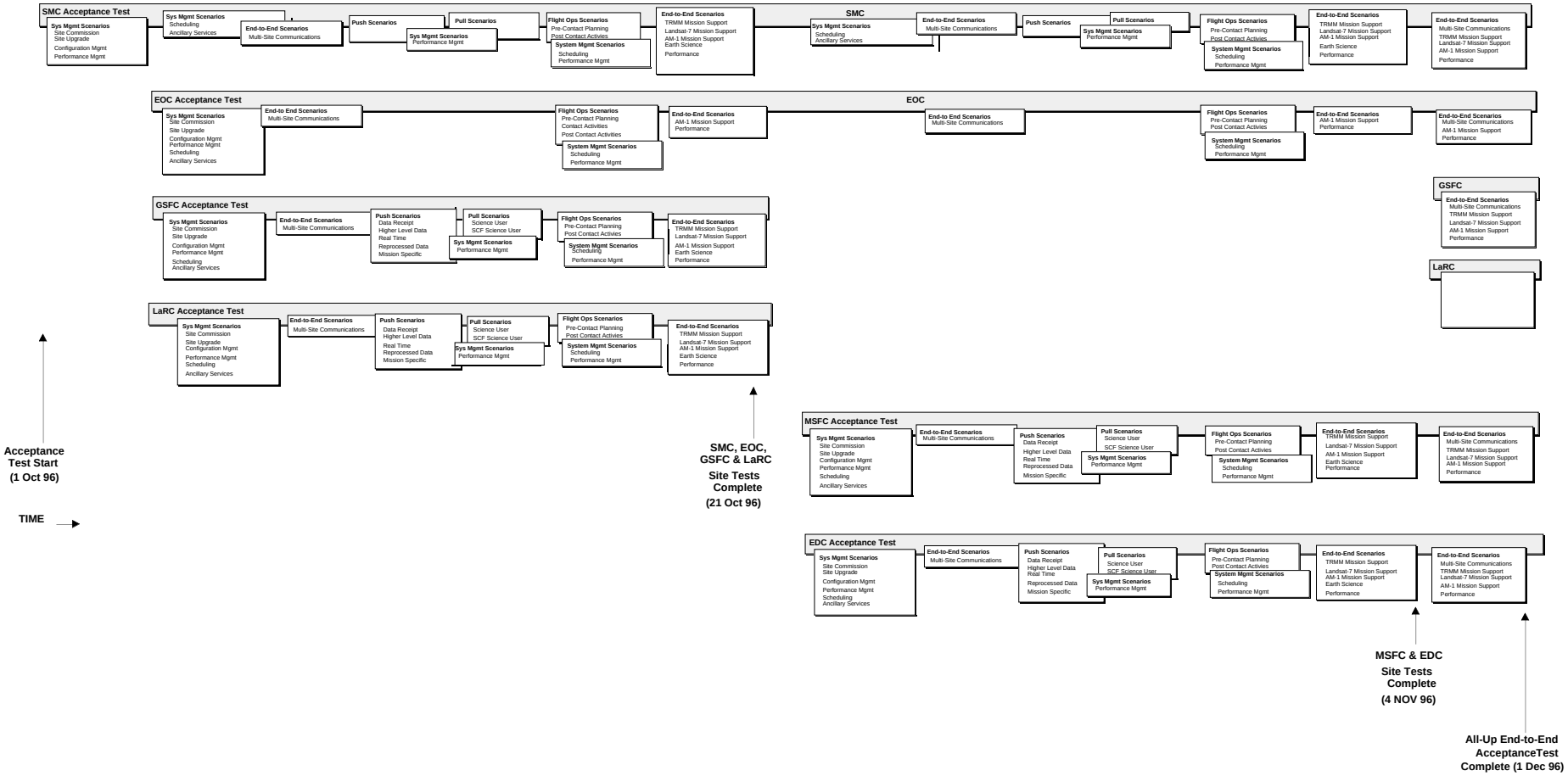

Figure 7-2. TRMM Release Acceptance Testing Activities By Site

8. ECS System Management Scenario Group

The objective of the System Management Scenario Group is to demonstrate the ability of ECS system facilities and infrastructure to perform ongoing operations at the levels required for the ECS TRMM release. The successfully completed scenarios at each site will provide assurance that the ECS TRMM Release sites (i.e., the Systems Monitoring and Coordination Center (SMC), the EOS Operations Center (EOC) and the GSFC, MSFC, EDC and LaRC Distributed Active Archive Centers (DAACs)) are capable of conducting nominal and contingency data center maintenance and operations. The ECS capability for developing and managing integrated schedules is reviewed. Each site's ability to accomplish, and to appropriately communicate, upgrades, is evaluated. The ECS system-level configuration management and performance management capability is evaluated. Ancillary capabilities (fault management, security functionality, accounting and accountability, and report generation) are reviewed for functional completeness and for acceptable operation at the sites, and in the total ECS system context.

Figure 8-1 provides a time-ordered list of the complete set of System Management Group scenarios. The placement of the boxes from left to right indicates the approximate order of test activities. The acceptance test plan is to repeat this general set of tests once for each applicable site, but with modified procedures in each case, to accommodate evaluation of site-specific requirements. Referring to Figure 8-1, the test activities are arranged to conduct the operations or maintenance viewer through a typical sequence of site operations events, site start-up, nominal operations, contingency operations, normal and abnormal site shutdown and site recovery. Subsequent inspections and demonstrations confirm site and ECS system ability to perform required TRMM Release scheduling, site and system upgrades, configuration management, performance management, fault management, security management, rudimentary accounting, and reporting at each site.

8.1 ECS Site Commission Scenario

This scenario familiarizes an ECS M&O team with the operational sites by acquainting the staff with ECS site procedures and the operation and care of ECS equipment. The scenario, in effect, follows the M&O staff through an indoctrination of the newly installed ECS at their site. It introduces the staff to the ECS documented procedures, a demonstration of how each ECS site is "powered up", how various start-up and shut-down procedures are done, and how recovery from an abnormal shutdown is accomplished. It also demonstrates the types and availability of ECS maintenance tools and the application of approved procedures for their use.

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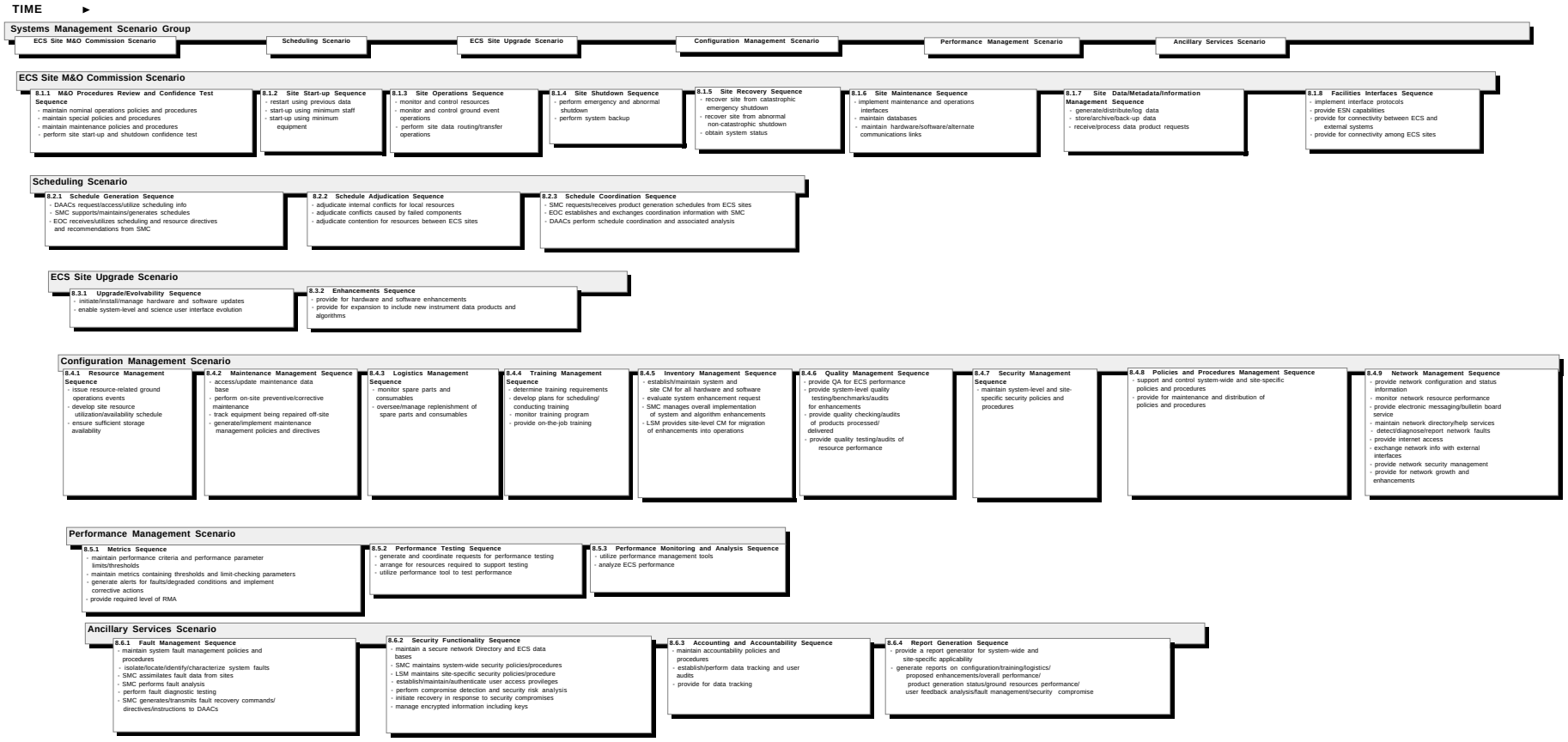

Figure 8-1. System Management Scenario Group Acceptance Test Sequencing.

The scenario evaluates ECS system-level operational, maintenance, and management capabilities and the ability of the SMC to effectively integrate and provide technical and management assistance to the M&O activity. ECS site maintenance procedures are reviewed and analyzed for completeness, applicability and effectiveness. Observed execution of selected maintenance procedures evaluates each site's adherence to documented nominal and emergency procedures. By analysis of procedures and demonstration of selected processes, each site's basic capability to manage every-day data and information loads is assessed. System-level procedures for acquiring, saving and accessing archives, backup systems, data storage systems, and output product systems including generation of the ECS Project Data Base are evaluated. Assessment of the ECS facility interface capability includes evaluation of both external and internal interfaces to include EDOS, SDPF, TSDIS, FDF, NCC, Landsat LPS, ASTER GDS, Version-0 DAACs, SCFs, and the NOAA ADC. Through demonstration of simulated events and through policy and procedures review, confidence is built in each site's ability to successfully respond to scheduled and unscheduled events.

As a final step, the acceptance test (AT) team estimates the sites' readiness to support further acceptance testing, based on the general stability and robustness of the sites' performance during this condensed, comprehensive overview of the systems operation.

8.1.1 M&O Procedures Review and Confidence Test Sequence

This sequence confirms the existence, readability and completeness of written computer systems M&O policies and procedures at each TRMM release site, including start-up and shutdown instructions, nominal operations event handling procedures and site recovery procedures which apply to partial or full, unscheduled system shutdowns.

At each of the six TRMM release sites, approved site procedures are inspected to confirm the existence, applicability and clarity of standard start-up, operations, shut down, recovery and maintenance procedures.

AT review of maintenance capabilities largely consists of inspections of maintenance tools and procedures at each TRMM release site.

Inspections confirming availability of adequate performance monitoring tools, and site M&O team proficiency in tools applications are performed. This includes procedures and tools for performing periodic testing of alternate communication capabilities to verify that they are operational.

Special SMC related M&O procedures and policies are also reviewed. The SMC is evaluated for it's ability to collect, archive and distribute ECS site equipment, software and personnel operational configuration requirements, support procedures, and for its ability to generate, analyze and distribute system-level operational directives to the operational support sites.

This sequence is concluded by a confidence demonstration of the sites' ability to "power up", reach nominal operating status and successfully execute a normal site shut down. Successful completion of this test signals readiness to proceed with AT.

8.1.1.1 Test Case A080110.010–ECS Sites Nominal Operations Policy and Procedures Review

This test case is executed at each of the six TRMM Release sites. Inputs consist of the set of written standard operations policies and procedures documentation for the site undergoing AT.

The site's standard operating procedures are inspected for step-by-step instructions for start-ups that are independent of previous operational states ("cold starts") and for start-ups that require re-establishment of a simulated previous operational state ("warm starts"). The inspection includes assurance of the existence and accessibility of system support procedures specifying system, facility and personnel security and safety/health requirements for system start-up and nominal operations. Procedures are confirmed for operations handling of every-day electronic and manual interfaces related to systems management, product generation, data archiving and distribution, and user support functions. Normal and selected abnormal shut-down procedures are inspected to confirm the existence, applicability and clarity of these procedures and their applicability to the general day-to-day operating environment. Site recovery policies and procedures are reviewed for confirmation of procedures for effectively responding to abnormal events.

The output from this test case is a by-exception report for each site, noting any detected omissions or other clarity or applicability weaknesses in the site's standard operating procedures as compared with ECS, ESDIS, or site-specific requirements.

8.1.1.2 Test Case A080110.020–ECS Maintenance Tools and Procedures Review

This test case is executed at each of the six TRMM Release sites. Inputs consist of the set of written standard maintenance policies and procedures documentation for the site undergoing AT. Available ECS hardware maintenance standards and selected vendor maintenance standards are also required inputs.

Each site's maintenance standards are reviewed for general compliance with ECS standards. Selected maintenance schedules are compared with vendor recommended schedules for compliance.

The site's standard maintenance procedures are inspected. In particular SMC-maintained toolkit configurations and supporting usage documentation are reviewed for specific ECS site applicability and for ready availability at the applicable facilities. Toolkit documentation maintained by the LSM team members are reviewed for currency and effective distribution. Other site-specific LSM procedures for site maintenance are inspected for effectiveness and compliance with ECS policies.

The output from this test case is a by-exception report for each site, noting any detected maintenance omissions or other clarity or applicability weaknesses in the sites' standard maintenance procedures as compared with ECS, ESDIS, or site-specific requirements.

8.1.1.3 Test Case A080110.030–SMC/LSM Special M&O Policy and Procedures Review

This test case is executed at the SMC site. Inputs consist of SMC standard operating procedures for transmitting and receiving information from the ECS TRMM Release sites.

By inspection, the AT team evaluates the SMC procedures that provide mechanisms for capturing site-level management data and integrate these inputs into appropriate system-level management directives. System-level procedures and cross-site standards for maintenance of the SMC configurations (such as system management procedures, science configurations maintenance directives), and SMC-originated LSM procedures for maintenance of site maintenance data configurations (such as product generation, data archiving and distribution, data base recovery, and other procedures) are inspected for completeness, currency and accessibility by the SMC and site maintenance teams. SMC-originated LSM procedures are evaluated to confirm procedures for implementing and maintaining awareness of SMC-distributed system-level management procedures, maintenance toolkits, maintenance procedures, and for maintaining communications with the SMC, including required reporting.

8.1.1.4 Test Case A080110.040–Site Startup/Shutdown Confidence Test and Nominal Operations Test

This test case is executed at each TRMM Release site. The purpose of this confidence test is to demonstrate the systems ability to nominally start up, operate, and shut down in an orderly manner. Test input conditions include the normally configured site, in a shut-down status, but ready for nominal operations. An applications data processing configuration is required as input that demonstrates major site ADP components (computation, input/output (I/O), communications) and simulates a representative level of system loading.

The system is “powered up” using normal cold-start procedures. The demonstration processing load is introduced onto the system. Successful system operation for fifteen minutes (or less if approved by the AT test manager) followed by execution of normal shut-down procedures concludes this test.

Real time monitoring of operations logs, displays and I/O products are used to estimate “successful” system operation. The output from this test case includes a verbal recommendation to continue (or discontinue) the AT based on observed system conditions during the test. Other post-test outputs include an analysis of hard copy logs, display images and output products. These are analyzed to confirm satisfactory nominal system start-up, shutdown and operations actions.

8.1.2 Site Start-up Sequence

The sequence conducts the operations and maintenance test observers through the steps required for "cold start-up" and "warm restart" of each of the six sites under other than nominal conditions. Restart demonstrations are performed assuming preservation of previous results as part of the start up conditions. Start-up demonstrations are also performed using less than optimal equipment and staff resource configurations.

8.1.2.1 Test Case A080120.010–Site Restart Including Introduction of Previous Results

This test case is executed at each TRMM release site. The purpose of the test is to demonstrate the site's start-up capability when previous results are introduced. Inputs include ECS standard operating procedures for site start-up and a representative data set consisting of interim results preserved from a previously simulated unscheduled shut-down. A description of status indicators that indicate successful introduction of the simulated start-up conditions when the system is operational, is also included as input.

The test proceeds by introducing the simulated previous results into the start-up configuration and performing a system restart.

System outputs are analyzed for confirmation of successful introduction of the start-up conditions.

8.1.2.2 Test Case A080120.020–Site Start-up Using Minimum Operations Staff Configuration

This test case is executed at each TRMM release site. The purpose of the test is to demonstrate the site's start-up capability using a minimum operating staff. Inputs include ECS standard operating procedures for site start-up and a minimum operating staff for start-up (as specified in the start-up procedures).

The test proceeds by performing a system start-up using the minimum operations staff.

System outputs are analyzed for confirmation of the system reaching a nominal operational status.

8.1.2.3 Test Case A080120.030–Start-up Using Minimum Equipment Configuration

This test case is executed at each TRMM release site. The purpose of the test is to demonstrate the site's start-up capability using a minimum equipment configuration as specified in the operating procedures. Inputs include ECS standard operating procedures for site start-up with the system in a minimum configuration for start-up.

The test proceeds by performing a system start-up under the minimum configuration.

System outputs are analyzed for confirmation of the system reaching a nominal operational status under the minimum configuration.

8.1.3 Site Operations Sequence

This sequence provides assurance of the SMC operations capability to provide application programming interfaces (APIs) for monitoring and control of managed resources. The sequence provides assurance that the SMC has the capability to support and maintain the allocation of ground event functions and capabilities to each ECS site. and that each site has the capability to receive applicable SMC directives.

8.1.3.1 Test Case A080130.010–SMC/LSM Monitoring and Control of Managed Resources

This test case is executed at each TRMM release site. The purpose of the test is to confirm that each site has an inventory of SMC supplied APIs that provide the following mechanisms; (1) capture, by and application of management data; (2) exchanging management data between a

management application and its management agent; (3) exchanging management data between a management agent and the site LSM; and (4) performing analyses and generating reports using management data. The test case also confirms that each site has the capability to receive applicable SMC directives.

The AT team confirms by inspection, that SMC supplied, APIs with the listed functionality are included in the sites' software inventory. The existence and completeness of procedures for receiving applicable SMC directives is also confirmed by inspection.

The test case proceeds by demonstrating the APIs functionality. Demonstration start-up conditions include the site computer configuration in an operational state and ready to demonstrate API functionality. Test data sets and test procedures are designed to exercise each of the listed API capabilities and expected outputs are specified that indicate successful API functioning. The test procedure is executed using the specified procedures and data sets. Test execution is observed and any abnormal operations displays, logs entries or other outputs during the test execution are recorded.

System outputs are analyzed for confirmation of successful operation of the test case. Execution or post-test analysis discrepancies are noted and compiled as the final test output.

8.1.3.2 Test Case A080130.020–SMC Ground Event Operations Monitoring and Control

This test case is executed at the TRMM release SMC. The purpose of the test is to confirm that the SMC standard procedures contains methodology for (1) allocating ground event functions and capabilities to selected ECS sites; (2) for maintaining cognizance of these allocations (3) for supporting and maintaining priorities used in scheduling ground events; and (4) for LSM monitoring of each site's schedule and execution of events.

The AT team confirms by inspection, that applicable SMC methodology is included in the SMC operating procedures. The SMC data base is inspected for evidence of inclusion of up-to-date, ground event functions allocation status, scheduling priorities, and execution status.

Omissions, errors and outdated event data entries are, if any, are compiled as the final test output.

8.1.3.3 Test Case A080130.030–ECS Site Data Routing/Transfer Operations

This test case is executed at each TRMM release site. The purpose of the test is to confirm that each site's standard procedures contain methodology for (1) manually altering the routing of data sets to physical storage locations; and for (2) for exchanging data sets and physical volumes between ECS on-line and off-site permanent storage.

The AT team confirms by inspection, that specified routing and exchange procedures are included in each site's operating procedures.

The test case proceeds by demonstrating the specified functionality. Demonstration start-up conditions include the site computer configuration in an operational state and ready to demonstrate the data routing and exchange functionality. Input test data sets and test procedures are designed to exercise the capabilities and expected outputs are specified that indicate successful completion of the routing and exchange functions. The test procedure is executed using the specified procedures and data sets. Test execution is observed and any abnormal operations displays, logs entries or other outputs during the test execution are recorded.

System outputs are analyzed for confirmation of successful data transfers for the test case. Execution or post-test analysis discrepancies are noted and compiled as the final test output.

8.1.4 Site Shutdown Sequence

This sequence evaluates TRMM release site capability for requirement-compliant response to abnormal site shutdown events. This evaluation consists of operations conducted demonstrations of abnormal shutdown events. Abnormal shut down demonstrations proceed from simulated abnormal environment situations and evaluate the sites' capability to successfully respond to these events.

Each site's ability to produce specified backups is also included in this sequence.

8.1.4.1 Test Case A080140.010–Emergency and Other Abnormal Shutdown

This test case is executed at each TRMM release site. The purpose of the test is to confirm that each site's standard procedures contain methodology for responding to catastrophic situations that require immediate site shutdown (such as life, or total system threatening events) and for other types of abnormal shutdowns such as system critical equipment failure.

The AT team confirms by inspection, that site procedures include procedures for required actions resulting from each of these types of threats.

Detected discrepancies from ECS standards or departures from good practice are noted and constitute the final test output report.

8.1.4.2 Test Case A080140.020–System Backups

This test case is executed at all TRMM Release sites. The test case verifies that procedures for producing complete and comprehensive system backup products are included as a part of each site's standard operating procedures. The AT team inspects system backup procedures for clarity and for comprehensive coverage of all site components requiring back up products. Procedures for identifying, saving, and recovering backups are reviewed. Backup storage facility structural safeguards and procedures for storing backups at remote locations are reviewed for compliance with site and ECS standards.

Departures from site standards or from good operational practices are noted and included in the test case final report.

8.1.5 Site Recovery Sequence

This sequence evaluates TRMM release site capability for maintaining operations during abnormal situations or recovering from abnormal shutdown events. The sequence consists of demonstrations of each site's ability to respond effectively to simulated abnormal events. Simulated events range from catastrophic situations such as fire or rising water, to relatively minor, but more frequently occurring events such as unscheduled data receipt or temporary loss of equipment or personnel resources. Tests to assure the user of the ability to obtain ECS operational status are also included in this sequence.

8.1.5.1 Test Case A080150.010–Recovery From Catastrophic Emergency Shutdown

This test case is executed at each TRMM release site. The purpose of the test is to confirm that each site has documented procedures for recovering from a catastrophic emergency shut-down. Recognizing that negative events such as power surges can be induced by emergency shut-down executions it may be necessary, in these cases, for extra M&O procedures to be installed prior to recovery. The AT Team inspects each site's standard operating procedures for inclusion of such recovery procedures or for a negative statement regarding the need for these procedures. If a negative statement is included, manufacturer specifications may also be spot checked to verify that no special recovery procedures are required.

Outputs consist of recording of noted omissions, errors or departures from good practice in the site documentation that addresses this type of recovery.

8.1.5.2 Test Case A080150.020–Recovery From Abnormal Non-Catastrophic Shutdown

This test case is executed at each TRMM release site. The purpose of the test is to confirm that each site's standard procedures contain methodology for recovery based on specific abnormal shut-down events such as unscheduled data receipt, unscheduled application interruption, or site data corruption.

For each of the specified events, the AT team confirms by inspection, that recovery procedures are included in each site's operating procedures.

The test case proceeds by demonstrating the specified recovery procedures. Demonstration start-up conditions include the site computer configuration in shut-down state. Input test data sets and test procedures are designed to simulate the required inputs for recovery from the specified abnormal shut-down event. Expected outputs are specified that include expected operational system status upon completion of the recovery. The system is "recovered" using the specified procedures and data sets. Test execution is observed and any abnormal operations displays, logs entries or other outputs during the test execution are recorded.

System outputs are analyzed for confirmation of successful system recovery. Execution or post-test analysis discrepancies are noted and compiled as the final test output.

8.1.5.3 Test Case A080150.030–Obtaining System Status of ECS

This test case is executed at each TRMM release site. The test case demonstrates the user capability to access an informational status message describing the predicted time for resumption of ECS services that are temporarily unavailable and also to allow users to obtain the current availability status of ECS services.

The AT team verifies that each site’s procedures include methodology and format descriptions for obtaining the specified status information. Using the standard procedures, the AT team retrieves both types of status information from a standard user work station.

The test output report consists of any issues or recommendations regarding the access or content of these reports.

8.1.6 Site Maintenance Sequence

The site Equipment maintenance sequence is largely composed of inspections of maintenance tools and procedures at each TRMM release site not included in paragraph 8.1.1.2 of this document, the maintenance overview test case.

The AT team confirms the availability of ECS-provided maintenance and operations interfaces to the DAACs to aid in maintaining the functions of system management, science algorithm integration, product generation, data archiving and distribution, user support services and system maintenance.

The AT team confirms that ECS provides data base maintenance.

System (SMC) procedures and cross-site standards for maintenance of the SMC configurations (such as system management procedures, science configurations maintenance directives), and LSM procedures for maintenance of site maintenance data configurations, such as product generation, data archiving and distribution, data base recovery, and other procedures, are inspected for completeness, currency, and accessibility by the SMC and site maintenance teams.

Inspections are performed to confirm SMC procedures for coordinating with each site in the management of off-site corrective hardware and systems software maintenance, for monitoring hardware and systems software maintenance status of off-site repair actions, and for assisting each site, when necessary, in the performance of on-site preventive and corrective hardware and systems software maintenance.

The AT team confirms the availability of tools for performing periodic testing of alternate communication capabilities to verify that they are operational.

8.1.6.1 Test Case A080160.010–DAAC M&O Interfaces

This test case is executed at each TRMM release DAAC site. The test case confirms by inspection that the DAAC configurations each include maintenance and operations interfaces to aid in maintaining the functions of system management, science algorithm integration, product generation, data archiving and distribution, user support services and system maintenance.

The test output report consists of any issues or recommendations regarding each DAACs' implementation of these interfaces.

8.1.6.2 Test Case A080160.020–Maintenance of ECS Databases

This test case is executed at each TRMM release site. The test case confirms by inspection that satisfactory procedures for maintaining ECS databases are installed at each site to include the capability to restructure the data base, and the capability to interrupt a maintenance session and restart the session without loss of information. Additional inspections are performed to confirm that System (SMC) procedures and cross-site standards for maintenance of the SMC database configurations (such as system management procedures, science configurations maintenance directives), and LSM procedures for maintenance of site data configurations (such as product generation, data archiving and distribution, and data base recovery) are inspected for completeness, currency and accessibility by the SMC and site maintenance teams.

The test output report consists of any issues or recommendations regarding the site implementation of these interfaces and databases.

8.1.6.3 Test Case A080160.030–Hardware/System Software and Alternate Communications Link Maintenance

This test case is executed at each TRMM release site. The test case confirms by inspection that satisfactory procedures for maintaining ECS procedures for coordinating with each site in the management of off-site corrective hardware and systems software maintenance, for monitoring hardware and systems software maintenance status of off-site repair actions, and for assisting each site, when necessary, in the performance of on-site preventive and corrective hardware and systems software maintenance. The AT team also confirms that each site's tools configuration includes tools for performing periodic testing of alternate communication capabilities to verify that they are operational.

The test output report consists of any issues or recommendations regarding the site implementation of these interfaces and databases.

8.1.7 Site Data/Metadata/Information Management Sequence

Each ECS site is evaluated for its ability to generate and collect, maintain, and appropriately distribute cognizant data/metadata/application information and for maintaining availability status for these data. Each ECS site's ability to verify user authorization by validation of inputs with SMC user input authorization directives is also evaluated. Provisions for adequately securing data media and for suitably retaining backups of required base information are also evaluated. These functions may be performed locally, within each site or may be a part of a system wide SMC data base service.

Each ECS site's' procedures for defining, acquiring, retaining and modifying user profile information as well as their procedures for verifying user accounts and requests for information with SMC provided authorization lists is evaluated.

Data/metadata/information access modes for each site (direct connection, dial-up connection, network access) are compared with site-specific requirements.

This sequence evaluates ECS system and site capability for requirement-compliant response to normal (user scheduled data receipts, scheduled and unscheduled user requests) and abnormal (unscheduled data receipt interruptions, erroneous data receipt, erroneous operations request) system and site-level events.. For each site, LSM capability for acquiring and transmitting to the SMC, site data request requirements and for receiving, implementing and monitoring SMC data request procedures directives is evaluated. The AT team also provides and assessment of the completeness and effectiveness of each site's data request policies and procedures.

8.1.7.1 Test Case A080170.010–ECS Data Generation/Distribution

This test case is executed at each TRMM release site. The purpose of the test is to confirm each site's capability to perform appropriate data/metadata generation, distribution and associated logging functions.

The AT team confirms by inspection, that procedures are included in each site's operating procedures for site-specific data/metadata generation, distribution and logging functions.

The test case proceeds by demonstrating the sites' generation/distribution and logging functions. Demonstration start-up conditions include the site computer configuration in an operational state. Input test data sets and test procedures are designed to provide representative data sets and

procedures for demonstrating site generation/distribution/logging activities. Expected outputs are specified that will confirm the success failure of the demonstrations. The specified functions are executed using the specified procedures and data sets. Test execution is observed and any abnormal operations displays, logs entries or other outputs during the test execution are recorded.

System outputs are analyzed for confirmation of successful system recovery. Execution or post-test analysis discrepancies are noted and compiled as the final test output.

8.1.7.2 Test Case A080170.020–ECS Storage/Archive/Backup Capability

This test case is executed at each TRMM release site. The purpose of the test is to confirm each site's capability to store, archive, and backup data.

The AT team confirms by inspection, that procedures are included in each site's operating procedures for storing/archiving data and for data back-up.

The test case proceeds by demonstrating the specified procedures. Demonstration start-up conditions include the site computer configuration in an operational state. Input test data sets and test procedures are designed to provide representative data products for storing/archiving and for back-up demonstrations. Expected outputs are specified that will confirm the success failure of the demonstrations. The specified functions are executed using the specified procedures and data sets. Test execution is observed and any abnormal operations displays, logs entries or other outputs during the test execution are recorded.

System outputs are analyzed for confirmation of successful system recovery. Execution or post-test analysis discrepancies are noted and compiled as the final test output.

8.1.7.3 Test Case A080170.030–Site Data Request Management Sequence

This test case is executed at each TRMM release site. The purpose of the test is to confirm each site's capability to receive and process data product requests.

The AT team confirms by inspection, that procedures are included in each site's operating procedures for site-specific handling of data processing requests to include actions for disposition of unscheduled or erroneous requests. The inspection assesses the SMC procedures for generating, maintaining, updating and distributing data requests as well as SMC generated procedures for LSM handling of data requests at the sites.

System outputs are analyzed for confirmation of successful system recovery. Execution or post-test analysis discrepancies are noted and compiled as the final test output.

The test output report consists of any issues or recommendations regarding the site implementation of data request procedures.

8.1.8 Facilities Interfaces Sequence

This sequence verifies the basic connectivity and fundamental protocols for ECS external and internal interfaces in support of TRMM operations and AM-1 and Landsat-7 early interface testing. These tests are executed early in the acceptance testing phase, before confirming proper message content and format in Sections 9 and 11, “Push Scenario Group” and “Flight Operations Scenario

Group," respectively. The early connectivity tests provide the AT team and the Government with confidence that all ECS interfaces are ready for testing simulated or real operational data and messages.

The ECS external interfaces and the six ECS operational sites (EOC, SMC, and the DAACs at GSFC, MSFC, LaRC, and EDC) for the TRMM Release are shown in Figure 7-1. Loop tests, interface simulators, and the EOSDIS Test System (ETS) will frequently be used to test the interfaces. The operational version of external systems will be used only if they are mature and available at the time needed to conduct acceptance testing on this sequence.

Confirmation of ECS external interfaces, including SDPF, TSDIS, EDOS, FDF, NCC, Landsat LPS, ASTER GDS, Version-0 DAACs, SCFs, and NOAA ADC, is performed through inspection of before and after data transmission products compared to requirements. Internal ECS interfaces through the ESN, are evaluated similarly. The capability to verify the fidelity of each ECS site's interfaces to other ECS sites at any time is confirmed. File transfer and management functions, interoperability including binary data exchange, and approved interfaces are confirmed. The AT team confirms external ISO/OSI data communications capability specified by GOSIP and TCP/IP and CCSDS communications protocols and services. Site-level access via direct connection, dial-up connection, and/or network linkages are confirmed as required by each site through inspection of site-to-site test messages. Interactive capabilities, particularly between the system-level data base and its users, are confirmed.

8.1.8.1 Test Case A080180.010–Interface Protocols and ESN Capabilities

This test case verifies the capability for satisfying communications protocols for ECS interfaces and for transferring specified data types over the ESN. This test case applies to the EOC, the SMC, and each TRMM Release DAAC except as stated otherwise. The Inspection method is used in this test case.

As part of each interface test, the AT team confirms ISO/OSI data communications capability specified by GOSIP as well as TCP/IP communications protocols and services as required by the applicable Interface Requirements Documents (IRDs). For the GSFC, LaRC, and MSFC DAACs, the AT team reviews CCSDS publications to confirm that the interfaces between TRMM and the ECS make appropriate use of standards for data structures and data transport.

The AT team verifies that the ESN, which provides the communications link among ECS sites and between ECS sites and selected external systems, can provide a file transfer and management service in both interactive and non-interactive modes. Connectivity tests involving the ESN evaluate the capability to transfer unstructured text, binary unstructured, binary sequential, and sequential text data types. Additionally, ESN-related tests verify the ESN's capability to interoperate and exchange messages with external SMTP and X.400 mail systems.

The AT team uses the protocol and standards information and ESN capabilities to evaluate the applicable test cases.

8.1.8.2 Test Case A080180.020–SMC External Interfaces

This test case verifies the capability for the SMC to communicate with its external interfaces for the TRMM Release including TSDIS, EDOS, and the ASTER GDS. It confirms that the SMC is prepared to test its external interfaces at any time during its lifetime. The Test method is used in this test case.

TSDIS transmits a test message to the SMC to confirm that the SMC has the capability to receive status and schedule adjudication information for data exchange with the DAACs. The SMC confirms message receipt.

The SMC transmits a test message to EDOS. Similarly, EDOS transmits a test message to the SMC. This exchange confirms the connectivity between these two sites, and prepares them for exchanging status and coordination data. The SMC and EDOS notify each other of message transmission and receipt.

The SMC then transmits a test message to the ASTER GDS. Similarly, the ASTER GDS transmits a test message to the SMC. This exchange confirms the connectivity between these two sites, and prepares them for exchanging status and schedule information. The SMC and GDS notify each other of message transmission and receipt.

During each part of this test case, the AT team verifies that the test messages have been transmitted and received and compares the messages at both ends of each interface for evidence of garbling or other communications errors. The AT team records the results, which should reflect the successful, error-free transfer of messages between the SMC and TSDIS, EDOS, and ASTER GDS.

8.1.8.3 Test Case A080180.030–EOC External Interfaces

This test case verifies the capability for the EOC to communicate with its external interfaces for the TRMM Release including EDOS, NCC, FDF, ASTER GDS, and SCFs. It confirms that the EOC is prepared to test its external interfaces at any time during its lifetime. The Test method is used in this test case.

The EOC transmits a test message to the EDOS/DIF, via Ecom, to demonstrate that the EOC is prepared for sending coordination and status information and AM-1 spacecraft uplink data using the SN, DSN, GN, and WOTS as necessary. Similarly, EDOS/DIF transmits a test message to the EOC so that the EOC will be capable of receiving down-link data, i.e., simulated telemetry and status data. The EOC and EDOS/DIF notify each other of message transmission and receipt.

The AT team confirms the connectivity between the EOC and NCC so that the EOC will be capable of sending TDRSS Schedule Requests to, and receiving TDRSS Schedules from, the NCC. The EOC and NCC notify each other of message transmission and receipt.

The FDF sends a test message to the EOC to see if orbit and attitude information could be received by the EOC. The EOC, in turn, sends a test message to the FDF to prepare the EOC for the transmission of orbit and attitude observations. The EOC and FDF notify each other of message transmission and receipt.

The connectivity between the EOC and the ICC part of the ASTER GDS is tested to provide the EOC with the capability of sending planning, scheduling, status, and coordination information. A test message is transmitted by the ASTER GDS so that the EOC can receive the same information as well as ASTER instrument commands. The EOC and ASTER GDS notify each other of message transmission and receipt.

The AT team evaluates the connectivity between the EOC and those SCFs with AM-1 instrument teams so that the EOC can send IST Toolkits and instrument software dumps to, and receive instrument software loads from, the SCFs. For each test, the EOC and applicable SCF notify each other of message transmission and receipt.

During each part of this test case, the AT team verifies that the test messages have been transmitted and received and compares the messages at both ends of each interface for evidence of garbling or other communications errors. The AT team records the results, which should reflect the successful, error-free transfer of messages between the EOC and EDOS, NCC, FDF, ASTER GDS, and SCFs.

8.1.8.4 Test Case A080180.040–External Interfaces Applicable to All TRMM Release DAACs

This test case verifies the capability for the DAACs at GSFC, LaRC, MSFC, and EDC to communicate with their common external interfaces for the TRMM Release. These external interfaces are the Version-0 DAACs, and the SCFs. It confirms that the TRMM Release DAACs are prepared to test their common external interfaces at any time during their lifetime. The Test method is used in this test case.

Test messages are transmitted in both directions between each TRMM Release DAAC and each Version-0 DAAC to verify the capability for inter-DAAC and cross-DAAC communications, interoperability, and data transfer. For each test, the applicable TRMM Release DAAC and Version-0 DAAC notify each other of message transmission and receipt.

The AT team evaluates communications links between those SCFs providing science algorithms and each TRMM Release DAAC so that the DAACs can receive algorithms from, and provide algorithm coordination information to, the SCFs. For each test, the applicable DAAC and SCF notify each other of message transmission and receipt.

A user connects to each TRMM Release DAAC via direct connection as well as network link, to determine if the user can successfully request and receive data products, including archived NOAA data. For each test, the user and the applicable DAAC notify each other of message transmission and receipt.

During each part of this test case, the AT team verifies that the test messages have been transmitted and received and compares the messages at both ends of each interface for evidence of garbling or other communications errors. The AT team records the results, which should reflect the successful, error-free transfer of messages between the TRMM Release DAACs and the Version-0 DAACs and SCFs.

8.1.8.5 Test Case A080180.050–GSFC DAAC External Interfaces

This test case verifies GSFC DAAC connectivity with external systems not described in Section 8.1.8.4, "Test Case A080180.040–External Interfaces Applicable to All TRMM Release DAACS." The external systems included herein are TSDIS, EDOS, FDF, NOAA ADC and ASTER GDS. This test case confirms that the GSFC DAAC is prepared to test these interfaces at any time during its lifetime. The Test method is used in this test case.

The connectivity from TSDIS to the GSFC DAAC, using the GSFC LAN, is evaluated so that the DAAC is capable of receiving TRMM VIRS Level-1A data, Level-1b through Level-3 standard products, requests for ancillary/correlative data, and TRMM product delivery schedules. The AT team confirms the interface from the DAAC to TSDIS to prepare the DAAC for sending TRMM VIRS Level-1A data and Level-1b through Level-3 standard products for reprocessing and ancillary/correlative data. The DAAC and TSDIS notify each other of message transmission and receipt.

The AT team tests the communications capabilities between the GSFC DAAC and EDOS/EDOS, via Ecom, so that the DAAC will have the capability to receive AM-1 level-0 science data and status and coordination information from, and transmit status and coordination information to, the EDOS. The DAAC and EDOS notify each other of message transmission and receipt.

A test message is sent from the FDF to the GSFC DAAC to verify that the DAAC will have the capability to receive repaired and refined orbit and attitude data for the AM-1 spacecraft. The DAAC confirms message receipt.

Connectivity between the NOAA ADC, i.e., the Satellite Active Archive (SAA) and the National Meteorological Center (NMC), and the ECS at GSFC DAAC is evaluated so that NOAA ancillary and correlative earth science data can be received at the DAAC. For each test, the DAAC and NOAA SAA and NMC notify each other of message transmission and receipt.

The AT team confirms the interface from the ASTER GDS to the GSFC DAAC to provide the DAAC with the capability for receiving ASTER algorithms, Level-1A and Level-1B data, product status, and user data search and order dialogs. Additionally, the link from the DAAC to the GDS is tested so that ASTER algorithm coordination messages, ancillary and correlative data, product request and status messages, and user data search and order dialogs can be transmitted from the DAAC. The DAAC and GDS notify each other of message transmission and receipt.

During each part of this test case, the AT team verifies that the test messages have been transmitted and received and compares the messages at both ends of each interface for evidence of garbling or other communications errors. The AT team records the results, which should reflect the successful, error-free transfer of messages between the GSFC DAAC and TSDIS, EDOS, FDF, NOAA SAA and NMC, and ASTER GDS.

8.1.8.6 Test Case A080180.060–LaRC DAAC External Interfaces

This test case verifies LaRC DAAC connectivity with external systems not described in Section 8.1.8.4, "Test Case A080180.040–External Interfaces Applicable to All TRMM Release DAACS." The external systems included herein are SDPF, EDOS, FDF, NOAA ADC and ASTER GDS. This test case confirms that the LaRC DAAC is prepared to test these interfaces at any time during its lifetime. The Test method is used in this test case.

The communications link from the SDPF to the LaRC DAAC is evaluated so that the DAAC can receive TRMM CERES Level-0 science and definitive orbit data from the SDPF. The DAAC confirms message receipt by the DAAC.

The AT team tests the transmit and receive capabilities between the LaRC DAAC and EDOS, via Ecom, so that the DAAC will have the capability to receive AM-1 level-0 science data and status and coordination information from, and transmit status and coordination information to, EDOS. The DAAC and EDOS notify each other of message transmission and receipt.

A test message is sent from the FDF to the LaRC DAAC to verify that the DAAC will have the capability to receive repaired and refined orbit and attitude data for the AM-1 spacecraft. The DAAC confirms message receipt.

Connectivity between the NOAA ADC, i.e., the Satellite Active Archive (SAA) and the National Meteorological Center (NMC), and the ECS at LaRC DAAC is evaluated so that NOAA ancillary and correlative earth science data can be received at the DAAC. For each test, the DAAC and NOAA SAA and NMC notify each other of message transmission and receipt.

The AT team confirms the interface from the ASTER GDS to the LaRC DAAC to provide the DAAC with the capability for receiving ASTER algorithms, Level-1A and Level-1B data, product status, and user data search and order dialogs. Additionally, the link from the DAAC to the GDS is tested so that ASTER algorithm coordination messages, ancillary and correlative data, product request and status messages, and user data search and order dialogs can be transmitted from the DAAC. The DAAC and GDS notify each other of message transmission and receipt.

During each part of this test case, the AT team verifies that the test messages have been transmitted and received and compares the messages at both ends of each interface for evidence of garbling or other communications errors. The AT team records the results, which should reflect the successful, error-free transfer of messages between the LaRC DAAC and SDPF, EDOS, FDF, NOAA SAA and NMC and ASTER GDS.

8.1.8.7 Test Case A080180.070–MSFC DAAC External Interfaces

This test case verifies MSFC DAAC connectivity with external systems not described in Section 8.1.8.4, “Test Case A080180.040–“External Interfaces Applicable to All TRMM Release DAACS.” The external systems included herein are TSDIS and SDPF. This test case confirms that the MSFC DAAC is prepared to test these interfaces at any time during its lifetime. The Test method is used in this test case.

The connectivity from TSDIS to the MSFC DAAC, is evaluated so that the DAAC is capable of receiving TRMM PR, TMI, and GV Level-1A data, Level-1b through Level-3 standard products, requests for ancillary/correlative data, and TRMM product delivery schedules. The AT team confirms the interface from the DAAC to TSDIS to prepare the DAAC for sending TRMM PR, TMI, and GV Level-1A data and Level-1b through Level-3 standard products for reprocessing and ancillary/correlative data. The DAAC and TSDIS notify each other of message transmission and receipt.

The communications link from the SDPF to the MSFC DAAC is evaluated so that the DAAC can receive TRMM LIS Level-0 science and definitive orbit data from the SDPF. The DAAC confirms message receipt.

During each part of this test case, the AT team verifies that the test messages have been transmitted and received and compares the messages at both ends of each interface for evidence of garbling or other communications errors. The AT team records the results, which should reflect the successful, error-free transfer of messages between the MSFC DAAC and TSDIS and SDPF.

8.1.8.8 Test Case A080180.080–EDC DAAC External Interfaces

This test case verifies EDC DAAC connectivity with external systems not described in Section 8.1.8.4, "Test Case A080180.040–"External Interfaces Applicable to All TRMM Release DAACS." The external systems included herein are Landsat LPS, EDOS, FDF, NOAA ADC and ASTER GDS. This test case confirms that the EDC DAAC is prepared to test these interfaces at any time during its lifetime. The Test method is used in this test case.

The basic interface from the Landsat LPS to the EDC DAAC is verified so that the DAAC will be capable of receiving data availability notices, Landsat 7 Level-0R data, activity calendar, metadata, and directory, guide, inventory, browse, and calibration information. The connectivity from the DAAC to the LPS is tested to prepare the DAAC for sending data transfer acknowledgments. The DAAC and LPS notify each other of message transmission and receipt.

The AT team tests the transmit and receive capabilities between the EDC DAAC and EDOS, via Ecom, so that the DAAC will have the capability to receive AM-1 Level-0 science data and status and coordination information from, and transmit status and coordination information to, EDOS. The DAAC and EDOS notify each other of message transmission and receipt.

A test message is sent from the FDF to the EDC DAAC to verify that the DAAC will have the capability to receive repaired and refined orbit and attitude data for the AM-1 spacecraft. The DAAC confirms message receipt.

Connectivity between the NOAA ADC, i.e., the Satellite Active Archive (SAA) and the National Meteorological Center (NMC), and the ECS at the EDC DAAC is evaluated so that NOAA ancillary and correlative earth science data can be received at the DAAC. For each test, the DAAC and NOAA SAA and NMC notify each other of message transmission and receipt.

The AT team confirms the interface from the ASTER GDS to the EDC DAAC to provide the DAAC with the capability for receiving ASTER algorithms, Level-1A and Level-1B data, product status, and user data search and order dialogs. Additionally, the link from the DAAC to the GDS is tested so that ASTER algorithm coordination messages, ancillary and correlative data, product request and status messages, and user data search and order dialogs can be transmitted from the DAAC. The DAAC and GDS notify each other of message transmission and receipt.

During each part of this test case, the AT team verifies that the test messages have been transmitted and received and compares the messages at both ends of each interface for evidence of garbling or other communications errors. The AT team records the results, which should reflect the successful, error-free transfer of messages between the EDC DAAC and Landsat LPS, EDOS, FDF, NOAA SAA and NMC `and ASTER GDS.

8.1.8.9 Test Case A080180.090–ECS Internal Interfaces

This test case verifies the capability for the four TRMM Release DAACs to communicate with each other and the SMC via the ESN. It also confirms that the DAACs at GSFC, LaRC, and EDC can communicate with the EOC via the ESN. It confirms that these sites are prepared to test their interfaces with each other at any time during their lifetime. The Test method is used in this test case.

Test messages are exchanged in pairs among the four DAACs to provide for the mutual exchange of data products, browse data, metadata, data quality information, research results, and documentation. For each test, the applicable DAACs notify each other of message transmission and receipt.

The SMC transmits a test message to each of the four DAACs so that the SMC can send directives on priorities and policies and the DAACs can utilize SMC product thread information to determine both the input data required for processing and the subsystems responsible for processing and distributing. The connection from each of the DAACs to the SMC verifies the capability for the SMC to receive operational, data processing, and data quality status from the DAACs. For each test, the SMC and applicable DAAC notify each other of message transmission and receipt.

The AT team verifies that the DAACs at GSFC, LaRC, and EDC can receive an EOC test message in preparation for obtaining AM-1 instrument operations plans and schedules. The connection from the GSFC DAAC to the EOC is confirmed so that the EOC has the capability to receive status messages on the storage of mission historical information. For each test, the EOC and applicable DAACs notify each other of message transmission and receipt.

The connectivity from the SMC to the EOC is tested so that SMC directives can be received at the EOC. The EOC transmits a test message to the SMC in preparation for providing the SMC with management and operations status information. The SMC and EOC notify each other of message transmission and receipt.

During each part of this test case, the AT team verifies that the test messages have been transmitted and received and compares the messages at both ends of each interface for evidence of garbling or other communications errors. The AT team records the results, which should reflect the successful, error-free transfer of messages between the DAACs, SMC, and EOC.

8.2 Scheduling Scenario

The Scheduling Scenario leads a site lead operator through the process of generating a series of schedules involving his/her site and support by other sites. It follows the process of scheduling the activities at his site, coordinating them with other sites through the SMC and resolving scheduling conflicts when they arise. The scenario then continues with the development of a coordinated master schedule by SMC operators. It carries the SMC operators through the schedule request, development, confirmation and adjudication process; returning in full-circle to the site lead operator who initiated the schedule request.

The purpose of this scenario is to evaluate the ECS system-level scheduling capability. It assesses the ECS ability to coordinate the generation of effective system level schedules that are responsive to user needs. ECS capacity and procedures for acquiring, storing and maintaining schedule related policies, negotiating and maintaining ground event functional allocations and priorities are

assessed. SMC procedures for acquiring and maintaining ECS end-to-end schedules, and for generating associated site-to-site and site-to-site integration, test, simulation, operations and maintenance directives are also evaluated.

This scenario also evaluates procedures for adjudicating cross-site and cross-facility schedule conflicts in the best interests of the systems users and in a manner that promotes the most efficient use of all ECS site and the total ECS system.

Procedures for receiving and analyzing product generation schedules from the DAACs and other ECS sites are evaluated as well as SMC's methodology for recommending, reviewing, approving and disseminating information related to schedule implementations or adjustments. Procedures for monitoring the effects of schedule coordination in an operating environment are reviewed for comprehensive coverage of the entire ECS system and for realistic use of ECS site outputs.

Each site's LSM scheduling activity is evaluated for its ability to communicate and receive scheduling information from the SMC as well as its effectiveness in monitoring, coordinating and implementing SMC integrated schedules within assigned sites.

8.2.1 Schedule Generation Sequence

The Schedule Generation Sequence follows the operator through the schedule generation process as implemented at each site. The sequence confirms ECS systems schedulers capability for generating, analyzing inputs, integrating, and distributing approved system-level schedules and for developing and communicating appropriate site scheduling guidelines for instrument and ground event scheduling. The SMC capability for initiating, analyzing, approving, implementing and maintaining current and historical ECS system scheduling information is confirmed. This includes review of SMC abilities to perform end-to-end scheduling information ingest of scheduling information related to event data processing, reprocessing, archiving and product distributing and receipt.. The SMC capability for generating scheduling directives for system-level site-to-site integration, testing, simulation and maintenance activities as well as the SMC capability for generating ground resource scheduling directives or recommendations to the EOC in response to emergency situations, is evaluated. The policies and procedures for site receipt, analysis and implementation of scheduling directives by the LSM and subsequent coordination and implementation by site scheduling personnel into site planning are inspected. Finally system and site procedures for monitoring ECS and each site's progress based on current approved schedules and procedures for maintaining the currency of ECS master schedules within the SMC are inspected.

8.2.1.1 Test Case A080210.010–DAAC Schedule Generation

The DAAC Schedule Generation test case is designed to test the DAAC's operational capabilities in requesting, accessing and making use of scheduling information received from the SMC. The test starts with a request by the DAAC to be included in an upcoming schedule-related-event. This involves an already distributed SMC schedule. This test case will demonstrate that the DAAC has capabilities to receive and accept schedule directives from the SMC, verify access to system-wide scheduling information provided, and convey non-instrument related schedules for ground operations within the DAAC and other ECS sites.

Summary and detail reports issued to the SMC, and the DAAC's reaction to SMC directives will be analyzed to determine the DAAC's ability to make schedule requests and to properly respond to schedule information received from the SMC.

8.2.1.2 Test Case A080210.020-SMC Schedule Generation

The SMC Schedule Generation test case verifies capabilities to support, maintain and generate data transmission and acquisition schedules, to support conflict resolution, and to respond to emergency situations.

The test case verifies SMC capabilities to provide schedule directives to DAAC sites in response to simulated AM-1 status and coordination data received by the SMC from EDOS, and TRMM Level-0 data transmission coordination data from TSDIS. A cross-DAAC process dependency situation is simulated which causes the need for system-wide scheduling along with a need for limited resource reconfiguration actions to resolve conflicts. The test case demonstrates that the SMC maintains and generates proper ECS scheduling actions appropriate to the need to transmit and capture ESDIS data.

The scheduling reports generated and directives issued will be analyzed to determine SMC's ability to properly schedule and re-schedule ECS sites.

8.2.1.3 Test Case A080210.030–EOC Schedule Generation

The EOC Schedule Generation test case verifies the EOC's capability to receive and accept scheduling and resource directives or recommendations from the SMC in response to the occurrence of unscheduled events of scientific interest (i.e., volcano eruption). The test case verifies that proper EOC procedures and associated activities are performed by the EOC in response to an urgent scientific request.

The EOC receives and acknowledges the directive from the SMC and takes appropriate action to generate and transmit a simulated spacecraft command load to configure the spacecraft and instruments to observe the event. It also informs the SMC of the action and issues set of instrument command notification messages appropriate to the simulated urgent request. The test case verifies EOC's capability to receive and accept scheduling and resource directives from the SMC.

Data communications and generated reports are captured and analyzed to determine the EOC's ability to use ESDIS procedures and directives and associated resource scheduling information to support nominal and emergency EOC operations. The test case examines the summary and detail reports issued to the SMC for purposes of verifying that the EOC is in compliance with scheduling procedures and actions.

8.2.2 Schedule Adjudication Sequence

The Schedule Adjudication Sequence confirms the process for adjudicating ECS schedules. The ECS systems scheduler's policy and practices for detecting, analyzing. adjudicating, distributing decisions; and monitoring actions resulting from schedule conflicts is confirmed by inspection of current procedures and practices at each site. The SMC policies and directives for determining conflict resolution based on proposed schedule change acceptance or rejection, and based on comparison with current master schedules maintained within the SMC is inspected.. The SMC capability for distributing schedule adjudication results is assessed based on comparison with ECS

requirements. Finally, system and site procedures for monitoring ECS and each site's progress and thoroughness in making on-site schedule adjustments based on approved adjudication results are inspected.

8.2.2.1 Test Case A080220.010–Adjudicate Internal ECS Site Application Conflicts for Local Resources

The Adjudicate Internal ECS Site Application Conflicts for Local Resources test case verifies SMC requirements to perform conflict-resolution in response to schedule or resource contention between internal applications at individual ECS sites. This test case simulates a conflict between the demand for local resources expressed by a series of local batch and on-line applications. The test case verifies SMC resource contention detection and adjudication capabilities to support science users who submit batch and interactive work through workstations at the site.

A resource contention problem is simulated at a DAAC site where the LSM is called into play to resolve the conflict. An adjudication process is established by the LSM resulting in the assignment of the resources under contention to the application with the highest priority applicable in the given circumstance. The LSM then notifies all applications of the conflict resolution action.

At the completion of the test, the actions taken by the SMC are inspected for conformance with expected results.

8.2.2.2 Test Case A080220.020–Adjudicate ECS Site Conflicts Caused by Failed Subsystem Components

The Adjudicate ECS Site Conflicts Caused by Failed Subsystem Components test case verifies requirements to perform analysis and conflict resolution in response to schedule or resource contention between DAAC subsystem components. It verifies that conflicts are identified and corrective action initiated for partitions of ECS functions at a DAAC site. For example, an instance of resource or schedule conflict caused by: failed operation of site hardware, delayed access to archived data, improper execution or performance of system software, and improper execution or performance of application (ECS services) level software will result in a notification of resource contention being posted by the LSM.

