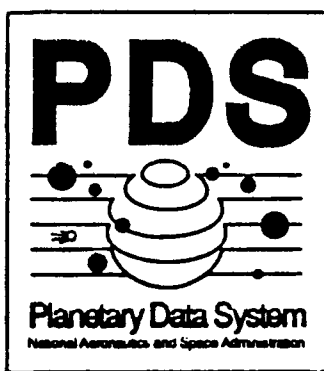


D - 3501

Planetary Data System Data Administration Plan

February 7, 1990

Version 2.0



Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California



D-3501

**PLANETARY DATA SYSTEM
VERSION 1.0
DATA ADMINISTRATION PLAN**

Version 2.0

February 7, 1990

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The Planetary Data System (PDS) *Data Administration Plan* represents a cooperative effort by the Data Engineering Team at the Jet Propulsion Laboratory (JPL), other members of the PDS System Development Team, the PDS Mission Interface Team, and the planetary scientific community.

The PDS Data Engineering Team at JPL has primary responsibility for the Administer Data and Prepare Data functions of the Version 1.0 PDS. This includes the functional design of the managing, monitoring, administrating and maintaining of the database and all the database elements which includes the PDS High-Level and Detail-Level catalogs, the PDS Data Dictionary, the stored commands, the DBMS and all of the system data associated with it. Members of the Data Engineering Team, past and present, who have contributed to this design effort are:

Mark Chapoton
Elaine Dobinson
Sandra Geyer
Steve Hughes
Karolen Paularena
Jesse Smith
Jimmie Young
Gail Woodward

The Planetary Data System exists to support the Planetary Science community. Node and Subnode personnel have worked closely with the Data Engineering Team throughout the development of the system, and this cooperation has been essential to the success of the development effort. The commitment and enthusiasm of personnel at the following Testbed Nodes and Subnodes have been invaluable:

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NAVIGATION ANCILLARY INFORMATION FACILITY – Jet Propulsion Laboratory.

PLANETARY ATMOSPHERES – Laboratory for Atmospheric and Space Physics, University of Colorado, Boulder.

PLANETARY GEOLOGY – Regional Planetary Imaging Facility, Jet Propulsion Laboratory; Regional Planetary Imaging Facility, Washington University; University of Hawaii.

PLANETARY RINGS – Jet Propulsion Laboratory.

RADIOMETRY – United States Geological Survey, Flagstaff.

Representatives of the JPL Space Flight Operations Center Project, current JPL flight projects and other NASA science database system projects have also contributed to the development of the PDS Science Catalogs.



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*Data
Preparation*

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Chapter 1

Introduction

This *Data Administration Plan* (DAP) document for the Planetary Data System (PDS) Version 1.0 presents policies, procedures and guidelines required to implement the Administer Data and Prepare Data Functions of Version 1.0 of the PDS. The design of these functions has been documented in the *PDS Software Specification Document* (SSD-1). There are two essential components of the Administer Data and Prepare Data Functions: one at the Central Node (CN), and one at the Discipline Nodes (DN)*. Because most of the general tasks of administering data are shared between the Central Node and the Discipline Nodes, there is considerable parallelism in the presentation of those tasks in this document. Figure 1 shows the interplay of Central Node and Discipline Node tasks.

The following list is an overview of the information presented in the *Data Administration Plan*:

- (1.) An introduction to the DAP is presented, along with some general background information about the PDS, including relevant documents and contact personnel.
- (2.) An overview of the PDS data administration is given in order to provide a broad context into which the specific standards and procedures fit.
- (3.) The appropriate organizational roles to fulfill the data administration responsibilities are discussed, along with their role statements.
- (4.) Detailed procedures and guidelines are provided, which will be followed during the execution of the Administer Data and Prepare Data Functions.

In general, data administration at the Central Node consists of coordinating the various tasks necessary to manage the integrity of the catalog database and support its continuity as new data are acquired. A primary responsibility of Central Node data administration is to coordinate the development and maintenance of those data policies and procedures necessary to ensure a consistent data system. Also, the Central Node must manage the PDS Science Catalog configuration, the security and configuration of the database server on which it resides, and the resources required by that configuration.

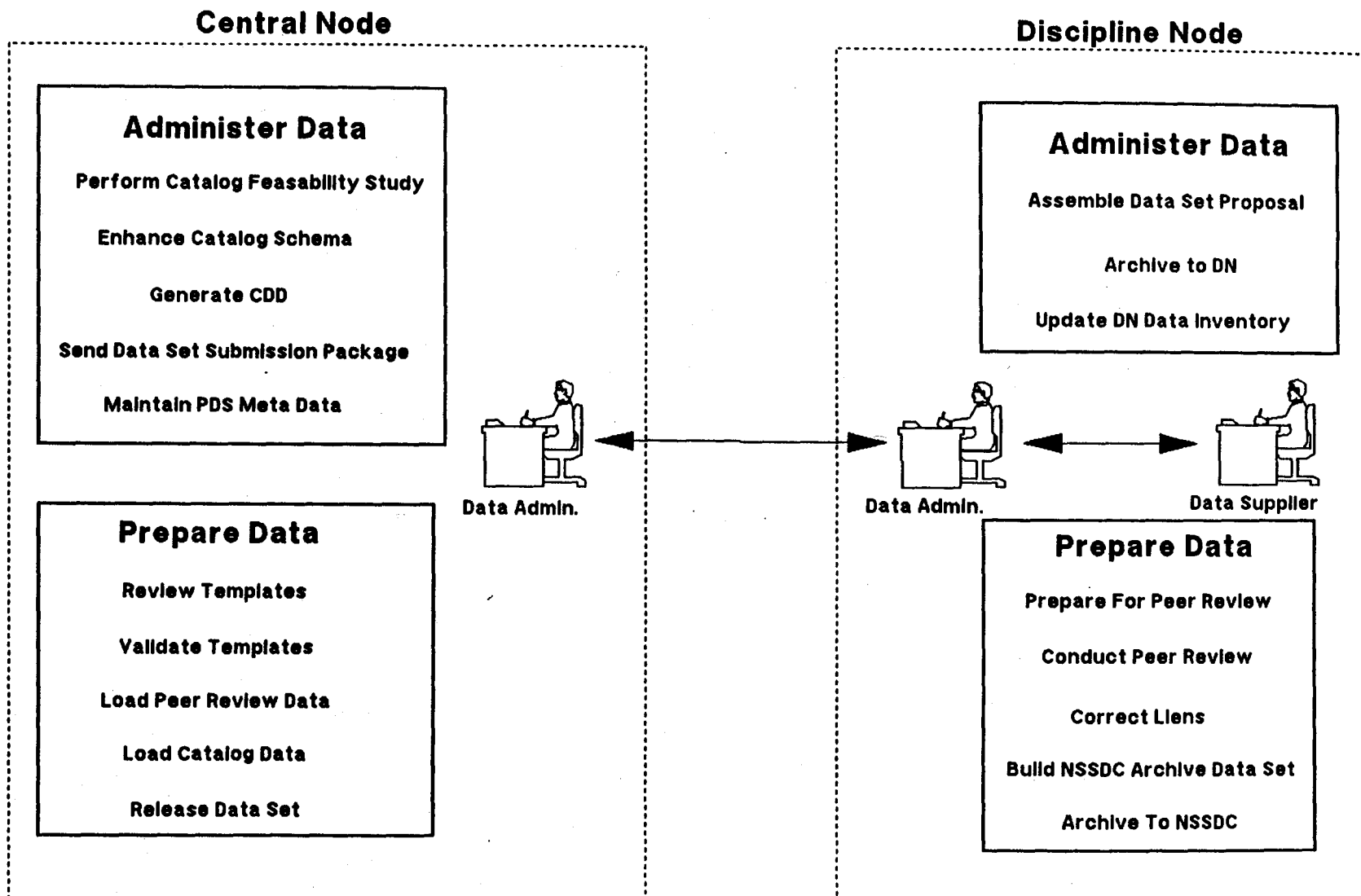
In contrast, data administration at the Discipline Nodes is more concerned with the specific tasks necessary to manage the data for which a particular node is responsible. Thus, although the Discipline Nodes interface with the Central Node to help determine data administration standards and policies, their primary focus is on the maintenance of the PDS Data Set archive. Related tasks include managing the submission of science data sets to the PDS, managing the security, configuration, and resources of the archive, and maintaining the inventory of their various PDS data sets.

* When PDS Version 1.0 became operational in October of 1989, the PDS Discipline Nodes were officially selected by NASA to replace the Testbed Nodes.

DATA ADMINISTRATION PLAN OVERVIEW

1-2

Figure I-1: Overview



1.1 Identification

This document is the *Data Administration Plan* (DAP) for the Version 1.0 of the Planetary Data System (PDS).

1.2 System Overview

The Planetary Data System (PDS) is a task sponsored by the National Aeronautics and Space Administration (NASA). The two entities within NASA supporting PDS are the Solar System Exploration Division (Code EL) and the Communications Division (Code EC), both being within the Office of Space Science and Applications.

The PDS was created as a solution to several problems currently facing the planetary science community. First, it increases the availability of the current data to scientists through the creation of data standards, a high-level catalog, and easy and timely access. Second, it preserves the usefulness of the data through the utilization of stable media and the conversion of proprietary information into a standardized format. And third, it inspires new types of research through correlative analysis which was previously difficult if not impossible to accomplish.

There are four functional components of the PDS:

- The first component of the PDS is the set of distributed science discipline nodes which provide the scientific expertise in archiving and utilizing the planetary science data. This component also provides the expert help in understanding the data.
- Second, the system development and maintenance effort for the PDS Version 1.0 is carried out at the Discipline Nodes and the Central Node at the Jet Propulsion Laboratory (JPL) in Pasadena, California.
- A third component works with the planetary missions to define and implement the standards and processes that will be used to transfer data from the missions to the PDS.
- Fourth, a technology component is evaluating technologies needed to solve problems of data archiving and distribution. It is this component that has done the pioneering work in the utilization of CD-ROM optical disk technology for widespread dissemination of large planetary data sets.

The PDS has a hierarchical structure, consisting of a Central Node supported by seven Discipline Nodes and the National Space Science Data Center (NSSDC). The Central Node, located at JPL, consists of a central, high-level database catalog, and several detailed database catalogs, all accessible through a user interface. The Central Node is connected to the NSSDC and the Discipline Nodes. These Discipline Nodes, located around the country, hold more detailed catalogs as well the actual data archive, all in the standard format. By consulting the Central Catalog, a user may search for and locate all the general data sets he needs, then transparently connect to the Discipline Node to narrow his choices. Either at the Central Node or at one of the Discipline Nodes, he can place an order for data. The

data may be transmitted electronically, or more likely, be sent via mail on magnetic tape or compact disc, along with documentation and analysis software.

The NSSDC currently contains all of the data sets for the PDS Version 1.0. It is the main archival storage facility for the planetary sciences. NSSDC's role in the PDS will be in filling large orders, to take advantage of the economies of scale, and to serve as the deep archive for the PDS.

The PDS Version 1.0 contains in excess of 75 Planetary Science data sets from the following disciplines:

- **Atmospheres:** Viking 1 and 2 and Mariner 9 at Mars from ISS, VIS, LCS, MET, MAWD, and IRTM experiments
- **Fields and Particles:** Voyager 1 and 2 at Jupiter and Saturn and Voyager 2 at Uranus from the LECP, MAG, PLS, and PWS experiments
- **Image:** Viking 1 and 2 at Mars from the ISS including special processed survey images
- **Radiometry:** Mariner 6 and 7 and Viking 1 and 2 at Mars from the IRS and IRTM instruments
- **Spectroscopy:** Earth based observations of selected asteroids from the DBP and 8CPS instruments
- **NAIF:** Ancillary (SP kernel) data for Voyager 1 and 2 at Jupiter and Saturn and Voyager 2 at Uranus

Other information that can be obtained through the PDS includes descriptions of data sets, science parameters, missions, spacecraft, instruments, software, planets, their satellites, and targets on these bodies, and ancillary information such as navigation files and calibration files. This data can be ordered and will be provided in well labeled and documented formats.

When actually using the system and looking at the data, several user support facilities are available. To assist the user of the catalog at the Central Node, context-sensitive help is available at all times and technical support phone numbers are provided for more specific problems. Orders for data will be placed and followed up by the PDS Operations Staff; no user interaction is necessary. The Discipline Nodes are responsible for user support. At each Discipline Node, a user can talk with, and get help from, a person with knowledge not only of the system and the data it contains, but also of the scientific aspects of the data as well. Thus, if a user needs help in deciphering data formats, or understanding calibration or targeting information, personnel at the Discipline Node are available to answer these questions, and perhaps even to supply software to do some types of analysis for the user.

1.3 Purpose

This *Data Administration Plan* (D-3501) for the Planetary Data System establishes the policies, procedures and guidelines by which the PDS Central Node and Discipline Nodes shall perform the data administration tasks required by the design of the Administer Data and Prepare Data Functions, which are presented in the *PDS Software Specification Document* (SSD-1). More specifically, this document gives guidelines for the administration of approved science data sets, ancillary data, and metadata, and for administering the PDS Catalog and the database server.

1.4 Scope

The PDS *Data Administration Plan* defines the policies, procedures and guidelines necessary to acquire and manage the data of the PDS. As a Version 1.0 document, it addresses the acquisition of restored data from previously flown space missions. The organizational roles to fulfill the data administration responsibilities are also presented.

Topics not covered in this document are data ordering and distribution procedures, and the acquisition of data from active flight projects. The procedures for the ordering and distribution of restored data for PDS Version 1.0 are found in the *PDS Operations Plan* (D-3479). They were placed there because it is the PDS operator and not the data administrator who must execute those procedures. If, at some future time, it makes sense to combine these procedures into this Data Administration Plan, then a new version of this document that contains those procedures can be generated. However, for now, the reader must refer to the Operations Plan for this information. Also, as this is strictly a Version 1.0 document, and since the ingestion of data from active flight projects was not part of the Version 1.0 system, this document covers the ingestion of restored data sets only. However, as both the system and the document evolve over time, the data administration functions of the PDS will be enhanced to include data from the active and future flight projects.

The data administration requirements presented in this document are applicable to the operation of the data administration function of the Planetary Data System from the time of this document's approval.

1.5 Audience

The PDS *Data Administration Plan* is designed for use as a PDS Version 1.0 operational reference manual by the Data Administration staff of the PDS Central Node and by the Data Administration staff of the PDS Discipline Nodes.

1.5.1 Central Node Contacts

Planetary Data System staff are available to help interpret and implement the guidelines, recommendations, and standards contained in this document. Specific contacts include:

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1.5.2 Discipline Node Contacts

Planetary Data System Discipline Node staff are available to help interpret and implement the guidelines, recommendations, and standards contained in this document. Specific contacts include:

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M. A'Hearn
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Node

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SPAN: MIPL2:

1.6 Applicable Documents

The following documents provide focus or context for the design of the operational Planetary Data System.

1.6.1 Binding Documents

- (1.) *JPL Software Management Standard*; JPL-D-4000; V.2.0; Dec. 1987.
- (2.) *JPL Software Management Standard, Document Content Descriptions and Review Criteria*; SORCE Technical Memorandum 1-A; V.4.0; Dec. 1986.
- (3.) *PDS Software Management Plan*; JPL-D-3487 ; V.2.1; May 3, 1988.
- (4.) *PDS Functional Requirements Document*; JPL-D-3454; V.2.0, Dec. 31, 1986.
- (5.) *PDS Functional Design Document*; JPL-D-3496; V.2.0; Jan. 18, 1988.
- (6.) *PDS Software Specification Document*; JPL-D-3497; V.1.0; Jan. 1989.
- (7.) *PDS Software Interface Specification*; JPL-D-3498; V.1.0; June 1988.
- (8.) *PDS Catalog Design Document*; JPL-D-1152; Rev.1.2; Feb. 1989.

1.6.2 PDS Reference Documents

The list of reference documents for the PDS shall be as given below:

- (1.) *Data Management and Computation - Volume 1: Issues and Recommendations*; Committee on Data Management and Computation, Space Science Board, Assembly of Mathematical and Physical Sciences, National Research Council, National Academy Press, Washington, D.C., 1982.
- (2.) *Data Management and Computation - Volume 2: Space Science Data Management Units in the 1980's and 1990's*; Committee on Data Management and Computation, Space Science Board, Assembly of Mathematical and Physical Sciences, National Research Council, National Academy Press, Washington, D.C., 1985.
- (3.) *Solar-Terrestrial Data Access, Distribution, and Archiving*; Joint Panel of the Committee on Solar and Space Physics Commission on Physical Sciences, Mathematics, and Resources, National Research Council, National Academy Press, Washington, D.C., 1984.
- (4.) *Navigation Ancillary Information Facility Project Plan*; Acton, Charles; JPL Internal Document; May 11, 1983.
- (5.) *Planetary Data Workshop, Volumes 1 and 2*; Kieffer, Hugh H.; NASA Conference Publication 2343; NASA; Washington, D.C., 1984.
- (6.) *Planetary Data System Concept*; Planetary Science Data Steering Group; NASA; Solar System Exploration Division; February 24, 1986.
- (7.) *Integrating Database Technology Into A Process-Oriented Life Cycle*; TMA, JPL Internal Document; April 15, 1987.
- (8.) *Recommendations for Incorporating Database Technology Into JPL Software Management Standard D-4000*; TMA, JPL Internal Document, April 23, 1987.
- (9.) *PDS User's Guide*; JPL; D-3500;

- (10.) *PDS Software Operators Manual*; JPL; D-3502;
- (11.) *PDS System Site Guide*; JPL;
- (12.) *SPIDS*; JPL;
- (13.) *Guidelines for Submitting Data to the NSSDC*;

1.6.3 Relevant Sharebase 700 DBMS Documents

- (1.) *C Run-Time Library Reference*
- (2.) *Command Summary*
- (3.) *Database Administrator's Manual*
- (4.) *Ethernet Controller Board Configuration Manual*
- (5.) *FCOPY Users Guide*
- (6.) *IDMLIB Users Guide*
- (7.) *Installation Manual*
- (8.) *Maintenance Manual*
- (9.) *Operation Manual*
- (10.) *SQL Reference Manual*
- (11.) *System Administrator's Manual*

1.6.4 Relevant Science Node Documents

- (1.) *Image Retrieval and Processing System, Software Requirements Document*; McDonnell Center for the Space Sciences; Washington University; December 1987.
- (2.) *Image Retrieval and Processing System, Software Specification Document*; McDonnell Center for the Space Sciences; Washington University; Feb. 1989.
- (3.) *Image Retrieval and Processing System, Acceptance Test Plan*; McDonnell Center for the Space Sciences; Washington University; Feb. 1989.
- (4.) *Image Retrieval and Processing System, User's Guide*; McDonnell Center for the Space Sciences; Washington University; Feb. 1989.
- (5.) *Prototype Atmospheres Node Data Access Software, Software Requirements Document*; Laboratory for Atmospheric and Space Physics, University of Colorado; December 3, 1987.
- (6.) *Prototype Atmospheres Node Data Access Software, Software Specification Document*; Laboratory for Atmospheric and Space Physics, University of Colorado; Feb. 1989.
- (7.) *Prototype Atmospheres Node Data Access Software, Acceptance Test Plan*; Laboratory for Atmospheric and Space Physics, University of Colorado; Feb. 1989.

- (8.) *Prototype Atmospheres Node Data Access Software, User's Guide*; Laboratory for Atmospheric and Space Physics, University of Colorado; Feb. 1989.
- (9.) *Prototype Fields and Particles Node, Software Requirements Document*; Institute of Geophysics and Planetary Physics, University of California at Los Angeles; Dec. 1988.
- (10.) *Prototype Fields and Particles Node, Software Specification Document*; Institute of Geophysics and Planetary Physics, University of California at Los Angeles; Dec. 1988.
- (11.) *Prototype Fields and Particles Node, Acceptance Test Plan*; Institute of Geophysics and Planetary Physics, University of California at Los Angeles; Feb. 1989.
- (12.) *Prototype Fields and Particles Node, User's Guide*; Institute of Geophysics and Planetary Physics, University of California at Los Angeles; Nov. 1988.
- (13.) *SPECIO System, Software Requirements Document*; U.S. Geological Survey, Branch of Astrogeology; December 1, 1987.
- (14.) *SPECIO System, Software Specification Document*; U.S. Geological Survey, Branch of Astrogeology; Feb. 1989.
- (15.) *SPECIO System, Acceptance Test Plan*; U.S. Geological Survey, Branch of Astrogeology; Feb. 1989.
- (16.) *SPECIO System, User's Guide*; U.S. Geological Survey, Branch of Astrogeology; Feb. 1989.
- (17.) *XGDATA Analysis and Retrieval System, Software Requirements Document*; U.S. Geological Survey, Branch of Astrogeology; December 1, 1987.
- (18.) *XGDATA Analysis and Retrieval System, Software Specification Document*; U.S. Geological Survey, Branch of Astrogeology; Feb. 1989.
- (19.) *XGDATA Analysis and Retrieval System, Acceptance Test Plan*; U.S. Geological Survey, Branch of Astrogeology; Feb. 1989.
- (20.) *XGDATA Analysis and Retrieval System, User's Guide*; U.S. Geological Survey, Branch of Astrogeology; Feb. 1989.

Chapter 2

Overview of Data Administration

This chapter describes those tasks concerning the acquisition and management of data in the Planetary Data System. Data, in this case, refers to both the planetary science data sets housed and distributed by the PDS, as well as all of the information (meta-data) about those data sets. As stated in the first chapter of this document, the scope of these data administration tasks is confined, for now, to the Prepare Data and Administer Data Functions, described in the PDS Version 1.0 Software Specification Document (SSD-1), and applies only to the administration and maintenance of restored science data sets. Therefore, this current version of the Data Administration Plan contains only those procedures and guidelines required to execute the Version 1.0 Prepare Data and Administer Data Functions. Procedures for the ordering and distribution of these data, required for the Order and Distribute Data Functions, can be found in the PDS Version 1.0 Operations Plan (D-3497).

The combination of the two functions, Prepare Data and Administer Data, covers the acquisition and management of all data in the PDS from the initial stages of data submission through to the final archiving of the data sets. These functions are performed by a staff which includes members of the Central Node, members of the Discipline Nodes, and Data Suppliers. Descriptions of the roles and relationships of these key personnel are included at the end of this chapter. The first part of the chapter provides a summary of the procedures required to obtain data, to assure data quality and integrity, and to safeguard data permanently. This discussion is divided into two main parts: Data Acquisition and Data Management. For ease of reference and completeness, two appendices are provided. Appendix A contains the data flow diagrams for the Administer and Prepare Data Functions, replicated from the SSD-1. In addition, in Appendix B, are matrices which break down the sequence of tasks, their inputs and outputs, the players involved, and the interfaces of the entire data ingestion process. These are titled the PDS Data Ingestion Matrices. The remainder of this chapter translates the functions of Prepare Data and Administer Data into ordinary language, and references, in bold print, the procedures and guidelines required for their execution. The actual procedures and guidelines themselves form Chapter 3 of this document.

2.1 Data Acquisition

The acquisition of data into the PDS is by far the largest and most complex task of these Prepare Data and Administer Data functions. It is here that the interplay of Central Node, Discipline Node, and Data Supplier is most involved. It is also here that the bulk of the data administration procedures and guidelines apply. A high-level, step-by-step chronology of the entire data acquisition process, from beginning to end, is presented here to give the reader an understanding of the PDS science data submission process.

2.1.1 The Beginning Phase: Planning and Scheduling

The first phase of the process of data set restoration and submission to the PDS begins with the planning phase. It is here that the decisions regarding which data to restore, and when and how to submit them, are made. This phase will occur periodically as determined by the PDS Management Council (PDSMC). Whatever the frequency, plans shall be reviewed annually with respect to changing science and development priorities. The following steps comprise the major activities of this phase.

Step 1: Develop a Prioritized List of Data Sets for Ingestion

The very first activity that needs to occur in the data acquisition process is the development of a prioritized list of science data sets for the PDS to restore and ingest. Each of the Discipline Nodes, in concert with their potential Data Suppliers, prepares a list of data sets they wish to restore and submit to the PDS. These lists are then reviewed by members of the PDS Management Council (PDSMC). The data sets are initially prioritized by this group of people across the disciplines according to scientific importance and availability of scientific expertise.

After this initial cut at a prioritized list occurs, members of the Central Node and the Discipline Node, under the leadership of the Central Node Data Administrator, make recommendations to the PDSMC as to the feasibility of the inclusion of each of the data sets (**Data Set Proposal, Data Set Feasibility Study**). These recommendations include a resource cost estimate for both Central Node and Discipline Node personnel to accommodate the new data. The PDSMC must then reprioritize the data set list to balance scientific importance with the budget realities. The resultant list is then reviewed by the PDSMC, and approved or revised. Ultimately, an approved list is generated and the next step can begin.

Step 2: Develop a Schedule for Data Restoration and Ingestion

Once the list of data sets is determined, plans for restoring the data and submitting them to the PDS can be made. These plans may include the establishment by the Discipline Node of one or more Data Nodes, at the discretion of the Discipline Node. Next, a schedule of work is established between all of the parties involved – Central Node, Discipline Node, Data Supplier and/or Data Node – and includes the tasks of data preparation for the Discipline Node and the Data Supplier, as well as the tasks that may need to be accomplished by the Central Node to revise the PDS Catalog. The responsibility of developing and tracking this schedule is shared by the Central Node Data Administrator, the Discipline Node Manager, and the Discipline Node Development Manager.

2.1.2 The Middle Phase: Data Preparation and Review

Once the plans for data set restoration have been finalized, the work of preparing the data for submission begins. This work is accomplished primarily by the Discipline Node and the Data Supplier, and monitored and reviewed by the Central Node Data Administrator. The chronological tasks that need to be accomplished are as follows.

Step 3: Formally Begin the Submission Process

Formal initiation of the submission process begins when the Discipline Node responsible for the data sends in the proposal for the inclusion of the new data to the Central Node Data Administrator (**Data Set Proposal**). The Central Node Data Administrator then specifies in detail what needs to be done to accommodate the new data (**Data Set Feasibility Study**), and sends a response to the Discipline Node which contains materials for the data set submission (**Template Generation, Data Set Submission Package**). This data set submission package includes a set of electronic forms, known as catalog submission templates, to be completed by the Data Supplier and/or the Discipline Node, as well as the appropriate instructions and documentation for doing so. When complete, these templates will contain all of the required meta-data about the data set(s) for the PDS High-Level Catalog. More detailed information for the Detailed-Level catalog, if any, is usually submitted in a load file in a format mutually agreed upon by the Discipline Node, the Data Supplier, and the Central Node Data Administrator.

The data set submission package also includes the schedule for the completion of the data preparation work that resulted from the earlier negotiations described in the planning and scheduling phase of this process. The Discipline Node is responsible for the completion of all the data preparation work, and for meeting the milestones on this schedule. At this point, the schedule should be reviewed, and, if necessary, renegotiated in the light of any changes in priorities or resources. After this point, the Discipline Node should begin to arrange for the remainder of the submission work to be done. The Central Node is responsible for updating the catalog schema and data dictionary (**Catalog Schema Updates**), and for participating in the submission and review process.

Step 4: Prepare the Science Data Set Package

The science data set package to be submitted contains the science data labelled and packaged in accordance with PDS standards, the high-level meta-data supplied in completed catalog templates, and detailed-catalog computer-readable files, if required. This package is prepared by the Data Supplier, as directed by the Discipline Node, and sent to the Discipline Node for initial verification. The Discipline Node then checks to see that the formats are correct, and that the information is complete (**Peer Review Preparation**). Any information that the Discipline Node needs to add to the catalog templates is done at this time. When verified and complete, copies of the catalog templates and, if applicable, detailed-catalog load files are then sent to the PDS Central Node. The Central Node shall then, according to its schedule, review, validate, and load the data into a replica of the PDS Catalogs for subsequent examination by the Peer Review Committee (**Template Review, Template Validation, Data Loading with SQL, Data Loading with Fcopy, Peer Review Database Initialization**).

Even as the science data set package is being prepared, plans for the review and approval of this package must be made. These plans include the selection of an appropriate committee of science peers to review the data, the determination and arrangement of the peer review logistics, notification of the meeting to all participants, and the sending of the requisite information for review. All of this is to be done by the Discipline Node well in advance of the actual meeting. In addition to planning for the actual review meeting, preliminary examination of the data and submittal of comments by the reviewers also need to occur during this preparatory phase. (**Peer Review Preparation**).

Step 5: Approve the Science Data Set Package

After the data are prepared and initially reviewed, and the Peer Review package is distributed, (**Peer Review Preparation**), the formal approval begins with the actual Peer Review meeting (**Peer Review, Peer Review Liens**). During this meeting, the submitted data, including labels and catalog, are reexamined by the established review committee. The scientists on the committee are responsible for determining the scientific quality of the actual science data, as well as the accuracy and completeness of the catalog meta-data. The members of the committee from the development staff have the responsibility for ensuring that the catalog information is in conformance with the catalog standards. The task of approval is commonly iterative; that is, problems with the data are identified, the data are corrected and reviewed again, until final approval is given by the committee. The procedures for this process (**Peer Review Preparation, Peer Review, Peer Review Liens**) are well documented in Chapter 3 of this document. Results of all Peer Reviews are documented and saved in the catalog database.

After the science data set package has been approved for ingestion into the PDS, the archival phase begins.

2.1.3 The End: Data Archiving and Catalog Loading

The final phase of data set submission, that of archiving the data and making it available to the PDS users, is accomplished by the completion of the following steps.

Step 6: Archive the Science Data Set Package at the NSSDC

Archiving approved PDS data at the NSSDC consists of sending the peer reviewed science data set package, along with two completed forms, to the National Space Science Data Center according to the **Data Set Archive Build** and **NSSDC Archive** procedures in Chapter 3. Copies of the AIM and DIF forms are found in Appendix C. The Discipline Node is responsible for the submittal of this archive package in accordance with the schedule. A complete copy of the approved data set must, in addition, be stored locally at the Discipline Node. The implementation of the local store is left to the Discipline Node, so long as the requirement to be able to re-create the archive package is satisfied. The guideline for this local archive is also documented in Chapter 3 (**Discipline Node Archive**). Once the data have been received and archived at the NSSDC, the NSSDC shall send an archive receipt notice to the Discipline Node. A copy of this acknowledgment shall then be sent by the Discipline Node to the Central Node, indicating that the data are ready for order and distribution (**Discipline Node Inventory**).

Step 7: Release the Data Set to the PDS Users

After the Central Node is notified that the data are ready for distribution to the PDS users, the final task of this long submission process takes place, that of officially including the data as part of the PDS (**Data Set Release**). The on-line catalog database is updated with new information reflecting the existence of the new science data (**Catalog Data Loading with SQL**), and the data inventories at both the Central and Discipline Nodes are revised, showing the data available for order and distribution (**Discipline Node Inventory**). The data submission process is now completed.

All of the procedures and guidelines referenced above are documented in Chapter 3 of this Data Administration Plan. Additional information, forms, etc. are found in the Appendices.

2.2 Data Management

This section of this overview of PDS Data Administration describes the general tasks of database and software management with respect to the PDS Science Catalogs. Once science data sets are officially part of the PDS system, the catalog information which describe these data become resident in a relational data base management system, which requires that certain procedures be followed for their maintenance. These procedures are characterized by the term database administration, and are summarized below. In addition, procedures for data loading and database validation, software maintenance, and document generation have been developed and are also described in summary here. The procedures themselves are documented in Chapter 3.

2.2.1 Catalog Database Administration

The PDS Science Catalogs are in the form of a relational database, managed by the Sharebase RDBMS. This DBMS is a combination of both hardware (the Sharebase 700, formerly the Britton Lee IDM), and software (the Sharebase operating system and VAX host software). Procedures for the installation and maintenance of this DBMS (**Operating System Installation and Maintenance**), backup and recovery of the databases (**Backup and Recovery**), and security management of the data (**Security Management, Data Audit**), have been developed and are documented in Chapter 3. In addition, there are procedures for monitoring database system performance (**Performance Monitoring**), accomodating new users (**Catalog User Update**), and applying data updates to the PDS Catalog (**Catalog Data Update**). Procedures also exists for managing replicated data between Central Node and Discipline Node catalogs (**Data Replication Mangement**) and for creating temporary Peer Review databases (**Peer Review Database Intilization**) used during the data ingestion process.

