334-CD-510-004

**EOSDIS Core System Project**

# 5B Science System Release Plan for the ECS Project

May 2000

Raytheon Systems Company
Upper Marlboro, Maryland

# 5B Science System Release Plan for the ECS Project

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**RESPONSIBLE AUTHOR**

John Russey /s/ 5/2/00

John Russey Date
EOSDIS Core System Project

**RESPONSIBLE MANAGER**

Mark McBride /s/ 5/3/00

Mark McBride, Manager, System Engineering Department Date
EOSDIS Core System Project

**RESPONSIBLE OFFICE**

Ron Klotz /s/ 5/3/00

Ron Klotz, ECS Program Manager Date
EOSDIS Core System Project

**Raytheon Systems Company**
Upper Marlboro, Maryland

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# Preface

This document is a formal contract deliverable with an approval code 1. It requires Government review and approval prior to final contract acceptance. This document is under ECS contractor configuration control. Contractor approved changes are handled in accordance with the change control requirements described in the EOS Configuration Management Plan. Changes to this document will be made by document change notice (DCN) or by complete revision.

Any questions should be addressed to:

Data Management Office
The ECS Project Office
Raytheon Systems Company
1616 McCormick Drive
Upper Marlboro, Maryland 20774-5301

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# Abstract

This document is the 5B Science System Release Plan for the ECS project. It documents the final ECS approach for completing the development of the SDPS Release 5B system for CSR.

***Keywords:*** Release 5B

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# 1. Introduction

## 1.1 Identification

This document is the 5B Science System Release Plan for the ECS project, which is defined by Data Item Description (DID) 334/DV1.

## 1.2 Scope

The 5B Science System Release Plan documents the definition, implementation, and development of the ECS SDPS Release 5B system. The scope of this plan is limited to 5B and covers the following items:

a. Capabilities to be developed

b. F&PRS requirements to be delivered

c. Approach to be used for NCR fixes and any known high priority NCRs planned to be delivered

d. Overall strategy for COTS upgrade

e. Build and drop/patch approach and known/scheduled drop/patch information

f. Customer reviews to be conducted

g. CDRLs to be delivered and/or updated

h. Approach to be used for requirements verification (test approach)

i. Schedule of key activities

j. Progress metrics

k. Risk mitigation plans and external drivers

Mod 86, the ECS Restructure Proposal for Contract NAS5-60000 provides the basis for this plan. The 5B schedule incorporates "NAS5-60000, Delivery Schedule" letter dated May 14, 1999. This plan and the associated schedule will be revised, as required, based on the negotiations.

## 1.3 Purpose

The 5B Science System Release Plan (SSRP) for the ECS Project documents the ECS approach for releasing the 5B Science System. This plan describes: the capabilities to be addressed by 5B; the process for defining requirements, designing, developing, integrating,

verifying, reviewing, monitoring, and statusing all products defined under the Restructure Proposal for 5B; and the known issues and risks.

The purpose of this plan is to provide the approach for and the road map to releasing the 5B system. This has been a working plan and, as necessary, it was updated to reflect the latest approved changes. This document is designed to complement the existing management tools such as Primavera.

## 1.4 Status and Schedule

This document provides ECS's plan for 5B as of two weeks prior to the publication of this document. It is issued as the final update prior to CSR for the 5B Release. This includes the incorporation of MOD 100 and the BP patch to 5B which will be delivered after the actual CSR date.

## 1.5 Document Organization

Section 2 provides the related documentation. Section 3 responds to the specific CDRL requirements

# 2. Related Documentation

## 2.1 Parent Documents

Parent documents are documents from which the Science System Release Plan's scope and content are derived.

| | |
|---|---|
| 803-RD-025 | Mod 86, The ECS Restructure Proposal for Contract NAS5-60000 |
| | Mod 100, Definitization of the Restructure and Incorporation of CCRs |
| 423-41-01 | ECS Statement of Work, December 1998, as modified by the proposed ECS Restructure Proposal modifications. |
| 423-41-02 | Functional and Performance Requirement Specification for the Earth Observing System Data and Information System (EOSDIS) Core System, Revision B, December, 1998, as modified by the proposed ECS Restructure Proposal modifications. |
| ECS 999-TR-951-024R | NAS5-60000, Delivery Schedule |
| MOD 100 | Definitization of the Restructure and Incorporation of CCRs |

## 2.2 Applicable Documents

The following documents are directly applicable, or contain policies or other directive matters that are binding upon the content of this volume.

| | |
|---|---|
| 334-CD-510 | 5B Science System Release Plan for ECS Project |
| 704-CD-510 | ECS SDPS Incremental Release Review for 5B |
| 335-CD-001 | ECS COTS Deployment Plan, Version 1. |
| 211-TP-005□ | Transition Plan 4PX to 4 PY, 4PY to 5A, and 5A to 5B for the ECS Project, Technical Paper |
| 223-WP-001 | Operating System Upgrade Plan for SGI Machines in ECS |

## 2.3 Information Documents

### 2.3.1 Information Documents Referenced

None

### 2.3.2 Information Documents Not Referenced

The following documents, although not referenced herein and/or not directly applicable, do amplify or clarify the information presented in this document. These documents are not binding on the content of this volume.

None

# 3. 5B System Development and Release

## 3.1 Overview

This section first summarizes the principal functionality additions to ECS for this release and then describes the capabilities to be developed, identifies requirements to be verified, and the approach for grouping of requirements in support of Ticket generation. It summarizes the custom software development, COTS, test, and transition approach.

The highlights of new capabilities for 5B are as follows:

- Terra Production Capacity
- SSI&T Support for Aqua (i.e., PM-1) including production rules and support for the SIPS interface testing
- Landsat 7 Floating Scene, Band and non-image product subsetting
- 2-way interoperability with GDS for Product Search and Orders
- Enhanced Client Data Access (PSA's, ECS Core, Integrated Browse)
- Operational Data Transition in Support of Software Releases

ESDTs will be developed to support AIRS, and AMSR on Aqua. Moreover, this release provides the capability to process Aqua orbit and attitude data.

The Java DAR Tool capability will be delivered to EDC in test executables. It will not be part of scheduled Test Organization activities but will be verified at the DAAC.

In addition to the above capabilities, at the request of ESDIS, Integrated Browse planned for 5B was delivered early as a patch to 5A Release. Since this capability is planned to be fully tested in 5B, Section 3.2.4 lists Integrated Browse as a Release 5B capability.

To provide continuity between Release 5B and prior Releases, the highlights of capabilities delivered prior to 5B are also provided in this section. Major capabilities provided prior to 5B are as follows:

- External interfaces (EDOS, Landsat 7, DAO, ancillary data)
- SIPS Interfaces (ACRIM, SAGE III, MODAPS)
- Archive and retrieval of Terra and Landsat 7 products
- Archive and retrieval support for ACRIM & SAGE III products
- Terra science software integration and test
- Automated processing of MODIS L1, ASTER and MISR standard products

- ASTER DAR Scheduling through the JAVA DAR Tool
- Landsat 7 fixed scene subsetting
- Expedited data service
- Operator-assisted science QA
- Operator-assisted ASTER on-demand processing
- Operator-assisted subscriptions
- User interface (EOS Data Gateway) for search, browse, and data order (limited metadata search) and DAR submission
- Media (8mm tape) and electronic data distribution
- Granule level access restriction
- Java DAR tool update for query status
- Automated on-demand processing for ASTER

## 3.2 Requirements

### 3.2.1 Mission Requirements

The missions supported by Release 5B are shown in Table 3.2-1.

***Table 3.2-1. Releases 5B Launch Highlights***

| Satellite | Launch Date | SSI&T Version | Operations Version | 5B Performance Capabilities |
|---|---|---|---|---|
| Landsat-7 | 15-Apr-99 | N/A | 4 or later | Full Ingest & Archive |
| Terra | 16-Dec-99 | 4 or later | 4 or later | Processing (1.2x for L1 and 0.6x for higher level), |
| Meteor/SAGE III | Jun-00 | SIPS I/F Testing | 4 or later | Full Ingest & Archive for Processing and Reprocessing |
| FOO/ACRIM | TBD | SIPS I/F Testing | 5A or later | Full Ingest & Archive for Processing and Reprocessing |
| Aqua (PM-1) | 31-Dec-00 | 5B (6A for MODIS) | 6A | N/A |

### 3.2.2 ESDT Requirements

Table 3.2.2-1 provides the requirements for new ESDTs. One additional ESDT is also needed by development for ESDT Update functionality. Presently, ECS does not anticipate any descriptor

file changes. However, changes to the Landsat 7 DLLs will be required to support the Floating Scene Subsetting.

***Table 3.2.2-1. 5B ESDT Requirements***

| Instrument | Number of new ESDTs |
|---|---|
| ACRIM | 5 (delivered in 5A) |
| AIRS | 90 (delivered in 5A) |
| AMSR ADEOSII | 1 |
| AMSR Aqua | 27 |

### 3.2.3 Capacity Requirements

Table 3.2.3-1 provides the capacity requirements for 5B.

***Table 3.2.3-1. 5B Capacity Requirements***

| | Archive Volumes GB / Day | # of Granules # / Day | Processing Power MFLOPS |
|---|---|---|---|
| **EDC** | 522 | 6886 | 908 |
| **GSFC** | 688 | 5545 | 5250 |
| **LaRC** | 312 | 2945 | 6080 |
| **NSIDC** | 22 | 1083 | 100 |

| | Archive Volumes Cumulative TB | # of Granules Cumulative '000s | Distribution | |
|---|---|---|---|---|
| | | | Network GB / Day | Tape GB / Day |
| **EDC** | 251 | 2660 | 194 | 159 |
| **GSFC** | 303 | 2210 | 226 | 226 |
| **LaRC** | 142 | 1283 | 102 | 102 |
| **NSIDC** | 8 | 364 | 6 | 6 |

### 3.2.4 Release Capability Requirements

Release 5B is being developed based on a set of Release Capabilities (RC's). These RC's are defined in support of operational readiness for new missions and enhancement of existing capabilities in use by operations. The following provide RC's and their summary description for 5B:

1. J**ava based DAR Tool enhancements for submit/query status -** The Java-based DAR tool is a Java version of the user interface for the submittal of Data Acquisition Requests (DARs) for the ASTER instrument. Initially delivered in Release 5A, it will be updated in Release 5B

to include enhancements for submit/query status functionality. Java DAR Tool will not be part of a scheduled Test Organization activity, but handled outside of ECS.

2. **Integrated Browse -** In addition to the Release 5A functionality of browse supported by downloading files for later display, Release 5B will include functionality to support display of browse data as the result of a single user request from the search results screen. (In addition to the above capabilities, at the request of ESDIS, Integrated Browse planned for 5B was delivered early as a patch to 5A Release. (Even though this capability was delivered in 5A, it is planned to be fully tested in 5B.)

3. **One-Way Interoperability with ASTER GDS for On-Demand Requests -** For Release 5B, ECS will provide the capability to submit on-demand requests to ASTER GDS for the generation of Level 1B products.

4. **Two-way Interoperability with ASTER GDS for Search/Order Requests -** For Release 5B, ECS will provide the capability to support the searching and ordering of ECS data products by the ASTER GDS. Also the capability will be provided for ECS users to search and order data products from the ASTER GDS.

5. **V0 Gateway Enhancements -** Release 5B will provide updates to the V0 gateway to support client requests for searches based on full ECS core metadata and product-specific attributes, Landsat 7 floating scene/band subsetting, and billing information for Landsat 7 data.

6. **C++ SDP Toolkit -** The SDP Toolkit will be updated in Release 5B to accept and compile science software source code written in C++.

7. **Processing Toolkit Upgrades to Support Concurrency -** The SDP Toolkit will be updated in Release 5B to support thread-safe concurrent processing by the science software.

8. **Restricted Granule Access -** Release 5B will add the capability to restrict data sets at the granule level based on data quality information.

9. **User Profile Enhancements -** Release 5B updates the user profile capability to perform user authorization checks to determine the services available to a user. Based on granule quality flag information, granule access will be restricted by members of instrument teams or operations.

10. **Closest Granule Production Rules -** The processing system is updated in 5B to provide closest granule production rules required for Terra, which allows a PGE to request the nearest input granule from the Data Processing Request time.

11. **Spatial Pad Production Rules -** The processing system is updated in 5B to provide spatial pad production rules required for AM-1, as an addition to the Spatial Query Production Rule, which allows a pad to be added to the spatial constraints of the Key Input.

12. **Orbit Processing Runtime Parameters Production Rules -** The processing system is updated in 5B to provide additional orbit processing runtime parameters required for Aqua.

13. **Fully automated on-demand processing support with non-default parameters for Higher Level Products -** Release 5B provides automated support for on-demand requests of

higher level products for ASTER processing. A Web interface will be provided to receive user requests including user-supplied parameters. An On-demand Request Manager will meter the on-demand requests so no more than a pre-defined threshold of on-demand requests will be processing simultaneously. On-demand requests for the manual generation of ASTER DEM products will be supported. Products generated through this process, with the exception of the ASTER DEM products, will not be permanently archived, but will be regenerated upon each request.

14. **On-Demand ASTER DEM -** Release 5B will support on-demand requests for the manual generation of ASTER DEM. Products generated through this process will be permanently archived.

15. **ASTER Browse -** Release 5B will provide the capability to browse ASTER L1B and DEM products derived from the corresponding ASTER L1A product.

16. **Update ESDT -** Release 5B provides the capability for operations to update certain ESDT attributes without requiring the deletion of the data collection. This capability also supports release transitions, therefore, the ESDT add capability was delivered early to support 4PY to Release 5A transition.

17. **Ingest Operability and Support for New Data Types -** ESDTs are developed in 5B to support, AIRS, and AMSR on Aqua and others for DAS and NCEP as required. This includes the allocation of these new ESDTs to specified archive volume groups for each DAAC. Additionally, new capabilities are provided for Ingest request cancellation, suspend, and resumption.

18. **DPREP Processing for Aqua -** Release 5B provides the capability to process Aqua orbit and attitude data. The attitude capability has been deprioritized and a TD is expected to remove the attitude capability from Release 5B**.**

19. **Landsat 7 floating scene and band subsetting -** Data retrieval and distribution of a subset of a Landsat 7 granule as selected by floating scenes (defined to be a partial subinterval consisting of variable number of scan lines) and/or individual bands is supported in Release 5B.

20. **Landsat-7 Error Handling -** Release 5B provides the capability to properly identify and correct errors that occurs in matching Landsat-7 Format 1 and Format 2 during data ingest.

21. **LLBox and Oriented Polygon -** Release 5B will provide the capability to support client requests for spatial searches against collections that use llbox and oriented polygon.

22. **Persistent Queuing of Subscriptions -** Release 5B provides enhancement to subscription capability to prevent queued request from being lost in the event of a hardware failure by providing persistent store.

23. **Maintenance Tool Enhancement -** Release 5B updates the maintenance tool for V0 Gateway enhancements and interoperability with ASTER GDS.

24. **SDSRV Recovery and Queuing Enhancements -** Release 5B enhances SDSRV recovery capability to queue request in the event of a hardware failure.

25. **Generate Reports Using IQ/SQR -** The COTS packages Intelligent Query (IQ) from Information Advantage and SQR Workbench (SQR) from Sqribe will be deployed in Release 5B to allow DAAC operations to generate customized reports from ECS databases. There are no new custom components required to fulfill this capability.

26. **Configuration Registry -** Release 5B will replace the multitude of custom configuration files with a single configuration registry database.

27. **User Profile Replication.** Users can select any ECS DAAC as their Home DAAC and submit a request for a user profile. Release 5B will provide the capability for user profiles to be centrally maintained (inserts and updates) at the SMC, with read-only replication of the profile to the DAACs. Users will then be able to submit orders for ECS data under their user ID to any of the ECS DAACs.

28. **SDP Toolkit Support for Aqua.** Provides SDP Toolkit support for access to Aqua format data packets, specifically, GIIS, GIRD, and spacecraft bus data types.

### 3.2.5 Requirements & Criteria for System Verification Development

The F&PRS contains all of the Level 3 (L3) requirements that are to be developed by ECS. The allocation of 5B L3 requirements and requirement interpretations are provided in Appendix B. Additionally, IRDs provide the external interface requirements for ECS. The list of 5B IRD's is also included in Appendix B. This section defines the process for further analysis of these requirements and generation of tickets.

Initially, Systems Engineering allocated L3 requirements to RC's, mapped IRD's to L3's, and developed operations concepts. Systems Engineering then performed a detailed requirements analysis which includes working with Development to derive 5B Level 4 (L4) requirements from the current L3 requirements. These L4 requirements were mapped to the 5B L3 and IRD requirements. Additionally, Systems Engineering generated a set of verification tickets. These verification tickets are structured to group requirements (L3's, IRD's, and L4's) for logical testing and establish a complete set of Acceptance Criteria (AC) against which test cases should be evaluated to verify that these groupings of requirements are satisfied by the system. When all of the Acceptance Criteria in a ticket are verified, the ticket and its associated requirements are considered verified by association. The process for reviewing and approving requirements and tickets is the same as process explained in the June version of 5B SSRP document.