A series of hardware faults are simulated at an ECS site where fault management services isolate the fault and configuration management services support replacement of failed equipment. The LSM is called into play where subsystem schedule and resource conflicts are identified and resolved where possible. During this process, the LSM is expected to respond to: unsatisfied service request notifications, conflict resolution request messages, data server conflict alerts, and user authentication requests.

At the completion of the test, the actions taken by the LSM are inspected for conformance with expected results.

8.2.2.3 Test Case A080220.030–Adjudicate Contention for Resources Between ECS Sites

The Adjudicate Contention for Resources Between ECS Sites test case verifies SMC requirements to resolve contention for resources between ECS sites. It verifies ECS requirements to perform analysis and conflict resolution in response to problems associated with ECS ground event

schedules or abnormal service delays between sites. It verifies that the adjudication process is executed between ECS sites and it verifies that message and data communications comply with ECS site-to-site requirements.

Simulated ECS ground event problems or resource contention problems are initiated at each connection between DAACs, EOC, and SMC. The simulations introduce abnormal response times for a remote site's access to ECS archived products, user services or repository of ECS status information .

ECS DAACs issue notifications to the SMC when the site's access requests are not satisfied within specified time periods.

The test case verifies that the adjudication process is supported between the SMC and ECS DAACs. The test case verifies that SMC and ECS DAAC site's use of conflict identification, performance analysis, and policy and procedure's services to support their conflict resolution process. The AT team verifies that each conflict intervention strategy has no system-wide consequences but does have an impact on the local site's scheduling.

The test case verifies that each internal ECS site forwards requests for conflict resolution and intervention messages to the SMC. The test case verifies that the SMC accepts the messages, performs its level of impact analysis, then concurs with the recommended resolution from the ECS DAAC.

The test case verifies that summary and detail report(s) identifying the extent of the conflict are produced by the SMC and that these reports delineate the cause of service delays, and processing dependencies associated with the service request. The SMC produces proposed solutions along with a schedule for implementation for each conflict resolution. At the completion of the test, the reports produced and actions taken by the SMC are inspected for conformance with expected results.

8.2.3 Schedule Coordination Sequence

The Schedule Coordination Sequence evaluates SMC systems schedulers ability to produce and distribute coordinated schedules to ECS sites. The SMC system is evaluated for its ability to receive product and event generation schedules from the relevant sites. The SMC's procedures for identifying cross-site schedule dependencies and its procedures for analyzing and adjusting master schedules and recommending adjustments to product generation schedules are inspected for consistency and equitable treatment based on system-level priorities, product generation requirements and total system operating efficiency. Procedures are inspected for their ability to coordinate recommended schedule adjustments with other affected ECS sites. After final adjustments are included, inspection confirms each site's ability to distribute final adjustment directives to the affected sites for implementation. The acceptance test process finally assesses SMC procedures for monitoring and assuring that directive contents are implemented as specified.

8.2.3.1 Test Case A080230.010–SMC Schedule Coordination

The objective of the SMC Schedule Coordination test case verifies that the SMC has capabilities to perform ECS coordination activities to support the TRMM and AM-1 missions. The test case is used to verify access to data generated by the DAACs and the EOC to assure that coordination of mission related ground events and resources are in compliance with policies and directives of

ESDIS. The test case is an exercise to define and clarify the analysis process used to support overall coordination of ECS activities at the SMC. It is used to examine the schedule related data content provided by the interfaces and data communications protocols between the DAACs and the SMC as well as the EOC and the SMC. The test case is used to assure that the DAAC and EOC can participate in the coordination process, maintain autonomy of resource utilization, and verify that SMC maintains visibility into the real-time activities of the ECS.

Inputs to this test case consist of DAAC level product generation schedules, EDOS status, SCF status, V0 DAAC status, EOC status, ESN status (traffic status, route usage and route directives). Inputs also include a generic schedule template which reflects typical IWG policy, guidelines and priorities contained in the LTSP and LTIP from ESDIS.

The test case verifies that the SMC requests and receives product generation schedules from the EOC and from the EDC, GSFC, MSFC and LaRC DAACs. The test case verifies that ground event activities and product distribution allocations support TRMM and AM-1 early interface testing and mission support/ground system testing. The test case verifies that SMC adjusts and combines ground event schedules from EOC into a coordinated schedule and verifies that the schedule is used to construct a recommended schedule of ground events to support EOC flight operations to support TRMM and AM-1 early interface and mission support/ground system tests.

Outputs for this test case includes coordinated ground events and product generation schedules the EDC, GSFC, MSFC and LaRC DAACs along with EOC related information to support flight operations activities. These outputs will be inspected for compliance with expected results.

8.2.3.2 Test Case A080230.020–EOC Schedule Coordination

The objective of the EOC Schedule Coordination test case verifies that the EOC has capabilities to perform EOC to SMC coordination activities in support of the AM-1 mission. It verifies EOC capability to execute procedures to establish and sustain exchange of data between EOC and SMC for purposes of coordination.

Inputs to this test case consist of a generic schedule template reflecting EOS management and operations directives (including science policy and guidelines from IWG containing Long Term Spacecraft Plan (LTSP) and long-term Instrument Plan (LTIP)) from SMC. Inputs for this test case also include a series of mission status requests received from the SMC.

After a mission status request is received from SMC by the EOC, a coordination dialog is established between the EOC's local SMC and the ECS SMC on a dedicated data communications link . The EOC conducts a site assessment and responds. The test case verifies that coordination procedures are exercised which demonstrate EOC's capability to coordinate operations with the SMC.

Outputs for this test case consist of a series of mission status reports including operational histories and other general status information for inclusion in the status reports generated by the SMC. The output also includes reports describing EOC's operational plans and supporting ground event schedules related to security actions, and maintenance actions. These outputs will be inspected for compliance with expected results.

8.2.3.3 Test Case A080230.030–DAAC Schedule Coordination

An objective of DAAC Schedule Coordination Test Case verifies that the DAACs have the capability to perform schedule coordination and associated analysis necessary for the support the TRMM and AM-1 missions. This test case is used to verify that the DAAC system management personnel have access to system-wide product generation information, along with SMC stored ECS ground event schedules for maintenance, training, logistics and other ECS sustaining engineering requirements. Additionally, the coordination process extends to the balanced use of DAAC subsystem components. The test case verifies that internal DAAC schedules are compatible with and adaptable to the incremental changes to TRMM and AM-1 mission event schedules.

Inputs to this test case consist of requests for initial product and event schedules from SMC; adjusted schedule ground event and product generation schedules from SMC; ESDIS policies, procedures and directives; local SMC product generation schedules; and DAAC trend analysis and applicable aspects of DAAC performance monitoring and analysis reports.

Results of this test case consist of product generation and event schedules for transmission to the SMC, adjusted product generation and ground event schedules reflecting directives transmitted from the SMC, confirmation message exchanges with the SMC that the coordinated schedule is implemented in compliance with directives from SMC, and planning and data transfer information related to archived products. These test results will be inspected for compliance with expected results.

8.3 ECS Site Upgrade Scenario

This scenario traces the steps taken by the M&O staff in the process of implementing changes to the ECS site environment. It carries the maintenance personnel through established procedures for system upgrades and enhancements.

The purpose of this scenario is to provide confirmation of the SMC's, each site's, and the total system's ability to successfully evolve through installation of minor enhancements and major upgrades. ECS overall and site capability for ascertaining the validity and assessing impacts of requested modifications is inspected. The systems ability to analyze and approve/disapprove modification requests and effectively schedule and install approved modifications including, procedures for effective testing (and regression testing) of approved modifications is inspected. Provisions for retaining pre-modification versions of the system plus approved procedures for re-installing these pre-modification versions should problems with the new version arise, are inspected. Procedures for placing new implementations on operational status are inspected for assurance that effective in-site and cross-site communications describing new capabilities, modified procedures, in-site and cross-site impacts from the new modification and other required special instructions are included.

8.3.1 Upgrade/Evolvability Sequence

This sequence conducts the AT reviewers through ECS systems capability for initiating, analyzing, approving, implementing and maintaining current and historical system configuration status of ECS upgrades. Assurance of ECS evolvability is provided by inspection and demonstration of selected ECS architectural components for evidence of

modularity, such as object oriented software practices, that indicate the ability to implement enhancements with minimal total system impacts. SMC policy and procedures are reviewed to evaluate system-level upgrade/evolvability policies and procedures for accepting and analyzing internal or external user or facility requests for system upgrades. SMC procedures for approving/disapproving upgrade requests and coordination of such decisions with ECS facilities and users are evaluated. The SMC capability for maintaining a continuous active log of proposed, approved, in-work and completed upgrade requests as well as the system-level procedures for tracking, statusing and reporting on approved upgrade request activity is also confirmed through inspection of practices and procedures and well as review of actual log status and entries.

Site procedures for receiving processing and reporting on SMC-originated system and site upgrade directives are assessed. The LSM ability to analyze and initiate system upgrade actions within their assigned sites, to coordinate with site management, and to monitor site implementation team upgrade activities are evaluated.

8.3.1.1 Test Case A080310.010–ECS Update/Evolvability Procedures

For the TRMM release this test case is applied separately to the SMC, and to each of the four TRMM release DAACs.

This test provides ECS software, hardware and general managers with assurance that the SMC and the DAACs have satisfactory software update, and system-level interoperability procedures in place at all TRMM release sites.

Each applicable site's written policy and procedures for performing software/hardware updates, procedures for managing upgrade configurations, and as-built site architecture specifications are required inputs for this test. At each applicable site, procedures are inspected for satisfactory life cycle coverage of update initiation, implementation, and installation. Update configuration management procedures are inspected and compared with procedures for specification of timely reviews and baseline updates that assure the site's ability to update and retain configuration status.

DAAC development and update team members present and participate in analyses to confirm, ECS's architectural and procedural capability for adding new data providers, e.g. DAACs, SCFs, and ADCs, as well as enabling extended provider support consisting of extended client access of data and services at SCFs and DAACs. Transportability procedures are inspected for confirmation of maximum transportability across heterogeneous site architectures and for the ability to enable addition of information search and retrieval services. The ability of each site to enable expansion to Gigabyte networks including the ability to provide increased volume of data distribution/access is verified by inspection. The ability to enable extended science user provider services and to enable interoperability with international system browse and data retrieval systems is confirmed.

SMC procedures for approving/disapproving upgrade requests and coordination of such decisions with ECS facilities and users are evaluated. The SMC capability for maintaining a continuous active log of proposed, approved, in-work and completed upgrade requests as well as the system-level procedures for tracking, stating and reporting on approved upgrade request activity is also confirmed through inspection of practices and procedures and well as review of actual log status and entries.

LSM procedures for receiving processing and reporting on SMC-originated system and site upgrade directives are assessed. The LSM ability to analyze and initiate SMC provided upgrade actions within their assigned sites, to coordinate with site management, and to monitor site implementation team upgrade activities are evaluated. For upgrades that involve actions by several sites, the ECS policy and procedures for analyzing, approving and for allocating upgrade requirements among applicable ECS sites is inspected as well as procedures for integrating, testing and accepting inter-site upgrades.

Analyses reports confirming the existence and suitability of the specified procedures and enabling capabilities constitute the outputs for this test case.

8.3.1.2 Test Case A080310.020–DAAC Update/Interoperability Procedures

For the TRMM release, this test case is applied separately to each TRMM Release DAAC.

This test provides DAAC and ECS software, hardware and general managers with assurance that the DAACs have satisfactory procedures in place for enabling future DAAC system evolution including science user interface evolution.

DAAC development and update team members present and participate in analyses to confirm each DAAC's architectural and procedural capability for adding DAAC-specific fields to metadata products, browse products, and data processing guides. Each DAAC's ability to package and document products and procedures that permit direct present or future installation of local user interfaces for accessing core metadata and browse data servers, for adding new storage devices, and for addition of new data types and DAAC-unique value-added services and products is evaluated.

DAAC science support system engineers present specifications for as-built DAAC development infrastructure that permits installation and interactive insertion of science user developed extensions and direct access to data including, new search methods for browsing data and metadata.

Analyses reports confirming the existence and suitability of the specified procedures and enabling capabilities constitute the outputs for this test case.

8.3.2 Enhancements Sequence

This sequence conducts the AT reviewers through ECS site procedures for coordinating site enhancements with the ECS systems level team. ECS site policy and procedures are inspected to evaluate in-site enhancement policies. Analysis is performed to provide evidence that proper coordination actions with SMC takes place that update SMC retained site architectures procedures to reflect the newly installed enhancement. Site procedures are reviewed for assurance that integrated system-level enhancement related policies and procedures are in force within ECS sites.

LSM procedures for receiving monitoring and reporting on SMC originated site enhancements are assessed. LSM procedures and activities for coordinating with site management and monitoring site implementation team enhancement activities, to confirm appropriate use of integrated toolkits and standard user interfaces are evaluated.

8.3.2.1 Test Case A080320.010–ECS Enhancements

For the TRMM release this test case is applied separately to the SMC, EOC, and each TRMM Release DAAC.

This test provides ECS software, hardware and general managers with assurance that the SMC, EOC, and DAACs have satisfactory software enhancement procedures in place at all TRMM Release sites.

Each applicable site's written policy, procedures and as-built architecture specifications for managing and performing system enhancements are required inputs for this test case. Procedures are inspected for satisfactory life cycle coverage of enhancement initiation, implementation, and installation. Enhancement configuration management procedures are inspected and compared with enhancement procedures for specification of timely reviews and baseline updates that assure the site's ability to update and retain configuration status.

DAAC, EOC, and SMC development and update team members present and participate in analyses to confirm the ECS architectural and procedural capability for expanding to include new instrument data products and algorithms. Special consideration is given to evaluate the ECS ability to easily expand storage capacity and processing capability. The ECS site architectures are inspected to confirm their ability to accommodate capacity growth in all existing functions, as well as it's ability to enable addition of new functions, new site toolkits with common user interfaces. The ECS data base is evaluated for its capability to enable its assimilation of new site toolkits with common interfaces and for its capability to undergo 100% expansion in both processing and storage capacity.

Analyses reports confirming the existence and suitability of the specified procedures and enabling capabilities constitute the outputs for this test case.

8.4 Configuration Management Scenario

This scenario conducts the site operations staff through the ECS capability for performing system-level configuration management. Both SMC and LSM configuration management functions and procedures are confirmed. Resource management procedures are evaluated for effective, complete and prompt coordination and movement between ECS sites, of resources, and resource related procedures and permissions, such as operational directives and COTS software usage licenses and unlicensed toolkits. Procedures for SMC team interface with site LSM points-of-contact are inspected to confirm ability to coordinate and effect integrated hardware and systems software maintenance activities including management of on-site and off-site corrective and systems hardware maintenance and monitoring off-site repair activities. SMC/LSM logistics management activities are assessed for their combined ability to monitor and communicate information concerning spares and consumable inventories and replenishment. The AT team evaluates the effectiveness of system training management including the quality of SMC support and the LSM's ability to coordinate training issues between the LSM assigned site and the SMC.

The completeness, effectiveness and the degree of comprehensives of the ECS capability for controlling and maintaining system-wide inventories including evaluation of previous or on-going inventory procedures is assessed. The quality of SMC/LSM /site coordination of inventory management activities is evaluated. SMC activities regarding management of system enhancement requests are included as a part of inventory management. The effectiveness of

sustaining engineering in managing system upgrades and enhancements are evaluated. ECS system-level quality management is evaluated for its ability to assess overall ECS performance within the SMC, for effective SMC/LSM coordination, and for satisfactory LSM quality assurance procedures. LSM procedures for monitoring and assessing in-site security procedures are evaluated as well as the LSM ability to receive SMC-originated system security information and directives and to communicate in-site security status and events. SMC security evaluations include assessments of SMC's ability to manage the system-level security process, including network security. The ECS capability for collecting controlling, maintaining and distributing ECS system-level policies and procedures is evaluated as well as the capability of providing, maintaining. and updating a bulletin board service for publishing current ECS status, events, news and toolkit references and updates.

AT configuration management evaluations include assessment of the ECS network management capability for providing control of network configuration parameters and resources. The performance testing component of ECS configuration management includes assessment of SMC performance based on comparisons with ECS performance requirements metrics as well as evaluation of the SMC's capability for collecting, generating, maintaining and updating ECS performance information such as performance criteria and responses to performance deficiencies.

The site LSMs will be evaluated for their procedures and proficiency in implementing SMC performance directives and evaluating site performance against established ESDIS performance criteria. AT of performance monitoring includes assessment of the SMC/LSM to effectively perform trend analyses at both the system and site levels and to analyze the results of this monitoring effort.

8.4.1 Resource Management Sequence

This sequence conducts the AT reviewers through ECS resource management activities for providing system-level information, equipment and software resources to ECS sites. The site management and operations team demonstrates the SMC capability to generate and send ground operations events to sites for implementation, as well as the LSM capability for conveying, monitoring and reporting to the SMC on the status and progress of the implementation of these activities. SMC procedures for generating and transmitting managerial and operational directives are also inspected, as well as the LSM capability for effectively conveying and monitoring in-site implementation of directives and performing required SMC coordination/reporting. The SMC procedures for making available system-level toolkits for automated distribution to appropriate sites is also inspected, including procedures for distributing unlicensed toolkit components, licenses for commercial products, product upgrades and user/maintenance documentation.

8.4.1.1 Test Case A080410.010–Resource Management Directive

This test case investigates the SMC M&O staff's ability to generate managerial and operational directives, such as directives involving operational status, resource allocation and upgrade to the sites' LSM M&O procedures. The input for this test is an approved set of written resource management policies.

The AT reviewer demonstrates the SMC M&O staff's effectiveness in issuing directives, such as those pertaining to the distribution of resources to authorized users. The reviewer generates a sample directive to use in the evaluation. As described in the policy, the directive is then

communicated to the site(s) affected. After receipt of the directive the LSM M&O staff disseminates the information to the parties affected. Upon completion of its review, the AT test team provides a detailed report on the effectiveness of the procedures.

8.4.1.2 Test Case A080410.020–Ground Operations Event

The purpose of this test case is to verify that the M&O staff has the capability to issue ground operations events regarding site resources. The events are sent to the site LSM(s) for implementation. These events include distribution, configuration, and testing of site resources, such as commercial software and toolkit software, upgrades and documentation.

The inputs for this test case are a sample ground operation event and the resources which are required for this event. Using these inputs, the SMC staff will generate an event. This event is then communicated to the site(s) LSM staff who will respond accordingly. The SMC staff monitors the LSM personnel's distribution of the hardware and/or software required by the event. The AT team examines the resource coordination and movement between itself and the site(s) M&O staff and notes the results to be included in the report. Coordination and movement within the site is also reviewed.

Once distributed to the appropriate location, the LSM then configures the resources as required for proper operation. The LSM then tests the resource's operation. Upon completion of the testing, the LSM communicates the resource's operational status back to the SMC. During this analysis and demonstration, the AT test team notes any significant occurrences to be included in a detailed report describing the SMC's ability to generate ground operations events for implementation.

8.4.1.3 Test Case A080410.030–Resource Conflict

The objective of this test case is to verify the capability of each LSM to inform the users of any resource availability conflicts. Effective utilization of site resources is critical to the accomplishment of individual site and system wide mission objectives. While product generation, servicing user information, and product requests are the highest priority tasks at each site, maintaining high reliability and availability of hardware and software resources is dependent on a variety of management activities.

The users provide LSM resource personnel with information on desired or required resource utilization. The LSM resource personnel collect these inputs and develop a planned site resource utilization or availability schedule. When more than one user requests utilization of the same resource, conflicts arise. Procedures for user notification of resource conflicts by the LSM are confirmed.

8.4.1.4 Test Case A080410.040–Sufficient Storage

This test case investigates the ability of the MSS to provide sufficient storage for ECS data. Sufficient storage capabilities need to be provided for various types of ECS data, such as metadata, spacecraft housekeeping and ancillary data, and summary data statistics.

Using an approved set of resource management policies, the M&O staff reviews the resource space procedures. Then, they verify that procedures exist for checking the amount of space currently available. M&O procedures for adding storage space when the space level falls below policy limits is confirmed.

The expected results of this test is the successful maintenance of storage space levels for ECS data.

8.4.2 Maintenance Management Sequence

This sequence illustrates to the AT reviewer, the ECS capabilities for managing system-level maintenance activities, personnel, and resources in performing on-site and off-site preventative and corrective maintenance activities. The AT team inspects SMC procedures for developing and updating a system-level maintenance management database containing historical, current and planned schedules resource commitments and budgets pertaining to system-level maintenance management. SMC system-level maintenance team policy and procedures are evaluated for specification of management activities for providing system-level assistance in managing site-level maintenance activities. The LSM procedures at each facility are inspected for the existence and completeness of procedures for receiving maintenance management directives and for monitoring, statusing and reporting to the SMC on LSM activities in response to maintenance directives. The SMC maintenance team policy and procedures are evaluated for specification of specific assistance activities in assisting and providing system-level skills and resources to assist in site-level maintenance activities, including personnel skills, multi-site use maintenance tools and system-level maintenance software toolkits. The LSM procedures at each facility are inspected for the existence and completeness of procedures for applying available SMC resources within their assigned facilities. SMC procedures for monitoring and evaluating maintenance procedures and effectiveness at the system and site levels are inspected.

8.4.2.1 Test Case A084020.010–Maintenance Database Management

This test case verifies the SMC staff's ability to manipulate maintenance data in a system-level maintenance management database. The Inspection method is used to verify this test case.

Historical, current and planned system maintenance schedules are used as input for this test. Other input for this test includes resource commitments, budgets regarding maintenance management, and on-site and off-site repair information. Preventive and corrective maintenance schedules are also included as input.

Using the maintenance database, the SMC maintenance staff enters, edits and queries maintenance activities. The test outputs consist of on-line and report data summaries. The output reflects a choice of data summary formats including comprehensive and detailed formats. Also provided as output is an analysis of the results of the data summaries with expected results of the data summaries.

8.4.2.2 Test Case A080420.020–Maintenance Database Access

This test case verifies that the SMC and LSM M&O personnel are able to access the maintenance data stored in the maintenance management database. The Demonstration method is used to verify this test case.

The data stored in the maintenance management database is the input for this test. This data stored in the database includes resource commitments, budgets regarding maintenance management, and preventive and corrective maintenance schedules (historical, planned, and current).

Using the Maintenance Database, the M&O staff issues search and query commands. The M&O staff issues commands to produce maintenance reports as well. The test outputs consist of on-line and report data summaries. The output reflects a choice of data summary formats including comprehensive and detailed formats. Also provided as output is an analysis of the results of the data summaries with expected results of the data summaries.

8.4.2.3 Test Case A080420.030–On-site Preventive Maintenance

This test case verifies the SMC and LSM M&O staff's ability to provide on-site preventive maintenance support at each site. Preventive maintenance is scheduled well in advance of its occurrence. Preventive maintenance schedules (historical, current, and planned) are used as input for this test. The Analysis and Demonstration methods are used to conduct this test.

When a preventive maintenance action is scheduled, LSM personnel notify the affected users prior to the maintenance occurring of any user services which may be affected during the preventive maintenance period. The users are also informed of the estimated duration of the preventive maintenance period. The LSM personnel coordinate with site staff to minimize the disruption of user services. After user notification, the LSM personnel perform the scheduled maintenance at the scheduled time at the site. If the scheduled preventive maintenance action requires SMC assistance, the SMC staff coordinates the maintenance duties between themselves and the LSM staff. Then, the SMC staff dispatches technicians to provide assistance in performing the actions to the LSM.

Upon completion of the maintenance procedure, the SMC and LSM personnel update the maintenance database with information on the preventive action taken and the results obtained. Preventive action reports are then generated by the database and analyzed to determine the effectiveness of the maintenance and assistance provided.

8.4.2.4 Test Case A080420.040–On-site Corrective Maintenance

This test case verifies the SMC and LSM M&O staff's ability to provide on-site corrective maintenance support. The Analysis and Demonstration methods are used to conduct this test. A corrective maintenance event is used as input for this test.

When a problem is detected, the site user contacts the LSM corrective maintenance personnel. A LSM technician responds. The LSM technician performs diagnostic actions and attempts to identify and isolate the cause of the problem. When a technician determines that the equipment cannot be repaired on-site, it is shipped to an off-site facility for repair. If the technician cannot isolate the problem, other LSM personnel are notified. If the problem cannot be resolved by LSM personnel, the SMC staff is then informed of the situation. At this point, the SMC staff dispatches technicians to provide assistance to the LSM at the site.

Upon completion of the troubleshooting procedure, both SMC and LSM technicians update the maintenance database with information on the diagnostic tests performed, results obtained, and corrective action taken. Diagnostic and corrective action reports are then generated by the database and analyzed to determine the effectiveness of the maintenance provided.

8.4.2.5 Test Case A080420.050–Off-Site Corrective Maintenance Management

This test case verifies the ability of the SMC's and LSM's M&O staff to coordinate off-site corrective maintenance management for each site. Computer equipment which cannot be repaired on-site is shipped to off-site intermediate and depot hardware maintenance support facilities for repair. The equipment must be repaired and returned in a timely fashion or other more costly resupply measures must be initiated.

The inputs for this test are the maintenance management policies and a corrective maintenance action. The management process includes the coordination activities required to maintain the site resources. The test is verified using the Demonstration method.

The LSM maintenance staff sends the component to the appropriate vendor and records repair information into the database. This information includes a description of the problem, name of repair contractor, date sent to repair facility, estimated time of repair and cost. After the item has been repaired and returned, updated information, such as repairs made, actual cost of repair and time of repair, is also recorded. The information is used for analyses purposes to include assessments of turn-around time, spare status, and maintenance trends. Software problems are addressed in accordance with approved configuration management procedures. Information including a description of the problems and their solutions is recorded in Non conformance Reports (NCRs) and made available to site and SMC staffs.

When a corrective maintenance action occurs, the SMC tracks the maintenance coordination process conducted by the LSM M&O staff. During this test, the SMC staff's ability to monitor hardware and software maintenance status for off-site repair actions is also confirmed. The SMC staff must be capable of monitoring off-site repair actions on a system-wide and site-specific basis. The monitoring procedures include identifying system-wide or local vendor repair problems and maintenance trends, such as an unusually high repair rate for certain equipment. The SMC staff notes any significant information pertaining to the repair of the component and logs it into the database.

Upon the return of the repaired item, the AT team generates a report on the effectiveness of the SMC to monitor Off-Site Maintenance Status. It is expected that the SMC and LSM M&O staff provide efficient and responsive maintenance management to each site through the use of effective maintenance instructions and procedures.

8.4.2.6 Test Case A080420.060–Maintenance Management Directive

This test case investigates the SMC M&O staff's ability to generate managerial and operational directives involving maintenance management to the sites' LSM M&O staff. Once received, the LSM M&O staff's ability to convey these directives to the site personnel is also evaluated. The input for this test is an approved set of written maintenance management policies.

The AT reviewer demonstrates the SMC maintenance staff's effectiveness in issuing directives on the distribution of resources to authorized users by generating a sample directive to use in the evaluation. As described in the policy, the directive is then communicated to the LSM(s) affected. Then, the directive is communicated to the personnel affected by the LSM M&O staff. Upon completion of its review, the AT test team provides a detailed report on the completeness and effectiveness of the procedures.

8.4.2.7 Test Case A080420.070–Maintenance Policy

The objective of this test case is to verify the effectiveness of the Maintenance Policy for the SMC and LSM M&O staffs. The ESN Maintenance Policy provides the authority and guidance necessary for the SMC and the LSM to accomplish maintenance objectives in a consistent and cohesive manner. In maintenance management, policy implementation is conducted through fine tuning or modification of selected parameters.

An approved set of written maintenance management policies is the input for this test. The Analysis method is used to verify these policies.

The review team randomly selects a group of maintenance management policies, such as the predicted maintainability policy. These policies are then examined and evaluated for effectiveness and completeness. The findings from this examination are then provided in a detailed report.

8.4.3 Logistics Management Sequence

This sequence reviews ECS capabilities for managing system-level logistics management activities and for managing system-level personnel and resources in logistics control activities. The AT team inspects SMC's procedures for developing and updating a system-level logistics management database containing historical, current and planned logistics commitments. SMC system-level logistics team policy and procedures are inspected for specification of management activities for providing system-level assistance in managing site-level inventory management and control activities. The LSM policies and procedures are inspected for the existence and completeness of procedures for receiving logistics management directives and for monitoring, statusing and reporting to SMC on LSM activities in response to logistics related directives. The SMC logistics team policy and procedures are inspected for specification of specific site-level logistics activities in assisting and providing system-level skills and resources to assist in site-level logistics functions, including personnel skills, logistic management tools and system-level logistics related toolkits. The LSM policies and procedures at each site are inspected for the existence and completeness of procedures for applying available SMC resources within their assigned facilities. SMC procedures for monitoring and evaluating logistics procedures and effectiveness at the system and site levels are inspected.

8.4.3.1 Test Case A080430.010–Logistics Monitoring

This test case verifies that the SMC and LSM have the capability to monitor the spares and consumables inventory. The Inspection and Demonstration methods are used to verify these capabilities. This test case is performed at the SMC, EOC, and each TRMM Release DAAC.

At the SMC, the AT team reviews the procedures for accessing and monitoring the inventory status data base for each TRMM Release site. The AT team performs a similar review at each individual site. The M&O team follows these procedures to bring up and access the inventory status data base at each site. At each site, the AT team records the quantity and status of three consumable items (computer tapes, computer disks, and computer paper) and one spare part as contained in the data base. In the case of the SMC, the AT team records this information for each site. A physical inspection of the inventory is made at each site to obtain the actual quantity and status of the three consumable items and the selected spare part. The AT team records the results.

There should be no discrepancies between the data base information and the quantity and status of consumable items and spare parts actually available at each site. The data base at the SMC should reflect the actual quantity and status of items for all sites. Additionally, the AT team makes an assessment of the SMC and LSM logistics monitoring procedures, which should provide information on how to track the location, quantity, status, and consumption rate concerning spares and consumables. These procedures should also describe actions to be taken when there is a discrepancy between physical inventories and data base information and when the quantity of spares and consumables falls below critical levels.

8.4.3.2 Test Case A080430.020–Logistics Replenishment

This test case verifies that the SMC has the capability to oversee, and the LSM the capability to manage, replenishment of spare parts and consumable items. The Inspection and Demonstration methods are used to verify these capabilities. This test case is performed at the SMC, EOC, and each TRMM Release DAAC.

At the SMC and each LSM, the AT team reviews the procedures for overseeing and managing, respectively, the replenishment of spare parts and consumable items. The AT team assesses these procedures for actions to be taken when stock levels fall below reorder points. At each site, the AT team notifies the M&O team that the current quantities of three consumable items (computer tapes, computer disks, and computer paper) and one critical spare part selected by the AT team have just fallen to one less than their respective reorder points at each site. The M&O team brings up the data base at each site and changes the current quantities of these items accordingly. (If necessary, a copy of this data base is made beforehand for test purposes so it can be changed without affecting operations.) The quantity of these items as contained in the data base is recorded. In the case of the SMC, the AT team records this information for all sites. The M&O team at each site uses logistics replenishment procedures to change the data base to reflect the decreased quantities of items, and the AT team records this information. At the SMC, this information is recorded for each site.

An alert or warning message notifying the SMC of a shortfall in consumables and spare parts should be generated. As a result of these messages, the M&O team should simulate appropriate actions regarding the shortfall using SMC logistics replenishment procedures. The AT team records any alert or warning messages, compares simulated actions to procedures, and records the results, noting any discrepancies and deficiencies.

The M&O team at each site takes action to replenish the shortfall items, including simulating the ordering of the items and changing the data base to indicate that the items have been ordered. The AT team records this information. At the SMC, the information is recorded for all sites.

The AT team notifies the M&O team at each site that the quantities of the items have been increased to one more than their respective reorder points. The M&O team uses logistics replenishment procedures to change the data base to reflect the new quantities of these items. The AT team records this information from the data base. In the case of the SMC, the AT team records this information for all sites.

Throughout this test case, the AT team compares M&O team actions with SMC and LSM logistics replenishment procedures and records the results noting any discrepancies and deficiencies. The AT team also compares the information gathered from the data base at each site with that gathered at the SMC. In all cases, the data base at the SMC should reflect the same information as that contained in the corresponding LSM data bases.

8.4.4 Training Management Sequence

This sequence provides the methodology for AT reviewer inspection of ECS capabilities for managing system-level training and for supplying system-level personnel and courseware in performing on-site. The AT team inspects the established database architecture to confirm the SMC's ability for developing and updating a system-level training management information base containing historical, current and planned schedules courseware availability, training commitments and budgets pertaining to system training activities. The SMC training team policy and procedures are inspected for specification of management activities for providing system-level assistance in managing site training.. The LSM procedures, at each facility, are inspected for the existence and completeness of procedures for receiving training management directives and for monitoring, statusing and reporting to SMC on LSM activities in response to SMC originated training directives. The SMC training team policy and procedures are inspected for specification of specific assistance activities in assisting and providing system-level skills and resources to assist in site-level training and courseware development, including personnel skills, multi-site training tools and system-level training courseware toolkits. The LSM procedures, at each facility, are inspected for the existence and completeness of procedures for applying available SMC training resources within their assigned facilities. SMC procedures for monitoring and evaluating training course conduct and training effectiveness at the system and site levels are inspected.

8.4.4.1 Test Case A080440.010–ECS Training and Certification Program Management

The Training and Certification Program Management test verifies that the ECS SMC training staff accesses the office automation (OA) tools required to develop plans for conducting training courses. The OA tools assists the SMC training staff in performing the following task: determining training requirements for various operator positions, tracking resources for training, and maintaining training course information. The Demonstration and Analysis methods are used to verify that the OA tools support the management of training and certification programs for the ECS.

When determining training requirements for the operator, maintenance engineer, and software sustaining engineer positions, the SMC training staff accesses the Certification Skills Catalog to identify the tasks and knowledge required, to effectively perform each specific DAAC ECS operation. The SMC training staff then contacts the MSFC, LaRC, and GSFC DAACs site ECS managers, via Email, to obtain information on the personnel training needs, the number of people requiring training, and any site unique training requirements. This information is collected and stored in the ECS on-line training database to assist the SMC training staff in the organization and management of ECS training.

Once all of the information from the DAAC site ECS managers has been entered into the Training database, the SMC training staff uses the information to assist in the following planning activities: scheduling dates of training courses, developing training courses, scheduling training resources (system equipment, software, instructional materials), and scheduling personnel to support training. The ECS training database is updated with all of the scheduling information and formatted into a Training Schedule Report. This report is disseminated to the ECS site managers via the ECS training bulletin board as the proposed training schedule. After review and consideration by the site managers, the SMC training staff finalizes the training course schedule and makes them available via the ECS training bulletin board. Training registration is done by Email. A confirmation of all training registration applications is transferred via Email.

8.4.4.2 Test Case A080440.020 – On-the-Job Training

The On-the-Job Training (OJT) Test verifies that the site ECS managers are equipped to provide the tools necessary to train personnel in operation skills under actual job conditions, while tutored by a Subject Matter Expert (SME). The tools required to conduct on-the-job training are as follows: the SME Handbook; the OJT Student Package; and the OJT Progress Records. The Demonstration method is used to verify that the development of OJT management is supported.

The site ECS manager is provided with a SME handbook that outlines the administrative procedures of the OJT program. The SME uses the handbook for guidance on the instructions and details of training activities, and the evaluation of progress.

Personnel participating in OJT activities make use of the OJT Student Package for an explanation of the roles of the SME and the student, instruction on how to use provided reference materials, and directions for OJT activities.

Upon completion of an OJT activity session the SME references the Certification Skills Catalog to identify the Certification Test that is administered to the student for final evaluation. The result are recorded in the OJT Progress Record database, and submitted to the SMC via Email.

8.4.5 Inventory Management Sequence

This sequence provides the methodology for AT reviewer inspection of ECS capabilities for providing and maintaining a configuration management (CM) system, maintaining inventory data bases, managing system-level inventory policy and procedures, and participating and contributing system-level skills and resources in performing site-level inventory activities. The AT team inspects the SMC's procedures and policy for planning, establishing and maintaining a system - wide inventory of all hardware, science software, system software, and associated documentation within ECS. The SMC inventory management teams procedures for evaluating received system enhancement requests and for approving and providing overall management of the implementation of approved requests is inspected. SMC management implementation oversight includes hardware, software, and algorithm enhancements and upgrades as part of sustaining engineering.

8.4.5.1 Test Case A080450.010–Inventory and Configuration Management

This test case verifies that the SMC can establish and maintain a system-wide inventory data base of hardware, system software, and science software and provide a system-wide configuration management (CM) capability. The LSM's capability to perform these functions for its own site is also confirmed. Verification that the SMC can establish, maintain, and update the authorized users

inventory, the approved facility and equipment inventory, and the system profile, is also performed. The Inspection and Demonstration methods are used to verify these capabilities. This test case is performed at the SMC, EOC, and each TRMM Release DAAC.

At the SMC and each LSM, the AT team reviews the documentation for maintaining the inventory of hardware, science software, and system software on a system-wide and site-specific basis, respectively. The M&O team uses this information to bring up and access the VCATS data base, which contains CM information for hardware. For each site, data base information pertaining one hardware item specified by the AT team is recorded. The AT team inspects the identification numbers, manufacturer, part number, and serial number of the actual hardware item and records this information. An inspection of the selected hardware is performed at each site, and the AT team records the results. In the case of the SMC, the AT team records this information for each site.

A similar set of events is repeated for both system and science software, except that the ClearCase data base, which contains CM information for system and science software, is accessed instead of VCATS. Additionally, software dates, version numbers, and the name and location for software maintenance are substituted for hardware manufacturer, part number, and serial number.

At each site, the AT team compares the data base information with results of the hardware and software inspection. There should be no discrepancies between the information contained in the VCATS and ClearCase data bases and the actual items selected for inspection. There also should be no discrepancies between information contained in the data base at the SMC and the data base at each site. Additionally, the AT team makes an assessment of the SMC and LSM inventory and CM documentation, which should be complete and accurate for accessing and monitoring the VCATS and ClearCase data bases. Procedures should also describe actions to be taken when there is a discrepancy between physical inventories and information contained in the CM system.

8.4.5.2 Test Case A080450.020–SMC Enhancement Evaluation and Implementation Management

This test case verifies the SMC's ability to evaluate system enhancement requests and manage implementation of approved system and algorithm enhancements. The Inspection and Demonstration methods are used to verify these capabilities. The description that follows involves the SMC and LaRC DAAC. However, this test case is repeated at the other TRMM Release DAACs as well.

At the SMC, the AT team reviews the procedures for evaluating system enhancement requests The SMC uses these procedures to evaluate a simulated system software enhancement request for the LaRC DAAC provided by the AT team via Configuration Change Request. The evaluation includes technical feasibility, implementation schedule, expected costs, and impacts on existing system-wide hardware and software.

The AT team reviews the procedures for managing the implementation of approved hardware, system software, and science algorithm enhancements. The AT team notifies the SMC that the system software enhancement request for the LaRC DAAC has been approved. The SMC provides overall management of the implementation of the approved changes to the hardware. The SMC documents the approval decision and distributes this information to the ECS sites. The AT team contacts the LaRC DAAC (by phone) to determine if the approval decision message sent by the SMC was received. The science community at large is also notified via mechanisms such as the

ECS Data Handling System (EDHS) and ECS Bulletin Boards. The AT team inspects these information systems for the approval decision message. The SMC coordinates the activities leading up to implementation, keeping the LaRC DAAC, the other ECS sites, the ECS development organization, and the ESDIS project informed. The SMC also monitors the actual implementation, keeping all parties notified of implementation status and any problems that might arise.

A similar set of events is repeated for both hardware and science algorithm enhancements. In the latter case, the SCF providing the algorithm and science community at large are also kept up-to-date with implementation activities and status.

The AT team inspects the EDHS and bulletin board for accuracy and content. Additionally, the AT team makes an assessment of the SMC procedures for evaluating system enhancement requests and managing the implementation of approved system and algorithm enhancements.

8.4.5.3 Test Case A080450.030–LSM Enhancement Migration and Inventory Updating

This test case verifies the capability for the LSM, via sustaining engineering, to update the system-wide inventory data base and provide CM for the migration of upgrades and enhancements into the operational system for site-specific items. The SMC capability to support the migration of upgrades is also confirmed. The Inspection and Demonstration methods are used to verify these capabilities. This test case is repeated at the EOC and each of the TRMM Release DAACs with SMC involvement in each instance.

The AT team reviews the documentation for updating the inventory data base for hardware and system and science software. The M&O team uses this information to update the VCATS data base containing CM information for hardware. (If necessary, a copy of this data base is made for test purposes so it can be changed without affecting operations.) The M&O team brings up and accesses the VCATS data base. Data base information about one hardware item specified by the AT team is recorded. At the SMC, data base information on the same hardware item is recorded.

The AT team notifies the M&O team that one hardware item has replaced another on the operational system. The AT team provides the identification number, manufacturer, part number, and serial number of the new hardware item. The M&O team uses LSM inventory updating procedures to change the VCATS data base so it reflects the new hardware configuration. Information from the data base is recorded after the update is made. At the SMC, data base information on the same hardware item is recorded.

A similar set of events is repeated for both system and science software, except that the ClearCase data base, which contains CM information for system and science software, is updated instead of VCATS. Additionally, software dates, version numbers, and the name and location for software maintenance are substituted for hardware manufacturer, part number, and serial number.

Throughout this test case, the AT team compares M&O team actions with LSM inventory update procedures and records the results noting any discrepancies and deficiencies. The AT team also compares information from the VCATS and ClearCase data bases generated at the SMC with the corresponding information generated at the site. The data base information at the SMC should be identical to the corresponding information for the site.

8.4.6 Quality Management Sequence

This sequence illustrates to the AT reviewer ECS capabilities for establishing and maintaining quality assurance management data bases, for managing system-level quality assurance policy and procedures and for system-level quality assurance for overall ECS performance as well as for specific programmatic areas. The AT team inspects the SMC's procedures and policy for planning, establishing and maintaining and executing quality assurance procedures including system quality testing, equipment and procedures benchmarks and quality audits, product quality checking and audits for products processed and delivered, and quality testing of system resource usage performance.

The AT team inspects LSM procedures to confirm LSM ability to perform quality assurance for assigned sites, such as site quality testing, benchmarks, audits of site enhancement implementations, site quality checking, processed and delivered quality checks and quality evaluations of site resource usage performance.

8.4.6.1 Test Case A080460.010–SMC Quality Assurance

This test case verifies that the SMC has the capability to perform quality assurance activities. The Inspection method is used to verify that the SMC can successfully perform these activities. This test case is performed at the SMC.

The AT team reviews QA policies and procedures for accomplishing system-wide QA activities, which include the following items: quality assurance for the overall ECS performance; system-level quality testing, benchmarks, and audits for system enhancement implementations at the EOC and each of the DAACs; quality checking and audits of products processed and delivered; and quality testing and audits of site and element resource performance.

The AT team inspects policies and procedures to ensure that the SMC can perform QA audits on a periodic basis to ensure adherence to established standards and procedures for hardware, software and operations; produce audit reports semi-annually, in accordance with DID 506, "Audit Reports;" work with performance assurance personnel to track the continuous measurable improvement (cmi) program; and instill into operations the importance of quality products and services.

8.4.6.2 Test Case A080460.020–LSM Quality Assurance

This test case verifies that the LSM has the capability to perform quality assurance (QA) activities. The Inspection and Demonstration methods are used to verify that the LSM can successfully perform this activity. This test case is repeated at each of the TRMM Release DAACs.

The AT team reviews the documentation for performing site-specific quality assurance. The M&O team uses this information to evaluate the quality of simulated ingested data. This includes reviewing error logs. Specifically, data headers are examined for errors in data identification, data routing, data quality, sequencing of time-ordered data, data gaps, and data redundancy. The M&O team performs actions necessary to reflect the appropriate quality assurance code in the product metadata.

The M&O team follows applicable procedures to perform manual QA for a simulated product generated by the DAAC and specified by the AT team. The M&O team registers a subscription for receiving the product and specifies the QA conditions for the data. Once the subscription is

triggered, the M&O team is notified and may access the product. The M&O team evaluates the product's quality using QA policies and procedures and performs actions necessary to reflect the appropriate quality assurance code in the product metadata. If necessary, a second product should be evaluated such that the product data are randomly distributed over time and geographical areas in order to detect unanticipated anomalies. The AT observes the actions of the M&O team and compares them with the quality assurance documentation, recording any discrepancies and inadequacies.

The AT team inspects policies and procedures to ensure that quality testing, benchmarks and audits for site-specific enhancement implementations can be successfully accomplished, and that quality testing and audits of DAAC resource performance can be performed.

8.4.7 Security Management Sequence

This sequence provides the AT reviewer guidance in inspecting and confirming ECS capabilities for establishing and maintaining security management data bases, for managing system and site-level security policy and procedures, and for system-level security activities for the entire ECS. The AT team inspects the SMC's procedures and policy for planning, establishing, maintaining and updating security policies and procedures. The AT team inspects the combined SMC and LSM system and site-level policies and procedures related to physical security password management, operational security, data security, privileges, and security compromise mitigation.

8.4.7.1 Test Case A080470.010–SMC Security Management Policies and Procedures

This test case provides SMC management and the ECS security officer with assurance that complete ECS security policies and procedures are in-place and are maintained within the SMC complex. Test inputs consist of written ECS security policies and procedures from the SMC library or database. This security documentation is inspected for applicability to all of the TRMM release sites. The inspection also verifies that the SMC security documentation is maintained to include latest security directives and information and addresses the following topics: physical security, password management, operational security, data classifications, access/privileges, and compromise mitigation.

A final test report is prepared either accepting the documents to be satisfactory as written, or listing noted defects.

8.4.7.2 Test Case A080470.020–ECS Site Security Management Policies and Procedures

For the TRMM release this test case is applied separately to the SMC, the EOC, and to each of the four TRMM release DAACs.

This test case provides ECS site management and LSMs with assurance that complete security policies and procedures applicable to the particular site are in-place and are maintained within the SMC complex. Test inputs consist of written site policies and procedures as available from the site LSM. Assisted by the site LSM, the AT team inspects the security documentation for applicability to the site. The inspection also verifies that the site security documentation is

maintained to include latest security directives and information and addresses the following topics: physical security, password management, operational security, data classifications, access/ privileges, and compromise mitigation.

A final test report is prepared either accepting the documents to be satisfactory as written, or listing noted defects.

8.4.8 Policies and Procedures Management Sequence

This sequence conducts an inspection of ECS/SMC/LSM procedures and policies for supporting, controlling and maintaining ECS/site policies and procedures covering site responsibility and authority, resource management, fault recovery, testing, simulation, maintenance, logistics, performance evaluation, training, quality and product issuance, inventory management, system enhancements, finance management, and administrative actions. Appropriate LSM implementation actions and security are inspected and confirmed. SMC procedures for posting and keeping current ECS status, events and news items through use of the ECS bulletin board service as well as inclusion of updates and other information concerning SMC toolkit contents and updates and references to changes and updates to scientific information, are inspected and confirmed.

8.4.8.1 Test Case A080480.010–Policies and Procedures Control

This test case verifies the overall support and control of policies and procedures affecting the ECS. It applies to the SMC, EOC, and the four TRMM Release DAACs.

The AT team confirms that the SMC receives system-level policies from ESDIS, that these policies as well as procedures and guidelines are incorporated into SMC directives, and that these directives are disseminated to the DAACs, the EOC, and supporting sites as required. It verifies that principal ECS operational functions at the DAACs, EOC, and SMC are provided for in the management and control of ESDIS/ECS policies and procedures.

The test case confirms that the SMC and LSM uses methods and procedures appropriate for controlling policies and procedures as well as pertinent correspondence at a system-wide and site level, respectively. The AT team confirms that the policies and procedures are sufficiently expanded to provide a level of detail necessary for implementation at each site.

The test case confirms that the SMC and LSM staffs, as appropriate, establish mechanisms and management processes for control of the following categories of ECS/ESDIS policy information: ECS and site-level responsibility and authority, resource management, fault recovery, testing, simulation, maintenance, logistics, performance evaluation, training, quality and product assurance, inventory management, system enhancements, finance management, administrative actions, and ECS security.

The AT team records any deficiencies or discrepancies regarding SMC and LSM policies and procedures control.

8.4.8.2 Test Case A080480.020–Policies and Procedures Maintenance

This test case verifies that SMC and LSM provide a bulletin board service with information on ECS status, events, and news so that ESDIS, SMC, and LSM policies and procedures and directives can be properly maintained and distributed. It confirms that access to updating this information is limited to specified personnel with the proper ECS responsibility and authority.

The AT team also evaluates the capability of the SMC and LSM staffs to provide, via the ECS bulletin board service, a toolkit consisting of a list of approved CASE tools and references to standards for exchanging data for science use.

8.4.9 Network Management Sequence

This sequence provides the AT reviewer with guidance for inspecting and confirming ECS procedures and policies for supporting, controlling and maintaining ECS network management information such as network configuration management, network fault management, network performance management, network security management. Network architecture as-built specifications are inspected to confirm that they are consistent with the architecture defined in the OSI Management Framework (ISO 7498-4), and the OSI Systems Management Overview (ISO DIS 10040). ECS network configuration management functions are inspected to assure that the following functions are supported: collect information describing the state of the network subsystem and its communications resources; exercise control over the configuration, parameters and resources, of the subsystem and over the information collected; store the configuration information collected, and display the configuration information

NSC procedures to ensure that the network operates in a manner that is transparent to the user are inspected including evaluations to ensure provision of ISO/OSI data communications protocols, appropriate GOSIP services to external interfaces, and support for TCP/IP communications protocols and services to external interfaces in response to approved IRDs.

Procedures for managing internetwork services are inspected for content of, protocol, translation, termination, bridging and routing functions extending to e-mail and file transfer functions. Procedures for interoperability with the NSI to provide user access to the ECS are inspected.

8.4.9.1 Test Case A080490.010–Network Configuration and Status

The Network Status Test confirms the ability of the SMC and LSM M&O staffs to obtain configuration management information and the status of network resources, including data flow status information. Services provided by the M&O Staff include collecting information describing the state of the network subsystem and its communications resources. The Systems Management Subsystem (MSS) provides enterprise-wide management to all ECS resources. This test also verifies the ability of the SMC and LSM M&O staff to perform configuration management functions which exercise control over the network configuration, parameters, and resources. These functions provided by the M&O Staff include access to and manipulation of network resources.

The management product used by the ECS project employs the simple network management protocol (SNMP). SNMP products include features, commands and services to access information pertaining the status of network resources. Using the management product's SNMP functions as input, the AT reviewer tests each of these functions. The Test method is used to verify the requirements.

From the SMC, the AT reviewer tests these functions from a central monitoring and coordination node providing system-wide capabilities. On these nodes where the management services reside, such as SNMP, are the configuration management functions. At the LSM, the AT reviewer tests these functions from a major service provider site's (currently the DAACs and the EOC) LSM

department. These LSMs contains federated, autonomous nodes where the local management services, such as SNMP, reside. These nodes provide configuration management functions for managing each site's resources.

The reviewer tests the configuration management functions for controlling local and system-wide network configuration, parameters and resources, such as bootstrap, and backups. Performing remote backups also satisfies the network requirement to provide data transfer and management services. Also tested are the configuration management functions for displaying, monitoring, capturing and maintaining status on network resources. This information is stored in the SNMP management information base (MIB). The MIB is accessible to the SMC and the LSMs across the network. A detailed report on the functionality of the SNMP management product is the output for this test. The output for this test also includes the contents of the SNMP MIB.

8.4.9.2 Test Case A080490.020–Resource Performance Management

The Resource Performance Management Test verifies the network's ability to evaluate the performance of network resources. At the LSMs, this ability is provided by the Performance Management Application Service of the network. At the SMC, it is provided by the Enterprise Monitoring and Coordination (EMC) Performance Management Application Service. Both support the routine gathering of statistical and historical data on the operational states of applications and systems resources, such as protocol stacks and ESN equipment. Furthermore, the Performance Management Application Service analyzes the data collected by comparing it with established criteria to measure the performance of a system and its components. Whereas, the EMC Performance Management Application Service operates on performance data collected system-wide by the various LSM Performance Management Application Services.

Using the Performance Management Application Service as input for and the Test method to verify this test, the AT review team will benchmark local trends as allowed by the parameters of the service. The AT review team collects performance data on scientific algorithms and compare this information with established performance criteria. Periodically, a summary report of this data is expected to be sent to the SMC. By sending this data to the SMC, this test also verifies the network requirement to provide data transfer and management services from each site.

At the SMC, the EMC Performance Management Application Service is used to benchmark system-wide trends upon receipt of the LSM data. The AT review team evaluates this data in order to determine system-level performance and system-wide trends.

The output from this test is performance metrics and a detailed evaluation report. This report will have the ability to be produced in three formats (console, disk, or printer). Each of these formats will be evaluated also.

8.4.9.3 Test Case A080490.030–Electronic Messaging/Bulletin Board Service

The Test Method is employed to confirm the Electronic Messaging/Bulletin Board Service Test. This test confirms the ability of the ESN to provide the Electronic Messaging and Bulletin Board Services. The Electronic Messaging Service provides the capability to manage electronic mail messages to its users and applications. The service also provides application programming interface (API) which has limited capabilities as compared to the interactive portion of the service. Only sending of messages is allowed by the interface. The Bulletin Board Service consists of

multiple bulletin boards. The M&O staff, who maintains this service, post information that relates to ECS services, products, status, events, and news for ECS users. This test uses the Test and Demonstration methods.

This test demonstrates the capability of the electronic message function to exchange messages across external mail systems based on SMTP and X.400 protocols, by sending and receiving the Multi-purpose Internet Mail Extension (MIME) messages available at GSFC, which supports X.400 operations. The test inputs for this test are two pair of mail accounts (mailbox) and two simple mail messages (a message and a reply). An AT reviewer will create and send a mail message from the source mail account. Upon receipt at the destination account, another AT reviewer will create and send a reply message. The expected results of this test include successful message transfers across the external mail system.

Once logged into E-mail, the AT reviewer tests access to moderated and non-moderated bulletin boards. Within E-Mail, the AT reviewer tests the capability for users to either subscribe or unsubscribe to any bulletin boards. Once subscribed, the AT reviewer tests the capability of selecting a subscribed bulletin board for viewing all messages in that bulletin board. The capability of the bulletin board to respond to a message by sending the response to the bulletin board and/or author is also tested. The expected results of this test are the successful demonstration of the capability of the BBS to provide interactive functions to BBS users.

8.4.9.4 Test Case A080490.040–Data Flow

The Data Flow Test investigates the SMC and the LSM M&O staff's ability to generate managerial and operational directives involving data flow to the sites' LSM staff. The input for this test is an approved set of written data flow policies.

The AT reviewer demonstrates the SMC maintenance staff's effectiveness in issuing directives on the passing of data, such as mission status information. The AT reviewer generates a sample directive to use in the evaluation. As described in the policy, the directive is then communicated to the site(s) affected. Upon receipt of the directive, the LSM staff's effectiveness in conveying directives on the distribution of resources to authorized users is also verified. The output of this test case is a detailed report on the completeness and effectiveness of the procedures.

8.4.9.5 Test Case A080490.050–Directory Service

The purpose of this test is to investigate the functionality of the Directory/Naming Service. The Directory/Naming Service is one of the fundamental facilities needed in distributed environments to uniquely associate a name with resources/principals, either physical or logical, along with some information so they can be identified and located by the name even if the named resource changes its physical address over time. The ECS requires the Directory/Naming Service to provide this functionality as well as directory access control capabilities. These access control capabilities include the capability of a support mechanism to authenticate the credentials of a user for the purpose of granting access rights.

Using the Test method, the AT test team stores and retrieves any general information, the test input, that is required to be made available about an object across the network. This information could include a server's (an ECS search program that is going to search the databases for a specified criterion) binding information, fileset (a file containing the atmospheric conditions for a specific

time) locations, SDPS product type (MODIS 2B), and a resource's (a printer) location in a network. The expected results for this test is the successful completion of name-to attribute mapping, gaining access to authorized network resources, and system response to requests for information.