2.2.2 Catalog Loading and Validation

All PDS catalog data are initially loaded into clones of the on-line catalog database, known as peer review databases, and then integrated into the on-line database after the data are officially approved and archived. Detailed procedures for both loading and unloading data are described in Chapter 3 (**Data Loading with SQL, Data Loading with Fcopy, Data Unloading with SQL**). In addition, since the DBMS provides no internal checks to ensure the referential integrity of the database, a referential integrity application program must be applied (**Database Referential Integrity**). Finally, standard values used to validate selected catalog data elements are maintained in a PDS data dictionary table *ddcolstdval* (**Catalog Standard Values**).

2.2.3 Software Maintenance

Data management software consists of the catalog loaders/unloader, the SQL stored commands, and the Database Administration (DBA) utilities mentioned above. Procedures for their maintenance are found in Chapter 3 (**DBA Utilities, Loader Software, Stored Commands**).

2.2.4 Document Generation

The *PDS Catalog Design Document (CDD)*, the *PDS Data Dictionary (DD)*, and the catalog submission templates are all driven by information in the PDS catalog database. The documents are all mostly automatically generated from the database. Procedures for doing this are given in Chapter 3 (**Catalog Design Document, Data Dictionary Document**).

2.3 Data Administration Staff

The following sections describe briefly the key personnel involved in the data administration procedures.

2.3.1 Central Node Data Administrator

The Central Node Data Administrator shall be responsible for policies, guidelines, and procedures that ensure the usability, reliability, security and integrity of the data maintained at the Central Node and the Discipline Nodes. This person shall coordinate with the PDS Management Council, PDS Management, Central Node Data Engineers and Discipline Node Managers and Data Administrators to develop the policies, guidelines and procedures for administration of all data within the PDS. The Central Node Data Administrator shall be familiar with general data management principles and a broad spectrum of data base management systems, file systems, data management tools and host computers.

2.3.2 Central Node Database Administrator

The Central Node PDS Database Administrator shall be responsible for maintaining the PDS Data Administration policies, guidelines, and procedures documented in the Data Administration Plan. The Central Node Database Administrator shall be proficient in the use of Database Management Systems, File Systems, and data management tools. An extensive computer background is necessary to coordinate with the host computer system manager and assist the Central Node Data Administrator with technical decisions and planning.

2.3.3 Central Node Data Engineer

The Central Node Data Engineer shall be responsible for the implementation of the policies, guidelines and procedures documented in the Data Administration Plan. During the data acquisition process this person shall coordinate and interface with Discipline Node representatives, the Central Node Data Administrator, and the PDS Science Manager for the implementation of the required policies, guidelines and procedures. The Central Node Data Engineer shall also be responsible for supporting the Central Node Data Administrator in developing policies, guidelines and procedures that ensure the usability, reliability, security, and integrity of the data maintained at the Central Node and the Discipline Nodes. The Central Node Data Engineer shall be experienced in the development of data models, the application of general data management principles, and the use of database management systems, file systems, data management tools, and host computers.

2.3.4 Discipline Node Data Administrator

The Discipline Node PDS Data Administrator shall be responsible for ensuring the usability, reliability, security and integrity of the data maintained at the Discipline Node. This person shall coordinate with the PDS Data Administration in implementing PDS Data Administration policies, guidelines, and procedures for maintaining the locally archived PDS data. The Discipline Node PDS Data Administrator shall be familiar with general data management principles, Database Management Systems, File Systems, data management tools, and the host computer at the Discipline Node.

2.3.5 Data Supplier

The Data Supplier is either a data node, a member of a Discipline Node, or a principal investigator submitting data for inclusion into the PDS.

2.3.6 PDS Science Manager

The Science Manager represents the Discipline Nodes at the Central Node. This liaison person participates in determining data ingestion priorities for the PDS as well as assisting the Node Managers in their data restoration activities.

Chapter 3

Procedures and Guidelines

The procedures and guidelines in this chapter of the Data Administration Plan are organized alphabetically by procedure name. The usage of these procedures and guidelines are described in Chapter 2. Procedures have detailed steps that must be executed as written and in general, are utilized by the Central Node. Guidelines are similar to procedures except that in general, they are used by the Discipline Nodes and are more flexible in design and interpretation. Each procedure or guideline will reference one or more data flow diagrams in the Data Flow Diagram section.

Appendix A in this document contains the Data Flow Diagrams for the Prepare Data and Administer Data functions of PDS. Appendix B contains a set of user matrices to use as a checklist of procedures depending on selected function. Appendix C contains a sample of the AIM and DIF forms required for data archive at the NSSDC. Appendix D contains notes describing the lessons learned in reviewing the data set peer review process.

PDS Data Administration Procedure

3.1 Backup and Recovery

3.1.1 General Information

The Planetary Data System (PDS) catalog database contains system operations data, as well as science catalog data describing planetary data sets. The operations data support the functions of data set ordering and customer support and are updated frequently. The catalog data are updated periodically to include peer reviewed data which describe new PDS data sets. Due to this volatile nature of the catalog database, it is necessary to be able to save (backup or dump) and recover (load or restore) the database. The reproducibility of the catalog and supporting databases supports the PDS Configuration Management function and provides a basis for disaster recovery should a database or the database server, suffer damage or destruction.

The PDS Version 1.0 catalog is implemented on a Sharebase/700 database server. The database server is administered through the use of a collection of Sharebase utilities which operate in the VAX/VMS client (computer) environment. Three of these utilities provide a backup and recovery capability for the database server. The IDMDUMP utility is used to generate a file containing a backup copy of a database. As part of this process, it also generates a file containing a dump of the contents of the transact system table. This system table contains database transaction information; each use of the IDMDUMP utility causes truncation (deletion of all rows) of the transact table. The database dump file produced by the IDMDUMP utility may be used by the IDMLOAD utility to load a database. The contents of the dump file overwrite the contents of this target database, and the size of the target database must be at least as large as the database which was backed up to produce the dump file. The database transaction dump file(s) produced by the IDMDUMP utility may be loaded by the IDMLOAD utility and the transactions reapplied to the database by use of the IDMROLLF utility. Refer to the Sharebase VAX/VMS Command Summary Manual for complete details on the use of these utilities. General discussions about the use of these utilities may be found in the Sharebase Database Administrator's Manual.

Included in this procedure are three (3) example recovery scenerios that apply to the Central Node Catalog.

3.1.2 Policy

- (1.) The database server backup and recovery operations procedures used by the JPLPDS Operations Staff shall be managed by the PDS Database Administrator.
- (2.) The PDS catalog and supporting databases backup schedule and procedure shall be determined by the Data Administrator.
- (3.) The backup of the PDS catalog and supporting databases shall be performed by the JPLPDS VAX Operations Staff.

3.1.3 Procedure

The following sections provide details of dumping and restoring databases.

3.1.3.1 Backup

A database and the database transaction log may be dumped by the following actions:

- (1.) Log on to the JPLPDS VAX under the account of the Database Administrator (DBA).
- (2.) Type "sql system" from the DCL prompt to start the SQL utility.
- (3.) Type "start ps" from the SQL prompt to run the process status system stored command. Refer to the Sharebase Pre-Defined Stored Commands Manual for details on the use of this stored command. Check the stored command output for any user processes which are active in the database to be dumped. If user processes are active in the database, the database cannot be dumped until the user is notified and the process is terminated.
- (4.) Type "exit" from the SQL prompt to return to the DCL prompt.
- (5.) Type "idmdump databasename system /trans="filename.t#hfile,type(binary)" /data="filename.bck#hfile,type(binary)" " from the DCL prompt. Filename.t indicates the name of the file which contains the dump of the transactions and filename.bck indicates the name of the file which contains the dump of the database. When dumping the database, it is required to also dump the transactions.
- (6.) Type "idmdump databasename system /trans="filename.t#hfile,type(binary)" " from the DCL prompt to alternatively dump the transactions without dumping the database.
- (7.) The dump files may be saved on a VAX disk or archived to magnetic tape via the DCL BACKUP command. Refer to the VAX/VMS System Management Manual for details on the use of the BACKUP command. The actual backup command file is maintained by the JPLPDS VAX Operations Staff.

3.1.3.2 Recovery

Database recovery falls into two categories: loading a database and rolling forward transactions.

3.1.3.2.1 Database Load

- (1.) Log on to the JPLPDS VAX under the account of the Database Administrator.
- (2.) Move to the directory containing the database dump file with the DCL SET DEFAULT command.
- (3.) Type "sql system" from the DCL prompt to start the SQL utility.
- (4.) If the target database to be loaded already exists, type "start ps" from the SQL prompt to run the process status system stored command. Refer to the Sharebase Pre-Defined Stored Commands Manual for details on the use of this stored command. Check the stored command output for any user processes which are active in the database to be loaded. If there are user processes active in the database, the database cannot be loaded until the user is notified and the process is terminated.
- (5.) If the target database to be loaded does not already exist, type "create database *databasename* with demand =9999 on "diskname" ". *Databasename* indicates the name of the new target database, 9999 indicates the number of 2048 byte blocks allocated to the new target database, and *diskname* indicates the name of the disk which will contain the new target database.
- (6.) If the target database already exists, type "open *databasename*" from the SQL prompt to open the target database. *Databasename* indicates the name of the target database which is being loaded. Type "start freespace" from the SQL prompt to run the free space system stored command. Refer to the Sharebase Pre-Defined Stored Commands Manual for details on the use of this stored command. Check the stored command output to verify that the target database to be loaded is at least as large as the database that was dumped to produce the source database dump file. If unable to determine the size of the source database, attempt to load the target database from the source file and if the source database is larger than the target database, then the database server will generate an error indicating the amount of additional allocation size required for loading the database from the source dump file. If it is necessary to enlarge the target database, type "open system" from the SQL prompt, then type "extend database *databasename* with demand=9999 on "diskname" " from the SQL prompt. *Databasename* indicates the name of the target database which is being loaded and 9999 indicates the number of 2048 byte blocks required to enlarge the target database to the required size.
- (7.) Type "exit" from the SQL prompt to return to the DCL prompt.
- (8.) Type "idmload *databasename* system filename.bck" from the DCL prompt. *Filename.bck* indicates the name of the file which contains a database dump. A system message indicates successful completion of the load process.

3.1.3.2.2 Roll Forward Transactions

To roll forward one or more transaction files, the target database must first be loaded from the database dump file which was created immediately prior to creation of the transaction files. Furthermore, the transaction files must be rolled forward in the same order that they were created. An example clarifies this point:

- (1.) Database A is dumped on day 1, creating file a.bck
- (2.) Transactions are dumped for database A on day 2, creating file "a1.t"
- (3.) Transactions are dumped for database A on day 3, creating file "a2.t"
- (4.) Transactions are dumped for database A on day 4, creating file "a3.t"
- (5.) Database A is lost due to a disk crash on day 5.
- (6.) Database A is recreated as of day 1 by the method described above in the Database Load section.
- (7.) Transactions for day 2 are rolled forward (by method which is described below).
- (8.) Transactions for day 3 are rolled forward.
- (9.) Transactions for day 4 are rolled forward.

Transactions may be rolled forward by the following actions:

- (1.) Log on to the JPLPDS VAX under the account of the Database Administrator.
- (2.) Move to the directory containing the database dump and transaction dump files with the DCL SET DEFAULT command.
- (3.) Load the target database as described above in the Database Load section.
- (4.) Type "idmload system system logfile="filename.t" " from the DCL prompt. Filename.t indicates the name of the transaction dump file. Repeat this step for each transaction dump file to be rolled forward. This step loads the transaction files into a working database for subsequent rolling forward.
- (5.) Type "idmrollf *databasename* system /logname="filename.t" ". Databasename indicates the name of the target database receiving the transactions and filename.t indicates the name of the transaction dump file. Repeat this step for each transaction dump file, specifying the transaction dump files in the same sequence in which they were created by the IDMDUMP utility.

3.1.4 Database Recovery Example Scenerios

The follow sections will address the scenerios that the PDS database may and probably will encounter.

3.1.4.1 Testing the System Scenerio - A

3.1.4.1.1 Assumptions

- (1.) Testing on the PDS catalog will result in modifications to one or more tables in the database.
- (2.) The PDS catalog needs to be restored as of a given date.
- (3.) The database was backed up using the IDMDUMP utility on a predetermined date per request of the Configuration Management Coordinator.
- (4.) The backup tape was saved by the Configuration Management Coordinator.

3.1.4.1.2 Recovery Procedure

1. Restore the database as of the last backup using the IDMLOAD utility. This is the easiest and fastest method.

3.1.4.2 Testing the System Scenerio - B

3.1.4.2.1 Assumptions

- (1.) Testing on the PDS catalog will result in modifications to one or more tables in the database.
- (2.) The PDS catalog needs to be restored as of a given date.
- (3.) The database was saved using the Configuration Management Coordinator save procedure.
- (4.) The backup files are controlled by the Configuration Management Coordinator.

3.1.4.2.2 Recovery Procedure

- (1.) Destroy the existing database. (DBA only)
- (2.) Create a new database. (DBA only)
- (3.) Restore the database with the PDS Configuration Management Coordinator ascii backup files. This procedure exists and is a cooperative effort between the PDS Configuration Management Coordinator and the Database Administrator.

3.1.4.3 Testing the System Scenerio - C

3.1.4.3.1 Assumptions

- (1.) Testing on the PDS catalog will result in modifications to one or more tables in the database.
- (2.) The PDS catalog needs to be restored as of a given date.
- (3.) A limited set of tables was saved using a Configuration Management Coordinator procedure. The Configuration Management Coordinator and the Database Administrator must determine exactly which tables may be modified prior to the testing. A DCL procedure using the IDMFCOPY utility may be used for this purpose.
- (4.) The table backup ascii files are controlled by the Configuration Management Coordinator.

3.1.4.3.2 Recovery Procedure

- (1.) Truncate only tables that have been modified (modified tables must be known). (DBA only)
- (2.) Restore the tables that have been modified with the Configuration Management Coordinator ascii backup files. A DCL procedure using the IDMFCOPY utility may be used for this purpose.

3.1.4.4 PDS Catalog Disk Crash Scenerio

3.1.4.4.1 Assumptions

- (1.) The disk with the PDS database crashes in the middle of the day with users on the system and orders may or may not have been taken.
- (2.) A regular backup was performed prior to the crash. (Daily backups are recommended)
- (3.) The user is aware of where they were at the time of the crash to continue later with any order steps remaining.
- (4.) The user interface allows the user to restart at any step of the order process that updates the database (i.e., executes a stored command that contains an update or insert statement).

3.1.4.4.2 Recovery Procedure

- (1.) Create a new empty database on a good disk. (DBA only)
- (2.) Restore the database as of the latest backup tape.
- (3.) Roll forward the transactions from the transaction log file (DBA only). All database transactions are logged to the transaction log file that resides on a separate disk from the data disk. It is extremely unlikely that both disks would crash at the same time. If the transaction log is not available, a procedure is required to reenter all database transactions from the Central Node since the last backup.

3.1.4.5 Sharebase Operating System Crash Scenerio

3.1.4.5.1 Assumptions

- (1.) The Sharebase DBMS crashes in the middle of the day with users on the system.
- (2.) The user is aware of where they were at the time of the crash to continue later with any order steps remaining.
- (3.) The user interface allows the user to restart at any step of the order process that updates the database (i.e., executes a stored command that contains an update or insert statement).

3.1.4.5.2 Recovery Procedure

- (1.) Reboot the IDM and the transactions are automatically recovered that had not been committed. The IDM will log what is being recovered to the log device (i.e., terminal or VAX port).
- (2.) Reload any batch load files that were not completed. Any duplicates will be rejected by the DBMS.
- (3.) Notify the user community that incomplete orders will need to be completed or cancelled.

3.1.5 Database Safety Guidelines

- (1.) Keep each database on a separate disk from transaction log files.
- (2.) Keep the Sharebase System database on a completely separate disk from all other files and databases.
- (3.) Backup the PDS catalog database daily.
- (4.) Backup all other development databases weekly or as required.
- (5.) Provide the user community with the capability to determine where an order is and how to resume the order process. This is also necessary whenever a communication connection is dropped.

3.1.6 Data Flow Diagram

This procedure supports the Maintain the PDS Meta Data segment (F-1.4.5) in DFD 1.4. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

PDS Data Administration Procedure

3.2 Catalog Data Loading with Fcopy

3.2.1 General Information

The need to load data into the PDS catalog without using templates will arise from time to time. On occasion, a PDS Data Supplier will submit data in an ASCII Delimited format. This format requires the use of the Sharebase utility, Fcopy, which in addition to the data file, uses a format file to describe the data file. This method of loading data into a Database is not the preferred method, but will be used on occasion and is therefore documented in this manual. The major reason for not using ASCII Delimited files when loading data is the lack of error checking being performed by software.

This Catalog Data Loading with Fcopy procedure documents the ingestion of the Data using the Sharebase utility, Fcopy. The preferred method for loading Data into a PDS Database is through the use of templates described in the Catalog Data Loading with SQL procedure.

3.2.2 Policy

- (1.) Data loading shall be performed by the Central Node Database Administrator.
- (2.) ASCII Delimited files shall be used for loading Database Data only after approval by the Central Node Data Administrator.
- (3.) The Central Node Data Administrator shall make all decisions as to what Data is (1) inserted into or (2) removed from any PDS Database.
- (4.) All additions to any Database, using any ASCII Delimited file as input, shall be logged by the Central Node Database Administrator.
- (5.) The creation of format files shall be performed using the Sharebase *IDMFCOPY USERS GUIDE*. The format file (tablename.FMT), used by the Fcopy utility, shall be forwarded to the Configuration Management Coordinator along with the ASCII Delimited file and the Database Change Notice after any Database load is performed.

3.2.3 Procedure

The Fcopy software used is only part of the complete procedure to ingest Data into the catalog. What follows are the minimum steps required to ingest Data into the PDS catalog utilizing the Fcopy software utility.

(1.) Receive ASCII Delimited Data

The ASCII Delimited file(s) arrive by VAX Mail, floppy disk, or magnetic tape. Depending on the media received, the Central Node Data Administrator shall copy the Data to the VAX Host computer.

(a.) Copy Data File(s) to Discipline Directory

The file(s) are moved to a Central Node Data Administrator specified directory that is associated with the Discipline Node submitting the Data. Doing this helps to maintain an organized structure for the storage of the received templates. For example, Data received from the Imaging Node would be moved to the IMAGE Data directory.

(2.) Review Contents of Data File

Once the Data file is loaded into the appropriate directory, the VAX editor shall be used to correct any obvious errors. After careful inspection and corrections, if any, the Data file shall be saved as a new version. It should be stated that the Fcopy software only loads one Database table at a time.

The complete instructions for using the Fcopy software is documented in the Sharebase Manual; Idmfcopy User Guide. In there, you will find all information necessary for execution of the Fcopy software and creation of the ASCII Delimited files.

(a.) Check and/or Create the Format file

The Fcopy software requires two files to exist; (1) the ASCII delimited file and (2) the format file. If the format file is not received with the ASCII delimited file, the format file shall be created using the VAX editor. This is a relatively simple process as long as the contents of the data file and the database table elements are understood. The Sharebase manual, *Idmfcopy Users Guide* contains the information necessary for creation of a format file.

(i.) The following is an example of a Format file:

```
record
  tpltfile      text to semi;
  loaddate      text to semi;
  authname      text to semi;
  Databasename  text to semi;
  suplyrname    text to semi;
end
```


(ii.) The following is an example of an ASCII Delimited file:

```
fpsoft.tpt;19880216;Gail Woodward;pdsdmt;Bill Kurth;  
jpllds.tpt;;19881020;Steve Hughes;peerrvw2;JPL;  
jplper.tpt;19881020;Steve Hughes;peerrvw2;JPL;
```

(3.) Run Fcopy (test only)

The Data Administrator shall execute the test load software by typing the Fcopy command at the VMS \$ prompt.

(a.) The following is an example of an Fcopy command that uses the CHECKData option to not actually load any Data. The command is actually spelled "IF-COPY" and is set up by the JPLPDS VAX System Manager.

```
$ iFcopy in peerrvw1 dbload /checkData -  
/Datafile="filename" /Formatfile="filename"
```

(b.) Monitor the screen for any errors messages that may be displayed by the Fcopy software. The most common error is "duplicate record found in database". If this happens, the problem must be resolved by working with the person responsible for the data. All errors must be resolved before any further loading can take place. After corrections are made, a re-run of the Fcopy test load shall be done.

(4.) Backup the Database (Procedure Backup and Recovery of this document.)

The backup is required as a preventative measure to insure that if loading the ASCII Delimited file corrupts the Database, the Database can be returned to it's state before the loading occurred.

(5.) Run Fcopy (actual load)

The Central Node Database Administrator shall execute the test load software by typing the Fcopy command at the VMS \$ prompt.

(a.) The following is an example of an Fcopy command that loads Data into a Database.

```
$ iFcopy in peerrvw1 dbload -  
/Datafile="filename" /Formatfile="filename"
```

(b.) Monitor the screen for any error messages that may be displayed by the SQL interpreter. There should be no errors caused by the Data at this point because of the test load previously done. The only errors that can happen at this point are hardware or host computer related. If an error occurs, the (Procedure Backup and Recovery shall be executed to restore the corrupted Database.

(6.) Update Database Log

Whenever a Database is updated using this procedure, an entry that contains the following shall be logged by the Database Administrator.

- (a.) Database Name
- (b.) Date of Load/Unload
- (c.) VAX Directory Name
- (d.) Filename of SQL file
- (e.) Authorized By Person
- (f.) Comment

(7.) Notify Responsible Science Interface

All persons involved with the newly loaded Data shall be notified by VAX Mail that an update has been completed or that there are unresolved problems with the Data. A Database Change Notice (DBCN) shall also be sent to the Configuration Management Coordinator. This notice informs the Configuration Management Coordinator that one or more tables in the database has been updated. The DBCN is described in detail in the Catalog Data Update procedure.

3.2.4 Data Flow Diagram

This procedure supports the Load Peer Review Data (F-1.7.3) and Load Catalog Data (F-1.7.5) segments in DFD 1.7. Appendix A contains the Prepare Data and Administer Data Data flow diagrams.

PDS Data Administration Procedure

3.3 Catalog Data Loading with SQL

3.3.1 General Information

Planetary Data System (PDS) Catalog Templates form part of the data submission package which is sent to PDS Discipline Node. These templates are electronic forms which the data supplier uses to submit catalog data into the PDS catalog. In addition to facilitating data submission from the user's perspective, the templates provide a mechanism for structured data submittal which allows an automated data loading process. The structure and content of the templates directly reflect the PDS data model and its physical implementation, the catalog database. The structure and content of the templates are defined in several tables in the PDS Data Dictionary; the template file which is used during the data submission process is produced from this information through the use of a Database Administrator (DBA) template generation utility. The template generation software is described in the **Template Generation** procedure. Because the templates are dependant on the catalog database schema, they must be maintained in synchronization with the schema Standard Data Dictionary of this document).

This procedure documents the ingestion of the SQL statements only. The **Template Review** and **Template Validation** shall be completed prior to this procedure when templates are the source of the data. The SQL statements used in this procedure are created by the **Template Validation** procedure.

3.3.2 Policy

Catalog data loading shall be performed by the Central Node Database Administrator.

3.3.3 Procedure

One of the output files from the execution of the *loader software* are the SQL statements. The SQL statements used are only part of the complete procedure to ingest data into the PDS catalog. The Database Administrator shall 1) review the SQL statements, 2) perform a test load of the SQL statements, 3) perform the actual load of the SQL statements, and 4) forward a copy of the corrected catalog template(s) to the Data Engineer for distribution to the Peer Review Committee. What follows are the minimum steps required to ingest data into the PDS catalog utilizing the Sharebase supplied SQL interface.

(1.) Prepare Test of SQL Insert Statements

In order to test the SQL Insert statements against a database without doing any actual update to the database, it is highly recommended that the following two SQL commands be added to the SQL file created by the **Template Validation** procedure using the VAX editor. After the two (2) statements are added, save the SQL file as a new version.

- (a.) Add the statement "set autocommit off" to the beginning of the file to direct the SQL interpreter to not commit any updates.
- (b.) Add the statement "rollback work" to the end of the file to direct the SQL interpreter to roll back all uncommitted transactions.

(2.) Run SQL interface (test only)

The Database Administrator shall start the interactive SQL software by typing "SQL" at the VMS \$ prompt.

- (a.) Open the database to be updated.
- (b.) Use the "%input" SQL command to load the contents of the SQL Insert file
- (c.) Monitor the screen for any error messages that may be displayed by the SQL interpreter. The most common form of error is when a duplicate key is found in the database. If this happens, the problems must be resolved by working with the Data Engineer responsible for the data. All errors must be resolved before any further loading can take place.

The solution may be any number of actions. Since every foreseeable error cannot possibly be listed in this procedure, a few of the possible areas that may be addressed to correct SQL load errors are listed below.

- (i.) Deletion of existing records in the database
- (ii.) Correction of the SQL Inserts in the SQL file
- (iii.) Correction of the supplied template and a re-run of the loader software.

(3.) Backup the Database (Procedure Backup and Recovery of this document.)

The backup is required as a preventative measure to ensure that if loading the SQL Insert file corrupts the database, the database can be returned to its state before the loading occurred.

(4.) Modify SQL Inserts

Once the test load described above can be run without errors, the SQL Insert file must be edited again using the VAX editor. The Central Node Database Administrator shall remove the two (2) statements previously added above and save the SQL file as a new version. The two statements to be removed are listed as follows:

- (a.) Remove the statement "set autocommit off" at the beginning of file.
- (b.) Remove the statement "rollback work" at the end of file.

(5.) Run SQL interface (actual update)

The Central Node Database Administrator shall start the interactive SQL software by typing "SQL" at the VMS \$ prompt.

- (a.) Open the database to be updated.

- (b.) Use the "%input" SQL command to load the contents of the SQL Insert file
- (c.) Monitor the screen for any error messages that may be displayed by the SQL interpreter. There should be no errors caused by the data at this point because of the test load previously done. The only errors that can happen at this point are hardware or host computer related.

(6.) Update Database Log Information

Whenever a database is updated using this procedure, an entry shall be logged by the Central Node Database Administrator that contains the following:

- (a.) Database Name
- (b.) Date of Load/Unload
- (c.) VAX Directory Name
- (d.) Filename of SQL file
- (e.) Authorized By Person
- (f.) Comment

The current method for tracking database load files is a PC REFLEX Database called DBLOAD that resides on the PC AT located at 301/420D. There are two reports written in Reflex that dump all information contained in the DBLOAD database.

(7.) Notify Responsible Science Interface

All persons involved with the newly loaded data shall be notified by VAX Mail that an update has been completed or that there are unresolved problems with the data. A Database Change Notice (DBCN) shall also be sent to the Configuration Management Coordinator. This notice informs the Configuration Management Coordinator that one or more tables in the database has been updated. The DBCN is described in detail in the Catalog Data Update procedure.

3.3.4 Data Flow Diagram

This procedure supports the Load Peer Review Data (F-1.7.3) and the Load Catalog Data (F-1.7.5) segments in DFD 1.7. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

PDS Data Administration Procedure

3.4 Data Unloading with SQL

3.4.1 General Information

The need to remove data previously loaded into the PDS catalog will arise from time to time. The major reason to remove any data from the PDS database is if the data is found to be incorrect. The cause of this may be as simple as loading the wrong version of a template or as complex as a problem with the PDS supplier's data itself. Another common reason for data removal will be the result of a peer review. The important point is that there will be occasions that necessitate the removal of data from the PDS database.

The Data Unloading with SQL Procedure documents the removal of the data using SQL Delete statements in an ASCII file. This ASCII file is usually generated automatically when the SQL Insert statements are generated by the loader software, which is the primary source for all SQL statements. In some instances, the ASCII files may be created by the PDS Central Node Data Administrator or Database Administrator using the VAX Editor.

3.4.2 Policy

- (1.) Catalog data unloading shall be performed by the PDS Database Administrator.
- (2.) SQL Delete statements in an ASCII file shall be the primary means of removing data from a PDS database.
- (3.) The PDS Data Administrator shall make all decisions as to what data is (1) inserted into or (2) removed from any PDS database.
- (4.) All deletions from any database, using the loader software generated SQL Delete statements, shall be logged by the PDS Database Administrator.

3.4.3 Procedure

In most instances, the loader software generated ASCII file with the DEL filename extension contains SQL Delete commands used to unload data from a database. As it is, the commands cannot be run against any database. The PDS Database Administrator must look at each SQL Delete statement and routinely make changes to statements prior to any database update.

What follows are the minimum steps required to modify the SQL Delete statements and the use of these statements to Delete data from the PDS catalog.

(1.) Modify SQL Deletes

Using the VAX editor, edit the ASCII file created by the loader software.

There are two types of database tables that can be affected by the SQL Delete statement. The first type of table is used to store textual data, which requires one or more

rows for each description. The second type of database table is not used for text and will not have multiples rows with common keys and sequence numbers. We shall call the table types (1) textual and (2) nontextual.

(a.) Textual Tables

This type of table is identified by including the dictionary element, Tuple Sequence Number. The loader software should have created an SQL Delete statement for one row in the table. Another method to identify a textual table is to look for the literal "EXISTS" in the SQL Delete statement. The literal "EXISTS" is not the textual data actually loaded into the PDS database, but a STATUS of the field itself. The literal "EXISTS" is the Status showing that some text was loaded into the table.

The PDS Database Administrator must remove the line of the Delete statement containing the literal "EXISTS". What follows is an example of an actual Delete statement with one of the lines containing the literal "EXISTS".

```
Delete from msnphsd where -
      msnphsd           = "EXISTS" -
and   msnphstype       = "ENCOUNTER" -
and   scid              = "VG1" -
and   targname         = "IO"
```

In the above example, the second line would need to be Deleted before the command would work. The remaining elements and values are required by SQL to execute the Delete of one or more rows successfully.

(b.) Nontextual Tables

This type of table is identified by NOT including the dictionary element, Tuple Sequence Number. The loader software should have created a single SQL Delete statement for one row in a table. The PDS Database Administrator need do nothing to the SQL Delete statement. The SQL WHERE conditions are sufficient to identify the exact row in the table to Delete.

(2.) Prepare Test of SQL Deletes

In order to test the SQL Delete statements against a database without doing any actual deletes, it is recommended that the following two SQL commands be added to the SQL file using the VAX editor. After these two (2) statements are added, save the SQL file as as new version.

- (a.) Add the statement "set autocommit off" to the beginning of the file to direct the SQL interpreter to not commit any updates.
- (b.) Add the statement "rollback work" to the end of the file to direct the SQL interpreter to roll back all uncommitted transactions.

(3.) Run SQL interface (test only)

The PDS Database Administrator shall start the interactive SQL software by typing "SQL" at the VMS \$ prompt.

- (a.) Open the database to be updated.
- (b.) Use the "%input" SQL command to process the statements in the SQL Delete file.
- (c.) Monitor the screen for any error messages that may be displayed by the SQL interpreter. All errors must be resolved before any further processing can take place. Corrections to the SQL Delete statements in the SQL file is the only possible action that can be taken.

(4.) Backup the Database (Procedure Backup and Recovery of this document)

The database backup is required as a preventative measure to ensure that if loading the SQL Delete file corrupts the database, the database can be returned to its state before the loading occurred.

(5.) Modify SQL Deletes

Once the test unload described above can be run without any errors, the SQL Delete file shall be edited again using the VAX editor. The PDS Database Administrator shall remove the two (2) statements previously added above and save the SQL file as as new version. The two statements to be removed are listed as follows:

- (a.) Remove the statement "set autocommit off" at the beginning of the file.
- (b.) Remove the statement "rollback work" at the end of the file.

(6.) Run SQL interface (actual update)

The PDS Database Administrator shall start the interactive SQL software by typing "SQL" at the VMS \$ prompt.