## 3.3 Software Design, Development, and Integration

Development of each capability involves activities that follow a water-fall life cycle as shown in Figure 3.3-1. Each phase of development (Requirements, Preliminary Design, Detailed Design, Code, Unit Test, and Integration) consists of an activity, followed by a peer review (the milestone shown in the figure) of the outputs, and a workoff period for any issues discovered during the peer review. Each of the phases has a set of required artifacts (shown underneath the

milestones) that are specified in Development Program Instructions. All of the activities shown are scheduled and maintained in Primavera as part of the overall system schedule.

At IRR, Development provided a draft Integration Test Plan, as well as drafts of the updated versions of DIDs 305, 313, and 609, in order to ensure that there is a broad understanding of the functionality to be delivered in the release. The Integration Plan (which will replace the Build Plan), identifies the development capabilities to be designed and coded for the L4 requirements; how these capabilities will be tested and the associated test criteria; the integration test plan for each capability; and how the integration will be managed (i.e., what will be integrated in what order).

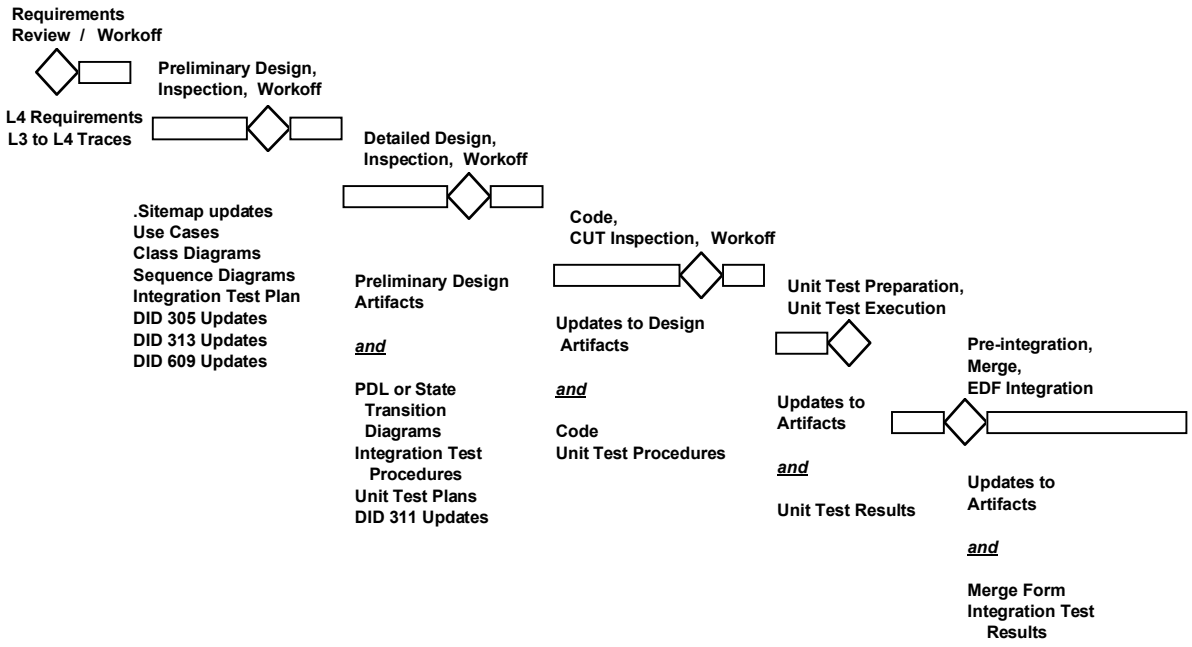


***Figure 3.3-1. Capability Development and Integration Approach***

ECS plans to turnover 5B custom software to the Test Engineering in three phases. The implemented Acceptance Criteria for some Release Capabilities are divided between T1, T2 and T3. Additional capabilities are scheduled for release patch "BP". Table 3.3-1 provides the list of Release Capabilities that are planned to be provided in Turnover 1 (T1), Turnover 2 (T2), and Turnover 3 (T3), as well as BP. This table provides the Release Capabilities in the same order as in the Section 3.2.4 and it also provides the IDs for the corresponding Tickets.

***Table 3.3-1. Release Capability to Turnover Mapping***

| Capability | Ticket ID | Turnover |
|---|---|---|
| Java DAR Tool | SM-5B-04 | Will not be delivered in a 5B Release and testing will be handled outside of the VATC |
| Integrated Browse | RM-5B-06 | T1 (and previous Patch to 5A ) |
| On-Demand ASTER L1B and ECS-GDS Gateway (One-way Interoperability with ASTER GDS) | RM-5B-03 | T3 |
| GDS-to-ECS Gateway (Two-way Interoperability with ASTER GDS for Search/Order Requests) | RM-5B-09 | T1 Partial (GDS to ECS Inventory Search), T3 Full |
| V0 Gateway Enhancements | RM-5B-08 | T1 Partial (FTP push), T3 Full |
| C++ SDP Toolkit | RH-5B-02 | T3 |
| Processing Toolkit Upgrades to Support Concurrency | RH-5B-01 | T2 |
| SDP Toolkit Support for Aqua | RH-5B-07 | T2 |
| Restricted Granule Access | RM-5B-10 | T1 |
| MSS User Profile Enhancements | RM-5B-11 | T1 Partial (Restricted granule access) , T2, T3 Full |
| Closest Granule Production Rules | RH-5B-03 | T1 |
| Spatial Pad Production Rules | RH-5B-04 | T1 |
| Orbit Processing Runtime Parameters Production Rules | RH-5B-05 | T1 |
| On-Demand ASTER Higher Level Products | RM-5B-05 | T2 |
| On-Demand ASTER DEM | RM-5B-04 | T2 |
| ASTER Browse | RM-5B-14 | T1 |
| Update ESDT | RM-5B-13 | T1 Partial (Add), T3 Full (Update) |
| Ingest Operability and New Data Types | SM-5B-01 | T1 Partial (Ingest Auto-Suspend/ Cancel/Resume), T2, T3 Full (5B Data Types) |
| DPREP Processing for PM-1 | RH-5B-06 | T2 |
| Landsat-7 Floating Scene Subsetting | SM-5B-02 | T2 |
| Landsat-7 Error Handling | SM-5B-03 | T2 |
| LLBox and Oriented Polygon | RM-5B-01 | T1 Partial (LLBox), T3 Full (Oriented Polygon) |
| Persistent Queuing of Subscription Actions | RM-5B-02 | T1 |
| M-Tool Enhancements | RM-5B-07 | T1 Partial (All capabilities except for ASTER Valids Import and Export), T3 Full (ASTER Valids Import and Export) |
| SDSRV Recovery and Queuing Enhancements | RM-5B-12 | T1 |
| Generate reports using IQ/SQR | EN-5B-01 | T1 Partial, T3 Full |
| Configuration Registry | HA-5B-01 | T2 |
| User Profile Replication | RM-5B-15 | T3 |
| Guide/Miscellaneous URL | EN-BP-01 | BP |
| Seamless User Registration | EN-BP-02 | BP |
| L7 Pricing Algorithm | RH-BP-01 | BP |
| Ingest NCEP Aviation Model (AVN) product data | RH-BP-02 | BP |

### 3.3.1 NCRs

ECS separated the 5B code baseline from the 5A baseline in June 1999. After this separation, the 5B code baseline continued/will continue to receive fixes for NCRs observed in the 4P and

5A code baselines. Historically, the expected work-off rate of these NCRs is approximately 100 per month. With delivery of 5B to the DAACs in April of 2000, approximately 1,000 NCR fixes are expected to be merged to the 5B code baseline. In addition to the NCRs incipient to the 4P and 5A code, NCRs resulting from the development of 5B code will also be fixed during this time period. These NCRs are expected to number approximately 175.

### 3.3.2 Release 5B COTS Changes

ECS has well defined procedures covering the life cycle of upgrading COTS products. The process includes the requirements process that will initiate an upgrade activity, the reviews and sign off review boards utilized along the way as checkpoints/milestones to ensure accuracy, adequate verification, and coordination with all ECS segments, customer activities, and DAACs that will be the recipient of the upgrades.

The CCR process is the key activity providing the reviews/system checks to ensure performance and system validation standards are met. These begin with the procurement of the upgrade, the introduction of the upgrade into Development's domain for analysis, installation, and test within the IDG Cell and the Functionality Lab. Upon Development organization satisfaction, the product is ready for transition to System Test within the VATC. System Test selects the appropriate tests, and the installation is coordinated with the Infrastructure organization. Satisfactory completion of the VATC activities results in the product being prepared for a Preliminary Ship Review (PSR). The PSR verifies that all testing and performance milestones have been met and installation instructions prepared and checked out before the product is released for delivery to the customer. A release CCR is generated to accomplish this release. ECS PI CM-1-005 describes the procedures for turnover and installation of COTS products.

The COTS products that are included in Release 5B were selected for inclusion for the following reasons:

- Vendor discontinuing support for a particular version
- Product being upgraded to fix 'Bugs'
- Vendor Supplied Patches
- Product being upgraded because of cross dependency on another COTS product upgrade
- Release functionality requirements associated with Release 5B
- Performance
- Customer Requests

The COTS products included in Release 5B are listed in DID 335, ECS COTS Deployment Plan, Version 2. As DID 335 Section 1.4 states, some elements of this document may change, i.e., additional products may be identified for upgrade. Status including changes on all COTS products is reported and delivered to ESDIS on a weekly basis.

### 3.3.2.1 Upgrade To SGI Irix 6.5

ECS plans to upgrade the SGI operating system from IRIX 6.2 to 6.5.6 during the 5B timeframe. The software compatibility analysis of layered COTS identifies a set of products that must be upgraded before upgrading to Irix 6.5, because the current ECS versions are not supported on Irix 6.5. The list of these products are provided in the Table 3.3.2.1-1.

***Table 3.3.2.1-1. Products to be Upgraded Before Irix 6.5***

| | **Standalone Products (existing version not supported on 6.5)** | **Products that cause custom code rebuild** | **Products that are tied to the OS** |
|---|---|---|---|
| **Upgrade Timeframe** | Before IRIX 6.5 upgrade:<br>PVC – now<br>Lab - by 1/31<br>VATC – by 2/29<br>DAACs – PSR by 3/31 | 5B Turnover 2 | With the IRIX 6.5 upgrade:<br>PVC – now<br>Lab - Dec<br>VATC – April<br>DAACs - Summer |
| **Product Names** | Netscape Communicator 4.7 (Sun, HP, SGI)<br>IMSL Cv3 and Fv4 (SGI)<br>Clearcase 3.2.1 (Sun, HP, SGI)<br>Secure Shell 2.0.12 (Sun, HP, SGI)<br>Purify (Sun, HP, SGI)<br>Visual Workshop 3.0 (Sun)<br>DCE Cell Manager (Sun, HP, SGI) | Rogue Wave (Sun, HP, SGI)<br>Open Client 11.1.1 (Sun, HP)<br>Sun Compilers 4.2 (Sun)<br>Sybase Server 11.5.1 (Sun, HP, SGI) | Irix 6.5 (SGI)<br>DCE 1.2.2a (SGI)<br>Rebuilt COTS libraries (SGI)<br>rebuilt freeware/shareware (SGI)<br>BDS and HiPPI SW (SGI)<br>IDL 5.3 (SGI) |

### 3.3.2.2 Hardware Upgrades

Hardware upgrades are generally based on capacity requirements provided by the F&PRS. However, TD 64 and TD 65 delay the capacity upgrades for Terra (AM) and Aqua (PM). Therefore only equipment required to support PM and the IRIX 6.2 to 6.5 upgrade will be purchased and deployed. Hardware COTS to be upgraded during the 5B development life covers the following areas:

- M&O equipment for GSFC and LaRC
- GSFC parts additions in the following subsystems to support PM-1: ACM, DRP
- EDC parts additions in the following subsystems to support PM-1: ACM, DRP
- LaRC upgrades and parts additions in the following subsystems: ACM
- MODAPS communications bandwidth enhancements for GSFC and EDC

Hardware ‘buys ‘ taking place during the 5B time frame include:

- The Early Buy, CCR 99-0609
- The Performance Verification Center, CCR 99-0608*
- GSFC Ingest RAID for L0 Buffer, CCR 99-0610
- Landsat 7 Sub-Setting RAID Upgrade, October 99 Buy*
- FTP Pull Requirement for GSFC and EDC

## 3.4 Test Approach

The ECS Test Engineering organization has been reorganized to provide a more system-oriented approach for testing activities, including Acceptance Testing. The organization reflects teams that are oriented to the major ECS system functions of System Infrastructure, Planning & Data Production, Data Archiving & Distribution, and Interoperability, while retaining individual subsystem coverage within the teams. This system orientation aligns well for testing to specifications (Tickets) containing the acceptance criteria for major system functions that cross subsystem boundaries. The acceptance testing will have a distinct system perspective for 5B. Additionally, the test organization is very well aligned with the ECS Software Development organization, permitting clear linkage between test engineers and their software counterparts, test engineering participation in software requirements, preliminary design, and detailed design reviews, and collaboration on appropriate test approaches to ensure full test coverage between the organizations. Figure 3.4-1 depicts the test organization within the ECS system environment.

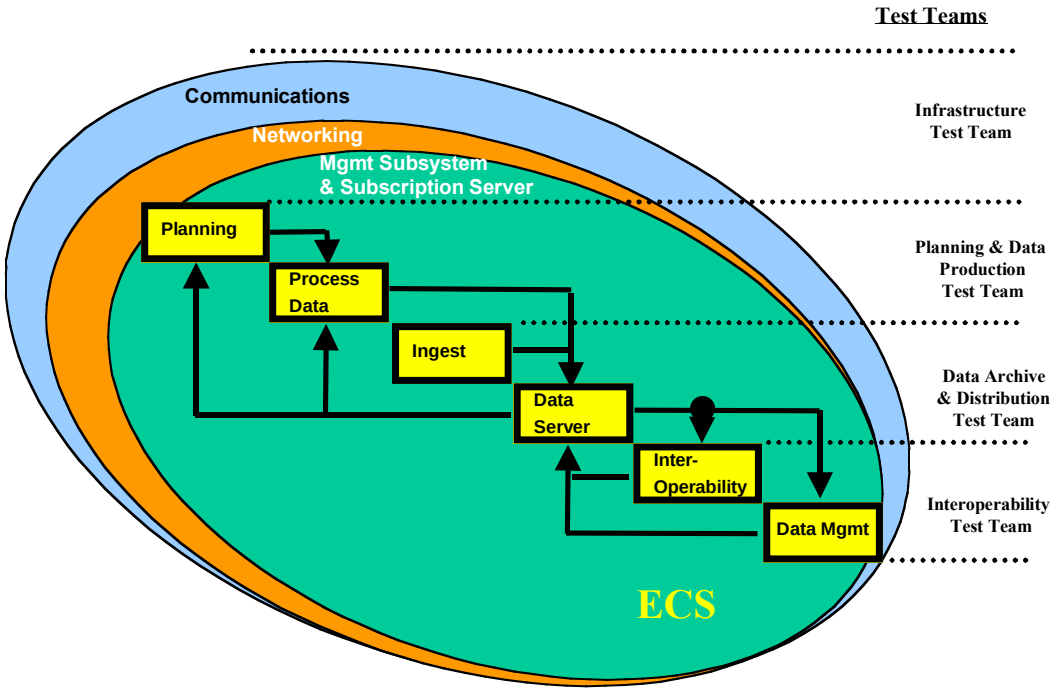


***Figure 3.4-1. Mapping of Test Organization to ECS System Environment***

The objective of the ECS formal Acceptance Testing activity is to verify that the Release 5B custom software is compliant with the Level 3 requirements through verifying satisfaction of Acceptance Criteria specified in the test Tickets. Additionally, regression testing will be performed for each new release of the custom software and for each software patch issued.

Major Test Engineering milestones for 5B are the 5B IRR, TRRs, CSR, and SRA. For 5B, the 5B custom software will be delivered by the Development organization to the Test Engineering organization in three turnovers, designated Turnover 1 (T1), Turnover 2 (T2) and Turnover 3 (T3). Table 3.4-1 provides a mapping of 5B test cases to the appropriate software turnover. The additional test cases for the capabilities delivered in the release patch 5B are also shown.

Several test cases will be utilized to verify custom software functionality with components fully complete in T1 (i.e., the function is partially complete, with some component or components of the function fully complete and ready to test), but the complete function is not present until T2 or T3. For these test cases, the test case is used to verify the acceptance criteria associated with the functional components designated as part of T1. Verification will be formal and witnessed by the customer representative. After T2, the T1 components will be regression tested, but not formally re-verified. The T2 components will then be formally verified. For functionality with

components available in T1 and the remainder available T3, verification will be handled in the same manner as stated above.