8.4.9.6 Test Case A080490.060–Help Service

This test is investigated using the Demonstration method. The objective of this test is to investigate the ability of the Help Service to assist users with communications questions and problems. SDPS services offers a set of interfaces which allow the user interface help services of the client subsystem to obtain help data for display to the user. The help data can be installed on the user interface platform or can be dynamically requested by the user interface software in response to a user action.

Using a communication question or problem as input, the AT test team will retrieve, by dynamic request, various information concerning the problem communications issue. The AT test team will then evaluate the information as to its effectiveness in solving this problem. The expected results for this test is the successful resolution of the problem through the use of the Help Service.

8.4.9.7 Test Case A080490.070–Network Fault Management

The Network Fault Management Test verifies the network's ability to detect, diagnose, analyze, and report network faults and errors. This ability is provided by the Fault Management Application Service of the network. The Fault Management Application Service supports the routine gathering of statistical and historical data on the errors and fault events. Furthermore, the Fault Management Application Service encompasses activities such as the ability to trace faults through the system. Also, it supports the use and management of error logs.

The Fault Management Application Service has two components, the LSM and the SMC Fault Management Application Services. The LSM Fault Management Application Service collects and operates on fault data local to each site. The SMC Fault Management Application Service operates on fault data collected system-wide by the various LSM Fault Application Services.

Using a scheduled fault (e.g. configuration errors, protocol errors, communications hardware errors, performance degradation conditions, and telecommunications errors and failures) as input for this test, an AT reviewer will release the fault. Another AT reviewer, who was denied knowledge of the aforementioned fault, will attempt to detect it. The second reviewer knows a fault is to occur, but not what type. Detection occurs due to the Fault Management Application Service reporting the information in the form of console display messages and storing it in the error logs. The detection of faults involves the identification of an unacceptable change in the state of a managed object. This portion of the test is verified using the Inspection method.

The second AT reviewer isolates and tests the fault event using the service's diagnostic utilities, including packet tracing, traffic modeling and network simulation utilities. The diagnosis and isolation of a fault involves determining the cause from the reported systems, using the diagnostic tests where applicable. This portion of the test is verified using the Test method. Once identified, the second AT reviewer will use the service's analysis function to determine a corrective action to restore the system to normal operational status.

After error recovery, a summary report of the fault event is sent to the SMC. Fault data summary reports can be generated on a periodic as well as interactive basis. A scheduled production of the report is generated for verification. The Fault Management Application Service supplies the mechanism to generate reports based on the information it collects and receives from the various LSMs at the DAACs and EOC. Summary reports contain information on various fault events, such as network reset and restart indications, network round trip delay, outages and CRC errors. The expected results of this test is the successful recovery from the network fault event.

8.4.9.8 Test Case A080490.080–Alert Threshold

This test investigates the ESN capability to manipulate alert threshold values for the fault management data generated. This ability is provided by the Fault Management Application Service of the network. The service provides the mechanism to assign severity levels, or thresholds, to faults. If and when a threshold is reached the network system notifies the M&O staff by sending an alarm to the system console.

This input for this test are the predetermined threshold values and a scheduled fault which exceeds the threshold values. After defining a fault category which applies to the graphic topology, the AT reviewer sets the threshold values within the service. Once set, the AT reviewer views the values for verification. Now that the threshold values have been set, the AT reviewer enables the fault notification verification for specific fault thresholds in the category. The scheduled fault is then released. The fault notification is disabled and the fault released again to test alarms when not activated. Also, the fault is released twice more after the thresholds are changed. The fault is released once during the enabled state and once during the disabled state for the new thresholds. The Test method is used to verify the requirements.

The fault information is written to the error log. The expected results of this test are to have the AT reviewer witness the alarms upon exceeding the thresholds when enabled and viewing the documented alarm in the error log. Upon completion of test, the AT reviewer will generate a summary report from the fault information stored in the database concerning the thresholds. This report is sent to the SMC. The SMC Fault Management Application Service provides the mechanism to receive notifications of fault conditions from the LSM Fault Management Services located at the DAACs or EOC.

8.4.9.9 Test Case A080490.090–Internet Access

The Internet Access Test investigates the ESN capability of transferring data transparently between end systems within local and wide area networks. The ECS is responsible for designing and developing both the ESN LANs and the ESN WAN. Multiple protocols (e.g. IP, ICMP, ARP, OSPF, RIP, BGP) are used to link these systems together.

The ESN LANs are responsible for data transfer within the DAACs, SMC, and EOC, and for providing interfaces between these components and to external networks. In addition, "campus" networks, which form the existing networking infrastructure at the ECS locations, will provide connectivity to EOSDIS components such as SCFs and ISTs. The ESN LANs are dedicated networks linking ECS facilities for internal ECS operations.

The ESN WAN's primary function is to transfer data between DAACs including both product data and inter-DAAC queries and metadata responses. Other networks, including Ecom, Nascom, and NSI will provide wide-area services to the ECS.

This test case also verifies the ESN's ability to provide remote terminal access. Remote terminal access is provided in ECS's File Access Service. The File Access Service provides file transfer and management capabilities. It consists of an interactive tool, the API, which allows for remote file access and transfers to the users (M&O staff). The remote access and transfer capability provides transparent access. To the user, access to the remote files is no different from access to the local files.

The AT review team will station reviewers at workstations located at Ecom, Nascom and NSI. Various types of terminals should be used, such as dumb terminals and bitmap display workstations. From these workstations, the reviewers log on to Mosaic. Mosaic provides access to the DAAC home pages via the Internet. The DAAC home pages are the input for this test. Then, the reviewer displays various ECS information accessible through these home pages and downloads some to the local system. This test employs the Analysis, Demonstration and Test methods of verification. As Mosaic is a windows-based Internet application, its use demonstrates the ability of the MSS to support multiple window displays, buttons and pull down menus, and random movement through fields. Next, the AT reviewer logs into an ECS server. From this server, the AT reviewer accesses and downloads scientific and ancillary data from the server's database.

Reviewers are also posted at the SCFs and the ISTs. Again, the reviewers will log on to Mosaic from workstations at these facilities. Then, the reviewer displays various ECS information accessible through these home pages and downloads some to the local system. Because use of inter-DAAC wide area networks is restricted for data transfer between ECS DAACs and other facilities (SCFs and ISTs) that are directly attached to the ECS internal environment, some information may be restricted to the reviewer. Again, the AT reviewer logs into an ECS server. From this server, the AT reviewer access and downloads scientific and ancillary data from the server's database. The expected result of this test is the successful downloading of unrestricted data.

8.4.9.10 Test Case 080490.100–Interface Network Status

The Interface Network Status Test confirms the ability of the ECS external interfaces (e.g. NOAA, NSI, EDOS) to send and obtain network management information to the SMC. The management product used by the M&O staff employs the simple network management protocol SNMP. SNMP products include features, commands and services to access information pertaining to network resources.

Using the management products SNMP functions as input, the AT reviewer tests each of these functions. The Demonstration method is used to verify the requirements. The AT reviewer tests these functions from a central monitoring and coordination node providing system-wide capabilities. On these nodes where the management services reside, such as SNMP. The reviewer tests the management functions for displaying, monitoring, capturing and maintaining status on

network resources handling communications between sites. This information is stored in the SNMP management information base (MIB). The MIB is accessible to the sites across the network.

The AT reviewer connects to the ECS via dial up connection as well as network link. From the MIB, the AT reviewer generates data summary reports. These reports are then sent to ECS internal and external sites. The output for this test is the contents of the SNMP management information base (MIB) where the status information is stored.

External sites also generate data using their SNMP management functions. This information is stored in their SNMP's MIB. Again, data summary reports are generated. These reports are sent to the SMC for review. The expected results of this test is the successful transfer of network management data.

8.4.9.11 Test Case A080490.110–Network Security Management

The Network Security Management Test verifies the LSM M&O staff's ability to provide network security management to its sites and the SMC M&O staff's ability to provide network security management between the sites. The Security Management Application Service is the LSM mechanism provided to implement security rules and authentication procedures, maintain authorization facilities, and maintain security logs, intrusion detection and recovery procedures. This test also investigates the ESN capability to manipulate network parameters. The manipulation does not affect user access and transactions. It is transparent.

The EMC Security Management Application Service is the SMC mechanism which provides these features as well as being responsible for establishing security guidelines and disseminating them to the sites, receiving security reports from the sites, and to receive notifications security breaches, and coordinating the recovery from detected security breaches at the sites and external systems. The LSM Security Management Application Service manages security databases local to it, manages compliance to security directive and guidelines established and disseminated by the SMC, performs intrusion detection checks in order to maintain the integrity of ECS resources, provides the capability to analyze security audit trails, and provides the mechanisms to generate reports for these activities.

The management product used by the ECS project includes features, commands and services to change information pertaining the network resources. An AT reviewer accesses system data across the network. Meanwhile, using the management product's SNMP functions as input, the AT reviewer accesses a network resource (a router) between the other reviewer and the data being accessed and changes the parameters on various functions. Thus, the reviewer reconfigures the resource. Then, employing the Test method for verifying requirements, the reviewer saves the changes. With the new changes in place, the original reviewer is still accessing the data.

After configuring the routing tables with security filters, the AT reviewer executes a predetermined security violation, such as unauthorized modification of data. Upon detection of the violation, the system notes the event in the security logs. After viewing the security logs, AT reviewer follows an approved set of security management policies and procedures on the countermeasures to be taken. The AT review then notes any pertinent information on the security violation and how it was handled into the security database.

After a site detects and reports a security violation, such as unauthorized data modification, to the SMC, SMC personnel assist in the recovery process by identifying and providing the system backup and archives as necessary. The SMC personnel access management data for the purpose of compliance management and for intrusion detection. The SMC M&O staff interfaces with the EMC Security Management Application Service to receive security management commands and to provide the mechanisms to access security management data and reports.

The inputs for this test are the security management policies and the security violation. The AT reviewer employs the Test method using this input to perform the test. The output for this test are the security logs and the security database. Also provided as output from this test is a detailed report of incident to be sent to the SMC. The expected results of this test are the successful recovery from the security breach.

8.4.9.12 Test Case A080490.120–MSS Report

The MSS Report Test confirms the ability of the MSS staff to provide the SMC with reports. Periodically, the MSS provides the SMC with a full and complete history report of all MSS resources used by science investigators. This report includes information on the CPU utilization, amount of user storage, connect time, and session histories. Also, a services usage report is also provided. This report includes the user name, service identification, date/time stamp, time expended, and facilities used. The MSS also provides the SMC with a Cross Reference Report. This report includes user and data set information and can be broken down by the type of processing performed or the data sets produced. Reports are also produced on operations data (system utilization and outstanding data distribution, processing, and data acquisition requests). The data used to generate a report is the input for this test.

The AT reviewer generates a report and sends it to the SMC. The SMC uses this information to determine access patterns on the systems. The AT reviewer uses the Test method to verify this test. The output of this test is the report provided by the MSS.

8.4.9.13 Test Case A080490.130–Periodic Network Testing

The Internetworking Subsystem (ISS) provides for the transfer of data transparently between end systems within local and wide area networks. The ISS is composed of the ESN LANs and the ESN WAN. The ESN LANs and ESN WAN is composed of multiple protocols and communications capabilities. Periodically, the ECS requires that the alternate communication capabilities be tested. The Periodic Network Testing Test fulfills that requirement.

Using the alternate communications capabilities (RIP access or passive connection (server) establishment with any remote system) and an approved set of network management policies as input, the AT team member reviews the network management policies with respect to periodic network testing. Following the procedures the AT team member, schedules and completes various communications capabilities. The AT reviewer employs the Demonstration method of confirming test cases. The expected results is the successful completion of the various communications capabilities.

8.4.9.14 Test Case A080490.140–Network Planning and Growth

The architecture and design of the CSMS was developed with special consideration for enabling support of future functional and operational capabilities. The inclusion of these considerations supports the ECS requirement for the ESN to be extensible in its design to provide capability for growth and enhancements. Special Consideration was exercised in the areas of DAAC change and addition, addition of information search and retrieval services, as well as others.

The AT reviewer analyzes the growth potential of the network with respect to the addition of other data providers, such as DAACs, SCFs, ADCs, and ODCs. The AT reviewer will provide a detailed report of the analysis which is the output of the test case. The input for this test case is a test data provider to be added. The Analysis method is employed by the AT reviewer to verify this test.

8.5 Performance Management Scenario

This scenario walks site operations personnel through the process of accessing and displaying system performance parameters and metrics. It carries the staff through a series of analytical and diagnostic sequences which demonstrate the system's capability to measure ECS performance and detect operational trends.

The Performance Management Scenario's acceptance testing activity guides the reviewer in confirming those ECS functions that provide global integrated ECS performance management services and exercise system-wide control. Verifying ECS metrics confirms ECS capability for defining meaningful measures, for developing and maintaining standard performance metrics, and for accomplishing system-level performance testing and performance improvement actions. SMC integrated system-level performance management data base structure and procedures are analyzed against stated requirements and performance/metrics standards. The LSM procedures for contributing to, receiving from, and implementing performance data base procedures, metrics, and other performance related directives and information are inspected. The SMC's capability for acquiring or developing and maintaining performance management tools and the overall quality of the SMC performance management evaluation toolkit, plus user access procedures to the toolkit, is inspected and confirmed.

The AT team inspects procedures for evaluating system-level performance against ESDIS performance criteria. System-level alert indicators or other alarm communications are demonstrated and evaluated for operational effectiveness. System-level performance testers are evaluated for their ability to receive and process requests. Their ability to perform relevant performance tests using system-level tools and procedures to good advantage is assessed, as well as the team's ability to create and appropriately distribute performance test results, accompanying analysis, and recommendations.

8.5.1 Metrics Sequence

This test sequence verifies the capability of the SMC to evaluate overall ECS system performance for a broad spectrum of activities including data collection and delivery, product generation, responses to user requests, and emergencies. The SMC capability to establish and maintain system-level metrics containing thresholds and multiple level limit-checking parameters is confirmed. Also confirmed is the SMC's ability to generate, maintain, and update performance criteria and responses to performance deficiencies for the system and the ECS sites. Similar

capabilities for the LSM are confirmed, including the ability to implement SMC performance criteria and limits testing, using SMC data base metrics for comparison. Finally, the capability of the ECS to provide the required availability of key services and to switch over or repair failed capabilities within specified mean down times (MDTs) is confirmed.

The SMC and the LSM capability to generate alert indicators for fault and degraded conditions is also confirmed.

8.5.1.1 Test Case A080510.010–Performance Metrics Establishment

This test case verifies the capability of the SMC and the local site LSMs to establish, maintain and update system performance criteria and performance parameter limits and thresholds. The capability to establish multiple threshold levels, including on/off, pass/fail, and various levels of degradation is also confirmed.

Demonstration, test, and analysis are used to verify these capabilities. Required test case inputs include a list of ESDIS-specified performance parameters, specifications, and policies and procedures, as well as an operational script exercising different levels of performance to assess the capability to update and check limit and threshold parameters.

Expected results include the verification of the capability of the SMC and the site LSMs to establish, maintain and update system performance parameters and limit thresholds. The capability to monitor performance and to evaluate performance and any degradation with respect to these parameters will be confirmed.

8.5.1.2 Test Case A080510.020–Performance Measurement and Degradation Response Capability

This test case verifies the capability of the SMC to assess overall ECS performance, including performance during data collection, archiving, and delivery, data reprocessing requests, user requests, and system emergencies. The SMC and site LSM capabilities to generate alert indicators for fault or degraded conditions and to generate corrective actions in response to these faults or degradations are also confirmed.

Demonstration and test are used to verify these capabilities. Required test case inputs include a performance parameters and specifications, and an operational script for exercising and simulating faults and degraded performance conditions. ESDIS policies and procedures specifying the range of responses and corrective actions to faults and performance degradation are also needed.

Expected results include the verification of the capability of the SMC and the site LSMs to monitor performance and to generate corrective actions for performance degradation and system faults.

8.5.1.3 Test Case A080510.030–RMA Assurance Test and Analysis

This test case verifies the capability of the ECS to provide services with required reliability, maintainability and availability (RMA). It confirms the capability of the ECS to correct faults and to restore system capabilities within specified times. GSFC 420-05-03, Performance Assurance Requirements for the EOSDIS, MIL-HDBK-217F, Reliability Prediction of Electron Equipment, and MIL-HDBK-472, Maintainability Prediction, Procedure IV, are used in verifying ECS RMA. Table 8-1 summarizes key availability and maximum Mean Down Time (MDT) requirements for specific ECS services verified by this test case.

This test case also confirms that the maximum down times are less than, or equal to, twice the required MDTs in 99% of failure occurrences and that the primary science data receipt mean switchover time to a backup capability is 15 minutes or less.

A combination of demonstration, inspection and analysis is used to confirm the above service availabilities and service restoration times. Test case inputs include reliability data and repair specifications for key ECS components, switchover time estimations, in-the-field maintenance records, and demonstrations by operations staff of repair and switchover procedures for various failure occurrences.

Table 8-1. RMA Capabilities

ECS Segment	ECS Function or Service Provided	Minimum Availability/Maximum MDT
Overall	System-level Functions and Services	0.96/ 4 hrs.
SDPS	Receiving Science Data	0.999/ 2 hrs.
SDPS	Archiving and Distributing Data	0.98/ 2 hrs.
SDPS	User Interfaces to Information Management System (IMS) Services at DAAC Sites	0.993/ 2 hrs.
SDPS	Information Searches on the ECS Directory	0.993/ 2 hrs.
SDPS	Metadata Ingest and Update	0.96/ 4 hrs.
SDPS	Information Searches on Local Holdings	0.96/ 4 hrs.
SDPS	Local Data Order Submission	0.96/ 4 hrs.
SDPS	Data Order Submission Across DAACs	0.96/ 4 hrs.
SDPS	IMS Data Base Management and Maintenance Interface	0.96/ 4 hrs.
SDPS	Product Generation Capability (Each Computer)	0.95/ N/A
CSMS	SMC Capability to Gather and Disseminate System Management Information (for critical services)	0.998/ 20 min.

Expected results include confirmation that the ECS can make needed services available as required and can repair or switchover from failed capabilities within specified MDTs.

8.5.2 Performance Testing Sequence

This sequence guides the reviewer in confirming SMC and each LSM's capability to generate, as needed, requests for performance testing including resources to be tested, test purpose, requested test environment, impacts to operations and expected results. This evaluation includes confirmation and review of the SMC performance test tool and evaluation of SMC and LSM personnel resources to determine the ability of the system and site test teams to respond to specific testing requests.

8.5.2.1 Test Case A080520.010–Generate Performance Testing Request

This test case verifies that the SMC and LSM have the capability to generate and coordinate requests for performance testing. It also evaluates the SMC's and LSM's ability to respond to testing requests. The test case applies to the SMC, EOC, and each TRMM Release DAAC.

At the GSFC DAAC, the AT team reviews the procedures for generating performance testing requests. The AT team requests that the M&O team accomplish the actions necessary so that performance testing can be conducted. As part of the performance testing, the AT team provides the M&O team with the purpose of the test, resources to be tested, desired test priority, required test environment, impact to operations, and expected results. The applicable site LSM executes the steps necessary to request the time and resources needed to accomplish the specified performance testing. During this process, the M&O team coordinates with the SMC. Data bases containing resource scheduling information for performance testing are updated, as required.

Similar tests are conducted at the LaRC, MSFC, and EDC DAACs, the EOC, and the SMC. For system-wide performance testing, the AT team reviews SMC procedures for generating performance testing requests. The AT team requests that the SMC generate a performance testing request involving all ECS sites and provides the SMC with specifics. The SMC coordinates with the LSM at each site and external interfaces, as necessary. The SMC also updates resource scheduling data bases, as required.

For each test and at each applicable site, the AT team observes the actions of the M&O team and compares them with procedures, noting any deficiencies and discrepancies. Each data base that is updated should reflect the same information at both the SMC and LSMs at the applicable site(s), as appropriate. The AT team records any discrepancies.

8.5.2.2 Test Case A080520.020–Performance Test Tool

This test case verifies that the ECS performance test tool supports overall ECS system performance as well as network, particularly ESN, performance testing. This test case applies to the SMC, EOC and each TRMM Release DAAC.

The AT team utilizes the capabilities of the performance test tool as the primary method for testing overall system-level and ESN performance capabilities. The graphical user interface (GUI), data base, and data collection, i.e., performance statistics, capabilities are confirmed.

The AT team observes and records the behavior of the performance test tool, particularly with respect to its interface to data stores and its ability to transport supporting data to and from subsystems within each ECS site.

8.5.3 Performance Monitoring and Analysis Sequence

This test sequence guides the reviewer in inspecting system and site capabilities for performing, analyzing and reporting on short and long term performance trend analyses of system and site operational status, specific resource performance and maintenance activities. The SMC's performance management team procedures monitoring system site hardware and software to determine their operational states (on-line, failed, in maintenance mode, test mode, or simulation mode) are inspected.

8.5.3.1 Test Case A080530.010–Performance Management and Analysis

This test case verifies the capabilities of the SMC and LSM to use performance management tools to augment overall system management activities for all ECS resources and personnel. It applies to the SMC for the overall ECS capability, and to the LSM for each TRMM Release DAAC site.

The test objectives are to observe and acquire trend information reflecting push and pull transaction rates along with associated trends reflecting delays associated with completion of those transactions. Visualization capabilities that enable SMC and LSM operations personnel to determine the state for each principal node of the ECS network and the LAN, respectively, are confirmed.

This test case verifies that monitoring and performance management capabilities are effectively used to determine if transactions are submitted at rates faster than the ECS or applicable DAAC can handle. Also confirmed is the capability to determine if an ECS node exhibits saturation behaviors or unacceptable delays. Principal aspects of the system-wide and DAAC-specific load and throughput performance analysis are conducted for the SMC and each DAAC, respectively. The analysis determines if the ECS as a whole or a particular DAAC exhibits a maximum steady state throughput at which some resource, e.g., CPU execution time, channel transfer rates, disc access rates, or memory, is fully occupied.

The analysis extends to the system software, hardware, and personnel at each ECS site. Performance is also measured by the ability of the staff at the site to use operational procedures and documentation to establish nominal operations, provide status information to SMC on request, and maintain processing capacity with reserves and expansion as required.

8.6 Ancillary Services Scenario

This scenario takes site management personnel through a series of cases involving the use of system services in the management of the ECS at their site. It carries the management staff through certain system fault detection and isolation instances, security monitoring episodes, and accounting and report generation sequences.

The ancillary services scenarios AT activity evaluates those ECS activities that provide global integrated ECS services and exercise system-wide control. AT of ECS fault management activity evaluates ECS capability for developing and maintaining fault management policies, for performing system-level fault analysis and for performing system fault diagnostic testing and recovery actions. SMC integrated system-level fault management data base structure and procedures are analyzed against stated requirements and the LSM capability for contributing to, receiving from, and implementing fault system data base directives and information. The SMC's capability for acquiring or developing and maintaining fault management tools and the overall quality of the SMC fault management toolkit plus user access procedures to the toolkit is evaluated.

In addition to security management, the SMG evaluates system-level security functionality, especially network security functions and those activities related to inter-site data and information exchange. SMC provisions for user access security are evaluated.

Evaluation of ECS accounting and accountability activities extends to both the SMC performed system functions and LSM in-site functions. The completeness and effectiveness of related data collection, analysis and reporting activities is assessed, by comparison with ECS management and administrative requirements, in particular the schedules and content of required reports.

Evaluation of ECS report generation capabilities extends to evaluating the capability for providing required reports specified by all of the services referenced in the system management scenario group as well as evaluation of the capability for reporting integrated data base summary information such as the allocation of ground segment functions to the sites, and, system user and supplier directories.

8.6.1 Fault Management Sequence

This sequence conducts the evaluator through inspections and demonstrations of ECS capability to detect system and site-level faults and to analyze fault conditions, perform diagnostic testing, correct and recover from faults (or execute suitable contingency actions). The site operations teams confirm, through demonstration, the system and each site's capability to recover from global faults such as system failures, global data losses, or catastrophic security violations as well as local fault conditions. The AT team evaluates by inspection, the SMC ability to establish, maintain and update system fault management policies and procedures. The SMC and each site's personnel capabilities and test tools for isolating, locating, identifying and analyzing faults at the system and site level (except for flight operations faults) are confirmed by inspection of training records and by evaluation of operator performance during abnormal shutdown and recovery demonstrations (Sections 8.1.4 and 8.1.5). SMC and site capabilities for performing fault diagnostic testing are confirmed and evaluated for the teams level of training and their ability to react efficiently to testing specific fault situations. The SMC and each site's capability for recovering from fault situations is evaluated during previous shutdown and recovery demonstrations, plus an inspection of recovery policy and procedures, level of training and typical operations response times for recovering from fault situations.

8.6.1.1 Test Case A080610.010–ECS System Fault Management Policies

This test provides SMC and other site managers the opportunity to revue and evaluate system-level fault management procedures.

The objective of this test case is to verify that the SMC has the capability to support, maintain, and update system fault management policies and procedures. The inputs for this test will be the approved set of written fault management polices. These procedures are inspected and analyzed for completeness and effectiveness of SMC system fault management policies including reviews of specifications of procedures for fault identification, setting fault priorities and specification of recovery or corrective actions when compared with SMC requirements. Test analysis results are detailed in an output report.

8.6.1.2 Test Case A080610.020–System and Site Fault Analysis

The objective of this test case is to verify that the SMC test team has the capability isolate, locate, identify and characterize SMC system faults. This test will also verify that the SMC has the capability to ingest fault data from sites and perform fault analysis at the subsystem and level except for faults directly related to flight operations.

The inputs for this test consist of a set of procedures for simulating a representative set of SMC faults at the system, site (subsystem), and equipment levels. At test start the SMC system will be in full Release A operation with real or simulated non-flight interfaces with the specific ECS components that are participating in the fault analysis procedure.

The SMC and site operations teams execute assigned simulated fault situations covering both the system level and each TRMM delivery site. The outputs from these test executions are all system logs products and reports related to SMC system functions and performance as a result of imposing the simulated fault conditions. An output report based on observations and comparison of system outputs with expected results, is generated, that assesses the SMC test teams capability for ingesting, isolating, locating, identifying and characterizing fault conditions at the SMC system level. Outputs will also include the results of an inspection that evaluates the SMC test team and element operations team capability to perform fault analysis at the subsystem and equipment levels.

8.6.1.3 Test Case A080610.030–System and Site Fault Diagnostic Testing

The objective of this test case is to verify that the SMC internal test team has the capability to satisfactorily perform fault diagnostic testing. The inputs for this test are descriptions of the set of fault diagnostic procedures (hardware, software tools or manual procedures) that exist in the SMC configuration, identified as to their ECS site applicability. Selected diagnostic procedures will also be available for execution in response to specific acceptance test requests.

The AT team prepares a fault diagnostic assessment output report, evaluating the results of an inspection of the ECS fault diagnostic testing capabilities based on a comparison of the input descriptions of the diagnostic test tool configuration with ECS element fault diagnosis requirements. An evaluation of the effectiveness of the diagnostic test suite based on comparisons of results of executing specific diagnostic procedures with specifications is also prepared to measure the effectiveness of the diagnostic suite.

8.6.1.4 Test Case A080610.040–SMC System Fault Recovery

The test case demonstrates SMC fault recovery capabilities to SMC operations and systems engineers. The objective of this test case is to verify that the SMC operations has the capability to generate and transmit fault recovery commands, directives and instructions to ECS sites except for fault related information directly related to flight operations. The test case demonstrates SMC fault recovery capabilities to SMC operations and systems engineers.

The inputs for this test are the system-level output results of Section 8.2.1.2, “Test Case A080610.020–System and Site Fault Analysis.”

The output from this test case consists of the generated, fault recovery commands, directives and instructions created by the system from Section 8.2.1.2 results. These AT team compares these results with expected results to produce an AT test report that evaluates the required ECS capability.

8.6.2 Security Functionality Sequence

The purpose of this sequence is conduct the reviewer through the elements of security functionality conformation and evaluation, including functions and toolkits used to perform security related functions at the ECS system and site levels. System-level data base security information policy is inspected for inclusion of data base utilization reporting, outstanding data requests, outstanding processing requests, outstanding data acquisition requests, time correlated user logs and user identification, and processing reports (by user and data set) of processing performed, data sets produced, supporting data used, data recipients and name-to-name attribute mapping directories. The presence of system-level services for access control, authentication of user credentials is confirmed by inspection. Confirmation and evaluation of countermeasures for security threats such as unauthorized modification of data, disclosure of authentication information, denial of authorized service, and impersonation of authentication information, is confirmed by inspection. Authentication, access control, data integrity, and data confidentiality protection functions are confirmed and evaluated against system and site requirements. Event functions (detection, reporting, and logging) are demonstrated and confirmed by comparison with system and site requirements.

8.6.2.1 Test Case A080620.010–Network Directory Security Functions

This test case introduces experienced and new site and system-level security managers and data base administrators to ECS Network Directory database functionality. During test case execution Directory security functionality is demonstrated in a real or simulated operational environment.

Inputs to this test case include as-built specifications for the ECS network Directory service. The test case requires the operational use of the SMC computers, configured to access the ECS network, in order to demonstrate Directory service functionality. The initial test case action is to inspect the specifications to confirm the following Directory functionality: name-to attribute mapping, a capability to respond to requests for information, such as access instructions, related to named physical or logical objects, Directory access control procedures and protocols, and inclusion of multiple Directory Service Agents (DSAs) who are collectively responsible for holding or retrieving all ECS directory information.

Test case outputs include evaluations that confirm the as-built functionality agrees with specifications and demonstration results, or the evaluation lists noted discrepancies.

8.6.2.2 Test Case A080620.020–Database Security Functions

This test case introduces experienced and new site and system-level security managers and data base administrators to ECS security database functionality. During test case execution database security functionality is demonstrated in a real or simulated operational environment.

Inputs to this test case include as-built specifications for the ECS database and database security functions. The test case requires operational use of the SMC data system configured to access the ECS network, in order to demonstrate security functionality. The initial test case action is to inspect the specifications to confirm the data base architecture permits retention of the following database security-related information: database system utilization, outstanding data distribution requests, outstanding processing requests, outstanding data acquisition requests. Database system functionality is also confirmed, that reports to the SMC, services usage by each user to include at

a minimum, user name, integrated database service identification, date/time stamp, time expended, and facilities used. Ready availability of these data by security personnel is also confirmed as well as the availability of cross reference reports (by user and data set) of processing performed, data sets produced, supporting data used, and data recipient.

Test case outputs include evaluations that confirm the as-built functionality agrees with specifications and demonstration results, or the evaluation lists noted discrepancies.

8.6.2.3 Test Case A080620.030–SMC Security Functions

This test case introduces experienced and new site and system-level security managers and data base administrators to SMC system-level functionality.

Inputs to this test case include specifications of the following SMC security functions to include: procedures for establishing, maintaining, and authenticating ECS access privileges for the ECS scientific users and methodology; procedures for managing , maintaining, and requesting site security testing such as password checking and site internal privileges control; performing compromise detection and security risk analyses; initiating recovery procedures in response to a detected security compromises; and managing encrypted information, including keys.

Test case inputs also include network security management specifications for the following functions: network process and user access control such as authentication and authorization procedures/subsystems; countermeasures for data communications security threats such as unauthorized disclosure of authentication information, authorized user impersonation or modification of in-transit data. Specifications of the following network security functions and events are also required inputs: authentication, access control, data integrity and confidentiality preservation, event detection, event reporting and event logging.

The test case also requires operational use of the SMC data system configured to access the ECS network, in order to demonstrate security functionality listed in the previous two paragraphs. The initial test case action is to inspect the input specifications to confirm the ECS architecture includes the listed functions. ECS system functionality is also confirmed by demonstrations of the listed functionality according to input procedures that use the operational SMC system to perform these ECS integrated functions.

Test case outputs include evaluations of the inspections and demonstrations that confirm the as-built functionality agrees with specifications and demonstration results, or the evaluation lists noted discrepancies.

8.6.2.4 Test Case A080620.040–LSM Security Functions

Procedures associated with this test case are executed for each of the TRMM release DAACs.

This test case introduces experienced and new site security managers, data base administrators and LSM personnel to LSM security functions performed at each site.

Inputs to this test case include specifications of the following site security functions which are the responsibility of the LSM. These functions include: promulgating, maintaining, authenticating, and monitoring user and device accesses and privileges; performing security testing that includes, password auditing and site internal access/privileges checking; performing compromise detection

(e.g., virus or worm penetration); and performing risk detection and analyses. Inputs that specify procedures for isolating security compromised areas, detaching compromised I/O and aiding in eliminating compromises by generating recovery actions.

The test case also requires operational use of the SMC data system in order to demonstrate security functionality listed in the previous paragraph. The initial test case action is to inspect the input specifications to confirm the ECS architecture includes the listed functions. ECS system functionality is also confirmed by demonstrations of the listed functionality according to input procedures that use the operational SMC system to perform these ECS integrated functions.

Test case outputs include evaluations of the inspections and demonstrations that confirm the as-built functionality agrees with specifications and demonstration results, or the evaluation lists noted discrepancies.

8.6.3 Accounting and Accountability Sequence

This sequence guides the evaluator through and assessment of the ECS and site capability to perform compliant accounting and accountability functions. The SMC database for supporting, maintaining and updating accounting and accountability policies and procedures is inspected for agreement with ESDIS Project policies and procedures. SMC accounting policies and procedures are inspected for conformance with accepted accounting principles, plus relevant GAO and OMB standards and guidelines. SMC accounting team functions output reports are inspected for inclusion of the ability to perform the following security data, user, and hardware/software resource audits. SMC ability to establish, maintain, and update data tracking systems to track data transport from ECS input to ECS output, and to allow statusing of all product-production activities is confirmed by inspection of outputs. The SMC capability to calculate the resource unit costs associated with processing information from system input to system output is similarly confirmed as id SMC's ability to establish, maintain and update resource usage information for individuals, groups and processes.

8.6.3.1 Test Case A080630.010–Accountability Policies and Procedures

This test case conducts the SMC site new administrative staff members and ECS managers through an inspection of the ECS system accountability policies and procedures maintained by the SMC administrative staff.

Test inputs are the written policies and procedures (electronic format and accessible by using OA, preferred) plus a copy of ESDIS Project accountability policies. The SMC accountability policies are reviewed for completeness and for adherence to ESDIS Project policies. With SMC administration staff guidance, SMC policies and procedures are reviewed for assurance that accountability policy support, maintenance and upgrade content and direction are contained therein.

Test case output is an evaluation that confirms that the SMC policies contain adequate accountability policy content and that SMC accountability policies adhere to ESDIS guidelines. If this is not the case, deviations are noted in the evaluation report.

8.6.3.2 Test Case A080630.020–Accountability: Data Tracking and Audit Trails

This test case conducts SMC site configuration management staff members and ECS managers through an inspection of the ECS methodology for establishing and performing system-level data and user audits based on predefined audit trails. The test case also reviews procedures for conducting hardware/software configuration audits as well as procedures for tracking data transport from system input to system output in a manner that allows the status of all product-production activities to be determined.

Test inputs are the written SMC audit trail definitions and data tracking policies and procedures. These SMC policies are reviewed for completeness of audit trail definitions compared with the total ECS hardware/software configuration. Procedures for conducting audits are reviewed for adherence to SMC site (GSFC) configuration management policies and procedures. SMC data tracking procedures are reviewed for assurance that the procedures specify data transport tracking from system input to system output as well as allowing the status of all product-production activities to be determined.

Test case output is an evaluation that confirms that the SMC audit and tracking policies and procedures adhere to GSFC standards insofar as these standards are applicable to the SMC configuration. If this is not the case, deviations are noted in the evaluation report.

8.6.3.3 Test Case A080630.030–Accountability: LSM Data Tracking

For the TRMM release this test case is applied separately to the SMC, EOC and to each of the four TRMM release DAACs.

This test case conducts SMC site configuration management staff members and ECS managers through an inspection of the ECS methodology for tracking data transport from site input to site output.

Test inputs are the written site data tracking policies and procedures. Site data tracking procedures are reviewed for assurance that the procedures specify data transport tracking from system input to system output as well as allowing the status of all product-production activities to be determined.

Test case output is an evaluation that confirms that the site tracking policies and procedures adhere to site standards. If this is not the case, deviations are noted in the evaluation report.

8.6.4 Report Generation Sequence

This sequence guides the evaluator in assessing ECS capability for performing site-specific report generation required for the TRMM Release. The report generators at each site are evaluated through inspection of output products and comparison of the products against site reporting requirements.

8.6.4.1 Test Case A080640.010–SMC Report Generator

This test case demonstrates to site system engineers the existence and capabilities of a generalized report generator residing within the SMC site configuration.

Inputs for this test case include the as-built report generator specifications. Initial test conditions require a fully operational SMC computer configuration including the generalized report generator and input data sets that are representative of the full range of data types that may be operated on by

the report generator. Test execution consists of performing all steps involved in producing standard or customized reports through use of the generalized report generator from user request through output to selected media. The process is evaluated for effectiveness of input specifications to the report generator and flexibility of receiving inputs as well as directing outputs to various media and devices. Output formats are evaluated for correctness as well as readability and satisfactory presentation. The report generator is also evaluated for it's capability to customize output reports, especially those resulting from data previously captured in a management DBMS, including all or portions of the system and variable amounts of time.

Test outputs include completed demonstration reports that compare expected versus actual report generator outputs. General comments and recommendations concerning report formats customization capabilities and timeliness of reports generation are included in the output report.

8.6.4.2 Test Case A080640.020–SMC Reports

This test case demonstrates to SMC managers, and to site and SMC systems and operations personnel, the SMC capability to generate pre-defined reports.

Inputs for this test case include the required reports specifications. Initial test conditions require a fully operational SMC computer configuration, ready to produce the specified reports including input data sets that are representative of nominal and special cases for each of the required report formats. Test execution consists of performing all steps involved in producing reports from the input data sets. Evaluated report capabilities include generation of: a functional allocation report giving the current allocation of ground segment functions; summary configuration status reports; summary training reports; hardware, system and scientific software reports; spares and consumables reports; lists of proposed enhancements; detailed and summary reports indicating the overall performance of the ECS Maintainability Status Reports; product generation status reports; ground resources performance reports; user feedback analysis reports; fault management reports; and security compromise reports.

Each of the report demonstrations is evaluated for adherence to report format and content specifications. Test outputs include completed demonstration reports that compare expected versus actual outputs. General comments and recommendations concerning report formats customization capabilities and timeliness of reports generation are included in the output report.

8.6.4.3 Test Case A080640.030–LSM Report Generator

This test case is executed separately for each of the four DAACs associated with the TRMM delivery.

This test case demonstrates to site system engineers the existence and capabilities of a site-specific report generator residing within the site configuration.

Inputs for this test case include the as-built report generator specifications. Initial test conditions require a fully operational site computer configuration including the site report generator and input data sets that are representative of the full range of data types that may be operated on by the report generator. Test execution consists of performing all steps involved in producing standard or customized reports through use of the site report generator, from user request through output to selected media. The process is evaluated for effectiveness of input specifications to the report generator and flexibility of receiving inputs as well as directing outputs to various media and

devices. Output formats are evaluated for correctness as well as readability and satisfactory presentation. The report generator is also evaluated for it's capability to customize output reports, especially those resulting from data previously captured in a management DBMS including all or portions of the system and variable amounts of time.

Test outputs include completed demonstration reports that compare expected versus actual site report generator outputs. General comments and recommendations concerning report formats customization capabilities and timeliness of reports generation are included in the output report.

8.6.4.4 Test Case A080640.040–LSM Reports

This test case is executed separately for each of the four DAACs associated with the TRMM delivery.

This test case demonstrates to site systems and operations personnel, the site capability to generate pre-defined reports.

Inputs for this test case include the required reports specifications. Initial test conditions require a fully operational site computer configuration ready to produce the specified reports including input data sets that are representative of nominal and special cases for each of the reports; product generation status reports; ground resources performance reports; user feedback analysis reports; fault management reports; and security compromise reports.

Each of the report demonstrations is evaluated for adherence to report format and content specifications. Test outputs include completed demonstration reports that compare expected versus actual outputs. General comments and recommendations concerning report formats customization capabilities, and timeliness of reports generation are included in the output report.

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9. Push Scenario Group

The push scenario group verifies ECS capability to interface with external data sources to receive, ingest, and archive Level-0 through Level-4 instrument data products, development software, ancillary data, correlative and calibration data, and the Version 0 System migration data. The scenarios include test descriptions to verify the ECS capabilities to ingest. The TRMM instrument data ingested from the SDPF and TSDIS. Figure 9-1, TRMM Interfaces, summarizes the external interfaces and the data ingested for the ECS at LaRC, MSFC and GSFC DAACs for the ECS TRMM Release. The push scenarios verify ECS capability to validate and process CERES and LIS Level-0 data into higher level products (L1 to L4), archive the data products, and perform quality checks as the data is being processed.

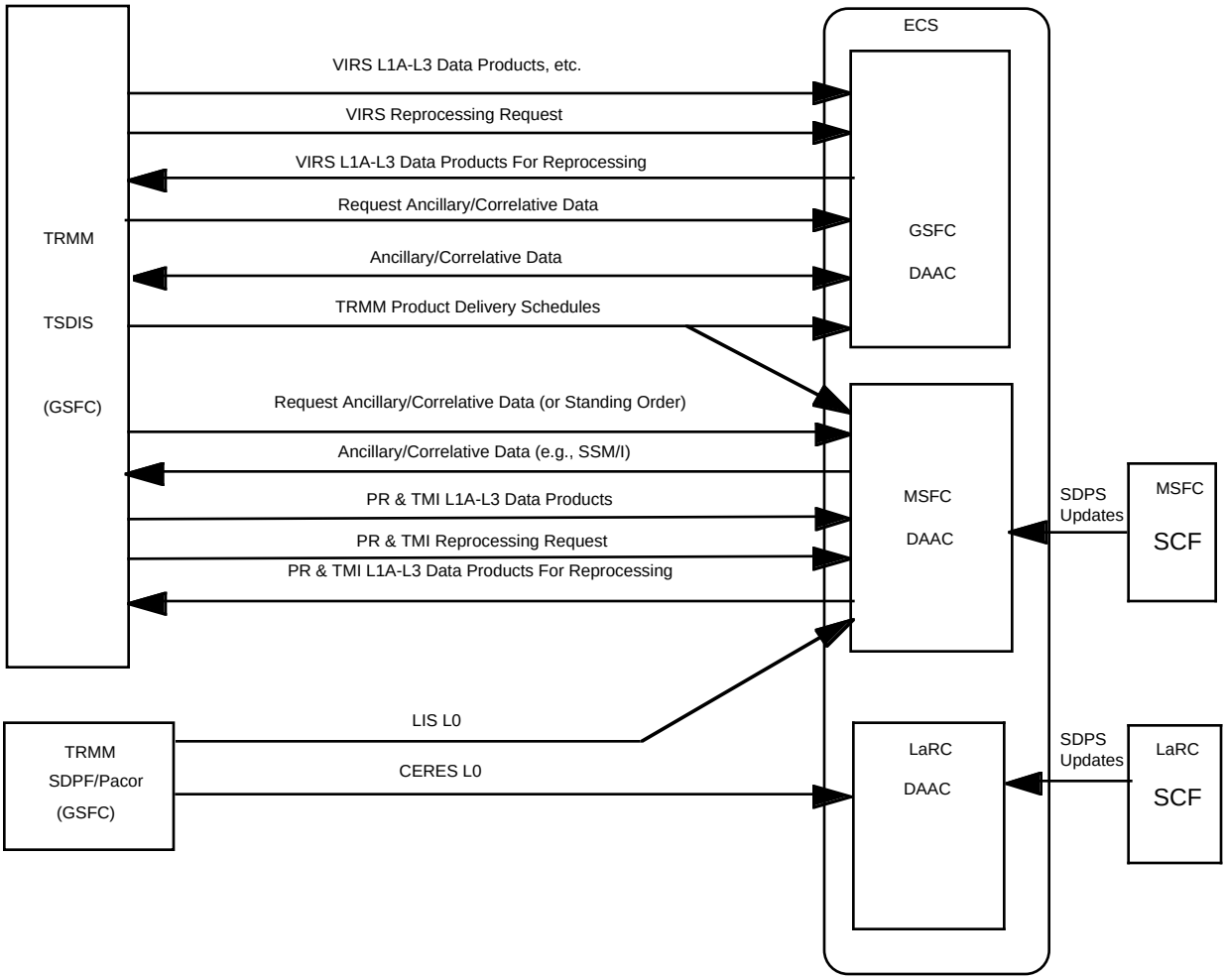

Figure 9-1. TRMM Interfaces

These scenarios also verify ECS capability to ingest, extract the associated metadata, update the inventory, and archive higher level processed TRMM data products for VIRS, TMI, GV, and PR instruments from TSDIS. The verification of handling request for reprocessing data is also described within the Push Scenario Group. CERES and LIS archived data products are reprocessed based on a schedule. The VIRS, TMI, GV, and PR data products are distributed by request to TSDIS for reprocessing.

Test descriptions within the Push Group also describe the ECS capability to receive science data production software (SDPS) update packages from the SCFs located at LaRC and MSFC. The content of the SDPS update packages are ingested and archived for use by the ECS for product processing.

Scenarios are included that describe the verification for the ingest of Level 0 CERES, MISR, MODIS, and MOPITT instrument data to support the early AM-1 interface testing.

Figure 9-2 provides a time-ordered list of the complete set of Push Group scenarios. Our plan is to repeat this series of tests at each site with slight variations to accommodate the evaluation of site-specific requirements.

9.1 Data Ingest/Process/Archive Scenario

This scenario carries the DAAC operations staff through the process of planning for and receiving a series of incoming data from external sources and executing the steps necessary to archive them and create higher levels of processed data.

This scenario verifies ECS capability to ingest Level-0 science, correlative, calibration, ancillary data, definitive data from EDOS, SDPF, and ADCs as listed in Table 7-1 of this document. This scenario verifies ECS capability to reformat level zero data products into an approved ECS format, schedule the data for processing, and determine the resources required for the production of the higher level products.

This scenario verifies ECS capability to activate the processing plan, schedule resources, create higher level products, and archive data products. This scenario verifies the automated generation of metadata by executing processing plans that link Level-0 data to ancillary data, science algorithms, databases, and math libraries. This scenario verifies ECS capability to activate the processing plan which will include simulated executions of algorithms to produce Level-1 through Level-4 data products.

This scenario verifies ECS capability to assess the quality of the data products that are received. Data checks will be performed to determine the type of data received and the procedure for processing the data. At each phase of processing, quality checks are performed to ensure that the required fields are in the data, granule size is within limits, the proper authorization is given to process and store the data. The compliance of the data with EOSDIS standards is also verified.

For the unacceptable data, the capability of ECS to request the external system to re-transmit the data will also be verified. This scenario verifies that status reports are generated and stored for all data received.

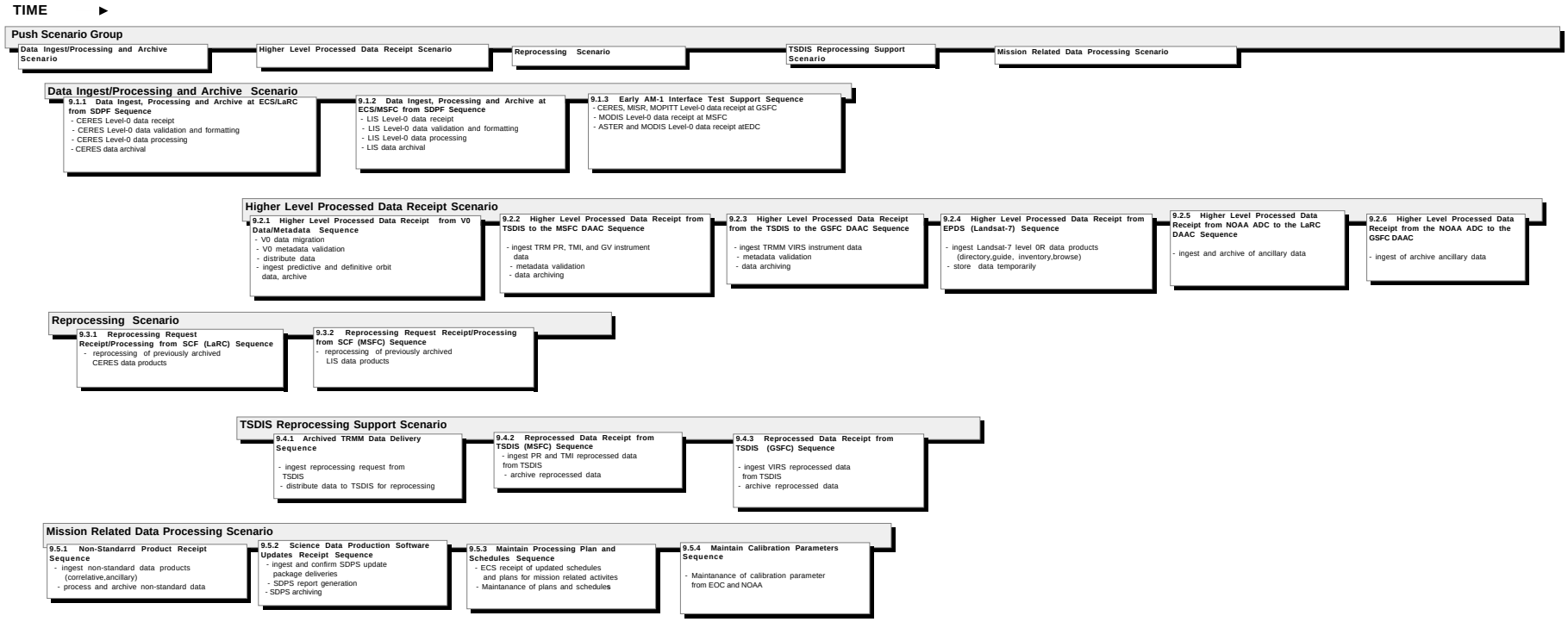

Figure 9-2. Push Scenario Group Acceptance Test Sequencing

9.1.1 Data Ingest, Processing and Archive at ECS/LaRC from SDPF Sequence

The Data Ingest, Processing and Archive at ECS/LaRC from SDPF sequence verifies that the Data Ingest Technician and Data Archive Technicians are provided access to the ECS/LaRC to produce CERES Level-1 through Level-4 data products from the CERES instrument on board the TRMM spacecraft. This sequence of tests verifies the capability of the ECS at LARC to receive Level-0, ancillary, correlative, and calibration data from the CERES instrument from the SDPF. Upon receipt of the data, ECS updates the data receipt log; validation and formatting are performed to ensure that the data is ready for processing; CERES higher level data products (L1–L4) and its associated metadata are generated; the data products are archived; and metadata is inserted into the ECS/LaRC directories, guides, and inventories.

9.1.1.1 Test Case A090110.010–CERES Data Receipt from SDPF to ECS/LaRC

The Data Receipt from SDPF to ECS/LaRC Test verifies ECS ingest requirements related to the receipt of Level-0, ancillary, correlative and calibration data products from SDPF to ECS/LaRC, for the CERES instrument of the TRMM platform. The Demonstration method is used to verify that the ingest data requirements are satisfied.

The Data Ingest Technician (DIT) monitors the data availability schedules to prepare the ECS for data arrival and processing. Verification of data ingest begins when the DIT unloads and logs the data sets containing CERES Level-0 data, metadata, and associated documentation transmitted from the SDPF into the ECS/LaRC. A receipt message is then sent to the SDPF notifying them of the data receipt. The data includes representative data rates and known exceptional conditions, such as pseudo-random single and burst data errors, that might affect data ingest processing. An input that contains intervals of representative unrecoverable data input errors is also included.

Once the data has been logged into the system the DIT compares the ECS/LaRC data receipt log to the SDPF data transmission log, delivered from SDPF, to note any data omissions, errors or other data deformations that occurred during the ingest process. A data transmission status report is then generated to notify the SDPF of the correctness. The DIT is then ready to continue on with the validation of the data.

9.1.1.2 Test Case A090110.020–CERES Data Validation/Formatting at ECS/LaRC

The CERES Data Validation/Formatting at ECS/LaRC Test verifies that the data ingested into the ECS at LaRC is validated, formatted, processed to extract associated metadata, and processed to generate Level-1 through Level-4 data products. The Analysis and Inspection methods are used to verify that the data validation, formatting and product generation requirements are satisfied.

The DIT prompts the system to begin validating the already logged and loaded CERES data-sets (data sets ingested in test case A090110.010) containing L0 data and associated metadata as transmitted to the ECS/LaRC from the SDPF. These ECS ingested data sets are accompanied by associated documentation including data authorization specifications for all ECS/LaRC data types. The ingest data sets also contain data modules with known exceptional conditions such as spurious data type identifiers and erroneous authorization specifiers. Once the validation process is complete the DIT receives a process complete message displayed on the DIT terminal, noting any

errors detected in the data sets. A report is then generated to capture all errors, the data header parameters, field sizes, and field presence. These results are compared with the ECS/LaRC Level-0 standard receipt formats. When no errors are detected the data is ready for formatting.

Formatting of the CERES Level-0 data sets involves the verification of creating internal formats based on data type (science, engineering, diagnostic, etc.). The internal format is necessary to convert Level-0 data to a higher level data product and extract the associated metadata.

9.1.1.3 Test Case A090110.040–CERES Metadata and Level-1 through 4 Data Processing at ECS/LaRC

The Generate Metadata and Level-1 through Level-4 (L1-L4) Test verifies the ECS requirements to extract and analyze associated metadata and to generate L1 through L4 data products for CERES Level-0 data from the SDPF. The Analysis method is used to verify that the generate metadata requirements are satisfied.

The DIT receives a set of notifications to create higher level products accessing formatted CERES data sets (data set validated and formatted in test case A090110.020). The DIT makes a note of the known exceptional conditions that might impact subsequent ECS L1-L4 processing, specifically incomplete data sets and data sets that are marked as low quality. A set of data processing plans representing the entire set of plans applicable to the ECS/LaRC portion of the ingest data set will be a second input. Additional notifications will be included as input to simulate data notification requests received from users to execute specific processing plans associated with the test input data plans. The DIT also accesses a plan for interrupting the test data processing sequence in a manner that simulates reallocation of system resources.

The test results include dumps of the ingest data sets, transformed to ECS format for all ECS/LaRC data types. The outputs also include all reports, products, operations and other logs generated as a result of L1-L4 processing performed on the ingest data stream. A second output is an analysis of the content of all submitted ECS/LaRC data processing plans that verifies inclusion of the following items, as appropriate, in the plans: a reference to algorithms used in processing, input files and data dependencies, output products, a reference to other plans required for producing output products (if any), a reference to standing orders to activate the subject plan after a higher level product is produced (if any), system resources required for processing; the definition and reference of utilities such as math libraries, toolkit software, algorithms, databases containing ephemeris information such as maps, land, sea , climate information and other system resources. An output report identifying the linkage of specific processing plans to input ECS/LaRC data types will be required for comparison with expected linkages implied from the input test data set. Output reports are required detailing the system reaction to the simulated reallocation of resources and the system reaction to encountering incomplete data sets during the processing of the ingest data.

Test outputs also include on-line and off-line data consistency checks results accomplished by comparing input and output data sets to verify that correct data transformations are applied to each ECS/LaRC data type and that erroneous data type specifications are detected. Outputs include analysis results verifying the timely availability of ancillary data prior to processing the data sets requiring the ancillary data plus verification of the system capability to suspend data set processing pending receipt of ancillary data. Further outputs include the complete set of L1-L4 products containing the granule id, the date, the time, and where the output products were created. An output

report is produced specifying the ECS produced linkage of metadata keywords to processing planes; guide, inventory and directory information; previously archived documentation; calibration data, algorithms, instrument and related documentation, key organizations and key personnel. Outputs include the full compliment of status reports for the L0 and higher level processing during test execution. Analysis reports that verifies ECS capability to monitor the status of L0 processing and to re-configure resources according to processing plan instructions are required outputs.