- (a.) Open the database to be updated.
- (b.) Use the "%input" SQL command to load the contents of the SQL Delete file
- (c.) Monitor the screen for any error messages that may be displayed by the SQL interpreter. There should be no errors caused by the data at this point because of the test load previously done. The only errors that can happen at this point are hardware or host computer related. If the database is corrupted, then the database shall be restored (Procedure Backup and Recovery of this document).

(7.) Update Database Log

Anytime a database is updated using this procedure, an entry shall be logged by the PDS Database Administrator that contains the following:

(a.) Database Name

This is the twelve character database name that was updated.

(b.) **Date of Load/Unload**

This is the date of the update in the format: YY/MM/DD

(c.) **VAX Directory Name**

This is the name of the directory that is used to save the template (.TXT), SQL Insert (.SQL), Loader Summary Report (.RPT), and the SQL Delete (.DEL) files.

(d.) **Filename of SQL file itemitem** This is the full disk/dir/file name of the file containing the SQL Delete statements. Remember to save only the last version used for the actual update.

(e.) **Authorized By Person**

This is the full name of person that authorized the database modification.

(f.) **Comment**

This field is used to save information that helps the reader understanding any special circumstances that are associated with the SQL file.

(8.) **Notify Responsible Science Interface**

All persons involved with the removal of PDS data shall be notified by VAX Mail that an update has been completed. A Database Change Notice (DBCN) shall also be sent to the Configuration Management Coordinator. This notice informs the Configuration Management Coordinator that a table in the database has been updated. The DBCN is described in detail in the **Catalog Data Update** procedure.

3.4.4 Data Flow Diagram

This procedure supports the Load Peer Review Data (F-1.7.3) and Load Catalog Data (F-1.7.5) segments in DFD 1.7. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

PDS Data Administration Procedure

3.5 Catalog Data Update

3.5.1 General Information

A major component of the Planetary Data System (PDS) is a catalog database which serves as a repository for planetary meta-data. The meta-data support the access, identification, analysis, and distribution of planetary data. The Version 1.0 catalog database is implemented on a Sharebase/700 database server.

Catalog data is usually loaded with data extracted from catalog templates. After this data is loaded, the Database Administration (DBA) utility, *dbri* is executed Database Referential Integrity which reports on standard value and referential integrity errors. To correct the errors, a Data Engineer will perform an analysis of the problem, generate a set of SQL statements to correct the data errors, and submit the corrections in a pre-defined format along with supporting documentation to the Database Administrator for processing. After applying the corrections to the catalog, a log entry is entered by the Database Administrator to record the update and a Database Change Notice (DBCN) is created and forwarded to the Configuration Management Coordinator. The format for submitting a correction is described along with a sample of a database correction file and a sample of the DBCN.

3.5.2 Policy

- (1.) The maintenance of the database shall be managed by the PDS Database Administrator.
- (2.) PDS corrections shall be submitted in files which conform to the format described in this procedure. Corrections shall not be implemented by "on-the-fly" interactive use of the SQL utility, rather, they shall be created by using these correction files as input to the SQL utility.
- (3.) PDS corrections shall be defined with the use of the SQL language, specifically the most recent version associated with the database server.

3.5.3 Procedure

- (1.) The Data Engineer generates the correction file with associated header information.
- (2.) The Data Engineer tests the correction file on the local copy of the Catalog database using the SQL commands *set autocommit off* and *rollback work*.
- (3.) The Data Engineer submits the correction file to the PDS Data Administrator for authorization along with a Database Change Notice (DBCN).
- (4.) The Data Administrator schedules the application of the correction file to the appropriate database.
- (5.) The Data Administrator then forwards the correction file and the DBCN to the Database Administrator for processing.
- (6.) The Database Administrator notifies the Data Engineer and the Configuration Management Coordinator that the correction has been applied.

3.5.3.1 Format of correction file

The correction file which contains the SQL statements and comments is structured as follows:

- (1.) Header section: a comment block which identifies and describes the stored command.
- (2.) Update section: SQL commands which implement one or more database update sets.

The file must be no wider than eighty characters per line. To accommodate this requirement and for purposes of readability, the query *target list* shall be specified with one target object per line. Likewise, each condition in the query *where clause* shall be specified on a separate line. SQL keyword phrases such as **UPDATE**, **INSERT**, **DELETE**, **WHERE**, etc. shall be placed at the left margin. The comment block which delimits the file header is delimited by the use of the */** and ***/* operators, and a column consisting of the **** character marks the left margin of the comment block. All but the last line of the SQL command must be ended with the *-* continuation character, indicating continuation of the command to the next line.

The file header section consists of a two groups of keywords.

- (1.) The first group is information that shall be logged by the Database Administrator.
- (2.) The second group is detailed documentation which describes each category of update which supports the batching of several different command sets in a single correction file.

The following is a sample of a correction file with a single set of updates:

```
/*
-----
* The following information is entered into the database update log
* by the DBA.
```

```

-----
*      SQL_FILE: public:[shughes.sc]dbupd34.sql
*      DATE: 19890721
*      AUTHORIZED: Steve Hughes
*      DATABASE: PDSCAT2
*      SUPPLIER: Steve Hughes
*      COMMENT: Make Pin Software Not Available
*      DIRECTORY: develop:[mchapoton.catdata.cn]
*      DISCIPLINE: CN
*      PFR/ECR NUM: N/A
*      PFR/ECR DESC: N/A
-----

```

```

* The following information is detailed documentation retained in
* this source file only.
-----

```

```

*      TEST_DB: PDSMT - CHANGES KEPT
*
*      UPDATE-1: Validate that filename corresponds to filtnum
*
*      ROWS_AFFECTED: 3
-----

```

```

* The following SQL commands modify the database.
* A database update log is kept showing rows affected.
-----

```

```

*/
/** UPDATE-1 **/

update swinfo set swtype = 'N/A', -
swaccessd = 'NOT ACCESSIBLE THROUGH PDS CATALOG - CONTACT NODE' -
where swname = 'PANDA'
update swinfo set swtype = 'N/A', -
swaccessd = 'NOT ACCESSIBLE THROUGH PDS CATALOG - CONTACT NODE' -
where swname = 'SPECIO'
update swinfo set swtype = 'N/A', -
swaccessd = 'NOT ACCESSIBLE THROUGH PDS CATALOG - CONTACT NODE' -
where swname = 'XG SYSTEM'

```

3.5.3.2 Content of the Correction File Header

The required entries for the header section of the correction file are detailed below.

- (1.) **SQL_FILE**
This is the fully qualified path name of the correction file that the Database Administrator shall apply against the database. The file is also saved by the Database Administrator in the appropriate JPLPDS VAX directory.
- (2.) **DATE**
This is the date that the update was performed and is entered by the Database Administrator at update time.
- (3.) **AUTHORIZED**
This is the full name of the person authorizing the update, usually the Data Engineer.
- (4.) **DATABASE**
This is the database name to be updated.
- (5.) **SUPPLIER**
This is the full name of the Data Engineer that generated and tested the correction file.
- (6.) **COMMENT**
This is a brief comment to describe the purpose of the update.
- (7.) **DIRECTORY**
This is the directory on the JPLPDS VAX that is used to save the correction files.
- (8.) **DISCIPLINE**
This is the discipline code for categorizing the updates. This supports summary reporting by discipline.
- (9.) **PFR/ECR NUM**
This is the ECR or PFR number that may have initiated the update.
- (10.) **PFR/ECR DESC**
This is a description of the ECR or PFR referenced in the PFR/ECR NUM entry.
- (11.) **TEST_DB**
The is the database name used for the testing of the correction file.
- (12.) **UPDATE-n**
This is the update set label where *n* is an integer beginning with 1 and incremented by 1 for each set of updates within the correction file.
- (13.) **ROWS_AFFECTED**
This is the count of the table rows affected by each update set.

3.5.3.3 Loading Corrections in the Catalog

Upon receipt of a correction file by the Database Administrator, the command file is applied to the target database. The loading of the correction file is performed by the Sharebase VAX SQL utility; the utility parses the statements contained in the correction file and returns a count of the table rows affected in the target database. The Data Engineer would already have tested the corrections on a local copy of the Catalog database but the Database Administrator may elect to test load the correction file against the actual Catalog database.

An example of applying the correction file against the pdscat2 database from the VMS command line follows:

```
$ SQL/input = develop:[idmadmin.catdata.cn]dbupd34.sql pdscat2
```

3.5.3.4 Generating the Database Change Notice (DBCN)

A DBCN is generated and forwarded to the Configuration Management Coordinator that summarizes the results of the database update. The DBCN is usually forwarded by electronic mail. An example of a DBCN for the above correction file example follows.

DATABASE CHANGE NOTICE (DBCN)
*** On-Line Format ***

Date: July 21, 1989
Database: PDSCAT2
Initiator: DBA, Steve Hughes

Notes: You may find the new swinfo.fcd file in
develop:[config.update.dba.runtime]

PFR/ECR No: N/A

Tablename	Updated	Comment
SWINFO	07/21/89	Correct pin software availability flag

-----End of DBCN -----

3.5.4 Data Flow Diagram

This procedure supports the Load Catalog Data segment (F-1.7.5) in DFD 1.7. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

PDS Data Administration Procedure

3.6 Catalog User Update

3.6.1 General Information

A new PDS user must submit specific information to the PDS system before access to or distribution of data set orders can be allowed. A PERSON template (electronic form) is submitted to the DBA for processing and validation (i.e., check for dups, missing data, invalid data). After processing of the PERSON template using the procedures **Template Review**, **Template Validation**, and **Data Loading with SQL**, the DBA must add the user to the access tables in the system database.

The Sharebase DBMS contains two system access tables that store user access codes to individual databases. These tables are fully defined in the *Database Administrators Manual* distributed with the Sharebase DBMS. An entry in each table is required before access to any database is allowed by the DBMS. Only the DBA may enter data into these system tables.

3.6.2 Policy

- (1.) The maintenance of the PDS Catalog database access tables shall be performed by the PDS Database Administrator in accordance with the PDS Data Administration Policies and Procedures.
- (2.) All PDS users must submit a completed PERSON template to the PDS Database Administrator. This template is usually prepared by the PDS System Manager and mailed (electronically) to the DBA.

3.6.3 Procedure

- (1.) Receive and review the completed PERSON template using the procedure **Template Review**.
- (2.) Process the reviewed PERSON template using the procedure **Template Validation**.
- (3.) Correct any errors found in the PERSON template and repeat the **Template Validation** procedure until all errors are corrected.
- (4.) Load the validated user information into the database using the procedure **Data Loading with SQL**.
- (5.) Add the access information to the DBMS system tables using the procedure defined in the Sharebase *Database Administrators Manual*.
- (6.) Send a reply to the PDS System Manager that the new user has been added to the PDS database.

- (7.) Update the Configuration Management Coordinator controlled security file using the procedure Security Management.

An example of the PERSON template follows:

```
/* Template: Personnel Template           Rev: 01/21/89
/* Note:      The following templates form part of a standard set
/*            for the submission of a pds user to the PDS.
/*
/* Hierarchy:  PERSON
/*            PERSINFO
/*            PERSORDER
/*            PERSELECMAIL
/*            PERSINSTN
/*            PERSNODE
/*            PERSMSN
/*            PERSTASK
/*
OBJECT_NAME           = PERSON
PDS_USER_ID          = "JDOE"
```

```
/* Template: Personnel Information Template   Rev: 01/21/89
/* Note:      This template shall be completed for the
/*            pds user id entered in the person template.
/*
OBJECT_NAME           = PERSINFO
FTS_NUMBER            = N/A
FULL_NAME             = "DR. JOHN DOE"
LAST_NAME             = DOE
TELEPHONE_NUMBER     = 2135551212
REGISTRATION_DATE    = 19891019
MAILING_ADDRESS_LINE = "123 ANYSTREET
                       \nCOLLEGETOWN, CA 90123"
END_OBJECT            = PERSINFO
```

```
/* Template: Personnel Order Template       Rev: 01/21/89
/* Note:      This template shall be completed for the
/*            pds user id entered in the person template.
/*            This template stores the default values used
/*            when ordering data sets from the PDS.
/*
OBJECT_NAME           = PERSORDER
BILLING_ADDRESS_LINE = "123 ANYSTREET
                       \nCOLLEGETOWN, CA 909009"
```


PERSONNEL_SHIPPING_CARRIER_NAM = "U.S. MAIL"
PERSONNEL_SHIPPING_ACCOUNT_NUM = N/A
ORDER_PREFERENCE_ID = 1
END_OBJECT = PERSORDER

/* Template: Personnel Electronic Mail Template Rev: 01/21/89

/* Note: This template shall be repeated for each
/* electronic mail address of a pds user.

/*

OBJECT_NAME = PERSELECMAIL
ELECTRONIC_MAIL_ID = JPLPDS:JDOE
ELECTRONIC_MAIL_TYPE = SPAN
PREFERENCE_ID = 1
END_OBJECT = PERSELECMAIL

OBJECT_NAME = PERSELECMAIL
ELECTRONIC_MAIL_ID = JDOE
ELECTRONIC_MAIL_TYPE = NASAMAIL
PREFERENCE_ID = 2
END_OBJECT = PERSELECMAIL

/* Template: Personnel Institution Template Rev: 01/21/89

/* Note: This template shall be repeated for each
/* institution affiliation of a pds user.

/*

OBJECT_NAME = PERSINSTN
PERSON_INSTITUTION_NAME = "UNIVERSITY OF CALIFORNIA"
END_OBJECT = PERSINSTN

/* Template: Personnel Node Template Rev: 01/21/89

/* Note: This template shall be repeated for each
/* node affiliation of a pds user.

/*

OBJECT_NAME = PERSNODE
NODE_ID = N/A
END_OBJECT = PERSNODE

/* Template: Personnel Mission Template Rev: 01/21/89

/* Note: This template shall be repeated for each
/* combination of mission, spacecraft and instrument
/* that a pds user is currently associated with.

/*

OBJECT_NAME = PERSMSN
MISSION_NAME = N/A

```

SPACECRAFT_ID          = N/A
INSTRUMENT_ID          = N/A
EXPERTISE_AREA_TYPE    = N/A
SPECIALTY_DESC         = N/A
ROLE_DESC              = N/A
END_OBJECT             = PERSMSN

```

```

/* Template: Personnel Task Template      Rev: 01/21/89
/* Note:      This template shall be repeated for each
/*            combination of task, expertise and specialty
/*            that a pds user is currently associated with.
/*

```

```

OBJECT_NAME            = PERSTASK
TASK_NAME              = N/A
EXPERTISE_AREA_TYPE    = N/A
SPECIALTY_DESC         = N/A
ROLE_DESC              = N/A
END_OBJECT             = PERSTASK
END_OBJECT             = PERSON

```

(8.) Generate the Database Change Notice(DBCN)

A Database Change Notice (DBCN) shall also be sent to the Configuration Management Coordinator. This notice informs the Configuration Management Coordinator that one or more tables in the database has been updated. The DBCN is described in detail in the Catalog Data Update procedure.

3.6.4 Data Flow Diagram

This procedure supports the Maintain PDS Meta Data segment (F-1.4.5) in DFD 1.4. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

PDS Data Administration Procedure

3.7 Catalog Design Document

3.7.1 General Information

The Planetary Data System (PDS) Catalog Design Document (CDD) defines and describes the logical and physical organization of the PDS science catalog database. The CDD (JPL Document D-1152) is useful to several communities of users, serving as a catalog database reference manual for data suppliers, catalog reviewers, and PDS developers. Since the CDD is relied upon to provide a current description of the physical organization of the catalog database, the document must be periodically regenerated and published in synchronization with PDS Data Dictionary modifications. A subset of the CDD exists as the PDS Data Dictionary Document (JPL Document D-6184).

The CDD is generated from text files (containing narrative), graphics files (containing diagrams), and a group of files (listing the PDS Data Dictionary contents) which are automatically created by Database Administration (DBA) utilities. These DBA utilities are programs written in the "C" programming language, and use the PDS Data Dictionary as input. The utilities are maintained as described in DBA Utilities procedure of this document. The text files and data dictionary files contain embedded commands and macros for the TeX typesetting system. By processing these files with TeX, the CDD is generated with a high-quality, typeset appearance. The graphics files are created and maintained with an Apple Macintosh.

The files which are used to generate the CDD and the DBA utilities which create some of these files are controlled by the PDS Configuration Management Coordinator. Any generation of the CDD or modifications to the CDD files requires that these files be checked out from the Configuration Management Coordinator and subsequently checked back in after processing, as described in the Procedures Appendix of the PDS Software Management Plan (Procedure Maintaining PDS Documents).

3.7.2 Policy

- (1.) The CDD shall be generated subsequent to any major PDS Data Dictionary modification, as determined by the PDS Data Administrator.
- (2.) Reproduction and distribution of the CDD shall be under the control of the PDS Document Coordinator.
- (3.) The CDD shall conform with the practices described in the PDS Writing Conventions And Document Standards document.
- (4.) The Catalog Design Document shall be maintained by the PDS Database Administrator.

3.7.3 Procedure

- (1.) Check out the CDD files from the PDS Configuration Management Coordinator. The CDD files consist of a group of VAX files and a group of graphics files in Apple Macintosh MacDraw format.
- (2.) Log on to the JPLPDS VAX under the account of the Database Administrator.
- (3.) Copy the CDD VAX files from PDS Configuration Management to a working directory with the use of the DCL "copy" command.
- (4.) Move to the working directory with the use of the DCL "set default" command.
- (5.) Type "@ctexfiles" from the DCL prompt. This starts a DCL procedure which runs DBA utilities to produce files containing listings of the data dictionary.
- (6.) Perform any required modifications to the text (narrative) files.
- (7.) Use the VAX T_EX program to process the input files. Type "tex cdd" from the DCL prompt, which produces an output file named "cdd.dvi".
- (8.) T_EX automatically generates a table of contents, creating a file named "toc.tex". This file must be modified as follows:
 - (a.) Using the VAX editor, edit the file named "partx.tex".
 - (b.) Include file "toc.tex" into the edit buffer.
 - (c.) Follow the instructions at the top of file "partx.tex" to reformat the contents of file "toc.tex". The table of contents information will be split into two parts with the use of T_EX macros in the "partx.tex" file.
 - (d.) Write the current edit session out to file "toc.tex" and quit the edit session without saving the results of the edit session. This leaves the "partx.tex" file in its original form for future use, and replaces the "toc.tex" file with the modified table of contents.
- (9.) Use the VAX T_EX program to process the table of contents file. Type "tex btocmake" from the DCL prompt, which produces an output file named "btocmake.dvi". Rename the file to "cddtoc.dvi" with the use of the DCL "rename" command.
- (10.) Use of the T_EX program generates files which contain statistics and error messages. These files are named "cdd.lis" and "btocmake.lis"; they are not required and should be deleted with the use of the DCL "delete" command.
- (11.) To print the T_EX output files on the VAX Imagen Laser Printer, type the following commands from the DCL prompt:

```
print cdd.dvi /queue=imagen
print cddtoc.dvi /queue=imagen
```

Alternatively, the files may be downloaded from the VAX to a microcomputer which contains the **DVILASER** utility and a compatible laser printer and printed there. For a description of this process, refer to the **VAX HELP** facility for a discussion of the **Kermit** utility for file transfer and to the **DVILASER User's Manual** for a discussion of the **DVILASER** utility.

- (12.) Load the graphics files to a Macintosh. Each file contains a single CDD figure, with no page number or figure title. The name of the Macintosh file identifies the figure, i.e. the file named "Fig402" contains CDD Figure 4-02. Use the MacDraw utility to make any required modifications or new files, then print each file. If new figures are created for addition to the CDD, a TeX command must be inserted into the narrative file which refers to the new figure. This TeX command will generate a placeholder page containing the figure title and a page number. The command appears as:

```
\pageinsert\vfil\figure {Figure Title} \endinsert   %% FIGURE 9-9
```

where the title of the figure is indicated by **FIGURE TITLE** and the figure number is indicated by **9-9**. The placement of this TeX command is not precise; it may be placed in proximity to the paragraph which references the figure.

- (13.) Replace the figure placeholder pages created by the TeX output file with the figure pages produced on the Macintosh. The figure title and page number from the TeX pages must be cut and pasted onto the bottom of the Macintosh output pages.
- (14.) Return all CDD files to the PDS Configuration Management Coordinator. This includes the group of VAX files and a Macintosh diskette containing the graphics files.
- (15.) Submit the output to the PDS Documentation Coordinator for inclusion of a signature page, binding, and distribution.

3.7.4 Data Flow Diagram

This procedure supports the Generate CDD segment (F-1.4.4) in DFD 1.4. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

PDS Data Administration Procedure

3.8 Database Schema Updates

3.8.1 General Information

The catalog database physical schema is composed of tables, elements of tables, and indices on elements. Definitions of each table and table-element are contained in one or more data dictionary tables which serve as the text for several documents and the data for several software utilities. The integrity of the database is the ultimate responsibility of the Data Administrator, who shall determine the ramifications of any change to the database schema.

Catalog schema updates shall be initiated by a Database Change Notice (DBCN). A Database Change Notice shall be written because of the new schema requirements described in the Catalog Feasibility Report (Data Set Feasibility Study procedure). The Database Change Notice is described in the procedure Catalog Data Update. After the schema modification is completed, a Catalog Update Completed Notice will be generated and forwarded to the Central Node Data Administrator and Data Engineer. This Catalog Update Completed Notice is a simple electronic mail message informing the Data Engineering Team that a database update has been completed.

Every possible condition cannot be presented in this document and, therefore, only an experienced Database Administration type of person familiar with the PDS Catalog database schema shall modify any portion of the schema or data in the data dictionary tables. This procedure documents, in tabular form, what tables must be updated and includes a brief description of what must be performed by the Central Node Database Administrator, given a schema change approved by the Central Node Data Administrator.

Data Dictionary tables are identified by the two letters DD at the beginning of each table name (e.g. DDCOL, DDTBL). Template tables are identified by the five letters TMPLT at the beginning of each table name. The following is a list of the data dictionary tables with a brief description.

(1.) **ddcol**

This table contains all of the unique element names defined for use in PDS database tables. Not all elements are used at this time, but are reserved for future entity modeling.

(2.) **ddcold**

This table contains the descriptions for each unique element.

(3.) **ddtbl**

This table contains the name of each table that exists.

(4.) **ddtblcols**

This table contains the set of table and element combinations that exist.

(5.) **ddcolstdval**

This table contains sets of standard values and usage codes for each element.

(6.) **ddunitd**

This table contains the unit-of-measure types.

(7.) **dduv**

This table contains the name of each user view.

(8.) **dduvsd**

This table contains the user view description.

(9.) **dduvhier**

This table contains the categories of users view names in menu sequence.

(10.) **dduvsatgry**

This table contains the names of the categories of user views.

(11.) **ddquery**

This table contains the name of each query (eg. Stored Command).

(12.) **ddqueryparm**

This table contains the set of query name , user view name , table name, and element name combinations used by software to paint the User Interface screens.

(13.) **tmplt**

This table contains the name of each template.

(14.) **tmpltd**

This table contains the description of each template.

(15.) **tmplthier**

This table contains the hierarchy of template names contained in a template set.

(16.) **tmpltattr**

This table contains the set of template name, table name, and element name combinations used for each template.

3.8.2 Policy

- (1.) The maintenance of the PDS Catalog database schema shall be performed by the Central Node Database Administrator. A database schema change requires an Engineering Change Request and/or a Problem Failure Report. An ECR must be approved by the Change Control Board.
- (2.) A Database Change Notice must be submitted and approved by the Central Node Data Administrator prior to any schema change. All Database Change Notices shall be kept on file by the Central Node Data Administrator.
- (3.) A Catalog Design Document and a Data Dictionary Document shall be generated after the schema change using the Catalog Design Document and Data Dictionary Document procedures.
- (4.) A Catalog Update Completed Notice will be generated and forwarded to the Central Node Data Administrator after the schema change is implemented.

3.8.3 Procedure

The following procedures are grouped into the following categories; (1) Elements (2) Tables (3) Indexes (4) User Views and (5) Templates. Each category includes an Add, Modify (optional) and Delete section. For each Add, Modify or Delete section, a table is listed with three (3) columns.

- (1.) The first column lists the cause or source of the change.
- (2.) The second column lists which tables may be affected.
- (3.) The third column is a brief description of the action to be taken by the Central Node Database Administrator.

A question mark following the description indicates that a decision by the Central Node Database Administrator is required based on the circumstances.

The term "entry" in the description column refers to one or more rows in a table.

3.8.3.1 Elements

- (1.) Add a new element

(Source)	Table(Dest.)	Action by Database Administrator
element	ddcol	Add entry
	ddcold	Add entry for each line of text
	ddcolstdval	Add entry for each standard value
	ddtblcols	Add entry for each table affected
	ddunitd	Add entry

- (2.) Modify existing element

(Source)	Table(Dest.)	Action by Database Administrator
element	ddcol	Modify entry?
	ddcold	Modify text entries?
	ddtblcols	Modify table element entries?
	ddunitd	Modify entry?

(3.) Delete existing element

(Source)	Table(Dest.)	Action by Database Administrator
element	ddcol	Delete entry
	ddcold	Delete text entries
	ddtblcols	Delete entries
	ddtblstdval	Delete entries
	ddunitd	Delete entry

3.8.3.2 Tables

(1.) Add a new table

Table(Source)	Table(Dest.)	Action by Database Administrator
table	ddtbl	Add entry
	ddtbl	Add entry for each line of text
	ddtblcols	Add entry for each table element
	tmpltattr	Add entry for each table element

(2.) Modify an existing table

Whenever a table is modified, the existing data in the table are unloaded, the existing table is deleted, the new table is created and the data are reloaded. Stored Commands that use the table being modified must be dropped prior to the table removal and loaded after the table is built. Any indices must also be created. All indices are listed in the table: DDTBLCOLS.

(Source)	Table(Dest.)	Action by Database Administrator
table	ddtbl	Modify entry?
	ddtbl	Modify text entries?
	ddtblcols	Modify entries?
	tmpltattr	Modify entries?

(3.) Delete existing table

Stored Commands that use the table being modified must be dropped prior to the table removal.

(Source)	Table(Dest.)	Action by Database Administrator
table	ddtbl	Delete entry
	ddtbl	Delete entries
	ddtblcols	Delete entries
	tmpltattr	Delete entries

3.8.3.3 Indexes

(1.) Add a new index

(Source)	Table(Dest.)	Action by Database Administrator
index	N/A	Create index
	ddtblcols	Modify entry
	tmpltattr	Modify entry

(2.) Delete an existing index

(Source)	Table(Dest.)	Action by Database Administrator
index	N/A	Drop index
	ddtblcols	Modify entry
	tmpltattr	Modify entry

3.8.3.4 User Views

User Views are implemented using Stored Commands loaded onto the PDS Catalog database. A User View may be implemented using one or more Stored Commands in future versions of the PDS Catalog.

(1.) Add a new user view

(Source)	Table(Dest.)	Action by Database Administrator
userview	ddiv	Add entry
	ddivd	Add text entries
	ddivhier	Add entry
	ddivcatgry	Add entry
	ddquery	Add entry
	ddqueryparm	Add entries

(2.) Modify an existing user view

(Source)	Table(Dest.)	Action by Database Administrator
userview	ddiv	Modify entry?
	ddivd	Modify text entries?
	ddivhier	Modify entry?
	ddivcatgry	Modify entry?
	ddquery	Modify entry?
	ddqueryparm	Modify entries?

(3.) Delete existing user view

(Source)	Table(Dest.)	Action by Database Administrator
userview	ddiv	Delete entry
	ddivd	Delete text entries
	ddivhier	Delete entry
	ddivcatgry	Delete entry
	ddquery	Delete entry
	ddqueryparm	Delete entries

3.8.3.5 Templates

(1.) Add a new template

(Source)	Table(Dest.)	Action by Database Administrator
template	tmplt	Add entry
	tmpltd	Add text entries
	tmplthier	Add entry
	tmpltattr	Add entries

(2.) Modify an existing template

(Source)	Table(Dest.)	Action by Database Administrator
template	tmplt	Modify entry?
	tmpltd	Modify text entries?
	tmplthier	Modify entry?
	tmpltattr	Modify entries?

(3.) Delete existing template

(Source)	Table(Dest.)	Action by Database Administrator
template	tmplt	Delete entry
	tmpltd	Delete text entries
	tmplthier	Delete entry
	tmpltattr	Delete entries

3.8.4 Data Flow Diagram

This procedure supports the Enhance Catalog Schema segment (F-1.4.3) in DFD 1.4. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

PDS Data Administration Procedure

3.9 Catalog Standard Values

3.9.1 General Information

The PDS science community has identified all database elements for which a standard list of values should be given. This procedure maintains these elements and the set of associated values. Additionally, it maintains a standard value type which defines the set of associated values as being either a list of values, a range, a formation rule, a definition, or text and indicates how the set may be updated.

Standard values have a dual purpose in the PDS catalog. They are used to provide current available values in the catalog to help the user constrain their searches, and to support the Data Supplier in filling out their catalog templates for submission of a PDS data set.

3.9.2 Policy

The PDS catalog standard values shall be maintained by the PDS Database Administrator.

3.9.3 Procedure

3.9.3.1 Data Dictionary Tables

Support for the maintenance of the standard values are provided by two Data Dictionary tables and the Database Referential Integrity (RI) utility. Please refer to the Database Referential Integrity Procedure to determine when the utility is executed.

The data dictionary table, `ddcol`, provides a standard value type (`stdvaltype`) for each data element. It shall be necessary to maintain this field when new elements are added, TBDs become active elements or if a change is required. The definition of the types are as follows:

(1.) STATIC

The list of values may not be updated, although the Central Node can do so. For example, the element `detailed_catalog_flag` has static standard values "Y" or "N" suggesting whether or not detailed catalog information exists for a data set.

(2.) DYNAMIC

The list of values may be updated, however, an update will have to be approved during the Peer Review Procedure before it can be applied to the Standard Values list. For example, the element `instrument.id` had a dynamic standard value of "VIS" for imaging instruments. The data suppliers for the Image Peer Review needed to

uniquely identify two cameras on the spacecraft. This required the addition of "VISA" and "VISB" denoting cameras A and B.

(3.) SUGGEST

The list of values may be updated without approval by the Peer Review Committee. For example, the element `role_desc` has suggested standard values such as "TEAM LEADER" but the data supplier will be allowed to add his own specific role if not represented.

(4.) RANGE

This is for elements that require either a floating point or integer value. The value has the single requirement that it be within a specified range and in the specified unit. For floating point type elements, these ranges and units are included in the MINIMUM/MAXIMUM list located in the *Data Dictionary* document. For integer type elements not listed here, these ranges are the limits of the system. For this system these limits are -32768 and 32767 for small integer and -2147483648 and 2147483647 for integer.

(5.) FORMATION

This is for elements that require values to conform to a formation rule; (all date/time elements such as `event_start_time`). These formation rules are listed in the Science Standards section of the PDS *Data Submission Standards and Procedures* document. These rules were determined by the Data Design Team.

(6.) DEFINITION

Standard values for this type need only to conform to the Data Dictionary definition of the element; e.g. `full_name`.

(7.) TEXT

Designates repeating description elements; e.g. `data_set_description`.

(8.) TBD

This is when an element is not currently being used in the catalog design and has not been analyzed as to what type of standard values will be associated with it. In this case, there should not be an entry for this element in the `ddcolstdval` table.

The other data dictionary table, `ddcolstdval`, maintains the standard values and shall be updated when ingesting a PDS data set. The elements of the table are as follows:

(1.) blname

The terse name of the data element.

(2.) colval

The standard value for the data element. If the value is TBD, this means the element does not have any associated values due to i) not currently being used in the catalog or ii) data has not been ingested for it yet.

(3.) colvalnodeid

The discipline node for which the value is available:

- (a.) A - Atmospheres
- (b.) C - Central
- (c.) F - Fields and Particles (F&P)
- (d.) I - Image
- (e.) N - Naif
- (f.) R - Radiometry
- (g.) S - Spectroscopy
- (h.) U - Unknown

The "Unknown" value is only valid for a possible value where the the provider is unknown. Once the value is used by a particular node it becomes available in the catalog and this table shall be updated.