***Table 3.4-1. Mapping of Test Cases to Software Turnover (1 of 2)***

| Test Case | Ticket ID | Turnover |
|---|---|---|
| 5B10090 - Configuration Registry | HA-5B-01 | T2 |
| 5B09010 - Closest Granule Production Rule | RH-5B-03 | T1 |
| 5B09020 - Spatial Pad Production Rule | RH-5B-04 | T1 |
| 5B09030 - Orbit Processing Run Time Parameters Prod Rule | RH-5B-05 | T1 |
| 5B10020 - Persistent Queuing of Subscription Actions | RM-5B-02 | T1 |
| 5B08030 - SDSRV Recovery & Queuing Enhancements | RM-5B-12 | T1 |
| 5B12040 - ASTER Browse | RM-5B-14 | T1 |
| 5B09050 - Ingest Cancel | SM-5B-01 | T1 |
| 5B09070 - Ingest Auto-Suspend/Cancel/Resume | SM-5B-01 | T1 |
| 5B10010 - LLBox | RM-5B-01 | T1 |
| 5B10050 - Restricted Granule Access | RM-5B-10 | T1 |
| 5B08060 - Generate Reports Using IQ/SQR Tools | EN-5B-01 | T1 Partial, T3 Full |
| 5B10030 - V0-ECS Gateway (Integrated Browse) | RM-5B-06<br>RM-5B-08 | T1 Partial, T3 Full |
| 5B08010 - Maintenance Tool Management (ASTER) | RM-5B-07 | T1 Partial, T3 Full |
| 5B10040 - ASTER Gateway | RM-5B-09 | T1 Partial, T3 Full |
| 5B08020 - User Profile Enhancements | RM-5B-11 | T1, T2 Partial, T3 Full |
| 5B08040 - Update ESDT | RM-5B-13 | T1 Partial, T3 Full |
| 5B10070 - Java DAR Tool Additional Functionality | SM-5B-04 | Verification at EDC |
| 5B09110 - C++ Version of SDP Toolkit | RH-5B-02 | T3 |
| 5B09100 - Thread-safe version of SDP Toolkit | RH-5B-01 | T2 |
| 5B09120 - Toolkit Support for PM-1 | RH-5B-07 | T2 |
| 5B09040 - Orbit DPREP Processing for PM-1 | RH-5B-06 | T2 |
| 5B10015 - Oriented Polygon | RM-5B-01 | T2 Partial, T3 Full |
| 5B12010 - ASTER On-Demand (ASTER L1B) | RM-5B-03 | T3 |
| 5B12020 - ASTER On-Demand (ASTER DEM) | RM-5B-04 | T2 |
| 5B12030 - ASTER On-Demand (ASTER Hi-Level Products) | RM-5B-05 | T2 |
| 5B08070 - User Profile Replication | RM-5B-15 | T3 |
| 5B09060 - Ingest Database Data Type Verification | SM-5B-01 | T3 |
| 5B10060 - L7 Floating Scene Subsetting | SM-5B-02 | T2 |
| 5B08050 - L7 Error Handling | SM-5B-03 | T2 |

***Table 3.4-1. Mapping of Test Cases to Software Turnover (2 of 2)***

| Test Case | Ticket ID | Turnover |
|---|---|---|
| BP08010 - Seamless User Reg | EN-BP-02 | BP |
| BP10020 - L7 Pricing Algorithm | RH-BP-01 | BP |
| BP09010 - Ingest NCEP AVN Data | RH-BP-02 | BP |
| BP10010 - Guide/Misc URL | EN-BP-01 | BP |

For each Turnover of the 5B custom software, the test program will proceed in sequential phases (see following) marked by key activities, reviews and documentation. The reviews (both internal and external) and documentation provide a forum for status and progress of the Acceptance Test program.

**Phase 1: Development of Test Plan.** This effort is built upon the following sources of information:

- This Science System Release Plan
- The Requirements Verification Traceability Matrix (RVTM) captured in the ESDIS's Verification Data Base (VDB)
- Requirements and Acceptance Criteria specified in the Tickets
- Participation in the Development organization's requirement reviews, preliminary design reviews, detailed design reviews, and integration activities.

As the predecessor step in the Test Planning process, the Systems Engineering organization's Architect Office (AO) generates the Tickets, populating the VDB with RCs, Level-3 requirements, Interface Design Specifications, Level-4 requirements, and Acceptance Criteria. The VDB also provides the traceability between these items.

The HW and SW environments are analyzed to determine the expected fidelity of testing in the Landover Test Facilities, and to identify any test that, due to the nature of the acceptance criteria or lack of resources in the VATC, satisfaction will need to be verified in one or more of the DAAC environments or in the PVC.

Test Engineering allocates the 5B Tickets generated from the VDB data to the various test development teams. The test teams will then generate the test case descriptions needed for the ECS Science Acceptance Test Plan (DID 409/VE1), published in draft form by IRR.

The Test Plan provides:

- A presentation of the 5B Acceptance Testing methodology.
- A list of Test Cases, including, the objective and a summary of each test, and identification of test inputs, test outputs and test configuration.
- A mapping of Test Cases to the Acceptance Criteria specified in the tickets.

**Phase 2: Refinement of Test Plan and Development of Test Procedures**. In addition to review of the 5B Tickets, test engineers participate in requirements reviews, Preliminary Design Reviews (PDRs), and Detailed Design Reviews (DDRs). They also interact with software developers during integration test development, as well as participate in integration test reviews and conduct. Early involvement with and support to the Development team permits the test engineers to gain an understanding of the functionality and associated 5B software implementation.

Acceptance test procedures are produced by first developing a high level flow of the test sequence, followed by a functional description of test actions, and then completed by the detailed test actions. Test Engineers also determine test dependencies, interactions, and sequences. As each test procedure is produced, it undergoes internal review (including a peer review presentation) and update before it is submitted to the Government as a draft for review and comment. These comments are incorporated into the test procedure, as appropriate. The final version of the test procedure is then submitted to the Government as a component of the ECS Science Acceptance Test Procedures (DID 411). It is then processed for any additional comments and approval.

This phase completes, for each software turnover, with a Test Readiness Review (TRR). TRR is preceded by successful installation and checkout of the 5B software in a dedicated mode(s) in the test facility for formal testing, as well as the availability of test data, tools, and resources.

**Phase 3: Execution of the Test Plan in Landover**. Following a successful TRR, Government-approved acceptance tests are dry run. After dry run, the test cases are formally conducted with witnesses present to verify satisfaction of specified Acceptance Criteria.

External interfaces are exercised in the test environment under conditions that simulate an operational environment, to the extent possible. In cases where it is not possible to achieve the necessary level of fidelity in the test facility, formal sell-off of acceptance criteria will occur in one or more DAAC environment(s), or the PVC, as described in the Test Plan.

Regression testing will be conducted to ensure that existing software is not adversely affected by new custom software. Regression tests are developed as functional thread tests from the repertoire of previous acceptance tests and end-to-end tests. Regression tests will be run against T1 software to ensure no regression from 5A, and against each software turnover to ensure no regression from the previous turnover.

After acceptance testing and verification of the release software, this phase concludes with a Consent-to-Ship Review (CSR). The CSR documents the results of the test program, including acceptance criteria verification status, liens associated with the release, and a lien work-off plan if needed. A successful CSR documents approval by the ECS Program and ESDIS to deploy the Release 5B software to the DAACs. The ECS Science Acceptance Test Report (DID 412/VE2), which formally documents the results of the acceptance testing, is published within one month following the final 5B SRA.

**Phase 4: Execution of the Test Plan at the DAACs.** Before deployment of the release, ECS ensures close-coordination with each DAAC to plan the on-site delivery. This includes on-site

ECS/Landover support for release 5B installation and checkout (ICO). The deployment of Release 5B is performed in accordance with the 5B Transition Plan.

Following CSR, the software is shipped to the DAACs. The ECS test team, with the aid of the DAAC staff, installs the release and performs site ICO in a test mode (nominally, TS2) under the direction of the ECS/Landover staff. The subsequent site testing, lead by the DAAC personnel, focuses on regression testing and DAAC-specific Launch-Critical and Launch-Essential scenarios. Also of concern are configuration issues that must be identified and resolved prior to operations. In general, this is not an extension of acceptance testing although there may be cases where specific acceptance criteria and interfaces must be tested at the DAAC.

DAAC testing occurs over an extended period to allow DAAC staff to gain experience with a new release prior to transition to operations. From a schedule perspective, ICO is a planned two-week activity for existing DAACs, and a one-month activity for new DAACs.

This phase concludes with a final (joint) Site Readiness Assessment (SRA) for each DAAC to review the completion of the test program at all DAACs. At the SRA, the results of site testing are documented.

### 3.4.1 Test Procedure Development Process

Test Engineering assigns resources to each expected Ticket containing the requirement groupings and acceptance criteria. As Tickets are developed, the Architect Office (AO) will provide them to the Test Engineering organization. The initial development of test cases starts with the issue of the draft Ticket. Test Engineering generates the test case summaries and supplies pertinent data, tools, and resource needs as a component of the Test Plan.

Test engineers participate with software developers in requirements reviews, Preliminary Design Reviews (PDRs), and Detailed Design Reviews (DDRs). They also interact with software developers during integration test development, as well as participate in integration test reviews and conduct. Early involvement with and support to the Development team permits test engineers incorporate lessons learned from integration testing into test case development, as well as to gain an understanding of the capabilities and implementation represented in 5B software.

Test Engineering refines the test cases as the Tickets are updated and approved internally and by ESDIS. Development of each draft test case continues until complete and ready for review. The responsible test engineer then generates an internal review package. A peer review presentation is conducted for representatives from the Architect Office, Software Development, Operations, and Test. After the peer review, the test case is updated per review comments and reposted to the web site, and ESDIS is notified that the test case is ready for Government review and comment. These comments are incorporated into the test procedure, as appropriate. ESDIS reviews and approves the test procedures.

### 3.4.2 System Verification Process

At the completion of Release 5B integration in the Engineering Development Facility (EDF), turnover of the software release from Development to the Test Engineering organization will

occur. There are three turnovers of software for 5B, designated T1, T2 and T3. After turnover, installation and checkout of the turnover software in the VATC will be accomplished.

Upon completion of ICO, a TRR will be held. The TRR is an internal review under the control of the ECS Test Engineering team and ECS contractor management. The TRR baselines the Government-approved revisions/comments to the test cases. The TRR also includes the current status of dry runs and formal tests from previous turnovers, as applicable, and establishes the day-by-day sequence of tests to allow for a metrics-based analysis of test program progress.

This TRR gate will be strictly monitored to ensure that: 1) all integration has been successfully completed; 2) all necessary documentation or installation procedures needed have been made available; 3) a successful installation and checkout has occurred; 4) and any other important information is communicated to or by the Test Engineering Organization prior to the start of formal testing.

After successful TRR of turnover software, the T1, T2 or T3 test cases will be dry run. Upon successful dry run of a test case, the acceptance test will be formally conducted before a government witness or representative in accordance with Test Engineering project instructions and work instructions, including execution of a test, test conduct documentation, and gathering test artifacts. All formal acceptance test conducts are coordinated with ESDIS in advance.

### 3.4.3 Regression Testing

The purpose of Regression Testing is to exercise the major functions of ECS to provide confidence that the addition of new custom or COTS software does not adversely affect the behavior of unmodified code. The Regression Test Plan provides an overview of the methodology used for the selection, development, and execution of Regression Test cases to be used for 5B.

Test cases selected, integrated into threads, are called the Regression Test Suite. Regression Test activities are based on normal production scenarios that exercise ECS functionality. A Regression Test Suite tailored by facility contains these classes of test cases:

- Test Checklist - The purpose of Test Checklists is to provide a list of functional system threads available in the Regression Test Suite.
- Representative sample of tests that exercise software functions
- Additional tests that focus on software functions likely to be affected by a new release/update
- Tests focusing on software components that have changed

The Regression Test Suite evolved as follows. Tests were selected from existing End-to-End and Acceptance test cases from previous releases of the ECS software. To select the test set for regression testing, major system functions were identified, and existing tests were allocated to a function. Analysis was performed and duplicate test coverage eliminated. System test threads were formulated using test procedures.

The system test threads were then incorporated into the Test Checklist, which is tailored for each test facility and DAAC. The Test Checklist is used to select threads that may be impacted by each new patch or release, ensuring complete coverage of the affected software.

A core set of regression test cases was developed based on threads of current ECS functionality. These test cases include a scenario beginning with ingest and archive, production, search and order, and distribution. This scenario is designed to test the basic functionality of the system after a release or patch is installed. By running this test each time, expected results form a baseline for future regression testing of the system.

In addition to the Insertion-Production-Retrieval core scenario, several other test cases have been developed based on related functions not tested in the core scenario. These functions are categorized into threads which are tested only if the new functionality affects it.

Finally, new functions that are delivered with each new drop or patch are analyzed, and a determination is made as to which components could be affected by the new software. Existing regression test cases are updated to include the new functionality.

Regression testing is performed after each new software release. For Turnover 1, regression testing was performed to ensure existing software from the 5A baseline was not adversely affected. For Turnover 2 and 3, regression testing included exercising software that formed the previous turnover(s) to ensure that it was not adversely affected. Regression testing will also be performed at the DAACs after installation and checkout following 5B CSR. These regression tests will be tailored to include test cases that exercise specific capabilities of interest to the DAAC, in addition to the general capabilities of the 5B software.

### 3.4.4 Site Testing

ECS will coordinate with each DAAC to plan the on-site delivery of 5B software, including ECS/Landover support for installation and checkout and later transition in operations from 5A to 5B. Deployment of Release 5B is performed in accordance with the 5B Transition Plan.

The ECS test team and DAAC staff install the release, then perform integration and checkout in a test mode under the direction of the ECS staff. Subsequent site testing lead by the DAAC personnel includes regression testing tailored for the particular DAAC, and DAAC-specific scenarios. These tests include a test scenario that exercises the system in an end-to-end manner to ensure that the system is stable, its performance supports 5B-specified needs, and it operates properly in its intended environment.

This testing is generally not an extension of acceptance testing. However, there may be cases where specific acceptance criteria and interfaces must be tested at the DAAC because resources at the Landover test facility could not support the testing. The ECS Verification Report (EVR) form is used to document results of criteria verification at the DAACs.

While the system is expected to satisfy 5B criteria at each DAAC, there is concern regarding differences between versions of COTS products in the Landover Facility test environments and each of the DAACs. This issue is due to each DAAC having its own timetable for upgrading

COTS packages. DAAC-unique configurations and software packages may also result in unexpected system manifestations.

Test Team support of the 5B installation and checkout, and regression testing is a planned two-week activity for the existing DAACs.

### 3.4.5 End to End Testing

ECS plans to perform on-site End to End (ETE) testing for those sites where no testing has been performed earlier. Since there are no 5B sites where ETE testing has not occurred previously, ECS has no plans for any DAAC Release 5B ETE testing. ETE testing is conducted as part of regression testing as explained in Section 3.4.3.

### 3.4.6 Performance Testing

Release 5B performance verification will consist of executing two 24 hour sustained operation tests using workloads that approximate the required loads for the Release 5B deployment timeframe. These tests will be self-contained and not use external interfaces. The success criteria will be the demonstrated ability of the system to execute each workload within a 24-hour period.

For Release 5B, GSFC and EDC DAAC workloads have been selected since they have the largest throughput rates. The workload specification is contained in Appendix A.

The workload specification has been derived from the SOW and F&PRS requirements for mission support, capacity phasing, and catch-up rates. The workloads use granule sizes, granule counts and PGE execution frequencies as defined in the ECS technical baseline. At its discretion, ECS will use synthetic data/PGEs, real data/PGEs, or a combination to implement the workload.

Performance Verification will be performed in the Landover Performance Verification Center (PVC). Because the ECS custom code will not be fully ported to the SGI Origin (IRIX 6.5) platform in time for Release 5B performance verification, the PVC will not provide sufficient capacity to fully test performance in all areas. The likely areas of reduced capacity are:

- fewer science processor CPU’s and processing disks than the largest DAAC;
- fewer silos and archive tape drives than the largest DAAC; and
- fewer physical media distribution devices than the largest DAAC.

Since the PVC became operational, further capacity analysis has been performed and the workload specification adjusted to be consistent with the PVC hardware, archive and network capacity available through the SGI Challenge platforms. For example, PGE execution times may be shortened to permit execution of full processing chains on a smaller number of CPU's. This approach will permit verification of the system's ability to plan and schedule the required number of PGEs per day on a smaller science processor configuration than would be required if baseline PGE execution times were used.

In order to reduce hardware, test development and execution costs, performance verification of secondary and/or low rate functions will not be performed. These functions include: failure recovery, failover, user registration; user profile update; user profile replication; user login; DAR submit; DAR status; directory search; GDS gateway requests; expedited data processing and distribution; ancillary data ingest from minor sources; and operator functions not related to core ingest, archive, production, and distribution.