Outputs also include ECS status report that verify that required information is recorded including estimated time of completion, number of processes scheduled, number of processes completed, the process currently in progress and the quality of the accounting data. Output reports based on status log analysis also includes verification that products created with low (unacceptable) quality flags are held for review prior to storage, or request for reprocessing. Output reports include analysis results verifying that a record logging the final disposition of products is produced and that products are correctly distributed; Verification that user requests for products have been satisfied and a record of product disposition is retained; verification that data products needed for future scheduled processing is held in the proper staging area for further processing; and verification that guide, inventory and directory data; and status summaries of the test data set process are staged for permanent storage.

9.1.1.4 Test Case A090110.050–Archive CERES Data Products at ECS/LaRC

The Archive Data Products from SDPF at ECS/LaRC Test verifies the ECS requirements to store L0 and higher level CERES data products at the ECS/LaRC. The Inspection test method is used to verify that store data products requirements are satisfied.

The Data Archive Technician inputs for this test consist of the ECS formatted L0 products produced from the representative ingest datasets used in the previous Test Case A090110.040, in section 9.1.1.3. A set of data processing plans specification for the nominal ECS storage requirements for all ECS/LaRC L0 data sets is also required as input.

The outputs from this test include standard ECS data summaries containing storage disposition of all L0 data sets from processing the test ingest data stream. An analysis report of the results of comparing the data summaries with expected results from the nominal ECS storage requirements specification is included as output. This analysis report also provides the results of exceptional conditions, confirming that data which cannot be stored successfully is directed to temporary storage for manual QA, that manual QA is performed and that re-transmission requests are prepared in cases where manual QA fails to confirm a satisfactory data set.

9.1.2 Data Ingest, Processing and Archive at ECS/MSFC from SDPF Sequence

This sequence of tests verifies the ability of ECS/MSFC users to produce LIS Level-1 through Level-4 data products from the LIS instrument on board the TRMM spacecraft. This sequence of tests verifies the capability of ECS/MSFC to receive Level-0 (raw data), ancillary, correlative, and calibration data from the LIS instrument from the SDPF. At the ECS/MSFC DAAC, upon receipt of the data, verifications are performed to ensure that the ECS updates the data receipt log; performs data quality validation on the data received as well as on the data during product

generation; generates LIS higher level data products (L1–L4) and its associated metadata; archives the data products; and inserts metadata into the ECS/MSFC directories, guides, and inventories.

9.1.2.1 Test Case A090120.010–LIS Data Receipt from SDPF at ECS/MSFC

The Ingest Data from SDPF/MSFC Test verifies ECS ingest requirements related to receipt of L0, ancillary, correlative and calibration data products from the LIS instrument, on the TRMM spacecraft, via SDPF/MSFC. The Demonstration method is used to verify that the ingest data from SDPF/MSFC requirements are satisfied.

This test case verifies the receipt of LIS data products from the SDPF following the same test process described in Section 9.1.1.1, "CERES Data Receipt from SDPF to ECS/LaRC" (test case A090110.010). The reports that are generated as a result of the data ingest are based on processing LIS data sets.

9.1.2.2 Test Case A090120.020–LIS Data Validation/Formatting at ECS/MFSC

The Data Validation Test verifies the requirements of ECS to perform data checking to validate data authorization and data types (e.g., science, engineering, diagnostic, or summary) of LIS L0 data sets received by ECS from the SDPF. The Analysis method is used to verify that the data validation requirements are satisfied.

This test case verifies the receipt of LIS data products from the SDPF following the same test process described in the "CERES Data Validation/Formatting at ECS/LaRC" (test case A090110.020). The reports that are generated as a result of the data ingest are based on processing LIS data sets.

9.1.2.3 Test Case A090120.040–CERES Metadata and Level-1 through 4 Data Processing at ECS/MSFC

The CERES Metadata and Level-1 through 4 Data Processing at ECS/MSFC Test verifies the requirements of ECS to extract and analyze ECS/MSFC associated metadata and to generate L1 through L4 data products from L0 data of the LIS instruments from SDPF. The Analysis method is used to verify that the generate metadata and generate Level-0-Level-4 data requirements are satisfied.

This test case verifies the receipt of LIS data products from the SDPF following the same test process described in "Data Receipt from SDPF to MSFC" test case (test case A090110.040). The reports that are generated as a result of the data ingest are based on processing LIS data sets.

9.1.2.4 Test Case A090120.050–LIS Data Archive at ECS/MSFC

The LIS Data Archive at ECS/MSFC Test verifies the ECS requirements to store L0 and higher level CERES data products at the ECS/MSFC. The Inspection method is used to verify the store data products requirements are satisfied.

The Data Archive Technician initiates the system for the archiving of processed metadata and high level data inputs(data sets processed in test case A090120.040) that are ready to be stored into the ECS archive at LaRC.

The outputs from this test include standard ECS data summaries containing storage disposition of all L0 data sets from processing the test ingest data stream. An analysis report of the results of comparing the data summaries with expected results from the nominal ECS storage requirements specification is included as output. This analysis report also provides the results of exceptional conditions, confirming that data which cannot be stored successfully is directed to temporary storage for manual QA, that manual QA is performed and that re-transmission requests are prepared in cases where manual QA fails to confirm a satisfactory data set.

9.1.3 Early AM-1 Interface Test Support Sequence

The Early AM-1 Interface Test Support Sequence verifies that the ECSs located at GSFC and LaRC support the interface testing for the AM-1 launch. To ensure that the connectivity is operational the Level-0 AM-1 instrument data is ingested, validated and temporarily stored at the ECS located at GSFC, LaRC and EDC. The AM-1 interfaces described in this sequence are shown in Figure 9-3.

9.1.3.1 Test Case A090130.010–AM-1 Data Ingest from EDOS at ECS/LaRC

The AM-1 Data Ingest from EDOS at ECS/LaRC test verifies that the ECS located at the LARC can ingest Level 0 data products from EDOS. This interface is required to support the early AM 1 interface testing. The Test method is used to verify that the ingest data requirements are satisfied.

The ECS/LaRC DIT receives the a schedule to receive Level 0 CERES, MISR and MOPITT data sets from EDOS. The data set consist of a production data set (PDS) that includes the following two files: the first file consist of a header record and the actual data packets; the second file consist of a delivery record providing the description and number of data packets in the first file. The DIT logs the PDS delivery and proceeds to load the files onto the system.

Once the data is loaded onto the system the DIT generates a report that provides details included in the header record and a description and count of the data packets delivered. from the EDOS. An ingest results report is also generated for comparison with input data sets to note any data omissions, errors or other data deformations that occurred during the ingest process. A data transmission status report is also included for comparison with operations processing logs and with input data receipt notices and availability notices, to verify the existence and correctness of the data transmission log and for verification that ECS receives data sets as prescribed from EDOS.

9.1.3.2 Test Case A090130.020–AM-1 Data Ingest from EDOS at ECS/GSFC

The AM-1 Data Ingest from EDOS at ECS/GSFC test verifies that the ECS located at the LARC can ingest Level 0 data products from EDOS. This interface is required to support the early AM 1 interface testing. The Test method is used to verify that the ingest data requirements are satisfied.

The ECS/GSFC DIT receives the a schedule to receive Level 0 MODIS data sets from EDOS. The data set consist of a PDS that includes the following two files: the first file consist of a header record and the actual data packets; the second file consist of a delivery record providing the description and number of data packets in the first file. The DIT logs the PDS delivery and proceeds to load the files onto the system.

This test case verifies the receipt of Level 0 MODIS data products from the SDPF following the same test process described in "AM-1 Data Ingest from EDOS at ECS/LaRC" test case (test case A090130.010). The reports that are generated as a result of the data ingest are based on processing LIS data sets.

9.1.3.3 Test Case A090130.020–AM-1 Data Ingest from EDOS at EDC

The AM-1 Data Ingest from EDOS at EDC test verifies that the EDC can ingest Level 0 ASTER and MODIS data products from EDOS. This interface is required to support the early AM-1 interface testing. The Test method is used to verify that the ingest data requirements are satisfied.

The EDC DIT receives the a schedule to receive Level 0 ASTER and MODIS data sets from EDOS. The data set consist of a PDS that includes the following two files: the first file consist of a header record and the actual data packets; the second file consist of a delivery record providing the description and number of data packets in the first file. The DIT logs the PDS delivery and proceeds to load the files onto the system.

This test case verifies the receipt of LIS data products from the SDPF following the same test process described in section 9.1.3.1, "AM-1 Data Ingest from EDOS at ECS/LaRC" test case (test case A090130.010). The reports that are generated as a result of the data ingest are based on processing of LIS data sets.

9.2 Higher Level Processed Data Scenario

This scenario takes the DAAC operations personnel through the process of planning for and receiving higher level data from other DAACs, EPDSs, NOAA ADC, and V0 DAAC; ingesting it; and making the data available to users for further processing and analysis.

This Higher Level Processed Data Scenario verifies the ECS capabilities to: receive data arrival notices and higher level data from the DAACs; verifies that the data receipt process is complete and header information is accurate; extract metadata and verifies the information; archive the metadata; and maintain an on-line directory.

This scenario verifies that the provider of the data sends a data availability notice/schedule to a DAAC informing the DAAC of the planned transfer of Level-1 and higher production data sets with associated metadata and documentation. In the case of a data driven process, data centers send data availability schedules to the DAACs indicating estimated date and time that the transfer of data will take place. For a schedule driven process, the DAAC utilizes data availability schedules to determine the proper time for transferal of the data from the source data center (i.e., TSDIS, other EPDSs (TRMM, Landsat-7), NOAA ADC, and V0 DAAC).

This scenario verifies the ECS capability to ingest higher level processed data. This scenario verifies the ECS capability to ingest higher level data products and supporting documentation from the external systems discussed in Table A-1. The ECS ingests data from the V0 DAAC, TRMM Ground Systems, EPDSs (TRMM, Landsat 7), NOAA ADC, and the user community. A data receipt log is maintained to account for all science data that is received by the ECS from the data centers and the user community. This scenario verifies that the following classes of data will be ingested by the ECS: metadata, ancillary data, calibration data, correlative data, Level 1–Level 4 data products, products status dialogs, and algorithms. The ESC DAACs capable of ingesting the higher level processed data are LaRC, MSFC, GSFC, and EDC.

The capability of the ECS to perform quality analysis on the data product is verified. This scenario verifies the ECS capability to check all metadata and data it receives for the presence of required fields, error-free input, correctness of data set granule size, and other checks that are_deemed necessary. If the quality of the data is unacceptable (e.g., transmission errors), this scenario verifies the ECS capability to request the external system to re-transmit the data. This scenario verifies that the data received is from an approved/authorized source. A status indicating the success or failure of metadata and data consistency checks is generated by the ECS and sent to the provider of the ingested data.

This scenario verifies the capability of the ECS to extract metadata and reformat the data product into an approved the ECS format. Once the data is checked and verified for completeness, metadata is extracted in order for the data to be identified, referenced, and stored. This scenario verifies that the ECS checks for the presence of a granule id and that a metadata guide and inventory is present to reference related science data, such as calibration data, navigation data, processing algorithms, and QA validation data.

This scenario verifies the capability of the ECS to archive product data, insert the metadata into the inventory, and update the data receipt log once the data archiving process is complete. This sequence verifies that the ECS provides storage for both EOS data and Non-EOS (i.e., NOAA ADC) scientist provided data. When current versions of products exist, the ECS archives the current version of the product, therefore, allowing the older version to be flagged for deletion. This scenario verifies that the ECS maintains data storage inventories defining the physical location of files and provides an inventory system capable of uniquely identifying each data granule and tracking the physical location of each granule.

The ECS maintains three levels of user accessible metadata: directory, guide, and inventory. A package consisting of guide and inventory information is included whenever products are inserted into the ECS. This scenario verifies that the guide and inventory directories are updated and an insertion is made in the ECS directory when the guide and inventory information is extracted from the metadata.

9.2.1 Higher Level Processed Data Receipt from the V0 DAAC Sequence

This sequence of test verifies the ability of the V0 DAAC users to store migration data at the ECS DAACs. The V0 migration data can include static data and operational data. Static data is data which is already archived at the DAAC V0 DADS. Operational data is which is produced at a DAAC V0 PGS. The test cases presented below are performed at each of the following ECS DAACs: LaRC, MSFC, and GSFC. If the data is static, the ECS DAAC receives migration data products, browse data, associated metadata and documentation, ancillary data, and correlative data from the DAAC V0 DADS. If the migration data is operational data, then the ECS receives the operational data products, browse data, and associated metadata from the DAAC V0 PGS according to a agreed upon schedule. Also, advertising information describing the data holdings at each V0 DAAC is ingested by the ECS DAAC. This sequence of tests verifies the receipt of the DAAC V0 migration data. At each ECS DAAC (LaRC, MSFC, and GSFC), verification is performed to ensure that all data received from the DAAC V0 are validated, accounted for, checked for EOSDIS compliance, and permanently stored. The ability of the DAAC V0 users to receive status information on their ingested products is also verified.

9.2.1.1 Test Case A090210.020–Ingest Migration V0 Data/Metadata from the V0 DAAC

The Ingest Migration V0 Data/Metadata from the V0 DAAC Test verifies that the ECS ingests the migration metadata, data products, browse data, ancillary data and correlative data. If the data is static, the migration data is ingested from the DAAC V0 DADS. If the data is operational, the migration data is ingested directly from the DAAC V0 PGS according to a agreed upon schedule. The Test method is used to verify that the migration data ingest requirements are satisfied. To exercise this capability, the ECS operational staff can accomplish the migration via one of the following media: CD-ROM, 4mm tape, 8mm tape, 6250 bpi magnetic tape, or electronic transfer. The migration data formats are as follows: HDF, native format, and a third format to be determined.

This test case verifies that upon ingest, successful or unsuccessful, of the migration data, the data receipt log is updated and verifies receipt, or non receipt, of the migration data information.

9.2.1.2 Test Case A090210.030–Ingest Migration Documentation and Validation

The Ingest Migration Documentation and Validation Test verifies that the ECS ingests documentation related to the migration data products. The Test method is used to verify that the migration documentation ingest requirements are satisfied.

This test case verifies that the ECS ingests migration data related documentation in various digital text formats from the V0 DAAC. Types of digital text formats include the following: ASCII text, Microsoft WORD, Hyper-Text Markup Language (HTML), Interleaf, Postscript, and WordPerfect. To exercise this capability, migration data documentation in various digital text formats are sent by the V0 DAAC and received by the ECS. Once received, verification is performed to ensure that all six types (ASCII text, Microsoft WORD, HTML, Interleaf, Postscript, and WordPerfect) of digital text formats are ingested by the ECS with no problems reported. To exercise this capability, the user accesses, via the supporting word processors, the various types of migration data related documentation ingested by the ECS from the V0 DAAC.

9.2.1.3 Test Case A090210.040–Migration Data/Metadata Accountability

The Migration Data/Metadata Accountability Test verifies that the higher level data ingested by the ECS from the V0 DAAC is complete and accurate. The transmission of the migration data should be successful. In the event of transmission difficulties, the ECS notifies the V0 DAAC and informs the data center of the problem and requests retransmission of the data. The Test method is used to verify that migration data/metadata accountability requirements are satisfied. To exercise this capability, verification is performed to ensure that all migration data transmitted from the V0 DAAC are accounted for in the data receipt log.

9.2.1.4 Test Case A090210.050–Migration Data/Metadata Validation and Compliance Check

The Migration Data/Metadata Validation and Compliance Check Test verifies that the ECS, upon receipt of the migration data from the V0 DAAC, automatically checks for transmission errors. During this validation process, an automatic examination of the data header is performed to ensure that no anomalies are present in the ingested migration data. Problems encountered may fall under one of the following categories: data identification, data routing, time-ordering of the data, data

gaps, data redundancy, and data quality. The Test method is used to verify that the migration data/ metadata validation requirements are satisfied. To exercise this capability, the user verifies that no errors were detected during the automatic examination of the data header.

This test also verifies that ECS performs validation and compliance checks on the migration data and metadata it receives from the V0 DAAC. The data and metadata validation checks involve the following verifications: presence of required fields, error-free input, correctness of the data set granule size, and other checks that are determined to be necessary in order to complete the validation process. Compliance checks are performed to ensure that scientist provided data complies with EOSDIS defined standards for metadata and file content (not scientific content).

This test verifies that ECS generates a status report indicating the success or failure of the data and metadata consistency checks and verifies that the higher level processed data ingested from the V0 DAAC came from an approved and/or authorized source. Upon completion of the validation and compliance checks, the ECS sends a data check status report to the V0 DAAC.

9.2.1.5 Test Case A090210.070–Migration Metadata Extraction/Verification

The Migration Metadata Extraction/Verification Test verifies that the ECS checks for the presence of a unique granule id in the metadata header. When the data is ingested by the ECS, metadata is extracted in order for the data to be identified, referenced, and stored. This metadata may be extracted from information contained within the data file, file/message associated with the data, or derived directly from the delivered file message. There is an extraction of limited metadata (i.e., data set name, instrument name, observation time, granule id, etc.) for the higher level data to ensure that the stored data may be access from permanent storage. The type of validation checks performed on the metadata is based on the data type ingested and the required agreed upon attributes list. The Demonstration and Inspection methods are used to verify the metadata extraction/validation requirements.

9.2.1.6 Test Case A090210.080–Migration Data Archiving

The Migration Data Archiving Test verifies that the ECS provides storage for the following V0 migration data: data products, browse data, associated metadata and documentation, ancillary data, and correlative data. This test case verifies the capability of the ECS to archive V0 migration product data, insert the metadata into the inventory, and update the data receipt log once the data archiving process is complete. Prior to data archiving, the following metadata information is produced: date and time of storage, physical location, data check status, and unique format identifiers. Verification is performed to ensure that this information is generated before the archiving of the ingested migration data begins. The Test and Inspection methods are used to verify that the migration data archiving requirements are satisfied.

9.2.1.7 Test Case A090210.090–Migration Data Maintain On-Line Directories

The Migration Data Maintain On-Line Directories Test verifies that when guide and inventory data is extracted from the migration metadata, the guide and inventory directories are updated and an insertion is made into the ECS directory. The Test method is used to verify the updating of the ECS directories with the pertinent information. There are three levels of user accessible metadata that maintained in the ECS: Directory, Guide, and Inventory. When higher level products are inserted into the ECS, guide and inventory information is included as part of the package.

9.2.2 Higher Level Processed Data Receipt from the TSDIS to the MSFC DAAC Sequence

This sequence of test verifies the ability of the TRMM PR, TMI, and GV users to store higher level standard products (L1A-L3), its associated metadata, and documentation at the ECS at the MSFC DAAC via TSDIS. This sequence of tests verifies that the ECS at the MSFC DAAC receives from the TSDIS data availability notices for the data to be ingested, the standard data products generated at the TSDIS, metadata, as well as browse data, GV data, algorithms, and documentation related to the PR, TMI, and GV products. At the ECS at the MSFC DAAC, verification is performed to ensure the TSDIS users that all data received from them is validated, accounted for, checked for EOSDIS compliance, and permanently stored. The ability of the TSDIS users to receive status information on their ingested products is also verified.

9.2.2.1 Test Case A090230.010–Data Availability Notice from the TSDIS to the MSFC DAAC

The Data Availability Notice from the TSDIS to the MSFC DAAC Test verifies that the ECS at the MSFC DAAC receives notices concerning data availability schedules and data delivery status from the TSDIS. The ECS at the MSFC DAAC receives data availability schedules from the TSDIS indicating the times when the TSDIS data sets (PR, TMI, and GV) will be available for ingest at the MSFC DAAC. The Demonstration method is used to verify that the data availability schedule requirements are satisfied. To exercise this capability, verification is performed to ensure that a data availability schedule is received and that the TSDIS data sets listed on the notice are accurate and complete.

9.2.2.2 Test Case A090230.020–Ingest Data/Metadata (PR, TMI, GV) at the MSFC DAAC

The Ingest Data/Metadata (PR, TMI, GV) at the MSFC DAAC Test verifies that the ECS at the MSFC DAAC ingests the following PR, GV, and TMI data products from the TSDIS: Level 1 A data; TRMM standard products (Level 1-B–Level 3-B); TRMM browse products; algorithms; correlative data; and metadata. The Test method is used to verify that the TSDIS data and product ingest requirements are satisfied. To exercise this capability, the user compares the data listed in the data availability notice with the data and products ingested by the ECS from the TSDIS. This verification ensures that the ingested data is complete and accurate.

This test case verifies that upon ingest, successful or unsuccessful, of the TRMM (PR, TMI, and GV) data products, metadata, algorithms, and correlative data, the data receipt log is updated and verifies receipt, or non receipt, of the higher level processed data information.

9.2.2.3 Test Case A090230.030–Ingest Documentation and Validation at the MSFC DAAC

The Ingest Documentation and Validation at the MSFC DAAC Test verifies that the ECS at the MSFC DAAC ingests TRMM related documentation from the TSDIS. The documentation the ECS ingests from the TSDIS consists of information describing PR, TMI, and GV Level-1–Level 3 data products, algorithms, and calibrations. The Test method is used to verify that the TRMM

related documentation ingest requirements are satisfied. To exercise this capability, the user verifies that all of the documentation contained in the data availability schedule/notice is ingested by the ECS from the TSDIS.

This test case verifies that the ECS at the MSFC DAAC ingests TRMM related documentation from the TSDIS in the following digital text formats: ASCII text, Microsoft WORD, HTML, Interleaf, Postscript, and WordPerfect. To exercise this capability, the user accesses the various types of TRMM related documentation ingested by the ECS from the supporting word processors.

9.2.2.4 Test Case A090230.040–Data/Metadata Accountability at the MSFC DAAC

The Data/Metadata Accountability at the MSFC DAAC Test verifies that the higher level TRMM PR, TMI, and GV data ingested by the ECS at the MSFC DAAC from the TSDIS is complete and accurate. The transmission of the higher level data should be successful. In the event of transmission difficulties, the ECS at the MSFC DAAC notifies the TSDIS and informs the data center of the problem and requests that the data be re-transmitted. The Test method is used to verify that PR, TMI, and GV data/metadata accountability requirements are satisfied. To exercise this capability, verification is performed to ensure that all of the TRMM data/metadata higher level data transmitted from the TSDIS and ingested by the ESC at the MSFC DAAC are accounted for in the data receipt log.

9.2.2.5 Test Case A090230.050–Data/Metadata Validation and Compliance Check at the MSFC DAAC

The Data/Metadata Validation and Compliance Check at the MSFC DAAC Test verifies that the ECS at the MSFC DAAC, upon receipt of higher level TRMM PR, TMI, and GV data products from the TSDIS, automatically checks for transmission errors. During this validation process, an automatic examination of the data header is performed to ensure that no anomalies are present in the ingested higher level processed data. Data validation checks for this part of the process consist of the following: data identification, data routing, time-ordering of the data, data gaps, data redundancy, and data quality. The Test method is used to verify that TRMM data/metadata validation requirements are satisfied. To exercise this capability, the user examines the system logs/reports to ensure that no errors were detected during the automatic examination of the data header.

This test verifies that the ECS at the MSFC DAAC performs additional validation and compliance checks on higher level processed PR, TMI, and GV data and metadata it receives from the TSDIS. The higher level processed data and metadata validation checks involve the following verifications: presence of required fields, error-free input, correctness of the data set granule size, and other checks that are determined to be necessary in order to complete the validation process. Compliance checks are performed to ensure that scientist provided data complies with EOSDIS defined standards for metadata and file content (not scientific content).

This test verifies that the ECS at the MSFC DAAC generates a status report indicating the success or failure of the data and metadata consistency checks and verifies that the higher level processed data ingested from the TSDIS came from an approved and/or authorized source. Upon completion of the validation and compliance checks, the ECS sends a data check status report to the TSDIS.

9.2.2.6 Test Case A090230.070–Metadata Extraction/Verification at the MSFC DAAC

The Metadata Extraction/Verification at the MSFC DAAC Test verifies that the ECS at the MSFC DAAC extracts and validates the associated metadata for the TRMM PR, TMI, and GV data products. The Demonstration and Inspection methods are used to verify these requirements. This test case verifies that the ECS at the MSFC DAAC checks for the presence of a unique granule id in the metadata header. When higher level processed data is ingested by the ECS at the MSFC DAAC, metadata is extracted in order for the data to be identified, referenced, and stored. This metadata may be extracted from information contained with the data file, file/message associated with the data, or derived directly from the delivered file message. There is an extraction of limited metadata (i.e., data set name, instrument name, observation time, granule id, etc.) for the higher level data to ensure that the stored data may be accessed from permanent storage. The type of validation checks performed on the metadata is based on the data type ingested and the required agreed upon attributes list.

This test case verifies that the ingested TRMM PR, TMI, and GV metadata, providing a cross reference for science related data, at a minimum, includes the following: calibration, navigation, and instrument engineering data; processing algorithms; software, parameters, and input data used for product generation; data recipients; the processor where the data was processed; and QA validation data. Verification is performed to ensure that a guide and inventory are present in order for users to reference related science data by choosing various criteria in order to access the higher level data. To exercise this capability, the user can access the higher level science data using the criteria selections listed above.

This test case verifies that the ingested TRMM PR, TMI, and GV metadata associated with standard products contains content-based summary information, including statistical summaries and granule features. For standard product related metadata, the following information is contained: keywords and glossary from investigators; keywords, synonyms, and glossary for cross-product and cross-directory referencing; and identifiers for locating products in the ECS archive by granule. To exercise this capability, the user can locate a higher level standard data product by using one of the criteria selections listed above.

This test case verifies that metadata associated with algorithm documentation are to include: version history, authors, written description of product, equations, and references from the higher level products received. Metadata associated with documentation on instrument(s) and spacecraft(s) history is verified for the following information: housekeeping, ancillary, and calibration parameters; discipline characterization; key individuals; and references. For metadata associated with static browse products, subsetted data products, subsampled data products, and summary data products, the following information is verified for inclusion: identifiers, algorithms, written descriptions, equations, authors, and associated references. Verification is performed for the presence of an author and date for published papers, research results, and "significant" results and their references to granule-specific information.

9.2.2.7 Test Case A090230.080–TSDIS Data Archiving at the MFSC DAAC

The TSDIS Data Archiving at the MSFC DAAC Test verifies the capability of the ECS at the MSFC DAAC to archive the TSDIS product data, insert the metadata into the inventory, and update the data receipt log once the archiving process is complete. This test case verifies that the ECS at the MSFC DAAC provides storage for the following TRMM data relating to the PR, TMI, and GV instruments: associated correlative, ancillary, and calibration data sets, as well as, metadata; Level 1–Level 3 equivalent data products; documents; and algorithms. Verification is also made to ensure that when a TSDIS user sends a notice to store a higher level product, the guide, inventory, and directory information is included in the notice. The Test and Inspection methods are used to verify the archiving of the TSDIS data. To exercise this capability, the user obtains the data storage status information to determine if all higher level TRMM data ingested by the ECS at the MSFC DAAC from the TSDIS is successfully archived. The following metadata information is produced prior to archiving: date and time of storage, physical location, data check status, and unique format identifiers. This information must be present in order to begin the archiving process for the TRMM PR, TMI, and GV data ingested from the TSDIS by the ECS MSFC DAAC. Verification is performed to ensure that the metadata information required for data archiving is produced and verified prior to the commencement of the archiving process. Upon successful completion of the data archiving process, an acknowledgment indicating storage status is sent to TSDIS.

This test case verifies that the ECS provides the storage capability to logically grouped sets of data as a single entity. Verification is made to ensure that the ECS maintains data storage inventories defining the physical location of files and provides an inventory system capable of uniquely identifying each data granule and tracking the physical location of each granule

This test case also verifies the capability of the ECS to archive multiple versions of selected V0 migration data. In the case where multiple versions of TRMM PR, TMI, and GV data products exist, this test sequence verifies that the ECS archives the current version of the product, thus making the preceding version of the product eligible for deletion. The ECS then notifies the MSFC DAAC of the product marked for deletion via direct notification and the ECS Bulletin Board. This test verifies the capability of the ECS to archive and manage the storage of all TRMM PR, TMI, and GV data products. To exercise this capability, a MSFC DAAC user requests the storage of multiple versions of a selected TRMM PR, TMI, and GV data product. Verification is performed to ensure that the current version of that product is archived and the older version is marked for deletion.

9.2.2.8 Test Case A090230.090–Maintain On-Line Directories at the MSFC DAAC

The Maintain On-Line Directories at the MSFC DAAC Test verifies that when guide and inventory data is extracted from the TRMM metadata relating to PR, TMI, and GV data products, the guide and inventory directories are updated and an insertion is made into the ECS directory at the MSFC DAAC. When higher level products are inserted into the ECS, guide and inventory information is included as part of the package. The Test method is used to verify the updating of the ECS directories and inventories with the appropriate information. There are three levels of user accessible metadata that are maintained in the ECS: Directory, Guide, and Inventory.

Verification is made to ensure that when a V0 DAAC user sends a notice to store a higher level product, the guide, inventory, and directory information is included in the store notice. The V0 DAAC is notified if discrepancies are found and the ECS logs the problem accordingly.

This test case verifies that ECS maintains a log of all updates to the local inventory. The information contained in this log is used to generate status reports, and in conjunction with the inventory backup, recreate the local inventory in the event of catastrophic failure. The Test method is used to verify that local inventory log requirements are satisfied. To exercise this capability, the user verifies that any updates involving the local inventory are listed in a log. Also, the user verifies that this log is utilized in the generation of status reports and that in the event of catastrophic failure, the local inventory list can be recreated from this updated log

9.2.3 Higher Level Processed Data Receipt from the TSDIS to the GSFC DAAC Sequence

This sequence of test verifies the ability of the TRMM VIRS users to store higher level VIRS standard products (L1A-L3), its associated metadata, and documentation at the ECS at the GSFC DAAC via the TSDIS. This sequence of tests verifies that the ECS at the GSFC DAAC receives from the TSDIS data availability schedule/status for the data to be ingested, the standard data products generated at the TSDIS, metadata, as well as browse data, algorithms, and documentation related to the VIRS products. At the GSFC DAAC, verification is performed to ensure the TRMM users that all data received from them is validated, accounted for, checked for EOSDIS compliance, and permanently stored. The ability of the TRMM users to receive status information on their ingested VIRS products is also verified.

9.2.3.1 Test Case A090240.010–Data Availability Notice from the TSDIS at the GSFC DAAC

The Data Availability Notice from the TSDIS at the GSFC DAAC Test verifies that the ECS at the GSFC DAAC receives notices concerning data availability schedules and data status from the TSDIS. The ECS at the GSFC DAAC receives data availability schedules indicating the times when the TSDIS VIRS data sets are available for ingest at the ECS at the GSFC DAAC. The Demonstration and Inspection methods are used to verify that the data availability schedule requirements are satisfied. This test case verifies the receipt of the data availability notice from the TSDIS and follows the same test process described in section 9.2.2.1 ”Data Availability Notice from the TSDIS to the MSFC DAAC” (Test Case A090230.010).

9.2.3.2 Test Case A090240.020–Ingest Data/Metadata (VIRS) at the GSFC DAAC

The Ingest Data/Metadata (VIRS) at the GSFC DAAC Test verifies that the ECS at the GSFC DAAC ingests the following VIRS data products from the TSDIS: Level 1 A data; VIRS standard products (Level 1-B–Level 3-B); VIRS browse products; algorithms; correlative data; and metadata. The Test method is used to verify that the TSDIS data and product ingest requirements are satisfied. This test case verifies the receipt of the VIRS data/metadata following the same test process described in section 9.2.2.2 “Ingest Data/Metadata (PR, TMI, GV) at the MSFC DAAC” (Test Case A090230.020).

9.2.3.3 Test Case A090240.030–Ingest Documentation and Validation at the GSFC DAAC

The Ingest Documentation and Validation at the GSFC DAAC Test verifies that the ECS at the GSFC DAAC ingests the TRMM VIRS related documentation in various digital text formats from the TSDIS. The documentation the ECS at the GSFC DAAC ingests from the TSDIS consists of information describing VIRS Level-1–Level-3 data products, algorithms, and calibrations. The Test method is used to verify that the TRMM related documentation ingest requirements are satisfied. To exercise this capability, the user can access a VIRS ingested document via one of the supporting digital text format word processors (e.g., Microsoft WORD). The test process for this test case is the same as described in section 9.2.2.3 "Ingest Documentation and Validation at the MSFC DAAC" (Test Case A090230.030).

9.2.3.4 Test Case A090240.040–Data/Metadata Accountability at the GSFC DAAC

The Data/Metadata Accountability at the GSFC DAAC Test verifies that the higher level data ingested by the ECS at the GSFC DAAC from the TSDIS is complete and accurate. In the event of transmission difficulties, the ECS at the GSFC DAAC notifies the TSDIS of the problem and requests that the data be re-transmitted. The Test method is used to verify that TRMM VIRS data/ metadata accountability requirements are satisfied. This test case verifies that all data ingested from the TSDIS is accounted for following the same test process described in section 9.2.2.4 "Data/ Metadata Accountability at the MSFC DAAC" (Test Case A090230.040).

9.2.3.5 Test Case A090240.050–Data/Metadata Validation and Compliance Check at the GSFC DAAC

The Data/Metadata Validation and Compliance Check at the GSFC DAAC Test verifies that the ECS at the GSFC DAAC, upon receipt of higher level TRMM VIRS data products from the TSDIS, performs data validation and compliance checks on the data. The Test method is used to verify that the TRMM data/metadata validation requirements are satisfied. This test case verifies that all data/metadata ingested from the TSDIS is valid and comply with the EOSDIS defined standards. The test process for this test case is the same as described in section 9.2.2.5 "Data/ Metadata Validation and Compliance Check at the MSFC DAAC" (Test Case A090230.050).

9.2.3.6 Test Case A090240.070–Metadata Extraction/Verification at the GSFC DAAC

The Metadata Extraction/Verification at the GSFC DAAC Test verifies that the ECS at the GSFC DAAC extracts and validates the associated metadata for the TRMM VIRS data products. The Demonstration and Inspection methods are used to verify these requirements. This test case verifies that the ECS at the GSFC DAAC checks for the presence of a unique granule id in the metadata header. When VIRS higher level processed data is ingested by the ECS, metadata is extracted in order for the data to be identified, referenced, and stored. This metadata may be extracted from information contained with the data file, file/message associated with the data, or derived directly from the delivered file message. There is an extraction of limited metadata (i.e., data set name, instrument name, observation time, granule id, etc.) for the VIRS higher level data to ensure that the stored data may be accessed from permanent storage. The type of validation

checks to be performed on the metadata is based on the data type ingested and the required agreed upon attributes list. The test process for this test case is the same as described in section 9.2.2.6 " Metadata Extraction/Verification at the MSFC DAAC" (Test Case A090230.070).

9.2.3.7 Test Case A090240.080–Data Archiving at the GSFC DAAC

The Data Archiving at the GSFC DAAC Test verifies the capability of the ECS at the GFSC DAAC to archive TRMM VIRS product data, insert the metadata into the inventory, and update the data receipt log once the archiving process is complete. This test case verifies that the ECS at the GSFC DAAC provides storage for the following TRMM VIRS data: associated correlative, ancillary, and calibration data sets, as well as, metadata; Level-1–Level-3 equivalent data products; documents; and algorithms. Verification is also made to ensure that when a TSDIS user sends a notice to store a higher level product, the guide, inventory, and directory information is included in the notice. The Test and Inspection methods are used to verify the archiving of the TSDIS data. To exercise this capability, the user can obtain data storage status information to determine if all higher level TRMM VIRS data ingested by the ECS at the GSFC DAAC from the TSDIS is successfully archived. Upon successful completion of the data archiving process, an acknowledgment indicating storage status is sent to the TSDIS. The test process for this test case is the same as described in section 9.2.2.7 "TSDIS Data Archiving at the MFSC DAAC" (Test Case A090230.080).

9.2.3.8 Test Case A090240.090–Maintain On-Line Directories at the GSFC DAAC

The Maintain On-Line Directories at the GSFC DAAC Test verifies that when guide and inventory data is extracted from the TRMM VIRS metadata, the guide and inventory directories are updated and an insertion is made in the ECS directory at the GSFC DAAC. There are three levels of user accessible metadata that are maintained in the ECS: Directory, Guide, and Inventory. The Test method is used to verify the updating of the ECS directories and inventories with the pertinent TRMM VIRS metadata. The test process for this test case is the same as described in section 9.2.2.8 "Maintain On-Line Directories at the MSFC DAAC" (Test Case A090230.090).

9.2.4 Higher Level Processed Data Receipt from EPDS (Landsat-7) Sequence

This sequence of tests verifies the ECS at the EDC DAAC capability to support the early interface testing for the Landsat-7 mission. This sequence of test verifies the ability of the Landsat-7 users to temporarily store the Level-0R (L0R) data products, its associated metadata, and documentation at the ECS at the EDC DAAC via the Landsat-7 Ground System. This sequence of tests verifies that the ECS receives from the Landsat-7 Ground System, data availability information for the data; the Landsat-7 L0R data; associated L0R metadata and browse data; IGS metadata and associated browse data; associated calibration and metadata; calibration updates and metadata; documentation; algorithms; and activity calendar. At the EDC DAAC, verification is performed to ensure the Landsat-7 users that all data received from the ground system is ingested and temporarily stored.

9.2.4.1 Test Case A090250.010–Science Planning Information

The Science Planning Information Test verifies that the ECS receives science planning information from the Landsat-7 Ground System. This notice contains information used to determine Landsat 7 access to an area of interest, acquisition schedules, and product orders. The Demonstration method is used to verify that the science planning information requirements are satisfied. To exercise this capability, the user can examine the contents of the science planning information (i.e., schedules and product orders) notice for accuracy and completeness.

9.2.4.2 Test Case A090250.020–Ingest Data/Metadata from Landsat-7

The Ingest Data/Metadata from Landsat-7 Test verifies that the ECS ingests related Landsat-7 L0R and IGS unique data products information (directory, guide, and inventory information); Level-0–Level-4 data sets; correlative and calibration data; metadata; associated L0R metadata and browse data; IGS metadata and associated browse data; associated calibration and metadata; calibration updates and metadata; algorithms; and activity calendar. The calibration information is required to perform calibration of the ETM+ science data. The Test method is used to verify that the Landsat-7 (L0R and IGS unique) data and product ingest requirements are satisfied. To exercise this capability, the user can examine the science planning information notice received from the Landsat-7 Ground System to ensure that all products and reference information listed in the notice are ingested by the ECS. Verification is also made to ensure that the ingested data is complete, accurate, and came from the Landsat-7 Ground System.

This test case verifies that upon successful completion of the ingest of the Landsat-7 (L0R and IGS unique) data products, metadata, calibration, and correlative data, the data receipt log is updated; temporary storage is provided; and Landsat-7 is notified. If any discrepancies are noted, the Landsat-7 operational staff is informed for corrective action and the problems are logged by the ECS.

9.2.5 Higher Level Processed Data Receipt from the NOAA ADC to the LaRC DAAC Sequence

This sequence of test verifies the ability of the ECS users of the NOAA data to store at the LARC DAAC ancillary data which is used to support CERES product generation, algorithm packages, as well as advertising information which describes the NOAA Data Center holdings received from the NOAA. The NOAA CERES ancillary data may include associated metadata, calibration data, and documents. The NOAA algorithm package may include algorithm code, scripts, and documentation contributed by an NOAA Satellite Active Archive (SAA). This sequence of tests verifies that once the ECS at the LaRC DAAC initiates a product request for the NOAA data, a product delivery status is received from the NOAA indicating the availability of the requested data. Once the ancillary data is available, it is ingested and stored at the ECS located at the LaRC DAAC. At the LaRC DAAC, verification is performed to ensure that all ancillary data requested and received from the NOAA to support CERES product generation is validated, accounted for, checked for EOSDIS compliance, and stored. The ability of the NOAA users to receive status information on their ancillary data received is also verified.

9.2.5.1 Test Case A090260.010–Product Delivery Status Receipt at the LaRC DAAC

The Product Deliver Status Receipt at the ECS at the LaRC DAAC Test verifies that the ECS receives status concerning data availability schedules from the NOAA ADC. The ECS receives data availability schedules indicating the times when the NOAA ADC data sets (i.e., ancillary data, calibration data, and documentation) will be available to support the ECS CERES product generation. The Demonstration method is used to verify that the data availability schedule requirements are satisfied. To exercise this capability, verification is performed to ensure that the product delivery status information is accurate.

This test case verifies that a product delivery status is sent from the NOAA ADC to the ECS in response to a product request by the ECS for CERES ancillary data.

9.2.5.2 Test Case A090260.020–Ingest Data/Metadata (CERES Ancillary) at the LaRC DAAC

The Ingest Data/Metadata (CERES Ancillary) at the LaRC DAAC Test verifies that the ECS ingests ancillary data, algorithm packages, and advertising information. The ancillary data may include associated metadata, calibration data, and documents from the NOAA ADC. The ECS receives ancillary data for the purpose of the ECS CERES product generation. Calibration data is needed to perform calibration of the instrument and the documentation includes information describing the data sets, algorithms, and etc. The algorithm package may include algorithm code, scripts, and documentation contributed by an SAA. The Test method is used to verify that the ancillary data, calibration data, algorithms, documents, and associated metadata ingest requirements are satisfied. To exercise this capability, the user verifies that the all products requested in the product request are received by the ECS from the ADC, unless otherwise indicated. Verification is also made to ensure that the ingested data is complete and accurate.

This test case verifies that upon ingest, successful or unsuccessful, of the CERES ancillary data, documentation, associated metadata, calibration data, and algorithm packages, the data receipt log is updated and verifies receipt, or non receipt, of the NOAA data information.

9.2.5.3 Test Case A090260.030–NOAA Documentation Validation at the LaRC DAAC

The NOAA Documentation Validation at the LaRC DAAC Test verifies that the documentation associated with the CERES ancillary data and algorithms ingested by the ECS from the NOAA is in various digital text formats. The Test method is used to verify the documentation validation requirements are satisfied. To exercise this capability, the user examines the data receipt log to ensure that all of the documentation contained in the ancillary data and algorithm package delivery is ingested by the ECS from the NOAA ADC.

This test case verifies the documentation ingested from the NOAA is in one of the following digital text formats: ASCII text, Microsoft WORD, HTML, Interleaf, Postscript, and WordPerfect. To exercise this capability, the user can access a ingested document via one of the supporting digital text format word processors (e.g., WordPerfect).

9.2.5.4 Test Case A090260.040–NOAA Data/Metadata Accountability at the LaRC DAAC

The NOAA Data/Metadata Accountability at LaRC DAAC Test verifies that the CERES ancillary data ingested by the ECS from the NOAA ADC is complete and accurate. In the event of transmission difficulties, the ECS notifies the NOAA ADC of the problem and requests a retransmission of the data. The Test method is used to verify that data/metadata accountability requirements are satisfied. This test case verifies that all data ingested from the NOAA ADC is accounted for and follows the same test process described in section 9.2.2.3 "Data/Metadata Accountability at the MSFC DAAC" (Test Case A090230.040).

9.2.5.5 Test Case A090260.050–NOAA Data/Metadata Validation and Compliance Check at the LaRC DAAC

The NOAA Data/Metadata Validation and Compliance Check at the LaRC Test verifies that the ECS, upon receipt of higher level CERES ancillary data from the NOAA ADC, performs data validation and compliance checks on the data. This test case verifies that all data/metadata ingested from the NOAA is valid and comply with the EOSDIS defined standards. The test process for this test case is the same as described in section 9.2.2.4 "Data/Metadata Validation and Compliance Check at the MSFC DAAC" (Test Case A090230.050).

9.2.5.6 Test Case A090260.070–NOAA Metadata Extraction/Verification at the LaRC DAAC

The NOAA Metadata Extraction/Verification at the LaRC DAAC Test verifies that the ECS extracts and validates the associated metadata from the NOAA ADC CERES ancillary data. The Demonstration and Inspection methods are used to verify these requirements. This test process for this test case is the same as described in section 9.2.1.5 "Migration Metadata Extraction/ Verification" (Test Case A09210.070).

9.2.5.7 Test Case A090260.080–NOAA Data Archiving at the LaRC DAAC

The NOAA Data Archiving at the LaRC DAAC Test verifies the ECS provides storage for non-EOS data required to support the CERES standard product processing. This test case verifies the capability of the ECS at the LaRC DAAC to archive the ingested NOAA ADC CERES ancillary data, algorithms packages, as well as advertising information; insert the metadata into the inventory; and update the data receipt log once the archiving process is complete. The Test and Inspection methods are used to verify the archiving of the NOAA ADC data. The test process for this test case is the same as described in section 9.2.1.6 "Migration Data Archiving" (A090210.080).

9.2.5.8 Test Case A090260.090–NOAA Data Maintain On-Line Directories at the LaRC DAAC

The NOAA Data Maintain On-Line Directories at the LaRC DAAC Test verifies that when guide and inventory data is extracted from the metadata associated with the NOAA ADC CERES ancillary data, the guide and inventory directories are updated and an insertion is made into the ECS directory. There are three levels of user accessible metadata that are maintained in the ECS: Directory, Guide, and Inventory. The Test method is used to verify the updating of the ECS

directories and inventories with the pertinent NOAA metadata. This test case follows the same test process described in section 9.2.1.7 “Migration Data Maintain On-Line Directories” (Test Case A090210.090).

9.2.6 Higher Level Processed Data Receipt from the NOAA ADC to the GSFC DAAC Sequence

This sequence of test verifies the ability of the ECS users of the NOAA data to store ancillary data which is used to support the TSDIS product generation as well as advertising information which describes the NOAA Data Center holdings received from the NOAA at the GSFC DAAC. The NOAA TSDIS ancillary data may include associated metadata, calibration data, and documents. The TSDIS ancillary data sets are received from the NOAA National Meteorological Center (NMC). This sequence of tests verifies that once the ECS at the GSFC DAAC initiates a product availability query for the NOAA data, a product availability list is received from the NOAA indicating the availability of the requested data. Once the TSDIS ancillary data is available, it is ingested and stored at the ECS located at the GSFC DAAC. At the GSFC DAAC, verification is performed to ensure that all ancillary data requested and received from the NOAA to support the TSDIS product generation is validated, accounted for, checked for EOSDIS compliance, and stored. The ability of the NOAA users to receive status information on their ingested ancillary data is also verified.

9.2.6.1 Test Case A090270.010–Product Availability List Receipt at the GSFC DAAC

The Product Availability List Receipt at the ECS at the GSFC DAAC Test verifies that the ECS receives a list indicating the availability of the NOAA ADC ancillary data to support the TSDIS product generation. The Demonstration method is used to verify that the data availability requirements are satisfied. This test case verifies that a product availability list is sent from the NOAA ADC to the ECS in response to a product availability query requested by the ECS for the TSDIS ancillary data. To exercise this capability, verification is performed to ensure that the product availability list received is accurate.

9.2.6.2 Test Case A090270.020–Ingest Data/Metadata (TSDIS Ancillary) at the GSFC DAAC

The Ingest Data/Metadata (TSDIS Ancillary) at the GSFC DAAC Test verifies that the ECS ingests ancillary data and advertising information. The ancillary data may include associated metadata, calibration data, and documents from the NOAA ADC. The ECS receives ancillary data for the purpose of the ECS CERES product generation. Calibration data is needed to perform calibration of the instrument and the documentation includes information describing the data sets. The Test method is used to verify that the ancillary data, calibration data, documents, and associated metadata ingest requirements are satisfied. To exercise this capability, the ECS user verifies that the all products requested in the product availability query are received by the ECS when made available by the ADC, unless otherwise indicated. Verification is also made to ensure that the ingested data is complete and accurate.

This test case verifies that upon ingest, successful or unsuccessful, of the TSDIS ancillary data, documentation, associated metadata, calibration data, and algorithm packages, the data receipt log is updated and verifies receipt, or non receipt, of the NOAA data information.

9.2.6.3 Test Case A090270.030–NOAA Documentation Validation at the GSFC DAAC

The NOAA Documentation Validation at the GSFC DAAC Test verifies that the documentation associated with the TSDIS ancillary data ingested by the ECS from the NOAA is in various digital text formats. The Test method is used to verify the documentation validation requirements are satisfied. To exercise this capability, the user examines the data receipt log to ensure that all of the documentation contained in the ancillary data is ingested by the ECS from the NOAA ADC.

This test case verifies the documentation ingested from the NOAA is in one of the following digital text formats: ASCII text, Microsoft WORD, HTML, Interleaf, Postscript, and WordPerfect. To exercise this capability, the user can access a ingested document via one of the supporting digital text format word processors (e.g., WordPerfect).

9.2.6.4 Test Case A090270.040–NOAA Data/Metadata Accountability at the GSFC DAAC

The NOAA Data/Metadata Accountability at GSFC DAAC Test verifies that the TSDIS ancillary data ingested by the ECS from the NOAA ADC is complete and accurate. In the event of transmission difficulties, the ECS notifies the NOAA ADC of the problem and requests a retransmission of the data. The Test method is used to verify that data/metadata accountability requirements are satisfied. This test case verifies that all data ingested from the NOAA ADC is accounted for and follows the same test process described in section 9.2.2.4 “Data/Metadata Accountability at the MSFC DAAC” (Test Case A090230.040).

9.2.6.5 Test Case A090270.050–NOAA Data/Metadata Validation and Compliance Check at the GSFC DAAC

The NOAA Data/Metadata Validation and Compliance Check at the GSFC Test verifies that the ECS, upon receipt of higher level TSDIS ancillary data from the NOAA ADC, performs data validation and compliance checks on the data. This test case verifies that all data/metadata ingested from the NOAA is valid and comply with the EOSDIS defined standards. The test process for this test case is the same as described in section 9.2.2.5 “Data/Metadata Validation and Compliance Check at the MSFC DAAC” (Test Case A090230.050).

9.2.6.6 Test Case A090270.070–NOAA Metadata Extraction/Verification at the GSFC DAAC

The NOAA Metadata Extraction/Verification at the GSFC DAAC Test verifies that the ECS extracts and validates the associated metadata from the NOAA ADC TSDIS ancillary data. The Demonstration and Inspection methods are used to verify these requirements. The test process for this test case is the same as described in section 9.2.1.5 “Migration Metadata Extraction/ Verification” (Test Case A09210.070).

9.2.6.7 Test Case A090270.080–NOAA Data Archiving at the GSFC DAAC

The NOAA Data Archiving at the GSFC DAAC Test verifies that the ECS provides storage for non-EOS data required to support the TSDIS standard product processing. This test case verifies the capability of the ECS at the LaRC DAAC to archive the ingested NOAA ADC TSDIS ancillary data as well as advertising information; insert the metadata into the inventory; and update the data receipt log once the archiving process is complete. The Test and Inspection methods are used to verify the archiving of the NOAA ADC data. The test process for this test case is the same as described in section 9.2.1.6 "Migration Data Archiving" (A090210.080).

9.2.6.8 Test Case A090270.090–NOAA Data Maintain On-Line Directories at the GSFC DAAC

The NOAA Data Maintain On-Line Directories at the GSFC DAAC Test verifies that when guide and inventory data is extracted from the metadata associated with the NOAA ADC TSDIS ancillary data, the guide and inventory directories are updated and an insertion is made into the ECS directory. There are three levels of user accessible metadata that are maintained in the ECS: Directory, Guide, and Inventory. The Test method is used to verify the updating of the ECS directories and inventories with the pertinent NOAA metadata. This test case follows the same test process described in section 9.2.1.7 "Migration Data Maintain On-Line Directories" (Test Case A090210.090).

9.3 Reprocessing Scenario

This scenario leads the operations staff through the procedures and processes used in the planning for and production of certain data sets previously processed.

This scenario verifies the SCF LaRC and MSFC users ability to request the reprocessing of CERES and LIS data products at the DAACs via a reprocessing request. The ECS at the LaRC DAAC ability to reprocess CERES standard products, browse data products, and metadata is verified. The ECS at the MSFC DAAC ability to reprocess LIS standard products, browse data products, and metadata is also verified. There are no data arrival events associated with reprocessing, the processing requests are dispatched from the system. Reprocessing is driven by the SCF's reprocessing request which can be generated in the event of the availability of improved input data, new/improved calibration data, and/or algorithm updates. Reprocessing of this data is performed in accordance to the reprocessing plan generated as a result of the request and the availability of resources. The reprocessing plan is generated by the ECS using the priority scheme established by the science user working groups. This sequence verifies that the reprocessing plan is part of the active plan and that there are no other dynamic data dependencies required for reprocessing and dispatches the reprocessing request. Reprocessing requests are dispatched to the processing subsystem at regular periods so that reprocessing jobs may take up any slack associated with late arrival of data for standard processing. The sequence verifies that the new plan includes provisions for continuing with the production that is not affected by the changed products. Changeover from the old plan to the new plan must be efficient.

Upon successful completion of the reprocessed data products, verification is performed to ensure that the new outputs are stored on the appropriate data server. The following steps associated with reprocessing are verified: the ECS notifies the SCF user that the products are ready for Quality Assurance (QA), supplying metadata cross references to the desired data. Those inputs and outputs

which are required for subsequent processing are left on the staging disk; the rest are marked for deletion. Once the reprocessed products are released by QA, the ECS capability to receive updated metadata from the SCF which provides an assessment of the new data product quality is then verified. If the data is of good quality then the ECS stores the metadata in its inventory and marks the reprocessed data for distribution. If the data is of inferior quality, the ECS marks the data as superseded and the data becomes a candidate for eventual deletion/retention based on the disposition of superseded data and its retention time frame as stated in the reprocessing request. Once the cancellation of the reprocessed data is received, the ECS aborts the reprocessing. Otherwise, reprocessing continues and the ECS archives the reprocessed data. The capability to replace the old processed data products with the new data products and update related directories and inventory files is also verified. Requests for reprocessing may range for a single standard product to several months worth of data for multiple products or instruments.

9.3.1 Reprocessing Request Receipt/Processing from the SCF (LaRC) Sequence

This sequence of tests verifies the ability of the SCF LaRC users to request the reprocessing of CERES standard data products, browse data products, and associated metadata at the ECS at the LaRC DAAC. This sequence of tests verifies that the ECS at the LaRC DAAC receives from the SCF reprocessing requests to initiate the regeneration of the CERES products. Upon receipt of the reprocessing request, the ECS validates the request; receives a reprocessing plan generated by the MSS/SMC; dispatches the new plan for activation; and produces the standard and browse data products as well as its associated metadata. Upon successful completion of the reprocessed CERES products, verification is performed to ensure that the ECS at the LaRC DAAC stores the newly created products on the appropriate data server, notifies the SCF LaRC users that the products are ready for QA, and supplies the associated metadata cross references to the data along with the new output products. Once the reprocessed products are released by the SCF QA, the ECS at the LaRC DAAC capability to receive and process the updated assessment metadata accordingly is verified. At the completion of the reprocessing, the SCF users are notified and the related directories and inventories are updated to reflect the changes.

9.3.1.1 Test Case A090310.010–SCF Reprocessing Requests Receipt/Validation at the LaRC DAAC

The SCF Reprocessing Requests Receipt/Validation at the LaRC DAAC Test verifies that the SCF LaRC users can initiate the ECS at the LaRC DAAC capability to reprocess CERES standard data products, their browse data products and metadata. A Reprocessing Request Template is made available to the scientist at the SCF to prepare a Reprocessing Request. The Demonstration method is used to verify that the Reprocessing Requests for CERES related data products and metadata are received from the SCF. Upon receipt of the requests, they are verified to include at a minimum, the following information: reason for the request, proposed reprocessing schedule, the time and data set range of the request, a list of CERES products to be generated, the version numbers of the science software and calibration coefficients, and a list of necessary ancillary data. All required information for reprocessing must be included in the request.

9.3.1.2 Test Case A090310.020–SCF Reprocessing Plan Generation/Dispatching at the LaRC DAAC

The SCF Reprocessing Plan Generation/Dispatching at the LaRC DAAC verifies the ECS capability to generate the reprocessing plan for the CERES data products reprocessing. The Test and Analysis methods are used to verify that the reprocessing plan is generated by the MSS/SMS and is based on the SMC directives and standard products specifications. The reprocessing plan is verified to include data dependencies, production strategy, and plan information from the affected DAACs. At a minimum, the created reprocessing plan contains a list of processing tasks needed to carry out each CERES product's reprocessing; estimated schedule for each task; and the order in which tasks will be executed. Reprocessing of the CERES products is performed in accordance to this reprocessing plan. If any discrepancies are found, the SCF is notified and the problem logged accordingly.