Since it is possible that more than one node can have the same available data value; e.g. targname = JUPITER is valid for NAIF and F&P, the colvalnodeid is just a concatenation of F and N. This is to minimize the number of tuples. Additionally, these values are maintained in alphabetical order and does not affect the searches against this field.

(4.) colvaltype

Indicates if the value is an available (A) value in the database or a possible value (P) that is not yet being used in the catalog.

(5.) outputflag

This Y/N flag indicates if the standard value is included in the standard value report which resides in the Catalog Design Document and Data Dictionary Document.

Context Sensitivity Scheme

The colvalnodeid field is also used to support context sensitivity between the High level (General Science) Catalog, and the Fields and Particles, and Image Detailed level catalogs. That is, there needs to be a distinction of which available values are valid in which catalog. The user interface uses colvalnodeid and another data dictionary table, ddquery, to determine which values will be displayed in the "help select" list. The table ddquery support s this scheme through its querycontext element. For each user view, a code identifying its context (H - High, F - F&P, I - Image) is maintained in this field.

For example, a "help select" on the targname field in the F&P Detailed level catalog Target and Time Related Data Quality user view should only display targets which PDS has F&P data for. The target names that are valid for other disciplines should not be visible at this level.

3.9.3.2 Maintenance

When a data set is being ingested for Peer Review, the PDS loader produces a report that will list any data values that it could not verify against the existing standard values in the Peer Review catalog. This report shall be reviewed by the Data Engineer for approval of loading into the catalog. Some of these standard values will be reviewed at the Peer Review. Additionally, the RI utility will be executed and the new standard values loaded into the Peer Review catalog to support the review of the data set. Note that the standard values are not loaded into the PDS catalog until a data set has passed the Peer Review.

Once a data set has been approved for ingestion into PDS by the Peer Review, the RI utility will again be executed. An optional output of the RI utility is to produce a standard values load file (stdval.dat). This file contains the values for the fields in the ddcoldval table. This file shall be reviewed by the DE, who shall then proceed with the Manual Procedures.

As an example, a partial load file for the MAWD instrument catalog data which was provided by the Atmospheres Discipline Node follows:

```
instid;MAWD;U;A;Y;
instname;MARS ATMOSPHERIC WATER DETECTOR;U;A;Y;
detid;CH1;U;A;Y;
detid;CH2;U;A;Y;
detid;CH3;U;A;Y;
detid;CH4;U;A;Y;
detid;CH5;U;A;Y;
detype;PBS;U;A;Y;
elecsid;MAWD;U;A;Y;
filtnum;N/A;U;A;Y;
filtnum;N/A;U;A;Y;
filtnum;N/A;U;A;Y;
filtnum;N/A;U;A;Y;
filtnum;N/A;U;A;Y;
tlscpid;MAWD;U;A;Y;
sectid;MAWD;U;A;Y;
scanmodeid;N/A;U;A;Y;
instparmname;RADIANCE_CHANNEL_1;U;A;Y;
instparmname;RADIANCE_CHANNEL_2;U;A;Y;
instparmname;RADIANCE_CHANNEL_3;U;A;Y;
instparmname;RADIANCE_CHANNEL_4;U;A;Y;
instparmname;RADIANCE_CHANNEL_5;U;A;Y;
instmodeid;WAVELENGTH_SCANNING;U;A;Y;
gainmodeid;UNK;U;A;Y;
```

datapathtype;UNK;U;A;Y;

3.9.3.3 Manual Procedures

The Data Engineer who is responsible for the ingestion of a given data set and therefore is familiar with the catalog data being submitted shall perform the following manual procedures:

- (1.) The Data Engineer shall review the stdval.dat file, particularly the colvalnodeid field. Modifications to this field shall be necessary because currently the RI utility sets the colvalnodeid value to "U". This value shall be updated to reflect the correct discipline of the data set. This is a temporary situation, and shall be resolved when the utility is updated to request this information at runtime.

Sometimes there will be values that are designated as unknowns (UNK) or not applicable (N/A). The N/A value is acceptable as a standard value, however UNK is not. Therefore, the Data Engineer shall delete any records in the load file containing UNK as a standard value.

The following example is the load file that appeared above but has now been modified accordingly: The colvalnodeid has been changed from "U" to "A" (Atmospheres), and the last two records that had UNK values have been removed.

```
instid;MAWD;A;A;Y;
instname;MARS ATMOSPHERIC WATER DETECTOR;A;A;Y;
detid;CH1;A;A;Y;
detid;CH2;A;A;Y;
detid;CH3;A;A;Y;
detid;CH4;A;A;Y;
detid;CH5;A;A;Y;
detype;PBS;A;A;Y;
elecsid;MAWD;A;A;Y;
filtname;N/A;A;A;Y;
filtnum;N/A;A;A;Y;
filttype;N/A;A;A;Y;
tlscpid;MAWD;A;A;Y;
sectid;MAWD;A;A;Y;
scanmodeid;N/A;A;A;Y;
instparmname;RADIANCE_CHANNEL_1;A;A;Y;
instparmname;RADIANCE_CHANNEL_2;A;A;Y;
instparmname;RADIANCE_CHANNEL_3;A;A;Y;
instparmname;RADIANCE_CHANNEL_4;A;A;Y;
instparmname;RADIANCE_CHANNEL_5;A;A;Y;
instmodeid;WAVELENGTH_SCANNING;A;A;Y;
```

The Data Engineer shall create a database update file containing the stdval.dat file. The Data Engineer shall then test this database update file on the Data Engineering Team local copy of the PDS catalog, then send the file to the PDS Database Administrator to apply to the PDS catalog. Since this file is a load file, it is tested and applied to the database by use of the ShareBase IFCOPY command on our system with an associated format file, an example follows:

```
/* FORMAT FILE */
```

```
record
  blname      text      to semi;
  colval      text      to semi;
  colvalnodeid text      to semi;
  colvaltype  text      to semi;
  outputflag  text      to semi;
end
```

```
/* IFCOPY COMMAND */
```

```
ifcopy in pdsdatabase /format = 'ddcolstdval.fmt' /data = 'stdval.dat'
```

- (2.) The Data Engineer shall also review the RI utility report. This is helpful in finding any inconsistencies. For example, when a new instrument identifier (instid) is added, the instrument identifier or name (instidname) element also needs this new value added to its associated list of values.
- (3.) The Data Engineer shall check if any of the standard values for a given data set already exist as available values in the catalog. If this is the case then the Data Engineer shall modify the colvalnodeid field, as discussed above, to reflect all disciplines using the value.
- (4.) The Data Engineer shall check if any of the standard values for a given data set previously existed as possible values in the catalog. If this is the case then the Data Engineer shall code a database update to remove the entry for the value as possible. The stdval.dat file will then insert the value as available.

To assist in the implementation of the above procedures 3 and 4, the Data Engineer will need to have a current standard values report. This report shall be generated by the Database Administrator. The generation of this report is discussed at the end of this procedure.

The Data Engineer shall create a database update file for updates due to manual procedures 3 and 4. The Data Engineer shall then test this database update file on the Data Engineer Team local copy of the PDS catalog, then send the file to the PDS Database

Administrator to apply to the PDS catalog. Please refer to the Catalog Data Updates Procedure for details.

3.9.3.4 Generation of Standard Values Report

An alphabetical listing of all standard values is generated using an extracted delimited ASCII file as input to a PC/MSDOS Reflex database. This extract file is created with a C program that runs on the Vax called `stdvaldmp.c`. This program, when executed, creates a delimited file of standard values from the PDS data dictionary tables, that is down loaded to the PC/AT and loaded in the Reflex database `stdval`. Reflex2 is a report writer that has a pre-defined format named `stdval` which is used to generate the report. A sample of the report is contained in this procedure. This report is used internally by the Data Engineering Team and use by anyone outside of the PDS Data Engineering Team is not supported. The official standard values list is contained in the *Catalog Design* and *Data Dictionary* documents.

3.9.4 Data Flow Diagram

This procedure supports the Load Catalog Data segment (F-1.7.5) in DFD 1.7. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

Blname	Stdvaltype	Colval	Colvalnodeid	Colvaltype
browseflag	STATIC	N	F	A
		Y	F	A
chnlgrpname	DYNAMIC	FAR ENCOUNTER	F	A
		FAR-NEAR ENCOUNTER	F	A
		NEAR ENCOUNTER	F	A
crdsysname	DYNAMIC	JUPITER MINUS SYSTEM III	F	A
		PLANET CENTERED CYLINDRICAL	F	A
		SATURN MINUS LONGITUDE SYSTEM	F	A
		URANUS MINUS LONGITUDE SYSTEM	F	A
datapathtype	DYNAMIC	N/A	U	A
		REALTIME	AFR	A
		RECORDED DATA PLAYBACK	F	A
discname	STATIC	ATMOSPHERES	C	A
		GEOSCIENCES	C	A
		PLASMA INTERACTIONS	C	A
		RADIOMETRY	R	A
		SMALL BODIES	C	P
dsidname	FORMATION	EAR-A-8CPS-3-RDR-8COL-V1.0	I	A
		EAR-A-DBP-3-RDR-26COL-V1.0	I	A
		EARTH ASTEROID 8CPS SURVEY REFLECT SPECTRA V1.0	I	A
		EARTH ASTEROID DBP CALIB 26COL SURVEY REFLECT SPECTRA V1.0	I	A
		MR6/MR7 MARS INFRARED SPECTROMETER CALIBRATED DATA V1.0	R	A
		MR6/MR7-M-IRS-3-V1.0	R	A
		MR9/VO1/VO2 MARS IMAGING SCIENCE SUBSYSTEM/VIS 5 CLOUD V1.0	A	A
		MR9/VO1/VO2-M-ISS/VIS-5-CLOUD-V1.0	A	A
		VG1-J-6-SPK-V1.0	N	A
		VG1-J-LECP-4-15MIN	F	A
		VG1-J-LECP-4-BR-15MIN	F	A
		VG1-J-MAG-4-1.92SEC	F	A
		VG1-J-MAG-4-48.0SEC	F	A
		VG1-J-MAG-4-9.60SEC	F	A
		VG1-J-PLS-5-ION-MOM-96.0SEC	F	A
		VG1-J-PLS/PRA-5-ELE-MOM-96.0SEC	F	A
		VG1-J-POS-4-48.0SEC	F	A
		VG1-J-PWS-2-SA-4.0SEC	F	A
		VG1-J-PWS-4-SA-48.0SEC	F	A
		dsinstparm	DYNAMIC	1.4 MICROMETER BRIGHTNESS
ATMOSPHERIC PRESSURE	A			A
ATMOSPHERIC TEMPERATURE	A			A
ATOMIC NUMBER (Z)	F			A
BRIGHTNESS	U			P
BRIGHTNESS TEMPERATURE	AR			A
BRIGHTNESS TEMPERATURE STANDARD DEVIATN	A			A
CLOUD COUNT	A			A
CLOUD TYPE	A			A
COLUMN WATER ABUNDANCE	A			A
DATA NUMBER	I			A
DERIVATIVE OF MODEL WITH ALBEDO	R			A
DERIVATIVE OF MODEL WITH INERTIA	R			A
ELECTRIC FIELD COMPONENT	F			A
ELECTRIC FIELD INTENSITY	F			A
ELECTRIC FIELD SPECTRAL DENSITY	F			A
ELECTRIC FIELD VECTOR	F			A

Figure 3-1: Sample Standard Values Report

PDS Data Administration Procedure

3.10 Data Audit

3.10.1 General Information

The Planetary Data System (PDS) catalog database contains system operations data, as well as science catalog data describing planetary data sets. The operations data support the functions of data set ordering and customer support and are updated frequently. The catalog data are updated periodically to include peer reviewed data which describe new PDS data sets. Due to this volatile nature of the catalog database, it is necessary to be able to save (backup or dump) and recover (load or restore) the database. The reproducibility of the catalog and supporting databases supports the PDS Configuration Management function and provides a basis for disaster recovery should a database or the database server, suffer damage or destruction.

The PDS Version 1.0 catalog is implemented on a Sharebase/700 database server. The database server is administered through the use of a collection of Sharebase utilities which operate in the VAX/VMS client (computer) environment. The SQL (Structured Query Language) utility provides the capability to access and modify database information. The SQL Audit command allows examination of all transactions performed on any database table which has active transaction logging (transaction logging may be switched on or off at any time for any table). The transaction information returned by the use of the Audit command includes the time of the update, the user responsible for the update, the type of update (deletion, modification, insertion, etc.), and all values in the table row. In the case of modification to an existing table row, transaction information is returned for both the original row and the updated row (allowing examination of "before" and "after" rows). All transactions against database tables with active transaction logging are stored in the `transact` system table in that database. Performing a database dump will write the contents of the `transact` system table out to a file and truncate (delete all rows from) the table. Refer to the Sharebase VAX/VMS Command Summary Manual for details of database dumping (`Idmdump` command) and to the Sharebase SQL Reference Manual for details of the SQL utility (`Alter Table` and `Audit` commands).

The ability to modify any table in the PDS catalog is triggered by a System table flag maintained by the Central Node Database Administrator. Under normal conditions, only the Database Administrator may write or delete information in any table with the exception of the few stored commands that support the Order Data function. This Audit procedure is one option that the Database Administrator may use to determine if a table has been modified. As each backup destroys the transaction log, this procedure must be run prior to any backup using `IDMDUMP`, or the transaction history is lost.

3.10.2 Policy

Auditing catalog database tables shall be performed by the Central Node Database Administrator.

3.10.3 Procedure

The SQL Audit command must be used on a single database table at a time. Before attempting to Audit a table, verify that transaction logging is active for the table with the use of the *rels* system stored command. The Audit information may be returned to the screen or inserted into a new table. It is recommended that the Audit information be returned into a new table so that it may be examined repetitively with SQL commands; depending on the size of the *transact* table the Audit command may require a lengthy period of time to complete and it is not feasible to repetitively Audit the same table. Returning the Audit information to a new table is accomplished with use of the *Audit Into* version of the Audit command.

- (1.) Log on to the JPLPDS VAX under the account of the Database Administrator.
- (2.) Type "sql" from the DCL prompt.
- (3.) Type "open *databasename*" from the SQL prompt. *Databasename* specifies the name of the database which contains the table(s) to be Audited.
- (4.) Type "start *rels*" from the SQL prompt to determine if the table to be Audited has active transaction logging. If the *logging* column indicates *Logged*, transaction logging is active for the table. If the *logging* column indicates *Not Logged*, logging is inactive and this procedure is not applicable. To activate transaction logging for the table to Audit future transactions at a later time, refer to the SQL Reference Manual, *Alter Table* command.
- (5.) Type "Audit into *tablename* * from *transact* where *relicid*=*table.id*('Audit-table)" from the SQL prompt. *Tablename* indicates the name of a temporary table into which the Audit information is returned. "Audit-table" indicates the name of the table which is being Audited, and it must be surrounded by double quote marks.
- (6.) Examine the contents of the temporary table which contains the Audit information with the use of the SQL *Select* command.
- (7.) Optionally destroy the temporary table by typing "drop *tablename*" from the SQL prompt. *Tablename* specifies the name of the temporary table.
- (8.) Type "exit" from the SQL prompt.

3.10.4 Data Flow Diagram

This procedure supports the Maintain PDS Meta Data segment (F-1.4.5) in DFD 1.4. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

PDS Data Administration Procedure

3.11 Data Dictionary Document

3.11.1 General Information

The Planetary Data System (PDS) *Data Dictionary* document (DD) defines and describes the physical organization of the PDS science catalog database. The DD (JPL Document D-6184) is useful to several communities of users, serving as a catalog database reference manual for data suppliers, PDS developers, and developers of similar science data systems. Since the DD is relied upon to provide a current description of the physical organization of the catalog database, the document must be periodically regenerated and published in synchronization with PDS data dictionary table modifications. The Data Dictionary Document exists as a subset of the PDS Catalog Design Document (JPL Document D-1152); both documents shall be generated simultaneously using the **Catalog Design Document** procedure.

The DD is generated from text files (containing narrative) and a group of files (listing the contents of the PDS data dictionary tables) which are automatically created by Database Administration (DBA) utilities. These DBA utilities are programs written in the VAX "C" programming language, and use the PDS data dictionary tables as input and creates T_EX encoded output files. The utilities are maintained as described in the **DBA Utilities** procedure. The text files and T_EX encoded data dictionary files contain embedded commands and macros for the T_EX typesetting system. By processing these files with TeX, the DD is generated with a high-quality, typeset appearance.

The files which are used to generate the *Data Dictionary* document and the DBA utilities which create some of these files are controlled by the PDS Configuration Management Coordinator. Any generation of the DD or modifications to the DD files requires that these files be checked out from the Configuration Management Coordinator and subsequently checked back in after processing, as described in the Procedures Appendix of the PDS Software Management Plan (Procedure Maintaining PDS Documents).

3.11.2 Policy

- (1.) The Data Dictionary shall be generated subsequent to any major PDS data dictionary table modification, as determined by the PDS Data Administrator.
- (2.) Reproduction and distribution of the DD shall be under the control of the PDS Document Coordinator.
- (3.) The DD shall conform with the practices described in the **PDS Writing Conventions And Document Standards** document.
- (4.) The *Data Dictionary* document shall be maintained by the PDS Central Node Database Administrator.

3.11.3 Procedure

- (1.) Check out the DD files from the PDS Configuration Management Coordinator. The DD files consist of a group of VAX files.
- (2.) Log on to the JPLPDS VAX under the account of the Database Administrator.
- (3.) Copy the DD VAX files from PDS Configuration Management to a working directory with the use of the DCL "copy" command.
- (4.) Move to the working directory with the use of the DCL "set default" command.
- (5.) Type "@ctexfiles" from the DCL prompt. This starts a DCL procedure which runs several DBA utilities to produce T_EX files containing listings of the data dictionary.
- (6.) Perform any required modifications to the text (narrative) files.
- (7.) Use the VAX T_EX program to process the input files. Type "tex datadict" from the DCL prompt, which produces an output file named "datadict.dvi".
- (8.) T_EX automatically generates a table of contents, creating a file named "toc.tex". Use the VAX T_EX program to process this file. Type "tex btocmake" from the DCL prompt, which produces an output file named "btocmake.dvi". Rename the file to "ddtoc.dvi" with the use of the DCL "rename" command.
- (9.) Use of the T_EX program generates files which contain statistics and error messages. These files are named "datadict.lis" and "btocmake.lis"; they are not required and should be deleted with the use of the DCL "delete" command.
- (10.) To print the T_EX output files on the VAX Imagen Laser Printer, type the following commands from the DCL prompt:

```
print datadict.dvi    /queue=imagen
print ddtoc.dvi      /queue=imagen
```

Alternatively, the files may be downloaded from the VAX to a microcomputer, which contains the Dvilaser utility and a compatible laser printer, and printed there. For a description of this process, refer to the VAX HELP facility for a discussion of the Kermit utility for file transfer and the Dvilaser User's Manual for a discussion of the Dvilaser utility.

- (11.) Return all DD files to the PDS Configuration Management Coordinator.
- (12.) Submit the output to the PDS Documentation Coordinator for inclusion of a signature page, binding, and distribution.

3.11.4 Data Flow Diagram

This procedure supports the Generate CDD segment (F-1.4.4) in DFD 1.4. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

PDS Data Administration Procedure

3.12 Data Replication Management

3.12.1 General Information

A major component of the Planetary Data System (PDS) is the Central Node catalog database which serves as a repository for planetary meta-data. The meta-data support the access, identification, analysis, and distribution of planetary data. Analogous to the Central Node catalog database are Discipline Node catalog databases, existing at some but not all of the PDS Discipline Nodes. These Discipline Node catalog databases contain primarily detailed-level catalog information which is specific to a single planetary discipline, yet they also may contain some high-level catalog information which co-exists with that in the Central Node catalog database. For the sake of PDS integrity, this replicated data must be consistent.

The Version 1.0 catalog database is implemented on a Sharebase/700 database server. The Discipline Nodes may use other Relational Database Management Systems (RDBMS) to implement their Discipline Node catalog database, so it may not always be possible to store replicated data in an identical state. In general, the replicated data residing at the Discipline Node will represent a subset of related information residing at the Central Node. The intent of data replication management is to ensure that the general content of the replicated catalog information which resides at the Discipline Node is an extraction or reasonable representation of the catalog information which resides at the Central Node. Since the catalog information at the Central Node has been approved through a Peer Review process, the check for data consistency shall occur against the replicated data at the Discipline Node.

3.12.2 Policy

Management of data replication shall be managed by the PDS Database Administrator in conjunction with the Discipline Node Database Administrators.

3.12.3 Procedure

Perform the following steps to ensure data consistency between the Central Node and Discipline Node catalog databases:

- (1.) Following Peer Review approval of information for a data set, send a copy of that catalog information to the Discipline Node. This copy may be in the form of an ASCII flat file containing delimited fields, files containing completed templates, or files containing Structured Query Language (SQL) insert commands, depending on the RDBMS in use by the Discipline Node. The files sent to the Discipline Node are identical to those used to load the Central Node catalog database.
- (2.) The Discipline Node will use the file(s) to extract whatever information they wish to ensure consistency between the Central Node and the Discipline Node catalog database. If the information is to be loaded into the Discipline Node catalog database from the Central Node catalog data, either an abstraction, an extraction, or a verbatim copy of the Central Node information may be used.

3.12.4 Data Flow Diagram

This procedure supports the Update TN Data Inventory segment (F-2.4.3) in DFD 2.4. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

PDS Data Administration Procedure

3.13 Data Set Archive Build

3.13.1 General Information

All data sets which have been accepted by the appropriate peer review committee are stored as archives at the National Space Science Data Center (NSSDC) and the Discipline Node. The actual archive package is prepared by the Discipline Node and sent by it to the NSSDC. The NSSDC Archive Receipt is sent to the Discipline Node and a copy forwarded to the Central Node. It is the responsibility of the Central Node Data Administrator to monitor this process and ensure that it is completed.

The contents of the submitted archive package include several items which are necessary to identify and catalog the data at NSSDC, as well as the PDS-approved data set which is being submitted to the archives. These items are described in the procedure below.

3.13.2 Policy

- (1.) All peer reviewed data sets shall be archived at the NSSDC by the Discipline Node upon receipt of the Notice to Archive Data from the Central Node Data Administrator.
- (2.) The Discipline Node is responsible for the generation of the NSSDC Archive Package described in this procedure.

3.13.3 Procedure

This procedure begins when the appropriate peer review committee has approved a submitted data set for inclusion in the PDS and has so notified the Central Node Data Administrator and the Discipline Node has received the Notice to Archive Data memorandum. The following steps outline the process which shall be followed to build the NSSDC Archive Package:

- (1.) The data set shall be copied and the original data set shall be sent to the NSSDC as part of the archive package (NSSDC Archive Package). This package shall consist of the following items:

Data sets generated on VAX machines using VMS should be copied with the COPY utility and not the BACKUP utility, to ensure portability. Also, if blocking is used, the block size should be an integral multiple of the record size.

(a.) Directory Interchange Format

The Directory Interchange Format (DIF) shall be used to exchange information between the PDS and the NASA Master Directory. In general, the format consists of a number of fields which describe the attributes of a directory entry (the archive data set) and a text block which is a descriptive summary of the directory entry.

The format of the DIF is detailed in *Guidelines for Submitting Data to the National Space Science Data Center* document. An example appears in Appendix C.

DIFs are prepared by the Central Node using an automated DIF generator.

(b.) Science Data Set

The Science Data Set consists of the following items which are described in more detail in the *PDS Standards for the Preparation and Interchange of Data Sets* document.

(i.) The Data Set Data Unit

The Data Set Data Unit contains the Standard Format Data Unit (SFDU) registration id. This id contains information to identify a data set according to a fixed and documented standard. The Data Set Data Unit also contains a label for the data unit, and the data unit itself. The data unit consists of data objects and their associated labels.

(ii.) Data Set Documentation

Any documentation which has been approved by the peer review committee as part of the submitted data set is included as part of the Science Data Set.

(c.) NSSDC Archive Administrative Material

The NSSDC needs certain general information to enable them to add the PDS-approved data set to their archives. Currently, this material consists of the two (2) NSSDC AIM forms. The forms numbers are AIMDM-1 and AIMDF-1.

3.13.4 Reference Documents

- (1.) *Guidelines for Submitting Data to the National Space Science Data Center*; NSSDC/WDC-A R&S 84-19; July, 1984.
- (2.) *Planetary Data System Standards for the Preparation & Interchange of Data Sets Document*; PDS Science Management and Project Engineering Team; JPL D-4683; Version 1.0.

3.13.5 Data Flow Diagram

This procedure supports the Build NSSDC Archive Data Set (F-2.7.4) segment in DFD 2.7. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

PDS Data Administration Procedure

3.14 Data Set Feasibility Study

3.14.1 General Information

The PDS is an evolving distributed database system that will continue to accept new data sets as they become available. The impact of accepting new data sets into the existing database schema must be determined which shall include resources necessary to accommodate new data.

3.14.2 Policy

- (1.) Whenever a Data Set Proposal is received from a Discipline Node, a feasibility study shall be conducted by the PDS Data Administrator (DA) to determine the impact on the PDS Version 1.0 catalog database schema.
- (2.) The results of the study shall be summarized in a Catalog Feasibility report. This report shall be forwarded to the Discipline Node which initiated the Data Set Proposal.

3.14.3 Procedure

- (1.) Review the Data Set Proposal in detail.
- (2.) Prepare the Catalog Feasibility Report.

The Catalog Feasibility Report shall contain the following information for each data set listed in the Data Set Proposal:

- (a.) Data Set Name
 - (b.) Brief description of changes necessary to accommodate the new data set.
 - (c.) Itemized task list with resource requirements for each task, and a schedule for performing the tasks.
 - (d.) Itemized list of new database schema tables and elements.
 - (e.) Itemized list of new user views (if any)
 - (f.) Itemized list of any menu changes (if any)
- (3.) Forward the Catalog Feasibility Report to the Discipline Node that submitted the Data Set Proposal.

3.14.4 Data Flow Diagram

This procedure supports the Perform Catalog Feasibility Study segment (F-1.4.1) in DFD 1.4. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

PDS Data Administration Guideline

3.15 Data Set Proposal

3.15.1 General Information

Accepting new data sets into the PDS requires a cooperative effort between the Discipline Node and the Data Supplier as well as between the Discipline Node and the Central Node. The process of accepting new data sets begins with a Request to Submit Science Data memorandum being generated by the Data Supplier and received by the Discipline Node. The Discipline Node and the Data Supplier then generate a Data Set Proposal which is forwarded to the Central Node for study. The results are returned to the Discipline Node in the form of a Catalog Feasibility Report. At this point, the Request to Include Data notice is generated by the Discipline Node and forwarded to the Central Node Data Administrator. This notice officially initiates the new data set ingestion process.

3.15.2 Policy

- (1.) A Data Set Proposal shall be generated by the Discipline Node and forwarded to the Central Node Data Administrator. The contents of this proposal are listed in the guidelines below.
- (2.) A Request to Include Data notice shall be generated by the Discipline Node and forwarded to the Central Node Data Administrator. The contents of this notice are listed in the guidelines below.

3.15.3 Guidelines

The Data Supplier shall send a Request to Submit Science Data to the specified PDS Discipline Node for the PDS data set. Then the Discipline Node assembles the Data Set Proposal incorporating information from the request and a listing of pre-prioritized data sets and forwards the proposal and listing to the Central Node Data Administrator along with a list of the prioritized data sets.

The Data Set Proposal may contain some or all of the following list of items. It should be noted that some of this information may not be available until the Peer Review Preparation procedure begins.

- (1.) The date of the request
- (2.) Data Set source
 - (a.) The PDS Discipline Node name and address
- (3.) Discipline Node technical contact
 - (a.) Data Administrator name
 - (b.) Data Administrator address

- (c.) Data Administrator phone number
- (4.) Data Supplier or Principal Investigator
 - (a.) Data Supplier name
 - (b.) Data Supplier address
 - (c.) Data Supplier phone number
- (5.) The name and data set identifier of the data set. The priority of this data set is contained in the list of prioritized data sets.
- (6.) Spacecraft name and identifier
 - (refer to the PDS Version 1.0 *Catalog Design Document*, D-1152)
- (7.) Experiment name and Identifier
 - (refer to the PDS Version 1.0 *Catalog Design Document*, D-1152)
- (8.) Data set component description
 - (a.) Science data records
 - (i.) Data Representation (single precision floating point, etc.)
 - (b.) Instrument calibration data
 - (i.) Measured parameters; theory of operation
 - (ii.) Instrument sensitivity parameters
 - (iii.) Temporal/spatial/spectral resolution
 - (iv.) Modes of operation; typical sequencing; observational compromises
 - (v.) Calibration techniques; laboratory and in-flight behavior
 - (vi.) Derivations from nominal performance
 - (vii.) Instrument characteristics
 - (c.) Ancillary data
 - (i.) SEDRs and processed SEDRs
 - (ii.) History of development of the instrument or experiment
 - (iii.) Bibliography - instrument and science
 - (iv.) Data Dictionary Data Element Names and Definitions
 - (v.) Lexicon of Terms
 - (vi.) Any other known conditions in the data, or affecting the data, which should be brought to the attention of the user data processing software
 - (d.) Data processing software

- (i.) Data reduction software with the accompanying documented data reduction procedure
- (ii.) Data analysis software with the accompanying documented data analysis procedure display or analysis data
- (iii.) Data analysis results; i.e., maps, plots

(9.) Media Identification

- (a.) Physical record size
- (b.) Logical record size
- (c.) Number of files and EOF marks
- (d.) Number of records per file
- (e.) Number of tracks
- (f.) Tape density
- (g.) Time period covered per media unit
- (h.) Computer used
- (i.) Descriptions of the integer, character, and binary representations
- (j.) Volume size in bytes

Upon receipt of the Catalog Feasibility Report, the Discipline Node shall send a Request to Include Data memorandum to the Central Node for the PDS data sets to be processed.

The Request to Include Data memorandum shall contain the following:

- (1.) Date of the request.
- (2.) Data Set name.
- (3.) Final list of prioritized data sets.

3.15.4 Data Flow Diagram

This guideline supports the Assemble Data Set Proposal segment (F-2.4.1) in DFD 2.4. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

PDS Data Administration Procedure

3.16 Data Set Release

3.16.1 General Information

This final step in the data acquisition process is to officially release a data set to the science community. A data set can only be released by the Central Node Data Administrator. A data set is considered officially released when the PDS Peer Reviewed Catalog information is loaded into the PDS database.

To release a data set, the Central Node Data Administrator generates the Notice to Archive Data which is sent to the Discipline Node Data Administrator. After the NSSDC receives the archive package and the final Peer Review Report is received from the Peer Review Committee Chairperson, a Data Set Release Notice is completed by the Central Node Data Administrator to inform the Central Node Database Administrator that the Peer Reviewed catalog information shall be loaded into the PDS Catalog.

3.16.2 Policy

- (1.) Only the Central Node Data Administrator has the authorization to release a PDS data set to the science community.
- (2.) Only the Central Node Data Administrator shall authorize any modifications to the PDS catalog.

3.16.3 Procedure

- (1.) The Central Node Data Administrator shall review the final Validation Report generated by the *loader software* for any errors listed.
- (2.) The Central Node Data Administrator shall review the Peer Review Report to verify that all liens levied against a data set during the peer review were addressed by the Committee Chair.
- (3.) The Central Node Data Administrator shall generate the Notice to Archive Data and forward this notice to the Discipline Node. This allows the NSSDC archive procedures to commence.
- (4.) The Central Node Data Administrator shall save the NSSDC Archive Receipt in the appropriate file cabinet when received from the Discipline Node. This receipt is a copy of the original receipt that the NSSDC sends to the Discipline Node.
- (5.) The Central Node Data Administrator shall generate the Data Set Release Notice and forward this notice to the Central Node Database Administrator only after all other steps in this procedure have been completed.

- (6.) After the NSSDC Archive Receipt is received from the Discipline Node, the Central Node Data Administrator shall load the catalog data into the PDS Catalog using the Catalog Data Loading with SQL procedure.
- (7.) Any new Standard Values are loaded into the PDS Catalog using the Catalog Standard Values procedure.
- (8.) The Database Referential Integrity procedure is then performed and the report is reviewed for any errors.