Performance verification will be performed as shown in the schedule contained in Appendix E. The first representative DAAC workload will be executed during the first week of testing. The second representative DAAC workload will be executed during the second week of testing. The third and fourth weeks will be spent working on performance related NCR fixes and tuning activities. The two tests will then be rerun during the fifth and sixth weeks. The tests will be performed in OPS mode. No activity will occur in TS1 or TS2 during the tests..

Similar to the system functionality criteria development and verification, performance related tickets have been developed for 5B. The criteria for verification is based on a set of performance workload specifications. Appendix A provides the details of performance workload specification for 5B. There are two performance tickets, one for GSFC and one for EDC, for 5B release. The workload specification is stored online as part of the VDB. The performance tickets and the future versions of SSRP will point to this single online version.

### 3.4.7 COTS Testing

COTS packages are delivered in various ways – some COTS software packages are delivered with the ECS custom software and have an associated Ticket (including acceptance criteria), and others are delivered as autonomous upgrades to existing COTS software packages that are not part of the custom software delivery process. The latter are handled through the COTS Pre-Ship Review (PSR) process.

For each COTS package having an associated Ticket and delivered along with the ECS custom software, Test Engineering, via established process for custom software, develops new test cases.

For each COTS software upgrade not part of custom software delivery, the Test Engineering organization executes one or more regression tests to exercise system functionality and the COTS software upgrade package. Additionally, other major ECS functions may be exercised during this regression testing. This provides confidence that the COTS package upgrade has not adversely affected the behavior of unmodified software and the COTS supports system needs.

If a regression test case does not yet exist, Development organization or Raytheon Technical Services Company (RTSC) engineers develop a test case and provide it to Test Engineering. Regression Testing is performed on all COTS upgrades delivered to the VATC.

RTSC engineers install in the VATC, configure and checkout all COTS package upgrades. Thereafter, the ECS Test Engineering organization executes one or more regression tests to exercise system functionality that interfaces with, depends upon, or otherwise utilizes the COTS package.

Satisfactory completion of the VATC testing activities results in the product being prepared for a Pre-Ship Review (PSR). The PSR verifies all testing and performance milestones have been met, installation instructions prepared, and checked out before the product is released for delivery to the customer. A CCR is generated to accomplish this release. ECS PI CM-1-005 describes the turnover and installation of COTS procedures.

## 3.5 Transition

### 3.5.1 Custom Code Transition

The 5A-to-5B transition follows the same general approach as the 4PY-to-5A transition described in Section 3.1 of 334-CD-510-001. The main difference is the additional automation provided by "ECS Assistant". For the 5B Release, ECS Assistant will allow the entire installation process to be controlled from a single user terminal. As the schedule permits, additional transition functions will also be incorporated into ECS Assistant. Such functions include:

- Automatically running configuration save and database dump scripts
- Enhanced error handling (in conjunction with database and mkcfg scripts)

Historically, the majority of the errors encountered in installations and transitions have involved configuration parameters. An effort is underway to improve the management of configuration parameters, they will be managed via a registry database. This new database will be delivered with 5B.

During the "make configuration" phase of the 5A-5B transition, ECS Assist will write the content of configuration (.CFG) files into the Registry Database. "Make Configuration" processing will then be switched off, and future updates to configuration parameters will be made via the Registry GUI.

Another new feature of 5A-5B transition is cross-DAAC database replication. At this time, no changes in the schema of replicated databases are known. If changes arise, they will be implemented by a patch which the DAACs and SMC will need to incorporate at approximately the same day.

The long-term goal is to significantly reduce the time required to complete the installation and verification in the OPS mode. The goal of the 5A-to-5B transition remains 48 hours or less. This goal will be updated based on the lessons-learned from the EDC transition 4PY-5A.

To plan and perform transition the following assumptions are made:

1. The transition is from a single baseline. That is, if the custom software for a given mode is not from a specific 5A release, then the appropriate patches will be applied to bring the release to that level before the transition is started.
2. The shared mode common is updated prior to the start of transition
3. COTS software versions match required baseline versions

4. Full system backup and any associated incremental backup are complete and available prior to the start of transition.

5. The DAACs will either delete all unused/test data that is outside the ESDT baseline from the archive prior to transition, or will be responsible for updating the associated ESDTs to meet 5B requirements.

6. All producers of higher-level data products (L1 and higher) are capable of holding/buffering products that could not be ingested during the transition period.

7. Prior to shutdown the system is quiesced (work queues are allowed to run until they are empty). It is estimated that the DAAC will be able to catch up at least 2 hours' worth of processing per day, so if the transition requires the full 48 hours, then catch up will take at most 24 days.

8. The downtime clock starts when system inputs are disabled, and completes when the system is again receiving operational data.

9. Once operations are restored, the use of the other modes is kept to a minimum to allow backlogged processing to catch-up.

The 5A-to-5B transition will use the same basic approaches to mitigating risks as the previous 4PY-to-5A transition. The approach is based on a step-by-step process structured in such a way that the level of confidence in the delivered code, the transition scripts, and the expertise of the operations staff increases at each new step. After the successful conclusion of the acceptance test phase, the transition to 5B is practiced in the VATC for a period of about three weeks. During this time personnel from the EDC and GSFC DAACs will be trained to perform the entire transition cycle (i.e., 5A system backup, system quiesce, installation of 5B, database transition, 5B checkout, and rollback to 5A). This training cycle is repeated three times, or once a week. The transition is then practiced in either or both TS1 and TS2 modes at GSFC and EDC for three weeks. This should allow the discovery of any outstanding DAAC-specific configuration issues. Finally, the transition to 5B is accomplished in GSFC and EDC OPS mode during an additional fourth week. To reduce the overall time to transition all DAACs and minimize the personnel resource required, the current approach is to train NSIDC personnel at EDC during the 4-week EDC transition phase and train LaRC personnel at GSFC. Four weeks of transition/practice and transition in OPS at LARC and NSIDC will conclude the 5A-to-5B transition phase. This approach allows for the early detection of possible bugs - and enough time to provide fixes, if needed - as well as for DAAC operations personnel to become intimately familiar with the entire transition process. This strategic approach for training DAAC personnel needs, of course, to be re-evaluated as the DAAC transition plans become clearer in order to ensure a transition as expedite as possible at each DAAC and an optimized use of the technical expertise of the personnel composing the ECS transition team.

Two additional ways for mitigating the risks associated with transition to 5B are presently under investigation. 1) Automation of checkout operations: scripting the execution of the test procedures could sensibly reduce the risks involved in the error-prone manual operations as well as the staff required to perform the transition. 2) System warm start: before starting the transition, the system would be shutdown to a well-defined state from which a warm restart

would be possible. Work in progress would either be completed (if the completion time is within expected limits) or brought to a checkpoint from where it could be restarted after the transition is completed. This would allow for a drastic reduction of the time required to quiesce the system (one hour versus six hours, according to preliminary estimates).

With respect to reducing any risk associated with database transition, early planning will need to occur. Any new capability or system change should be evaluated relative to transition impacts. Since the level of risk will depend on the specifics of the change, a full assessment can only be made once the specifics are known. The minimum risk obviously occurs when there are no database schema changes. The goal of the assessment would be to trade-off the benefit of the change against the risk of the database transition.

### 3.5.2 COTS Transition

The ECS project is required to upgrade the operating system (OS) on all the SGI machines in the EDF Landover facility as well as at all DAACs. There are two compelling reasons for the OS upgrade. First, the current SGI support of OS, IRIX 6.2, terminates as of 30 June 2000 and, second, the system performance requirement for Aqua requires SGI Origin machines; the Origin class is not capable of running an IRIX release prior to 6.5.

The SGI vendor recommendation is that we target the latest available maintenance release, IRIX 6.5.x, for our final upgrade release. The latest version will have more bugs identified and fixed and hence the project will incur less risk than the earlier version. Currently, the ECS baseline version is the IRIX 6.5.6 maintenance release. Several COTS products need to be upgraded to versions that are certified for the IRIX 6.5.6 release.

The proposed OS upgrade can happen only after 5B release is moved to the OPS mode at a DAAC (estimated to be June/July 2000) and must complete 30 days before the Aqua launch. For scheduling purposes Aqua launch is assumed to be in December 2000. Note also that ECS Release 6A is built on IRIX 6.5, so the DAACs must upgrade before taking Release 6A.

The OS upgrade plan assimilates with the hardware upgrade and Sybase upgrade activities planned around the same time frame.

The custom code that will be released with the new OS will be referred to as Release 55. Release 55 will be SGI custom code 5B built on IRIX 6.5 with upgraded COTS. It will be delivered as a release to 5B. The PSR for Release 55 is scheduled on 10 July 2000. At that time, the release will be known as 5B.n where n is the sequence number within the 5B releases

Starting in March, a build of the 5B SGI source code will be maintained on Irix 6.5, in addition to Irix 6.2. The same code baseline will be built on the two Irix versions, so that a mix of 6.2 and 6.5 machines can exist at a site.

As many as possible of the COTS product PSRs are conducted in advance to minimize the overall risk. The section 3.3.2.1 shows the PSR scheduled for the COTS product that need to be upgraded on or before Release 55.

### 3.5.2.1 Upgrade To SGI Irix 6.5

This Section is deleted. Sections 3.5.2.1.1 and 3.5.2.1.2 are consolidated and moved to 3.3.2.1.

## 3.5.3 DAAC Transition Strategy

The proposed OS upgrade is only for the SGI machines. The Table 3.5.3-1 shows the scope of the proposed OS upgrade at each DAAC.

***Table 3.5.3-1. Number of SGI machines at each DAAC***

| DAAC | Number of SGI machines | Total number of machines (SUN, SGI, X-term, HP, PC) |
|---|---|---|
| EDC | 12 | 53 |
| GSFC | 14 | 67 |
| LaRC | 12 | 52 |
| NSIDC | 7 | 40 |

The transition to Release 55 on IRIX 6.5 will be conducted through the functional areas of the ECS system viz. ACG, DRG, ICG, QA, SPG, and WKG. In a few cases SGI Origin machines will substitute the current SGI Challenge machines while in other cases, SGI Challenge machines will substitute the current SGI Challenge machines. The SGI machines that can be taken off line without stopping ECS operations will be upgraded without substitution.

Transition activities will start in TS2 mode, then to TS1, and finally into the OPS mode. At this point the new machine will become fully functional. Figure 3.5.3-1 illustrates the transition steps.

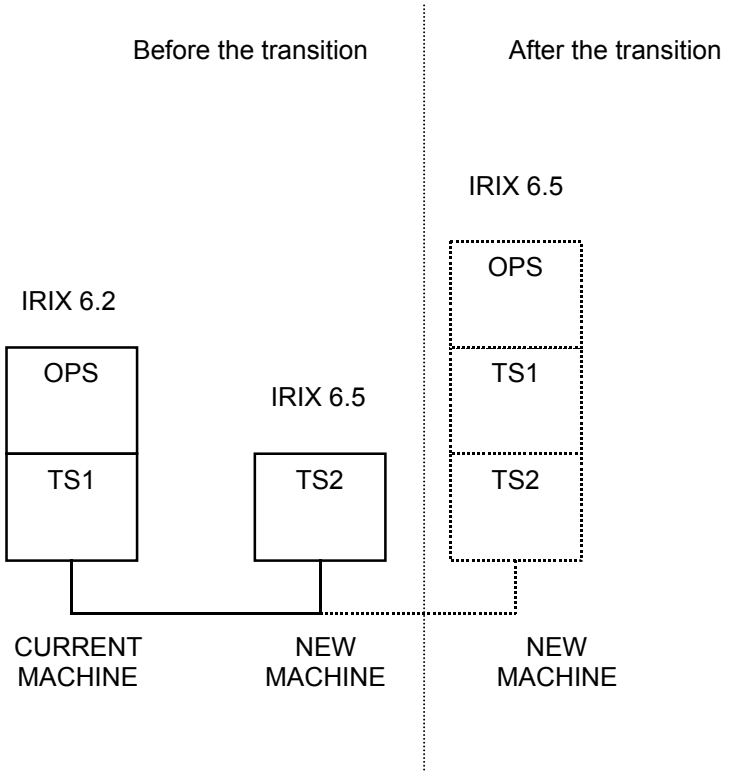


***Figure 3.5.3-1. Transition steps***

The above-mentioned substitution method requires very little downtime and provides a quick fall back plan. The white paper "Operating System Upgrade on SGI machines in ECS" will provide details about the transition activities at each DAAC.

## 3.6 Customer Reviews

Customer reviews for 5B consist of Incremental Release Review (IRR), Consent to Shipment Review (CSR), and Site Readiness Assessment (SRA). Appendix C provides a preliminary agenda for each of these reviews.

In August 1999 ECS conducted 5B Release IRR. This IRR addressed the requirements and their associated priority. It included the design aspects of incorporating the requirements into the system, the detailed requirements and requirement verification traceability, and the acceptance test plan.

Following a successful TRR, an ECS internal event, the software release is installed in a dedicated mode(s) in the VATC for formal testing. Formal tests are run to verify a predefined set of system capabilities reflected in the L3 and L4 requirements. A prerequisite for formal execution of tests is ESDIS approved test procedures. This phase concludes with a CSR. The CSR documents the results of the VATC test program including requirement verification status, liens associated with the release, and a lien work-off plan.

The SRA will be conducted to review the completion of the release installation and checkout at each DAAC. At the SRA, the results of acceptance testing, custom software PCA, and existing liens against system functionality with work-off plans including determination of system readiness to transition are documented and reviewed.

## 3.7 5B CDRL List

The documents associated with the delivery of Release 5B are provided in the Appendix D. This Appendix provides the list of 5B documents as well as the schedule of delivery.

## 3.8 Schedule of Key Activities

The project schedule is maintained on line with the Primavera system and is compiled and delivered to the customer on a weekly basis as the weekly 447 report. Additionally, on-line access is provided to compiled project schedule in the Primavera system. Appendix E provides a high level schedule for 5B activities.

## 3.9 Progress Metrics

Metrics are used as a management tool to assess progress, adjust resources, and aid in the delivery of ECS/SDPS. Planned versus actual metrics aid in determining progress towards the planned goals. All subsystems and disciplines use these types of metric. Other types of metrics include the rate of discovery of problems or issues, the rate of changes in code, and the rate of new code being developed. These rate metrics provide trends that predict system stability and help identify additional potential resource needs. The Program Manager will maintain a sustained emphasis on continually improving the data collection, analysis and presentation of the relevant metrics of the project.

Selected metrics presentation charts and their updates are presented at the Daily Status Reviews (DSR), and posted for use and reference by interested individuals, and formally provided in the weekly update to the monthly program report.

Current metrics delivered each week include:

- Code & Unit Test Plan vs. Actual
- Integration Plan vs. Actual
- Severity 1, 2, & 3 NCRs Prior to ‘T’ State
- NCR Work-off Actuals vs. Projections and top 20 NCRs
- DAAC Support Desk Trouble Tickets Open vs. Closed
- SLOC by Sub-System
- SV/AT Tests Planned vs. Actual
- Verification Progress Status, Schedules, and Variances

ECS Quality Office is leading a metrics team representing all functional organizations. This team has recently been selected to modify and develop additional metrics for all phases of development lifecycle. The future release of this document will reflect the metrics identified by this team.

## 3.10 Government Furnished Information

The following table (3.10-1) provides the list of known GFE/GFI as of the publication of this document. The detailed list is reviewed on weekly bases at the DSRs.

***Table 3.10-1. Release 5B GFE/GFI List***

| GFE/GFI Description | Need Date |
|---|---|
| | |
| Need FDD ICD updated for Aqua formal definition/documentation of quaternion format, orbit formats, and definitive orbit spacing. | 10/19/99 |
| | |
| | |

## 3.11 Risk Mitigation Plans

### 3.11.1 Risk Management Approach

Achieving balanced technical/cost/schedule performance, the ECS project emphasizes risk identification and management. This section describes the program's approaches to this critical process.

PM-1-002, the Risk Management Methodology (a Project Instruction) provides the details of ECS's risk management process. This process is composed of four stages. This section provides a brief and high level description of the four stages.

**Stage 1, Risk Identification** - Risk items will be identified over the course of the Program from routine ECS activities and recorded on the Program risks list.

Any ECS personnel can identify risks with potential technical, cost, or schedule impacts and report to the management. The Management will then designate a "Responsible Individual" to lead all activities related to that particular risk. Identified risks will be moved to the Risk Assessment stage of the Risk Management Process.

**Stage 2, Risk Assessment -** Detailed analyses of the identified risks and associated drivers are performed by the Responsible Individuals.

The analyses are conducted to discover the causes, effects, and magnitude of perceived risks. They consist of determining the probability of potential risk occurrence (probability of occurrence, Pf) with respect to design maturity, system complexity, and dependency variables

and evaluating all technical, cost, and schedule consequences (consequence of failure, Cf) caused by the potential risk.

**Stage 3, Risk Mitigation** - In this stage, Program Management evaluates various mitigation alternatives presented by the Responsible Individual for cost, impact, effectiveness, and feasibility and approves a mitigation plan for implementation.