This test case also verifies the ECS capability to dispatch the reprocessing requests at regular periods at the LaRC DAAC. Once the reprocessing schedule is determined, the SCF is supplied a Reprocessing Status informing the scientist at the SCF of the request status. Dispatching of the request is only to occur at regular reprocessing periods (i.e., when there is system slack time due to late arrival of standard processing data). The Test method is used to verify deactivation of the old processing plan and the activation of the new reprocessing plan. During this test, verification is performed to ensure that an efficient changeover from the old plan to the new plan occurs without interrupting any ongoing production. This test case verifies that the procedures provided within the plan include provisions for continuing with production that is not affected by the changed products.

9.3.1.3 Test Case A090310.040–CERES Standard Data Products Reprocessing at the LaRC DAAC

The CERES Standard Data Products Reprocessing at the LaRC DAAC Test verifies the ECS capability to reprocess CERES standard data products (Level 1A-3) and its associated metadata at the LaRC DAAC. The data which may initiate the reprocessing are improved input data, new calibration data, improved calibration data, updated algorithms, required ancillary data, and correct version of science software. The Test and Analysis methods are used to verify the regeneration of the CERES products. The ECS capability to reprocess CERES standard data products in accordance with the reprocessing plan is verified. Verification is done to ensure that all data dependencies are satisfied by staging the necessary ancillary data prior to processing the data. If ancillary data is needed from other DAACs, this test case verifies that the data is received prior to processing. In the event that all of the required data for processing is not available, this test case verifies that the processing of the data is suspended until all the data is available, then the processing plan is re-activated. In addition, all data transmission problems are logged and the SCF is informed for internal corrective action.

As the processing plan is executed, verification is performed to ensure that the correct version of science software and calibration coefficients, and system resources are defined and referenced in the processing plan. Based on the processing plan, the ability of the ECS at the LaRC DAAC to create Level 1A to Level 3 CERES data products as specified in the reprocessing plan is verified. All reprocessing is based on the priority scheme determined by the scientist working group. The reprocessed products are created according to the time and data set ranges specified in the plan.

Verification is performed to demonstrate that an unique granule identifier (id), associated metadata, and keyword cross references are generated for each reprocessed Level 1A to Level 3 data product. The associated metadata is verified to ensure that it provides a logical and technical description of the content, format, and utility of the standard data sets generated. This test case also verifies that the keywords links the newly created products to processing plans; guide, inventory, and directory information; previously archived documentation; calibration data, algorithms, instrument and related documentation; key organizations; and key personnel. Upon successful completion of the reprocessed CERES standard data products, the following verifications are performed: the newly created product is stored on the appropriate data server at the ECS at the LaRC DAAC, the SCF LaRC operational users are notified that the products are ready for QA, and the associated metadata cross references to the data are supplied along with the new output products. Temporary status of data stored on the data servers that is awaiting QA can be obtained by the users. Verification is performed to ensure that all processing activities are tracked and logged.

9.3.1.4 Test Case A090310.050–CERES Standard Data Products QA Assessment Metadata Receipt/Processing at the LaRC DAAC

The CERES Standard Data Products QA Assessment Metadata Receipt/Processing at the LaRC DAAC Test verifies the ECS at the LaRC DAAC capability to receive and process the QA assessment done on the reprocessed CERES standard data products and its associated metadata received from the SCF. The test case verifies the Data Product Quality Staff at the LaRC DAAC ability to receive the product QA data from the SCF. This assessment provides metadata regarding the data quality of the new product. At a minimum, the following information is included in the scientist's product QA review at the SCF: product ID, QA results, and product storage and processing instructions. The Test and Demonstration methods are used to verify the QA assessment receipt and processing. Verification is performed to ensure that the ECS analyzes the metadata and proceed production accordingly. If the data is of good quality then verification is done to ensure that the ECS stores the metadata in its inventory and marks the reprocessed data for distribution. If the data is of inferior quality then verification is done to ensure that the ECS marks the data as superseded and it becomes a candidate for eventual deletion/retention based on the disposition of the superseded data and its retention time frame stated in the reprocessing request. If cancellation of the reprocessed data is received, the ECS aborts the reprocessing. Otherwise, reprocessing continues, the ECS archives the reprocessed data along with its metadata at the LaRC DAAC, and sends data storage information to the SCF. This test case also verifies that ECS receives distribution status requests from the collocated LaRC SCF for the distribution of the CERES related reprocessed products.

To obtain a description of the quality of each reprocessed product, the Data Product Quality Staff can generate a data quality report assessment report. Verification is performed to ensure that all processing activities are tracked and logged. However, if the product is not reviewed within the amount of time allocated for QA, the processing status of the product is updated to reflect a QA timeout and the list of products requiring QA by the SCF is updated.

9.3.1.5 Test Case A090310.060–Reprocessed CERES Data Directories/ Inventories Update

The Reprocessed CERES Data Directories/Inventories Update Test verifies the ECS at the LaRC DAAC capability to update related directories and inventories associated with the reprocessed data. The Demonstration method is used to verify that all related directories and inventory files are updated with the appropriate information. The ECS ability to update the internal file directories with the unique data set ID is verified. At a minimum, the updating of the inventory with metadata reflecting the changes as a result of the reprocessing as well as the updating of the list of reprocessed data is verified.

9.3.1.6 Test Case A090310.080–Reprocessed CERES Standard Data Product Notification

The Reprocessed CERES Standard Data Product Notification Test verifies that the subscribed users be notified when the CERES standard data products have been reprocessed. Metadata on the newly stored data granules is provided. The Test and Demonstration methods are used to verify that general information concerning CERES product reprocessing is available to all users through the Advertising Service. This test case verifies that when requested by the user (i.e., a subscription with the Data Server is placed), the metadata reflecting changes as a result of the updates is provided.

9.3.1.7 Test Case A090310.090–CERES Browse Data Product Reprocessing at the LaRC DAAC

The CERES Browse Data Product Reprocessing at the LaRC DAAC Test verifies the ECS at the LaRC DAAC capability to reprocess CERES browse data products and its associated metadata in the event that improved input data, new calibration data, improved calibration data, and/or algorithm updates becomes available. The Test and Analysis methods are used to verify the regeneration of the CERES browse data products. The ECS capability to reprocess CERES browse data products in accordance with the reprocessing plan is verified. Verification is done to ensure that all data dependencies are satisfied by staging the necessary ancillary data prior to processing the data. If ancillary data is needed from other DAACs, this test case verifies that the data is received prior to processing. In the event that all of the required data for processing is not available, this test case verifies that the processing of the data is suspended until all the data is available, then the processing plan is re-activated. The test process for this test case is the same as described in section 9.3.1.3 “CERES Standard Data Product Reprocessing at the LARC DAAC” (Test Case A090310.040).

9.3.1.8 Test Case A090310.100–CERES Browse Data Products QA Assessment Metadata Receipt/Processing at the LaRC DAAC

The CERES Browse Data Products QA Assessment Metadata Receipt/Processing at the LaRC DAAC Test verifies the ECS LaRC capability to receive and process the QA assessment done on the reprocessed CERES browse data products and its associated metadata received from the SCF. The test case verifies the Data Product Quality Staff at the MSFC DAAC ability to receive the product QA data from the SCF. This assessment provides metadata regarding the data quality of the new product. The Test and Demonstration methods are used to verify the QA assessment

receipt and processing. This test case verifies that the ECS analyzes the metadata and proceeds production accordingly. The test process for this test case is the same as described in section 9.3.1.4 "CERES Standard Data Products QA Assessment Metadata Receipt/Processing at the LaRC DAAC" (Test Case A090310.050).

9.3.1.9 Test Case A090310.110–Reprocessed CERES Browse Data Directories/ Inventories Update

The Reprocessed CERES Data Directories/Inventories Update Test verifies the ECS at the LaRC DAAC capability to update related directories and inventories associated with the reprocessed data. The Demonstration method is used to verify that all related directories and inventory files are updated with the appropriate information. The ECS ability to update the internal file directories with the unique data set ID is verified. At a minimum, the updating of the inventory with metadata reflecting the changes as a result of the CERES browse data reprocessing as well as the updating of the reprocessed data list is verified.

9.3.1.10 Test Case A090310.130–Reprocessed CERES Browse Data Notification

This sequence of tests verifies that the subscribed users be notified when the browse data products have been reprocessed. Metadata on the newly stored data granules is provided. The Test and Demonstration methods are used to verify that general information concerning CERES browse product reprocessing is available to all users through the Advertising Service. This test case verifies that when requested by the user (i.e., a subscription with the Data Server is placed), the metadata reflecting changes as a result of the updates is provided.

9.3.2 Reprocessing Request Receipt/Processing from SCF (MSFC) Sequence

This sequence of tests verifies the ability of the SCF MSFC user to request the reprocessing of LIS standard data products, browse data products, and associated metadata at the ECS at the MSFC DAAC. This sequence of tests verifies that the ECS at the MSFC DAAC receives from the SCF reprocessing requests to initiate the regeneration of the LIS products. Upon receipt of the reprocessing request, the ECS validates the request; receives a reprocessing plan generated by the MSS/SMC; dispatches the new plan for activation; and produces the LIS standard and browse data products as well as its associated metadata. Upon successful completion of the reprocessed LIS products, verification is performed to ensure that the ECS at the MSFC DAAC stores the newly created products on the appropriate data server, notifies the SCF MSFC users that the products are ready for QA, and supplies the associated metadata cross references to the data along with the new output products. Once the reprocessed products are released by the SCF QA, the ECS at the MSFC DAAC capability to receive and process the updated assessment metadata accordingly is verified. At the completion of the reprocessing, the SCF users are notified and the related directories and inventories are updated to reflect the changes.

9.3.2.1 Test Case A090320.010–SCF Reprocessing Requests Receipt/Validation at the MSFC DAAC

The SCF Reprocessing Requests Receipt/Validation at the MSFC DAAC Test verifies that the SCF MSFC users can initiate the ECS at the MSFC DAAC capability to reprocess LIS standard data products, their browse data products and metadata. A Reprocessing Request Template is made

available to the scientist at the SCF to prepare a Reprocessing Request. The Demonstration method is used to verify that the Reprocessing Requests for LIS related data products and metadata are received from the SCF. This test case verifies the receipt of the requests and follows the same test process described in section 9.3.1.1 "SCF Reprocessing Requests Receipt/Validation at the LaRC DAAC" (Test Case A090310.010).

9.3.2.2 Test Case A090320.020–SCF Reprocessing Plan Generation/Dispatching at the MSFC DAAC

The SCF Reprocessing Plan Generation/Dispatching at the MSFC DAAC Test verifies the ECS capability to generate and dispatch the reprocessing plan for the LIS data products reprocessing. The Test and Analysis methods are used to verify these requirements. This test case verifies that the reprocessing plan is generated by the MSS/SMC and is based on the SMC directives and standard products specifications. The reprocessing plan is verified to include data dependencies, production strategy, and plan information from the affected DAACs. At a minimum, the created reprocessing plan contains a list of processing tasks needed to carry out each LIS product's reprocessing; estimated schedule for each task; and the order in which tasks will be executed. Reprocessing of the LIS products is performed in accordance to this reprocessing plan. If any discrepancies are found, the SCF is notified and the problems logged accordingly. The test process for this test case is the same as described in section 9.3.1.2 "SCF Reprocessing Plan Generation/ Dispatching at the LaRC DAAC" (Test Case A090310.020).

9.3.2.3 Test Case A090320.040–LIS Standard Data Product Reprocessing at the MSFC DAAC

The LIS Standard Data Product Reprocessing at the MSFC DAAC Test verifies the ECS at the MSFC DAAC capability to reprocess the LIS standard data products (Level 1A-3) and its associated metadata. The data which may initiate the reprocessing are improved input data, new calibration data, improved calibration data, updated algorithms, required ancillary data, and correct version of science software. The Test and Analysis methods are used to verify the regeneration of the LIS products. The ECS capability to reprocess the LIS standard data products in accordance with the reprocessing plan is verified. Verification is done to ensure that all data dependencies are satisfied by staging the necessary ancillary data prior to processing the data. If ancillary data is needed from other DAACs, this test case verifies that the data is received prior to processing. In the event that all of the required data for processing is not available, this test case verifies that the processing of the data is suspended until all the data is available, then the processing plan is re activated. The test process for this test case is the same as described in section 9.3.1.3 "CERES Standard Data Product Reprocessing at the LaRC DAAC" (Test Case A090310.040).

9.3.2.4 Test Case A090320.050–LIS Standard Data Products QA Assessment Metadata Receipt/Processing at the MSFC DAAC

The LIS Standard Data Products QA Assessment Metadata Receipt/Processing at the MSFC DAAC Test verifies the ECS at the MSFC DAAC capability to receive and process the SCF's QA assessment done on the reprocessed the LIS standard data products and its associated metadata. This test cases verifies the Data Product Quality Staff at the MSFC DAAC ability to receive the product QA data received from the SCF. This assessment provides metadata regarding the data

quality of the new product. At a minimum, the following information is included in the scientist's product QA review at the SCF MSFC: product ID, QA results, and product storage and processing instructions. The Test and Demonstration methods are used to verify the QA assessment receipt and processing. Verification is performed to ensure that the ECS analyzes the metadata and proceeds production accordingly. The test process for this test case is the same as described in section 9.3.1.4 "CERES Standard Data Products QA Assessment Metadata Receipt/Processing at the LaRC DAAC" (Test Case A090310.050).

9.3.2.5 Test Case A090320.060–Reprocessed LIS Standard Data Products Directories/Inventories Update

The Reprocessed LIS Standard Data Products Directories/Inventories verifies the ECS at the MSFC DAAC capability to update related directories and inventories associated with the reprocessed data. The Demonstration method is used to verify that all related directories and inventory files are updated with the LIS appropriate information. The ECS ability to update the internal file directories with the unique data set ID is verified. At a minimum, the updating of the inventory with metadata reflecting the changes as a result of the reprocessing as well as the updating of the list of reprocessed data is verified.

9.3.2.6 Test Case A090320.080–Reprocessed LIS Standard Data Products Notification

The Reprocessed LIS Standard Data Products Notification Test verifies that the subscribed users be notified when the LIS standard data products have been reprocessed. Metadata on the newly stored data granules is provided. The Test and Demonstration methods are used to verify that general information concerning the LIS standard product reprocessing is available to all users through the Advertising Service. This test case verifies that when requested by the user (i.e., a subscription with the Data Server is placed), the metadata reflecting changes as a result of the updates is provided.

9.3.2.7 Test Case A090320.090–LIS Browse Data Product Reprocessing at the MSFC DAAC

The LIS Browse Data Product Reprocessing at the MSFC DAAC Test verifies the ECS capability to reprocess LIS browse data products and its associated metadata in the event that improved input data, new calibration data, improved calibration data, and/or algorithm updates become available. The Test and Analysis methods are used to verify the regeneration of the LIS browse data products. The ECS capability to reprocess LIS browse data products in accordance with the reprocessing plan is verified. Verification is done to ensure that all data dependencies are satisfied by staging the necessary ancillary data prior to processing the data. If ancillary data is needed from other DAACs, this test case verifies that the data are received prior to processing. In the event that all of the required data for processing is not available, this test case verifies that the processing of the data is suspended until all the data is available, then the processing plan is re-activated. The test process for this test case is the same as described in section 9.3.1.3 "CERES Standard Data Products Reprocessing at the LaRC DAAC" (Test Case A090310.040).

9.3.2.8 Test Case A090320.100–LIS Browse Data Products QA Assessment Metadata Receipt/Processing at the MSFC DAAC

The LIS Browse Data Products QA Assessment Metadata Receipt/Process at the MSFC DAAC Test verifies the ECS at the LaRC DAAC capability to receive and process the SCF QA assessment done on the reprocessed LIS browse data products and its associated metadata. This test cases verifies the Data Product Quality Staff at the MSFC DAAC ability to receive the product QA data received from the SCF. This assessment provides metadata regarding the data quality of the new product. The Test and Demonstration methods are used to verify the QA assessment receipt and processing. This test case verifies that the ECS analyzes the metadata and proceeds production accordingly. The test process for this test case is the same as described in section 9.3.1.4 "CERES Standard Data Products QA Assessment Metadata Receipt/Processing at the LaRC DAAC" (Test Case A090310.050).

9.3.2.9 Test Case A090320.110–Reprocessed LIS Browse Data Products Directories/Inventories Update

The Reprocessed LIS Browse Data Products Directories/Inventories Update Test verifies the ECS at the MSFC DAAC capability to update related directories and inventories associated with the reprocessed data. The Demonstration method is used to verify that all related directories and inventory files are updated with the LIS appropriate information. The ECS ability to update the internal file directories with the unique data set ID is verified. At a minimum, the updating of the inventory with metadata reflecting the changes as a result of the reprocessing as well as the updating of the list of reprocessed data is verified.

9.3.2.10 Test Case A090320.130–Reprocessed LIS Browse Data Products Notification

The Reprocessed LIS Browse Data Products Notification Test verifies that the subscribed users be notified when the browsed data products have been reprocessed. The Test and Demonstration methods are used to verify that general information concerning LIS browse product reprocessing is available to all users through the Advertising Service. This sequence of tests verifies that when requested by the user (i.e., a subscription with the Data Server is placed), the metadata reflecting changes as a result of the updates is provided.

9.4 TSDIS Reprocessing Support Scenario

This scenario carries the DAAC operations staff through the operational steps necessary to distribute TSDIS TRMM datasets for reprocessing previously archived at the DAAC while the DAAC continues to receive its routine daily allotment of current data sets from external sources.

This scenario verifies that the ECS DIT receives a Data Request from TSDIS for the TRMM PR, TMI, and GV archived data that will be needed for reprocessing.

This scenario also verifies the ECS capability to ingest reprocessed data from the TSDIS for the three TRMM instruments (PR and TMI at MSFC DAAC and VIRS at GSFC DAAC) and if required, reformat the data products for internal storage. The capability to replace the old processed data products with the new data products and update related directories and inventory files is verified.

9.4.1 Archived TRMM Data Delivery Sequence

This sequence of test verifies the ability of the ECS to distribute archived TSDIS TRMM data products and ancillary data to TSDIS for the purpose of reprocessing. This sequence of tests verifies the ECS capability to electronically make deliveries of archived TRMM PR, TMI, GV, VIRS, and required ancillary data to the TSDIS. The ECS capability to extract the archived TRMM data (PR and TMI for MSFC DAAC and VIRS for GSFC DAAC) from the data server and distribute the data to the TSDIS for the purpose of reprocessing is verified.

9.4.1.1 Test Case A090410.010–TSDIS Data Requests Receipt/Validation at the MSFC DAAC

The TSDIS Data Requests Receipt /Validation at the MSFC DAAC Test verifies the ECS capability to support the TSDIS reprocessing. The capability of the ECS MSFC DAAC to receive Data Requests from the TSDIS for archived PR, TMI, GV, and required ancillary data stored at the MSFC DAAC is verified. The Test method is used to verify the receipt of the Data Requests.

A Data Request is received by the ECS/MSFC DIT for Level 1A-3 data products, metadata, browse, algorithms, associated documentation, GV, and SSM/I ancillary data. Upon receipt of a request, it is verified to include at a minimum, the following information: data set type and the start and stop times for the data. All required information for proper archiving extraction must be included in the request.

9.4.1.2 Test Case A090410.020–Deliver Archived TRMM Data to the TSDIS from the MSFC DAAC

The Deliver Archived TRMM Data to the TSDIS from the MSFC DAAC Test verifies that the ECS/MSFC DDT retrieves the request data from the archive system, puts the data on the TSDIS accessible disk, and sends a Data Response to TSDIS informing TSDIS of the data availability. A time period is also specified in the Data Response to indicate the time during which the data will be available.

The dataset request in the 9.4.1.1 , " TSDIS Data Requests Receipt/Validation at the MSFC DAAC" (Test Case A090410.010) are used as input to this test.

This test also verifies that all data transferred to the TSDIS from the ECS at the MSFC DAAC follows EOSDIS-defined standards with specific product formats jointly agreed to and documented in the ICDs. Verification is performed to ensure that the specific data specified in the Date Request from the TSDIS is made accessible to the TSDIS.

9.4.1.3 Test Case A090410.030–TSDIS Data Requests Receipt/Validation at the GSFC DAAC

The TSDIS Data Requests Receipt/Validation at the GSFC DAAC Test verifies the ECS capability to support the TSDIS reprocessing. The capability of the ECS at the GSFC DAAC to receive Data Requests from the TSDIS for archived VIRS and required ancillary data stored at the MSFC DAAC is verified. The Test method is used to verify the receipt of the Data Requests.

A Data Request is received by the ECS/MSFC DIT for VIRS Level 1A-3 data products, metadata, browse, algorithms, associated documentation, and AVHRR, GOES Precipitation Index (GPI), Global Precipitation Climatology Project (GPCP), and NMC ancillary data. Upon receipt of a

request, it is verified to include at a minimum, the following information: data set types and the start and stop times for the data. All required information for proper archiving extraction must be included in the request.

9.4.1.4 Test Case A090410.040–Deliver Archived TRMM Data to the TSDIS from the GSFC DAAC

The Deliver Archived TRMM Data to the TSDIS from the GSFC DAAC Test verifies that the ECS/MSFC DDT retrieves the request data from the archive system, puts the data on the TSDIS accessible disk, and sends a Data Response to TSDIS informing TSDIS of the data availability. A time period is also specified in the Data Response to indicate the time during which the data will be available.

The dataset request in the 9.4.1.3 , " TSDIS Data Requests Receipt/Validation at the GSFC DAAC" (Test Case A090410.030) are used as input to this test.

This test also verifies that all data transferred to the TSDIS from the ECS at the GSFC DAAC follows EOSDIS-defined standards with specific product formats jointly agreed to and documented in ICDs. Verification is performed to ensure that the specific data specified in the product request from the TSDIS is made accessible to the TSDIS.

9.4.2 Reprocessed Data Receipt from the TSDIS (MSFC) Sequence

This scenario verifies the ability of the ECS at the MSFC DAAC users to ingest reprocessed data from the TSDIS for the TRMM instruments (PR and TMI). This sequence of tests verifies the ECS at the MSFC DAAC capability to ingest reprocessed data on a routine basis from the TSDIS. Upon receipt of the reprocessed data, verification is performed to ensure that the ECS performs a data check for consistency, extracts metadata, updates the metadata with inventory and consistency check information, stages the data for storage, sends data check status to the TSDIS, and updates the data receipt log.

9.4.2.1 Test Case A090420.010–Reprocessed Data Receipt at the MSFC DAAC

The Reprocessed Data Receipt at the MSFC DAAC Test verifies the ECS MSFC capability to ingest reprocessed data on a routine scheduled event from the TSDIS. The TSDIS electronically provides the ECS a schedule of TRMM product delivery to the system weekly. The Demonstration method is used to verify the receipt of the TSDIS reprocessed data. The TRMM data products reprocessed by the TSDIS for the ECS at the MSFC DAAC are related to reprocessed PR, TMI, and GV data products. The data sets include Level 1A-3 data products, metadata, browse, GV, algorithms, and associated documentation. Verification is performed to ensure that all data received from the TSDIS conforms to the EOSDIS-defined product formats standards and the ICDs. In an event of product delay, the TSDIS electronically provides status information to the ECS at the MSFC DAAC for planning purposes.

9.4.2.2 Test Case A090420.020–Reprocessed Data Check at the MSFC DAAC

The Reprocessed Data Check at the MSFC DAAC Test verifies the capability of the ECS to validate the reprocessed TRMM data and metadata (PR, TMI, and GV) ingested from the TSDIS. The Test method is used to verify the data and metadata validation. At a minimum, the following verifications are performed to ensure that all data ingested from the TSDIS satisfies the data

transmission and consistency checks: transmission checks (e.g., data quality, data gaps, data redundancy, etc.), the presence of required fields, error-free input, correctness of the data set granular size, approved/authorized source, and data/metadata compliance with EOSDIS defined standards and file content. If there are data transmission errors, the ECS notifies the TSDIS to request a resend of the data or for the TSDIS operations to investigate the problem and logs the transfer as unsuccessful. This test case verifies that the ECS generates and sends status to the TSDIS indicating the success or failure of the data consistency checks. Also verified are the updating of the data receipt log at the ECS at the MSFC DAAC with all data received and the status of the data checks; and the updating of the ingested associated metadata with the status of the data consistency checks.

9.4.2.3 Test Case A090420.030–Reprocessed Data Metadata Extraction and Validation at the MSFC DAAC

The Reprocessed Data Metadata Extraction and Validation at the MSFC DAAC Test verifies the capability of the ECS to extract and validate minimal metadata from the data ingested to allow the data to be referenced. The Test method is used to verify the metadata validation. This metadata are extracted from information held with the data file, held in a file/message associated with the data, or derived directly from the delivered file reference. This test case verifies that the TRMM data ingested from the TSDIS satisfies the metadata validation checks. The limited metadata to be verified are: data set name, instrument name, observation time, and granule id. This test case verifies that if the data ingested passes all checks, the ECS at MSFC generates and sends a successful status message to the TSDIS. If there are validation errors, the ECS notifies the TSDIS of the problem and logs the metadata check as unsuccessful. The data receipt log at the ECS at the MSFC DAAC is updated to reflect the result of the metadata validation checks. The ingested associated metadata is updated to include the status of the metadata checks.

9.4.2.4 Test Case A090420.040–Data Product Storage Preprocessing at the MSFC DAAC

The Data Product Storage Preprocessing at the MSFC DAAC Test verifies the ECS capability to prepare the reprocessed PR, GV, and TMI data products received at the MSFC DAAC for archiving. The Test method is used to perform this verification. The test verifies that the appropriate input data is destaged and if required, reformatted for internal storage. Reformatting is done in accordance the ECS approved project standard format. Prior to storage, a minimal set of metadata is generated and are as follows: date and time of storage, physical location, data check status, and an unique format identifier.

9.4.2.5 Test Case A090420.050–Data Product Storage at the MSFC DAAC

The Data Product Storage at the MSFC DAAC Test verifies the ECS at the MSFC DAAC capability to archive PR, GV, and TMI data. The Test method is used to perform this verification. The following steps that are associated with data archiving are verified: insertion of the data into the appropriate data server, insertion of metadata into the inventory, updating of the data receipt log with storage status information, and sending storage status information to the TSDIS. The following PR, GV, and TMI data types are verified for storage: Level 1A-3 data products, metadata, browse, algorithms, and associated documentation.

9.4.2.6 Test Case A090420.060–Reprocessed Data Directories/Inventories Update at the MSFC DAAC

The Reprocessed Data Directories/Inventories Update at the MSFC DAAC Test verifies the ECS at the MFSC DAAC capability to update related directories and inventories associated with the reprocessed PR, TMI, and GV data. The Demonstration method is used to verify that all related directories and inventories files are updated with the appropriate information. The ECS ability to update the internal file directories with the unique data set ID is verified. At a minimum, the updating of the inventory with metadata reflecting the changes as a result of the reprocessing as well as the updating of the list of reprocessed data is verified.

9.4.2.7 Test Case A090420.080–Reprocessing Data Notification at the MSFC DAAC

The Reprocessed Data Notification Test verifies that the subscribed users be notified when the PR, TMI, and GV data products has been reprocessed. The Test and Demonstration methods are used to verify that general information concerning PR, TMI, and GV product reprocessing is available to all users through the Advertising Service. This test case verifies that when requested by the user (i.e., a subscription with the Data Server is placed), the metadata reflecting changes as a result of the updates is provided.

9.4.3 Reprocessed Data Receipt from the TSDIS (GSFC) Sequence

This scenario verifies the ability of the ECS at the GSFC DAAC users to ingest reprocessed data from the TSDIS for the TRMM VIRS instrument. This sequence of tests verifies the ECS at the GSFC DAAC capability to ingest reprocessed data on a routine basis from the TSDIS. Upon receipt of the reprocessed VIRS data, verification is performed to ensure that the ECS performs a data check for consistency, extracts metadata, updates the metadata with inventory and consistency check information, stages the data for storage, sends data check status to the TSDIS, and updates the data receipt log.

9.4.3.1 Test Case A090430.010–Reprocessed Data Receipt at the GSFC DAAC

The Reprocessed Data Receipt at the GSFC DAAC Test verifies the ECS GSFC capability to ingest reprocessed VIRS data on a routine scheduled event from the TSDIS. The ECS receives a schedule of products available from the TSDIS weekly. The Demonstration method is used to verify the receipt of the TSDIS reprocessed data. The TRMM data products reprocessed by the TSDIS and stored at the ECS at the GSFC DAAC are related to reprocessed VIRS data products. The data sets include Level 1A-3 data products, metadata, browse, algorithms, and associated documentation. Verification is performed to ensure that all data received from the TSDIS conforms to EOSDIS-defined product formats standards and the ICDs. In the event of product delay, the TSDIS electronically provides status information to the ECS at the GSFC DAAC for planning purposes.

9.4.3.2 Test Case A090430.020–Reprocessed Data Check at the GSFC DAAC

The Reprocessed Data Check at the GSFC DAAC Test verifies the capability of the ECS to validate the reprocessed TRMM VIRS data and metadata ingested from the TSDIS. The Test method is used to verify the data and metadata validation. At a minimum, the following

verifications are performed to ensure that all VIRS data ingested from the TSDIS satisfies the data transmission and consistency checks: transmission checks (e.g., data quality, data gaps, data redundancy, etc.), the presence of required fields, error-free input, correctness of the data set granular size, approved/authorized source, and data/metadata compliance with EOSDIS defined standards and file content. If there are data transmission errors, the ECS notifies the TSDIS to request a resend of the data or for the TSDIS operations to investigate the problem and logs the transfer as unsuccessful. This test case verifies that the ECS generates and sends status to the TSDIS indicating the success or failure of the data consistency checks. Also verified are the updating of the data receipt log at the ECS at the GSFC DAAC with all data received and the status of the data checks; and the updating of the ingested associated metadata with the status of the data consistency checks.

9.4.3.3 Test Case A090430.030–Reprocessed Data Metadata Extraction and Validation at the GSFC DAAC

The Reprocessed Data Metadata Extraction and Validation at the GSFC DAAC Test verifies the capability of the ECS to extract and validate minimal metadata from the data ingested to allow the data to be referenced. The Test method is used to verify the metadata validation. This metadata is extracted from information held with the data file, held in a file/message associated with the data, or derived directly from the delivered file reference. This test case verifies that the TRMM data ingested from the TSDIS satisfies the metadata validation checks. The limited metadata to be verified are: data set name, instrument name, observation time, and granule id. This test case verifies that if the data ingested passes all checks, the ECS at the GSFC DAAC generates and sends a successful status message to the TSDIS. If there are validation errors, the ECS notifies the TSDIS of the problem and logs the metadata check as unsuccessful. The data receipt log at the ECS at the GSFC DAAC is updated to reflect the result of the metadata validation checks. The ingested associated metadata is updated to include the status of the metadata checks.

9.4.3.4 Test Case A090430.040–Data Product Storage Preprocessing at the GSFC DAAC

The Data Product Storage Preprocessing at the GSFC DAAC Test verifies the ECS capability to prepare the reprocessed VIRS data products received at the GSFC DAAC for archiving. The Test method is used to perform this verification. This test verifies that the appropriate input data is destaged and if required, reformatted for internal storage. Reformatting is done in accordance the ECS approved project standard format. Prior to storage, a minimal set of metadata is generated and are as follows: date and time of storage, physical location, data check status, and an unique format identifier.

9.4.3.5 Test Case A090430.050–Data Product Storage at the GSFC DAAC

The Data Product Storage verifies the ECS at the GSFC DAAC capability to archive VIRS data products. The Test method is used to perform this verification. The following steps that are associated with data archiving are verified: insertion of the VIRS data into the appropriate data server, insertion of metadata into the inventory, updating of the data receipt log with storage status

information, and sending storage status information to the TSDIS. The following VIRS data types are verified for storage: Level 1A-3 data products, metadata, browse, algorithms, and associated documentation.

9.4.3.6 Test Case A090430.060–Reprocessed Directories/Inventories Update at the GSFC DAAC

The Reprocessed Directories/Inventories Update at the GSFC DAAC Test verifies the ECS GFSC DAAC capability of updating of related directories and inventories associated with the reprocessed VIRS data. The Demonstration method is used to verify that all related VIRS directories and inventory files are updated with the appropriate information. The ECS ability to update the internal file directories with the unique data set ID is verified. At a minimum, the updating of the inventory with metadata reflecting the changes as a result of the reprocessing as well as the updating of the list of reprocessed data is verified.

9.4.3.7 Test Case A090430.080–Reprocessing Data Notification at the GSFC DAAC

The Reprocessed Data Notification at the GSFC DAAC Test verifies that the subscribed users be notified when the VIRS data has been reprocessed. The Test and Demonstration methods are used to verify that general information concerning VIRS product reprocessing is available to all users through the Advertising Service. This test case verifies that when requested by the user (i.e., a subscription with the Data Server is placed), the metadata reflecting changes as a result of the updates is provided.

9.5 Mission Related Data Processing Scenario

This scenario takes the operations staff through the process of receiving previously undefined mission related data, ingesting it, and making it available for further processing by the users.

This scenario verifies the capability of ECS to ingest data products that require special procedures (data products received on media, nonstandard data products, or in-situ data), DAAC specific baseline mission data parameters received from the SMC, and other ECS internal segments. This scenario verifies ECS capability to update experiment parameter files and databases because of more accurate data, new policy direction, changes to internal database formats ,or unique processing instructions from the ECS science community.

The capability of ECS to ingest new calibration parameters which in some cases will cause higher level data to be reprocessed is also verified in this scenario. This scenario verifies ECS capability to ingest instrument schedule information from system management or flight operations.

9.5.1 Non-Standard Product Receipt Sequence

This sequence of tests verifies the ability of ECS operational users to receive non-standard products for mission related processing. This sequence of tests verifies the capability to receive data products from users electronically or on other media. The type of data received may consist of correlative and ancillary data, documents, algorithms, and instrument history logs from other DAACs, SCFs, and NOAA. The capability to ingest test plans, data, and procedures to facilitate the checkout of new algorithms and to update processing plans is verified. This sequence of tests verifies the capability to receive the data, follow the instructions for loading the data onto ECS

media, validate that the data were received, perform the necessary processing based on procedures included with the product or a specified processing plan (if processing is required), store the data products, and notify the sender that the data have been archived.

9.5.1.1 Test Case A090510.010–Receive, Process and Store Non-Standard Products from DAAC's

The Receive, Process and Store Non-Standard Products from DAAC's Test verifies the capability of ECS to receive anticipated non-standard data products from each DAAC. This test also verifies the capability of ECS to validate the received non-standard data, to process the received non standard data (according to a specified data processing plan), to store the data products, and to notify the sender that the data products have been archived. The Test method is used to verify that the received non-standard data requirements are satisfied.

The inputs for this test consist of representative non standard data products from each of the DAACS, which may include correlative and ancillary data, documents, algorithms and instrument history logs, procedures for loading the received data onto ECS media, procedures for recording and appropriately distributing information concerning the availability of the newly loaded data.

Upon taking the appropriate processing (or reprocessing) steps according to the directions received, the final output should be an analysis report which assesses ECS procedures for handling each of the DAAC data transmissions relative to ECS functional and performance requirements.

9.5.1.2 Test Case A090510.020–Receive, Process and Store Non-Standard Products from SCFs

The Receive Process and Store Non-Standard Products from SCFs Test verifies the capability of ECS to receive anticipated non-standard data products from the SCFs. This test also verifies the capability of ECS to validate the received non-standard data, to process the received non-standard data (according to a specified data processing plan), store the data products, and to notify the sender that the data products have been archived. The Test method is used to verify that the received non standard data requirements are satisfied.

The inputs for this test consist of representative non-standard data products from each of the SCFs. These non-standard data products may include correlative and ancillary data, documents, algorithms and instrument history logs. These example inputs should specify data products stored on all media which can be transmitted by a SCF to an ECS component including electronic media, hard copy, and even specifications for oral transmissions between ECS components.

The outputs from this test includes dumps of ECS data products which are the result of ingesting each of the example data products from each SCF. Each of the data product dumps is accompanied by a written description (in bullet format) of the procedures used to ingest each of the example inputs, including in each case, the receiving components procedures for receiving the inputs; procedures for loading the received data onto ECS media; procedures for recording and appropriately distributing information concerning the availability of the newly loaded data; taking appropriate processing (or reprocessing) steps according to directions received with the data set or in response to existing processing plans; fulfilling storage requirements for each received data product; and properly informing each of the senders that his/her data has been received . This description includes a timeline, listing the time intervals for completion each step in the ingest

process as well as the total time required for completing the ingest process. The final output is an analysis report that assesses the success of ECS procedures for handling each of the SCF data transmission examples relative to ECS functional and performance requirements.

9.5.1.3 Test Case A090510.030–Receive, Process and Store Non-Standard Products from NOAA

The Receive, Process and Store Non-Standard Products from NOAA Test verifies the capability of ECS to receive non-standard data products from NOAA. This test also verifies the capability of ECS to validate the received non-standard data products, to process the received non-standard data products (according to a specified data processing plan), to store the received non-standard data products, and to notify the sender that the data products have been archived. The Test method is used to verify that the received non-standard data requirements are satisfied.

The inputs for this test consist of representative non-standard data products from NOAA, which may include correlative and ancillary data, documents, algorithms and instrument history logs. The inputs should specify non-standard data products stored on all media that may be transmitted by NOAA to an ECS component including electronic media, hard copy, and even specifications for oral transmissions between ECS components.

The outputs from this test includes dumps of ECS non-standard data products that are the result of ingesting each of the example data products from NOAA. Each of the data product dumps is accompanied by a written description (in bullet format) of the procedures used to ingest each of the example inputs, including in each case, the receiving components procedures for receiving the inputs; procedures for loading the received data onto ECS media; procedures for recording and appropriately distributing information concerning the availability of the newly loaded data; taking appropriate processing (or reprocessing) steps according to directions received with the data set or in response to existing processing plans; fulfilling storage requirements for each received data product; and properly informing each of the senders that his/her data has been received. This description includes a timeline, listing the time intervals for completion each step in the ingest process as well as the total time required for completing the ingest process. The final output is an analysis report that assesses the success of ECS procedures for handling each of the NOAA data transmission examples relative to ECS functional and performance requirements.

9.5.2 Science Data Production Software Updates Receipt Sequence

The Science Data Production Software Updates Receipt sequence of tests verifies that the Algorithm Integration and Test team (AITT) personnel accesses the system capability to log, ingest, generate status reports and archive the science data production software that is delivered from the SCF. For the TRMM release the following two sites are planned for performing updates to science data production software: the SCF at LaRC for the updates to science data production software used to produce CERES data products; and the SCF at MSFC for the updates to science data production software used to produce LIS data products. The transmission of the software is initiated when the SCF science investigator contacts the AITT manager to coordinate and make arrangements to have the software update package electronically transferred for integration and testing purposes. The same general process for receiving software package update is used for the ECS at the LaRC and MSFC DAACs.

9.5.2.1 Test Case A090520.020–Science Data Production Software Updates Installation

The Science Data Production Software Updates Installation Procedures Test verifies the capability of ECS to install algorithm updates and appropriately coordinate ECS internal and external communications concerning the effects and impacts of each new algorithm update. The Inspection method is used to verify that the algorithm updates installation requirements are satisfied.

It is verified that once the AITT confirms delivery of software updates package, the delivery is logged into the system software delivery file and a receipt message is sent to the SCF to acknowledge the delivery. The AITT then proceeds to inspect the contents of the packages containing a configuration list, software programs, test data, calibration and coefficient data, and associated documentation. It also verified that the ECS has the capability to accept update packages that include a POSIX-compliant representation of science data production software. All of the data delivered is received into the system via the configuration management (CM) process and is then made operational, so that the AITT may proceed with the integration and test activities.

A history file is updated with all delivery and configuration information to include software size, required resources, associated documentation, data handling standard, operation compatibility and required metadata outputs. All the information recorded in the history file is captured in a series of reports that are generated by the AITT following the integration and test activities.

9.5.2.2 Test Case A080330.030–Science Data Production Software Reporting

The Science Data Production Software Reporting test verifies that the science users and the ECS site systems engineers and managers site reporting is accomplished correctly and in a timely manner.

It is verified that the AITT submits request to generate reports for the science data production software history/audit information, test schedules, and test results, to the system operator. This requires access to the specifications and schedules for required algorithm related reports sent or received by the site under test These specifications include master database reports relating algorithm data sets to processing algorithms and algorithm/ calibration test reports. These specifications and schedules are inspected for compliance with system level schedules and report format requirements. An output report evaluating each sites schedule and format requirements versus ECS specifications is generated to inform the AITT of the report request status.

Formats are include in written specifications of the site configuration control reporting requirements to the SMC including the schedule and format for delivering information to the SMC. Data formats for transmission CM data to the SMC are reviewed for format correctness to include such data items as source code, version number, author, benchmark test procedures, test data and results, date and time of operational installation, compiler identification and version, and final algorithm documentation.

9.5.2.3 Test Case A080330.040–Storage and Retention

This Storage and Retention test verifies that the science users and the ECS site systems engineers and managers can access and maintain a central data base storage of the ECS science data production software. Procedures are specified to assure efficient retention and retrieval of ECS science data production software executables and calibration coefficients.

It is verified that the system managers maintain as-built specifications of the ECS data base procedures for storing, retaining and retrieving ECS science data production software executables and calibration coefficients. Volume estimates for retention of these products are also input as well as specification of storage availability for retaining these products.

Testing proceeds by comparing the products, versus current and future storage volume and processing specifications. A report containing evaluation results to include identification of risk factors and degree of risk associated with the sites storage and retention specification conclude this portion of the test.

9.5.3 Maintain Processing Plan and Schedules Sequence

This sequence of tests verifies the ability of ECS operational users to receive updated schedules and reconfiguration directives from EOC and SMC, respectively for mission related planning and processing. This sequence of tests verifies the capability to update the data processing plans and schedules manually or automatically from schedule updates from EOC or the SMC using software tools. The capability to modify the frequency (i.e., daily, weekly, monthly) a product is generated is verified. This sequence of tests verifies the capability to modify subscriptions, data dependencies tables, and product dependencies tables, and product generation deadlines and standing orders. The capability to receive reconfiguration directives from the SMC to update schedule priorities, resolve schedule conflicts, and operational assignments is verified.

9.5.3.1 Test Case A090530.010–Maintain EOC Processing Plans and Schedules

The Maintain EOC Processing Plans and Schedules Test verifies that ECS has adequate procedures for maintenance and update of EOC processing plans and schedules. These procedures may be manual, automated or both. The Inspection method is used to verify that the EOC processing plan and schedule maintenance requirements are satisfied.

The inputs for this test consist of representative real or simulated processing plan update requests and schedule update requests from EOC. The test data set should include representative requests for modification of product generation frequency generation as well as requests for subscriptions modification, data dependency tables modification, product dependencies tables modifications, modifications to product generation deadlines and modifications to standing orders. The input data sets should include both nominal and erroneous requests for processing plans and schedule updates.

The outputs from this test includes the results of inspection of the EOC processing procedures for accomplishing processing plan and schedule updates. Both software assisted and manual procedures for handling EOC plan and schedule updates should be assessed. The results of an inspection of procedures for detecting and processing erroneous plan and schedule updates from EOC is included in the output report.

9.5.3.2 Test Case A090530.020–Maintain SMC Processing Plans and Schedules

The Maintain SMC Processing Plans and Schedules Test verifies that ECS has adequate procedures for maintenance and update of SMC processing plans and schedules. These procedures may be manual, automated or both. The Inspection method is used to verify that the SMC processing plan and schedule maintenance requirements are satisfied.

The inputs for this test consist of representative real or simulated updated schedules and reconfiguration directives for mission related planning and processing. The inputs shall include reconfiguration directives to update schedule priorities, to resolve schedule conflicts and to request changes in operational assignments The input data sets shall include both nominal and erroneous directives for processing plans and schedule updates.

The outputs from this test includes the results of inspection of the SMC processing procedures for accomplishing processing plan and schedule updates. Both software assisted and manual procedures for handling SMC plan and schedule updates should be included in this report. The results of an inspection of procedures for detecting and processing erroneous plan and schedule updates from EOC is included in the output report.

9.5.4 Maintain Calibration Parameters Sequence

This sequence of tests verifies the ability of ECS operational users to receive, process, and store calibration data from external sources and flight operations. Error checking is performed on this data to ensure that the necessary information is included with the calibration data. Data receipt logs and status summaries are updated. As part of preparing the data for storage, a reference is created linking the calibration data to processing plans, algorithms, and storage inventories. This sequence of tests verifies that if the new calibration data that is received is to replaced old data, a checked is made to determine if the new data caused a threshold limit to be violated. Verification is performed to demonstrate , if a violation occurs, previously archived data associated with the new calibration data is flagged for reprocessing.

9.5.4.1 Test Case A090540.010–Maintain Calibration Parameters from EOC

The Maintain Calibration Parameters from EOC Test verifies that ECS has adequate procedures for installing and updating calibration data sets in accordance with the specified formats received from EOC. The Inspection method is used to verify that the EOC calibration parameter maintenance requirements are satisfied.

The inputs for this test consist of representative real or simulated calibration data installation or update requests from EOC. The test data set should contain examples of typical format and data errors for all forms of calibration data that may be received from EOC.

The outputs from this test includes the results of inspection of the EOC processing procedures for input or update of EOC calibration data. Both software assisted and manual procedures for handling EOC plan and schedule updates should be assessed in this report. The results of an inspection of procedures for detecting and processing erroneous plan and schedule updates from EOC is included in the output report to include an assessment of procedures for assuring that all necessary information is included in the calibration data inputs and that data receipt logs and status summaries are maintained and updated. The analysis report confirms that linkages between calibration data, processing plans, algorithms, and storage inventories are specified in the calibration update request. For calibration updates, the report also verifies that required reprocessing is requested for those archived data sets that are affected by the requested calibration updates.

9.5.4.2 Test Case A090540.020–Maintain Calibration Parameters from NOAA

The Maintain Calibration Parameters from NOAA Test verifies that ECS has adequate procedures for installing and updating calibration data sets in specified formats received from NOAA. The Inspection method is used to verify that the NOAA calibration parameter maintenance requirements are satisfied.

The inputs for this test consist of representative real or simulated calibration data installation or update requests from NOAA. The test data set should contain examples of typical format and data errors for all forms of calibration data that may be received from NOAA.

The outputs from this test includes the results of inspection of the NOAA processing procedures for input or update of NOAA calibration data Both software assisted and manual procedures for handling NOAA plan and schedule updates should be assessed in this report. The results of an inspection of procedures for detecting and processing erroneous plan and schedule updates from NOAA is included in the output report to include an assessment of procedures for assuring that all necessary information is included in the calibration data inputs and that data receipt logs and status summaries are maintained and updated. The analysis report confirms that linkages between calibration data, processing plans, algorithms, and storage inventories are specified in the calibration update request. For calibration updates, the report also verifies that required reprocessing is requested for those archived data sets that are affected by the requested calibration updates.

10. Pull Scenario Group

The objective of the Pull Scenario Group is to confirm that the ECS user is provided the ECS services necessary to search and access the data holdings of the ECS DAACs, the Version 0 DAAC's, and the NOAA ADC. ECS services tested in this scenario include: user login, user authentication, browse, search types (inventory, directory, guide), file transfer protocol (ftp) orders, media access, support for standing orders, interoperability with the Version 0 system, the NOAA ADC and interfaces to Science Computing Facilities (SCF's).

The ECS Science Office conducted detailed discussions with the Earth Science community in order to develop representative science scenarios that illustrate how the science community utilizes ECS. The Science User Scenarios applicable to the TRMM Release are used as a basis for the test descriptions included in the Pull Scenario Group. These baseline scenarios are tailored for the TRMM Release. Figure 10-1 illustrates the scenarios and sequences associated with the Pull Scenario Group.

10.1 Science User Scenario

The Science User scenario demonstrates the ECS search and access services available to variously skilled ECS science users. The following services are included: ECS accessibility and functionality via the Client/Server interface at three sites (LaRC, MSFC, GSFC), one-way interoperability between ECS and the NOAA ADC, two-way interoperability between ECS and the ESDIS Version 0 System, Application Programming Interfaces (APIs) for Information Management; search methods, on-line browse/data visualization, data product orders, standing orders, and basic SDPS Scheduling capabilities.

According to the ECS system skills and work area assignment of the science user, these services are used to perform particular sets of functions and therefore, have been separated into groups that are relevant to the new science user, the experienced science user, ECS/Version 0 System Interoperability, and ECS/NOAA interoperability.

The new science user sequence begins by testing ECS basic search and access services using default conditions for product generation. The experienced science user is expected to exercise more complex search, browse and access services.

ECS interoperability with NOAA and the Version 0 System involves the user having extended search and ordering skills to permit access to the data holding of NOAA and the Version 0 system.

10.1.1 New Science User Sequence

The New User sequence confirms that a new science user is provided with efficient access to ECS services, while making use of the help utilities such as on-line guide to explore the system services. The test process involves the following: initial processing of a new science user access setup, generation of simple search queries using a number of methods to access high-level and detailed information about data products; locating and retrieving data products in preparation for ordering, submitting orders to request data products, and receiving data order results. Access to each DAAC is established to confirm that the new science user can access the full range of services, spanning the whole of EOSDIS data holdings for the TRMM Release.

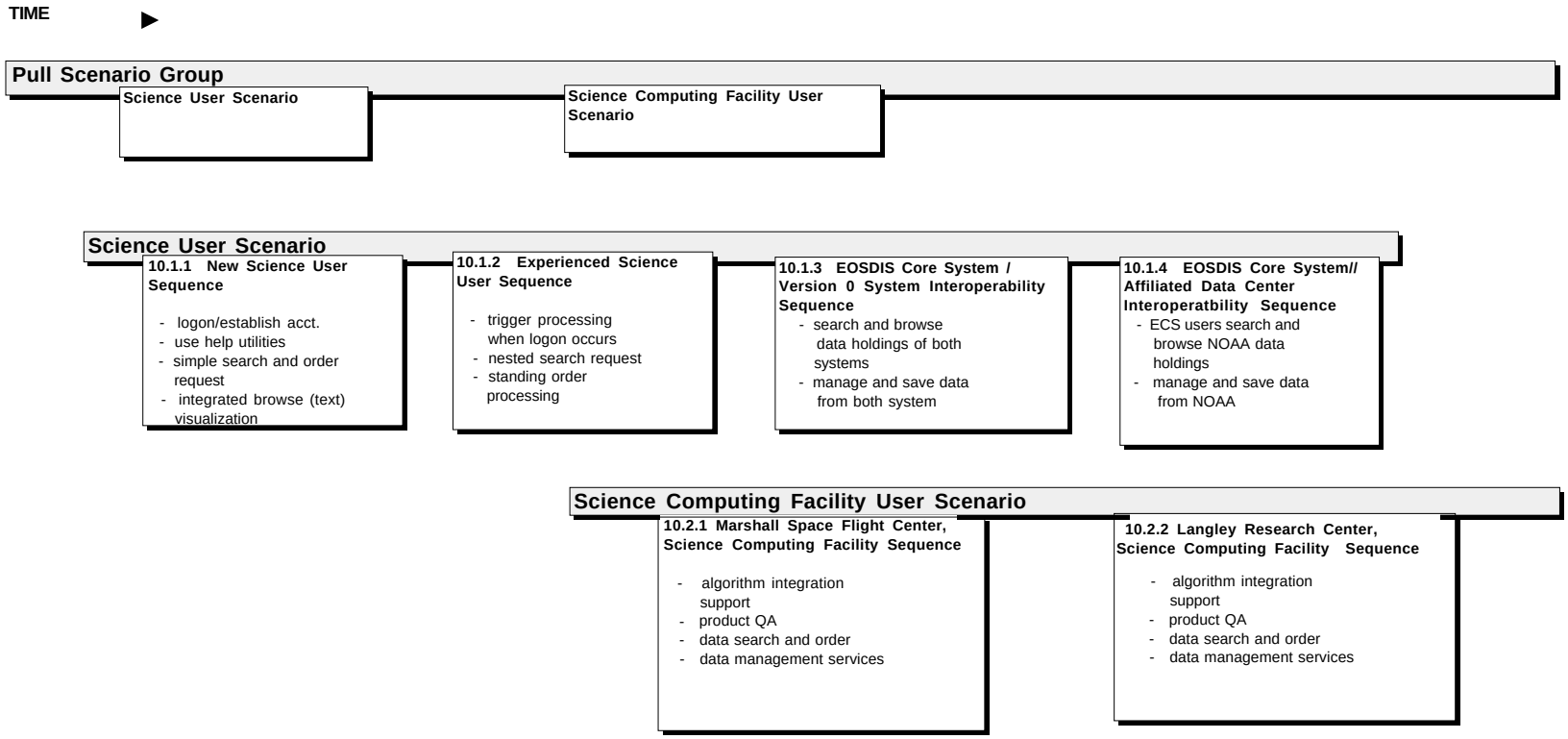

Figure 10-1. Pull Scenario Group Acceptance Test Sequencing.

Initial processing of the new user setup involves user log-on, completion of an ECS account application, activation and update of the user profile for account privileges.

Generation of simple search queries and locating information about mission and instrument data products that are available for request, involves the user accessing the following services: the directory, providing the user with information on DAAC datasets from any point in the system; the Guide, providing the user with detailed descriptions about data products, platforms, and data centers; the inventory, providing the user with the specific observations that are available for a data archive; and the browse capability, allowing the user to view the image at reduced resolutions.

Once the user has located and selected the product of interest, the user is ready to place a product order. The type of distribution is specified in the order.

For this sequence, the Science Scenario Model #11b ("Derivation of Snow Water Equivalents", described by John Walsh) collected by Kaminski/Khalsa and written by Tess Wingo of the ECS Science Office, forms the basis for the test cases. Figure 10-2 shows the scenario.

10.1.1.1 Test Case A100110.010–System Access via Network Connection

The System Access via Network Connection test verifies that ECS is accessible via network link. The Demonstration method is used to verify that each ECS TRMM Release DAAC is accessible via remote network connection.

The user telnets to the specific DAAC for network link. Upon successful access to the system, the system should launch a login window and prompt the user for their login name and password. If this is the first time the user is on the system, the user has the option to launch an on-line help tool.

10.1.1.2 Test Case A100110.020–System Access via WAIS and WWW

The System Access via WAIS and WWW test verifies that ECS is accessible via WAIS and WWW. The Demonstration method is used to verify that ECS is accessible via WAIS and WWW. For this test, the user has a proficient browser such as Mosaic, Netscape, or WinWeb. The Demonstration method is used to verify that ECS can be accessed by entering the URL to the ECS TRMM Release DAACs.

Upon successful access to the system, the system launches a login window and prompt the user for their login name and password. Since this is the first time the user is accessing the system, the user launches an on-line help tool. The user goes on to verify functionality for: User Registration, User Profile, Directory, Guide, Inventory, Browse, and Data Product Order, as described in the test cases below.