3.16.4 Data Flow Diagram

This procedure supports the Release Data Set segment (F-1.7.4) in DFD 1.7. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

PDS Data Administration Procedure

3.17 Data Set Submission Package

3.17.1 General Information

The acceptance of new data into the PDS requires that information be distributed to the Discipline Node responsible for data set preparation for archive. This information is contained in several documents that are distributed by the Central Node. Other information is gathered using forms or catalog templates that are also distributed by the Central Node.

Various standards have been adopted by the PDS. Such standards range from procedures to submit data to various archives, to the naming convention for specific data sets, and to the use of certain terms as element names in the database. These standards may be either formal or informal, and are detailed in such PDS documents as the PDS Catalog Design Document, the PDS Standards for the Preparation and Interchange of Data Sets document, and this document, the PDS Data Administration Plan.

The standards described in the various documents are an integral part of the PDS, and are used to facilitate communication; for example, between the Central Node and the Discipline Nodes, or between the members of the PDS and the NSSDC (National Space Science Data Center). Some of the formal standards have been adopted during PDS Data Design Team (DDT) meetings, or PDS Science Working Group (SWG) meetings. Most such standards relate to specific types of scientific information. Other standards have evolved to fulfill functional requirements placed on the PDS by its science user community, or to enable various PDS software to function efficiently. These standards are frequently related to certain data values, or to such things as lengths of data items, or to the contents of a given form.

The PDS standards are flexible with each new version of the PDS, and sometimes within a given version, and are designed to help the PDS successfully ingest and distribute data. Their promulgation is an important part of the PDS, since widespread adoption of some guidelines will simplify future data ingestion. In particular, the task of data ingestion is facilitated when new missions adopt the current PDS standards during their design phases. Because this is so important to the continuing success of the PDS, the PDS Data Administrator is responsible for helping to promote accepted standards.

3.17.2 Policy

- (1.) After receipt of the Request to Include Data from a Discipline Node, the Central Node Data Administrator shall perform the following steps: 1) If needed, generate a Database Change Notice (Catalog Schema Update procedure) that authorizes the catalog schema changes specified in the Catalog Feasability Report (Data Set Feasability Study procedure). 2) If a Database Change Notice was necessary, await the receipt of a Catalog Update Completed Notice from the Central Node Database Administrator. 3) The Central Node Data Administrator shall assemble the Data Set Submission Package. The contents of the Data Set Submission Package are listed in the Procedure section below.
- (2.) The PDS Data Administrator shall promote only those standards which are fully accepted by the PDS community. Whenever reasonable or necessary, data standards shall be reviewed by the PDS System Design Team, and their acceptance as PDS standards shall rest with the members of that team, or with the members of the Science Working Group, as appropriate.
- (3.) Alternate standards, especially those proposed by the non-PDS community, shall be carefully examined by the PDS Data Administrator, who shall present them to the PDS community for review as necessary. In particular, the standards currently adopted by the various flight missions shall be examined carefully whenever data from those missions is considered for ingestion into the PDS.
- (4.) Generate the Response to Include Data notice to accompany the Data Set Submission Package. The contents of the Response to Include Data are listed in the Procedure section below.

3.17.3 Procedure

- (1.) Assemble the following set of components and distribute this Data Set Submission Package to the Discipline Node that initiated the Request to Include Data.
 - (a.) A copy of the latest PDS *Data Dictionary* document.
 - (b.) A copy of the latest PDS *Data Submission Standards and Procedures* document.
 - (c.) An ASCII set of the PDS Catalog Templates applicable to the new data set. The templates are generated using the procedure **Template Generation** described in this document.
 - (d.) A cover letter describing the contents of this package.
 - (e.) SPIDS Workbook
- (2.) Generate and forward the Response to Include Data notice to the Discipline Node that initiated the Request to Include Data. A copy of this notice is also forwarded to the PDS Science Manager and PDS Project Scientist.

The Response to Include Data consists of:

- (a.) A short response that officially accepts a data set into the PDS ingestion process.
 - (b.) Data Set Name
 - (c.) Data Set ID
 - (d.) Current Date
 - (e.) Title and signature of the Central Node Data Administrator.
- (3.) There are no exact procedures for the PDS Data Administrator to follow in the promotion of PDS standards. Various opportunities, such as invitations to meetings of mission Science Working Groups, or to PDS nodes, may arise, and it would be wise to distribute copies of the *Catalog Design* document, *Data Dictionary* document, or the *PDS Standards for the Preparation and Interchange of Data Sets* document.
- (a.) The PDS Data Administrator shall coordinate and document meetings of the PDS Data Design Team, and shall ensure that various data standards which require review by the PDS DDT are proposed and discussed at such meetings.
 - (b.) In addition, the PDS Data Administrator should interface with the various groups at JPL whose responsibility it is to create and document lab-wide standards.

3.17.4 Data Flow Diagram

This procedure supports the Send Data Set Submission Package segment (F-1.4.2) in DFD 1.4. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

PDS Data Administration Procedure

3.18 Database Referential Integrity

3.18.1 General Information

Database referential integrity involves validating references between database tables. Since the SQL standard does not support referential integrity, the task of ensuring database referential integrity for the PDS catalog database is performed by the PDS Database Administrator using a database software utility written for this purpose.

This utility is driven by a data dictionary table called DDRI, controlled by the Data Administrator. This table supplies pairs of data elements that are involved in references between two database tables. Each of the references are checked for integrity by ensuring that every value associated with the first data element is also associated with the second data element. In addition, this table supplies a list of data elements for which all associated values must also exist as standard values in the table DDCOLSTDVAL. The output of executing this utility includes a referential integrity exception report that lists the foreign keys without associated primary keys, invalid table element values, and a standard values load file that contains all values that were found to be missing from the standard values table. This standard values load file of missing values may be used as input to load the standard values table.

The specification and maintenance of the DDRI table determines the completeness of the checking to be done and therefore directly impacts the integrity of the database. A set of informal definitions follow to help understand the concept of database keys and their roles in the DDRI table and database referential integrity.

For clarification, an informal set of definitions for keys follows. A key is one or more data elements which identify one or more rows in a database table. For example, `instrument_host_id` and `instrument_id` together identify an instrument in the instrument information table. A primary key is a key, possibly chosen from among several candidate keys, that uniquely identifies a row in a table. `Instrument_host_id` and `instrument_id` have been chosen as a primary key for the instrument information table. A foreign key may be a field in one table that is a primary key in one or more other tables. For example, `target_name` in the image information table is a foreign key that exists as a primary key in the target information table. A foreign key/primary key pair represent a reference between two database tables. A simple key is a key that consists of only one data element. A complex key is a key that consists of more than one data element. Standard values are those values of a data element that have been approved for use either through a peer review or by the PDS Data Design Team.

3.18.2 Policy

- (1.) The data dictionary table DDRI and the referential software utility shall only be modified by the PDS Database Administrator.

- (2.) A copy of the most current summary report for each PDS catalog database shall be kept on file by the PDS Data Administrator.
- (3.) The referential integrity software utility shall be executed whenever any of the following conditions occur:
 - (a.) A PDS catalog database is updated with new or corrected data.
 - (b.) A PDS catalog database is restored from a backup.
 - (c.) At least once every three months.
 - (d.) At the request of the PDS Data Administrator
 - (e.) In association with a Peer Review to validate the Peer Review and Catalog databases after data loading.
- (4.) A memo shall be written and filed by the PDS Data Administrator to address any errors listed in the summary report that cannot be corrected due to the modeling approach used or the nature of the data.

3.18.3 Procedure

The maintenance of the DDRI table is accomplished through database updates as discussed in the Catalog Data Update procedure. This maintenance includes the addition of new referential integrity checks as well as modifications to existing checks.

3.18.3.1 DDRI Table Definition

The referential integrity table (DDRI) is used to drive the Referential Integrity Utility. This utility validates referential integrity between:

- (1.) primary keys
- (2.) foreign and primary keys
- (3.) primary keys and standard values
- (4.) nonkey data elements and standard values

The integrity checks for standard values are considered to be a form of referential integrity since the check occurs between two tables, one of which is the standard values table (ddcolstdval).

The DDRI table is an updateable table used to drive the software that contains over 400 rows, each of which specifies a pair of data elements to be used in the integrity check. Integrity checks involving complex keys require a row for each field used within the complex key. Each row has eight data element. These identify the integrity check, its type, a sequence, and the data element pair. These DDRI table fields are described in more detail below.

- (1.) **rikey:** The rikey data element uniquely identifies a referential integrity check. A referential integrity check may require one or more rows of the *ddri* table, depending on whether the key is simple or complex. For example, the primary key of both the data set information table (*dsinfo*) and the data set description table (*dsd*) table is

`data_set_id` (`dsid`). Since this key consists of only one data element it is a simple key. The referential integrity check for the `dsd` table subsequently requires only one row in the `ddri` table. This check would consist of ensuring that every `dsid` in the `dsd` table is also in the `dsinfo` table.

A referential integrity check between the complex primary key of the instrument filter table (`instfilt`) and the complex primary key of the instrument information table (`instinfo`) consists of ensuring that every `instrument_host_id` (`insthostid`)/`instrument_id` (`instid`) pair in the `instfilt` table is also in the `instinfo` table. The rikey for this complex key check would identify two rows in the `DDRI` table.

The rikey is generated using the name of the source table described below.

- (2.) **seqno:** The `seqno` data element orders the rows when more than one row must be used for a referential integrity check involving a complex key.
- (3.) **usage:** The `usage` data element enforces a hierarchy scheme that both structures and orders the referential integrity checks. This assists in analyzing the checks for completeness and allows them to be executed in a logical order. For example, the instrument filter table (`instfilt`) has a complex primary key consisting of `instrument_host_id` (`insthostid`), `instrument_id` (`instid`), and `filter_number` (`filtnum`). `Insthostid` and `instid` together uniquely identify an instrument. Therefore, two checks are required to ensure that any filter is valid and that it can be related to the specified instrument. The `insthostid/instid` pair must exist in the instrument information (`instinfo`) table and `filtnum` must exist as a standard value.

This in turn implies referential integrity checks for the `instinfo` table. The specified `insthostid` must exist in the host information (`hostinfo`) table and the `instid` must exist as a standard value.

Finally, the `insthostid` in the `hostinfo` table must also exist as a standard value.

The hierarchy scheme developed reverses the above sequence and validates that all `insthostids` in the `hostinfo` exist as standard values before any other referential integrity check is allowed against the `hostinfo` table. This is not required for correctness of the referential integrity testing but does order the results of the report and helps in determining the completeness of the `DDRI` table. The scheme chosen to order the values of `usage` consists of a 5 digit number specified as follows:

01000 Standard Value check for non-key data elements
 (Subordered by rikey generated by using data
 element name)

1.... Science Catalog
 11... High Level Catalog
 111.. Referential Integrity Tables (RI table)
 (primary keys uniquely identify entities)
 (Subordered using last two digits)

(Subsubordered using rikey generated by using source table name)

113.. Primary key check
(Primary keys of these tables checked for existence in RI tables)

115.. Foreign key check
(Foreign keys of these tables checked for existence in RI tables)

13... Fields and Particles

131.. General

132.. LECP

1321. RI table

1323. Primary key check

1325. Foreign key check

133.. MAG

1331. RI table

1333. Primary key check

1335. Foreign key check

134.. PLS

1341. RI table

1343. Primary key check

1345. Foreign key check

135.. PWS

1351. RI table

1353. Primary key check

1355. Foreign key check

15... Image

151.. RI table

153.. Primary key check

155.. Foreign key check

3.... Data Dictionary

311.. RI table

313.. Primary key check

315.. Foreign key check

(4.) type: The type data element designates the type of validation that is to be performed. Possible values are:

(a.) R - Referential integrity check

All values of a data element in the source table must exist as values of the data element in the RI table.

(b.) S - Standard value check

All values of a data element in the source table must exist as standard values in the standard value table. (ddcolstdval)

(c.) D - Definition

All values of a data element in the source table must conform to the definition of the data element contained in data dictionary. (TBD)

(d.) F - Formation Rule

All values of a data element in the source table must conform to a standard formation rule. (TBD)

(e.) U - Unknown

Not used

- (5.) **sourcetbl:** The source table data element in the DDRI table identifies the database table from which the values for data elements will be selected for validation. These values will be checked for validity based on the type of referential integrity check specified.
- (6.) **sourceattr:** The source attribute data element in the DDRI table identifies the database data element from which values will be selected for validation. These values will be checked for validity based on the type of referential integrity check specified.
- (7.) **ritbl:** The referential integrity table data element in the DDRI table identifies the data base table within which the source data element values must exist.
- (8.) **riattr:** The referential integrity attribute data element in the DDRI table identifies the database data element within which the source data element values must exist.

3.18.3.2 Running the DBRI Utility

(1.) Submit Utility as Batch Job

Submit the program for execution by using the VAX commands: Run or Submit. Since the utility accepts command line arguments, it must be equivalenced to a system name prior to execution. Example: DBRI ::= "\$public:[source]dbri.exe" The "\$" is required and must be present. The utility provides four options to be specified during execution. These options are as follows:

- (a.) -S for Standard Value checking
- (b.) -R for RI checking
- (c.) -K for a summary of all keys
- (d.) -D to print debugging message

(2.) Review Referential Integrity Exception Report

The Referential Integrity Exception report shall be reviewed carefully by the PDS Data Administrator. All errors must be investigated and the database corrected as soon as possible. After the database is corrected, this entire procedure shall be repeated. Note: Any database under control of the Configuration Management Coordinator

may only be modified using the Operations procedure: Process DBCN. The DBCN is described in detail in the Catalog Data Update procedure.

(3.) Review ASCII file

The editable disk file that contains the values not found in the ddcolstdval table must be analyzed. After the review of the file and any corrections have been applied, the file may be used as input to append the new values to the ddcolstdval table.

(4.) Document Referential Integrity Errors

The Data Administrator shall compose and file a memo that addresses each referential integrity error that cannot be corrected due to the modeling approach or the nature of the data. In fact, they are not errors, but anomalies of the database design that the software logic cannot ignore.

3.18.4 Data Flow Diagram

This procedure supports the Load Peer Review Data (F-1.7.3) and Load Catalog Data (F-1.7.5) segments in DFD 1.7. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

PDS Data Administration Procedure

3.19 DBA Utilities

3.19.1 General Information

A major component of the Planetary Data System (PDS) is the catalog database which serves as a repository for planetary meta-data. The meta-data support the access, identification, analysis, and distribution of planetary data. The Version 1.0 catalog database is implemented on a Sharebase/700 database server. The Sharebase Relational Database Management System (RDBMS) implementation includes various client (computer) utilities and run-time libraries which provide an interface to the database server through the use of high-level programming languages. Software programs written in any supported high-level language make calls to Sharebase run-time library functions for database access.

The high-level language selected for PDS implementation is VAX C. A collection of utilities (miscellaneous software programs) have been developed to support database administration of the PDS catalog and supporting databases. These utilities offer such functions as automated document generation, report generation, and automated database schema generation. As database modifications occur or new requirements are developed, the Database Administration (DBA) utilities need to be augmented or modified. This procedure documents the mechanism for modification and development of these DBA utilities.

The following is a list of the DBA utilities that support the generation of the *Catalog Design* and *Data Dictionary* Documents:

(1.) APPENDIXA.C

This program creates the Screen Display Name - Attribute xref list.

(2.) APPENDIXB.C

This program creates the Attribute - Relation xref list.

(3.) COLUMNNAMES.C

This program creates the element definitions list.

(4.) RANGES.C

This program creates the Min/Max element values list.

(5.) STDVAL.C

This program creates the Standard Values list.

(6.) STOREDC.C

This program creates source code lists for the stored commands.

(7.) TABLENAMES.C

This program creates the database table/element list.

(8.) UNITS.C

This program creates the Units of measure list.

(9.) UV.C

This program creates the User View descriptions list.

The following is a list of miscellaneous DBA utilities that are used for configuration control, template generation, referential integrity, DET internal reports, and format (.FMT) file creation:

(1.) DBRI.C

This program runs the referential integrity check against the PDS catalog. This program is linked with RETATTR1, RETATTR2, RETATTR3, and RETATTR4 programs.

(2.) DEPEND.C

This program lists all dependencies between stored commands and database tables.

(3.) FMFILES.C

This program creates the Format files that the IDMFCOPY Sharebase utility uses using the data dictionary.

(4.) PDSDDL.C

This program creates the SQL Create Table, Create Index, and Grant statements using the data dictionary.

(5.) RETATTR1.C

This is a small subroutine used by DBRI.C.

(6.) RETATTR2.C

This is a small subroutine used by DBRI.C.

(7.) RETATTR3.C

This is a small subroutine used by DBRI.C.

(8.) RETATTR4.C

This is a small subroutine used by DBRI.C.

(9.) STDVALDMP.C

This program creates an extract file of the standard values used to populate a PC Reflex database.

(10.) TEMPLATTR.C

This program creates an extract file of the Template Attributes used to populate a PC Reflex database.

(11.) **TMPLTGEN.C**

This program creates the full set of Templates from the data dictionary.

3.19.2 Policy

- (1.) The maintenance of DBA utilities shall be managed by the PDS Database Administrator.
- (2.) PDS DBA utility software shall be under configuration management by the PDS Configuration Management Coordinator, as defined in the configuration management chapter of the *PDS Software Management Plan (SMP)*.
- (3.) Modification to existing source code files or creation of new source code files shall result from an approved ECR or PFR and shall be documented with the use of the PDS Software Change Notice (SCN) form, which shall be submitted to the PDS Configuration Management Coordinator.
- (4.) PDS DBA utility software shall be written with the VAX C programming language, specifically the most recent version supplied by Digital Equipment Corp.
- (5.) The PDS DBA utility software source code files shall adhere to the coding conventions described in the PDS SMP.

3.19.3 Procedure

Creation of a new DBA utility or modifications to an existing DBA utility shall constitute DBA utility maintenance. The steps necessary to create a new DBA utility are identical to modifying an existing DBA utility, except that no previous version will be checked out from PDS Configuration Management. To perform maintenance of a DBA utility, perform the following steps:

3.19.3.1 Checkout Source Code from PDS Configuration Management

To perform modifications to the DBA utilities, the VAX file(s) which contain the source code must be checked out from the PDS Configuration Management Coordinator and the modifications made to these file(s). The Configuration Management Coordinator shall make the file(s) available as described in the configuration management procedures in the PDS SMP. The file may be copied to any directory owned by the Database Administrator for subsequent editing.

3.19.3.2 Modification of Source Code

Modification to any file necessitates documentation of the changes in the header block of the modified file; the information in the header block must be appropriately modified to reflect the changes. For creation of a new function, the header block version control section should so indicate.

All program functions shall be structured as defined in the coding standards sections of the PDS SMP.

3.19.3.3 Check-in of Source Code to PDS Configuration Management

Upon completion of modifications to an existing source code file or addition of a new source code file and successful testing of the software, the file shall be returned to the PDS Configuration Management Coordinator as described in the PDS SMP. As part of this step, the software changes shall be identified on a PDS Software Change Notice (SCN) form which shall be submitted to the Configuration Management Coordinator along with the source code file(s). The Database Administrator shall return the file to the Configuration Management Coordinator with the use of the DCL Copy command. Any copies of the file which were created during this procedure shall be considered obsolete and deleted; a fresh copy of the file shall be checked out from Configuration Management for any future modification or loading of the stored command.

3.19.4 Data Flow Diagram

This procedure supports the Maintain PDS Meta Data segment (F-1.4.5) in DFD 1.4. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

PDS Data Administration Guideline

3.20 Discipline Node Archive

3.20.1 General Information

All data sets which have been accepted by the appropriate peer review committee are stored as archives at the National Space Science Data Center (NSSDC) and the Discipline Node. The actual archive package is prepared by the Discipline Node and sent by it to the NSSDC. The NSSDC Archive Receipt is sent to the Discipline Node and a copy forwarded to the Central Node. It is the responsibility of the Central Node Data Administrator to monitor this process and ensure that it is completed.

3.20.2 Policy

- (1.) All data sets shall be archived by the Discipline Node at the NSSDC archive facility upon receipt of the Notice to Archive Data notice from the Central Node Data Administrator.
- (2.) The Discipline Node local archive facility (if applicable), shall use reasonable security precautions to protect archived data sets from destruction by human error. The Discipline Node shall use existing capabilities that are provided with the DBMS and/or the Operating System to control and secure access privileges to PDS data sets. All on-line disks used for archive purposes shall be periodically backed up to an off-line media (i.e., tape).
- (3.) The actual procedures used by the Discipline Node for data set security shall be documented and available for review by the Central Node Data Administrator. The documentation format is decided upon by the Discipline Node and may be any format from a simple memo to a chapter in a Discipline Node document.

3.20.3 Guidelines

This guideline begins when the Notice to Archive Data is received from the Central Node Data Administrator. The following steps outline the process which shall be followed.

- (1.) The Discipline Node Data Administrator shall coordinate adding the approved data set to the Discipline Node archive. A copy of the peer reviewed Science Data Set shall be archived at the Discipline Node archive facility.
 - (a.) The Science Data Set consists of the following items:
 - (i.) The Data Set Data Unit

The Data Set Data Unit contains the Structured Format Data Unit (SFDU) registration ID. This ID contains information to identify a data set according to a fixed and documented standard. The Data Set Data Unit also contains a label for the data unit, and the data unit itself. The data unit consists of data objects and their associated labels.

(ii.) **Data Set Documentation**

Any documentation which has been approved by the peer review committee as part of the submitted data set is included as part of the Science Data Set.

These items are described in more detail in the *PDS Standards for the Preparation and Interchange of Data Sets* document.

3.20.4 Reference Documents

- (1.) *Guidelines for Submitting Data to the National Space Science Data Center*; NSSDC/WDC-A R&S 84-19; July, 1984.
- (2.) *Planetary Data System Standards for the Preparation & Interchange of Data Sets Document*; PDS Science Management and Project Engineering Team; JPL D-4683; Version 1.0.

3.20.5 Data Flow Diagram

This guideline supports the Archive to TN (F-2.4.2) segment in DFD 2.4. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

PDS Data Administration Guideline

3.21 Discipline Node Inventory

3.21.1 General Information

The Central Node Data Administrator shall require periodic status reporting from each Discipline Node concerning data sets archived at the NSSDC. Implementation of the Discipline Node Inventory System design is left to the discretion of the Discipline Node Data Administrator, provided the requirements described in this guideline are satisfied.

This Discipline Node Inventory guideline documents the maintenance of the Discipline Node PDS data set inventory.

3.21.2 Policy

- (1.) The Discipline Node Data Administrator shall maintain an Inventory System that satisfies the requirements described in this guideline.
- (2.) The Discipline Node Data Administrator shall update the Inventory System within five (5) working days of receiving an NSSDC Archive Receipt.

3.21.3 Guideline

The Discipline Node Data Administrator shall monitor the inventory of PDS data sets that are archived at NSSDC and locally. What follows are the minimum requirements for an Inventory System.

- (1.) Update Inventory Information after notification that a PDS approved data set has been archived at NSSDC (NSSDC Archive Receipt) and after the Inventory Update Notice has been generated by the Discipline Node Archive Guideline.
- (2.) Maintain Inventory Information
 - (a.) Data set inventory shall be tracked in a Discipline Node defined Inventory System that shall contain the following minimum set of elements for each archived copy of a data set.
 - (i.) Data Set ID
 - (ii.) Data Set Name
 - (iii.) Data Set Media Description
 - (iv.) Data Set Physical Location (building address, room name/number)
 - (v.) Data Set Start and Stop time
(The start and stop times of the science data.)
 - (vi.) Data Set Release Date

- (vii.) Data Set Producer (full name)
 - (viii.) Data Set Copy Requirements Description
 - (What it requires to make a single copy of the archived data set.)
 - (b.) The Inventory System utilized to store the PDS data set inventory may contain non-PDS data set information provided that the PDS data sets can be distinguished from the non-PDS data sets.
 - (c.) All PDS approved and archived data sets shall be included in the Discipline Node Inventory System.
- (3.) Distribute Inventory Listing to Central Node Data Administrator.
- (a.) The inventory listing, generated by the Discipline Node, shall reflect the above listed inventory elements sorted by data set ID.
 - (b.) The Central Node Data Administrator may request a current listing of the Discipline Node's archived data sets at any time. The Discipline Node then has five (5) working days to create and forward the inventory listing to the Central Node Data Administrator.
 - (c.) The Discipline Node shall distribute a copy of the most current inventory listing to the Central Node Data Administrator whenever any of the following conditions occur:
 - (i.) At least once every three months.
 - (ii.) At the request of the Central Node Data Administrator

3.21.4 Data Flow Diagram

This guideline supports the Update TN Data Inventory segment (F-2.4.3) in DFD 2.4. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

PDS Data Administration Procedure

3.22 Loader Software

3.22.1 General Information

A major component of the Planetary Data System (PDS) is the catalog database which serves as a repository for planetary meta-data. The meta-data support the access, identification, analysis, and distribution of planetary data. The Version 1.0 catalog database is implemented on a Sharebase/700 database server. Catalog data are ingested into the catalog with the aid of the *Loader Software*, a program which performs parsing and validation of PDS templates, and creates SQL INSERT statements that are bulk-loaded using the Sharebase SQL interpreter. The use of PDS templates allows the data supplier to submit data to the PDS Data Administrator in an ASCII (i.e., readable) format.

The loader software is implemented as a single program written in the VAX C programming language and contained in an executable file on the JPLPDS VAX. The source code files are controlled by the PDS Configuration Management Coordinator, who performs the build of the executable program after any program changes or enhancements are made. The source code is comprised of nine (9) modules and one (1) include file, "loader.h".

3.22.2 Policy

- (1.) The maintenance of loader software shall be managed by the PDS Database Administrator.
- (2.) PDS loader software shall be defined in files which are controlled by the PDS Configuration Management Coordinator.
- (3.) Modification to existing source code files or creation of new source code files shall be documented with the use of the PDS Software Change Notice (SCN) form, which shall be submitted to the PDS Configuration Management Coordinator.
- (4.) PDS loader software shall be written with the VAX C programming language, specifically the most recent version supplied by DEC.
- (5.) The PDS loader software source code files shall adhere to the coding conventions described in the PDS Software Management Plan (SMP).

3.22.3 Procedure

Any of the following conditions can necessitate modification to the existing loader software source code file(s):

- (1.) Changes to the catalog database schema which require corresponding changes to the template mapping rows in the data dictionary.
- (2.) Requirements for new capabilities.
- (3.) Requirements change request for existing capabilities.
- (4.) A program bug is discovered.

The following sections detail the steps required to modify the existing loader software source code files.

3.22.3.1 Check-out Source Code from PDS Configuration Management

To perform modifications to the loader software, the JPLPDS VAX file(s) which contain the source code must be checked out from the PDS Configuration Management Coordinator and the modifications made to the checked out file(s). The Configuration Management Coordinator shall make the file(s) available as described in the Procedures Appendix of the PDS SMP. The file may be copied to any directory owned by the Database Administrator for subsequent editing.

3.22.3.2 Modification of Source Code

Modification to any function necessitates documentation of the changes in the header block of the modified function; the information in the header block must be appropriately modified to reflect the changes. For creation of a new function, the header block version control section should so indicate. All C program functions shall be structured as defined in the coding standards sections of the PDS SMP.

3.22.3.3 Check-in of Source Code to PDS Configuration Management

Upon completion of modifications to an existing source code file or addition of a new source code file and successful testing the loader software, the file shall be returned to the PDS Configuration Management Coordinator as described in the Procedures Appendix of the PDS SMP. As part of this step, the software changes shall be identified on a PDS Software Change Notice (SCN) form which is submitted to the Configuration Management Coordinator along with the source code file(s). The Database Administrator shall return the file to the Configuration Management Coordinator with the use of the DCL "copy" command. Any copies of the file which were created during this procedure shall be considered obsolete and deleted; a fresh copy of the file shall be checked out from Configuration Management for any future modification or loading of the program.

3.22.4 Data Flow Diagram

This procedure supports the Maintain PDS Meta Data segment (F-1.4.5) in DFD 1.4. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

PDS Data Administration Procedure

3.23 NSSDC Archive

3.23.1 General Information

All data sets which have been accepted by the appropriate peer review committee are stored as archives at the National Space Science Data Center (NSSDC) and the Discipline Node. The actual archive package is prepared by the Discipline Node and sent by it to the NSSDC. The NSSDC Archive Receipt is sent to the Discipline Node and a copy forwarded to the Central Node. It is the responsibility of the Central Node Data Administrator to monitor this process and ensure that it is completed.

The contents of the submitted archive package include several items which are necessary to identify and catalog the data at NSSDC, as well as the PDS-approved data set which is being submitted to the archives. Copies of the AIM and DIF forms required, are in Appendix C.

3.23.2 Policy

- (1.) All peer reviewed data sets shall be delivered to the NSSDC by the Discipline Node upon receipt of the Notice to Archive Data notice from the Central Node Data Administrator.
- (2.) The Discipline Node Data Administrator shall forward a copy of the NSSDC Archive Receipt to the Central Node Data Administrator after receiving the Archive Receipt from the NSSDC.
- (3.) The Discipline Node Data Administrator shall update the Discipline Node Inventory System complying with the Discipline Node Inventory guideline contained in this document.

3.23.3 Procedure

This procedure begins after the NSSDC Archive Package has been assembled by the Discipline Node. The following steps outline the process which shall be followed:

- (1.) A cover letter shall be written and sent with the NSSDC Archive Package that identifies the PDS data sets being submitted for archive. The Discipline Node Data Administrator shall mail best way the NSSDC Archive Package to the NSSDC archives at the address below. The contents of the NSSDC Archive Package are described in the Data Set Archive Build procedure.

Ralph W. Post
NSSDC Digital Data Manager
Code 633
Goddard Space Flight Center

- (2.) The Discipline Node Data Administrator shall store the NSSDC Archive Receipt.
- (3.) The Discipline Node Data Administrator shall notify the Central Node Data Administrator that the NSSDC has received the archive package by forwarding a copy of the NSSDC ARCHIVE RECEIPT to the Central Node.
- (4.) The Discipline Node Data Administrator shall comply with the Discipline Node Archive and Discipline Node Inventory guidelines, which are detailed in this document. These procedures result in adding the copy of the data set to the Discipline Node's archive and entering information about that data set into its data inventory.

3.23.4 Reference Documents

- (1.) *Guidelines for Submitting Data to the National Space Science Data Center; NSSDC/WDC-A R&S 84-19; July, 1984.*
- (2.) *Planetary Data System Standards for the Preparation & Interchange of Data Sets Document; PDS Science Management and Project Engineering Team; JPL D-4683; Version 1.0.*

3.23.5 Data Flow Diagram

This procedure supports the Archive to NSSDC (F-2.7.5) segment in DFD 2.7. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

PDS Data Administration Procedure

3.24 Operating System Installation and Maintenance

3.24.1 General Information

The Sharebase Server is a stand-alone computer system, complete with CPU, memory, disk drives, controllers, and an operating system. The communications between the PDS application on the host processor is via Ethernet (DECNET) using a PDS local area network. The host computer is a DEC VAX 11/780, which runs the PDS applications, interfaces with the terminals and sends data retrieval requests to the Sharebase Server. An online interface using SQL commands is also provided for the experienced user.

The installation and maintenance of the Sharebase Server is fully defined in the Sharebase manuals: *Operation Manual*, *Installation Manual*, and *Maintenance Manual*. New versions of the operating system are always sent with documentation highlighting the changes and known problems.

This procedure does not repeat the details of what must be done to perform an installation, an upgrade or system maintenance; instead, it shall reference the manuals for the detailed procedures to be followed by the Database Administrator and the PDS Operations personnel.

3.24.2 Policy

- (1.) Any Sharebase Server operating system installation, upgrade or software maintenance shall be done by the PDS Database Administrator.
- (2.) The System Manager shall coordinate hardware upgrades and/or maintenance to the Sharebase Server 700. This includes such items as disk drives, disk controllers, all cables, and all circuit boards in the card cage.
- (3.) The PDS Operations support personnel shall support the PDS Database Administrator in the performance of any Sharebase Server maintenance.
- (4.) Whenever the Sharebase Server is to be taken off-line for maintenance, down-time will be scheduled and a system-wide bulletin will be broadcast by operations personnel informing all PDS users of the approximate downtime.