The mitigation plan identifies details of mitigation activities with schedules and the supporting organizations. It also provides detailed actions with schedules for completion.

For highly significant risks, contingency plans may also be developed and documented during this stage; contingency plans address the situation where the selected mitigation might fail, and provide for documented alternate courses of actions.

**Stage 4, Risk Monitoring** - After approval of a mitigation plan for implementation, the risk management team will periodically review the status of the related risk action items and assess their progress via risk meetings. If there is any indication of an increase in the severity of the risk, the risk is referred back to the mitigation stage for further option analysis. In addition, risk metrics (impacts and probabilities) are reviewed and updated periodically.

### 3.11.2 Known Risks and Mitigation Strategies

Threats with potential technical, cost and schedule impacts will be routinely identified and evaluated during the normal course of program execution. Based on experience with the program to date, the following risks have been identified:

1. The release 5B timeframe contains the first operating system upgrades during the operational life of ECS. The ability to upgrade operating systems with minimal system downtime impacting the operational environment is a significant risk.

   The SGI OS upgrade affects many of the COTS products currently used in the ECS system. Some dependent COTS products are required to be upgraded while other COTS products are required to be recompiled on the new OS. The risk will be mitigated by upgrading the dependent COTS before the SGI OS upgrade, as far as possible.

   ECS Systems Engineering has identified a comprehensive set of risks associated with the OS upgrade. The risks include: custom code integration and inter-operability with the new OS; transition process, downtime, and recovery contingency at DAACs; and high degree of schedule risk in meeting the delivery dates due to competing and conflicting priorities associated with work overload. ECS has planned and scheduled a detailed set of activities. ECS management reviews the implementation progress and identified risks on a weekly basis. To facilitate understanding of the severity of these risks and the management of the risks following attributes are developed for each risk: description, mitigation activities (including planned start dates and complete dates), probability of occurrence, severity of consequence, impact of risk (including cost), and risk closure criteria and rationale.

   Utilization of Origin processors at EDC and GSFC, and utilization of secondary machines, will allow the new operating system version, layered COTS, and custom code to be installed

without stopping operations. This approach will also allow operations to revert to the established system in the event of problems with the new system.

2. A major schedule and cost driver relates to the timely and complete delivery of required information, both metadata and PGEs as well as Production Rules, from the PM-1 instrument teams. Failure to deliver this data in a timely fashion can result significant delays in the integration and testing of science algorithms into the ECS system.

   ECS works with ESDIS to obtain the requirements from each of the instruments teams for production rules, ESDTs and test data. This is not a risk that the ECS program alone can mitigate. ECS has notified ESDIS of the need dates for external information required to meet our schedule commitments and will continue to report progress on a weekly basis.

3. Ability to obtain timely agreement on interface issues included in Interface Control Documentation.

   ECS continues to work with the ESDIS point of contacts (the book bosses) to prepare the 5B external interfaces. The SIPS interface Documents for 5B are currently not available, and likewise government provided information for the 5B interfaces has not been provided. Efforts on behalf of ECS Development, Science, and Test will proceed at risk to position ECS to make schedule. In order to do this, ECS will make design assumptions to accommodate the development, test, and integration activities required as part of 5B. These assumptions must be reviewed and concurred by ESDIS. Should anything change in regards to these assumptions during the 5B period, the ECS 5B schedule and 5B cost may be impacted.

4. Risk of Science Software requiring computer resources over and beyond the ECS contract baseline impacting the effectiveness of the operational systems at the DAACs.

   ECS will continue to support early SSI&T of science software to determine as early in the process as possible the potential impact of science software on provided computing resources. This includes monitoring requiring CPU, memory and disk and archiving resources. This will allow time for the instrument teams to better tune/optimize their algorithms in selected cases. For instrument teams where processing is being provided externally, ECS will support early interface testing to determine potential impacts on system ingest and archiving throughput.

5. Ability to transition from 5A to 5B with minimal system down-time impacting the operational environment.

   A major risk associated with transition is the transition of existing operational databases including metadata of the ingested data files and OS upgrades. With respect to reducing any risk associated with these, early planning will need to occur. Any new capability or system change should be evaluated relative to transition impacts. Since the level of risk will depend on the specifics of the change, a full assessment can only be made once the specifics are known.

6. Concern about DAAC-unique configurations and software packages resulting in unexpected system manifestations.

   While the system is expected to satisfy 5B criteria at each DAAC, there is concern regarding differences between versions of COTS products in the Landover Facility test environments and each of the DAACs. This issue is due to each DAAC having its own timetable for upgrading COTS packages.

   This is not a risk that the ECS program alone can mitigate. ECS will work closely with DAACs to schedule COTS product upgrades within the schedule required to maintain the baseline that supports 5B. Activities such as site unique testing, checkout testing, and transition should minimize the impact of this risk. Since the level of risk will depend on the specifics of the site differences, a full assessment can only be made once the specifics are known.

# Appendix A. 5B Workload Specification

## A.1 Introduction

Release 5B performance verification will consist of executing a simulated 24 hour workload for the GSFC and EDC DAACs. Release 5B supports full AM-1 ingest, archive, production and distribution requirements. The workloads will simulate "catch-up" scenarios where 120% of ingest, archive, and production data volume will be simulated along with 100% of the distribution volume. The tests will be performed in OPS mode. No activity will occur in TS1 or TS2 during the tests.

This appendix contains the workload specification that defines the acceptance criteria for the performance verification test procedures. For each DAAC, an initial system state is defined, as well as, ingest criteria, production criteria, planning criteria, distribution criteria, data access criteria, and system backup criteria.

Performance verification will take place in the Landover Performance Verification Center (PVC). For Release 5B, the Release 4 End-to-End test method will be used. This includes the simulation of external interfaces and the execution of test procedures against a minimally populated archive.

Note that this workload specification may need to be revised to fit the throughput available through the SGI Challenge-based subset of hardware in the PVC. This is because Release 5B custom software is not scheduled to execute on SGI Origins in time for Release 5B performance verification. Further analysis will be required once the PVC is operational and this workload specification will be adjusted, if necessary.

## A.2 GSFC Workload Specification

### A.2.1 Initial System State

At the beginning of the 24 hour test, the system state shall be as follows:

a) User registrations required for the test have been performed.

b) ESDTs required for the test have been installed.

c) Volume group assignments have been made to mirror the volume group assignments at the DAAC.

d) The Science Data Server inventory database has been populated with 95,000 granules. A small subset of these granules will have browse associated with them. These granules will be used to support the Data Access plan specified in A.2.6.

e) The Subscription Server database has been populated with the subscriptions that are required to support the Distribution plan specified in A.2.5.

f) The Science Data Server inventory database and archive have been populated with 8 hours of MODIS PGE01, PGE02, and PGE03 output granules. These granules will be used to support the first 8 hours of the Distribution plan specified in A.2.5.

g) The Ftp Pull distribution area has been populated with at least 1,000 files linked to at least 250 directories.

h) One or more production plans have been created to cover the 8-12 hour pretest period (see item g below) and 30 hours of production to be performed during the 24 hour test period (~120% of daily production requirement).

i) MODIS Level 1 production has been initiated and has reached steady state. That is, at least 80% of the science processor CPUs allocated to ops mode are in use. To achieve this, it is estimated that processing may need to begin 8-to-12 hours prior to the start of the test.

### A.2.2 Ingest Criteria

The Ingest plan for the 24 hour test is as follows:

a) One MODIS Level 0 granule shall be ingested every 96 minutes from a simulated EDOS, starting at hour 0. 15 granules shall be ingested during the 24 hour period (120% of the daily average). Total data volume is 97.5 GB.

b) One AM-1 ancillary granule shall be ingested every 96 minutes from a simulated EDOS, starting at hour 0. 15 granules shall be ingested during the 24 hour period (120% of the daily average). Total data volume is < 1 GB.

c) One AM1ATTF granule shall be ingested every 96 minutes from a simulated FDD, starting at hour 0. 15 granules shall be ingested during the 24 hour period (120% of the daily average). Total data volume is < 1 GB.

d) 39 MODIS Level 0 expedited granules (120% of the daily average) shall be ingested at an average rate of one every 30 minutes from a simulated EDOS, starting at hour 3. Total data volume is < 2.4 GB.

e) 39 ASTER Level 0 expedited granules (120% of the daily average) shall be ingested at an average rate of one every 30 minutes from a simulated EDOS, starting at hour 3. Total data volume is < 2.4 GB.

f) One ancillary granule shall be ingested every 144 minutes from a simulated NOAA server, starting at hour 0. 12 granules shall be ingested. Total data volume is < 1 GB.

g) 1 DAO granules shall be ingested every 60 minutes from a simulated DAS, starting at hour 0. 24 granules shall be ingested. Total data volume is 2 GB.

h) 1,805 MODIS higher-level (MODAPS) product granules shall be ingested during the 24 hour period. As a practical matter, this should be done as 75 granules ingested every 60 minutes from a simulated MODAPS interface server, starting at hour 0. The results in 1,800 granules. The remaining 5 granules may be ingested as desired. The total data volume is 69 GB.

i) 17 MODIS higher-level browse granules shall be ingested every 60 minutes from a simulated MODAPS interface server, starting at hour 0. 408 granules shall be ingested during the 24 hour period. Total data volume is < 1 GB.

j) 8 MODIS higher-level QA granules shall be ingested every 60 minutes from a simulated MODAPS interface server, starting at hour 0. 192 granules shall be ingested during the 24 hour period. Total data volume is < 1 GB.

k) 1,805 MODIS higher-level (MODAPS) production history granules shall be ingested during the 24 hour period. As a practical matter, this should be done as 75 granules ingested every 60 minutes from a simulated MODAPS interface server, starting at hour 0. This results in 1,800 granules. The remaining 5 granules may be ingested as desired. The total data volume is < 1 GB.

### A.2.3 Production Criteria

The Production plan for the 24 hour test is as follows:

a) Perform the DPREP processing necessary for 30 hours of data coverage. This results in 15 PGE executions that produce 90 output granules. Total data volume is < 1 GB.

b) Perform the MODIS L1A processing necessary for 30 hours of data coverage. This results in 120 PGE executions that produce 360 MOD01 granules and 360 MOD03 granules. Total data volume is 150 GB.

c) Perform the MODIS L1B processing necessary for 30 hours of data coverage. This results in 360 PGE executions that produce 360 MOD02OBC granules, 360 MOD021KM granules, 360 MOD02HKM granules, and 360 MOD02QKM granules. Total data volume is 236 GB

d) Perform the MODIS Cloud Mask processing necessary for 30 hours of data coverage. This results in 360 PGE executions that produce 360 MOD35_L2 granules and 360 MOD07_L2 granules. Total data volume is 27 GB.

### A.2.4 Planning Criteria

The Planning criteria for the 24 hour test is as follows:

- Starting at hour 8, enter and plan the production requests required for 24 hours of data coverage of MODIS. In order to simulate normal DAAC operations, data granules for the covered 24 hours shall not be in the archive. As a practical matter, given the current processing profile, this production plan amounts to 12 instances of the DPREP PGE(s), 96 instances of the MODIS L1A PGE, and 288 instances each of the MODIS L1B and the MODIS Cloud Mask PGEs.

### A.2.5 Distribution Criteria

The Distribution plan for the 24 hour test is specified in Table A-1.

***Table A-1. GSFC Distribution Plan***

| Recipient | # Orders | Source | Product(s) | Media Type | Submit Time | # Grans Per Order | Size Per Order (MB) | Total Size (GB) |
|---|---|---|---|---|---|---|---|---|
| MODAPS | 360 | Subscription | MOD02OBC | FtpPush | Ongoing | 1 | 57 | 20.52 |
| MODAPS | 360 | Subscription | MOD021KM | FtpPush | Ongoing | 1 | 262 | 94.32 |
| MODAPS | 360 | Subscription | MOD02HKM | FtpPush | Ongoing | 1 | 168 | 60.48 |
| MODAPS | 360 | Subscription | MOD02QKM | FtpPush | Ongoing | 1 | 168 | 60.48 |
| MODAPS | 360 | Subscription | MOD35_L2 | FtpPush | Ongoing | 1 | 48 | 17.28 |
| MODAPS | 360 | Subscription | MOD07_L2 | FtpPush | Ongoing | 1 | 28 | 10.08 |
| MODAPS | 360 | Subscription | MOD03 | FtpPush | Ongoing | 1 | 62 | 22.32 |
| Total MODAPS | 2,520 | | | | | | | 285.48 |
| EDC | 39 | Subscription | AST00_E | FtpPush | Ongoing | 1 | 62 | 2.42 |
| Total EDC | 39 | | | | | | | 2.42 |
| GDS | 39 | Subscription | AST00_E | FtpPush | Ongoing | 1 | 62 | 2.42 |
| Total GDS | 39 | | | | | | | 2.42 |
| Xrun1 | 89 | EDG | MOD02OBC, MOD021KM, MOD02HKM, MOD02QKM | 8mm | 5 per hour starting at hour 0 | 4 | 1,965 | 174.89 |
| Xrun1 | 8 | EDG | MOD02OBC, MOD021KM, MOD02HKM, MOD02QKM | 8mm | 1 per hour starting at hour 8 | 12 | 5,895 | 47.16 |
| Total 8MM | 97 | | | | | | | 222.05 |
| Xrun2 | 360 | Subscription | MOD01 | FtpPush | Ongoing | 1 | 354 | 127.44 |
| Xrun1 | 143 | EDG | MOD35_L2, MOD07_L2 | FtpPull | 7 per hour starting at hour 2 | 20 | 760 | 108.68 |
| Total Elect | 542 | | | | | | | 238.54 |
| Total User | 600 | | | | | | | 458.17 |
| Total Distribution | 3,198 | | | | | | | 748.48 |

### A.2.6 Data Access Criteria

The Data Access plan for the 24 hour test is as follows:

a) Submit 45 search requests per hour from EDG against the 95,000 granule inventory. The search requests should be spread across 4 simulated EDG users.

b) Submit 19 integrated browse requests per hour from the EDG against the 95,000 granule inventory. The browse requests should be spread across 4 simulated EDG users.

### A.2.7 System Backup Criteria

The System Backup plan for the 24 hour test is as follows:

a) An incremental Sybase backup will be performed on all databases starting at hour 16.

b) An incremental file system backup will be performed on all servers starting at the completion of the Sybase backup.

## A.3 EDC Workload Specification

### A.3.1 Initial System State

At the beginning of the 24 hour test, the system state shall be as follows:

a) User registrations required for the test have been performed.

b) ESDTs required for the test have been installed.

c) Volume group assignments have been made to mirror the volume group assignments at the DAAC.

d) The Science Data Server inventory database has been populated with 95,000 granules and a snapshot of the EDC Landsat 7 inventory taken around 11/1/99 (estimated at 30,000 granules). A small subset of the 95,000 granules will have browse associated with them. These granules will be used to support the Data Access plan specified in A.3.6.

e) The Subscription Server database has been populated with the subscriptions that are required to support the Distribution plan specified in A.3.5.

f) The Science Data Server inventory database and archive have been populated with 200 ASTER PGE02, PGE03, PGE04, PGE05 and PGE06 output granules. These granules will be used to support the first 8 hours of the Distribution plan specified in A.3.5.

g) The Science Data Server inventory database and archive have been populated with 100 L70RWRS scenes. These scenes will be used to support the first 8 hours of the Distribution plan specified in A.3.5.

h) The Ftp Pull distribution area has been populated with at least 1,000 files linked to at least 250 directories.

### A.3.2 Ingest Criteria

The Ingest plan for the 24-hour test is as follows:

a) 372 ASTER L1B granules shall be ingested from D3 tape, starting at hour 0. Total data volume is 47 GB.

b) 937 ASTER L1A granules shall be ingested from D3 tape, starting when the D3 tape drive is available following the L1B ingest. Total data volume is 116 GB.

c) One ancillary granule shall be ingested every 120 minutes from a simulated NOAA server, starting at hour 0. 12 granules shall be ingested during the 24 hour period. Total data volume is < 1 GB.

d) 39 ASTER L0 expedited granules (120% of the daily average) shall be ingested at a rate of 3 granules every 60 minutes from a simulated GDAAC, starting at hour 3. Total data volume is < 3 GB.

e) Approximately 84 L70R granules (F1 and F2) shall be ingested using a simulated L7 contact plan. The total number of scenes contained in these granules shall be 336.

f) Metadata and browse for 690 IGS scenes shall be ingested, starting at hour 8. Total data volume is < 2 GB.

g) 3,718 MODIS higher-level (MODAPS) granules shall be ingested during the 24 hour period. As a practical matter, this should be done as 155 MODIS higher level granules ingested every 60 minutes from a simulated MODAPS interface server, starting at hour 0. This will result in a total of 3,720 granules ingested. The total data volume is 185 GB.