Derivation of Snow Water Equivalents
Subject: John Walsh

Note: The scenario has been modified for use by the acceptance test team.
Purpose and Duration of the investigation:
-The purpose of the investigation will be to research snow water equivalents. -All work in this scenario in done interactive to the screen, except for an initial phone call to the help desk.
1) Researcher *Searches* Directory for high level datasets information for brightness and snow for research into snow water equivalents.(@1 request, @ small <25 hits returned for the request)
2) *Inspects* the Directory for high level dataset information for brightness and snow for research into snow water equivalents.(@1 request, @small <25 hits returned for the request)
3) After phoning the help desk the researcher is informed that there are currently no EOS instruments that will produce the same information. The help desk directs them to the SSM/I gridded brightness temperature data, and tells them about the Canadian Climate Center Snow Water Equivalent(SWE) algorithm, which they can use with the SSM/I data to derive snow water equivalents. So, the researcher does a *Search* on the Guide to get the information on SSM/I (Special Sensor Microwave/Imager), gridded brightness temperature data sets, working with a 5 year period North of 30 degrees N. (The Science Data Plan says that in 1995 this product has 12.26GB/year, but this may change by year) (@1 request, @ small <25 hits returned for the request)
4) *Inspects* the Guide in order to look at SSM/I gridded brightness temperature data to eventually derive snow water equivalents with the help of an algorithm. (@1 request, @ small <25 hits returned for the request)
5) After conferring with Dr. Walsh about their findings and confirming his research needs the staff submits inventory *searches* for the data sets they are interested in. (@1 request, @ Medium 25-75 hits returned for the request)
6) This is the same type of step as (step 5) however the search has a greater complexity. The researcher wants the *search* to filter the results list from the **Inventory** to retain only every third day. (@1 request, @ medium 25-75 hits returned for the request)
7) Researcher wants to *inspect* the **inventory** from the (second - refined) search on this dataset. (@1 request, @ small <25 hits returned for the request)
8) The help desk has told them about the Canadian Climate Center's Snow Water Equivalent (SWE) algorithm which they can use with the SSM/I data to derive snow water Equivalents. So they *Search* the **Algorithm package** for the above information. (@1 request, @ small <25 hits returned for the request)
9) They want to order the full algorithm package for the Canadian Climate Center's Snow Water Equivalent (SWE) algorithm, so they do an *exchange* from the **Algorithm package** layer. (@ 1 request, @ small <25 hits for the request) via ftp.
10) After having refined the search and inspected the data they order the data (or *Exchange* **Level 3** SSM/I gridded brightness temperature data, North of 30 degrees N, 120 days/yr. * 5 years, at 600 granules (1 grid/granule)) (600 grids * 608 * 896 pixels/grid * 16 bpp = 653 MB) (@1 request, @ large >75 hits for the request) via ftp.

Figure 10-2. Derivation of Snow Water Equivalents Science Scenario

10.1.1.3 Test Case A100110.030–System Access to ECS Client

The System Access to ECS Client test verifies that ECS is accessible via direct connection (the client is local to the user's workstation). The Demonstration method is used to verify that ECS is accessible via direct connection. The user uses a telnet address for a specific DAAC to establish the connection. Upon successful access to the system, the system should launch a login window and prompt the user for his/her login name and password. Since this is the first time the user is on the system, the user has the option to launch an on-line help tool. The user will go on to verify functionality for: User Registration, User Profile, Directory, Guide, Inventory, Browse, and Data Product Order, as described in the test cases below.

NOTE: For the remainder of this sequence, the user is to be accessing the system via network connection.

10.1.1.4 Test Case A100110.040–User Registration

The User Registration test verifies requirements that relate to the user registration process for a new science user. The Test method is used to verify that ECS requests registration approval, user account priorities and authorized user services from the SMC.

The registration process consists of downloading the set of standard client software from a publicly accessible system distribution point. This includes a variety of software for accessing system services and managing the user's desktop environment. A variety of access mechanisms are supported, including, but not limited to World Wide Web HTTP servers, anonymous FTP servers, and hard media (e.g. CD-ROM) distribution via US mail.

After the registration process is complete, the system responds by displaying a list of services that are available to the user.

10.1.1.5 Test Case A100110.050–User Profile

The User Profile test verifies that ECS provides the capability for the new science user to customize and configure the ECS client to the specifications that are most conducive to the user's research interest. The Test method is used to verify that ECS provides the capability for users to define and modify their user profile information.

The test verifies that the user profile can be set and modified through a set of screens which provide the user with the capability to adjust the behavior of the client's user interface, as well as to expand on information needed to utilize specific ECS services (e.g. data search). This includes preferences such as date, time, latitude, and longitude formats, user mailing address, search parameter defaults, default application/services to invoke for data browsing, expertise level: novice, intermediate, or expert. The registration process should also assist the user in selecting the best DAAC for their research interest.

10.1.1.6 Test Case A100110.060–Directory

The Directory Test verifies that ECS has the capability to provide the user with a collection of uniform descriptions that summarize the contents of a large number of data sets. The information within this view provides information suitable for initial determination of the existence and

contents of each data set. The Science User Scenario entitled "Derivation of Snow Water Equivalents (Figure 10-2) collected by Kaminski/Khalsa and written by Tess Wingo of the ECS Science Office is referenced to demonstrate and test this service.

After corresponding with the ECS help desk, which directs the user to the SSM/I gridded brightness temperature data, the Demonstration method is used to verify that the user can query the directory for SSM/I gridded brightness temperature data using "SSM/I" as the keyword for the search criteria.

The system should then respond to the user with an informational message stating that the query is being executed and then provide a listing of the directory information that relates to the requests.

10.1.1.7 Test Case A100110.070–Guide

The Guide Test verifies that ECS has the capability to provide the user with a detailed (document) description of a number of data sets and related entities, containing information suitable for making a determination of the nature of each data set and its potential usefulness for a specific application. This service provides detailed information on whole data sets and related entities as a user aid in selecting and using data. The Science User Scenario entitled "Derivation of Snow Water Equivalents" (Figure 10-2) is referenced to demonstrate and test this service.

The Demonstration method is used to verify that ECS provides the user with on-line guide (documentation/reference material) that provides information about individual EOSDIS data sets. This functionality is tested by searching for the availability of guide information for data set and data product names for products associated with SSM/I gridded brightness temperature.

To locate the guide information, the user specifies the following parameters: 5 year period (1987–1991 North of 30 degrees N), and "SSM/I" as the keyword.

The system should then respond to the user with an informational message stating that the query is being executed and then provides a listing of < 25 hits of guide information that relates to the requests.

10.1.1.8 Test Case A100110.080–Inventory

The Inventory Test verifies that ECS has the capability to provide the user with a uniform set of descriptions of granules from one or more data sets with information required to select and obtain a subset of those granules. The primary use of this service is to view local, regional, or global product searches, returning enough information in the results to identify specific granules and allow further investigation (such as requests for browse products, production history, QA statistics), or to determine that the granules are suitable for access.

The Demonstration method is used to verify that ECS provides the capability to search the data inventory which describes each granule of EOSDIS data. While executing this query, the Demonstration method is used to verify that ECS provides interactive support that includes extensive prompting and help utilities. The Science User Scenario entitled "Derivation of Snow Water Equivalents" (Figure 10-2) is referenced to demonstrate and test this service. Using "SSM/I" as the keyword for the search criteria, the user queries the inventory for data sets. The system should then responds to the user with an informational message stating that the query is being executed and then a listing of 25–75 hits for guide information are returned.

10.1.1.9 Test Case A100110.090–Browse

The Browse Test verifies that ECS allows the user to prescreen individual products before ordering, or possibly to perform correlative viewing of multiple sources to aid in the selection of product order. The Demonstration method is used to verify that ECS provides the capability to visualize pre-order data products and metadata (e.g., coverage maps, summary data) to facilitate the data selection and ordering process. The Science User Scenario entitled "Derivation of Snow Water Equivalents" (Figure 10-2) is referenced to demonstrate and test this service.

To locate the data sets, the user submits a query for Level 3 SSM/I gridded brightness temperature browse data for the northern hemisphere (see the scenario in Figure 10-2).

After selecting and reading the result of the request, the Demonstration method will be used to verify that ECS provides the capability for the user to browse Level 3 SSM/I gridded brightness temperature browse data.

10.1.1.10Test Case A100110.100–Data Product Order

The Data Product Order test verifies that ECS can access distribution criteria for each data product and data product software and compare the distribution criteria to the requester's data access rights to verify that the data and software can be distributed as requested. The Science User Scenario entitled "Derivation of Snow Water Equivalents (Figure 10-2) is referenced to demonstrate and test this service.

The Demonstration method is used to verify that ECS has the capability to distribute information on-line (i.e., over a network) and off-line (i.e., hard copy). The Demonstration method also verifies that ECS has the capability to accept orders from users for periodic delivery of information stored in ECS.

To order the data sets, the user submits an order for Level 3 SSM/I gridded brightness temperature data for the northern hemisphere (see Scenario in Figure 10-2).

This functionality is tested by ordering Level 3 SSM/I gridded brightness temperature data via ftp. After the user orders the data product, the system should then respond with an acknowledgment of the request, and the estimated time for the data transfer. The user is then notified of the data arrival with a message via e-mail. The data order steps are then repeated, but with different media specified, to verify distribution capabilities for all required media.

10.1.2 Experienced Science User Sequence

The Experienced Science User sequence addresses science users who are thoroughly familiar with the system. This science users may be located at an SCF or be local to the DAAC. This sequence differs from the “New User Sequence” in that the focus is on demonstrating the capabilities of the ECS system to a user who is already familiar with the system.

This sequence verifies requirements related to the following services: Information Search—searching across multiple data sets for coincident occurrences of data in space or time, data product ordering, standing orders on various types of high density media such as CD ROM, 8mm tape, 4mm DAT, 6250 tape, and 3480/3490 tape; User Feedback Information—product data quality assessment, schedule performance assessment, and the evaluation of quality of ECS services; ECS

Client Operations Information—system utilization of the ECS, outstanding data distribution requests, outstanding data processing requests, history of ECS resources, data base administration, backlog information, and CPU utilization; and Applications Programming Interfaces (APIs).

Two Science scenarios are used during this sequence to demonstrate information search and order capabilities. These scenarios: Daily Access of Lightning Data (Science Scenario #15), and Grassland Scenario (Science Scenario #3) are summarized in Figures 10-3 and 10–4 below. These scenarios will be further expanded on during development of the Acceptance Test Procedures.

10.1.2.1 Test Case A100120.010–Data Access Privileges

The Data Access Privileges Test verifies that the user can readily access ECS and utilize all of its services available in TRMM Release A. This test assumes that the user is already a registered ECS user. The Demonstration method is used to verify requirements that relate to the initial system access of ECS, the configuration of the user's desktop and the availability of ECS services. While executing this test, the Test method is also used to verify that the user can utilize previously stored user profile information. This test determines if the user's working preferences were stored properly. The Test method is then used to verify that the user is capable of accessing ECS data and services based upon the information obtained from the user profile. Upon completion of the authorization and authentication process, the Demonstration method is used to verify that the user can request additional services based upon the search scenario for this test.

In order for the user to access a ECS TRMM Release DAAC, the following user login information is necessary: user name and password; user profile information such as the user's mailing, shipping address, e-mail address, and other contact information; and the type of desired service: directory search, inventory search, guide search, and/or data browse.

The results of this test should be the following series of events: The ECS client launches its login screen, the system authenticates the user's identity and presents last login day and time, the system logs (records) the user's login date and time, the user verifies being on-line at the specified day and time indicated by ECS, and finally ECS launches a graphical user interface (GUI) that indicates the services that the user is authorized to access and the option to request additional services.

10.1.2.2 Test Case A100120.020–Information Search

The Information Search Test verifies that the user is able to utilize the advanced search functionality available in the TRMM Release. These services include inventory search, directory search, and guide search. This test differs from the previously mentioned test cases for the New Science User Sequence because it verifies requirements that relate to more complex searches, which includes multiple searches across multiple data sets for coincident occurrences of data in space and/or time and all other attribute(s) of metadata.

Daily Access of Lightning Data

Dr. Raul Lopez

Note: The scenario has been modified, to add user authentication and registration , user profile and distribution authentication steps to the scenario. Note that these steps will be expanded in the Acceptance Test Procedures, to define the exact keystrokes, and specific results expected.

1. The user logs on for the first time. After completing the user authentication and user profile process, the user enters "LIS" and "Continental United States and coastal areas" as search criteria for Guide information. The user is hoping to find descriptions at the parameter level, so the user knows which parameters will be useful to him. The system returns a list of matching items.
2. The user then selects each item and reads the descriptions. The user decides that his parameters of interest are: Event Data (param #4363, prod. #LIS02, Level 1B), Observation Time (param. #4365, prod. #LIS02, Level 1B), and Single Events (param. #4368, prod. #LIS02, Level 1B), and Single Events (browse) (param. #4372, prod. #LIS02, Level 1B).
3. The user orders all of the Guide information for all of the LIS parameters (24 of them), for reference purposes. The user specifies that the user would like to receive it via ftp overnight.
4. The user then would like to know if there are any algorithms available that will take the Single Events parameter and from it, produce a contour plot (units of number of flashes/km2) for the United States and its coastal areas. The user enters "contour plot" and "algorithms" as search criteria. The system returns a list of available algorithm packages that will produce a contour plot.
5. The user selects the items one at a time and reads the information regarding what inputs are required, etc. The user determines that one of them will suit his purposes.
6. The user orders the information describing the algorithm the user intends to use.
7. The user then instructs the system to produce a contour plot of the Single Event Data (using his chosen algorithm), overlay the contours on a map of the continental U.S., and send this to the screen for his inspection. The user studies the contour plot and sees areas of activity in central and southern Florida and in southern Arizona.
8. The user draws a polygon enclosing the closely-spaced contours in Florida. The user then requests that the system "zoom in" on the enclosed area of Florida.
9. While in this "zoomed" display, the user would like to see the same data for the 12 hours preceding the current (most recent) map by viewing it using browse animation. The user determines the lightning activity began about 4 hours before the current (most recent) map. The user also determines that the lightning activity is still fairly heavy.

Figure 10-3. Daily Access of Lightning Data Scenario (1 of 3)

10. Still in the "zoomed" display, The user submits an order for his parameters of interest (there are 4) for the time range of t- 4 hrs < t < t + 8 hrs., where t is the time of the current (most recent) map.

NOTE: This will cause an "immediate" order for data already available (the previous 4 hrs), as well as a "standing" order for the next 8 hrs of data as it becomes available. The order is for ftp of the data. In addition the user will request distribution by tape (exact format tbd.).

11. The user "zooms out" to the contour plot.
12. The user draws a new polygon enclosing the activity in Arizona. The user then requests that the system "zoom in" on the enclosed area of Arizona.
13. While in this "zoomed" display, the user would like to see the same data for the 12 hours preceding the current (most recent) map by viewing it using browse animation. The user determines the lightning activity began about 2 hours before the current (most recent) map. The user determines that the lightning activity is still increasing.
14. Still in the "zoomed" display, The user submits an order for his parameters of interest (there are 4) for the time range of t- 2 hrs < t < t + 4 hrs., where t is the time of the current (most recent) map.

NOTE: This will cause an "immediate" order for data already available (the previous 2 hrs), as well as a "standing" order for the next 4 hrs of data as it becomes available.

15. The user zooms out to the contour plot
16. The user requests that the systems display a file (user profile) that the user can edit. The user would like to set up his account in such a way that when the user logs on every day, the contour plot is automatically generated and the Single Event data is also available when the user "zooms in". Then the user logs off.
17. The user logs back onto ECS and his contour plot appears after a slight delay. However, the plot contains no contours. An "empty" contour plot is unexpected.
18. The user requests that the system display the Product History for the product from which the contour plot is generated (the "Single Events" parameter).
19. The user searches for lightning data from the National Lightning Detection Network (NLDN) using "NLDN", lightning, and U.S." as search criteria. A list is displayed.
20. The user selects the item corresponding to the time when the Product History from step #18 said there was a problem with the "Single Events" generation. The user expects to see a map of the U.S. with the ground strike locations plotted as "o" or "+".
21. The user sees lightning activity in Florida, draws a polygon, and zooms in.
22. The user requests that the system display the data as a movie loop (continuous forward mode) from the past six hours to the present, if possible.

Figure 10-3. Daily Access of Lightning Data Scenario (2 of 3)

23. While in this display, The user orders the NLDN data for the zoomed area for a time span: t - 3 hrs < t < t +3 hrs, where t is the current time. NOTE: This will cause an "immediate" order for data already available (the previous 3 hrs), as well as a "standing" order for the next 3 hrs of data as it becomes available. Then the user logs off.
24. The user logs onto EOSDIS and his contour plot appears after a slight delay. The user sees there is very high lightning activity in the Gulf of Mexico area, extending across southeastern Texas, southern Mississippi, and southern Alabama.
25. The user draws a polygon and zooms in on the enclosed area to inspect the LIS Single Events.
26. While inspecting the zoomed display, the user requests a 12 hour browse animation of the data, ending with the current time.
27. The user sees that his chosen area is not large enough to capture everything of interest to him, so the user zooms out to the contour plot.
28. The user then draws a new polygon that includes all of Texas, Mississippi, Alabama, Oklahoma, Arkansas, Tennessee, North Carolina, South Carolina, Georgia, and Florida. The user zooms in on the new area.
29. While in the zoomed display, the user requests a 12 hour browse animation of the data, ending with the current time.
30. The user then requests that the NOAA radar network data for the corresponding times and for his chosen area (as close to the times as possible) be displayed in a window next to the LIS Single Event data.
31. The user then selects both of the windows and steps forward (both the radar data and the LIS data displays advance to the next image in the loop).
32. While still in the zoomed display, the user then requests coincident (as closely coincident as possible) data from the NLDN be displayed in a third window, such that the user can see all three displays side-by-side.
33. While still in the zoomed display, the user views a 12-hour browse animation of these three data sets in continuous forward mode. All three data set displays advance simultaneously (or as close to simultaneously as possible).
34. While still in the zoomed display, the user views a 12-hour movie loop of these three data sets in step forward mode. All three data set displays advance simultaneously (or as close to simultaneously as possible). The user does this to narrow the temporal coverage of his order.
35. While still in the zoomed display, the user requests that the user receive all three data sets for the area and specifies the temporal range the user would like as: t - 8 hrs < t < t + 12 hrs, where t is the time of the most recent data in each set. NOTE: This will cause an "immediate" order for data already available (the previous 3 hrs), as well as a "standing" order for the next 3 hrs of data as it becomes available. Occasionally, the user will not need all three data sets, so before ordering, the user will have to "de-select" the undesired data sets. Then the user logs off.

Figure 10-3. Daily Access of Lightning Data Scenario (3 of 3)

Grassland Scenario (4/27/94)(revised Oct. 18,1994)

Scenario #3 - Don Strebel

Overview: A Graduate student wishes to test ecological theory regarding vegetation competition in grasslands across the central United States. The student wants to know where he can find data to test the theory - he needs ways of identifying and getting data, but will use his own tools to do the analysis. After doing a literature search, the student finds the ECS 1-800 number to call, in a publication.

1. Graduate student calls ECS and asks for all the data available on grasslands in the U.S. from 1901 to the present. Consultant conducts a query on this data.
   Over 2000 hits are returned. Consultant informs student of large number of hits and helps guide student by asking the student what kind of comparison he wants to make.
2. The student replies, "I'm looking for a time series of consistent data that captures all of the grasslands in the U.S." Consultant conducts a query with this information.
   1572 hits are returned. Consultant informs student of large number of hits and asks student what type of specific information he requires about the grasslands.
3. The student replies, "I am interested in precipitation, LAI and Regional Global Change Susceptibility Index data from 1901 to present for a minimum 5 year period, for purposes of development and prediction." Consultant conducts this refined query.
   123 hits are returned.
4. Consultant notices that most returned hits are contained in a data set entitled "Integrated Grassland Data for Central U.S." and asks the student if he would like more information. The student replies that he would like more information on the "Integrated Grassland Data for Central U.S." Consultant conducts query on this data set. Consultant receives GUIDE information for data set on screen. Consultant reads the price and description of the data set to the student and asks the student if he would be interested in receiving a detailed description of the data set and contents, along with the previous hit list and an order form. The student replies that he would like this information. Consultant takes student's name and address and prints hard copy of session and mails this to the student.
5. The student receives hard copy and order form within one week.
6. The student mails in an order for the "Integrated Grassland Data for Central U.S." data set. Consultant places an order (10GB in volume).
   Consultant sends the 10GB of data (on optical disc) to the student within one week.
7. The student replies that he would like more information on the “Integrated Grassland Data for Central U.S.” Consultant conducts query on this data set.
8. Consultant reads the price and option of the data set and asks the student if he would be interested in receiving a detailed description of the data set and contents, along with the previous hit list and an order form.
9. The student replies that he would like this information. Consultant takes student’s name and address and prints hard copy of session and mails to student.
10. The student receives hard copy and order form within one week.
11. User mails in order for the “Integrated Grassland Data for Central U.S.” data set. Consultant places order (10 GB).
12. Consultant sends 10 GB optical disc set to student within one week.

Figure 10-4. Grasslands Scenario

Relevant sections of the Daily Access of Lightning Data Scenario (Figure 10-3) are referenced to test and demonstrate the aforementioned functionality. It should also be noted that portions of this scenario were modified by the acceptance test team to completely verify the relevant requirements. The Demonstration method is used to verify that ECS provides the capability for the user to search the guide in order to locate descriptions at the parameter level that are related to his research. To locate this information, the user specifies a keyword of "LIS" (Note that the data used in these tests may be from the Optical Transient Detector (OTD), a precursor instrument that is expected to fly in 1995. This data may be substituted for the LIS) and "Continental Unites States and coastal areas" as the search criteria. While executing this test, the Demonstration method is used to verify that ECS provides a “friendly interactive interface” that provides on-line support for the experienced user (i.e. quick command driven information input).

After the user has identified the description of the products, the Demonstration method is then used to verify that ECS provides the capability to search for metadata which provides a cross reference that relates the science data to the calibration data, the navigation data, the instrument engineering data, and to the algorithms used to generate the product. While executing this series of time intensive searches, the Demonstration method is used to verify that ECS provides the user with informational messages that indicates that a query is being executed. During a time-intensive query, the Demonstration method is also be used to verify that the user has the capability to abort any time-intensive operation.

The expected results of this test are a series of events: the ECS client launched several windows which included descriptive information from the inventory describing the data sets of interest, on line support, the metadata for the algorithm packages used to generate the product of interest, and QA statistics which provides information about product validation. During this test, the ECS client should also display informational messages which provides the option for the user to abort any of the time-intensive operations.

10.1.2.3 Test Case A100120.030-Data Browse

The Data Browse Test verifies that ECS provides the capability to perform geographic and geophysical overlays to aid in the selection of spatial data and to enhance the display of metadata. This test also verifies that the ECS provides the capability to query geographic metadata by the following criteria: geographic reference, data element content, minimum bounding rectangle, point and radius, polygon, and/or geographic name. Using the "Daily Access of Lightning Data" Scenario (Figure 10-3) as reference, the user must specify the "LIS" and "Continental United States and coastal areas" as search criteria and then query the guide for Event Data (param. #4363, prod. #LIS02, Level 1B), Observation Time (param. #4365 prod. #LIS02, Level 1B), and Single Events (param. #4368, prod. #LIS02, Level 1B), and Single Events (browse) (param. #4372, prod. #LIS02, Level 1B).

The Demonstration method will verify that the user can produce a contour plot of the Single Event Data, overlay the contours on a map of the continental U.S., and send it to screen for inspection. While executing this test, the Acceptance Test Team modifies the scenario to demonstrate the capability for ECS to display geographic metadata. Using contour plots that were returned from the previous execution, the user draws a polygon that encloses the closely-spaced contours in

Florida. The user then request that the system "zooms in" on the enclosed area. While in this "zoomed" display, the Demonstration method will then be used to verify that the user is capable of browsing 12 hours preceding the current map by viewing it as a "movie loop".

The system responds by displaying contour plots of the Single Event Data (using chosen algorithms), an overlay of the contours on the map of the continental U.S. which illustrates that areas of heavy activity are in central and southern Florida and southern Arizona. This display produces the actual full-resolution Single Events overlaid on top of the "zoomed" map of the enclosed area of Florida. These series of events are all used to verify the browse capabilities of ECS.

10.1.2.4 Test Case A100120.040–Data Product History

The Data Product History test verifies that ECS provides the capability to search a product's processing history and make the information available to the user. Using step 18 of the "Daily Access of Lightning Data" (Figure 10-3), the Demonstration method verifies that the user can request the product history of the data used to produce the contour plots.

Using "NLDN", "OTD", "lightning", and the "U.S." as search criteria, the user queries the lightning data from the National Lightning Detection Network (NLDN), and Optical Transient Detector (OTD–a LIS instrument prototype development at MSFC) OTD database.

The system then responds with a message stating that there was a problem with the "Single Events" generation.

10.1.2.5 Test Case A100120.050–One-Time Orders

The One Time Orders test verifies that ECS can accept and validate from its users requests for ECS archiving data products. This test also verifies that ECS has the capability to generate and update request for one-time orders from the data archive to distribute archive holdings. The "Daily Access of Lightning Data" (Figure 10-3) was used to demonstrate this functionality. The Test method verifies that while the user is visualizing the various contour plots as a movie loop, that the user can order NLDN and OTD data for a given time span (see Figure 10-3). This query will cause an immediate order for data already available.

Scenario #15 did not specify how the data and its parameters were going to be delivered, so the Acceptance Test Team modified the scenario to demonstrate that this data could be received via ftp. To order the data and its parameters, the user specifies that he wishes to receive NLDN and OTD data for a the time span given in the scenario.

The system responds by sending lightning data and its parameters via ftp, and notifies the user via e-mail that the data was successfully transferred.

10.1.2.6 Test Case A100120.060–Standing Orders

The Standing Orders test verifies that ECS has the capability to generate and update request for standing orders for the data archive to distribute archive holdings that include Standard Products, Standard Product software, EOC historical data, spacecraft housekeeping and ancillary data, and engineering data. The "Daily Access of Lightning Data" (Figure 10-3) written by Dr. Raul Lopez and collected by Lori Tyahla of the Science Office demonstrates this functionality.

Table 10-1. V0 Data Planned for Migration During the TRMM Release

DAAC	Data Set	SDP reference
GSFC	TOMS-nimbus 7	G-26
GSFC	CZCS level 1	G-11
GSFC	AVHRR Pathfinder	G-1,G-2,G-3,G-4
LaRC	ERBE (S-4,S-4G,S-4GN, S-8,S-9,S10N)	L-1,L-3,L-4,L-7,L-5,L-8,L-11,L-14
LaRC	ISCCP D-x, D-1,D-2	L-48,L-49,L-50
LaRC	SAGE II level 2&3	L-33,L-34,L-35,L-36,L-37,L-38
MSFC	SSM/I Pathfinder	M-13,M-14,M-15,M-48
MSFC	TOVS Pathfinder	M-56,M-57,M-58,M-59,M-60, M-61
MSFC	SMMR Pathfinder	M-63

While viewing the movie loop of the enclosed area of Florida, the Demonstration method verifies that the user can order an additional eight hours of data. This test also verifies that ECS can display or transfer data based on the request of the user. In this instance, the user specifies that the data must be displayed as a contour plot once it is received by the workstation. To display the contour plots, the user must specify the region of Arizona that is of interest and the required time span.

The system responds by displaying the actual full-resolution Single Events (by plotting a "°" or a "+" for each event at the latitude/longitude at which it was detected) overlaid on top of a zoomed map of the enclosed area of Arizona.

10.1.2.7 Test Case A100120.070–Reprocessing

The Reprocessing Test verifies that ECS is capable of notifying the user community when data has been reprocessed. Reprocessing is driven by a reprocessing request which can be generated in the event of the availability of improved input data, new/improved calibration data, and/or algorithm updates. Products that are resubmitted due to a failure of any kind during processing are considered to be apart of standard processing, not reprocessing.

The Daily Access to Lightning Data Scenario was modified by the Acceptance Test Team to test the requirement that relates to reprocessing. The Demonstration method verifies that ECS notifies the user if the data has been reprocessed. To verify this requirement, the algorithms used to generate the contour plots were modified to improve the resolution. After the algorithms were modified, the data used to generate the contour plots was reprocessed to generate improved single events data.

To view the contour plots that uses the reprocessed single events data, the user requests to receive this data and have it displayed on his/her workstation. The system responds by displaying the contour plots on the user's workstation with a system message stating that single events data was reprocessed.

10.1.2.8 Test Case A100120.080–Distribution Medium

The Distribution Medium test verifies requirements that demonstrate the capability for ECS to distribute data on-line or off-line. The Demonstration method verifies that each archive has the capability to distribute a variety of approved high level density storage media such as 8-mm tape, 4-mm DAT, 3480/3490 tape, CD ROM, and 6250 tape. The "Grassland Scenario" (Scenario #3) that was written by Dan Stroebel from the ECS Science Office demonstrates this functionality. This scenario demonstrates that the user can order 10 GB of "Integrated Grassland Data for Central U.S." data set on CD ROM. Prior to ordering the Integrated Grassland Data, the Demonstration method is also used to verify that the user can receive a hard copy which consist of a detailed description for the data set and its contents via mail. This test also verifies that ECS has the capability to distribute information on-line (i.e. over a network). Instead of the user receiving the detailed description for the data set and its contents via mail, the scenario was modified by the Acceptance Test Team to verify that ECS is capable of sending information over the network via ftp.

To acquire the Integrated Grassland Data, the user specifies simulated precipitation data, LAI and Regional Change Susceptibility Index data and a data set entitled "Integrated Grassland Data for Central U.S." as the search criteria.

ECS responds with the most hits on the "Integrated Grassland Data For U.S." data. After conferring with the student, the user decides to order 10 GB of "Integrated Grassland Data" data on CD ROM, a hard copy and soft copy of inventory and guide information for the "Integrated Grassland Data For U.S." data set, via mail and via ftp, respectively.

10.1.2.9 Test Case A100120.090–Application Programming Interfaces

The Application Programming Interfaces Test verifies that ECS provides configuration-controlled application programming interfaces (API's) that are capable of supporting development of extensions to the ECS Client and the data archive system by the DAACs.

Since the DAACs will have just received the software, it is not expected that any of the API's will have been used, and no actual DAAC extensions will therefore be in place. Instead, the Acceptance Test Team uses the Inspection method to prove that the API's are part of the Release and are usable to build the following user interface extensions: a) Addition of metadata fields that are unique to the DAAC; b) Addition of documents for use as guide metadata; c) Support of data visualization utilities; d) Support of DAAC-specific data analysis utilities; e) Development of DAAC-unique metadata searching and services; f) Development of a local user interface. For the data archive system these API are usable to develop DAAC unique data distribution services and a custom operator interface.

The expected results of this test are that the software is present at each DAAC in the correct directories, along with all appropriate read software and manuals giving directions on how to use the software.

10.1.2.10 Test Case A10120.100 ECS Client Operations

The ECS Client Operations Test verifies requirements that relate to data base administration, data base maintenance, communication services, ECS resources history, and ECS operations summaries for the ECS client.

The Demonstration method verifies that ECS provides data base administration utilities for modifying the data base schema, performance monitoring, administration of user access control, on-line incremental backup, on-line recovery, and export/import of data. The Demonstration method also verifies that ECS provides the capability to restructure the database and interrupt a maintenance session and restart the session without loss of information.

The Demonstration method verifies that ECS provides its users with the following communication services: file transfer, multimedia mail, and electronic bulletin board. To test this functionality, the ECS operator performs a series of commands. These include transferring files to the user, and utilizing the electronic mailing system The expected results for this test are successful manipulation of all the listed communication services.

The Test method verifies that ECS client at a DAAC provides the SMC with a full and complete history of all ECS resources used by science investigators, which includes CPU utilization, amount of user storage, connect time, and session histories. Using the information recorded by the system from previous tests as input, the SMC may request a history of all ECS resources used by science investigators. The system responds by notifying the SMC via electronic mail that the information was sent successfully. This information is distributed to the SMC on-line (i.e. over the network) using the file transfer protocol (ftp). While executing this test, the Demonstration method is also used to determine the capability for ECS to distribute reports on a periodic basis to a pre-defined list of report recipients on-line, and off-line either by paper or electronic media. These reports include: backlog of data distribution request, processing request, data quality assessment, and ECS performance summaries.

10.1.3 ECS/Version 0 (V0) System Interoperability Sequence

This sequence demonstrates that the ECS and the V0 systems (via the V0 system level Information Management System (IMS)) work together to provide correct exchange of data and information between the V0 and ECS. The interoperability between ECS and the V0 system is exercised to show that either system can interact with the other system's information server, making the ECS data holdings accessible for viewing and ordering by the V0 user. Moreover this sequence demonstrates that V0 data holdings are also accessible for viewing and ordering by the ECS user.

Before a user accesses the data archived in the ECS or V0, the user must be authorized to receive the specified data. The ECS user identifies data of interest that is archived in the V0 system using the ECS Advertising Service (EAS). The EAS provides search and order services for accessing V0 data holdings. V0 products are delivered directly to the ECS user on physical media or electronically per the user's request.

The V0 user identifies data of interest that is archived in the ECS, using the V0 IMS client, which provides search and order services for accessing ECS data holdings. ECS products are delivered directly to the V0 user on physical media or electronically, per the user's request

10.1.3.1 Test Case A100130.010–Version 0 Data Storage in ECS

The Version 0 Data Storage in ECS test verifies requirements related to ECS providing storage for Version 0 data. This test uses the demonstration method to show that V0 data is on-line and by analysis, demonstrates that the necessary archive storage space is available for all V0 data to be

migrated into ECS during the TRMM Release time period. The System Design Specification(s), as built documentation and vendor hardware specifications for archive devices are used as the basis for determining the archive capacity at each site.

This information is then compared to the data sets selected for migration for the TRMM Release as shown in the table below. The documentation should demonstrate that ECS has sufficient archive capacity in tera-bytes (TB) to store all V0 data and associated documentation, algorithms, etc.

10.1.3.2 Test Case A100130.020–ECS User Access to Version 0

The ECS User Access to Version 0 test verifies that ECS provides an Advertising Service interface that allows V0 to identify the data holdings at each DAAC. The Test method is used to verify that by using the ECS Advertising Service, the ECS user can search and identify Version 0 data of interest.

Through the use of a series of queries generated for guide, inventory and browse, this test case verifies that when an ECS user requests information that is held in Version 0, ECS determines which V0 DAAC system holds this data and passes the request to the appropriate DAAC IMS Server. The queries (guide search request, browse request, inventory search request) should be passed from ECS to the DAAC IMS Server. Finally, the results of the query should be passed from the V0 DAAC(s) to ECS. All query results should be the same as query results generated from the V0 IMS (this verifies proper translation of the ECS query to V0 protocols).

The requirements verified in this test case support the functionality described in the "Version 0 EOSDIS Information Management System Users Manual", July 1994, science scenarios #1 (Inventory and Guide Searches) and #5 (Inventory and Browse Searches).

10.1.3.3 Test Case A100130.030–ECS and V0 Search and Order

The ECS and V0 Search and Order test uses the Test method to verify that a user logged on to the ECS Client can construct and execute a query that searches the holdings of both ECS and V0 DAAC's and returns the correct list of guide data. It also tests to verify that a single query can be constructed that does the same for inventory data. In addition, it is verified that V0 held browse data can be accessed and displayed on the ECS client. In this test the user generates the queries for guide, inventory and browse requests from the ECS client.

The Test method is used to verify that an ECS user may request a product from the V0 archives. The request is passed by the ECS to the ESDIS IMS Server via V0 protocols. The test case verifies that the V0 DAAC sends the product directly to the authorized user either on physical media or electronically per the user's request.

For queries going to the V0 system, all query results should be the same as query results generated from the V0 IMS (this again verifies proper translation of the ECS query to V0 protocols). For queries sent to ECS DAAC(s), query results are compared to a list of datasets (along with associated guide and browse data, documentation and algorithms), to verify that queries returned the correct results for each ECS DAAC. All product requests should be verified as being distributed (network and tape) to the user account used for the test.

10.1.3.4 Test Case A100130.040–Version 0 User Access to ECS

The Version 0 User Access to ECS test verifies that a user logged on to the Version 0 IMS can query for and access data in ECS. (NOTE: The ESDIS V0 IMS Client maintains information regarding the data holdings of each DAAC. Each DAAC reports this information through Dependent Valids information. This is currently a manual interface. ECS will also report its holdings to Version 0 using the same method.). This test uses the Demonstration and Test methods to verify that when a V0 user wants to request information using the ESDIS V0 IMS Client, the ESDIS V0 IMS Client is able to send the query to the applicable ECS DAAC(s) and receive and display the response.

During the test a series of queries are entered from the V0 IMS client that are sent to the applicable ECS DAAC(s), with at least several queries going to MSFC, GSFC and LaRC. These queries will include requests for inventory (Inventory requests for: At GSFC, TOMS-nimbus 7, CZCS level 1, and AVHRR Pathfinder; At LaRC, ERBE (S-4,S-4G,S-4GN,S-8,S-9,S10N), ISCCP D-x, D-1,D 2, and SAGE II level 2&3; At MSFC, SSM/I Pathfinder, TOVS Pathfinder, and SMMR Pathfinder), guide and browse data.

The user authentication should be sent by V0 and received by ECS. ECS (each DAAC) should receive the applicable queries for inventory, guide and browse data and return the appropriate data to the V0 IMS client for display.

10.1.3.5 Test Case A100130.050–V0 and ECS Search and Order

The V0 and ECS Search and Order test verifies that a user logged on to the V0 IMS can construct and execute a query that searches the holdings of both V0 and ECS DAACs and returns the correct list of guide data, and a query that does the same for inventory data. In addition, it is verified that ECS held browse data can be accessed and displayed on the V0 IMS.

This test also uses the Demonstration and Test methods to verify that once a V0 user identifies data of interest in ECS, products may be requested from ECS. The request is passed by the ESDIS V0 IMS Client to ECS using V0 standards and protocols. This test verifies that ECS sends the data directly to the user either on physical media or electronically per the user's request. It is also verified that upon user request, the ESDIS V0 IMS Client may request and receive product delivery status from the ECS.

During the test, a series of user generated queries for inventory, guide and browse data that cause a search of both ECS and V0 DAAC's. These queries are constructed in such a way as to cause the queries to go to each ECS DAAC (GSFC, LaRC and MSFC). The queries are for data migrated to ECS (At GSFC, TOMS-nimbus 7, CZCS level 1, and AVHRR Pathfinder; At LaRC, ERBE (S 4,S-4G,S-4GN,S-8,S-9,S10N), ISCCP D-x, D-1,D-2, and SAGE II level 2&3; At MSFC, SSM/I Pathfinder, TOVS Pathfinder, and SMMR Pathfinder). The user then reviews the results of these queries and orders data from the LaRC, GSFC, and MSFC ECS DAAC's.

As a result of the queries described above, the user authentication should be sent by ECS and received by V0. All ECS and V0 DAAC's should receive the applicable queries for inventory, guide and browse data and return the appropriate data to the V0 IMS client for display. Each order for data from the MSFC, GSFC and LaRC ECS DAAC's should be filled correctly. Orders will

include: At GSFC, TOMS-nimbus 7, CZCS level 1, and AVHRR Pathfinder; At LaRC, ERBE (S 4,S-4G,S-4GN,S-8,S-9,S10N), ISCCP D-x, D-1,D-2, and SAGE II level 2&3; At MSFC, SSM/I Pathfinder, TOVS Pathfinder, and SMMR Pathfinder.

10.1.4 EOSDIS Core System (ECS)/Affiliated Data Center (ADC) Interoperability Sequence

The ECS/ADC sequence confirms that an ECS science user can access, search, and view pertinent NOAA data holdings. The sequence assures that the NOAA ADC works in coordination with ECS to allow the ECS user to establish NOAA data holdings communication access, search, and view per ICD specifications . The sequence also demonstrates that the ECS operations staff efficiently transmits data to authorized requesters.

The sequence confirms that communication between the ECS and the NOAA ADC is supported by the NSI and/or ESN, as required by the user specifications for data to support ECS data production, or for data in response to queries and searches.

The process of searching and viewing the data holding of the sequence guides the science user through the steps required for submitting a user authentication request. Once access privileges are granted, the user continues to generate queries to search inventory, directory and guide metadata, and to browse particular products.

Accessing data holdings of the NOAA ADC tests the ECS user ordering of data products, algorithm packages, and documents; initiating of standing orders; and requesting status for previous orders.

10.1.4.1 Test Case A100140.010–ECS User Access NOAA ADC

The ECS User Access NOAA ADC test verifies that a system advertising service for the NOAA ADC is available to the ECS user and that the user has access to the services. The Demonstration, Test and Analysis methods are used to verify authorization, guide, browse, and search requirements.

When the user logs onto the system, the system verifies the ECS user's level of security after specific parameters for services is entered. Once the level of security is established, the test case verifies the ECS User can access the NOAA ADC from the ECS client.

This test case verifies that the ECS user's request for information is sent successfully to the NOAA ADC and that the requested information is received by the ECS user from the NOAA ADC. The user's requests take the form of guide, inventory and/or browse requests. The user should receive a displayed list for each query under the parameter established by the user when requesting the information.

In addition, the user may query the system for a product availability list or the user may request the availability of a specific product. Once the user receives the product availability list the user can request a cost estimate for the product. The user should receive the product availability list on screen or just the single specific request. The system Advertising service also makes a cost estimate available to the users. The screen should display the cost estimate for the product or products upon request.

10.1.4.2 Test Case A100140.020–ECS User Request NOAA ADC Product

The ECS User Request NOAA ADC Product test verifies that the ECS user's request for NOAA ADC products is sent to the NOAA ADC. The Demonstration, Test and Analysis methods are used to verify product request requirements. The test case verifies that the ECS user receives the requested products, including products requested as ancillary data followed by the data availability schedule and the data availability notification. The following products are accessible to the ECS user: L0-L4 equivalent data sets, calibration data, documents, algorithms, correlative data, and ancillary data.

The user executes guide queries to determine what the composition of the products. The guide query provides the user with a detailed description of a number of data sets and related entities. Once the user decides on the product, the user can order the information.

The system should send an acknowledgment of the product request. The user is notified of the data arrival via a notice received in the user's message box.

10.1.4.3 Test Case A100140.030–Product Status Request

The Product Status Request test verifies the user's ability to request product delivery status after the product has been requested. The Demonstration, Test, and Analysis methods are used to verify the ECS user's product delivery status request requirements. This test case verifies that the product delivery status request is sent to the NOAA ADC and that product delivery status is received by the ECS user.

Once a product has been ordered, the user may inquire on the status of the product on-line. The user should receive the status of the requested product on line. The status message notifies the user of the products status.

10.1.4.4 Test Case A100140.040–ECS User Search

The ECS User Search test verifies that an ECS user's can construct and execute queries that search both the ECS and the NOAA ADC archives. The Demonstration, Test, and Analysis methods are used to verify that the queries are sent and the ECS user receives the correct data from the NOAA ADC and ECS archives. The data is displayed on screen and the user may browse the data.

The ECS user queries the system for a product that will search both the ECS archives and the NOAA ADC archives. The user should receive the requested data on-line.

10.2 Science Computing Facility (SCF) User Scenario

The SCF User Scenario demonstrates to an SCF user that the EOS investigators are provided access to the ECS toolkits of the Science Computing Facilities collocated at the Marshall Space Flight Center (MSFC), and Langley Research Center (LaRC), to perform the following activities: develop and maintain standard data production software; perform quality assurance (QA) of standard products; administer and manage local data bases for each site; request production status and history files; request resource usage updates; and update calibration coefficients.

The science investigator is assured of the ECS DAAC's ability to develop and transmit to the SCF electronically, science data production software for use by the ECS, as contents of an initial Toolkit Delivery Package containing the Science Data Production tools that are necessary to begin development. The process for completed development package delivery to the DAAC and integration and test procedures for these packages is also confirmed.

QA at a SCF is demonstrated and evaluated, including, QA initial activities when an apparent data problem is detected an reported via a Data Quality Request Notification to a SCF, steps taken to assure investigator confirmation of the problem, transfer of the presumed erroneous data product from its DAAC archive location to the SCF, and QA access to ancillary data such as history files, to facilitate the QA investigations.

The product history file standard format is analyzed to assure inclusion of specific file components including, the algorithms used in development, the science investigators that developed the software, input databases used, and any atypical input options that might have been used in running the software.

Procedures are reviewed to assure that activities are identified for receiving data into the SCF, as well as assuring that the products that are developed and distributed at the SCF are managed by the DAAC's configuration management Site Software Manager.

SCF ability to update calibration coefficient procedures are confirmed including, procedures for science investigator requests for, and receipt of, coefficient files from the DAAC, as well as confirmation that updates are returned electronically to the DAAC as part of the Science Production Software Delivery Package.

10.2.1 MSFC SCF/ECS Sequence

The MSFC SCF/ECS sequence verifies that the ECS is accessible to a user at the MSFC SCF. Resource configurations may vary from SCF to SCF and not all SCF's are required to support all interfaces. The interfaces that a given SCF needs to support will depend on its charter, e.g., data production, software development, calibration coefficient analysis and update. The interfaces are standardized for each SCF function independent of the SCF's resource configuration. The MSFC SCF is concerned with the same data that is processed by the MSFC DAAC. LIS data is the type of data processed, archived, and distributed by the MSFC DAAC.

10.2.1.1 Test Case A100210.010–Algorithm Integration and Test

The Algorithm Integration and Test test verifies the following using the Demonstration method: A user at the MSFC SCF can check-out and receive algorithms; search and receive standard L0-L4 data with corresponding metadata, ancillary data, calibration data and correlative data for use in developing and testing algorithms; and interface with ECS AI&T personnel for support in developing and testing algorithms (this will be provided by the use of E-mail and phone contacts to ECS AI&T personnel for algorithm development and test support). A user at the MSFC SCF can use EOSView to help analyze algorithm test products, calibrate data, verify parameters and detect anomalies.

10.2.1.2 Test Case A100210.020–Product QA

The Product QA test verifies that a member of the MSFC DAAC staff using the ECS system, can view a list of products requiring QA by the SCF's. Using the Demonstration method, it is shown that a user at the MSFC SCF can request and receive a product and its associated metadata from the ECS for QA, use EOSView to help QA products, interface with ECS QA personnel for product QA support (this will be provided by the use of E-mail and phone contacts), send QA reports to the ECS with the following minimum information (identification of product, QA results, and product storage and processing information). The ECS should also be able to append the quality reports to the associated archived data products. The Product Quality staff should then be able to view the QA report after it is sent to the ECS.

10.2.1.3 Test Case A100210.030–Data Search, Browse, Request and Receive

The Data Search, Browse, Request and Receive test verifies that a user at the MSFC SCF can search the ECS for L1-L4 products and use the Browse service to view these products. For this test, the focus is on the ability of the SCF user to access data related to pre-launch checkout of the LIS instrument. Using the Demonstration method, it is shown that a user at the MSFC SCF can request and receive L1-L4 products, browse data, documents, accounting information, unstructured text, binary unstructured data, binary sequential data and sequential text. The user at the MSFC SCF should be able to interface with ECS personnel for support in generating new search services (this will be provided by the use of E-mail and phone contacts to ECS personnel) that dynamically browse the data and metadata. The ECS can make these new search services available to all users.

10.2.1.4 Test Case A100210.040–Data Management Services

The Data Management Services test verifies that a user at the MSFC SCF can use the Virtual IMS Information Management Software to import the local SCF data base using an ECS supported DBMS (provided by the SCF) into the ECS. Using the test method, a user at the MSFC SCF can use the Virtual IMS Information Management Software to: manage the metadata of; search, add, update, delete, and retrieve information interactively or by batch from; modify the schema of; monitor the performance of; control user access to; backup, and recover the local SCF data base. A user at the MSFC SCF can use the Virtual IMS Information Management Software to: modify the structure of; and electronically load the structure and content of the data base. A user at the MSFC SCF can use the Virtual IMS Information Management Software to select data for retrieval by boolean operators, relational operators, attribute values, and a combination thereof from the data base. This test also demonstrates that a user at the MSFC SCF can use the Virtual IMS software to simulate an on-line training session.

10.2.2 LaRC SCF/ECS Sequence

The LaRC SCF/ECS sequence verifies that the ECS is accessible by a user at the LaRC SCF. CERES data and products are the responsibility of the LaRC DAAC. Resource configurations may vary from SCF to SCF and that not all SCF's are required to support all interfaces. The interfaces that a given SCF needs to support will depend on its charter, e.g., data production software development, calibration coefficient analysis and update. The interfaces are standardized for each SCF function independent of the SCF's resource configuration.

10.2.2.1 Test Case A100220.010–Algorithm Integration and Test

The Algorithm Integration and Test test verifies the following by the Demonstration method; A user at the LaRC SCF can check-out and receive algorithm's; search and receive standard LIS L0-L4 data with corresponding metadata, ancillary data, calibration data and correlative data for use in developing and testing algorithms; and interface with ECS AI&T personnel for support in developing and testing algorithms (this will be provided by the use of E-mail and phone contacts to ECS AI&T personnel for algorithm development and test support). A user at the LaRC SCF can use EOSView to help analyze algorithm test products, calibrate data, verify parameters and detect anomalies.

10.2.2.2 Test Case A100220.020–Product QA

The Product QA test verifies that a member of the LaRC DAAC PGS staff can view a list of products requiring QA by the SCF's. By the Demonstration method it is shown that a user at the LaRC SCF can request and receive a product and its' associated metadata from the ECS for QA, use EOSView to help QA products, interface with ECS QA personnel for product QA support (this will be provided by the use of E-mail and phone contacts), send QA reports to the ECS with the following minimum information (identification of product, QA results, and product storage and processing information). The ECS can append the quality reports to the associated archived data products. The Product Quality staff is able to view the QA report after it is sent to the ECS.

E-mail and phone contact to ECS QA personnel for product QA support.

10.2.2.3 Test Case A100220.030–Data Search, Browse, Request and Receive

The Data Search, Browse Request and Receive test verifies that a user at the LaRC SCF can search the ECS for L1-L4 products and use the Browse service to view these products. For this test, the focus is on the ability of the SCF user to access data related to pre-launch checkout of the CERES instrument. By Demonstration it is shown that a user at the LaRC SCF can request and receive L1-L4 products, browse data, documents, accounting information, unstructured text, binary unstructured data, binary sequential data and sequential text. A user at the LaRC SCF can interface with ECS personnel for support in generating new search services that dynamically browse the data and metadata. The ECS can make these new search services available to all users.

10.2.2.4 Test Case A100220.040- Data Management Services

The Data Management Services test verifies that a user at the LaRC SCF can use the Virtual IMS Information Management Software to import the local SCF data base using an ECS supported DBMS (provided by the SCF) into the ECS. By Demonstration it is shown that a user at the LaRC SCF can use the Virtual IMS Information Management Software to: manage the metadata of; search, add, update, delete, and retrieve information interactively or by batch from; modify the schema of; monitor the performance of; control user access to; backup, and recover the local SCF data base. A user at the LaRC SCF can use the Virtual IMS Information Management Software to: modify the structure of; and electronically load the structure and content of the data base. A user at the LaRC SCF can use the Virtual IMS Information Management Software to select data for retrieval by boolean operators, relational operators, attribute values, and a combination thereof from the data base. This test also demonstrates that a user at the MSFC SCF can use the Virtual IMS software to simulate an on-line training session.

11. Flight Operations Scenario Group

Flight Operations Segment (FOS) capabilities in the TRMM Release are primarily provided to support: EOS Operations Center (EOC) activation including training and development of operational procedures; testing of EOC related interfaces (EDOS/ECOM, FDF and NCC); and integration of the EOS AM-1 Spacecraft at the contractor's facility.

In order to accomplish this the following FOS capabilities are being provided in the TRMM Release: (1) Basic mission planning for command and control of the AM-1 spacecraft and its complement of instruments; (2) Basic health and safety monitoring via telemetry and engineering analysis; and (3) Initial capability and connectivity for Instrument Support Terminals (ISTs).

Although the TRMM Release provides significant functionality, it is not intended to support either launch or routine on-orbit operations. This fact complicates the selection of scenarios to be utilized in Acceptance Testing of the FOS. There are a significant number of well thought out and documented flight scenarios in the ECS Operations Concept Document (DID 604) and in the EOSDIS Flight Operations Segment Operations Concept Document prepared by GSFC. However, these primarily address the end state system (i.e. Release B, also known as the AM-1/Landsat Release)). They cannot be directly used here. Neither should they be discarded since in addition to the support drivers enumerated above, the TRMM release of FOS is also clearly being built to provide early confidence in all of the design concepts developed and to allow Flight Operations Team (FOT) visibility/feedback to insure that Release B will support the mission. On this basis, the TRMM Release scenarios will be excerpted from the all-up Release B scenarios.

In executing the Flight Operations Scenario Group it must be remembered that TRMM Release capabilities limit the fidelity of the exercise. Particularly significant will be the lack of the EDOS/ ECOM interfaces. Current planning requires the use of internally generated simulated data sets to represent these and other operational system interfaces.

This scenario group is comprised of the Pre-Contact, Contact, and Post-Contact scenarios (Figure 11-1).

The Pre-Contact Scenario tests FOS activities that proceed from a FOS system "lights out" state, through FOS initialization, followed by Pre-Contact Planning and MISR IST Planning sequences. The Pre-Contact Scenario culminates in the FOS system attaining a "lights on" operational state, ready for contacting a simulated on-orbit AM-1 spacecraft. The second scenario, the Contact Scenario, consists of verifying the systems capabilities for performing normal on-orbit real-time contacts with the simulated AM-1 spacecraft as well as confirming the systems capabilities for receiving real-time telemetry and for transmitting manual commands The final scenario, the Post-Contact Scenario, verifies FOS capabilities for updating continuous operations plans and for installing changes to baseline schedules based on information generated during the previous Contact Scenario. Whenever applicable, FOS demonstration procedures terminate by returning captured resources to the system, thus confirming the system capability for releasing system resources to promote efficient system operations. At the end of the Post-Contact Scenario, FOS capability for orderly return to a "lights out" state is demonstrated.

11.1 Pre-Contact Scenario

This scenario demonstrates the FOS capability for accomplishing actions that bring the system from an initial "lights-out" state to a "lights-on" state, ready for contact with a simulated AM-1 spacecraft.

The first sequence in the group confirms the ability to perform initial actions that bring the system from lights-out status to a state capable of supporting the execution of succeeding test sequences.

The next sequence is an initial scheduling exercise, whose purpose is to show how the TRMM Release capability can be used to provide the scheduling basis for the succeeding scenarios. Basically, this activity demonstrates how a scheduling position user enters basic data for initializing the spacecraft bus and the instrument complement in preparation for subsequent normal spacecraft contacts. The sequence requires the simultaneous use of several user terminals simulating actions done by both the FOT and the Instrument teams. The command manager will, near the end of the sequence, merge the information for the bus and the instruments into a single, de-conflicted load to be sent during the contact. A ground script laying out the activities for the contact is established and activated. The Pre-Contact Planning Sequence demonstrates FOS ability to perform the set of functions that must be verified in the planning area, while the MISR IST Planning Sequence demonstrates FOS's ability to build a MISR table load from a simulated MISR IST input.

11.1.1 EOC Initialization Sequence

This sequence takes the EOC from a powered down state to a FOS ready to support the rest of activities in the acceptance test. This series of activities verifies that the system can be initialized and configured into a basic operating state. Because of the FOS strings concept resources are dedicated to activities dynamically within the EOC. The establishment of those strings will be demonstrated in the appropriate sequences and test cases later in this test. This sequence is only concerned with establishing the core configuration of capabilities that is always present in the EOC. This sequence consists of three test cases as shown in Figure 11-2.

11.1.1.1 Test Case A110110.010–EOC Startup

The test case begins with the powering up of the EOC hardware according to operational procedures. The data and real-time servers are booted and allowed to initialize. Particular attention will be paid to the initialization of which ever components support the time server function. To prove that consistent time keeping is maintained in the EOC, the time code generator will be initially set to a time a few minutes ahead of the current time in order to simulate drift of the built-in clocks of the computers that make up the FOS. The adjustment of the computer clocks will be monitored. The elapsed time to achieve synchronization will be recorded.