3.24.3 Procedure

- (1.) Notify user community through VAX message broadcast utility of scheduled system down time, if possible.
- (2.) Always reference the Sharebase Server/700 manuals listed below whenever performing Sharebase Server Maintenance.

Server/700 Operation Manual

Server/700 Installation Manual

Server/700 Maintenance Manual

Additional information on hardware and software configuration may also be found in the *PDS Operations Plan*.

3.24.4 Data Flow Diagram

This procedure supports the Maintain PDS Meta Data segment (F-1.4.5) in DFD 1.4. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

PDS Data Administration Procedure

3.25 Peer Review

3.25.1 General Information

The effectiveness of the Planetary Data System (PDS) in performing its service to the space science community depends upon the communication between, and the working relationships established with, each data supplier and his/her coworkers. These peer review procedures are intended to form the basis for determining how data and their accompanying documentation should be prepared for submission to the PDS. Should questions arise, the PDS Discipline Node staff is on hand to answer them and to assist each data supplier in submitting his data. The PDS stands ready both to supply requesters with catalog information about space science data and to relieve the Principal Investigators (PIs) or PI teams of the burden of supplying copies of their data to fellow scientists who request them.

The purpose of the Peer Review is to ensure the accuracy, dependability, and usefulness of science data to be distributed in the Planetary Data System (PDS). Specifically, the Peer Review shall:

- (1.) Ensure that enough supporting documentation is available for future users of the data to access, understand, and use the data correctly and effectively.
- (2.) Ensure that the standards and guidelines of the PDS system are adhered to and promoted.
- (3.) Encourage the standardization of nomenclature and symbol usage in the data, documentation, and software across scientific disciplines.

3.25.2 Policy

A Peer Review shall be required before any PDS data set can be approved for archive.

3.25.3 Procedure

The Peer Review process shall accept or reject the data sets that are being reviewed. During the procedure, the peer review catalog, science data sets, PDS labels, SFDU headers and catalog templates are reviewed. All minor and major liens levied against the reviewed components are documented in the Peer Review report. The Peer Review Chairperson shall generate the Peer Review report and forward them to the Central Node.

The steps that shall be accomplished for the Peer Review are the following:

- (4.) After the Peer Review committee receives the peer review package, they shall review the package prior to the meeting. The package is generated in the Prepare for Peer Review procedures and shall consist of the review comments, science data sets or samples of and supporting documentation, high level catalog templates, detailed level catalog samples if applicable, PDS labels, and SFDU headers.
- (5.) Conduct the Peer Review
- (6.) Determine the conditions for acceptance or rejection
- (7.) Document the Peer Review by generating a preliminary Peer Review report, which will contain a list of compiled liens. The final report will be generated during the Peer Review Liens Procedure. If there were no liens levied, then the report produced in this procedure is the final version.

3.25.3.1 Guidelines for Conducting the Peer Review

Conflicts shall be resolved by mutual agreement of the PDS Project Manager, Project Scientist, Science Manager and Discipline Node Manager. If the Discipline Node Manager is the data supplier, then conflicts shall be resolved by the above group without the participation of the Discipline Node Manager.

The PDS Project Manager shall resolve any conflict between the recommendations of the review board and the capabilities of PDS.

In any situation where the PDS Project Scientist or Science Manager is the data supplier, their non-data supplier roles shall be filled by the PDS Project Manager or a designated representative.

The Peer Review Committee shall consider the data set format, content, documentation, ancillary data, and software, and shall provide a written summary of all deliberations and conclusions. Each logical component of the data set shall be judged for inclusion. If it is determined that the component is not ready for inclusion, a clear indication of the reasons shall be provided in a lien. If appropriate, both a set of positive comments and a set of minor liens shall be documented and made available for reference in the Central Node catalog. A second peer review shall be scheduled for the resolution of any major liens. Minor liens can be resolved by an appointed committee.

The review board shall also make recommendations regarding the set of information which constitutes the orderable data set, the assignment of curatorial responsibility, and

the disposition of the data set. These recommendations shall include a determination of the appropriate data processing level and quality tags to be assigned, its position in the data hierarchy (on-line, off-line, etc.), the number of inventory copies, and other recommendations to the Discipline Node Data Administrator.

3.25.3.2 Guidelines for Determinining the Conditions for Acceptance or Rejection

During the actual peer review meeting, the data providers or their representative may make presentations on the data set(s) which they have provided as part of their submission package. Any comments as to the associated catalog data may form part of the presentation. During and after the presentation, the various members of the peer review committee may ask questions to help them understand the data set submission package. If deficiencies are uncovered, they will be classified into two groups: minor liens and major liens. Minor liens are items which the Peer Review Committee feels require only routine correction, such as catalog descriptions (grammer errors or wording changes), catalog standard values or catalog data errors. These can be resolved by a committee member. Major liens are deficiencies which the Peer Review Committee feels require extensive correction, and which need the review of more than the committee chairperson before they are accepted as being resolved. These could include missing data or data that would mislead the user. The resolution of a major lien shall be assigned to an appointed committee.

Each data set included in the data set submission package is then determined to have passed or failed the peer review. In general, a data set is considered to have passed if the only problems consist of a set of minor liens. Any major liens against a data set may require a second meeting before it can be determined if the data set has passed the review. Only in extremely rare cases would a data set be rejected. If this is the case, a Data Supplier may resubmit the data set by initiating the Data Ingestion process again with a Request to Submit Science Data notice (Data Set Proposal procedure). The thrust of the peer review is to ensure that problems are resolved before the data are given the PDS "stamp of approval," and not to make data submission a risky procedure with little hope of success.

3.25.3.3 Guidelines for Documenting the Peer Review

Finally, the Peer Review Committee Chairperson prepares a report (in the form of the Peer Review Results template) of the peer review meeting, documenting the discussion of the data set submission and any outstanding liens and their deadlines for resolution. This report is usually circulated to the peer review committee for their review and comment before being submitted to the PDS Central Node.

The Peer Review report shall contain the following:

- (1.) Location/Date/Time of peer review
- (2.) Attendees

(3.) List of data sets being reviewed

(4.) Status of data sets

A data set has passed the review if no liens or only minor liens were levied against it. Otherwise, the list of liens, the resolution, the schedule for resolution, and responsible person(s) shall be documented.

(5.) Peer Review criteria

(6.) Materials used to support review

(7.) Discussion and results

3.25.3.3.1 Peer Review Report

The Peer Review Report shall be generated by the Peer Review Committee Chairperson filling out the Peer Review Results templates. This report shall then be sent to the Central Node Data Administrator for loading into the PDS Catalog. Additionally, a copy of the report is given to the PDS Central Node Configuration Management Coordinator.

3.25.4 Data Flow Diagram

This procedure supports the Peer Review segment (F-2.7.2) in DFD 2.7. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

PDS Data Administration Procedure

3.26 Peer Review Database Initialization

3.26.1 General Information

Peer Review databases are temporary databases used to store new meta-data and to prototype new schemas. During the Peer Review Preparation procedure, a Peer Review database is used as a staging database where new meta-data resides until all Peer Review liens have all been addressed. See the Peer Review and Peer Review Liens procedures for detailed data ingestion steps. Disk space permitting, there may be one or more Peer Review databases in existence and any given time and are labeled PEERRVWn where n is an integer (e.g. PEERRVW1, PEERRVW2).

The need to create one or more Peer Review databases will vary with the amount of data ingestion being done at any given time by the Data Engineering Team. A Peer Review database is created by making a copy of the latest version of the PDS Catalog database. This procedure documents the steps necessary to create a new Peer Review database.

3.26.2 Policy

- (1.) All Peer Review databases shall be created from the latest PDS Catalog by the Central Node Database Administrator.

3.26.3 Procedure

- (1.) The following commands are necessary to create the new database *stinky*.
 - (a.) From the VMS \$ prompt, make a backup copy of the current PDS Catalog *pdscat* to the work database *workdb* and start the SQL interpreter. The work database is necessary for the temporary storage of backup files.

```
$ idump pdscat workdb /trans=nl: /data="pdscat_bck#ifile"  
$ sql pdscat
```

- (b.) Create the new database *stinky* with 60000 blocks on a disk drive *pds1* from within the SQL interpreter and exit to VMS.

```
1) create database stinky with demand=60000 on "pds1"  
1) exit
```

- (c.) From the VMS \$ prompt, load the new database from the work database *workdb* and start the SQL interpreter.

```
$ iload stinky workdb "pdscat_bck#ifile"  
$ sql stinky
```

(d.) From the SQL interpreter, update the database name in the table *current_db* and exit to VMS.

- 1) update *current_db* set *dbname* = "stinky"
- 2) exit

(2.) Notify Data Engineering Team of New Database

All persons involved with the newly created database shall be notified by VAX Mail that the new database is available to them.

3.26.4 Data Flow Diagram

This procedure supports the Maintain PDS Meta Data segment (F-1.4.5) segments in DFD 1.4. Appendix A contains the Prepare Data and Administer Data Data flow diagrams.

PDS Data Administration Procedure

3.27 Peer Review Liens

3.27.1 General Information

The effectiveness of the Planetary Data System (PDS) in performing its service to the space science community depends upon the communication between, and the working relationships established with, each data supplier and his peers. These Peer Review procedures are intended to form the basis for determining how data and their accompanying documentation should be prepared for submission to the PDS. Should questions arise, the PDS Discipline Node staff is on hand to answer them and to assist each data supplier in submitting his data. The PDS stands ready both to supply requesters with catalog information about space science data and to relieve the Principal Investigators (PIs) or PI teams of the burden of supplying copies of their data to fellow scientists who request them.

In general, a data set is considered to have passed if the only problems consist of a set of minor liens. Any major liens against a data set may require a second meeting before it can be determined if the data set has passed the review. Only in extremely rare cases would a data set be rejected; If this is the case a Data Supplier may resubmit the data set by initiating the Data Ingestion process again with a Request to Submit Science Data Notice (Data Set Proposal procedure). The thrust of the Peer Review is to ensure that problems are resolved before the data are given the PDS "stamp of approval," and not to make data submission a risky procedure with little hope of success.

3.27.2 Policy

- (1.) Minor liens may be resolved by a Peer Review Committee member.
- (2.) Major liens shall only be resolved by an Peer Review appointed committee.
- (3.) The Peer Review Committee Chairperson shall coordinate all lien resolutions and document the final Peer Review report.

3.27.3 Procedure

3.27.3.1 Resolve Major and Minor Liens

The Peer Review Committee Chairperson shall manage all necessary tasks to resolve the minor and major liens that were levied against a data set as a result of the Peer Review procedure. Corrections may address liens against science data sets, high level catalog templates, detailed level catalog data, PDS labels and SFDU headers. This may involve some or all of the committee members. These tasks shall include:

- (1.) Monitor the Lien Resolution schedule that was produced in the Peer Review procedure.
- (2.) Monitor the resolutions and the review of the resolutions. The resolutions shall be done by a single committee member or appointed committee, or by the chairperson as assigned during the Peer Review procedure.
- (3.) Document the results of the lien resolution process in the Peer Review report.

3.27.3.2 Documenting the Peer Review Lien Resolution

The Peer Review Committee Chairperson prepares a final report (in the form of the Peer Review Results templates) of the Peer Review meeting, documenting the resolution of liens. This report is usually circulated to the Peer Review Committee for their review and comment before being submitted to the PDS Central Node. This report may be an addendum to the Peer Review report generated in the Peer Review Procedure.

The final Peer Review report shall contain the following:

- (1.) Location/Date/Time of Peer Review
- (2.) Attendees
- (3.) List of Data Sets Reviewed
- (4.) Status of the Data Sets

A data set has passed if all liens against it have been resolved. Otherwise, a data set has failed and it shall be documented why there are outstanding major liens and what the recommended action is. The action may be a revised lien resolution schedule and subsequent Peer Reviews. If a data set is rejected, then it is no longer considered to be part of the current Data Set Submission Package being reviewed. A Data Supplier may resubmit the data set by initiating the Data Ingestion process with a Request to Submit Science Data notice (Data Set Proposal procedure).

- (5.) Peer Review Criteria
- (6.) Materials Used To Support Review
- (7.) Discussion and Results

3.27.3.2.1 Peer Review Report

The Peer Review report shall be generated by the Peer Review Committee Chairperson filling out the Peer Review Results templates. This report shall then be sent to the Central Node Data Administrator for loading into the PDS Catalog. Additionally, a copy of the report is given to the Central Node Configuration Management Coordinator.

3.27.4 Data Flow Diagram

This procedure supports the Correct Liens segment (F-2.7.3) in DFD 2.7. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

PDS Data Administration Procedure

3.28 Peer Review Preparation

3.28.1 General Information

The effectiveness of the Planetary Data System (PDS) in performing its service to the space science community depends upon the communication between, and the working relationships established with, each data supplier and his coworkers. These Peer Review procedures are intended to form the basis for determining how data and their accompanying documentation should be prepared for submission to the PDS. Should questions arise, the PDS Discipline Node staff is on hand to answer them and to assist each data supplier in submitting his data. The PDS stands ready both to supply requesters with catalog information about space science data and to relieve the Principal Investigators (PIs) or PI teams of the burden of supplying copies of their data to fellow scientists who request them.

The Peer Review cycle begins after the Response To Include Data cycle has completed and assumes the following issues have been resolved:

- (1.) The agreement finalized on the contents of the Data Set Submission Package.
- (2.) The feasibility study on the catalog schema completed, approved and any changes implemented.
- (3.) The data set formatted.
- (4.) The contents of the Data Set Submission Package completed by the Data Supplier and sent to the Discipline Node Data Administrator.

The Peer Review cycle ends after the Peer Review Committee passes judgement on the data sets in the Data Set Submission Package; the final Peer Review report is written and distributed; the Discipline Node Data Administrator generated and sent the Response to Submit Science Data notice to the Data Supplier; and the data set has been sent to be archived at the NSSDC.

3.28.2 Policy

- (1.) The Version 1.0 Peer Review Catalog shall be maintained by the PDS Database Administrator. Any additions, deletions, changes or corrections to the Peer Review Catalog shall be forwarded to the PDS Database Administrator.
- (2.) Following the approval of a data set for ingestion into the PDS Version 1.0, the PDS Science Manager and PDS Project Scientist shall select a Peer Review Committee, assisted by recommendations submitted by the PDS Discipline Node Manager and send the results of their selection to the Peer Review Committee Chairperson. The Discipline Node Manager shall chair the committee unless he is the data preparer, in which case either the PDS Project Scientist or Science Manager shall chair the Peer Review Committee.
- (3.) The Peer Review Committee shall use the Data Set Submission Package contents to determine what the specific Peer Review criteria shall be for the data set. It is important to realize that the specifics of these criteria (e.g., what constitutes proper documentation) are left to the judgement of the Peer Review Committee members, and may vary from data set to data set. However, the composition of the Peer Review Committee, with its discipline-specific members, outside scientific members and PDS Central Node Development Team, helps ensure some level of consistency between reviews. When the Data Supplier receives the Data Set Submission Package from the Discipline Node, the Data Supplier shall be informed of what the criteria will be and what the format of the review shall be. If any special requirements for passing the Peer Review are necessary, they shall be communicated to the Data Supplier at this time.

A generic Peer Review Criteria list follows which may be used as a guide to develop specific criteria.

- (1.) Ensure that all available data (for the appropriate time period and type) for ingestion into PDS shall be in the data set.
- (2.) Check that the data is properly formatted and that the data set is properly labeled.
- (3.) The catalog data is loaded into a Peer Review catalog and shall be validated for correctness and completeness, and validated for internal consistency with the data set.
- (4.) Ensure that the science data are reasonably valid and the rationale given for the sampling is adequate.
- (5.) Determine that the data set is properly documented, including a special emphasis on data quality.
- (6.) Review the ancillary data.
- (7.) Examine the data to determine if it is scientifically useful and interesting.
- (8.) Review the data element definitions of the contents of the data for accuracy and completeness.

3.28.3 Procedure

This procedure shall cover all necessary tasks to prepare a set of data sets for the formal Peer Review procedure. This shall involve the Peer Review Committee reviewing the science data sets or samples of the data set, PDS Peer Review catalog, PDS catalog templates, and finally producing the review comments. Upon receiving all the review comments, the data supplier with assistance from the Discipline Node or the Peer Review Board if needed, shall resolve any problems noted in the review comments. Any errors or suggested changes that require discussion will be placed on the agenda of the formal Peer Review meeting. The preparation of the data set shall continue as long as possible prior to the scheduled Peer Review with the intent to minimize the liens that are a result of a formal Peer Review.

This procedure shall include the following tasks:

- (1.) The Discipline Node accepts the Response to Include Data and the Data Set Submission Package from the Central Node.
- (2.) The Discipline Node forwards the Response to Include Data and the Data Set Submission Package to the data supplier.
- (3.) The data supplier, with assistance from the Discipline Node if needed, fills out the PDS catalog templates.
- (4.) The Discipline Node receives the science data set package from the data supplier. This package consist of the completed catalog templates, draft or completed SFDU headers and PDS labels, science data, ancillary data, and supporting documentation.
- (5.) The Discipline Node submits the completed catalog templates to the Central Node.
- (6.) The Discipline Node Science Manager, and Project Scientist select the Peer Review Committee Chairperson and members.
- (7.) The Peer Review Chairperson develops a schedule for the Peer Review.
- (8.) The Peer Review Committee reviews the science data sets for scientific merit and accuracy. This may be done in a workshop using PIN or NIN software, or may simply be a package of sample plots.
- (9.) The Peer Review Committee reviews the PDS catalog templates, PDS Peer Review Catalog, PDS labels, and SFDU headers for accuracy and syntax.
- (10.) The Peer Review Committee shall provide written review comments. These comments shall consist of peer comments, corrections and suggestions concerning either the science data, catalog data, PDS labels or SFDU headers.
- (11.) The Peer Review Chairperson compiles the submitted review comments from the Peer Review Committee.
- (12.) The Discipline Node communicates and works with the data supplier to resolve any problems noted in the review comments.

- (13.) The Peer Review Committee reviews the PDS Peer Review Catalog after the catalog templates have been reloaded due to any corrections made from the review comments.
- (14.) The Discipline Node prepares the Peer Review Package and forwards this package to the Peer Review Committee. This package shall consist of the review comments, science data sets or samples of and supporting documentation, PDS labels, and SFDU headers. Additionally, the Central Node shall assist in providing copies of the loaded PDS catalog templates and detailed level catalog samples if any. The Peer Review Committee shall review this package prior to the formal Peer Review Meeting.
- (15.) The formal Peer Review meeting is held. Please refer to the Peer Review procedure for details.
- (16.) The Discipline Node generates and sends a Response to Submit Science Data notice to the data supplier after receiving the Peer Review Results templates. This notice consist of the Peer Reivew results which lists the data sets that have been accepted into the PDS.

3.28.3.1 Selecting the Peer Review Committee

Following the approval of a data set for ingestion into the PDS Version 1.0, the PDS Science Manager and PDS Project Scientist shall select a Peer Review Committee, assisted by recommendations submitted by the PDS Discipline Node Manager and send the results of their selection to the Peer Review Committee Chairperson. It is important to realize that the specific roles and responsibilities of the Peer Review Committee may vary from Peer Review to Peer Review depending on the data set being ingested.

The selection results should contain the following:

- (1.) Rationale.
- (2.) Members/Roles and Responsibilities.
- (3.) Contact Information.

The Peer Review Committee shall include members from the following groups:

Chairperson	The Discipline Node Manager shall chair the committee unless he is the data preparer, in which case either the PDS Project Scientist or the PDS Science Manager shall chair the Peer Review Committee.
--------------------	--

Data Node	Data Preparer or Principal Investigator (PI) Data Supplier
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Discipline Node	Scientists Data Administrator or Database Administrator Observer
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Science Community	Outside Scientists familiar with data set, capable of critical review Observer
Central Node	Science Manager Data Administrator Data Engineer Standards Representative (Project Scientist or Science Discipline Expert) Observer

3.28.3.1.1 Responsibilities of the Peer Review Chairperson

The Peer Review Chairperson shall be responsible for the following:

- (1.) Monitor the receipt and distribution of the Response To Include Data with the Data Set Submission Package.
- (2.) Monitor the formatting of the data set, the filling out of the catalog templates, and completion of the Data Set Submission Package.
- (3.) Monitor the submission of the Data Set Submission Package to PDS Central Node.
- (4.) Set the Peer Review agenda.
- (5.) Determine the logistics of the Peer Review.
- (6.) Schedule the Peer Review.
- (7.) Send the following items to each Peer Review Committee member:
 - (a.) The location/date/time of the Peer Review.
 - (b.) A list of the members of the committee and their roles and responsibilities.
 - (c.) The agenda for the Peer Review.
 - (d.) The schedule.
 - (e.) The standards and procedures for the Peer Review.
 - (f.) The Data Set Submission Package as completed by the Data Supplier.
- (8.) Monitor the submittal of all Peer Review comments from the Peer Review Committee to the Discipline Node and Data Supplier prior to the scheduled Peer Review meeting.
- (9.) Monitor the distribution of the Peer Review Package to the Peer Review Committee prior to the scheduled Peer Review meeting.
- (10.) Conduct the Peer Review and noting the liens, schedule and responsible person for working off the lien.

- (11.) Get a quorum determination of the review criteria and conditions for acceptance or rejection.
- (12.) Submit the Peer Review documentation.
 - (a.) Write the Peer Review report via Peer Review Results templates
 - (b.) Assure the proper distribution of the Peer Review results.
- (13.) Follow up on the NSSDC archival of the data set.

3.28.3.2 Scheduling the Peer Review

The Peer Review cycle begins after the Response To Include Data cycle has completed and assumes the following issues have been resolved:

- (1.) The agreement finalized on the contents of the Data Set Submission Package.
- (2.) If necessary, the feasibility study on the catalog schema completed, approved and any changes implemented.
- (3.) The data set formatted.
- (4.) The contents of the Data Set Submission Package completed and sent to the Discipline Node Data Administrator.

One of the most important milestones in the Peer Review process is the submittal of the review comments. The formal Peer Review meeting shall not take place until this milestone is met. This milestone shall ensure that the review of the individual components are completed in advance and allows time for the resolution of some problems prior to the meeting, thus minimizing the liens that result from the formal Peer Review.

The Peer Review cycle ends after the Peer Review Committee passes judgement on the Data Set Submission Package, the final Peer Review report is written and distributed, the Discipline Node Data Administrator has generated and sent a Response to Submit Science Data notice to the Data Supplier, and the data set has been sent to be archived at the NSSDC.

3.28.3.2.1 Examination of Science Data Samples

Prior to the actual Peer Review meeting, the committee members should also attempt to satisfy themselves that the actual science data in the data set are valid. Various procedures exist for performing this verification, and it is important to note that the committee must judge the data set on limited representations. Two suggested procedures are to compare the submitted data to published versions (where available), and to use the data for further scientific analysis, such as in a workshop or other forum. Both procedures are based on the assumption that major problems, if any, will be quickly encountered during use of the actual data for scientific investigation.

3.28.3.2.2 Review of Catalog Data

After the catalog data in the Data Set Submission Package are received from the Data Supplier, they are loaded into special databases. These databases are the Peer Review databases, and will be referred to as the Peer Review Catalog. Before the Peer Review Committee meets, each member is responsible for reviewing the data in the Peer Review Catalog. The scientific community members are responsible for judging the accuracy and completeness of the catalog information; that is, how well the catalog information reflects what is known about the data set they describe. The Central Node Data Administrator is responsible primarily for examining the data to make sure that they conform with various catalog standards which are not tested by the catalog loading software. The review of the catalog information also helps the members of the Peer Review Committee to familiarize themselves with the scope and intended use of the data set, as represented in the many descriptions provided as part of the catalog information.

3.28.3.2.3 Review of Data Dictionary Data Elements

After the data elements for detailed level catalog data in the Data Set Submission Package are received from the Data Supplier, they are loaded into a special database. This database is the Peer Review database, and will be referred to as the Peer Review data dictionary. Before the Peer Review Committee meets, each member is responsible for reviewing the data in the Peer Review data dictionary. The scientific community members are responsible for judging the accuracy and completeness of the data element names and definitions; that is, how well the data element names and definitions reflect what is known about the data set they describe. The Central Node Data Administrator is responsible primarily for examining the data to make sure that they conform with various data dictionary standards which are not tested by the data dictionary loading software.

3.28.3.2.4 Examination of Data Set Documentation

The Peer Review Committee members shall examine the data set documentation prior to the Peer Review. The documentation shall be examined for completeness, accuracy and readability.

3.28.3.2.5 Central Node Preparations

The steps (procedures) that shall be accomplished by the Central Node Data Administrator prior to the Peer Review are the following:

(1.) Confirm Discipline Node Data Administration Contacts for Peer Review.

Contact the PDS Science Manager or the Peer Review Chairman to confirm the following:

- (a.) Date of Peer Review**
- (b.) Data Supplier contacts**
- (c.) Discipline Node contacts**

- (d.) Peer Review Committee contacts
- (e.) Data Administration task schedule
- (f.) Data Set List

(2.) Confirm Schedule Dates for Central Node Data Administration Tasks.

The PDS Data Administrator communicates with the Discipline Node Manager or Data Administration contact at the Discipline Node to confirm the schedule dates for the Peer Review support tasks assigned to the Central Node Data Administration staff.

(3.) Notify JPLPDS VAX System Manager of Resource Requirements.

The JPLPDS VAX System Manager shall be notified of the Peer Review schedule, the machine resources, and the level of support that shall be required to support the Peer Review activities. The five working days prior to the Peer Review are the most critical.

(4.) Allocate and Initialize Peer Review Database.

(See the **Peer Review Database Initialization** procedure in this document.)

(5.) Support Discipline Node Data Administration.

Discipline Node Data Administration shall be supported by periodic contact to confirm that progress is being made and to offer assistance.

(6.) Receive, Verify and Load Catalog Templates.

This initial loading of the Peer Review Databases is done to confirm modeling and loader mapping. After loading, the data is then inspected via the SQL interface to confirm table contents and inspected via the PDS user interface to confirm referential integrity.

Refer to the following procedures to load catalog templates.

- (a.) Template Review.
- (b.) Template Validation.
- (c.) Data Loading - SQL.
- (d.) Data Unloading - SQL.
- (e.) Database Referential Integrity.
- (f.) Catalog Standard Values.

(7.) Notify Discipline Node Data Administration of any Problems.

The data supplier and the Discipline Node are notified of any problems. They are sent corrected catalog templates, the Loader Error Report, and suggestions, when appropriate, on how to re-submit the data.

(8.) Receive, Verify and Load Catalog Templates.

A second loading of the Peer Review Databases is done and the results verified and inspected. Please refer to previous step for initial loading for details.

(9.) Notify Peer Review Committee of Peer Review Database Availability.

The Peer Review Committee and attendees are notified that the Peer Review Databases are ready for access and review.

(10.) Prepare Peer Review.

In order to support the Peer Review, the Central Node Data Administrator prepares the following:

(a.) Final corrected and loaded templates listing loaded from load files.

(b.) Formatted database dumps of selected records that were loaded from load files.

(11.) Confirm Identity of Chairperson and Send Peer Review Templates.

(12.) Attend Peer Review.

The PDS Data Administrator and the Data Engineer may attend the Peer Review to advise on matters of standards and procedures, and to answer any questions that may be asked about the Peer Review Databases.

The next four steps may continue until the data set is accepted and ready for release (Data Set Release procedure):

(13.) Correct Catalog Templates and Load Files.

Any corrections that are necessary as a result of the Peer Review are made by the data supplier and re-submitted to the Central Node Data Administrator.

(14.) Re-Initialize Peer Review Database.

The Peer Review Databases are re-initialized to prepare for the final loading of the corrected catalog templates and load files.

(15.) Receive, Verify and Load Corrected Catalog Templates and Load Files.

The loading of the Peer Review Databases is done and the results verified and inspected. Please refer to the previous step for initial loading for details.

(16.) Notify Peer Review Committee of Database Availability Date.

The Peer Review Committee and attendees are notified that the Peer Review Databases are ready for access and review.

(17.) Receive, Verify and Load Peer Review Results Templates.

The Peer Review Chairperson fills out the Peer Review Results templates and sends them to the PDS Central Node Data Administrator for verification, inspection and loading into the PDS catalog.

3.28.4 Data Flow Diagram

This procedure supports the Prepare for Peer Review segment (F-2.7.1) in DFD 2.7. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

PDS Data Administration Procedure

3.29 Performance Monitoring

3.29.1 General Information

The Planetary Data System (PDS) catalog database contains system operational data and catalog data which describe planetary data sets. The operational data support Customer Support and data set ordering functions, and are frequently updated. The catalog data are periodically updated to include peer reviewed data which describe additional PDS data sets. The primary use of the catalog database is for viewing cross-sections of the database rather than performing updates of data. Catalog views are implemented through the use of pre-defined database queries which select data from one or more related database tables. Because of this relational design of the catalog database and the volume of catalog data, database server performance must be an ever-present consideration of the PDS Database Administrator.

Performance of database queries is directly related to indices which are created on the database tables. These indices are created and maintained as described in the Updates and Maintain Data Dictionary procedures of this document. Performance of the database server is affected by server resources (amount and configuration of memory, disk layout, server-to-computer data channel) and the number of user processes simultaneously active on the server.

The PDS Version 1.0 catalog database is implemented on a Sharebase/700 database server. The database server is administered through the use of a collection of Sharebase utilities which operate in the VAX/VMS client (computer) environment. The SQL (Structured Query Language) utility provides the capability to access and modify database information and to run pre-defined queries which monitor system usage. The system console logging facility reports details of hardware and memory allocation; this information is available through the use of the Idmcheck utility. The Sharebase VAX/VMS Command Summary Manual and the SQL Reference Manual contain complete descriptions of these utilities.

3.29.2 Policy

- (1.) Database server performance monitoring shall be managed by the PDS Database Administrator.
- (2.) Performance monitoring shall be performed at the discretion of the PDS Database Administrator.

3.29.3 Procedure

The following sections describe the steps necessary to collect information which will allow an analysis of database and database server performance.

3.29.3.1 Database Distribution

For optimal performance, databases should be contiguous, and if possible, contained on a single disk. Database fragmentation occurs when databases are enlarged onto an area of the disk which is not contiguous with the original database. If database fragmentation occurs, performance will suffer and the databases should be rebuilt in a contiguous manner. To determine the physical location of databases, perform the following steps:

- (1.) Log onto the JPLPDS VAX under the account of the Database Administrator.
- (2.) Type "sql" from the DCL prompt.
- (3.) Type "open <databasename>" from the SQL prompt. The parameter databasename indicates the name of a database on the database server; this step and the next will be performed for every database.
- (4.) Type "select * from disk_usage" from the SQL prompt. Examine the output to determine the location of the database. There will be one tuple for each contiguous section of the database; ideally a single tuple will be returned, indicating that the database exists as a single contiguous entity on a single disk. The values returned in the low and high column may be compared to those listed for each database server disk in the console logger file (described in a section below) to determine the disk location of each contiguous database section.
- (5.) Type "exit" from the SQL prompt.

3.29.3.2 SQL Performance Monitoring

The SQL utility may be run with a performance monitoring option, allowing display of monitoring information for each query. Available information includes database server response time, server CPU usage, server input wait, server memory wait, server disk wait, server output wait, server accelerator (secondary processor) usage, server cache memory hits, number of server disk reads, server query buffer space usage, and information about the query processing (optimization) strategy (including the use and selection of indices). This information may be shown collectively by typing "sql /performance" at the DCL prompt, or individual performance options may be set by using the Set SQL command (refer to the Sharebase SQL Reference Manual for details of the use of the Set command).