### A.3.3 Production Criteria

The Production plan for the 24 hour test is as follows:

a) Routinely produce ASTER DST products from the ASTER L1B granules ingested from D3 tape. This requires 372 PGE02 executions that produce 1,116 output granules. Total data volume is 40 GB.

b) Process 75 on-demand requests for ASTER ACVS products. This requires 75 PGE04 executions that produce 75 AST09V granules, 75 AST09S granules, 75 AST07S granules, and 75 AST07V granules. Total data volume is 36 GB.

c) Process 75 on-demand requests for ASTER ACT products. This requires 75 PGE05 executions that produce 75 AST09T granules. Total data volume is 1 GB.

d) Process 75 on-demand requests for ASTER ETS products. This requires 75 PGE05 executions that produce 75 AST09T granules and 75 PGE06 executions that produce 75 AST05 granules and 75 AST08 granules. Total data volume is 2 GB.

e) Process 75 on-demand requests for ASTER BTS products. This requires 75 PGE03 executions that produce 75 AST04 granules. Total data volume is < 1 GB.

### A.3.4 Planning Criteria

The planning criteria for the 24 hour test is as follows:

a) Within the 24-hour test period, perform the planning required to produce the number of ASTER DST products specified in A.3.3.

b) Within the 24-hour test period, perform the planning required to produce the number of ASTER on-demand products specified in A.3.3.

### A.3.5 Distribution Criteria

The Distribution plan for the 24-hour test is specified in Table A-2.

***Table A-2. EDC Distribution Plan***

| Recipient | # Orders | Source | Product(s) | Media Type | Submit Time | # Granules Per Order | Size Per Order (MB) | Total Size (GB) |
|---|---|---|---|---|---|---|---|---|
| Xrun1 | 20 | EDG | L70RWRS | 8mm | 3 per hour starting at hour 6 | 1 | 500 | 10.00 |
| Xrun1 | 39 | EDG | ASTL1A | 8mm | 3 per hour starting at hour 8 | 20 | 2,480 | 96.72 |
| Xrun1 | 39 | EDG | MODPTHKM | 8mm | 3 per hour starting at hour 0. | 14 | 2,114 | 82.45 |
| **Total 8MM** | **98** | | | | | | | **189.17** |
| Xrun2 | 372 | Subscription | ASTL1B | FtpPush | Ongoing | 1 | 126 | 46.87 |
| Xrun2 | 780 | Subscription | MODIS Products | FtpPush | Ongoing | 1 | 100 | 78.00 |
| Xrun1 | 90 | ODFRM | AST9V, AST9S, AST7V, AST7S | FtpPull | 5 per hour starting at hour 8 | 4 | 476 | 42.84 |
| Xrun1 | 90 | ODFRM | AST09T | FtpPull | 5 per hour starting at hour 8 | 1 | 13 | 1.17 |
| Xrun1 | 90 | ODFRM | AST05, AST08 | FtpPull | 5 per hour starting at hour 8 | 2 | 12 | 1.08 |
| Xrun1 | 90 | ODFRM | AST04 | FtpPull | 5 per hour starting at hour 8 | 1 | 7 | 0.63 |
| Xrun1 | 5 | EDG | ASTL1B | FtpPull | 4 per hour starting at hour 2 | 7 | 882 | 4.41 |
| Xrun1 | 90 | EDG | L70RWRS | FtpPull | 6 per hour starting at hour 2 | 1 | 500 | 45.00 |
| **Total Network** | **1,607** | | | | | | | **220.00** |
| **Total Distribution** | **1,705** | | | | | | | **409.17** |

### A.3.6 Data Access Criteria

The Data Access plan for the 24 hour test is as follows:

a) Submit 19 search requests per hour from EDG against the 95,000 granule inventory. The search requests should be spread across 2 simulated EDG users.

b) Submit 19 integrated browse requests per hour from the EDG against the 95,000 granule inventory. The browse requests should be spread across 2 simulated EDG users.

c) Submit 26 search requests per hour from EDG against the Landsat 7 inventory. The search requests should be spread across 2 simulated EDG users.

### A.3.7 System Backup Criteria

The System Backup plan for the 24 hour test is as follows:

a) An incremental Sybase backup will be performed on all databases starting at hour 16.

b) An incremental file system backup will be performed on all servers starting at the completion of the Sybase backup.

## A.4 Post-Test Reporting Requirements

The following information shall be provided one day after each formal test:

a) Actual work accomplished vs. planned work.

b) List of hardware and software failures that occurred during the test.

c) NCRs for all new defects found during the test.

The following information shall be provided two weeks after completion of both formal tests:

a) Resource usage analysis (e.g., cpu, memory, disk I/O) for each hardware platform.

b) Response time analysis for search and browse requests.

c) Memory growth analysis for key servers.

d) Recommendations for hardware and/or software configuration adjustments.

# Appendix B. L3 Requirements

Tables A-1 and A-2 contain the Release 5B L3 requirements and IRDs from Revision B of the December 1998 F&PRS including changes assumed by ECS for the Option A+ ECS Restructure Proposal. Interpretations of some L3 requirements are included to facilitate agreement on their meaning. Several performance/capacity requirements are included which can not be completely satisfied until the end of the contract. They will be evaluated for their applicability to Release 5B.

***Table B-1. L3 Requirements***

| L3 ID | Rel | L3 Text | Interpretation Text |
|---|---|---|---|
| EOSD5250 | 5A 5B Partial | The ECS shall enable access to configuration controlled applications programming interfaces (APIs) that permit development of DAAC-unique value added services and products. The interfaces include: a. V0-ECS Gateway b. SIPS/LaTIS Gateway c. Search and Order Gateway | Current: V0-ECS Future: SIPS (5A); Search and Order Gateway (5B) |
| DADS0170 | 5A 5B 6A Partial | The ECS shall be capable of receiving from Landsat the following: a. L70R data sets b. Metadata c. Ancillary data d. Calibration data e. Engineering data | (5P): Electronic ingest of IGS format 0 metadata; (5B): Landsat-7 Format 1 /Format 2 Error Handling; (6A):IGS Browse and format 0 metadata from tape; and L7 engineering data from the MOC |
| DADS0190 | 5A 5B Partial | The ECS shall receive from the SCF the following: a. Special products (L1-L4) b. Metadata c. Ancillary data d. Calibration data e. Correlative data f. Science Software g. Standard Products (L1-L4) | The ingest of SCF data products will be supported by the SIPS interface which is further specified in SDPS0092 and SDPS0093. Special Data Products are described in the F&PRS Glossary. ECS assumes that the DAACs are responsible for creating and testing ESDTs for Special Products. The volume of Special Data Products will not impact archive capacity significantly and they will be ingested by ECS through the SIPS interface. 5A: Support to AM-1 Mission 5B: Capability to be added to support PM-1 Mission 6B: CHEM-1 |

| L3 ID | Rel | L3 Text | Interpretation Text |
|---|---|---|---|
| IMS-0625 | 5A 5B Partial | The ECS shall support V0 requests for a. Access to ECS inventory metadata (including ECS core and product specific metadata attributes) and browse data b. Ordering of data products (including Landsat 7 Level 0R fixed WRS and floating partial subintervals) c. On-demand processing of ASTER data products d. Price estimates for Landsat 7 Level 0R fixed WRS and floating partial subintervals e. User profile information f. Production history g. Science software h. Spacecraft housekeeping and ancillary information i. Engineering data j. EOC historical data | Current: items b (L70R fixed WRS), d (L70R fixed WRS), e, f, g, h, I Future: items a (5B), b (floating partial subintervals at 5B), c, d (floating partial subintervals at 5B), j |
| DADS3105 | 5A 5B 6A Future | The ECS shall be capable of ingesting and archiving data in support of external data production at the data rate specified in the SIPS ICD. | 5A: AM-1 Data Rates<br>5B: 5B SIPS throughput support for Terra increases to 2X ingest/archive for Level 1 and 1.5X ingest/archiving for higher level products.<br>6A: PM-1 Data Rates |
| DADS0202 | 5B | The ECS shall associate ASTER L1B data products to the browse data that is delivered for ASTER L1A data products. | |
| DADS0203 | 5B | The ECS shall associate ASTER DEM data products to the browse data that is delivered for ASTER L1A data products. | |

| L3 ID | Rel | L3 Text | Interpretation Text |
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| PGS-0200 | 5B 6A 6B Partial | The ECS shall execute Science Software in accordance with the Production Rules specified by the responsible instrument team | Most of the production rules listed below have been identified to support execution of specific PGEs. Some Instrument Teams have not yet identified all of the production rules that will be required to execute their PGEs. As these Production Rules and those for CHEM-1, and PM-1 are identified, they will be added to this list and evaluated against the Production Rule budget in Option A+ for additional cost consideration. All supported Production Rules will be identified in individual L4 requirements. Current: a-s (a, b, c, d, e, f, g, h, I, j, k, l, m, n, o, p, q, r, s) Future: t-aa (t, u, v, w, x, y, z, aa) Where the currently identified Production Rules are: a. Basic temporal b. Advanced temporal c. Boundary offset d. Orbit-based activation f. Alternate ancillary inputs i. Spatial query l. Metadata-based query for input granules n. Minimum number of granules p. Runtime parameters q. Runtime parameter flag r. Accessing 1-233 path number t. Optional DPRs u. Most rec |
| SDPS0092 | 5B 6A Future | The ECS shall provide an interface as defined in the SIPS ICD for supporting external production and reprocessing of standard ECS products. | Future: Provided through SIPS ingest interface and machine-to-machine gateways. 5B: PM-1 Ingest 6A: Machine to machine |
| EOSD3750 | 5B 6B Partial | The ECS shall be able to recover from 95% of system failures without losing queued requests. | Disk failures and other hardware failures may result in queued requests being lost. 6B: 95% threshold for recovery from system failures. |
| EOSD2400 | 5B Future | The ECS shall provide multiple categories of data protection based on the sensitivity levels of ECS data, as defined in NHB 2410.9. | Multiple levels provided as part of the Granule Level Access control This refers to granule level access control based on granule quality metadata. |
| IMS-0212 | 5B Future | The ECS shall have the capability to restrict access of data at the granule level to only DAAC operations and instrument team members. | Users will be able to see restricted data granules in the results of metadata queries, but will not be notified when restricted data granules are ordered and not distributed. If there is an inexpensive way for SDSRV (for acquires) to compile a list of restricted granules being eliminated and send email notification to the user then this capability will be added. (TBR) |
| IMS-0216 | 5B Future | The IMS shall provide the capability for DAAC operations staff and Instrument Team members to designate which granules have restricted access. | |

| L3 ID | Rel | L3 Text | Interpretation Text |
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| IMS-0626 | 5B Future | The ECS shall provide an interface to the ASTER GDS to support: a. Access to ECS directory metadata, inventory data, and browse (including integrated access to browse data associated with a data product) b. Ordering ECS data products (including price estimates for Landsat 7 Level 0R fixed WRS scenes) c. Obtaining order status | |
| IMS-0628 | 5B Future | The ECS shall provide an interface to ASTER GDS to support ECS users. a. Access to ASTER GDS inventory data b. Ordering of ASTER GDS data products | |
| IMS-0922 | 5B Future | The ECS shall provide support for the construction and submittal of On-Demand Production requests for processing of ASTER data, which contain the following information: a. Requester identification b. Science Software input requirements c. L1A or L1B data set d. Resulting product type e. Processing parameters f. ECS distribution options | Inputs consist of ASTER Level 1A and Level 1B products and various ancillary products; no Level 3 or Level 4 products. Text description of need for processing has been dropped from the requirements. |
| IMS-0980 | 5B Future | The ECS shall determine the necessary processing required to generate an On-Demand requested product. | |
| IMS-0990 | 5B Future | The ECS shall determine the necessary associated ancillary data input products for processing of the requested On-Demand data product. | The primary, Level 1 ASTER inputs are selected by the user. The user also selects certain of the ancillary inputs via the processing parameters. On the other hand, ECS determines the specific ancillary input granules to be used. |
| SMC-5320 | 5B Future | The ECS shall establish and maintain access privileges for ECS scientific users. | Capability to be added in 5B is related to: a: recording user type to support granule level access control b: recording whether user is permitted to order on-demand L1B processing |
| DADS0145 | 5B Partial | The ECS shall be capable of receiving from NOAA the following: a. Metadata b. Ancillary data | Some ancillary data types are not yet supported. 5B: ISCCP-GW; NCEP |
| DADS0260 | 5B Partial | The ECS shall receive non-EOS correlative and ancillary digital data. | Current: Support to AM-1 Mission 5B: Capability to be added to support PM-1 Mission |
| DADS0570 | 5B Partial | The ECS shall verify product orders, and withhold granules from distribution which the user is not authorized to receive. | The capability to check the format of product orders is provided. Future: Granules for which the user is not authorized will be removed from the order. |

| L3 ID | Rel | L3 Text | Interpretation Text |
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| DADS0740 | 5B Partial | The ECS shall provide the capability to subset a Landsat subinterval granule based on defined criteria to include: a. Floating partial subinterval b. Spectral band c. WRS (fixed scene) | Current: only item c is supported. IMS-0705 is related to this requirement. |
| DADS1020 | 5B Partial | The ECS shall generate data retrieval status to acknowledge the acceptance or rejection, including the reason for rejection (e.g., distribution parameters missing, data not present or unreadable), of a product order. | Future - support of order tracking of On-Demand order Orders issued by SDSRV for subsetting are not supported. |
| EOSD1600 | 5B Partial | The ECS shall exchange status data with EDOS. | PDRD and PANs are exchanged with EDOS EDOS/EOC STATUS (AS APPLICABLE). . Current: Support to AM-1 Mission 5B: Capability to be added to support PM-1 Mission |
| EOSD1605 | 5B Partial | The ECS shall receive from EDOS telemetry data, including housekeeping, engineering, ancillary, and science data from EOS instruments and spacecraft. | Current: Support to AM-1 Mission 5B: Capability to be added to support PM-1 Mission |
| EOSD1703 | 5B Partial | The ECS shall provide maintenance and operations interfaces to the DAACs to support the functions of: a. System Management b. Science Algorithm Integration c. Product Generation d. Data Archive/Distribution e. User Support Services f. System Maintenance | Users Support Services (e) are available through non-ECS personnel at the DAACs. Ingest Cancel/Resume capability to be added in 5B. |
| EOSD2510 | 5B Partial | ECS shall maintain an audit trail of: a. All accesses to security controlled data b. Users/processes requesting access to security controlled data c. Data access/manipulation operations performed on security controlled data d. Date and time of access to security controlled data e. Unsuccessful access attempt to security controlled data by unauthorized users/processes | All interactive and file transfer sessions are logged, whether successful or unsuccessful. Current: a,b,c,d Future: e Security controlled data defined as data granules. Access means data order. |
| IMS-0130 | 5B Partial | The ECS shall verify that a user is authorized to access a particular ECS service before providing the service to the user. | This includes users of external clients supported by ECS gateways. Current: Authorization only supported for DARs Future: L1B on demand production (5B) and restricted granules (5B). |
| IMS-0150 | 5B Partial | The ECS shall supply a user interface for access to the following services: a. User registration b. Data Acquisition Request submission and status c. Earth Science On-Line Directory. | Current: items a, b (submission), c Future: (5B) item b (status) |

| L3 ID | Rel | L3 Text | Interpretation Text |
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| IMS-0355 | 5B Partial | The ECS metadata shall be expandable to include additional attributes which are identified during the mission and deemed useful for data search. | Current: delete and reinstall ESDT Future: (5B) actually update existing ESDT |
| IMS-0380 | 5B Partial | The ECS shall provide the capability to exchange directory data with ASTER GDS and V0. | Current: V0 Future: ASTER GDS |
| IMS-0640 | 5B Partial | The ECS shall provide the capability to query geographic metadata by any of the following criteria at a minimum: a. Geographic reference b. Minimum bounding rectangle c. Point and radius d. Polygon e. WRS f. Any combination that allows for specification of multiple, distinct geographic areas | Current: Limited to current SDSRV search capabilities. Future: llbox component of item b (5B) Geographic Reference is assumed to mean a point. |
| IMS-0690 | 5B Partial | The ECS shall provide the capability to visualize browse data and metadata (e.g. coverage maps, summary data) to facilitate the data selection and ordering process. | Current: EOSVIEW provides visualization capabilities and ECS gateways support the ability to order browse data. Future: (5B) Core metadata and PSA; integrated browse |
| IMS-0705 | 5B Partial | The ECS shall provide the capability to request a subset (i.e. scene) of a Landsat 7 subinterval identified by: a. WRS b. Floating partial subinterval c. Spectral Band | Current: a Future (5B): b, c |
| IMS-1340 | 5B Partial | The ECS shall provide the capability for users to preview billing costs for L7 scene data products prior to order submission. | This includes users of external clients supported by ECS gateways. Current: L70R fixed Future (5B): floating and subset scenes only |
| IMS-1365 | 5B Partial | The ECS shall obtain user account and order verification from EDC prior to processing orders for Landsat 7 Level 0R scene data. | According to the Billing and Accounting MOU Current: L70R fixed scenes 5B: L70R floating partial subintervals |
| PGS-0410 | 5B Partial | The ECS shall have the capability to track the processing status of all products scheduled to be generated. | Future: On-Demand Production Request tracking and Automatic Start Time checking |
| PGS-0602 | 5B Partial | The ECS shall have the capability to accept POSIX-compliant science software and compile Science Software source code written in any of the following ECS approved programming languages: a. FORTRAN 77 b. FORTRAN 90 c. C d. C++ | Future: (5B) C++ |
| SDPS0030 | EOC Partial | The ECS shall produce Standard Products (as listed in Appendix C, including prototype products on a time-available basis) for EOS instruments based on the Science Software source code and calibration | Satisfied when Production Rules, ESDTs, and SDP Toolkit enhancements are complete for future missions. |

| L3 ID | Rel | L3 Text | Interpretation Text |
|---|---|---|---|
| | | coefficients supplied by EOS scientists. | |
| SDPS0093 | 5B 6A 6B Partial | The ECS shall use priorities in support of external production and reprocessing of standard ECS products. | Current: Support for data distribution (DDIST) priorities<br>5B: Support for Subscription (SBSRV),<br>6A: Machine to machine interface priority handling<br>6B: Data server (SDSRV) |
| ESN-0450 | 5B Partial | The ECS shall provide process-to-process communication service. | |
| SMC-7300 | 5B Partial | The ECS shall establish, maintain, and update the authorized users inventory to include: a. Users identifications b. Addresses c. Allowed privileges | Future: User privileges Item c: Supported through granule level access (refer to requirements IMS-0212 and IMS-0216). Capability to be added in 5B is related to: a: recording user type to support granule level access control b: recording whether user is permitted to order on-demand L1B processing from GDS |
| SMC-8300 | 5B Partial | The ECS shall have a generalized report generator with the capability to customize output reports covering data previously captured in a management DBMS including:<br>a. All or portions of the system<br>b. Variable amounts of time | |