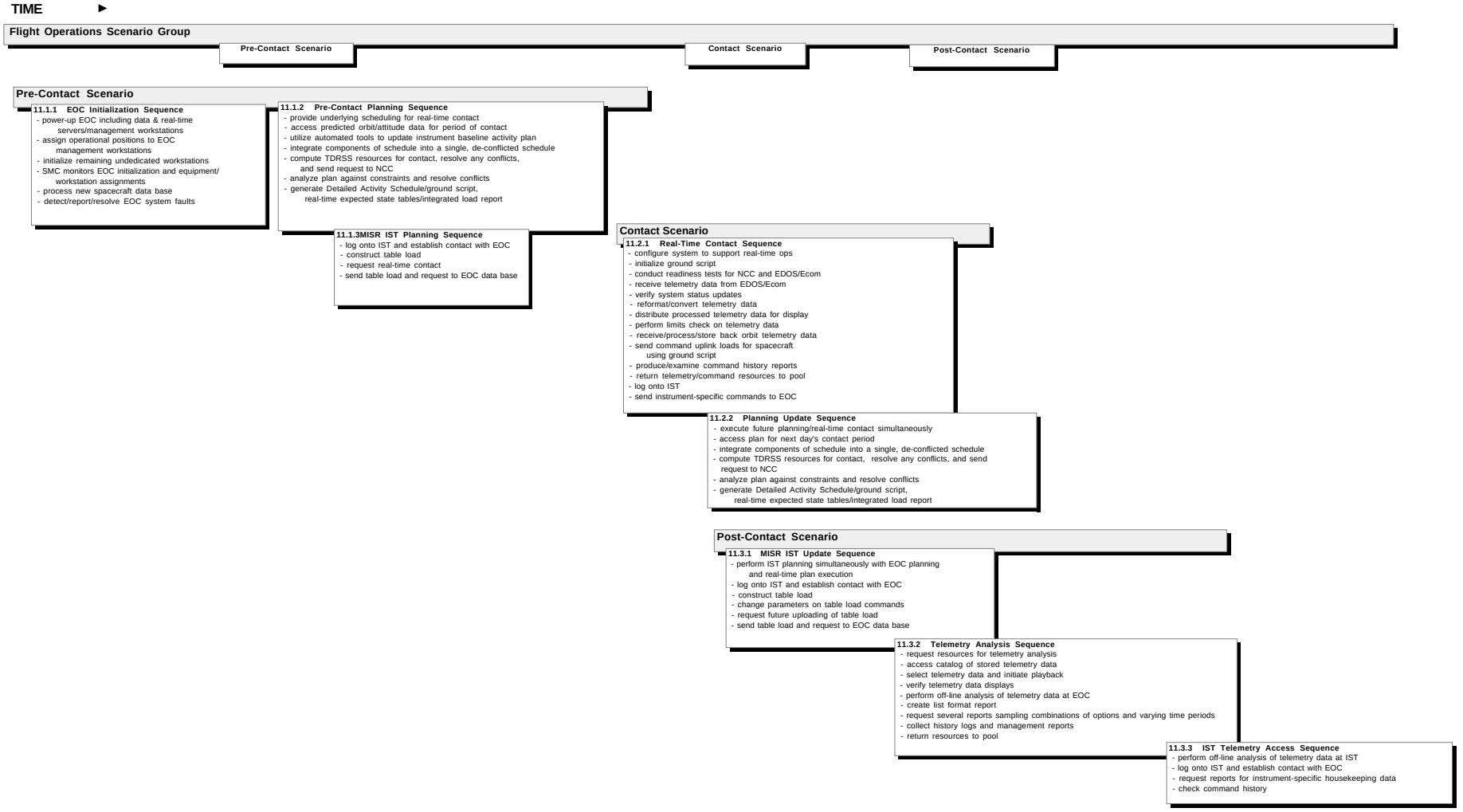

Figure 11-1. Flight Operations Scenario Group Acceptance Test Sequencing.

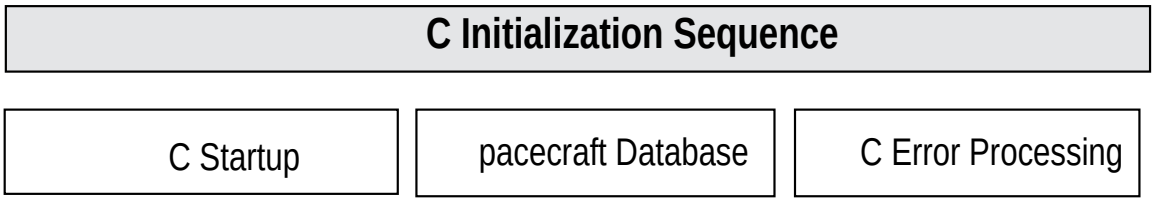

Figure 11-2. EOC Initialization Sequence

Next, the EOC management workstations will be brought up and allowed to enter the configuration. Operational positions will be assigned to the workstations through the logon process. During this portion of the test case a number of correct and incorrect logons will be attempted to evaluate the security processing. Additionally, attempts will be made to initialize conflicting configurations in order to verify the system will enforce system integrity. An example of an illegal configuration would be the initialization of two real-time user positions with each requesting commanding authority.

Finally, the remainder of the undedicated workstations will be initialized into their non-logged in states.

The TRMM Release capabilities of the System Management Center (SMC) will be utilized during this test case to verify that the state transitions of the equipment within the EOC are properly reported. Basically, SMC displays should show the EOC transitioning, step-by-step, to an operational condition. If the SMC capability is unavailable during the FOS testing period, this portion of the test case may be deferred to the TRMM Release all-up test, described in Section 12, "End-to-End Scenario Group."

11.1.1.2 Test Case A110110.020–Spacecraft Database

This test case demonstrates the ability of the EOC configuration software to process a new Spacecraft Database as supplied by the manufacturer. The information on this file describes all of the important characteristics of the AM-1 bus. Included are descriptions of the telemetry system including its format, content, limits, and engineering-units conversion configuration. The file also defines the commands that the spacecraft (S/C) will accept and the telemetry that verifies their successful execution.

This test case begins with login and activation of the appropriate tools on a workstation. Since this is a critical system function special attention is provided to the security procedures imposed on its execution. Before the new file is processed, the existing configuration is backed up using established procedures and tools.

Next, a specially modified S/C database file is selected for ingest into the system. This file is based on the latest S/C baseline available to the development organization at the time of the test. For purposes of the test, hand modifications are made to introduce a selection of known errors. As the ingest proceeds, the expected activity is for the errors to be detected and corrected by the operator. When the ingest is complete, listings are produced and saved.

Finally, the operator uses the update capabilities to make changes to each of the data types in the PDB such as , changing the engineering units coefficients and the limits. The resulting database is used for successive scenarios. The changes made during this test case are coordinated with the simulated telemetry data so that their effects can be easily verified during the Telemetry Processing Test Case.

11.1.1.3 Test Case A110110.030–EOC Error Processing

During this test case a number of EOC system faults are created to verify their correct detection, reporting and resolution utilizing automatic and manual features of the delivered software. During the execution of this test case the EOC is configured in various states (i.e. strings will be allocated in different configurations). A range of software, system and hardware errors are introduced. The scope of these errors is limited by safety considerations (e.g. induced hardware errors must not permanently harm the devices). Simulated software errors are accomplished by killing processes and removing hosts from tables. System errors include events such as storage media overflows and unavailable system services. Hardware errors include events such as network disconnections and simulated inadvertent computer or other equipment shutdowns.

Verification of correct error processing includes recording system responses on displays and in historical logs. Where processes are to be manually performed, availability of M&O documentation is verified by inspection.

11.1.1.4 Test Case A110110.040–FOS Growth Capacity

This test case confirms by inspection, demonstration and analysis that the EOC computer hardware can grow without redesign to twice the processing, storage, and communications capacities estimated for full system operation and that the EOC architecture is capable of growing to support additional spacecraft without major redesign.

As-built FOS system architecture specifications are compared with total system capacities (memory, I/O channel bandwidth, processor speed, communications bandwidth, and spare hardware/software, interfaces). These features are inspected, for the presence of additional capacity, which can be accessed without system modification. The requirements for additional growth capacity are analyzed. Where modification is required, the capacity for system growth without major design is assessed.

Computer hardware performance as-built specifications are inspected for confirmation that the as-delivered FOS hardware components are able to support twice the estimated fully loaded operational capacities on a continuous basis. Demonstration inputs include a simulated maximum-load benchmark. This benchmark is executed on the fully operational FOS configuration and hardware performance statistics are recorded. At the conclusion of the benchmark execution, performance output reports are inspected to confirm that no hardware component (including communication components) exceeds one-half of is rated performance capability during the execution.

The test output report consists of any issues or recommendations regarding the site implementation of these interfaces and databases.

11.1.2 Pre-Contact Planning Sequence

The Preplanning Sequence demonstrates use of the FOS capabilities necessary to provide the underlying scheduling for the Real-Time Contact Sequence that follows. In other words, it demonstrates the type of day-to-day scheduling that is necessary to perform routine health and safety maintenance of the AM spacecraft and its instruments. Overlaid on this basic requirement, this type of planning initializes the instruments for their scientific missions and collects the resultant data during TDRSS contacts. This sequence attempts, within the limitations of the TRMM release capability, to highlight typical activities without exhaustively demonstrating every capability.

For ease of description and test execution the sequence is broken down into the following test cases, as shown in Figure 11-3: Session Establishment, Orbit/Attitude Data Acquisition, CERES Baseline Activity Plan Update, Schedule Review and Integration, TDRSS Contact Planning, and Finalization and Load Generation

The sequence test cases are described in the subparagraphs that follow. At the end of the sequence an active plan for the contact complete with Actual Time Command Load (ATC), Ground Script and a scheduled contact will result. These will be used to control the Real-Time Contact Sequence.

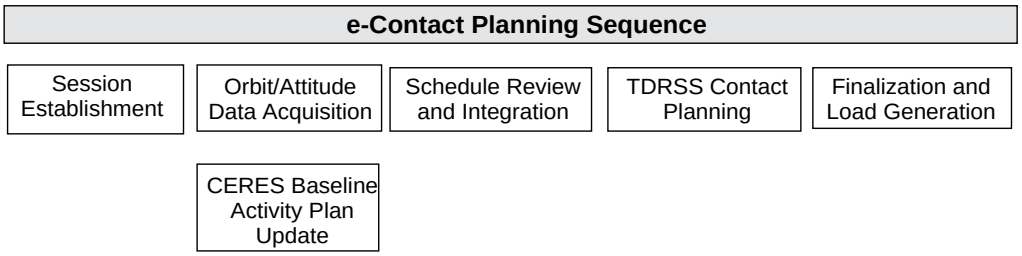

Figure 11-3. Pre-Contact Planning Sequence

11.1.2.1 Test Case A110120.010–Session Establishment

At the beginning of test case execution the Planner contacts the Resource Manager and requests establishment of strings to support two planning activities. The first string will support the entire Test Case. The second will only be used to create the CERES BAP. When the string(s) is/are configured the planners proceed to their positions, logon and access the plan for the next contact period. In real life this would be done weeks ahead as described in the OPS Concept. The test will indulge in last minute scheduling and prepare for the next contact. Each position will bring up the scheduling tools and use them to review the current state of the plans in progress.

11.1.2.2 Test Case A110120.020–Orbit/Attitude Data Acquisition

For this test case the primary planner will use the FDF Planning Tool to access the predicted orbit and attitude data for the period of the contact. The FDF is contacted, the data requested , downloaded to the EOC and converted for storage in the FOS data base. The planner accesses the data and display it within the tool. The data acquired in this test case is used when the schedule is being finalized to help determine when to request TDRSS contacts.

11.1.2.3 Test Case A110120.030–CERES Baseline Activity Plan Update

Co-incident with acquisition of orbit/attitude data an instrument team planner begins updating the BAP for the CERES instrument. An initial BAP is available so that the planner can add a few representative events. The Plan Permission Tool is accessed to locate the CERES resources for the time interval of the upcoming contact.. The planner utilizes the Activity Scheduler Tool to view the series of instrument control events to be executed in the time frame of the next contact. The tool is utilized to modify and delete a few of the baseline activities to show the capability to easily tailor the plan. At the completion of the test case the BAP is released to indicate that it is ready to be incorporated in the load for the next contact period. The planner produces reports summarizing the BAP created and then logs off of the user terminal and returns the string resources to the available pool.

11.1.2.4 Test Case A110120.040–Schedule Review and Integration

This test case contains the activities performed by the primary planner who pulls together the component pieces of the schedule and integrates it into the single, de-conflicted schedule that is the basis for generation of the load to be uplinked during the Real-Time Contact Sequence.

The planner begins by accessing the submitted component plans in order to insure that all are present. The FOT generated plan for the bus and a selected instrument are reviewed through the use of the Timeline and other tools. An attempt is made to merge the schedule. The plan inputs are pre-built to create several obvious resource conflicts that should be flagged for resolution. The planner accesses each of these, investigates them and resolves them by modifying the offending plan component. This portion of the test case shows the ability of the planner to view the plan as a whole and resolve conflicts. The test case also insures that combined resource requirements (solid state recorder requirements are the prime example) for the contact have been generated in preparation for the TDRSS Contact Planning Test Case.

11.1.2.5 Test Case A110120.050–TDRSS Contact Planning

The planner brings up the TDRSS activity scheduler tool and requests it to compute the necessary contact times. If the test data allows, the plan is constructed to generate requests that cannot be satisfied due to either lack of TDRSS resources or due to violation of spacecraft visibility constraints. In these cases the planner, views the problem on the timeline display and utilizes the manual scheduling capability to adjust the requests.

When this is complete, the resulting request is sent to the (simulated) NCC. Their response is received, displayed and evaluated. Any conflicts are resolved through the negotiation process. The updated timeline showing the resulting contacts is examined and printed.

11.1.2.6 Test Case A110120.060–Finalization and Load Generation

During this Test Case the planner performs the activities that complete the scheduling process for readying the system for the real-time contact. The plan as a whole is analyzed by the software for activity and command-level constraint violations that remain in the schedule. These must be resolved at this point in order to deconflict the schedule. The planner utilizes the displays and analysis capabilities to locate the source(s) of the conflict and to provide the necessary changes. During the test case notification of the affected instrument team will be simulated.

The staged microprocessor and table loads are then readied for inclusion in the plan. All but the MISR table load is pre-built before the test. The MISR table load was built during IST Planning Sequence #1. The planner utilizes the Load Scheduler Tool to resolve the transfer times or windows submitted with the reality of the TDRSS contact times in the plan. The contents of the loads are validated by the software during this process.

The next part of this test case generates the Detailed Activity Schedule (DAS) for the contact. The planner activates the Daily Plan Tool, enters the time boundaries, and allows the tool to process the request to generate the Absolute Time Commands for the target day. The planner utilizes the Daily Plan Tool and selects ATC generation. This processing also generates the Ground Script, real-time expected state tables and the integrated load report. Available tools are used to verify the presence of each. Printed copies of the plan will be prepared.

11.1.3 MISR IST Planning Sequence

The single test case in this sequence builds a MISR table load through the use of the Table Load Builder Tool at the simulated MISR IST. Aside from the obvious goal of providing the MISR Table to the Pre-Contact Planning Sequence, this activity is also designed to show that simultaneous scheduling activities can take place without unwanted interaction. The sequence consists of the single test case that follows.

11.1.3.1 Test Case A110130.010–MISR IST Planning

During the Test Case the MISR Instrument Planner logs onto the IST and establishes contact with the EOC. During the contact establishment, the user's identity is verified. Next , the user begins constructing a simple table load through use of the Table Load Builder Tool. The tool utilizes previously defined templates for ease of data entry. Valid and invalid data values are entered to demonstrate verification. When the table is complete, the planner requests the Real-Time Contact Sequence. This will cause the table and the request to be sent to the EOC database and to be made available for use during the Pre-Contact Planning Sequence.

11.2 Contact Scenario

This scenario demonstrates the FOS capability to perform the activities associated with the (simulated) on-orbit AM-1 spacecraft. To the extent possible, the ground script is used to automate the progress of this activity. The ability to establish spacecraft contact, and to initialize reception of recorded health and science data is confirmed. A pre-planned command load is uplinked. The capability to receive simulated real time telemetry data is confirmed, as is the capability to transmit manual commands. During the Contact Scenario additional planning is performed using a local user terminal to demonstrate both the use of IST and the ability of the FOS to simultaneously support the real-time contact and the ongoing planning necessary for continuous operations. Contact Scenario events include logon by a simulated SCF user to work on a calibration required in a future contact and user input of a change to the previously planned baseline schedule from a simulated IST.

11.2.1 Real-Time Contact Sequence

This sequence demonstrates the activities that take place during a contact with the AM-1 spacecraft. Telemetry processing and spacecraft and IST commanding are verified. Again it is important to remember that the TRMM Release main focus is the support of ground system interface testing and integration of the AM-1 spacecraft. Actual flight is supported with Release B. Even so, this sequence is organized to exercise the TRMM Release capabilities as if there were a spacecraft flying. This is done to show that the TRMM Release is a sound foundation for Release B and operations support. Because many of the actual external interfaces are being developed on parallel schedules and are not available, ECS-provided simulators of varying fidelity will be used during the test. Figure 11-4 depicts the test cases included in this sequence.

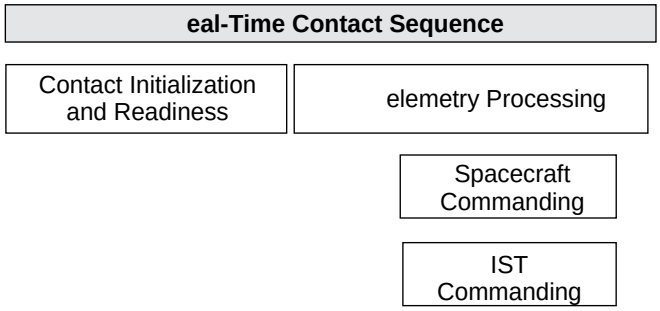

Figure 11-4. Real-Time Contact Sequence

11.2.1.1 Test Case A110210.010–Contact Initialization and Readiness

The EOC Initialization Scenario described above left the EOC initialized at a basic state of readiness to support activities. The planning sequences, in turn, dedicated resources to their activities and then returned them to the pool of available resources when done. Thus, at this point, the EOC is up and awaiting assignment. This test case performs the steps necessary to configure the system to support a simulated real-time contact with the AM-1 spacecraft. After doing this the necessary built-in readiness checks are performed to insure that the EOC is in communications with the NCC and EDOS/ECOM before the scheduled time for the simulated spacecraft contact.

The Resource Manager workstation is utilized to request and configure three (TBD) positions. One will be utilized to accomplish the Telemetry Processing Test Case described below. The second serves as the real-time commanding position used in the final test case in the scenario. The third will be used during this test case to allow for test-specific activities. After each workstation is reserved and identified the simulated FOT member will proceed to the workstation, log on and bring up the necessary tools for his task on the workbench. In the case of the command position, a very important function is next tested. The operator requests command authority and enters special identification to gain the right to send commands. Because of the importance of this function, several test cases are performed to explore some of the functions surrounding this process. For instance, the operator at the telemetry position also attempts to gain command authority. This should be rejected since there can only be one command position at a time.

Another test case will involve "crashing" the command position. The operator will then proceed to the "spare" position and attempt to regain command authority. The system should realize that the original workstation is no longer responding and allow the switch.

Next, the command-authorized user initializes the ground script prepared in the Pre-Contact Planning Sequence. This is accomplished from the Command Control Window. This ground script will actually drive the contact that follows.

Readiness tests for the NCC and EDOS/ECOM are run next to insure that all necessary communications paths are available. During the test, simulators will be utilized for this function.

At this point the EOC is configured and ready for the contact. Progress from this test case to the next is time driven. As time progresses events in the ground script initiate actions and external systems initiate data transfers.

11.2.1.2 Test Case A110210.020–Telemetry Processing

This Test Case covers the receipt, processing, display and storage of telemetry data from the simulated AM-1 spacecraft and the supporting ground system (i.e. ground telemetry). Much of the processing capability in this area is deferred to Release B. Present is the capability to extract the data from the EDOS packets, decommutate the data according to the spacecraft database and display it in appropriate units. Absent are capabilities to do processing which correlates multiple telemetry points. Also missing is the capability to process memory dumps and to check the spacecraft clock.

The Telemetry Processing Test Case begins with the telemetry position manned and awaiting the contact. The operator has brought up the proper windows and established the operational context as necessary. The EDOS/ECOM simulator drives the test case by, according to a time-tagged script, beginning to send data to the EOC (EDOS pushes data). As spacecraft and ground telemetry arrive, the operator verifies system status updates. Spacecraft data includes both housekeeping and health/safety information. As the data is received, it is reformatted and converted in preparation for display and limit checking. After processing, the data is distributed which allows it to be displayed. Within the context of this test, our ability to fully exercise this capability is determined by the capability of the simulated data source. As this update is written for PDR, it appears that simulated data is provided by ECS-generated tools. The simulated data stream is generated to match the spacecraft database provided by Martin Marietta. A few channels within the frame are changed over time to that excursions from database limits are generated. Also, if the S/C database includes sufficient information, a representative sample of engineering unit conversions are tested by stepping individual data points through all values. The method used to verify this sort of capability is both the examination of actual displays (EOC and IST) and the (simple) reports produced by the Analysis capability.

At the EOC Telemetry position a few custom screens are configured to display the data points that are active in the simulated data stream. The operator verifies that data is present and changes value according to the test script. Results are documented by notation in the test procedure and production of screen dumps and history reports. An IST terminal is brought up in the Telemetry Analysis Sequence to demonstrate the remote display of telemetry data as an instrument team member might use the system. A different subset of the data stream is displayed in order to demonstrate that the system can subset and route the data correctly.

The simulated real-time data continues through the end of the Spacecraft Commanding Test Case. After this, the simulated contact with the spacecraft is concluded, but the Telemetry Processing Test Case continues with several key activities. The first of these is the transfer of the back orbit telemetry data from EDOS via FTP. This is likely controlled by the ground script. Receipt, processing and storage of the data is automatic according to the design documentation. Therefore from a testing point of view, the Telemetry Analyst will utilize the functionality of his tools to verify receipt and storage of the data. Finally the resource manager is contacted to return the telemetry contact resources to the available pool at the end of the contact session.

11.2.1.3 Test Case A110210.030–Spacecraft Commanding

This test case demonstrates that the EOC position with command authority can perform activities typical to a real-time spacecraft contact. The activities performed and the data used within this test case were determined in the preceding planning test cases. The prime driver is the ground script that is initiated and observed from the command enabled user position. The ECS EOC concept is that most of the commanding actions are automated. The ground script tells the EOC what to do during the contact. Included capabilities are: perform EOC functions automatically; send individual commands to the S/C (e.g. initiate SSR dumps); and upload tables to the S/C.

Within this context, manual actions are demonstrated through inclusion of commands that demand operator concurrence before they are sent. If possible, a manual command is sent to simulate a real-time reaction to an observed spacecraft anomaly.

The fidelity of the commanding testing is determined by the ability to simulate the responses of the external system. As this is written, it appears that the EDOS/ECOM acknowledgment protocol must be provided to do any commanding. It does not appear feasible to expect that any telemetry verification of commanding will be possible. If the telemetry verification capability in the FOS is available for the TRMM Release, but the simulator capability is not, it will still be possible to demonstrate commanding by selecting commands that have no verification criteria in the health/ safety stream.

Basically, during this test case, the commanding operator monitors the progress of the ground script, responding to confirmation requests and sending a manual command or two. At the end of the pass, after the uplink loads have been sent, command history reports are produced and examined. The commanding terminal is signed of f and returned to the pool of available resources.

11.2.1.4 Test Case A110210.040–IST Commanding

In this test case, the simulated MISR IST is brought up and used to perform commanding in parallel with that going on at the EOC.

The IST workstation is initialized as a commanding authorized station. During this exercise, an improper user ID is entered to verify that strict validation of user identity is performed. After authorization has occurred, the commanding support tools are initialized. and MISR plans and schedules for the current contact are accessed.

As the contact occurs the IST is utilized to monitor the sending of commands that effect the MISR instrument. All such actions should be routed to the IST. During the contact, the IST operator attempts to send several pre-stored command groups from the IST to be sent during the contact.

This action simulates detection of an instrument problem from the telemetry and the ISTs reaction to the problem. The operator collects all command histories at the end of the contact, saves them and produces printed reports.

At the end of the test case the IST operator terminates the command tools and logs off.

11.2.1.5 Test Case A110210.050–SCF Interface

This test case confirms the FOS capability to accept and transmit to an SCF, data such as instrument microprocessor memory loads and changes in instrument parameters.

For both the receipt and transmission events, the AT team confirms by inspection, that these processes are included in the FOS operating procedures.

The test case proceeds by demonstrating the science data transmission and receipt procedures. If possible this demonstration is performed by communications with a real SCF. Otherwise, a the SCF functionality is simulated. Inputs consist of test data sets representing typical instrument microprocessor memory loads and changes in instrumentation parameters for transmission to the SCF (or simulator) plus similar data sets for transmission from the SCF. The data sets are transmitted to the SCF from the operational FOS facility and the SCF transmits its data sets to the FOS. In both cases, data dumps of the received products and status log read-outs are preserved for post-test analysis.

The test report contains the results of analysis of the outputs from the receipt and transmit test execution as compared with the expected results. The test report also includes a listing of problems or issues and recommendations associated with the test analysis results.

11.2.2 Planning Update Sequence

The primary purpose of the Planning Sequence is to show that future planning can take place simultaneously with a real-time contact that is actively utilizing the current time period of the plan. The sequence includes the test cases listed below. Several simplifications from the Pre-Contact Planning Sequence have been made here. First it is assumed that the orbit/attitude data obtained includes the predictive information needed here. Second, fewer changes to the plan are being demonstrated here. This is probably more typical of a normal day's activity. The major steps of gathering, combining and finalizing of the plan are included. The test cases that comprise this sequence, as shown in Figure 11-5, are: Session Establishment, Schedule Update and Integrate, TDRSS Contact Planning, and Planning Finalization.

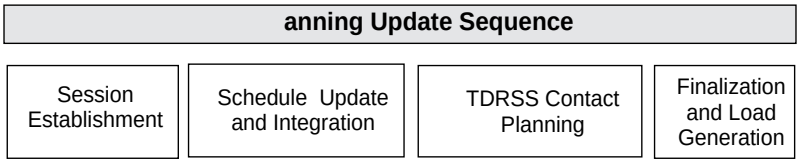

Figure 11-5. Planning Update Sequence

11.2.2.1 Test Case A110220.010–Session Establishment

As before, the Planner contacts the Resource Manager and requests establishment of a string to support the planning activity. The string supports the entire test case. When the string is configured the planner proceeds to his position, logs on and accesses the plan for a contact period during the next day. The operator brings up the scheduling tools and uses them to review the current state of the plans in progress.

11.2.2.2 Test Case A110220.020–Schedule Update and Integration

This test case contains the activities performed by the primary planner who pulls together the component pieces of the schedule and integrates them into the single, de-conflicted schedule.

The planner begins by accessing the submitted component plans in order to insure that all are present. The FOT generated plan for the bus and a selected instrument is reviewed through the use of the Timeline and other tools. An attempt is made to merge the schedule. The plan inputs are pre-built to create several obvious resource conflicts that should be flagged for resolution. The planner accesses each of these, investigates them and resolves them by modifying the offending plan component. This portion of the test case shows the ability of the planner to view the plan as a whole and resolve conflicts. The test case also insures that combined resource requirements (solid state recorder requirements are the prime example) for the contact have been generated in preparation for the TDRSS Contact Planning Test Case.

11.2.2.3Test Case A110220.030–TDRSS Contact Planning

The planner brings up the TDRSS activity scheduler tool and requests it to compute the necessary contact times. The planner views the proposed TDRSS contacts on the timeline display and utilizes the manual scheduling capability to adjust the requests if any conflicts are detected. It is the goal of this test case to utilize actions different from the corresponding test case in the previous planning test case.

When complete, the resulting request is sent to the (simulated) NCC. Their response is received, displayed and evaluated. Any conflicts are resolved through the negotiation process. The updated timeline showing the resulting contacts is examined and printed.

11.2.2.4 Test Case A110220.040–Finalization and Load Generation

During this test case the planner again performs the activities that complete the scheduling process to ready the system for the real-time contact. The plan as a whole is analyzed by the software for activity and command-level constraint violations that remain in the schedule. These must be resolved at this point in order to deconflict the schedule. No significant conflicts are included in the test data for this test case.

The staged table loads are readied for inclusion in the plan. The planner utilizes the Load Scheduler Tool to resolve the transfer times or windows submitted with the reality of the TDRSS contact times in the plan. The contents of the loads are validated by the software during this process.

The next part of this test plan generates the Detailed Activity Schedule (DAS) for the contact. The planner activates the Daily Plan Tool, enters the time boundaries and allows the tool to process the request. The planner sees messages notifying him of final constraint checking that takes place.

Hard constraint violations, if any, are removed. If soft constraints remain the planner must explicitly acknowledge them via the tool. When the process completes, the DAS is available. A copy is sent to SDPS for storage. (This step will be verified in the all-up scenarios, described in Section 12, "End-to-End Scenario Group.")

The final step in the test plan is to generate the Absolute Time Commands for the target day. The planner utilizes the Daily Plan Tool and selects ATC generation. This processing also generates the Ground Script, real-time expected state tables and the integrated load report. Available tools are used to verify the presence of each. Printed copies of the plan will be prepared.

11.3 Post-Contact Scenario

This scenario demonstrates the FOS capability to perform post-contact actions leading to an orderly return to a FOS lights out status. Post-pass verification activities include demonstrations of the capability to prepare historical reports, a demonstration of the capability to store and reuse work already done, a demonstration of the off-line EOC telemetry capabilities, and a demonstration of the ability to perform analysis of previously acquired telemetry data.

At the conclusion of this scenario, the systems ability to return to a "lights-out" state is confirmed by inspection of the post contact configuration, archives and reports.

11.3.1 MISR IST Update Sequence

The single test case in this sequence builds a second MISR table load through the use of the Table Load Builder Tool at the simulated MISR IST. This activity is the logical follow-on to the previous MISR IST planning activity. Similar activities will be performed to verify simultaneous execution of a plan (in a contact), EOC planning and IST planning. The sequence consists of the single test case that follows.

11.3.1.1 Test Case A110310.010–MISR IST Planning

During this test case the MISR Instrument Planner logs onto the IST and establishes contact with the EOC. During the contact establishment, the user's identity is verified. Next, the user begins constructing a simple table load using the Table Load Builder Tool. The load created in the already completed MISR IST Planning Sequence is accessed and becomes the basis for he next load. The desire is to show that the planning tools provide the ability to re-use work already done. The planning tool will be used to change parameters on several of the commands. When the table is complete, the planner requests that the contents be uploaded during a future contact.. This causes the table and the request to be sent to the EOC database and made available for use during a future contact.

11.3.2 Telemetry Analysis Sequence

The Telemetry Analysis Sequence demonstrates the off-line telemetry capabilities of the EOC. First, the ability to access previously acquired telemetry data from the local EOC storage and perform a playback is demonstrated. Second, the same stored telemetry data is used to produce custom graphs and reports for off-line analysis. the TRMM Release constrains these capabilities to data collected within a seven-day period because the interface to the SDPS archive is not present. The sequence consists of the following four test cases, as depicted in Figure 11-6: Session Establish, Telemetry Display, Telemetry Reports, and Wrap-Up.

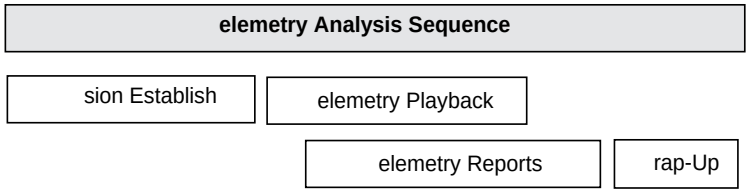

Figure 11-6. Telemetry Analysis Sequence

11.3.2.1 Test Case A110320.010–Session Establish

At the time the Telemetry Analysis Sequence begins, the EOC has secured from the real-time contact and is supporting mission planning both at the EOC and a simulated IST. Telemetry analysis is, therefore, a new activity requiring assignment of resources by the Resource Manager. The Telemetry Analyst contacts the Resource Manager and requests establishment of two strings to support the this activity. These strings will support the entire test case. When the strings are configured the analyst proceeds to his position, logs on and brings up the proper tools.

11.3.2.2 Test Case A110320.020–Telemetry Playback

This test case demonstrates the FOS capability to playback previously acquired telemetry data. Because of the dearth of simulated data this test case will playback the data from the Real-Time Contact Sequence. The heart of the test procedure will be that of the Telemetry Processing test case. The value of this exercise is that, except for processing rate, playback should be indistinguishable from the original acquisition.

The test case begins with the Analyst utilizing the Telemetry display tool to access the catalog of stored data. The data set from the Real-Time Contact Sequence is located and selected for playback. The screen configurations used in the previous exercise are readied. Playback is initiated. The same displays and values seen previously are verified visually and via printed screens and history reports.

11.3.2.3 Test Case A110320.030–Telemetry Reports

This test case demonstrates the capability to perform off-line analysis of previously acquired telemetry data. For the test the analysis is performed on the data set acquired during the Real-Time Contact Sequence. This test case simulates the actions that might be performed by a S/C analyst resident at the EOC. The IST Telemetry Access Sequence shows how an instrument team member would accomplish the same thing.

The off-line analyst begins by logging onto the string allocated during the Session Establish Test Case and bringing up the Analysis Request Builder tool. The analyst then proceeds to create a list format report for all subsystems for the entire time period of the real-time contact. This report is queued for processing and will, during the post test period, form the basis for evaluating the subsetted reports to be generated.. The Analysis Status tool is brought up to track the progress of the system in satisfying the request. While the first report is being processed the analyst begins

requesting a number of additional reports sampling combinations of the available options and covering varying time periods within the available data set. Prior knowledge of the test data will allow specification of fairly short periods to minimize the volume of data prepared.

When the various datasets are shown to be available of the status display, the Analysis Product Selector is invoked Using this display the reports already requested may be output to printers and/ or files. As before, a representative sample of the available combinations is demonstrated. The primary goal here is to verify consistency between the data presented in the different data formats.

When all activities have been completed, the Analysis resources are returned to the available pool by terminating the strings involved.

11.3.2.4 Test Case A110320.040–Wrap-Up

The Telemetry Analysis is the last EOC-centered sequence in this group. This Wrap-Up Test Case takes advantage of this and provides the place where history logs and management reports covering the entire Scenario Group are collected. This supports the post-test analysis of a number of requirements about collection of historical and performance information.

The Resource Management workstation is utilized to request printed and soft copy versions of all available logs and history files for later analysis.

When this is complete the Resource Manager requests an orderly shutdown of the entire EOC.

11.3.3 IST Telemetry Access Sequence

During the IST Telemetry Access Sequence an IST terminal is logged on to the EOC simulating access by a MISR Instrument team member. The purpose of the access to is to examine the MISR engineering data from the just completed Real-Time Contact Sequence and compare it against supporting data such as a previously saved telemetry data set and the command history from the latest contact. This sequence consists of the single test case that follows.

11.3.3.1 Test Case A110330.010–IST Telemetry Access

The IST Telemetry Access Test Case demonstrates the ability of an Instrument team member to perform analysis of previously acquired telemetry data. This test case is very similar to the Telemetry Reports Test Case described above.

The test case begins with the Instrument Team member logging on to the IST workstation. Contact is made with the EOC, authorization to access the data verified, and the appropriate tools initialized. The user then utilizes the Analysis Request Builder tool to generate requests for MISR-specific housekeeping data. A representative subset of the many possible combinations of reports is generated. The Analysis Status tool is used to tell when the products are available. When they are the user utilizes the Analysis Output Selector tool to print reports from the IST workstation.

The user examines the reports, determines that there is a possible anomaly and decides to check the command history for the period to make sure that the proper commands were in fact sent to the instrument. The appropriate tools are used to access the historical data on the IST. Selected portions are printed out and compared against the plan that was input in the MISR IST Planning Sequence.

When all activities are complete, the IST is logged off to free up system resources.

11.3.4 FOS Testing Sequence

This sequence confirms the FOS capability for providing a complete test environment for the FOS system and its components. The AT team confirms that both validation and revalidation capabilities are a part of the FOS test capability. The capability to validate the primary functional performance of FOS system components through comparison with benchmark or other previous test results is confirmed. Functionality for performing subsystem, element and FOS site testing is verified, as is the capability for testing and revalidating internal and external FOS interfaces. Procedures for monitoring all FOS testing are inspected to verify existence, applicability and efficiency. The AT team confirms FOS procedures and capability for performing suitable testing after system repairs or upgrades and for providing complete testing services.

The capability for performing pre-pass operational tests is confirmed. as is the ability to perform testing with the FOS system in an operational mode without interfering with on-going production. The capability for performing pre-pass operational tests within FOS and with FOS external interfaces is confirmed.

The AT Team confirms FOS access to test data sets, plans and procedures used in the checkout and verification process

11.3.4.1 Test Case A110340.010–Test Capabilities

The purpose of this test case is to verify FOS capability for initial testing and re-testing of the FOS components, systems and sites. The test case addresses FOS in-site and inter-site test capabilities.

Test Case inputs include complete as-built specifications of the FOS Test capability. These specifications are inspected for completeness and conformance to FOS and ESDS requirements.

AT testing proceeds with a demonstration of the capabilities for supporting IV&V activities and ECS development activities. This is followed by a demonstration of the accessibility of benchmarks and standard data sets to be used in FOS testing. A Test procedure that executes a benchmark and provides a comparison with a previous operational benchmark is be included in this test case. Next the functional capabilities for supporting subsystem, element, and ECS system level testing are demonstrated. This procedure includes demonstration of in-site, ECS inter-site, and EOSDIS interfaces. A demonstration of FOS procedures for performing fault isolation is included. Procedures that provide for ECS monitoring of FOS testing, and procedures for providing test support during pre-launch, spacecraft verification, and instrument verification, are confirmed by inspection. Procedures for tests that re-validate/re-qualify, verify and check EOC functional capabilities and performance after repairs or upgrades are inspected. Procedures for performing pre-pass operational readiness tests within FOSS and across FOS interfaces are demonstrated.

The AT Team performs detailed tests that demonstrate nominal and abnormal conditions. Beginning with an operational FOS system running in a pre-specified operational configuration the capability for system level nominal operation is confirmed. Next, by inducing pre-specified failures, the FOS system reaction to these abnormal events is tested. During both of these test activities the contents of all FOS system logs are retained for further analysis and for confirmation of the FOS system capability to produce satisfactory log entries. All input test procedures and test results are retained confirming FOS capability to produce these outputs and for subsequent analysis activities.

The test report contains the results of analysis of the outputs and logs from the demonstration execution. An analysis of expected versus actual results is also included. The test report also includes a listing of problems or issues and recommendations associated with the logs or other products outputs and the analysis results.

11.3.4.2 Test Case A110340.020–Test Modes

The purpose of this test case is to verify FOS capability to operate in the required test modes

AT testing proceeds with a demonstration of the FOS system capability to operate in specific modes without interfering with on-going operations. Inputs include specifications and procedures for (a real or simulated) system loading configurations: (1) a full operational TRMM system operation, (2) a spacecraft instrument and integration test operations configuration, (2) a pre-launch configuration test, and (3) an upgrades and enhancements test configuration. From an operational FOS system loaded with the TRMM support mode, the other three modes are introduced. All system logs, input, and output products are retained from the test.

The test report contains the results of analysis of the outputs and logs from the test execution. An analysis of expected versus actual results is also included. The test report also includes a listing of problems or issues and recommendations associated with the logs or other products outputs and the analysis results.

11.3.4.3 Test Case A110340.030–Test Inputs

The purpose of this test case is to verify FOS capability to prepare or receive, store, retrieve, and properly use test data inputs.

Inputs for this test case representative FOS system benchmarks and test data sets; stored test plans, test data sets and test procedures with access instructions; representative mission and operations management test data sets from all TRMM release sources for these data; and procedures for performing intra and intersite FOS operational readiness tests

AT proceeds with an inspection to confirm that written definitions of benchmark tests and test data sets for verification and data quality evaluation, exist and are complete. Next a demonstration of the accessibility of test data sets, plans and procedures is performed from the operational FOS system. This is followed by a demonstration of FOS capability to receive mission and operations management test data sets from applicable TRMM release sites. These demonstrations are performed using real or simulated site data sources, from which are transmitted pre-prepared test data sets.. All system logs, input, and output products are retained from the demonstration execution.

The test report contains the results of analysis of the outputs and logs from the test execution. An analysis of expected versus actual results is also included. The test report also includes a listing of problems or issues and recommendations associated with the logs or other products outputs and the analysis results.

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12. End-to-End Scenario Group

The End-to-End Scenario Group verifies the ECS capabilities to support "all-up" multi-site operations and typical "day-in-the-mission-life" scientist activities. This group of scenarios and associated tests verifies that the ECS can support broad, multi-site interactive operations in support of mission planning, scheduling and science data access, processing and distribution. These scenarios verify the capabilities of users and operators to perform multi-step processes, including multiple data set searches and transfers, correlative data set analysis, etc.

In addition, early selected AM-1 mission interfaces needed in Release B, some of which are still being implemented, are tested and/or simulated. Most of the interfaces and data flows depicted earlier in Figure 7-1 and tabulated in Table 7-1 are verified in the execution of these scenarios. The overall objective of the end-to-end scenario group is to demonstrate that the ECS, as a 'whole', operates properly and can provide the full range of required functional capabilities for the TRMM Release users and operators.

This scenario group concentrates on extending the functional verification performed in executing the scenarios described in Sections 8 through 11, but occasional replication of single entity functional testing is unavoidable. Where possible, actual interfaces and existing, real data are used. In many cases, however, simulated data streams and/or interfaces are used due to the immaturity of the ECS, the missions and/or the interfacing external facilities. The ECS EDF is used to simulate some tests, but testing at the actual DAAC sites predominates. Performance tests and performance analyses complement the multi-site and mission support tests to ensure that the ECS meets current and projected system performance requirements.

Specifically, this scenario group verifies the ECS capabilities to support inter-site communications and operations among the four TRMM Release DAAC sites, the EOC, the SMC and with the external EDOS, Ecom, FDF, NCC systems; scientist data handling, processing and distribution support for the TRMM and Landsat-7 missions; early AM-1 mission interface testing; system management and inter-site coordination; and system and end-to-end performance requirements. Figure 12-1 illustrates scenarios, sequences and associated capabilities of the End-to-End Scenario Group.

12.1 Multi-Site Intercommunications and Interoperations Scenario

This scenario carries the ECS site operations staff through the process of handling complex data product orders that requires supporting data from multiple sites. This scenario confirms the capability of users and operators to perform multi-site communications and to transfer data among different sites. This scenario confirms inter-site interfaces, with each site accepting and interpreting data messages from other sites. The sites send multiple messages among themselves to confirm capabilities to support interactive message traffic among the four DAACs and the SMC, and with the EDOS and the NOAA ADC, using Ecom or NOLAN. Message traffic to/from the EOC and the GSFC DAAC and the SMC is also verified. Each data recipient system reads its message, interprets it, sends an appropriate acknowledgment message back to the sender, and perhaps transmits related information to another site.

Functions tested include message broadcasting, multi-site system management and inter-site network communications. The scenario also confirms the SMC capability to support system wide schedule generation, coordination and adjudication.

12.1.1 Inter-Site Message Sequence

In addition to the testing of inter-site connectivity performed in Section 8, the ECS must be capable of transmitting and handling concurrent multiple data messages. This sequence of tests verifies the capability of the DAACs as well as the SMC to receive and handle broadcast messages. To perform these tests, an operator broadcasts a simulated data request message to each of the four DAACs and to the SMC. Each site receiving a message sends an acknowledgment of proper receipt of the message. The received messages are compared with those sent to check that they are identical and to confirm the integrity of the ECS message broadcasting capability. The capability to send and receive a sequential set of messages over an extended period is also tested.

The next set of tests confirms the capability of users/operators at each DAAC and the SMC to broadcast to and acknowledge receipt of messages from the other sites. Users/operators at each DAAC broadcast messages to the other DAACs and the SMC and receive message receipt acknowledgments. Subsequently, an operator at the SMC broadcasts a message to each of the DAACs and confirms, via receipt of acknowledgment messages and by message comparison, the inter-site ECS broadcasting capability. Similarly, the transfer, receipt and proper interpretation of a set of sequential messages from and to each site is verified. Message traffic to/from the EOC and the GSFC DAAC and the SMC is also verified.

12.1.1.1 Test Case A120110.020–Inter-DAAC and DAAC–SMC Communications

The Inter-DAAC and DAAC-SMC Communications test case verifies the capabilities of the ECS DAAC users/operators to sequentially send messages among themselves, to the EOC (with the GSFC DAAC only) and the SMC and to receive and process acknowledgments of proper message receipt. Each ECS DAAC user/operator sequentially and then concurrently broadcasts simulated data request messages to each of the other four DAACs and to the SMC. The GSFC DAAC operator also tests interfaces with the EOC.

In preparation for Release B, each DAAC sends to remote DAACs the following data: L0-L4, metadata, ancillary, calibration, correlative, documents and algorithms. Simulated messages in proper format for transmission among the DAACs, the EOC and the SMC are required. A test script is needed that can perform sequential message transmission, specifying the order and time of each transmission. Sequential messages are transmitted to all four DAACs, to the SMC and to the EOC. The Demonstration and Test methods are used to verify these capabilities.

The desired results are the receipt by each of the other DAACs, the EOC (from the GSFC DAAC only) and the SMC of the simulated transmitted messages and the receipt by the corresponding entity of message receipt acknowledgment messages. The inter-DAAC, the DAAC to SMC and GSFC DAAC to EOC message communications capabilities are verified.

Proper receipt of the transmitted messages, proper acknowledgments transmitted to the senders of message receipt, as well as verification of the overall ECS capability to support inter-DAAC communications of individual and sequential message transmissions, are confirmed.

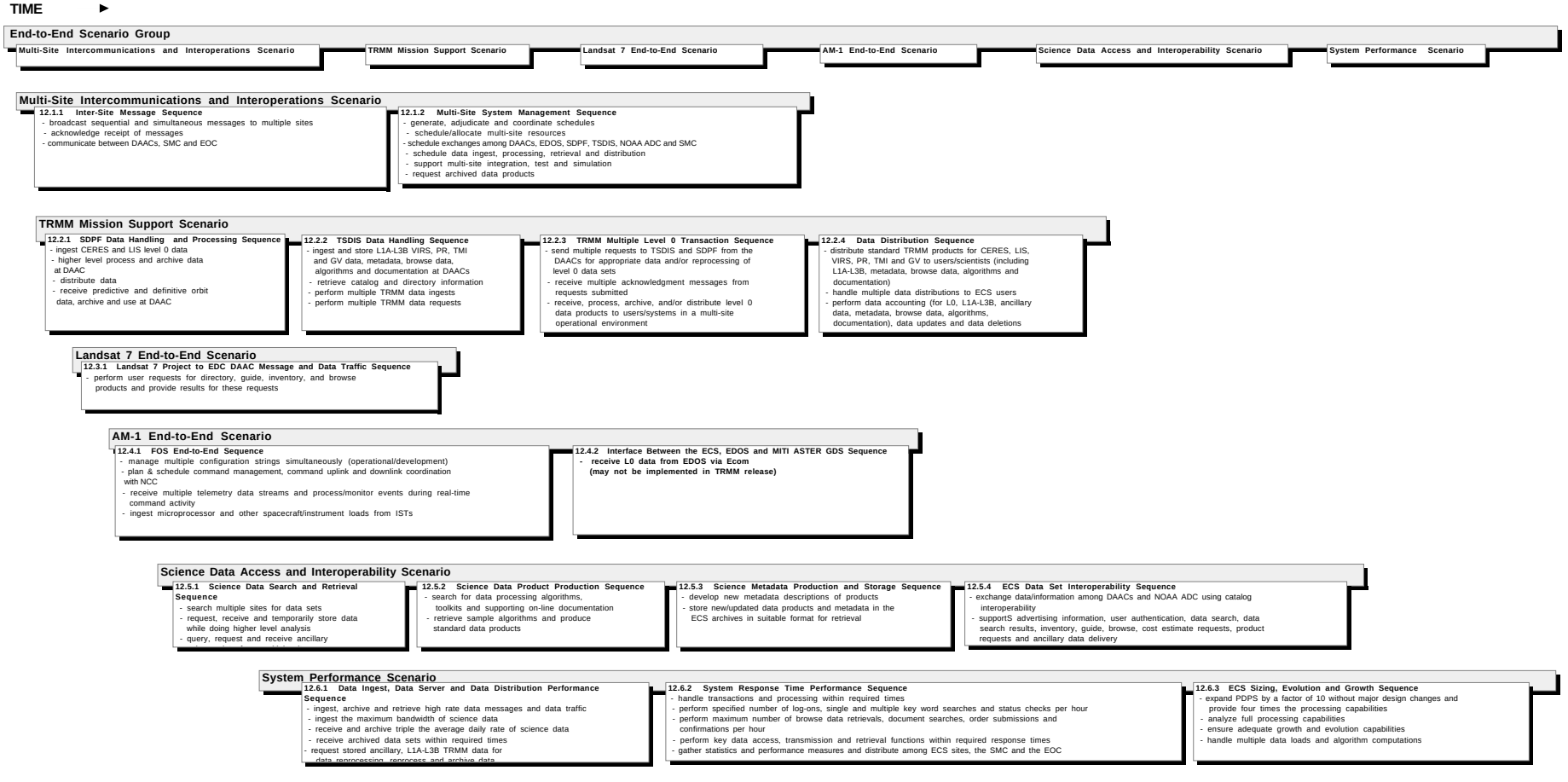

Figure 12-1. End-to-End Scenario Group Acceptance Test Sequencing.

12.1.1.2Test Case A120110.030–EOC to SMC, GSFC DAAC Communications

The EOC communicates with one DAAC, e.g., the GSFC DAAC, for the TRMM Release. The EOC to SMC, GSFC DAAC Communications test verifies the capability to send sequential messages to the SMC and to the GSFC DAAC. An EOC operator establishes communications with the GSFC DAAC and the SMC, sends a set of sequential messages to them, and confirms proper message receipts and message acknowledgments. The Demonstration and test methods are used to verify these capabilities.

To exercise these capabilities simulated messages in proper format for sending to the SMC and the GSFC DAAC are required. The tests confirm successful EOC message transmission and successful receipt by the EOC operator of acknowledgment messages from the SMC and from the GSFC DAAC.

12.1.1.3 Test Case A120110.040–SMC to DAACs, EOC Communications

The SMC to DAACs, EOC Communications test verifies the capability of an SMC operator to send sequential messages to the EOC and to the four DAACs. An SMC operator establishes communications with the four DAACs and with the EOC, sends a set of sequential messages to each, and confirms proper message receipts and message acknowledgments. The Demonstration method is used to verify these capabilities.

To exercise these capabilities simulated messages in the proper format for sending by the SMC to the EOC and to the four DAACs are required. The tests confirm successful SMC message transmissions and successful receipt by the SMC operator of acknowledgment messages from the EOC and from the four DAACs that the messages were received and properly interpreted.

12.1.2 Multi-Site System Management Sequence

This sequence of tests builds on earlier scheduling capability tests performed in Sections 8 and 9. In this sequence the emphasis is on multi-site coordination and support of sequential scheduling actions. This sequence confirms the capability of the SMC to support broad system-wide schedule generation, adjudication and coordination. This sequence demonstrates the capabilities of the SMC and its operators to exchange schedule and product delivery data and information among ECS sites and with external entities, for use in ECS resource management.

This sequence verifies the capability of the SMC and ECS operations to support multi-site scheduling of activities related to TRMM instrument data ingest, processing, retrieval and distribution and to support AM-1 interfaces. This sequence also verifies the capability to interface and exchange schedule related messages and data among the DAACs and with the EDOS, the SDPF, the TSDIS and the NOAA ADC.

The capability of the SMC and ECS operations to support multi-site integration, test and simulation activities, to send schedule directives, and to coordinate and adjudicate system resource scheduling conflicts is verified.

12.1.2.1 Test Case A120120.010–SMC Schedule Generation, Coordination and Adjudication Support

This SMC Schedule Generation, Coordination and Adjudication Support test case verifies the ECS capabilities to support system resource allocation and schedule generation in support of ECS missions. Coordination among a number of ECS elements and with external entities is required to develop a coordinated schedule among all ECS systems and interfacing entities. An ECS operator communicates schedule related data and decisions among ECS systems and interfacing entities. The Demonstration method is used to verify these requirements.

To exercise these capabilities a set of simulated schedule related information and data, as well as, a set of procedures and protocols which describe the processes and responsibilities for schedule development and maintenance are required. Also required are schedule generation operational scenarios defining a typical mission related schedule generation process, including the parameters being scheduled, the resources being allocated, and the overall responsibility among the different EOSDIS entities for schedule decision-making and control. Also required are prototype scheduling directives and associated adjudication procedures to test the capability to exchange this information and develop an adjudicated schedule.

ECS operations staff will verify the capability to exchange among themselves and external entities the relevant schedule and resource data, to generate schedule related inputs, to coordinate among the responsible parties in supporting development of an overall EOSDIS schedule and to communicate about and negotiate schedule conflicts.

12.1.2.2 Test Case A120120.020–TRMM and AM-1 Data Handling and Resource Scheduling Support

This TRMM and AM-1 Data Handling and Resource Scheduling Support test case verifies the ECS capabilities to support users in specific mission resource scheduling and related interface testing. In particular, support in scheduling data ingest, data processing, data retrieval and data distribution activities for the TRMM mission and AM-1 interface testing is verified. The requirements to communicate and coordinate schedules among the DAACs and with EDOS, Ecom, SDPF and TSDIS facilities in supporting these missions are verified.

Also verified are the capabilities of the GSFC DAAC operators to receive the TRMM VIRS product delivery schedules from TSDIS as well as status information concerning delayed VIRS products. Furthermore, this test case verifies the capability of the MSFC DAAC to receive the TRMM PR, TMI and GV product delivery schedules from TSDIS as well as status information concerning delayed PR, TMI and GV products. The desired results are for the GSFC DAAC and MSFC DAAC operators to successfully receive the delivery schedules and status information concerning delayed products for TRMM. Schedule coordination with the NOAA ADC in support of earth science resource data exchange among scientists is also verified. The Test and Demonstration methods are used to verify these requirements.

Typical simulated timelines of the TRMM mission activities, with required resources to perform the necessary data processing and storage activities, are needed. Also needed are the required protocols and message formats to communicate resource information among the DAACs, EDOS, Ecom, SDPF, and TSDIS; and to support AM-1 interface testing. Also needed are simulated TSDIS product delivery schedules and status information about VIRS products to the GSFC

DAAC as well as about PR, TMI and GV products to the MSFC DAAC. Finally, a simulated set of user resource scheduling requests and coordination messages, developed in response to the simulated mission timelines, are needed to execute the mission related scenarios.

The expected results from this test are verifications of the requirements to support testers/users in the AM-1 interface testing and TRMM mission related data ingesting, processing, storing and retrieving activities. Also verified is the capability to coordinate resource scheduling and allocation among the DAACs and with the EDOS, Ecom, SDPF and TSDIS facilities. Also expected are the successful receipt by GSFC DAAC as well as by the MSFC DAAC of the delivery schedules and delayed products status information from TSDIS.

12.1.2.3 Test Case A120120.030–SMC Support to Integration, Test and Simulation Activities

This SMC Support to Integration, Test and Simulation Activities test case verifies the capabilities of SMC operators to support ECS integration, test and simulation activities. The SMC operators support system integration and test by controlling system access, managing system resources, tracking and reporting system faults and gathering and reporting system performance statistics. The SMC must support user simulation activities in accepting simulated system inputs and providing necessary system responses and operations control. The Demonstration method is used to verify the ability of the SMC to support integration, test and simulation activities.

To exercise these capabilities, a list of the required support functions of the SMC is needed. In order to perform system integration, test and simulations the SMC operators use a set of integration and test scripts and system simulation exercises which utilize these SMC capabilities.

The desired result is the verification of the requirements of the SMC and its operators to provide the necessary system support functions to foster effective ECS integration, test and simulation activities.

12.2 TRMM Mission Support Scenario

The Tropical Rainfall Measurement Mission (TRMM) scenario covers the entire range of ECS activities involved in ingesting, processing, archiving and distributing TRMM data products. This scenario verifies the capability of the ECS to support scientific data analyses related to the full scope of TRMM activities and data sets. The ECS interfaces and functional capabilities required by a scientist to perform multi-site data access and analysis are demonstrated in this scenario.

This scenario verifies the capability of the ECS to support end-to-end TRMM mission operations. This scenario exercises the capabilities needed to perform multi-step TRMM data searches and analyses, together with associated data support functions.

The scenario confirms the ECS capability to support a scientific investigator at a Science Computing Facility (SCF). The scientist may want to receive and analyze TRMM related scientific and operational data, using the NSI or NOLAN/Ecom, and interfacing to the GSFC, the MSFC and the LaRC DAACs. This scenario verifies the DAAC capabilities to access data sets from TSDIS and/or SDPF, in assisting the scientist with a multi-step scientific data analysis.