3.29.3.3 Pre-defined SQL Queries

A collection of pre-defined queries are included with the Sharebase SQL utility. These queries are designed to facilitate the use of the Sharebase data server in conjunction with the SQL utility. Included in this collection of queries are several which may be used to collect performance monitoring information; these return information from the monitor, devmonitor, and dbinstat system tables. For a description of the contents of these tables, refer to the Sharebase System Administrator's Manual (Performance Tuning chapter). To use these queries, perform the following steps:

- (1.) Log onto the JPLPDS VAX under the account of the Database Administrator.
- (2.) Type "sql system" from the DCL prompt to run SQL in the system database.
- (3.) Type "start *commandname*" from the SQL prompt, where *commandname* is the name of any of the following queries:
 - (a.) *cmds_system* (describes monitor queries)
 - (b.) *diskio* (lists on-line disks and their activity)
 - (c.) *mon* (monitors CPU and accelerator usage)
 - (d.) *mondisk* (monitors disk usage)
 - (e.) *monfail* (shows processes suspended for lack of memory)
 - (f.) *monlock* (shows current database locks)
 - (g.) *monun* (shows unused memory buffers)
 - (h.) *monwait* (shows summary of wait queues)
 - (i.) *ps* (lists active processes and status)
- (4.) Type "exit" from the SQL prompt.

3.29.3.4 Console Logger

The console logger facility is a process which runs on the VAX and directs all output from the database server to a file named *idm.log*. This file is located in the directory containing the Sharebase VAX software (VMS logical *idm.dir*), and it may be examined with the use of the *Idmcheck* utility. To use this utility, type "idmcheck" from the DCL prompt. The contents of the file will be directed to *SYS\$OUTPUT*, which may be assigned to the screen or to a VAX file.

When the database server is powered on or rebooted, the console outputs various status messages. Information which is useful for performance analysis includes the distribution of disks on the database server disk controllers and database server memory allocation. The databases should be evenly distributed over the disks and the disks evenly distributed over the disk controllers so that the load on each disk is uniform. The Sharebase System Administrator's Manual contains a discussion on adjusting memory allocation, including setting up cache buffers to enhance performance. Configuring the memory depends on the total amount of memory installed on the database server.

3.29.4 Data Flow Diagram

This procedure supports the Maintain PDS Meta Data segment (F-1.4.5) in DFD 1.4. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

PDS Data Administration Procedure

3.30 Security Management

3.30.1 General Information

The Planetary Data System (PDS) Version 1.0 Science Catalog is implemented in a catalog database and other supporting databases on a Sharebase Server/700 database server. Any computer which is capable of communicating with the database server over a data channel may access these databases if the computer utilizes the proper communications protocol and provides required access information to the server. The database server utilizes user-provided access information (stored in system tables) to control access to the server and its databases. A group of SQL commands are used to store the access control information on the PDS database server. These SQL commands are contained in a file which is controlled by the PDS Configuration Management Coordinator. For purposes of this procedure, the file shall be referred to as "security.sql"; in practice the filename shall be secured by the PDS Database Administrator and the PDS Configuration Management Coordinator. Since this file contains access control information, including user names and passwords, the file must be treated as confidential and processed with an appropriate level of security awareness. The contents of the file serve as the basis for security management of the PDS databases. Thus, this procedure discusses the mechanism for modification and control of the file. This procedure does not include a tutorial on the Sharebase implementation of server and database security; for an in-depth discussion of the subject refer to the Sharebase *Database Administrator's Manual* and the Sharebase *System Administrator's Manual*.

Access to the database server may be controlled at two levels: system level access (controls access to the database server), and database level access (controls access to a database and access to database objects such as tables and stored commands). Access control may range from nonexistent (all users are allowed to access all databases with full operational privileges) to total control (a fully privileged Database Administrator and a user community which enjoys few or no operational privileges). The PDS operational concept dictates a tightly controlled data access scheme which strictly controls access to both the server and individual databases. PDS users are admitted only to the catalog database and may read only from tables which contain PDS catalog data. PDS users may not directly write to any table; the PDS user interface software implements the *Order Data* function by writing to tables on behalf of the PDS user through the use of privileged stored commands. PDS operational personnel are admitted only to the catalog database, may read from tables which contain PDS catalog data, and are permitted to write to tables which contain PDS support and order data. The PDS Database Administrator has complete server and database privileges.

Under the PDS Version 1.0 system hardware configuration, the database server is attached to an Ethernet local area network (LAN). This LAN is bridged to other networks, including SPAN, allowing a multitude of computers to access the PDS database server.

Due to this architecture, all computers attempting to access the database server must be considered untrustworthy, i.e. one may not assume that the computer has authenticated the user by requesting a login name and password. Because the PDS catalog data are not considered confidential and are available for all to read, penetration of the server by an illegal user utilizing a valid PDS non-privileged user ID/password is not considered a problem due to the limited capabilities of the user ID. Access of the server by the user ID/password of the PDS Data Administrator or PDS Operational Staff must be more rigidly protected, however. Users of these accounts must provide an additional username and password to gain access to the database server. The specifics of this additional level of security are addressed in the procedure section below.

3.30.2 Policy

- (1.) Database security shall be managed by the PDS Database Administrator.
- (2.) No PDS Data Administration procedure shall contain actual references to filenames, directory structure, or access control information (such as user IDs and passwords).
- (3.) Management of database server tables containing access control information shall be performed with the use of the Sharebase SQL utility.
- (4.) No database server system tables containing access control information shall be modified through "on-the-fly" interaction with the database server (i.e. with the SQL utility); rather these modifications shall be specified in SQL commands which are contained in a file under the control of the PDS Configuration Management Coordinator.
- (5.) Modification of security management files shall be documented with the use of the PDS DataBase Change Notice (DBCN) form, which shall be submitted to the PDS Configuration Management Coordinator. The DBCN is described in detail in the Catalog Data Update procedure.

3.30.3 Procedure

Any of the following conditions necessitate modification of the "security.sql" security management file and subsequent processing of the file by the SQL utility to load the changes to the database server system tables:

- (1.) Creation or destruction of a new PDS database.
- (2.) Creation or destruction of a new PDS user ID (i.e., adding a new user).
- (3.) Modification of database server access or database access for an existing PDS user ID.

The following sections describe the steps required to modify the file.

3.30.3.1 Check-out of Security Management File from PDS Configuration Management

The "security.sql" file must be requested for checkout from the PDS Configuration Management Coordinator as described in the Procedures Appendix of the *PDS Software Management Plan* (Maintain Database Server Security Management File procedure). The PDS Configuration Management Coordinator will send the file to the Database Administrator via the VAX Mail utility. The protections of VAX Mail ensure that the file may be read only by the recipient of the file. Upon receipt of the file, the file editor may copy it to any VAX directory owned by the Database Administrator, but the file protection code must be set such that only the Database Administrator may read the file. The following DCL command ensures that only the file owner may access the file's contents (exception - any VAX user with the BYPASS privilege):

```
$ set prot=(o:rwed, s,w,g)
```

The editor (and temporary owner) of the file has full responsibility for controlling access to the working copies of the file while the file is checked out from PDS Configuration Management Coordinator.

3.30.3.2 Modification of Security Management File

The "security.sql" file shall be modified in accordance with the format described in the section below. If the file modifications are necessitated by the creation of a new PDS database, a new database section must be added to the file. If the file modifications are necessitated by the destruction of a PDS database, the existing database section must be deleted from the file. The actual database destruction destroys the database access control information along with the affected database. If the file modifications are necessitated by the addition of a new PDS user ID, access control information must be inserted to the *login* system table in the *system* database and to the *host_users* and *users* system tables in each database to which the new user is being granted access. Corresponding SQL "insert" commands must be added to the "security.sql" file in the database section for each affected database. If the file modifications are necessitated by the destruction of an existing PDS user ID, the access control information must be deleted from the "security.sql" file. The access control information for the affected user IDs will be deleted from the affected databases when processing the "security.sql" file with the SQL utility: by convention, the "security.sql" file always truncates (removes all data) from the *login*, *host_users*, and *users* system tables as the first action in each database section, ensuring that these tables contain only access control information which originates from the configuration managed "security.sql" file. If the file modifications are necessitated by a modification to server or database access for an existing PDS user ID, access control information for the affected user ID must be modified in the affected databases by modifications to the corresponding SQL "insert" commands in the "security.sql" file.

3.30.3.3 Format of Security Management File

The "security.sql" file is structured as follows:

- (1.) file header - a comment block which identifies the file and the databases for which access control information is defined
- (2.) database sections - one section per database for which access control information is defined

The first database section is for the *system* database, followed in no particular order by a database section for all PDS databases. The *system* database is a special case, since it contains SQL insert commands for the *login* system table and the *system* database should be accessible only to the Database Administrator. Each database section is separated by a form feed (<FF>) and adheres to the following format:

- (1.) open database
- (2.) permit read/write access to system relations
- (3.) truncate system relations
- (4.) insert access control information to *users* table
- (5.) insert access control information to *host_users* table
- (6.) deny read/write access to system relations

The SQL commands which insert access control information to the system tables are logically grouped according to groups of users, i.e. by PDS Developers, Peer Review Committee members, PDS users, etc. Comments are included on the right margin to help identify users; comments are delimited by the use of the "/*" and "*/" operators.

The following is a sample of the "security.sql" file.

```
/* -----  
* security.sql                      version 1.0    02/22/89  
*  
* description:  create PDS database server and database access  
*               control information  
* databases:  
* 1.) system   - server system   database  
* 2.) det      - DET development database  
* 3.) ui       - SPSE development database  
* 4.) peer1    - peer review     database  
* 5.) peer2    - peer review     database  
* 6.) test     - SITP test       database  
* 7.) catalog  - PDS Version 1.0 database  
* 8.) iir      - PDS IIR         database  
* ----- */
```

```

<FF>
/* ----- system ----- */

open system

/* -----
* temporarily permit the DBA access to system relations
* ----- */

grant all on login      to dba
grant all on users      to dba
grant all on host_users to dba

/* -----
* truncate the login, users, host_users relations before inserting
* access control information to ensure Configuration Management
* ----- */

delete from login
delete from users
delete from host_users

/* -----
* login relation - all users
* ----- */

insert into login (hid,huid,type,huname,password)
              values (1,65537, "T","dbauser1","quark")
insert into login (hid,huid,type,huname,password)
              values (1,65547, "T","dbauser2","neutron")
insert into login (hid,huid,type,huname,password)
              values (1,4715753, "A","","")
insert into login (hid,huid,type,huname,password)
              values (1,4715771, "A","","")
insert into login (hid,huid,type,huname,password)
              values (1,57252955,"A","","")
insert into login (hid,huid,type,huname,password)
              values (1,57252938,"A","","")
insert into login (hid,huid,type,huname,password)
              values (1,23318465,"A","","")
insert into login (hid,huid,type,huname,password)
              values (1,23318487,"A","","")
insert into login (hid,huid,type,huname,password)
              values (1,23252961,"A","","")

```

```

/* -----
* users relation - dba
* ----- */

insert into users (id,gid,name) values (1, 999,"dba") /* user */
insert into users (id,gid,name) values (999,999,"dba") /* group */

/* -----
* host_users relation - dba
* ----- */

insert into host_users (hid,uid,huid) values (1,1,65537) /* jdoe */

/* -----
* remove all access to system relations
* ----- */

revoke all on login      from public
revoke all on users      from public
revoke all on host_users from public

<FF>
/* ----- pdsdet ----- */

open pdsdet

/* -----
* temporarily permit the DBA access to system relations
* ----- */

grant all on users      to dba
grant all on host_users to dba

/* -----
* truncate the users and host_users relations before inserting
* access control information to ensure Configuration Management
* ----- */

delete from users
delete from host_users

/* -----
* users relation - dba

```

```

* ----- */

insert into users (id,gid,name) values (1,999,"dba") /* user: dba */

/* -----
* users relation - PDS Developers
* ----- */

insert into users (id,gid,name) values (2, 100,"jstiff")
insert into users (id,gid,name) values (3, 100,"kpark")
insert into users (id,gid,name) values (11,200,"mlist")
insert into users (id,gid,name) values (12,200,"alever")

/* -----
* users relation - miscellaneous read-only
* ----- */

insert into users (id,gid,name) values (40,400,"pdsguest")
insert into users (id,gid,name) values (43,400,"pds_test")
insert into users (id,gid,name) values (44,400,"config")

/* -----
* users relation - groups
* ----- */

insert into users (id,gid,name) values (100,100,"det")
insert into users (id,gid,name) values (200,200,"spse")
insert into users (id,gid,name) values (400,400,"miscreadonly")
insert into users (id,gid,name) values (999,999,"dba")

/* -----
* host_users relation - dba
* ----- */

insert into host_users (hid,uid,huid) values (1,1,65537) /* jdoe */

/* -----
* host_users relation - temporary dba
* ----- */

insert into host_users (hid,uid,huid) values (1,1,65547) /* mjones */

/* -----
* host_users relation PDS Developers

```



```

* ----- */

insert into host_users(hid,uid,huid) values(1, 2,4715753) /* jstiff */
insert into host_users(hid,uid,huid) values(1, 3,4715771) /* kpark */
insert into host_users(hid,uid,huid) values(1,11,57252955) /* mlist */
insert into host_users(hid,uid,huid) values(1,12,57252938) /* alever */

/* -----
* host_users relation - miscellaneous read-only
* ----- */

insert into host_users(hid,uid,huid) values(1,40,23318465) /* pdsguest */
insert into host_users(hid,uid,huid) values(1,43,23318487) /* pds_test */
insert into host_users(hid,uid,huid) values(1,44,23252961) /* config */

/* -----
* remove all access to system relations
* ----- */

revoke all on users      from public
revoke all on host_users from public

```

3.30.3.4 Conventions for Access Control Information in Security Management File

Most of the access control information contained in the "security.sql" file may be arbitrarily chosen (such as usernames) and some is derived by method. Each PDS user ID must have one row in the *login* table to allow access to the database server, and one row in the *users* and *host_users* tables for each database to which the user is granted access.

The *hid* column of the *login* and the *host_users* table indicates the computer hostid which is specified while linking the database server communications driver program. Selection and specification of the PDS VAX hostid is discussed in the PDS Operations Plan. The number is arbitrary, and may be determined by use of the following DCL command:

```
$ show logical idm_hostid
```

The *huid* column of the *login* and the *host_users* table is derived from the VAX UIC corresponding to each PDS user ID. The UIC format is [group number, member number] and both numbers are represented in octal format. To compute the value for the *huid* column, convert the group and member numbers to decimal and apply the formula :

(decimal group number * 65536 + decimal member number)

Alternatively, use the following DCL command:

```
$ write sys$output f$identifier("vaxuserid", "name_to_number")
```

where *vaxuserid* represents the JPLPDS VAX user ID.

The *type* column of the *login* table must be set to the value "T" for any user ID which is considered privileged (i.e. the Database Administrator and Operations Personnel); this forces the database server to request a secondary username/password before granting access to these user IDs. The *type* column should be set to the value "A" for all non-privileged (i.e. read-only) PDS user IDs; this forces the database server to grant unconditional access to these user IDs.

The *huname* and *password* columns of the *login* table must be set to arbitrary values (up to twelve characters in length) for privileged user IDs. These values are the secondary username/password which the user ID must provide to gain access to the database server. Nonprivileged user IDs require no values for these two columns.

The *uid* column of the *host_users* table contains an arbitrary integer (between 1 and 32768) which identifies a user ID within a given database. For consistency, the same number should be used in every database to identify the same user. A value of 1 for the *uid* column indicates that the user ID is the Database Administrator; this value should be assigned only to the Database Administrator and temporary database administrators (PDS developers who are temporarily assigned complete database privileges). The *uid* column of the *host_users* table joins to the *id* column of the *users* table; each row in the *host_users* table shall have a corresponding row in the *users* table joined by the value in these two columns.

The *gid* column of the *users* table contains an arbitrary integer (between 1 and 32768) which identifies a group of users within a given database. For consistency, the same number should be used in every database to identify the same group. For readability the group numbers should be multiples of 100, and the DBA group is identified by the value 999.

The *name* column of the *users* table contains an arbitrary name (up to twelve characters in length) which for readability shall be the same as the JPLPDS VAX user ID.

3.30.3.5 Processing Security Management File with SQL Utility

Load the modified access control information into the database server system tables by performing the following sequence of steps:

- (1.) Log onto the JPLPDS VAX under the account of the Database Administrator.
- (2.) Move to the directory containing the "security.sql" file with the DCL "set default" command.
- (3.) Type "sql" from the DCL prompt.
- (4.) Type "%input security.sql" from the SQL prompt.
- (5.) Type "exit" from the SQL prompt.

If the database server reports any syntax or database errors, modify the "security.sql" file to rectify the errors, then repeat the above sequence.

3.30.3.6 Check-in of Security Management File to PDS Configuration Management

Upon completion of modifications to the "security.sql" file and successfully processing it through the SQL utility, the file shall be returned to the PDS Configuration Management Coordinator as described in the *PDS Software Management Plan* (Maintain Database Server Security Management File procedure). As part of this step, the database changes shall be identified on a PDS DataBase Change Notice (DBCN) form which is submitted to the Configuration Management Coordinator along with the stored command file. The Database Administrator shall return the file to the Configuration Management Coordinator with the VAX Mail utility with the following DCL command:

```
$ mail security.sql pdsconfig
```

where *pdsconfig* represents the VAX user ID of the Configuration Management Coordinator. Any copies of the file which were created during this procedure on any VAX account other than that owned by the PDS Configuration Management Coordinator shall be deleted, due to the confidential nature of the file contents. The Database Administrator shall be responsible for deleting these extraneous copies of the file.

3.30.4 Data Flow Diagram

This procedure supports the Maintain PDS Meta Data segment (F-1.4.5) in DFD 1.4. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

PDS Data Administration Procedure

3.31 Stored Commands

3.31.1 General Information

A major component of the Planetary Data System (PDS) is a catalog database which serves as a repository for planetary meta-data. The meta-data support the access, identification, analysis, and distribution of planetary data. The Version 1.0 catalog database is implemented on a Sharebase/700 database server. Catalog data are viewed with the use of *stored commands*, pre-defined database queries which are stored on the database server and allow selection of data meeting user-specific constraints. The use of stored commands to implement catalog views allows enhanced database server performance and decouples database interface software from user interface software. This method separates database queries from the user interface code, allowing maintenance of the database interface code independantly of the user interface code.

Each PDS stored command is implemented as one or more database queries written in the Structured Query Language (SQL) and contained in a file on the JPLPDS VAX. During the development of each stored command, one or more walk-throughs are held, unit testing is performed, and the tested command is formally submitted to the Database Administrator for loading into the database. The Data Engineering Notebook is maintained by the Data Engineering Team with the results of each stored command walkthrough. For specifics on the use of SQL, refer to the Sharebase SQL Reference Manual. These VAX files are controlled by the PDS Configuration Management Coordinator, and they serve as direct input to the loading process which stores the pre-defined queries on the database server. This procedure describes the mechanics of maintaining these pre-defined queries (stored commands), both for modification of existing stored commands and creation of new stored commands.

3.31.2 Policy

- (1.) The maintenance of stored commands shall be managed by the PDS Database Administrator.
- (2.) PDS stored commands shall be defined in files which are controlled by the PDS Configuration Management Coordinator. Stored commands shall not be created in any PDS database by "on-the-fly" interactive use of the SQL utility, rather, they shall be created by using these stored command files as input to the SQL utility.
- (3.) Modification of existing stored command files or creation of new stored command files shall be documented with the use of the PDS Database Change Notice (DBCN) form, which shall be submitted to the PDS Configuration Management Coordinator. The DBCN is described in detail in the Catalog Data Update procedure.
- (4.) PDS stored commands shall be defined with the use of the SQL language, specifically the most recent version associated with the database server.

3.31.3 Procedure

Any of the following conditions necessitate modification of an existing stored command file or the creation of a new stored command file:

- (1.) Changes to catalog database schema which require corresponding changes to the query.
- (2.) Requirement for a new query.
- (3.) Requirement change for an existing query.
- (4.) An existing query returns incorrect results.

The following sections detail the steps required to modify existing stored command files or to create a new file.

3.31.3.1 Check-out Stored Command File from PDS Configuration Management

To perform modifications to an existing stored command, the VAX file which defines that stored command must be checked out from the PDS Configuration Management Coordinator and the modifications made to that file. The Configuration Management Coordinator will make the file available as described in the the PDS Software Management Plan . The file may be copied to any directory owned by the Data Engineer for subsequent editing. To create a new stored command, the file should be created with an editor, defining the new stored command according to the format and content requirements described in following sections.

3.31.3.2 Modification of Stored Command File

Modification of a stored command necessitates documentation of any changes in the header section of the stored command file; the information in the header section must be appropriately modified to reflect the changes. For creation of a new stored command, the header section version control comment should so indicate. Modifications of an existing stored commands will be implemented as changes to the SQL commands in the query section of the file. The format and content of the header block and query sections of the stored command file are described in the following sub-sections.

3.31.3.3 Format of Stored Command File

The file which defines a stored command is structured as follows:

- (1.) Header section: a comment block which identifies and describes the stored command.
- (2.) Query section: SQL commands which implement one or more database queries.

The file must be no wider than sixty characters per line. To accommodate this requirement and for purposes of readability, the query target list shall be specified with one target object per line. Likewise, each condition in the query where clause shall be specified on a separate line. SQL keyword phrases such as SELECT, SELECT DISTINCT, FROM, ORDER BY, WHERE, etc. shall be placed at the left margin. SQL function keywords such as BCDFLT, CHAR, and CONCAT may occur in any column across the page. The comment block which delimits the file header is delimited by the use of the “/*” and “*/” operators, and a column consisting of the “*” character marks the left margin of the comment block. All but the last line of the query definition must be ended with the “-” continuation character, indicating continuation of the query definition to the next line.

The file header block consists of a group of keywords (each preceded by the “\$” character) and associated information following each keyword. Non-applicability of any keyword to the stored command is indicated with the use of the word “none” on the line which follows that keyword. The contents of the descriptive information which follows each keyword is described in the next section.

The following is a sample of a file which defines a stored command:

```
/* $Stored Command
*      hdsd
*
*$User View
*      Data Set Description
*
*$User Description
*      The Data Set Description user view allows the input of a
*      data set id or a data set name. The output of the user
*      view consists of the data set description. This
*      description describes the content and type of a data
*      set and provides information required to use the
*      data.
*
*$Version (Id/Date/Author/Description)
*      1.2.0      2/6/89      GMW      New Stored Command
*
*$Author/Title
*      G. M. Woodward/Data Engineer
*
*$Inputs  (DD name      BL name)
```

```

*
*      data_set_id_or_name      dsidname
*
* $Outputs
*
*      data_set_id              dsid
*      data_set_name            dsname
*      data_set_desc            dsd
*
* $Technical Description
* There is one join on dsid performed between dsinfo
* and dsd.
*/
%display "Procedure: Loading Stored Command: hdsd"
drop      hdsd -
store     hdsd -
select    dsi.dsid, -
          dsi.dsname, -
          dsd.dsd -
from      dsinfo dsi (minlock), -
          dsd (minlock) -
where     (dsi.dsid like &dsidname or -
          dsi.dsname like &dsidname) -
and       dsi.dsid = dsd.dsid -
order by  dsi.dsid, -
          dsd.tupseqnum -
end store

grant start on hdsd to public

```

3.31.3.4 Content of Stored Command File Header

The content of the header section of the stored command file is detailed in the subsections below.

3.31.3.4.1 Stored Command

The stored command section indicates the database terse name of the stored command. This name must be less than twelve characters in length and conform with the PDS Terse Naming Rules.

3.31.3.4.2 User View

The user view section indicates the English-like name of the catalog view, such as "Data Set Description". This name must be less than fifty characters in length and is intended to describe the outputs of the catalog view.

3.31.3.4.3 User Description

The user description section contains a description of the catalog view from the user's perspective. This description describes in general terms the stored command intent, inputs, and outputs.

3.31.3.4.4 Version (ID/Date/Author/Description)

The version section indicates version control information for the stored command. The leftmost information in this section is the version number, which is in an "m.n.o" format where "m" indicates the PDS version number, "n" reflects the SQL version, and "o" indicates the revision level of the stored command. Current values for "n" are "1" for Sharebase SQL Version 3.4 or "2" for Version 3.5. An example version number is "1.2.21", indicating a PDS Version 1.0 stored command, revision 21, loaded under SQL version 3.5. To the right of the version number is the date of revision, in MM/DD/YY format. To the right of the revision date is the initials of the person responsible for the revision. To the right of the revision is a brief explanation of the modifications (or an indication that the stored command is new). If this explanation should extend beyond the right margin (column 60) of the file, it shall be continued onto the next line and lined up beneath the same field on the previous line.

3.31.3.4.5 Author/Title

The author/title section indicates the name and title of the original developer of the stored command.

3.31.3.4.6 Inputs

The inputs section includes all query input parameters. These parameters must be specified when running the stored command or an error will be generated. The inputs are listed with the data dictionary full column name on the left side of this section and the data dictionary terse column name on the right side.

3.31.3.4.7 Outputs

The outputs section includes all query outputs, i.e. the query target list. The outputs are listed with the data dictionary full column name on the left side of this section and the data dictionary terse column name on the right side.

3.31.3.4.8 Technical Description

The technical description section includes comments which address technical aspects of the stored command, including joins between database tables, secondary indices necessary for performance enhancement, SQL anomalies which affect the query, or other information which assists query maintenance.

3.31.3.4.9 Content of Stored Command File Query Section

The content of the query section of the stored command file is detailed in the subsection below.

3.31.3.4.9.1 Query

The query section of the stored command file immediately follows the header section of the file. The first line of the query section is a front-end command to the SQL utility which displays a message to the screen indicating the name of the stored command being loaded. This line shall be:

```
%display Procedure: Loading Stored Command: name
```

where *name* indicates the database terse name (same as the stored command keyword value in the file header block) for the stored command. The next line of the query section shall be:

```
drop name
```

where *name* indicates the database terse name for the stored command. The next line of the query section shall be:

```
store name
```

where *name* indicates the database terse name for the stored command. This SQL command begins the actual definition of the stored command to the database server. The following lines consist of the SQL commands necessary to define the database queries required to implement the desired catalog view. Then, the next line of the query section shall be:

```
end store
```

which completes the actual definition of the stored command. The final line of the query section allows any database user to run the stored command:

```
grant start on name to public
```

where *name* indicates the database terse name for the stored command.

3.31.3.5 Loading Modified or New Stored Command onto Database Server

Upon completion of modification to an existing stored command or the creation of a new stored command, the stored command must be loaded into a target database. The SQL commands in the stored command file first destroys any prior versions of the stored command in the target database, thus existing stored commands are replaced by the new version. For creation of new stored commands, no previous version exists and a meaningless error message is generated which indicates that an "object was not found". The loading of the stored command is performed by the Sharebase VAX SQL utility; the utility parses the queries contained in the stored command file and stores a compiled version of the queries in the target database. The stored command is then referenced in that target database by the terse name which was indicated by the store command.

3.31.3.6 Check-in of Stored Command File to Configuration Management

Upon completion of modifications to an existing stored command file or creation of a new stored command file and successfully loading the stored command to the database server, the file shall be returned to the PDS Configuration Management Coordinator as described in the *PDS Software Management Plan*. As part of this step, the database changes shall be identified on a PDS DataBase Change Notice (DBCN) form which is submitted to the Configuration Management Coordinator along with the stored command file. The Data Engineer shall return the file to the Configuration Management Coordinator with the use of the DCL "copy" command. Any copies of the file which were created during this procedure shall be considered obsolete and deleted; a fresh copy of the file shall be checked out from the PDS Configuration Management Coordinator for any future modification or loading of the stored command.

3.31.4 Data Flow Diagram

This procedure supports the Maintain PDS Meta Data segment (F-1.4.5) in DFD 1.4. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

PDS Data Administration Procedure

3.32 Template Generation

3.32.1 General Information

Planetary Data System (PDS) Catalog Templates form part of the data submission package which is sent to PDS data suppliers. These templates are forms which the data supplier uses to submit catalog data into the PDS catalog. Templates are grouped in categories; the data set category contains several templates, ordered hierarchically, which are required for submission of information pertaining to science data sets. In addition to facilitating data submission from the user's perspective, the templates provide a mechanism for structured data submittal which allows an automated catalog loading process. The structure and content of the templates directly reflect the PDS data model and its physical implementation, the catalog database. The structure and content of the templates are defined in several tables in the PDS Data Dictionary; the template file which is used during the data submission process is produced from this information through the use of the PDS Database Administration (DBA) template generation utility as described below. Because the templates are dependent on the catalog database schema, they must be maintained in synchronization with the schema (Catalog Schema Updates procedure of this document). This procedure documents the generation of the template file by use of the tmpltgen DBA utility.

The tmpltgen utility produces a file named "template.txt" in the current directory from which the utility is run. This file contains every PDS template category, ordered alphabetically as follows:

- (1.) template categories which contain multiple templates
- (2.) template categories which contain a single template

The template file may be edited to remove template categories not required in a data submission package.

3.32.2 Policy

- (1.) Template generation shall be performed by the PDS Database Administrator.
- (2.) Catalog templates shall be generated from information which is stored and managed within the PDS Data Dictionary.
- (3.) Catalog templates shall be generated with the use of the tmpltgen utility.
- (4.) Any changes to catalog template structure or format shall be implemented by modifications to the tmpltgen utility.

3.32.3 Procedure

- (1.) Log onto the JPLPDS VAX under the account of the Database Administrator.
- (2.) Move to the directory containing the tmpltgen.exe utility with the DCL "set default" command.
- (3.) Type "run tmpltgen" from the DCL prompt.
- (4.) Optionally, to make the file readable by any user, type "set prot=(w:re) template.txt" from the DCL prompt.
- (5.) The Central Node Data Administrator shall select the applicable template sets using the generated complete set. The selected template sets are then distributed to the Discipline Nodes.

3.32.4 Data Flow Diagram

This procedure supports the Send Data Set Submission Package segment (F-1.4.2) in DFD 1.4. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

PDS Data Administration Procedure

3.33 Template Review

3.33.1 General Information

Planetary Data System (PDS) Catalog Templates form part of the Data Set Submission package which is sent to the Discipline Node. These templates are forms which the data supplier uses to submit catalog data into the PDS catalog. In addition to facilitating data submission from the user's perspective, the templates provide a mechanism for structured data submittal which allows an automated data loading process. The structure and content of the templates directly reflects the PDS data model and its physical implementation, the catalog database. The structure and content of the templates are defined in several tables in the PDS data dictionary. The template sets used during the Peer Review Preparation procedure are produced from this data dictionary information through the use of a PDS Template generation utility described in the Template Generation procedure. Because the templates are dependent upon the catalog database schema, they must be maintained in synchronization with the schema Standard Data Dictionary of this document.

3.33.2 Policy

Catalog templates shall be the primary source of input data for the PDS Catalog which are managed by the PDS Data Administrator.

3.33.3 Procedure

This template review procedure is only part of the complete procedure to ingest data into the catalog. What follows are the minimum steps required to prepare the template for loader software processing.

(1.) Receive Template

The completed catalog template(s) arrive by electronic mail, magnetic tape, or a floppy disk from the Discipline Node. Depending on the media received, the PDS Data Administrator shall copy to the data to a disk device on the JPLPDS VAX.

(a.) Store template in the Discipline Directory

The template file is moved to a Data Administrator specified directory that is associated with the discipline submitting the data. Doing this helps to maintain an organized structure for the storage of the received templates. For example, a template received from the Plasma Interactions Node would be moved to the FANDP data directory.

(2.) Review Template Contents

Once the template(s) are loaded into the appropriate directory, the VAX editor shall be used to correct any obvious errors. After careful inspection and corrections, if any, the template shall be saved as a new version.

(a.) Check Syntax

The following are specific areas of inspection that shall be performed:

- (i.) Text fields that contain blanks shall be enclosed within double quotes.
- (ii.) The template hierarchy, expected templates, shall be compared to the hierarchy listed in the beginning template description.
- (iii.) The corrected template shall be saved as a new version. The old version shall be deleted after the data has passed the peer review.

3.33.4 Data Flow Diagram

This procedure supports the Review Templates segment (F-1.7.1) in DFD 1.7. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

PDS Data Administration Procedure

3.34 Template Validation

3.34.1 General Information

Planetary Data System (PDS) Catalog Templates form part of the data submission package which is sent to Discipline Node. These templates are forms which the data supplier uses to submit catalog data into the PDS catalog. In addition to facilitating data submission from the user's perspective, the templates provide a mechanism for structured data submittal which allows an automated data loading process. The structure and content of the templates directly reflects the PDS data model and its physical implementation, the catalog database. The structure and content of the templates are defined in several tables in the PDS Data Dictionary; the template file which is used during the data submission process is produced from this information through the use of a PDS Database Administration (TDBA) Template generation utility. Because the templates are dependent on the catalog database schema, they must be maintained in synchronization with the Catalog Schema Update procedure of this document).