## *Table B-2. IRD Requirements*

| IRD ID | Rel | Source | Destination | IRD Text |
|---|---|---|---|---|
| ASTER-0800 | 5B | ECS | ASTER | ECS shall have the capability to send and ASTER GDS shall have the capability to receive dependent valids information related to ECS data products. |
| ASTER-0805 | 5B | ASTER | ECS | ASTER GDS shall have the capability to send and ECS shall have the capability to receive dependent valids information related to ASTER GDS data products. |
| ASTER-0810 | 5B | ECS | ASTER | ECS shall have the capability to send and ASTER GDS shall have the capability to receive directory metadata related to ECS data products. |
| ASTER-0815 | 5B | ASTER | ECS | ASTER GDS shall have the capability to send and ECS shall have the capability to receive directory metadata related to ASTER GDS data products. |
| ASTER-0820 | 5B | ECS | ASTER | ECS shall have the capability to send and ASTER GDS shall have the capability to receive inventory search requests. |
| ASTER-0835 | 5B | ASTER | ECS | ASTER GDS shall have the capability to send and ECS shall have the capability to receive inventory data search results. |
| ASTER-0850 | 5B | ASTER | ECS | ASTER GDS shall have the capability to send and ECS shall have the capability to receive inventory search requests. |
| ASTER-0860 | 5B | ASTER | ECS | ASTER GDS shall have the capability to send and ECS shall have the capability to receive browse requests. |
| ASTER-0865 | 5B | ECS | ASTER | ECS shall have the capability to send and ASTER GDS shall have the capability to receive inventory search results. |
| ASTER-0875 | 5B | ECS | ASTER | ECS shall have the capability to send and ASTER GDS shall have the capability to receive browse results. |
| ASTER-0900 | 5B | ECS | ASTER | ECS shall have the capability to send and ASTER GDS shall have the capability to receive product requests for ASTER GDS data products. |
| ASTER-0930 | 5B | ECS | ASTER | ECS shall have the capability to send and ASTER GDS shall have the capability to receive product delivery status information. Product delivery status information contains the following information, at a minimum: a. Requester identification b. Request identification c. Request status d. If rejection, then the reason for the rejection e. If delayed longer than the latest completion time specified by the user, adjusted start and stop times. |
| ASTER-0935 | 5B | ASTER | ECS | ASTER GDS shall have the capability to send and ECS shall have the capability to receive requests for product delivery status. |
| DAS0040 | 5B | DASCE | ECS | DASCE shall have the capability to provide, and ECS at GSFC DAAC shall have the capability to acquire, archive and distribute, DAS Standard Product data, and associated metadata in HDF-EOS standard format. |
| DAS0050 | 5B | ECS | DASCE | ECS shall make available to the DASCE non-EOSDIS data that is common to multiple EOS Standard Data Product producers. |
| DAS0060 | 5B | ECS | DASCE | ECS shall make EOS products available to the DAS. |

| IRD ID | Rel | Source | Destination | IRD Text |
|---|---|---|---|---|
| EDOS-4.1.2.1 | 5B | EDOS | ECS | EDOS shall interface with the Langley Research Center (LaRC) DAAC to transfer Operations Management Data, PDSs, EDSs, Mission Test Data, and Operations Management Test Data. |
| EDOS-4.1.2.10 | 5B | ECS | EDOS | EDOS shall conform to Internet protocol standards as specified in Applicable Documents 2,3,4, and 5 for communications service to provide receipt for the following: a. Reserved b. PDS/EDS Acceptance Notifications c. Reserved *d. Service Requests *Applicable with EDOS SU#1 |
| EDOS-4.1.2.11 | 5B | EDOS | ECS | EDOS shall provide the capability to ship archived PDSs on removable physical media to the LaRC DAAC upon request. |
| EDOS-4.1.2.14 | 5B | EDOS | ECS | EDOS shall provide the capability to transfer EDS Delivery Records as specified in Applicable Document 1 to the LaRC DAAC following the delivery of each EDS. |
| EDOS-4.1.2.2 | 5B | ECS | EDOS | EDOS shall interface with the LaRC DAAC to receive Operations Management Data, and Operations Management Test Data. |
| EDOS-4.1.2.3 | 5B | EDOS | ECS | EDOS shall provide the capability to transfer PDS Delivery Records as specified in Applicable Document 1 to the LaRC DAAC following the delivery of each PDS. |
| EDOS-4.1.2.7 | 5B | EDOS | ECS | EDOS shall conform to Internet protocol standards as specified in Applicable Documents 2,3,4, and 5 for communications services to provide guaranteed data delivery for the following data types: a. PDS Delivery Records b. Reserved c. Reserved * d. Service Request Dispositions e. PDSs f. EDSs g. EDS Delivery Records *Applicable with EDOS SU#1 |
| EDOS-4.1.2.8 | 5B | ECS | EDOS | EDOS shall provide the capability to receive Operations Management data from the LaRC DAAC as specified in Applicable Document 1, including: a. PDS/EDS Acceptance Notifications b. Reserved c. Reserved * d. Service Requests *Applicable with EDOS SU#1 |
| EDOS-4.1.3.1 | 5B | EDOS | ECS | EDOS shall interface with the GSFC DAAC to transfer Mission Data, Operations Management Data, Mission Test Data, and Operations Management Test Data. |
| EDOS-4.1.3.10 | 5B | ECS | EDOS | EDOS shall conform to Internet protocol standards as specified in Applicable Documents 2,3,4, and 5 for communications services to provide receipt for the following: a. Reserved b. PDS/EDS Acceptance Notifications c. Reserved *d. Service Requests *Applicable with EDOS SU#1 |
| EDOS-4.1.3.11 | 5B | EDOS | ECS | EDOS shall provide the capability to ship archived PDSs on removable physical media to the GSFC DAAC upon request. |
| EDOS-4.1.3.14 | 5B | EDOS | ECS | EDOS shall provide the capability to transfer EDS Delivery Records as specified in Applicable Document 1 to the GSFC DAAC following the delivery of each EDS. |
| EDOS-4.1.3.2 | 5B | ECS | EDOS | EDOS shall interface with the GSFC DAAC to receive Operations Management Data, and Operations |

| IRD ID | Rel | Source | Destination | IRD Text |
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| | | | | Management Test Data. |
| EDOS-4.1.3.3 | 5B | EDOS | ECS | EDOS shall provide the capability to transfer PDS Delivery Records as specified in Applicable Document 1 to the GSFC DAAC following the delivery of each PDS. |
| EDOS-4.1.3.7 | 5B | EDOS | ECS | EDOS shall conform to Internet protocol standards as specified in Applicable Documents 2,3,4, and 5 for communications services to provide guaranteed data delivery for the following data types: a. PDS Delivery Records b. Reserved c. Reserved *d. Service Request Dispositions e. PDSs f. Reserved g. EDSs h. EDS Delivery Records *Applicable with EDOS SU#1 |
| EDOS-4.1.3.8 | 5B | ECS | EDOS | EDOS shall provide the capability to receive Operations Management data as specified in Applicable Document 1 from the GSFC DAAC including: a. Reserved b. PDS/EDS Acceptance Notifications c. Reserved * d. Service Requests *Applicable with EDOS SU#1 |
| EDOS-4.1.7.13 | 5B | EDOS | ECS | EDOS shall provide the capability to ship archived PDSs on removable physical media to the EDC DAAC upon request. |
| EDOS-4.1.8.1 | 5B | EDOS | ECS | EDOS shall interface with the SMC to transfer Operations Management Data, and Operations Management Test Data. |
| EDOS-4.1.8.12 | 5B | EDOS | ECS | EDOS shall provide the capability to transfer EDOS Summary Performance Reports as specified in Applicable Document 1 to the SMC. |
| EDOS-4.2.2.1 | 5B | EDOS | ECS | The EDOS-LaRC DAAC interface shall provide the capability to support the transfer of Operations Management data to the LaRC DAAC at a rate of up to 49 kbps. |
| EDOS-4.2.2.5 | 5B | EDOS | ECS | The EDOS-LaRC interface shall provide the capability to support the transfer of expedited and production data sets at a rate of up to 28 Mbps. |
| EDOS-4.2.3.1 | 5B | EDOS | ECS | The EDOS-GSFC DAAC interface shall provide the capability to support the transfer of Operations Management data to the GSFC DAAC at a rate of up to 49 kbps. |
| EDOS-4.2.3.5 | 5B | EDOS | ECS | The EDOS-GSFC interface shall provide the capability to support the transfer of expedited and production data sets at a rate of up to 68 Mbps. |
| EDOS-4.3.2.1 | 5B | ECS | EDOS | The LaRC DAAC shall provide the capability to initiate transfer of the PDS/EDS Acceptance Notification to EDOS within a time period of 15 minutes plus an additional 15 minutes for each gigabyte of EDS data, after successful receipt of the PDS/EDS Delivery Record from EDOS. |
| EDOS-4.3.2.2 | 5B | ECS | EDOS | The LaRC DAAC shall provide the capability to initiate transfer of the PDS/EDS Acceptance Notification to EDOS within a time period of 15 minutes plus an additional 15 minutes for each gigabyte of PDS data, after successful receipt of the PDS/EDS Delivery Record from EDOS. |
| EDOS-4.3.3.1 | 5B | ECS | EDOS | The GSFC DAAC shall provide the capability to initiate transfer of the PDS/EDS Acceptance Notification to EDOS |

| IRD ID | Rel | Source | Destination | IRD Text |
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| | | | | within a time period of 15 minutes plus an additional 15 minutes for each gigabyte of EDS data, after successful receipt of the PDS/EDS Delivery Record from EDOS. |
| EDOS-4.3.3.2 | 5B | ECS | EDOS | The GSFC DAAC shall provide the capability to initiate transfer of the PDS/EDS Acceptance Notification to EDOS within a time period of 15 minutes plus an additional 15 minutes for each gigabyte of PDS data, after successful receipt of the PDS/EDS Delivery Record from EDOS. |
| EDOS-4.6.1.1 | 5B | EDOS/ECS | ECS/EDOS | EDOS shall conform to Internet protocol standards for communications services as specified in Applicable Documents 2, 3, 4, and 5. |
| EDOS-4.6.1.10 | 5B | EDOS | ECS | EDOS shall transfer EDSs using FTP. |
| EDOS-4.6.1.11 | 5B | EDOS | ECS | EDOS shall transfer PDS Physical Media Unit Delivery Records using FTP. |
| EDOS-4.6.1.9 | 5B | EDOS | ECS | EDOS shall transfer PDSs using FTP. |
| NOAA0020 | 5B | ECS/NOAA | ECS/NOAA | The ECS shall maintain a controlled list of the mutually-agreed data sets required from the NOAA ADC to support ECS standard product generation. |
| NOAA0510 | 5B | CEMSC | ECS | The CEMSCS shall have the capability to send and the ECS shall have the capability to receive data sets to be used as ancillary data for ECS standard product generation. |
| NOAA0560 | 5B | ECS/CEMSC | ECS/CEMSC | The CEMSCS and the ECS shall have the capability to perform Schedule Adjudication via telephone. |
| NOAA0620 | 5B | ECS/SAA | SAA/ECS | The ECS and the NOAA SAA and the CEMSCS shall have the capability to coordinate Network Management issues via telephone. |
| NOAA0710 | 5B | NCEP | ECS | The NCEP shall have the capability to send via the GSFC DAAC and the ECS shall have the capability to receive via the GSFC DAAC data sets to be used as ancillary data for ECS standard product generation. |
| NOAA0810 | 5B | ECS/NOAA DC | NOAA DC/ECS | The NOAA Data Centers and the ECS shall have the capability to perform Schedule Adjudication via telephone. |
| NOAA0820 | 5B | NOAA DC | ECS | The NOAA Data Centers shall have the capability to send and the ECS shall have the capability to receive data sets requested by ECS as ancillary data for ECS standard product generation. |
| SCF-0030 | 5B | ECS | SCF | The SCF interface platform shall have adequate computing resources for the storage, compilation, linking, and execution of ECS supplied software resident on the platform. |
| SCF-0130 | 5B | SCF | ECS | The ECS shall have the capability to receive Special Products from the SCF. These shall include L1 - L4 Special Products. |
| SCF-0140 | 5B | SCF | ECS | The ECS shall have the capability to receive Metadata, related to Special Products, from the SCF. |
| SCF-0150 | 5B | SCF | ECS | The ECS shall have the capability to receive Ancillary Data, related to Special Products, from the SCF. |
| SCF-0160 | 5B | SCF | ECS | The ECS shall have the capability to receive Calibration |

| IRD ID | Rel | Source | Destination | IRD Text |
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| | | | | Data, related to Special Products, from the SCF. |
| SCF-0170 | 5B | SCF | ECS | The ECS shall have the capability to receive Correlative Data, related to Special Products, from the SCF. |
| SCF-0190 | 5B | SCF | ECS | The ECS shall have the capability to receive Data Production Software, related to Special Products, from the SCF. |
| SCF-0280 | 5B | ECS | SCF | The ECS shall have the capability to supply a Reprocessing Status to the SCF. This status that includes the reprocessing schedule informs the scientist at the SCF the status of his reprocessing request and provides notification upon completion of the reprocessing by the ECS. |
| SCF-0350 | 5B | ECS | SCF | The ECS shall have the capability to provide SCF with the Processing Status of SCF-requested data processing. |
| SIPS0010 | 5B | ECS | SIPS | The ECS shall have the capability to send and the SIPS shall have the capability to receive data for use in the SIPS Standard Product generation using an agreed file transfer protocol. |
| SIPS0020 | 5B | SIPS | ECS | The SIPS shall have the capability to provide and the ECS shall have the capability to receive notification of data availability from Standard Product generation using an agreed protocol. |
| SIPS0030 | 5B | SIPS | ECS | The SIPS shall have the capability to send and the ECS shall have the capability to receive EOS Standard Products from the SIPS using an agreed file transfer protocol. |
| SIPS0040 | 5B | SIPS | ECS | The SIPS shall have the capability to send and the ECS shall have the capability to receive the SIPS metadata with an agreed upon format and content using an agreed file transfer protocol. |
| SIPS0050 | 5B | SIPS | ECS | The SIPS shall have the capability to send and the ECS shall have the capability to receive Ancillary Input Data used in the SIPS Standard Product generation using an agreed file transfer protocol. |
| SIPS0060 | 5B | SIPS | ECS | The SIPS shall have the capability to send and the ECS shall have the capability to receive Algorithm Packages used for SIPS Standard Product generation using an agreed file transfer protocol. |
| SIPS0070 | 5B | SIPS | ECS | The SIPS shall have the capability to send and the ECS shall have the capability to receive browse products for SIPS Standard Product generation using an agreed file transfer protocol. |
| SIPS0080 | 5B | SIPS | ECS | The SIPS shall have the capability to send and the ECS shall have the capability to receive production history files for SIPS Standard Product generation using an agreed file transfer protocol. |
| SIPS0110 | 5B | SIPS | ECS | The SIPS shall have the capability to provide and the ECS shall have the capability to receive data search and acquisition requests for EOS Standard Product reprocessing. |
| SIPS0120 | 5B | ECS | SIPS | The ECS shall have the capability to provide and the SIPS |

| IRD ID | Rel | Source | Destination | IRD Text |
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| | | | | shall have the capability to receive notification of data availability for EOS Standard Product reprocessing using an agreed protocol. |
| SIPS0130 | 5B | SIPS | ECS | The SIPS shall have the capability to provide and the ECS shall have the capability to receive acknowledgments of receipt of file transfers for EOS Standard Product reprocessing using an agreed protocol. |
| SIPS0140 | 5B | SIPS | ECS | The SIPS shall provide linkage information for data provided for archive using an agreed-on protocol. |
| SIPS0150 | 5B | SIPS | ECS | The SIPS shall uniquely identify each granule provided to the ECS in a manner compatible with the ECS. |
| V0-0145 | 5B | V0 | ECS | The EOSDIS V0 IMS shall have the capability to send and ECS shall have the capability to receive Directory Search Requests via V0 protocols. |
| V0-0146 | 5B | No Data | No Data | The ECS shall have the capability to send and EOSDIS V0 IMS shall have the capability to receive Global Change Master Directory entry (DIF) id's via V0 protocols. |
| V0-0150 | 5B | EOSDIS V0 IMS | ECS | EOSDIS V0 IMS shall have the capability to send and the ECS shall have the capability to receive Inventory Search Requests via V0 protocols. |
| V0-0160 | 5B | ECS | EOSDIS V0 IMS | ECS shall have the capability to send and EOSDIS V0 IMS shall have the capability to receive Inventory Search Results via V0 protocols. |
| V0-0190 | 5B | V0 EOSDIS IMS | ECS | V0 EOSDIS IMS shall have the capability to send and ECS shall have the capability to receive Browse Requests [implementation issue 2]. |
| V0-0200 | 5B | ECS | V0 EOSDIS IMS | The ECS shall have the capability to send and V0 EOSDIS IMS shall have the capability to receive Browse Results [implementation issue 2]. |
| V0-0230 | 5B | EOSDIS V0 IMS | ECS | The EOSDIS V0 IMS shall have the capability to send and ECS shall have the capability to receive Product Requests via V0 protocols. |
| V0-0240 | 5B | ECS/V0 | V0/ECS | ECS and Version 0 shall exchange pricing information, as necessary. |
| V0-0380 | 5B | ECS | DAAC V0 | ECS shall have the capability to send and the EOSDIS V0 IMS system shall have the capability to receive Dependent Valids Information [implementation issue 6]. |

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# Appendix C. Agenda for Reviews

This appendix provides an agenda for each of the release customer reviews.