This scenario confirms ECS capabilities to receive and process TRMM Clouds and Earth's Radiant Energy System (CERES) instrument Level 0 data received by the LaRC DAAC via the SDPF. The scenario will also verify the capabilities to receive and process Lightning Imaging Sensor (LIS)

Level 0 data received by the MSFC DAAC via the SDPF. The scenario confirms the capability of the ECS to perform Level 1A through Level 3B (L1A-L3B) processing on the ingested Level 0 CERES and LIS data; to archive the higher level CERES and LIS data products at the LaRC and MSFC DAACs, respectively for later distribution; and to perform data accounting. The scenario also tests the capability of the MSFC and LaRC DAACs to receive definitive orbit data from the SDPF. Finally, the scenario verifies the capability of the ECS to support multiple sequential TRMM data request and data processing functions.

This scenario also proves the ECS capabilities to receive, store and access 1) Visible Infrared Scanner (VIRS) data received by the GSFC DAAC via the TSDIS; and 2) Precipitation Radar (PR), TRMM Microwave Imager (TMI) and Ground Validation (GV) data received by the MSFC DAAC via the TSDIS. These data consist of L1A-L3B data products from TSDIS and associated metadata, browse data, algorithms and documentation. The ECS stores at the GSFC DAAC the VIRS related data and at the MSFC DAAC the PR, TMI and GV related data (e.g., L1A-L3B data and metadata, browse data, algorithms and documentation).

12.2.1 SDPF Data Handling and Processing Sequence

This sequence verifies the ECS capability in a multi-DAAC environment to ingest CERES and LIS data (including predictive and definitive data) from SDPF, to higher level process and to archive higher level/standard products for later distribution to requesting users.

This sequence of tests verifies the capability of ECS operators to ingest TRMM Clouds and Earth's Radiant Energy System (CERES) Level 0 data at the LaRC DAAC from the SDPF. This sequence confirms the capability of the ECS to support the user by performing higher level processing (Level 1A through Level 3B (L1A-L3B)) on the ingested Level 0 CERES data. This sequence also validates the capability of the ECS to archive the higher level CERES data products at the LaRC DAAC for distribution of desired products to requesting users.

This sequence of tests verifies the capability of ECS operators to ingest Lightning Imaging Sensor (LIS) Level 0 data at the MSFC DAAC from the SDPF. This sequence confirms the capability of the ECS to perform higher level (L1A-L3B) processing on the ingested LIS Level 0 data. This sequence also tests the capability of the ECS to archive the higher level LIS data products at the MSFC DAAC for distribution of desired data products to requesting users.

This sequence of tests also exercises the capability of operators at the MSFC and LaRC DAACs to ingest predictive and definitive orbit data from the SDPF.

Finally, this sequence of tests verifies the capability of the ECS DAAC operations team to ingest multiple sequential CERES, LIS and predictive and definitive orbit data sets from the SDPF and to handle and process these data sets in a multi-message traffic environment.

12.2.1.1 Test Case A120210.010–Retrieve CERES Data from SDPF, Process and Archive Standard CERES Products at LaRC DAAC

The Retrieve CERES Data from SDPF, Process and Archive Standard CERES Products at LaRC DAAC Test verifies that CERES level 0, predictive orbit and definitive orbit data can be ingested from SDPF by ECS operators and utilized in the production of standard products. The standard CERES products and the definitive orbit data are archived by ECS at the LaRC DAAC. The Test

method is used to verify predictive and definitive orbit data can be obtained and utilized by ECS operators in the production of standard products as well as show that appropriate data products are archived at the LaRC DAAC.

To exercise these capabilities the LaRC will transfer a file of CERES level 0 data, as well as predictive and definitive orbit data available at the SDPF.

Once the appropriate CERES data sets are ingested from the SDPF using the file transfer protocol, the CERES data is processed into standard products at the LaRC. The definitive orbit data and the standard products are archived at the LaRC. Definitive orbit CERES data are archived in case reprocessing of level 1A data is required.

12.2.1.2 Test Case A120210.020–Retrieve LIS Data from SDPF, Process and Archive Standard LIS Data at MSFC DAAC

The Retrieve LIS Data from SDPF, Process and Archive Standard LIS Data at MSFC DAAC Test verifies that LIS level 0, predictive orbit and definitive orbit data can be ingested from SDPF by ECS operators and utilized in the production of standard products. The standard LIS products and the definitive orbit data are archived by ECS at the MSFC DAAC. The Test method is used to verify the predictive and definitive orbit data can be obtained and utilized by ECS operators in the production of standard products as well as show that appropriate data products are archived at the MSFC DAAC.

To exercise these capabilities LIS level 0 data, as well as predictive and definitive orbit data need to be available at the SDPF for the MSFC to file transfer.

Once the appropriate LIS data sets are retrieved from the SDPF using the file transfer protocol, the LIS data is processed into standard products at the LaRC. The definitive orbit data and the standard products are archived at the LaRC. Definitive orbit CERES data are archived in case reprocessing of level 1A data is required.

12.2.1.3 Test Case A120210.030–Multiple DAAC Ingest and Processing of CERES and LIS Data

Multiple DAAC Ingest and Processing of CERES and LIS Data test verifies that the LaRC DAAC and the MSFC DAAC respectively ingest CERES, LIS, predictive and definitive orbit data sets from the SDPF. Also, the processing of these data sets in a multi-message traffic environment is verified. The Test method is used to verify these capabilities.

To exercise these capabilities multiple CERES, LIS and the associated predictive and definitive orbit data sets are ingested into the LaRC and the MSFC DAACs.

Once the appropriate CERES and LIS data sets have been successfully ingested, these data sets are processed into standard products by the appropriate DAAC. The standard products created at each of the DAACs as well as the definitive orbit data sets used in the standard product generation are archived for future use.

12.2.2 TSDIS Data Handling Sequence

This sequence verifies the ECS capability in a multi-DAAC environment to ingest VIRS, PR, TMI and GV data from TSDIS, to higher level process and to archive higher level/standard products for later distribution to requesting users.

This sequence tests the capability of a scientist to ingest from the TSDIS and store at the GSFC DAAC the Visible Infrared Scanner (VIRS) level 1A through level 3B data. This test sequence also demonstrates the ECS capability to ingest and store, for later retrieval by requesting users, the associated VIRS metadata, browse data, algorithms and documentation.

This sequence also confirms the capability of a scientist to ingest from the TSDIS and store at the MSFC DAAC the Precipitation Radar (PR) level 1A through level 3B data. This test sequence also confirms the ECS capability to ingest and store, for later retrieval by requesting users, the associated PR metadata, browse data, algorithms and documentation.

This test sequence also verifies the user capability to ingest from the TSDIS and store at the MSFC DAAC the TRMM Microwave Imager (TMI) level 1A through level 3B data. This sequence also tests the ECS capability to ingest and store, for later retrieval by requesting users, the associated TMI metadata, browse data, algorithms and documentation.

This sequence of tests also verifies the capability of ECS operations to ingest from the TSDIS and store at the MSFC DAAC the Ground Validation (GV) level 1A through level 3B data. This sequence of tests also confirms the ECS capability to ingest and store for later retrieval by requesting users the associated GV metadata, browse data, algorithms and documentation.

Finally, this sequence verifies the capability of ECS operations personnel to ingest multiple TRMM products from TSDIS and SDPF, to process when appropriate (CERES and LIS), and to archive higher level/standard products.

12.2.2.1 Test Case A120220.010–VIRS Data Ingest and Store

The VIRS Data Ingest and Store Test verifies that VIRS level 1A through level 3B data, metadata, browse data, algorithms, documentation, catalog and directory information can be ingested by ECS operators at the GSFC DAAC. The desired results are that the VIRS level 1A through level 3B data, metadata, browse data, algorithms and documentation are stored at the GSFC DAAC. The Test method is used to verify the ingesting and storage of data.

To exercise these capabilities VIRS level 1A through level 3B data, metadata, browse data, algorithms, documentation, catalog and directory information needs to be available at TSDIS for ECS ingest.

Once TSDIS has made the desired data products available (level 1A through level 3B data, metadata, browse data, algorithms, documentation, catalog and directory information), the GSFC DAAC operators can ingest the data products via file transfer and then archive the desired products so that users can then search for VIRS products and information.

12.2.2.2 Test Case A120220.020–PR, TMI and GV Data Ingest and Store

The PR, TMI and GV Data Ingest and Store test verifies that PR level 1A through level 3B data, metadata, browse data, algorithms, documentation, catalog and directory information can be ingested by ECS at the MSFC DAAC. The desired results are that the PR level 1A through level 3B data, metadata, browse data, algorithms and documentation are stored at the MSFC DAAC. The Test method is used to verify the ingesting and storage of data.

To exercise these capabilities PR, TMI and GV level 1A through level 3B data, metadata, browse data, algorithms, documentation, catalog and directory information needs to be available at TSDIS for ECS ingest.

Once TSDIS has made the desired data products available (level 1A through level 3B data, metadata, browse data, algorithms, documentation, catalog and directory information), the MSFC DAAC operators ingest the data products via file transfer and archive the products so that users can search for desired PR, TMI and GV products and information.

12.2.2.3 Test Case A120220.050–Multiple Data Type Ingest and Store

The Multiple Data Type Ingest and Store Test verifies the multiple ingest and archive of VIRS, PR, TMI and GV level 1A through level 3B data sets, metadata, browse data, algorithms and documentation by the ECS at the appropriate DAAC (GSFC or MSFC). The Test method is used to verify the multiple ingesting and storing of these data.

To exercise these capabilities multiple data sets of VIRS, PR, TMI and GV level 1A through level 3B data, metadata, browse data, algorithms, documentation, catalog and directory information needs to be available at the same time for ingest into ECS.

Once TSDIS has made the VIRS, PR, TMI and GV data and information products available to the appropriate DAAC, each DAAC operator can file transfer the data and then archive the level 1A through level 3B data, metadata, browse data, algorithms, documentation, catalog and directory information for users to search for VIRS, PR, TMI and GV products and information.

12.2.3 TRMM Multiple Level 0 Transaction Sequence

This sequence demonstrates the ECS capability to submit several requests for TRMM data and receive acknowledgments.

This sequence of tests verifies (using NOLAN and/or Ecom for message communications) the capability of three TRMM Release DAAC (GSFC, MSFC and LaRC) operations to send multiple requests to TSDIS and SDPF, and to receive acknowledgments from them. These tests confirm the capability of the GSFC and MSFC DAACs to receive higher level processed data, and to store and distribute multiple data sets from TSDIS. The capability of the MSFC and the LaRC DAACs to request, receive, process into higher level products, archive and distribute higher level data products to users is confirmed.

12.2.3.1 Test Case A120230.010–Multiple Data Request/Data Acknowledgment

The Multiple Data Request/Data Acknowledgment Test verifies the capability of the GSFC, MSFC and LaRC DAAC operators to send multiple requests to the TSDIS and the SDPF, and to receive corresponding acknowledgment messages. The transmission of data products (or simulated data products) is tested for the GSFC, MSFC and LaRC DAACs that interface with the TSDIS and/or the SDPF.

The desired results are verification of the capability of the DAACs to send sequential messages to and receive acknowledgment messages from the TRMM processing facilities. The Demonstration method is used to verify the capability to send multiple requests and to receive multiple corresponding acknowledgment messages.

To exercise these capabilities simulated multiple messages in proper format are needed for transmission from the DAACs to the appropriate processing facility (e.g., the SDPF, the LaRC or the TSDIS). Also needed is a test script indicating the order of DAAC message transmission and generating sequential message transmission by the DAACs to the respective processing facilities.

Once the receiving system obtains the message, a proper acknowledgment is returned to the sender verifying that the original message was received and interpreted properly.

12.2.3.2 Test Case A120230.020–Multiple L0 Data Set Processing, Storage and Distribution

The Multiple L0 Data Set Processing, Storage and Distribution Test verifies the capabilities of the SDPF to distribute level 0 TRMM data to TSDIS, to the MSFC DAAC and to the LaRC DAAC for higher level processing and/or storage; to store the TSDIS higher level TRMM products at the prescribed GSFC DAAC or MSFC DAAC; and to distribute the TRMM data from the GSFC, the MSFC and the LaRC. Each DAAC user/operator is able to request, receive, process, store and distribute level 0 data and to request level 0 data reprocessing in a multi-site operational environment. The Test method is used to verify these capabilities.

To exercise these capabilities simulated data request messages of correct format are needed. Also, a script specifying the order of L0 data requests and generating sequential data request messages is required.

The expected results are verification that the ECS DAAC operators can request from the SDPF and the TSDIS L0 data sets and that the responding elements (SDPF and TSDIS or their simulators) reply with appropriate data sets in response.

12.2.3.3 Test Case A120230.040–Multi-DAAC Data Operations

The Multi-DAAC Data Operations Test verifies the capabilities of the ECS operators to support multiple L0 data handling, processing and storage functions in a multi-DAAC interactive environment. This test case verifies the capability of the DAACs to send sequential messages as well as a suite of randomly generated messages. In addition the test case verifies the capability of the DAAC operators to receive acknowledgment messages and to receive, store and process L0 data sets received from the SDPF. The Demonstration method is used to verify these capabilities.

To exercise these capabilities a set of data request messages of the correct format and a test script which sequentially generates multiple data request messages are required. Also required are a script for generation of a random sequence of data request messages and a system monitoring and accounting function to keep track of and monitor the ongoing multi-DAAC operations and data handling functions.

The expected results are verification that the ECS operators and the ECS DAACs can receive multiple sequential and random data requests, data processing requests and data storage operations in an interactive operational environment.

12.2.4 Data Distribution Sequence

This sequence has two purposes—to verify that multiple data distributions can be performed and to verify the ability of ECS to perform data accounting for new data as well as data updates due to reprocessed data.

This sequence of tests verifies the ECS capability to distribute standard TRMM products for CERES, LIS, VIRS, PR, TMI and GV to users at the SCFs. This sequence also confirms the capability of the ECS to distribute the VIRS, PR, TMI and GV metadata and browse data products, as well as any stored CERES and LIS metadata and browse data, to the SCFs. This sequence tests the capability of the ECS to distribute and manage multiple data distributions for ECS users.

This sequence of tests also demonstrates the ECS capability to perform data accounting of L0, L1A-L3B, ancillary data, metadata, browse data, algorithms and documentation. This includes accounting for new data received, as well as data updates (the result of reprocessing) and data deletions.

12.2.4.1 Test Case A120240.010–Multiple Data Product Distribution

The Multiple Data Product Distribution Test verifies that ECS can distribute multiple standard TRMM (CERES, LIS, VIRS, PR, TMI and GV) data files and products from the DAACs (GSFC, MSFC and LaRC) to users at the SCFs. Standard data products and files include level 1A through level 3B, browse data, metadata, algorithms and documentation. The desired results are for multiple standard data products and files to be distributed from the DAACs (GSFC, MSFC and LaRC) to the SCF users. The Demonstration method is used to verify these capabilities.

To exercise these capabilities multiple requests from multiple SCF users for standard TRMM data products and files from the ECS are required. These sequential requests include several requests for standard products at the MSFC DAAC, since standard data products and files from LIS, PR, TMI and GV reside at this DAAC. Several requests are required for CERES standard data products and files which reside at LaRC DAAC, and several requests for VIRS standard data products and files which reside at GSFC DAAC.

The expected results are for all the SCF users who requested standard data products and files to receive the desired products and files, even though multiple requests for products and files were made.

12.2.4.2 Test Case A120240.020–Data Product/Data Receipt Accounting

The Data Product/Data Receipt Accounting Test verifies the ECS's ability to perform data accounting for the level 0, level 1A through level 1B, ancillary data, metadata, browse data, algorithms and documentation. Data accounting includes new data, data updates due to reprocessed data as well as data deletion after 6 months; unless the ECS is directed by the appropriate authority not to delete data. The Demonstration method is used to verify these capabilities.

To exercise these capabilities ancillary data, level 0 data from CERES and LIS and level 1A through 3B data, metadata, browse data, algorithms and documentation from VIRS, PR, TMI and GV are to be requested by the appropriate ECS DAACs.

The expected results are for ECS DAACs to account for all of the data archived, update archived data as reprocessed data becomes available and delete data that is 6 months old.

12.3 Landsat 7 End-to-End Scenario

The Landsat 7 scenario verifies the TRMM Release end-to-end ECS operational capabilities to support the Landsat 7 project. This scenario verifies the interface between the Landsat 7 project and the EDC DAAC which for the TRMM Release A involves the EDC limited capability to receive, interpret and temporarily store data.

12.3.1 Landsat 7 Project to EDC DAAC Message and Data Traffic Sequence

This sequence tests the Landsat 7 project interface with the EDC DAAC. This sequence confirms the capabilities for the EDC to submit requests and obtain results for directory, guide, level 0R inventory, level 0R browse and level 0R data .

12.3.1.1 Test Case A120310.020–Landsat 7 Directory, Guide, Inventory, Browse Information and Level 0R Data

The Landsat 7 Directory, Guide, Inventory, Browse Information and Level 0R Data test verifies the requirements relating to EDC requesting and receiving Landsat 7 directory, guide, level 0R inventory, level 0R browse information and level 0R data. This test case verifies the capability to request directory, guide, level 0R inventory and level 0R browse information and to receive the desired information from the EDC DAAC. This test case also verifies the temporary storage of data. The Test method is used to verify these capabilities.

To exercise these capabilities requests are submitted for Landsat 7 directory, guide, level 0R inventory, level 0R browse information and level 0R data.

The expected results for each of the five types of requests are described: For a Landsat 7 directory request the result is a brief concise high-level information about Landsat 7 datasets; For a Landsat 7 guide request the result is a detailed description about Landsat 7 datasets, platforms, sensors and projects; For a Landsat 7 level 0R inventory request the results provides descriptions of collections of observations of Landsat 7 level 0R data that are available from the data archive; For a Landsat 7 level 0R browse request the result is the retrieval of a reduced resolution Landsat 7 data image; For a Landsat 7 level 0R data request the result is Landsat 7 level 0R data. Landsat 7 data products will only be temporarily stored.

12.4 AM-1 End-to-End Scenario

The ECS needs to support the AM-1 mission by Release B. This scenario confirms that by the TRMM Release, the ECS already has the basic required external interfaces, FOS functional infrastructure and FOS operational procedures in place. This scenario builds upon the methodical, detailed verification of FOS capabilities described in Section 11. This scenario consists of performing an end-to-end sequential set of mission support operations to demonstrate the required FOS AM-1 mission support infrastructure.

This scenario confirms the capability of the ECS to support sequential flight operational activities likely to be performed during a "day in the life" of the AM-1 spacecraft, including planning and scheduling, communications coordination, command management, command uplink, telemetry receipt and processing and health and safety monitoring. Also demonstrated are end-to-end mission planning, scheduling and commanding, while also supporting background mission plan and resource schedule development.

The scenario verifies the ECS capabilities to access stored mission data and plans, develop and/or update mission resource profiles and schedules, coordinate with the NCC for TDRSS return and uplink services, obtain necessary orbit and attitude data from the FDF, coordinate with the ASTER ICC, if needed, and generate and execute simulated command sequences, while also supporting ongoing mission planning. The integrated usage of EOC and IST workstations is also demonstrated.

12.4.1 FOS End-to-End Sequence

This sequence verifies the ECS capability to support AM-1 mission planning & scheduling, communications coordination; command generation, management and uplink; and mission activity monitoring and control. These activities are performed in conjunction with ongoing AM-1 support occurring at active EOC and IST user stations. The AM-1 mission support activity includes TDRSS return and uplink service scheduling via the NCC; receipt of orbit and attitude data from the FDF; real-time spacecraft and instrument telemetry processing and health and safety monitoring; ASTER-ICC command coordination, if needed; and AM-1 spacecraft/instrument analysis. The capability to uplink command data to EDOS and verify receipt status from EDOS is also demonstrated.

The capability of both the EOC and the IST stations to support the AM-1 the development of new or updated mission plans and schedules, without impact to the ongoing real-time mission support functions, is demonstrated.

12.4.1.1 Test Case A120410.010-AM-1 Mission Initiation Support

This AM-1 Mission Initiation Support test case verifies by demonstration that the FOS can activate and execute a simulated AM-1 mission plan. Operators at the EOC and at an IST workstation coordinate to retrieve existing planning information, obtain from the FDF updated orbit and attitude data, coordinate with the NCC to schedule needed uplink and telemetry downlink TDRSS services, generate mission plan and schedule updates as warranted, and generate and send new (simulated) commands to the AM-1 spacecraft and instruments. The capabilities to receive, store and interpret simulated return link telemetry data and safety and housekeeping data are also demonstrated.

12.4.1.2 Test Case A120410.020-Coincident AM-1 Mission Support and Planning

The Coincident AM-1 Mission Support and Planning test case demonstrates the FOS capability to perform and manage AM-1 activity and resource planning & scheduling; to transform plans & schedules into command uplink data for use by the AM-1 spacecraft; and at the same time to support a simulated real-time AM-1 mission, as demonstrated in the previous test case.

Both real-time and non-real time AM-1 support activity will be performed at the same time to demonstrate that the execution of one operational activity does not affect concurrent development planning. The capability to receive and process multiple telemetry streams during real-time commanding and to perform real-time telemetry monitoring at EOC and IST user stations will be demonstrated. To execute this test case, we require FOS planning & scheduling information (ephemerides, orbital information, etc.), NCC schedule messages, FDF test messages, resource and activity schedules, simulated AM-1 spacecraft/instrument commands at EOC and IST user stations and simulated resource and activity planning updates.

12.5 Science Data Access and Interoperability Scenario

This scenario demonstrates that an EOS investigator can access, receive, exchange, process and store assorted data sets and information among ECS DAAC sites, the Version 0 System and the NOAA ADC. The scenario confirms that a scientist can perform multi-site data search and retrieval; can retrieve science algorithms and produce science data products; and can store the data products and associated metadata in formats compatible with these systems. The scenario describes the sequential process of searching for and accessing input data sets, including any required ancillary data; manipulating and analyzing these data sets; using corresponding algorithms to develop data products; generating and/or updating metadata descriptions of these products; and storing these products and the new metadata in standard formats within the ECS. This scenario also confirms catalog interoperability between the ECS DAACs, the V0 DAACs and the NOAA ADC.

12.5.1 Science Data Search and Retrieval Sequence

This sequence of tests verifies that a science user can perform a sequential, multi-site search for selected data sets required to perform a desired science analysis. The scientist searches on-line catalogs and directories among data stored within the ECS DAACs, the V0 DAACs and the NOAA ADC to find the data relevant to the science analysis to be performed. The scenario confirms the scientist's ability to request and receive these data using specified data set search characteristics, and to temporarily store these data for subsequent analysis and for higher level data product generation.

12.5.1.1 Test Case A120510.010–Multi-Site Data Search and Access

The Multi-Site Data Search and Access test verifies the ECS user's capability to perform data search and data access among several different sites. The user specifies the data set characteristics and selection criteria and performs sequential searches over the ECS DAACs, the V0 DAACs and the NOAA ADC. Upon finding data sets matching the specified criteria, the user submits requests to each system containing desired data for that system to send the data to the user. The number of different data searches and the types of data selection criteria are varied to test a broad range of data archive searches and a variety of data matches for retrieval.

12.5.1.2 Test Case A120510.020–Data Receipt and Data Storage

The Data Receipt and Data Storage test verifies that for each data set found which matches the selection criteria specified, the recipient data system sends the requested data to the user, so that the user can subsequently read and interpret the data received. Also confirmed is that the ECS can temporarily store these data for the user for subsequent analysis and processing. A number of data sets among the ECS DAACs, the V0 DAACs and the NOAA ADC will have data which match the criteria. Subsequently, these sites receive the user's data request and send to the user the requested data set(s). The capability of the ECS to store and retrieve a number of diverse data sets is confirmed.

12.5.1.3 Test Case A120510.030-Science Ancillary Data Access

The Science Ancillary Data Access test verifies the ECS user's capability to query, request and receive ancillary science data sets from other DAACs and the NOAA ADC. The user has access to both the NOAA Satellite Active Archives (SAAs) and the NOAA National Meteorological Center (NMC) ancillary data.

This test case verifies the capability of the ECS operators to poll, archive and process ancillary data sets received from the ECS DAACs and the NOAA ADC. The ancillary data sets are provided in mutually agreed upon formats. The Demonstration method is used to verify these capabilities. To exercise these capabilities different sets of ancillary data products need to be made available to the ECS for use in accessing and in standard product generation.

The expected results are for the ECS to: 1) receive and interpret the ancillary data products and 2) store the ancillary data sets for subsequent use in producing and then archiving the standard data products.

The test case verifies the capability of the ECS user to poll, receive and archive NOAA SAA and NMC ancillary data. The provision by the SAA and NMC to the ECS of a list of operationally available data sets needed for standard product generation is verified. The Test method is used to verify these capabilities. The ECS polls the NOAA facilities for the availability of desired ancillary data products. Once ancillary products are found, requests are made from the ECS for those particular ancillary data files needed for ECS standard product generation. The ECS requests those ancillary data products required for product generation. These ancillary data products are delivered to ECS and are archived and used for producing standard higher level data products.

12.5.2 Science Data Product Production Sequence

This sequence demonstrates the science user's ability to search and retrieve required data processing algorithms from within the ECS, including related tool kits and supporting on-line documentation, in order to produce higher level science products. Sample algorithms are retrieved and simple products are produced in this sequence. The compatibility of the products with ECS standards is confirmed. A couple of representative science algorithms are selected for this test using representative science data sets, in order to confirm this capability. An exhaustive check of many algorithms using a comprehensive set of sample data is not planned.

12.5.2.1 Test Case A120520.010–Science Algorithm Retrieval and Compatibility

The Science Algorithm Retrieval and Compatibility test confirms the capability of the user to request an operating version of one or more relevant science data processing algorithms for the data requested above. This test case checks and confirms that the proper algorithms are received, have the required supporting documentation and toolkit capabilities and can run in the ECS environment to perform higher level data processing.

12.5.3 Science Metadata Production and Storage Sequence

This sequence of tests verifies the ECS's capability to store new and/or update existing metadata descriptions of the produced products. Subsequent to the scientist producing the higher level data products, the ECS will store in the ECS archives the new or updated metadata as well as the data products produced. Also verified is that the produced data products and metadata are in a format suitable for retrieval by other users.

12.5.3.1 Test Case A120530.010–Metadata Production and Updating

The Metadata Production and Updating test confirms the capability of the ECS to store new and/ or update existing metadata descriptions for the data products generated in the previous sequence. A representative sample of data sets will be selected, which have both new metadata as well as updated metadata to be stored. A representative sample of metadata data sets is needed for this portion of the test.

12.5.3.2 Test Case A120530.020–Metadata Storage and Retrieval

The Metadata Storage and Retrieval test verifies that the ECS can store and subsequently retrieve the generated data products and their associated metadata. Data sets will be generated and stored at the ECS DAACs. Access to these data will be from the other DAACs.

12.5.4 ECS Data Set Interoperability Sequence

This sequence confirms the ECS user's capability to exchange data and information among the ECS DAACs, the V0 DAAC and the NOAA ADC via data and catalog interoperability. Exchange information includes: advertising information (directory-level information about data sets); data holdings of ECS and the DAACs and the NOAA ADC; data search/search results; inventory, guide and browse information; user authentication; and product requests. Only HDF standard data formatted data is used in this sequence.

12.5.4.1 Test Case A120540.010–ECS DAAC and V0 DAAC Interoperability

The ECS DAAC and V0 DAAC Interoperability Test verifies the ECS DAACs to V0 DAACs interface supports catalog and data set interoperability. This interface supports advertising information, user authentication, data search, data search results (inventory, guide and browse), user authentication requests, product requests and ancillary data delivery. Other functions of the interface are: the successful exchange of advertising information between ECS DAACs and the V0 DAACs, and the receipt by the requesting system of the desired results such as guide and inventory query results, browse results, user authentication information and product delivery status.

The Demonstration method is used to verify the catalog interoperability, while the Test method is used to verify the interface supports advertising information, user authentication, data search, data search results (inventory, guide and browse), cost estimate requests, user authentication requests, product requests and data delivery.

12.5.4.2 Test Case A120540.02–NOAA Data Centers/ECS DAAC Interoperability

The NOAA Data Centers/ECS DAAC Interoperability test verifies the capability to exchange data among these sites. The NOAA Data Centers consist of three data centers which archive retrospective data. The NOAA Data Centers are: the National Oceanic Data Center (NODC), the

National Geophysical Data Center (NGDC), and the National Climatic Data Center (NCDC). The NOAA Data Centers/ECS Interoperability Test verifies the NOAA Data Centers interface with the ECS and the ECS DAACs supports data and catalog interoperability. This interface enables ECS users to receive advertising information about the data holdings and the option to link to the information systems of the NOAA Data Centers. The Demonstration method is used to verify these capabilities.

12.6 System Performance Scenario

The system performance scenario demonstrates overall ECS performance capabilities as well as the ability of ECS to expand and evolve without changes to design. The focus is on performance measures which are distributed among several elements and cannot be confirmed by single element testing. An example is the ECS end-to-end response time in commanding an instrument to return core data. Other performance measures are the ability to handling triple the average daily rate of science data, handling transactions and processing within prescribed response time envelops, confirming archiving capacity of DAACs, and archiving triple the average daily rate of science data and distributing data within the required times.

The performance requirements, as specified in ECS documentation, are verified under specified operational conditions. The emphasis is on testing in a simulated or near real operational environment, typifying moderately loaded and busy system conditions. Response time, archiving capacity and expansion capability performance measures are emphasized.

The scenario verifies the ECS capability to generate and gather statistics and measure performance pertaining to DAAC operations and end-to-end message traffic. Measurement and analysis of the message traffic, resource utilization and operational statistics are used to confirm ECS system performance.

12.6.1 Data Ingest, Data Server and Data Distribution Performance Sequence

This sequence of tests demonstrates the capability of the ECS to ingest, archive and retrieve high rate data messages and data traffic. This sequence demonstrates that ECS can ingest the maximal bandwidth of science data from a L0 data facility (the SDPF or TSDIS) and can also receive and handle triple the average daily rate of science data. This sequence confirms the archiving capacity of the DAACs, the ECS capability to archive triple the average daily rate of science data and the capability of users to retrieve these data within required times.

This sequence also confirms the performance capabilities related to reprocessing data, such as the ability of ECS to send two days worth of archived ancillary data to TSDIS. Another important capability is verified and that is the ability of ECS to ingest an average of two days worth of reprocessed data from TSDIS.

This sequence also confirms the ECS capabilities to request stored correlative and ancillary data, along with L1A-L3B VIRS, PR, TMI and GV data for data reprocessing at TSDIS. The reprocessed data at TSDIS are then retrieved by the appropriate DAAC for archiving. The capability to retrieve and archive reprocessed L1A-L3B VIRS data at the GSFC DAAC and, similarly, the reprocessed PR, TMI and GV data at the MSFC DAAC is confirmed. This sequence

confirms the ECS capabilities to reprocess CERES and LIS data products at the LaRC and MSFC respectively. User access to the data archived at GSFC, LaRC and MSFC DAACs is also confirmed.

This scenario also confirms the capabilities to access and send correlative and ancillary data, as well as stored L1A-L3B data sets from the ECS back to the TSDIS for use by the TSDIS for data processing and data reprocessing. Finally, this scenario verifies the capability of ECS to support multiple, sequential data transfer, processing and reprocessing requests.

12.6.1.1 Test Case A120610.010–High Data Rate Ingest, Archiving and Retrieval

This High Data Rate Ingest, Archiving and Retrieval test case verifies ECS ingest, archiving and retrieval performance requirements. For the TRMM Release, there is no L0 data from the LPS or the EDOS, as the L-7 and AM-1 missions are not yet active; only interface testing for LPS and EDOS is required. The ability to handle the maximal bandwidths from the SDPF and the TSDIS for TRMM is tested. Also, the capability of each TRMM Release DAAC to retrieve for distribution the archived data within required response times is tested. Finally, analysis and test are used to verify that the ECS SDPS is capable of supporting 24 hours per day, 7 days per week data operations and that each ECS element can support end-to-end test and verification activities during the pre-launch, the spacecraft verification and the instrument verification phases. Also, each DAAC shall provide archiving capacity for the current volume plus one year.

The demonstration, test and analysis methods are used to verify these capabilities. To execute this test case, a set of TRMM mission profiles describing the data types, rates and duty cycles, with estimates of the likely daily maximal data rates of these data, are needed. Information on the communication network maximal bandwidths are also necessary to assure that these limits are stressed, but not exceeded. Also required are simulated data driver software to generate simulated high rate data streams of correct data type mix and format(s) to perform these tests. A summary list of required data retrieval response times for each DAAC is also needed as a performance measure of archiving retrieval capability. Also required are a summary of operational and test support requirements and scenarios during mission pre launch and instrument check-out phases.

The desired results are confirmations of the ECS capabilities to handle the maximum bandwidths of data from the SDPF and the TSDIS L0 data systems. Additional expected results from this test case are system performance indicators and performance statistics confirming that the ECS and the respective DAACs can ingest and archive data at these maximal rates, can retrieve these data within required response times and can support mission operations and check-out activities on an ongoing basis.

12.6.1.2 Test Case A120610.020– Ingest and Archiving of Triple the Average Daily Data Rate

This Ingest and Archiving of Triple the Average Daily Data Rate test case verifies the ECS DAAC capability to ingest data from the SDPF or the TSDIS at triple the average daily rate and to be able to archive this amount of data per day. The capability to retrieve these data within required response times is also tested. If triple the average daily rate requires exceeding the maximal ingest rate, then the maximal ingest rate for one day's duration will be tested. If triple the average daily rate is much less than the maximal rate, the total required data will be ingested at the maximal rate until three times the daily volume of data is ingested.

Analysis and demonstration are the primary methods used to confirm these capabilities. To execute this test case, a set of TRMM mission profiles describing the data types, rates and duty cycles, with estimates of the maximal and average daily data rates for these data per DAAC, are needed. Information on the communication network maximal bandwidths are also necessary to assure that these limits are not exceeded. Also required are simulated data driver software to generate simulated high rate data streams of correct data type mix and format(s) to achieve three times the average daily data rates for each DAAC from each L0 facility for each TRMM experiment. A summary list of required data retrieval response times for each DAAC is used as a performance measure of archiving retrieval capability.

The expected results from this test case are confirmation that each DAAC can ingest and archive data at up to three times the average daily rates and can retrieve these data within required response times. The capability to archive within 24 hours the 'triple the average daily rate' data stream is required to assure that the DAACs can keep up with this high data rate ingest for an extended period, if necessary.

12.6.1.3 Test Case A120610.030–GSFC DAAC Data Reprocessing Support and Archiving

The GSFC DAAC Data Reprocessing Support and Archiving Test verifies that two days worth of archived ancillary data are sent by ECS via standing order and that other data (VIRS level 1A, level 1B to 3B and browse) are sent upon user request to TSDIS for reprocessing. The desired results are for the ancillary and correlative data and other data needed for reprocessing of data sets to be successfully sent to TSDIS where reprocessed products are created. Reprocessed data products include: level 1A, level 1B to 3B, and browse data. Following the creation of reprocessed data products, the ECS shall ingest on the average two days worth of reprocessed data from TSDIS. The Test method is used to verify the reprocessing and archiving of the data products.

To exercise these capabilities standing orders need to be submitted for VIRS ancillary and correlative data and user requests need to be submitted for appropriate data sets desired for reprocessing from the GSFC DAAC.

Once the required data are retrieved by TSDIS, it can reprocess the data. The reprocessed data products are then retrieved (via file transfer) and archived by the GSFC DAAC where users can request and search for desired reprocessed data products.

12.6.1.4 Test Case A120610.040–MSFC DAAC Data Reprocessing Support and Archiving

The MSFC DAAC Data Reprocessing Support and Archiving Test verifies that ancillary and correlative data concerning PR, TMI, GV and SSM/I are sent by ECS via standing order and other data (level 1A, levels 1B to 3B and browse) are sent upon user request to TSDIS for reprocessing. The desired results are for ECS to deliver daily to TSDIS an average of two days worth of archived ancillary and correlative data and other data needed for reprocessing of PR, TMI, and GV data sets. TSDIS will then create reprocessed data products. Reprocessed data products include: level 1A, level 1B to 3B, and browse data. Following the creation of reprocessed data products, ECS shall ingest an average of two days worth of reprocessed data from TSDIS. Also, the ability of the ECS

to retrieve the archived definitive LIS data for reprocessing is confirmed. The ability to reprocess the LIS data at twice the incoming data rate (at a minimum) while concurrently processing new data is confirmed. The Test method is used to verify the reprocessing and archiving of the data.

To exercise these capabilities standing orders need to be submitted for appropriate PR, TMI, GV and SSM/I ancillary and correlative data sets and user requests need to be submitted for other data sets required for reprocessing from the MSFC DAAC.

Once the required data are retrieved by TSDIS, the data can be reprocessed at TSDIS. The reprocessed data products are then retrieved (via file transfer) and archived by the MSFC DAAC where users can then request and search for desired reprocessed data products.

12.6.1.5 Test Case A120610.050–LaRC DAAC Data Reprocessing Support and Archiving

The LaRC DAAC Data Reprocessing Support and Archiving Test verifies the ability of the ECS to retrieve the archived definitive CERES data for reprocessing. The ability to reprocess the CERES data at twice the incoming data rate (at a minimum) while concurrently processing new data is confirmed. Once the data is reprocessed the data is archive for users to access. The Test method is used to verify the reprocessing and archiving of the data.

To exercise these capabilities a data loss of CERES level 1A data at the LaRC needs to be simulated and then CERES data can be reprocessed from the archived definitive orbit data. Once the CERES data are reprocessed and archived at the LaRC then users can request and search for desired reprocessed data products.

12.6.1.6 Test Case A120610.060–Multiple Data Reprocessing Request

The Multiple Data Reprocessing Request Test verifies the ECS DAAC capabilities to send to TSDIS and to the SDPF multiple messages requesting reprocessing of Level 0 data. The desired results are verification of the DAAC-L0 processing facility interfaces for data reprocessing requests. The Test method is used to verify these capabilities.

To exercise these capabilities simulated data processing request messages and a script to generate multiple data reprocessing request messages is required.

The expected results are verification of the capability of the DAACs to send and to receive acknowledgments to multiple data reprocessing request messages.

12.6.2 System Response Time Performance Sequence

This sequence of tests demonstrates the capability of the ECS to perform client server transaction handling and processing within prescribed response time envelopes. These tests confirm the ECS capabilities to handle the daily specified data volume, processing load and storage volume requirements, and to perform specified numbers of log-ons per hour, single and multiple keyword searches per hour and status checks per hour. The ability of ECS users to perform the required maximum number of browse data retrievals, document searches and order submissions and confirmations per hour is also confirmed. The ECS capability to generate and distribute Level 1 through Level 4 standard data products within prescribed times is also tested.

This sequence demonstrates the capability of the ECS to perform key data access, processing, transmission and retrieval functions within required response time envelopes. The DAACs send data and multiple data reprocessing request messages to the EDOS, LPS, TSDIS and the SDPF. Response time performance is verified for receipt of and response to these multiple data messages. The capability of the DAACs to receive Level 0 data transfers in an operational environment and the capability to receive data availability messages from the TSDIS and the SDPF are also demonstrated.

This sequence also verifies the capability of each DAAC, the SMC and the EOC to gather statistics and performance measures pertaining to multi-DAAC operations and end-to-end message traffic. The status data gathered by each site are sent to the SMC for subsequent analysis. This sequence confirms the capability to transfer integration, testing, simulation, maintenance, logistics and training status data and data orders. This sequence also tests the capability to transfer resource usage data, including CPU utilization, user storage, connect time and session history data.

12.6.2.1 Test Case A120620.010–Client-Server Response Time Performance

This test case verifies the required capability of the ECS to perform client server transaction handling and processing within prescribed response time envelopes. These tests verify the ECS capabilities to handle the daily specified data volume, processing load and storage volume requirements, and to perform specified numbers of log-ons per hour, single and multiple keyword searches per hour and status checks per hour. The ECS capabilities to perform the required maximum number of browse data retrievals, document searches and order submissions and confirmations per hour are also verified. The ECS capability to generate and distribute to users Level 1 through Level 4 standard data products within specified time periods is also confirmed.

The test, demonstration and analysis methods are used to verify these capabilities. The inputs for this test case consist of a summary of ECS client-server loads and response time requirements, relevant operational scenarios for which these requirements are applicable, and simulation software to generate multiple client-server messages in accord with the relevant operational scenarios. A test script generating sequential log-ons, keyword searches, status checks, browse data requests and retrievals, document searches and order submissions is also required.

Desired results include the confirmation that the ECS can satisfy specified numbers of client-server interactions within required response time parameters. Expected results from this test case also are confirmation that the ECS can support daily data volume, processing load and storage volume requirements and can meet required client-server transaction volume and response time performance for likely operational scenarios and operating conditions.

12.6.2.2 Test Case A120620.020–Data Access, Retrieval and Transmission Performance

This test case verifies the capability of the ECS to perform key data access, transmission and retrieval functions over communication networks at required rates and within required response time envelopes in support of data production and data distribution. These tests verify the DAAC capabilities to send data reprocessing request messages to the EDOS, LPS, TSDIS and the SDPF. The tests verify response time performance for receipt of and response to these data messages. The capability of the DAACs to receive Level 0 data transfers in an operational environment and the

capability to receive data availability messages from the TSDIS and the SDPF are also verified. Included are tests to confirm that the ECS contribution to end-to-end loop delay for emergency real-time commands in a typical ECS operational environment is less than 2.5 seconds.

This test case uses test, inspection, demonstration and analysis verification methods. It verifies that the EOC can receive real-time data from EDOS at up to a 1.1 Mbps rate and can receive TDRSS Service Session (TSS) Summary reports from EDOS. The inspection method will be used to verify for interface testing only that each DAAC can store EDOS level 0 data sets for the required amount of time. Also confirmed are the capabilities of the SMC, the MSFC DAAC and the GSFC DAAC to receive operations management data from EDOS at up to 50 kbps and to receive Production Data Set (PDS) delivery records from the EDOS. The test case also verifies that ECS can generate and make available on physical media Level 1 through Level 3 data products within 24 hours of input data availability and Level 4 data products within one week of input data availability. Furthermore, this test case verifies that ECS can create media tapes at a rate equivalent to the level 0 ingest rate.

The inputs for this test case consist of a summary of required messages/requests in correct formats, system response time requirements, operational scenarios and test scripts to generate simulated message traffic performing the desired ECS access, transmission and retrieval functions.

The desired results are the verification of the ECS to perform data access, data transmission, data retrieval functions within required response time performance parameters.

12.6.2.3 Test Case A120620.030–Performance Statistics Data Gathering

This test case verifies the capability of each DAAC, the SMC, the ESN and the EOC to generate and gather statistics to measure performance pertaining to multi-DAAC operations and end-to-end message traffic. This test case demonstrates the capability to transfer integration, testing, simulation, QA, maintenance, logistics and training status data and the capability to transfer data orders. This test case also confirms the capability to transfer resource usage data, including CPU utilization, user storage, connect time and session history data. This test case confirms the SMC capabilities to generate requests for performance data, to maintain and evaluate a broad array of performance measures, to establish performance alert thresholds and to generate performance alerts upon detection of system performance degradation. This test case also verifies the SMC capabilities to detect and respond to system faults within 5 minutes and to detect and respond to system security compromises within 5 minutes. Analysis is used to show that the PDPS has the capacity to support I/O to temporary storage, I/O to intermediate storage or I/O to multiple passes by individual science algorithms. The Demonstration method is used to show each DAAC can distribute QA data to the collocated PDPS within one hour from the time the QA data is produced.

The inputs for this test case consist of real or simulated sets of operational data (integration, testing, simulation, maintenance, logistics and training) for exchange among the DAACs, the SMC, the EDOS and the EOC; a script and an realistic operational scenario under which such types of data will be exchanged; a set of simulated data orders; and a script for collecting and exchanging resource usage data (CPU utilization, user storage, connect time and session history data), and a scenario for generating and collecting resource performance data and system fault and security compromise data.

The desired result is the verification of the ECS capability to gather and exchange performance statistics among ECS sites to support system performance monitoring. The expected results from this test include verification of the ECS and SMC capabilities to exchange data among the DAACs, to collect performance statistics data, to respond to performance anomalies and to generate and track data orders. Another desired result is that the PDPS has the capacity to support input and output to temporary and intermediate storage as well as support multiple passes as required by science algorithms. Also, expected is that the PDPS can retrieve QA data from its DAAC within one hour after the data is produced.

12.6.3 ECS Sizing, Evolution and Growth Sequence

This sequence verifies by analysis the ECS capability to accommodate an expansion of PDPS capabilities by a factor of 10 without major design changes, and to provide four times the normal processing capability to process all relevant EOS science data. These analyses shall extend beyond estimated capabilities for the TRMM Release through the contract lifetime. Analyses are used to verify the capability of each PDPS site to utilize the full processing capability of that site, including parallel processing and processing of any mix of algorithms.

Additional analyses verify that the ECS PDPS has adequate growth and evolution capabilities. Similarly, analyses verify that the PDPS has adequate processing expansion capabilities to handle multiple data loads and to support multiple algorithm computations. Analysis is also used to verify the ECS capability to support science algorithm I/O operations.

Analyses also confirm the capability of the ECS networks to accommodate expansions in required data traffic and data storage and to be able to accommodate interfaces with the Global Change Data and Information System (GCDIS).

12.6.3.1 Test Case A120630.010–Accommodation of ECS Expansion Analyses

These analyses verify the capabilities of the ECS to accommodate an expansion of PDPS capabilities by a factor of 10 without major design changes, and to provide four times the normal processing capability to process all relevant EOS science data. Analyses are performed to verify projected PDPS capabilities will be adequate through the contract lifetime. Analyses also verify that each PDPS site can utilize the full processing capability of that site, including parallel processing and processing of any mix of likely algorithms. This test case also analyzes and confirms the capability of the ECS to accommodate growth in instrument processing loads, to expand up to three times the processing capacity of PDPS without changing the processing design and to increase the associated storage capacities with no required change in ECS architecture or design. Analysis is performed to show that for sizing purposes the PGS CPU processing rates are not greater than 25% of the peak-related CPU capacity. Based on data volumes, at-launch instrument processing load requirements assigned to each DAAC and on a 20 % yearly product growth, analysis is used to determine the processing capacity necessary to process all EOS science data for each PGS.

Additional demonstrations and analysis also verify that the ECS can expand to enable GByte networks and their corresponding increased data volume and data distribution requirements. Also, the capability of the ESN to expand to meet these increased data loads is evaluated and confirmed.

The inputs for these analyses consist of the projected processing loads on each PDPS processor and the current and maximal processing capabilities of each site processor. Also needed are a likely mix of algorithms which may be executed concurrently at each site and the maximal computational load which each of these algorithms will place on the PDPS processor(s). The baseline PDPS design and supporting analyses of the likely expandability of processor capabilities within current and future technologies are needed to assess whether any design modifications may be required to meet expanded processor loads. Additional inputs of projected data volume and data distribution loads and projected network capacities are needed to support network adequacy analyses.

The desired results are verification of the robust and expandable capabilities of the ECS, to handle much greater processing and storage loads, without requiring redesign. Additional expected results from these analyses are verification by analysis of the projected capability of the PDPS processing elements to meet up to ten times required capabilities and up to four times normal processing requirements without major redesign efforts.

12.6.3.2 Test Case A120630.020–ECS Growth and Evolution Adequacy Analyses

These analyses verify the evolutionary and growth requirements of the ECS. The analyses verify that the PDPS can evolve to meet the future ECS processing requirements, can handle multiple data loads, multiple algorithm computations and can support the required science algorithm input/ output operations. The analyses confirm the capability of the ECS to interface with the GCDIS and that processing capabilities are spread over different computers to provide a 'failsoft' environment. Additional analyses confirm that the ECS hardware, software and interface capabilities are transportable among homogenous site architecture.

The inputs for these analyses consist of summaries of the current and future ECS processing requirements, current processor processing capabilities and future technology projections for relevant PDPS type processors. Summary data of GCDIS interface and loading requirements are also needed.

The desired results are the verification by analysis that the ECS can evolve and grow to meet future processing, storage and interfacing requirements. Expected results from these analyses include the verification by analysis of the capability for the PDPS to gracefully evolve and grow to meet projected future ECS processing requirements. The capability of the ECS to interface with the GCDIS is also confirmed.

Abbreviations and Acronyms

ADC	Affiliated Data Center
AI&T	Algorithm Integration and Test
AITT	Algorithm Integration and Test Team
AM-1	EOS AM Project (morning spacecraft series)
API	application programming interface
ARP	address resolution protocols
ASF	Alaska SAR Facility (DAAC)
ASTER-	Advanced Spaceborne Thermal Emission and Reflection Radiometer (formerly ITIR)
ATC	Actual Time Command
ATP	Acceptance Test Plan
ATPR	Acceptance Test Procedures
ATT	Acceptance Test Team
AVHRR	Advanced Very High Resolution Radiometer
BGP	boundary gateway protocol
CASE	Computer Aided Software Engineering
CAST	Computer Aided Software Test
CCR	Configuration Change Request
CCSDS	Consultative Committee for Space Data Systems
CDRL	Contract Data Requirements List
CERES	Clouds and Earth's Radiant Energy System
CIESIN	Consortium for International Earth Science Information Network
CM	Configuration Management
cmi	continuous measurable improvement
CMO	Configuration Management Office
COTR	Contracting Officer's Technical Representative
COTS	Commercial Off-The-Shelf (hardware or software)
CSR	Consent to Ship Review
CZCS	Coastal Zone Color Scanner

DAAC	Distributed Active Archive Center
DAS	Daily Activity Schedule
DCN	Document Change Notice
DHF	Data Handling Facility
DID	Data Item Description
DIT	Data Ingest Technician
DIF	Data Interface Facility (EDOS);
DSA	directory service agent
DSN	Deep Space Network
EAS	ECS Advertising Service
Ecom	ECS Communications
ECS	EOSDIS Core System
EDC	EROS Data Center (DAAC)
EDF	ECS Development Facility
EDHS	ECS Data Handling System
EDOS	EOS Data and Operations System
EGS	EOS Ground System
EMC	Enterprise Monitoring and Coordination
EOC	EOS Operations Center
EOS	Earth Observing System
EOSDIS	Earth Observing System Data and Information System
ERBE	Earth Radiation Budget Experiment
EROS	Earth Resources Observation System
ESDIS	Earth Science Data and Information System
ESN	ECS Science Network
ETS	EOSDIS Test System
F&PRS	Functional and Performance Requirement Specification
FDF	Flight Dynamics Facility
FOS	Flight Operations System
FOT	Flight Operations Team
FTP	File Transfer Protocol

GATT	Government Acceptance Test Team
GCDIS	Global Change Data Information System
GDS	ground data system
GN	Ground Network
GPCP	Global Precipitation Climatology Project
GPI	GOES Precipitation Index
GSFC	Goddard Space Flight Center
GUI	Graphic User Interface
GV	TRMM Ground Verification
HTML	Hypet-Text Markup Language
I/O	Input/Output
I&T	Integration and Test
IATO	Independent Acceptance Test Organization
ICMP	Internet Control Message Protocol
IDR	Incremental Design Review
IGS	International Ground Station
IMS	Information Management System
IP	Internet Protocol
IR	Interim Release
IRD	Interface Requirements Document
ISCCP	International Satellite Cloud Climatology Project
ISS	Information Subsystem
IST	Instrument Support Terminal
IV&V	Independent Verification and Validation
JPL	Jet Propulsion Laboratory
L0–L4	Level 0 through Level 4 data
L0R	Level 0 Reformatted
L-7	Landsat 7
LAN	Local Area Network
LaRC	Langley Research Center
LIS	Lighting Imaging Sensor

LSM	Local System Management
LTIP	Long Term Instrument Plan
LTSP	Long Term Spacecraft Plan
M&O	Maintenance and Operations
MDT	mean down time
MIB	Management Information Base
MIME	Multi-purpose Internet Mail Extension
MISR	Multi-Angle Imaging SpectroRadiometer
MITI	Ministry of International Trade and Industry (Japan)
MODIS	Moderate Resolution Imaging Spectrometer
MOPITT	Measurements of Pollution in the Troposphere
MSFC	Marshall Space Flight Center
MSS	Management Subsystem
NASA	National Aeronautics and Space Administration
NASCOM	NASA Communications
NCC	Network Communication Center
NCDC	National Climatic Data Center
NCR	Non Conformance Report
NGDC	National Geophysical Data Center
NLDN	National Lightening Detection Network
NMC	National Meteorological Center (NOAA)
NOAA	National Oceanic and Atmospheric Administration
NODC	National Oceanic Data Center
NOLAN	Nascom Operational Local Area Network
NRCA	Nonconformance Reporting and Corrective Action
NSI	NASA Science Internet
NSIDC	National Snow and Ice Data Center
OA	Office Automation
ODC	Other Data Center
OJT	On-the-Job Training
ORNL	Oak Ridge National Laboratory

OSI	Open Systems Interconnection
OSPF	Open Shortest Path First (routing protocol)
OTD	Optical Transient Detector
PA	Product Assurance
PDPS	Product Development and Processing System
PDR	Preliminary Design Review
PDS	Production Data Set
PR	Precipitation Radar
QA	Quality Assurance
QO	Quality Office
RIP	Routing Information Protocol (207)
RMA	Reliability, Maintainability, Availability
RRR	Release Readiness Review
RTM	Requirements & Traceability Management
S/C	spacecraft
SAA	Satellite Active Archive
SAGE	Stratospheric Aerosol and Gas Experiment
SAR	Synthetic Aperture Radar
SCC	Spacecraft Computer
SCF	Science Computing Facility
SDPF	Sensor Data Processing Facility
SDR	System Design Review
SI&T	System Integration and Test Organization
SMC	System Management Center
SME	Subject Matter Expert
SMMR	Scanning Multichannel Microwave Radiometer
SNMP	Simple Network Management Protocol
SORR	Segment Operational Readiness Review
SSM/I	Special Sensor Microwave/Imager
SSR	Solid State Recorder
SWE	Snow Water Equivalent

TB	tera-byte
TDRSS	Tracking and Data Relay Satellite System
TMI	TRMM Microwave Imager
TOMS	Total Ozone Mapping Spectometer
TOO	Target of Opportunity
TOVS-	Television Infrared Observing Satellite (TIOS) Operational Vertical Sounder
TRMM	Tropical Rainfall Measurement Mission
TRR	Test Readiness Review
TSDIS	TRMM Science Data and Information Systems
TSS	TDRSS Service Session
V0	Version 0
VIRS	Visible Infrared Scanner
WAN	Wide Area Network
WOTS	Wallops Orbital Tracking Station

Glossary

Analysis-	Technical or mathematical evaluation based on calculation, interpolation, or other analytical methods. Analysis involves the processing of accumulated data obtained from other verification methods.
Consent to Ship Review (CSR)	Review to determine the readiness of a release for transition to sites for integration testing.
Critical Design Review (CDR)-	A detailed review of the element/segment-level design, including such details as Program Design Language (PDL) for key software modules, and element interfaces associated with a release.
Demonstration-	Observation of the functional operation of the verification item in a controlled environment to yield qualitative results without the use of elaborate instrumentation or special test equipment.
Incremental Design Review (IDR)	Review conducted to evaluate segment designs associated with a release.
Inspection-	The visual, manual examination of the verification item and comparison to the applicable requirement or other compliance documentation, such as engineering drawings.
Scenario Group-	A collection of scenarios that form one of the broadest functional subdivisions of the system.
Scenario-	A functional subdivision of a Scenario Group which is designed and executed independently.
Sequence-	A subdivision of a scenario which is designed to verify a number of functionally related requirements
Release Readiness Review (RRR)-	Conducted at the ECS system level for a GSFC Project Review Team upon completion of release acceptance testing. The IATO leads the RRR to determine, with the GATT and the COTR, if the release is ready to be delivered, installed, and incorporated into the operational system.
Test-	A procedure or action taken to determine under real or simulated conditions the capabilities, limitations, characteristics, effectiveness, reliability, or suitability of a material device, system, or method.
Test Case-	A relatively small grouping of requirements that form the building blocks of a sequence.