## C.1 August 1999 Agenda for IRR

1. Overview
2. Requirements
   - Mission Requirements
   - ESDT Requirements
   - Capacity Requirements
   - Release Capabilities
3. Design
   - Development Overview
   - Operations Concepts
     - Requirements Summary
     - Design Changes
     - Key Drivers
     - Hardware / Software Changes
     - Interaction Diagrams
     - End User Interactions
     - DAAC Operations Impacts
   - COTS S/W Additions and Upgrades
4. Test Engineering, Transition, & Operating System Upgrades
5. Wrap-up/Summary
   - Release Schedule
   - GFE/GFI Identified for 5B
   - Risk Areas & Mitigation Strategy
   - Review of Open Actions

- Concluding Remarks

## C.2 Preliminary Agenda for CSR

1. Introduction
2. 5B System Functionality
3. 5B Test Results/Status
4. Non-Conformance Report Status
5. Physical Configuration Audit Results
6. Functional Configuration Audit Results
7. CDRL Documentation Summary
8. Post-CSR Installation and Transition
9. ECS Support to Site Readiness
10. Concluding Remarks

## C.3 Preliminary Agenda for SRA

1. Introduction
2. 5B Capabilities Review
3. 5B Test Results Since CSR
4. 5B On-site Tests
5. Non-Conformance Delivered to Sites Since CSR
6. Future Maintenance Releases to 5B
7. Readiness for Transition
8. Panel Deliberations
9. Panel Report

# Appendix D. Documentation

Table D-1 provides the list of documentation associated with 5B Release.

***Table D-1. List of 5B Documentation***

| CDRL | DID/ Approval | Title | Science Delivery Schedule |
|---|---|---|---|
| 002 | 102/MG1 | ECS Configuration Management Plan | 1 wk prior to PMR- Completed<br>Vol 1: Completed<br>Vol 2: Completed after update to reflect ESDIS CM Plan |
| 008 | 108/MG3 | Logic Network Diagrams | Electronic access |
| 009 | 109/MG3 | Performance Measurement Status Reports | monthly |
| 011 | 111/MG3 | Monthly Progress Reports | monthly |
| 013 | 113/MG3 | Intermediate Bar Charts | Electronic access |
| 015 | 115/MG3 | 90-Day Window Report | Electronic access |
| 019 | 119/MG3 | Contractor Cost Reporting – 533 Requirements | monthly |
| 020 | 120/MG3 | Monthly Contractor Manpower Reporting | 15 working days following end of calendar month |
| 039 | 219/SE2 (P),<br>219/SE1 (F) | Interface Requirements Documents | ASTER DEM = 12/28/99 |
| 045 | 304/DV1 | Segment Requirements Specification | Electronic delivery (VDB) |
| 046 | 305/DV3 (P)<br>305/DV2 (F)<br>305/DV2 (U/D) | Segment/ Design Specifications | CSR – 2 Weeks |
| 050 | 311/DV1 | Database Design and Database Schema Specifications | CSR – 2 Weeks |
| 051 | 313/DV3 (P),<br>313/DV3 (F) | ECS Internal ICDs | CSR – 2 Weeks |
| 057 | 326/DV3 | Monthly Tabulation of Nonconformance | Electronic delivery |
| 062 | 333/DV1 | PGS Toolkit Users Guide for the ECS Project | 2/4/00 |
| 069 | 409/VE1 | ECS Science Acceptance Test Plan | Electronic delivery,<br>IRR+1 Week |
| 070 | 411/VE1 | ECS Science Acceptance Test Procedures | Electronic delivery,<br>IRR+5 Months |

| CDRL | DID/ Approval | Title | Science Delivery Schedule |
|---|---|---|---|
| 071 | 412/VE2 | ECS Science Acceptance Test Report | Electronic delivery,<br>Preliminary: CSR +15 days, Final: SRA + 15 days |
| 081 | 506/PA3 | Audit Reports | SRA + 30 Days |
| 092 | 519/PA3 | Maintainability Demonstration Test Reports | One time at completion of demonstration,<br>within 1 month of demonstration |
| 102 | 529/PA3 | Malfunction/Failure Reports (MRs) | Electronic delivery |
| 106 | 533/PA1 | Responses to Problem Notices and Alerts | as required |
| 107 | 534/PA1 | Maintenance Records | on-going — available for review on request |
| 108 | 535/PA1 | Acceptance Data Package | SRA + 30 Days |
| 111 | 603/OP1 | Operational Readiness Plan | Limited to GSFC & EDC,<br>Launch -8 months |
| 115 | 608/OP1 | ECS Operations Plan | Each calendar year |
| 116 | 609/OP1 | Operations Tools Manual | CSR – 2 Weeks |
| 117 | 611/OP3 | Mission Operations Procedures | CSR – 2 Weeks |
| 129 | 625/OP3 | Training Material | Electronic delivery, CSR – 2 Weeks |
| 143 | 714/PP3 | CSR Presentation Package | CSR + 2 weeks |
| 147 | 334/DV1 | Science System Release Plan | Per master schedule |
| 148 | 335/DV2 | COTS (hardware and software) Deployment Plan | Submit a minimum of 6 months prior to deployment of COTS |

# Appendix E. Schedule

Figure E-1 provides the high level schedule of 5B major milestones for defining requirements, designing, developing, testing, and delivering 5B system.

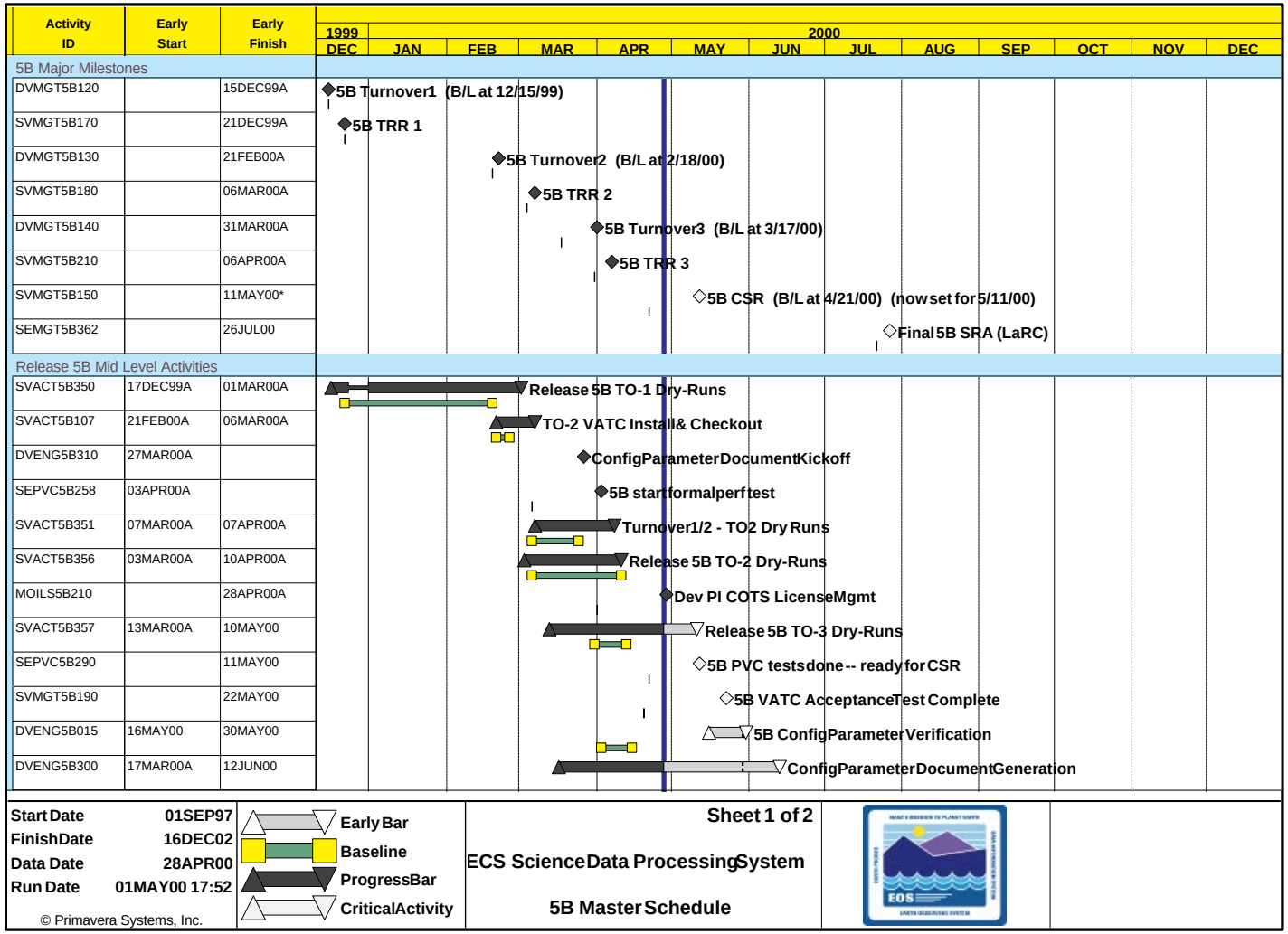
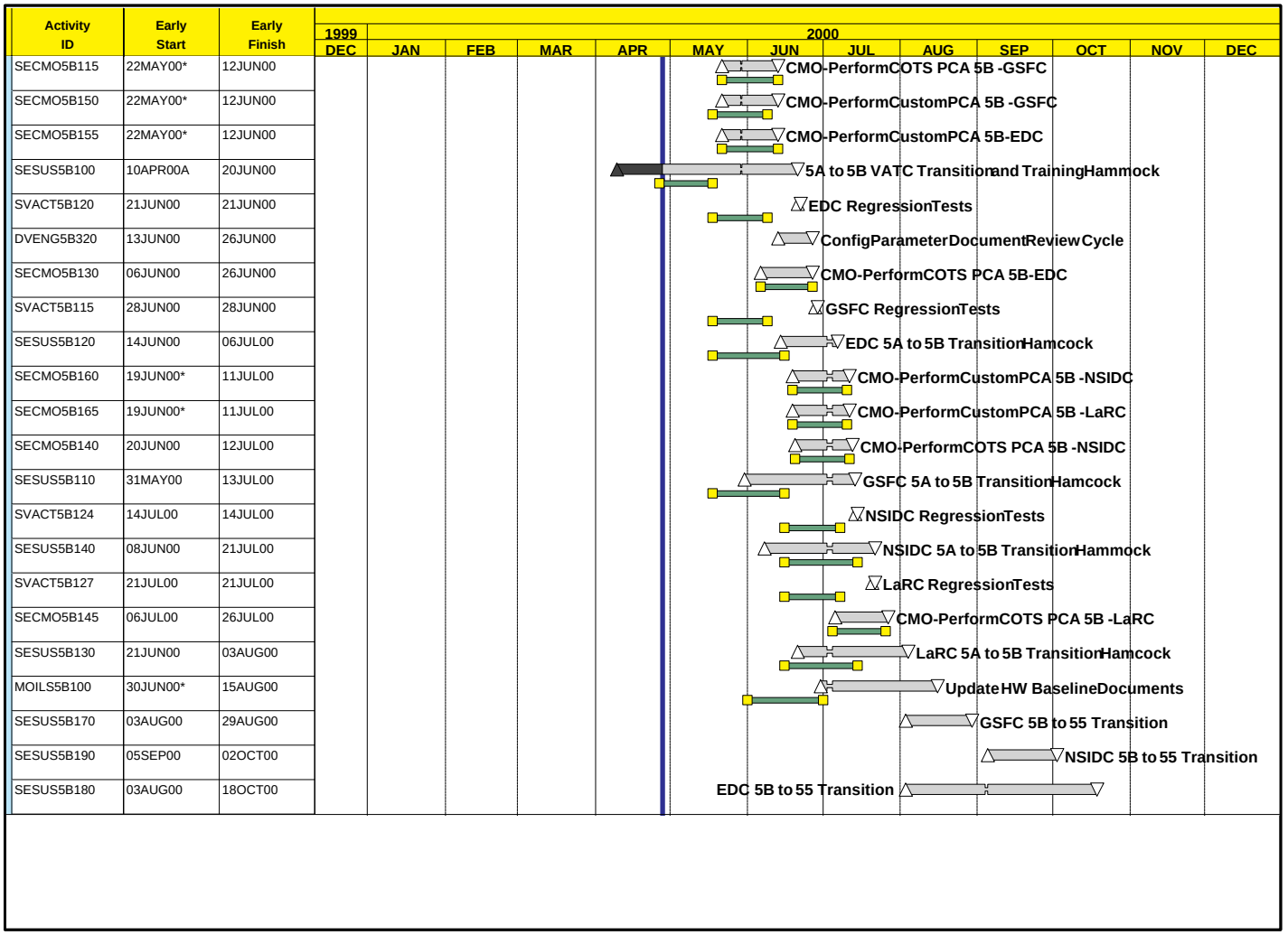



***Figure E-1. Release 5B Schedule***

| Activity ID | Early Start | Early Finish |
|---|---|---|
| SECMO5B115 | 22MAY00* | 12JUN00 |
| SECMO5B150 | 22MAY00* | 12JUN00 |
| SECMO5B155 | 22MAY00* | 12JUN00 |
| SESUS5B100 | 10APR00A | 20JUN00 |
| SVACT5B120 | 21JUN00 | 21JUN00 |
| DVENG5B320 | 13JUN00 | 26JUN00 |
| SECMO5B130 | 06JUN00 | 26JUN00 |
| SVACT5B115 | 28JUN00 | 28JUN00 |
| SESUS5B120 | 14JUN00 | 06JUL00 |
| SECMO5B160 | 19JUN00* | 11JUL00 |
| SECMO5B165 | 19JUN00* | 11JUL00 |
| SECMO5B140 | 20JUN00 | 12JUL00 |
| SESUS5B110 | 31MAY00 | 13JUL00 |
| SVACT5B124 | 14JUL00 | 14JUL00 |
| SESUS5B140 | 08JUN00 | 21JUL00 |
| SVACT5B127 | 21JUL00 | 21JUL00 |
| SECMO5B145 | 06JUL00 | 26JUL00 |
| SESUS5B130 | 21JUN00 | 03AUG00 |
| MOILS5B100 | 30JUN00* | 15AUG00 |
| SESUS5B170 | 03AUG00 | 29AUG00 |
| SESUS5B190 | 05SEP00 | 02OCT00 |
| SESUS5B180 | 03AUG00 | 18OCT00 |




Sheet 2 of 2

***Figure E-1. Release 5B Schedule (Cont.)***

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