This procedure documents the validation of the template data and the SQL statements generation performed by the *loader software*.

3.34.2 Policy

Catalog templates shall be processed by use of the loader software.

3.34.3 Procedure

Prior to this procedure, the catalog templates are reviewed and corrected using the Template Review procedure. The *loader software* produces four (4) files in the current directory from which the software is run. In addition, a Validation Report is generated that lists all detected errors and template statements processed. The *loader software* uses the template filename previously retrieved from the command file to build the filenames used for the output files described below:

- (1.) The filename.SQL file contains SQL Insert commands used for the actual loading of data into a database.
- (2.) The filename.DEL file contains SQL Delete commands used if the need arises to unload data from a database.
- (3.) The filename.RPT file contains the Template Loader Summary report created during the processing of the templates database.
- (4.) The filename.SAV file contains the contents of the two work tables: kwdctltbl and txtctltbl. This files may be helpful in debugging any logic problems within the *loader software*.

The data loading software used is only part of the complete procedure to ingest data into the catalog. What follows are the minimum steps required to process one or more catalog templates using the loader software.

(1.) Run Loader

The following steps are required to run the *loader software*:

- (a.) Create a .COM file to run the *loader software* as a batch job on the VAX. The following are the minimum required statements to be used to submit the .COM file as a batch job:
 - (i.) Create a logical to use current version of loader.exe
 - (ii.) Set up the default directory that points to the directory containing the template file.
 - (iii.) Set up a process logical "LOAD_DB" to point to the database against which the template is being validated. This is done with the VAX command "AS-SIGN databasename LOAD_DB".
 - (iv.) Create a command that runs the *loader software*.
 - (v.) Set up the program parameters normally prompted for by the the *loader software*.

The following is a sample of a .COM file to be submitted as a batch file:

```
$ loader := run loader.exe
$ set def public:[mchapoton.pds.tpt]
$ assign "pdsdet" LOAD_DB
$ loader
spacecraft
JPL, Mike Martin
vg1
n
```

The four(4) entries after the "\$ loader" line in the above example are the parameters expected by the *loader software*. The following are the values to be substituted for each template process:

- (i.) Starting Template Name
- (ii.) Organization, Supplier Name
- (iii.) Template Filename

The name of the VAX file containing the template(s) with the suffix .TPT appended to the filename.

- (iv.) Y or N

This switch instructs the *loader software* on whether or not to create the SQL INSERT statements. This is set to the value "N" initially until all errors are corrected; then, it is set to the value "Y".

- (b.) Submit the job to the VAX with the VAX command, "submit filename" where filename is the name of the .COM file.

(2.) Review Log File from Job

The *loader software*, when run as a batch job, creates a .LOG file that shall be reviewed as follows:

- (a.) Are there any VAX VMS errors? If so, correct the .COM file and resubmit the job
- (b.) Are there any *loader software* errors? These errors/warnings are lines in the .LOG file that begin with "DEBUG" followed by a message. If so, print this listing to compare later to the input template.
- (c.) Is there a message "Successful Completion" as the last message in the .LOG file? If so, then the *loader software* completed without a abnormal end.

(3.) Review Report from Loader

The *loader software*, while processing templates generates various messages, both error messages and informative messages, that are written to a file with the same name as the input template but with a filename extension of .RPT. This file shall be reviewed carefully by the Central Node Data Administrator and Data Engineer with all warnings and errors investigated. In some cases, the *loader software* or the template mapping in the data dictionary must be changed to correct the error. Because of this possibility, a programmer with a knowledge of "C" and the database data dictionary shall be available to correct the problem.

(a.) Discuss Errors with Responsible Science Interface

The following are the common types of errors that must be resolved by the PDS Data Administrator and the person(s) responsible for the contents of the template(s). These types of errors are common because of the constantly changing requirements of new data sets, instruments, and other scientific data.

(i.) Standard Values

These values, maintained in the data dictionary, must be reviewed when a new value is included within the template. Some values will need to go through Peer Review. When the final loading of the Peer Reviewed catalog data is performed, the Catalog Standard Values and Database Referential Integrity procedures are performed.

(ii.) N/A fields

Often, template values are filled in with the the value "N/A" which may or may not be an error. If the value is used as a key in any of the PDS catalog

tables, then this template is either (1) deleted, or (2) corrected, or (3) loaded with "N/A" value to support the relational user views.

(iii.) UNK fields

Often, template values are filled in the the value "UNK" which may or may not be an error. If the value is used as a key in any of the PDS catalog tables, then this template is either (1) deleted, or (2) corrected, or (3) loaded with the "UNK" value to support the relational user views.

(iv.) Missing Templates/Data

Data is often, either not known or missing completely, and after discussion with the data supplier, may be either (1) deleted, or (2) corrected.

(b.) Correct Template and Rerun

After all the errors have been addressed, the template shall be corrected by the PDS Data Administrator and the *loader software* rerun as described above.

(4.) Review Inserts

The *loader software*, while processing templates, creates SQL INSERT commands that are written to a file with the same name as the input template, but with a filename extension of .SQL. This file shall be reviewed carefully by the PDS Data Administrator with all missing values accounted for. Any missing data must be either (1) corrected, or (2) the Insert must be deleted. Because of this possibility, a knowledge of SQL and familiarity with the database structure and the *loader software* is required to diagnose and correct the problem.

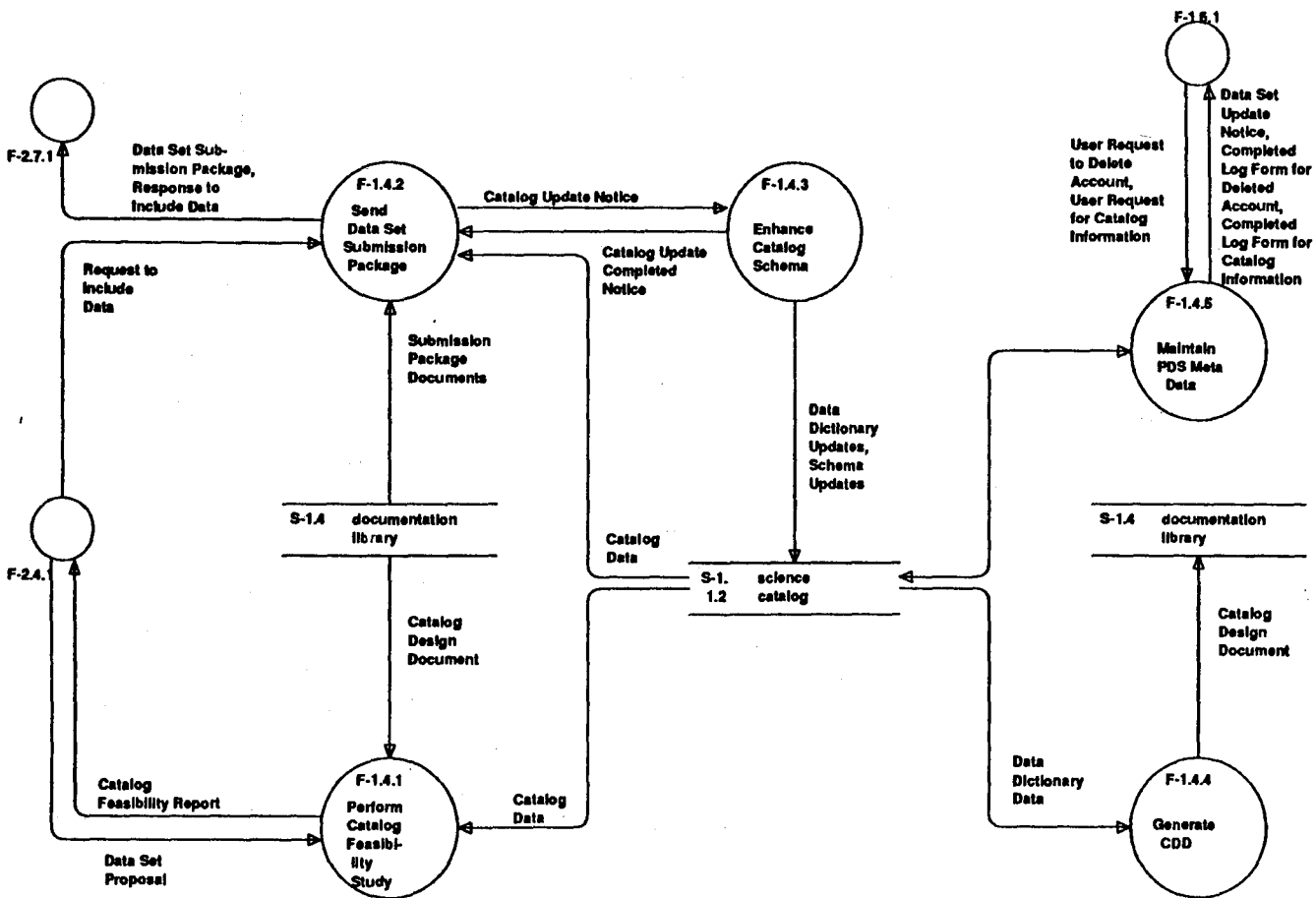
Empty arguments within the SQL commands may or may not be errors. The summary report should be available to resolve this question. If the missing data is not acceptable, then the entire SQL Insert statement shall be deleted from the file.

If the errors are caused by the template input file, then the template shall be corrected by the PDS Data Administrator and the *loader software* rerun.

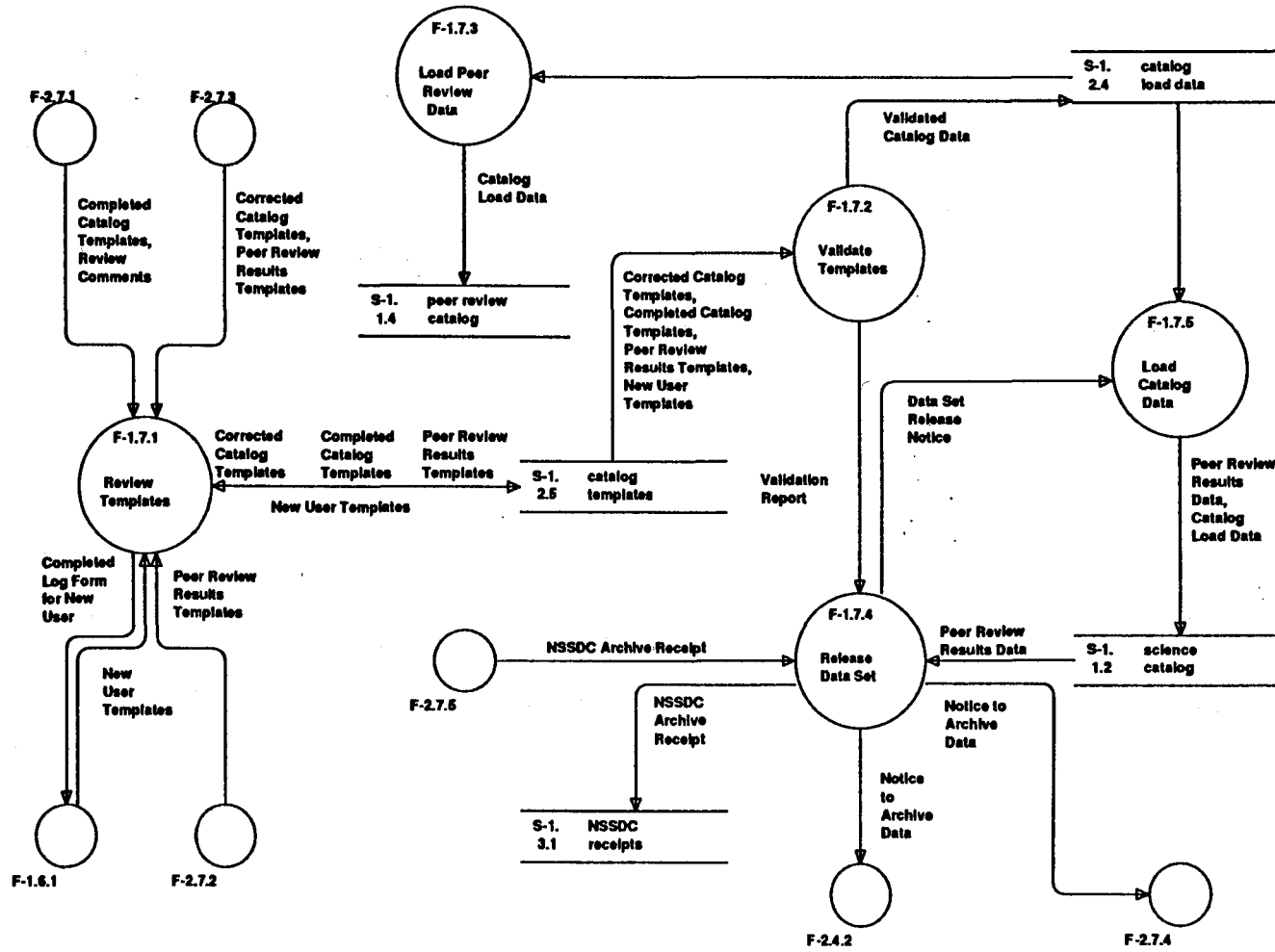
3.34.4 Data Flow Diagram

This procedure supports the Validate Templates segment (F-1.7.2) in DFD 1.7. Appendix A contains the Prepare Data and Administer Data data flow diagrams.

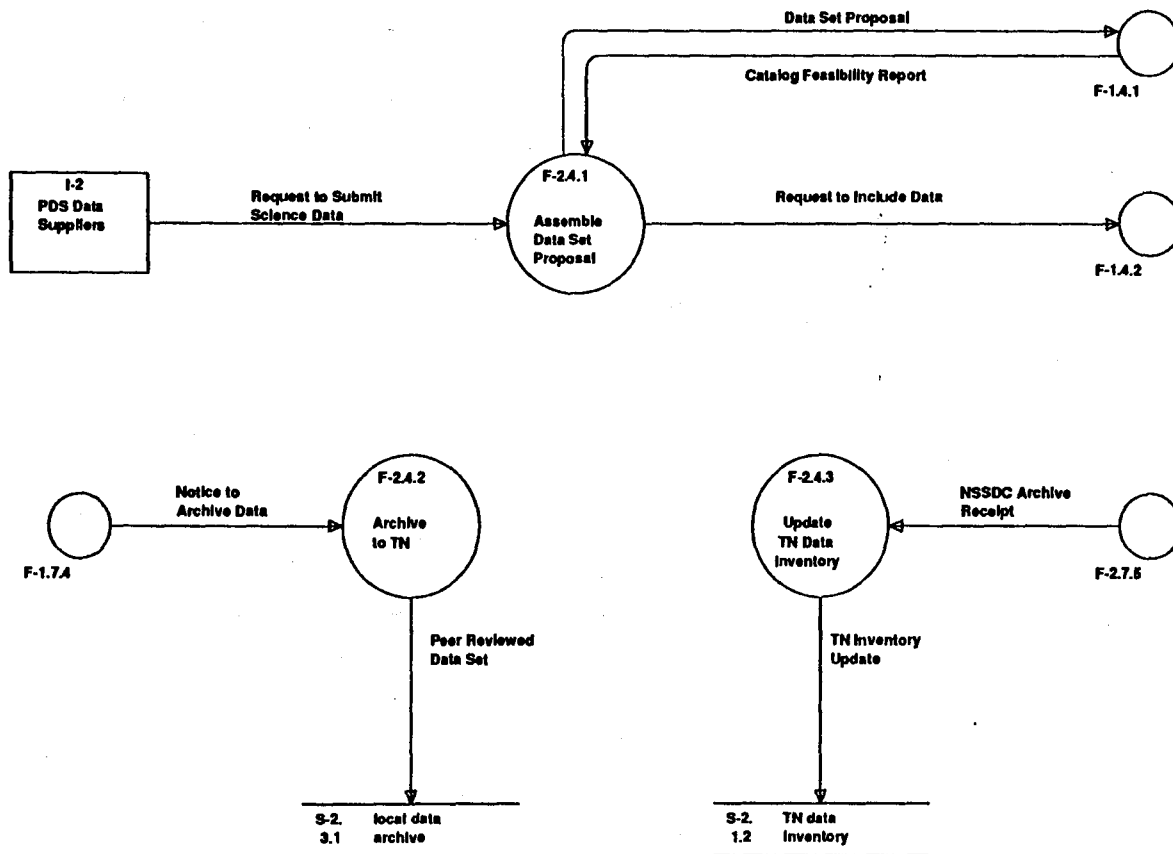
1.4 ADMINISTER DATA (CN)



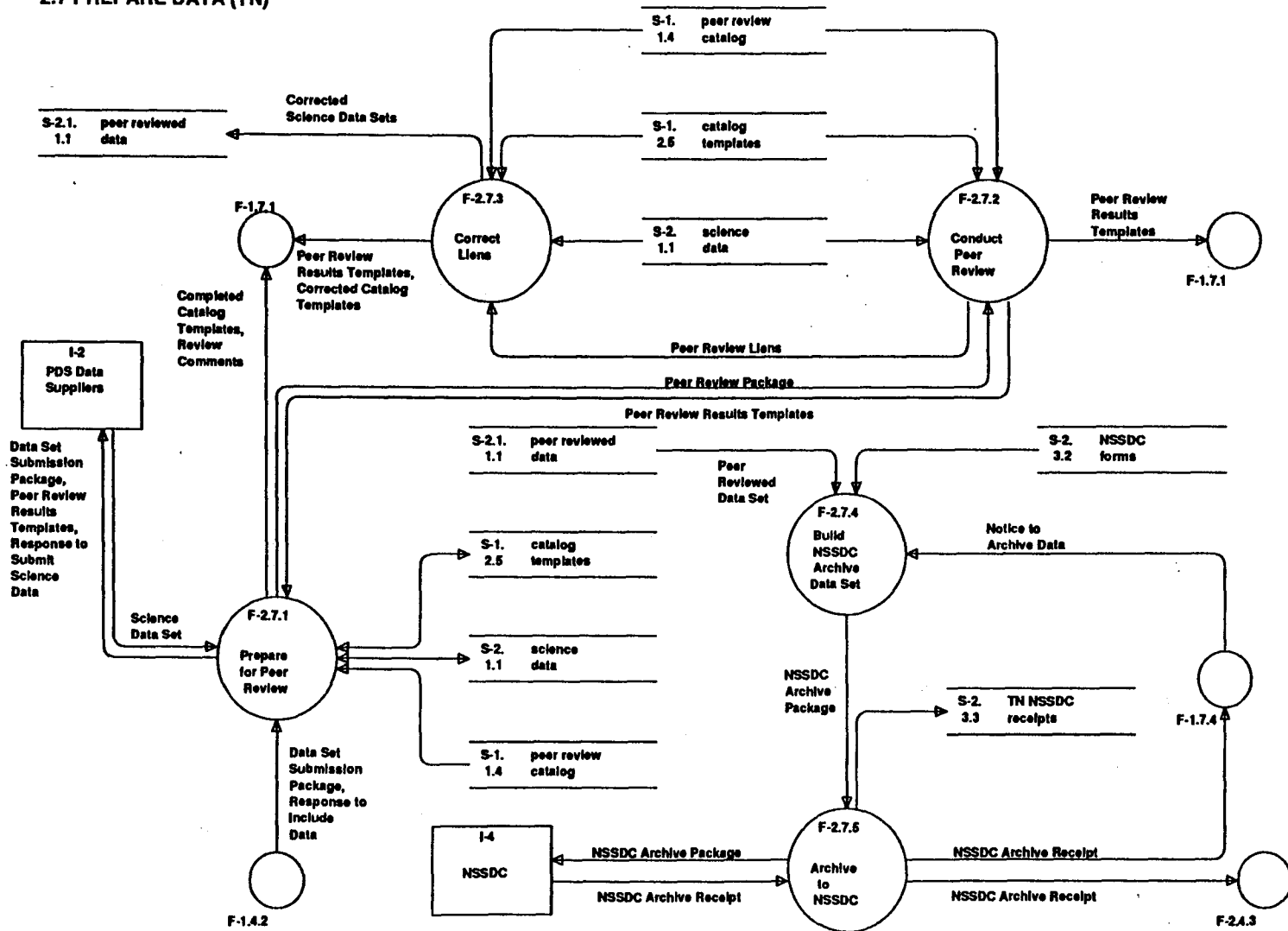
1.7 PREPARE DATA (CN)



2.4 ADMINISTER DATA (TN)



2.7 PREPARE DATA (TN)



Appendix B

PDS Data Ingestion Matrices

The purpose of these data ingestion matrices is to provide the different players of the data ingestion tasks with a easy lookup mechanism to determine which activities they need to be involved in and with whom they will interface.

Even though these matrices provide entry points and steps for the Data Administration Plan (DAP) procedures, they do not provide all the details necessary to complete a procedure or a step within a procedure. Please refer to the appropriate DAP procedure listed in the matrix for details.

The DAP Data Ingestion procedures are ordered in the sequence in which they should occur from beginning to end in the natural course of the data ingestion task. Sometimes a DAP procedure will occur more than once in the process; however, the values for the sub-procedure, initiated by, or result will be different. This implies that a single DAP procedure can have multi-entry points. However, the timing is important since not all entry points are valid at all times. They are dependent upon the completion of other activities. Additionally, there may be the absence of a DAP procedure in the player's matrix; this simply means that the player is not involved in that aspect of the task.

There is a matrix for each of the following players: the Discipline Node (DN), the Data Supplier (DS), the Peer Review Committee (PRCOMM) (which some of the other players may be on), the Data Administrator (DA-CN), Data Engineer (DE-CN) and Database Administrator (DBA-CN) at the Central Node. Additionally, there are three other players that will appear in the interface list: NSSDC, PDS Mangement Council (PDSMC), and the PSDSG.

Each matrix provides the following:

(1.) DAP Procedure

The name of the relevant DAP Procedure.

(2.) Sub Procedure

A brief listing of the steps needed to be performed to complete a DAP procedure. For further details, refer to the DAP Procedure.

(3.) Initiated by

This is the required input of a given procedure or sub-procedure. This action must occur prior to the start of the procedure. If the term "flow" appears, then that implies no specific input is required other than the completion of the previous step.

(4.) Result

This is the required output of a given procedure or sub-procedure. A result may be another DAP procedure.

(5.) Interfaces

This list the player(s) who need to be involved at each of the steps.

Additionally, there is an overall matrix that will list all of the DAP data ingestion procedures, provide the mappings of these procedures to their corresponding Data Flow Diagram (DFD) segments and Computer Software Configuration Item (CSCI) Functions, and list all the players involved.

B.1 Overall

CSCI FUNCTION	DFD SEGMENT	DAP PROCEDURE	SUB PROCEDURE	INITIATED BY	RESULT	INTERFACES
17 Administer Data DN	Assemble Data Set Proposal	Data Set Proposal	Compile Relevant Data Set Info	Request To Submit Sci Data		DA-CN DE-CN DN DS
18 Administer Data DN	Assemble Data Set Proposal	Data Set Proposal	Pre Prioritize Data Sets	flow		DN DS PDSMC
19 Administer Data DN	Assemble Data Set Proposal	Data Set Proposal	Assemble Data Set Proposal & send to CN	flow	Data Set Proposal	DN DS
20 Administer Data CN	Perform Catalog Feasibility Study	Data Set Feasibility Study	Determine Catalog Changes	Data Set Proposal		DA-CN DBA-CN DE-CN DN
21 Administer Data CN	Perform Catalog Feasibility Study	Data Set Feasibility Study	Generate Report & send to DN	flow	Catalog Feasibility Report	DA-CN DBA-CN DE-CN
22 Administer Data DN	Assemble Data Set Proposal	Data Set Proposal	Final Prioritized list of Data Sets	Catalog Feasibility Report		DA-CN DN DS PDSMC
23 Administer Data DN	Assemble Data Set Proposal	Data Set Proposal	Generate Request To Include Data & send to-CN	flow	Request To Include Data	DN
24 Administer Data CN	Send Data Set Submission Package	Data Set Submission Package	Generate Catalog Update Notice	Request To Include Data	Catalog Update Notice	DA-CN DE-CN
25 Administer Data CN	Enhance Catalog Schema	Catalog Schema Updates	Review Feasibility Report	Catalog Update Notice		DBA-CN DE-CN
26 Administer Data CN	Enhance Catalog Schema	Catalog Schema Updates	Perform Database Modifications	flow		DBA-CN DE-CN
27 Administer Data CN	Enhance Catalog Schema	Catalog Schema Updates	Generate Catalog Update Completed Notice	flow	Catalog Update Completed Notice	DBA-CN
28 Administer Data CN	Send Data Set Submission Package	Data Set Submission Package	Generate Data Set Submission Package & send to DN	Catalog Update Completed Notice	Data Set Submission Package	DE-CN

CSCI FUNCTION	DFD SEGMENT	DAP PROCEDURE	SUB PROCEDURE	INITIATED BY	RESULT	INTERFACES
29 Administer Data CN	Send Data Set Submission Package	Data Set Submission Package	Generate Response to Include Data & send to DN	flow	Response To Include Data	DE-CN
30 Prepare Data DN	Prepare For Peer Review	Peer Review Preparation	Send Response To Include Data to DS	Response To Include Data & DS Subm Pkg		DN
31 Prepare Data DN	Prepare For Peer Review	Peer Review Preparation	Complete Catalog Templates	flow		DN DS
32 Prepare Data DN	Prepare For Peer Review	Peer Review Preparation	Receive Science Data Set Package from DS	flow		DN DS
33 Prepare Data DN	Prepare For Peer Review	Peer Review Preparation	Submit completed catalog templates	flow	Completed Catalog Templates	DE-CN DN
34 Prepare Data CN	Review Templates	Template Review	Store catalog templates	Completed Catalog Templates		DBA-CN DE-CN
35 Prepare Data CN	Validate Templates	Template Validation	Review and Edit Templates	flow		DBA-CN DE-CN DN
36 Prepare Data CN	Validate Templates	Template Validation	Store Corrected Templates	flow		DBA-CN
37 Prepare Data CN	Validate Templates	Template Validation	Process templates and print report	flow	Summary Report	DBA-CN DE-CN DN
38 Prepare Data CN	Load Peer Review Data	Data Loading - SQL	Review SQL stmts generated by Loader	flow		DBA-CN
39 Prepare Data CN	Load Peer Review Data	Data Loading - SQL	Perform Test Load	flow		DBA-CN
40 Prepare Data CN	Load Peer Review Data	Data Loading - SQL	Perform Actual Load	flow		DBA-CN
41 Prepare Data CN	Load Peer Review Data	Data Loading - SQL	Send copies of loaded catalog templates to PRCOMM	flow	Loaded Catalog Templates	DBA-CN DE-CN

CSCI FUNCTION	DFD SEGMENT	DAP PROCEDURE	SUB PROCEDURE	INITIATED BY	RESULT	INTERFACES
42 Prepare Data DN	Prepare For Peer Review	Peer Review Preparation	Determine Peer Review Committee	flow	Committee Roster	DA-CN DE-CN DN DS PRCOMM
43 Prepare Data DN	Prepare For Peer Review	Peer Review Preparation	Develop Peer Review Schedule	flow	Peer Review Schedule	DA-CN DN PRCOMM
44 Prepare Data DN	Prepare For Peer Review	Peer Review Preparation	Review Science Data Sets	flow	Peer Review Comments	DN DS PRCOMM
45 Prepare Data DN	Prepare For Peer Review	Peer Review Preparation	Review Catalog Templates	Receive Loaded Catalog Templates	Peer Review Comments	DE-CN DN DS PRCOMM
46 Prepare Data DN	Prepare For Peer Review	Peer Review Preparation	Review SFDU Headers and PDS Labels	flow	Peer Review Comments	DN DS PRCOMM
47 Prepare Data DN	Prepare For Peer Review	Peer Review Preparation	Review PDS Peer Review Catalog	flow	Peer Review Comments	DE-CN DN DS PRCOMM
48 Prepare Data DN	Prepare For Peer Review	Peer Review Preparation	Prepare Peer Review Package	Peer Review Comments	Peer Review Package	DN DS
49 Prepare Data DN	Conduct Peer Review	Peer Review	Review PDS Peer Review Catalog	Peer Review Schedule & Peer Review Pkg.	List of liens, if any.	PRCOMM
50 Prepare Data DN	Conduct Peer Review	Peer Review	Review Science data sets or samples	Peer Review Schedule	List of liens, if any.	PRCOMM
51 Prepare Data DN	Conduct Peer Review	Peer Review	Review Catalog Templates	Peer Review Schedule	List of liens, if any.	PRCOMM
52 Prepare Data DN	Conduct Peer Review	Peer Review	Review Balance of Peer Review Package	Peer Review Schedule	List of liens, if any.	PRCOMM
53 Prepare Data DN	Conduct Peer Review	Peer Review	Generate Preliminary Peer Review Results Template	Flow	Preliminary Peer Review Results Data	PRCOMM
54 Prepare Data DN	Conduct Peer Review	Peer Review	Compile all Liens	List of liens, if any.	Peer Review Liens	PRCOMM

CSCI FUNCTION	DFD SEGMENT	DAP PROCEDURE	SUB PROCEDURE	INITIATED BY	RESULT	INTERFACES
55 Prepare Data DN	Prepare For Peer Review	Peer Review Preparation	Generate Response To Submit Sci Data & send to DS	Peer Review Results Data	Response To Submit Sci Data	DN DS
56 Prepare Data DN	Correct Liens	Peer Review Liens	Correct Science Data Liens	Peer Review Liens		DN DS
57 Prepare Data DN	Correct Liens	Peer Review Liens	Correct catalog template Liens	Peer Review Liens		DN DS
58 Prepare Data DN	Correct Liens	Peer Review Liens	Correct PDS label liens	Peer Review Liens		DN DS
59 Prepare Data DN	Correct Liens	Peer Review Liens	Correct SFDU header liens	Peer Review Liens		DN DS
60 Prepare Data DN	Correct Liens	Peer Review Liens	Generate Final Peer Review Results Template	flow	Final Peer Review Results Template	PRCOMM
61 Prepare Data CN	Release Data Set	Data Set Release	Review the final Validation Report	Peer Review Results Data		DA-CN DBA-CN DE-CN
62 Prepare Data CN	Release Data Set	Data Set Release	Review Peer Review Results	flow		DA-CN DE-CN
63 Prepare Data CN	Release Data Set	Data Set Release	Generate Notice to Archive Data & send to DN	flow	Notice To Archive Data	DA-CN DE-CN
64 Prepare Data DN	Build NSSDC Archive Data Set	Data Set Archive Build	Complete archive DS with SFDU and Labels	Notice To Archive Data		DN
65 Prepare Data DN	Build NSSDC Archive Data Set	Data Set Archive Build	Complete NSSDC forms	flow		DN
66 Prepare Data DN	Build NSSDC Archive Data Set	Data Set Archive Build	Prepare NSSDC Archive Package	flow	NSSDC Archive Package	DN
67 Prepare Data DN	Archive to NSSDC	NSSDC Archive	Send Archive Package to NSSDC	NSSDC Archive Package	NSSDC Archive Package	DN NSSDC

CSCI FUNCTION	DFD SEGMENT	DAP PROCEDURE	SUB PROCEDURE	INITIATED BY	RESULT	INTERFACES
68 Administer Data DN	Archive to TN	Discipline Node Archive	Archive peer reviewed Data Set	Notice to Archive Data		DN
69 Administer Data DN	Archive to TN	Discipline Node Archive	Generate Inventory Update Notice	flow	Inventory Update Notice	DN
70 Prepare Data DN	Archive to NSSDC	NSSDC Archive	Store NSSDC Archive Receipt	NSSDC Archive Receipt		DN NSSDC
71 Prepare Data DN	Archive to NSSDC	NSSDC Archive	Forward NSSDC Archive Receipt to CN	flow	NSSDC Archive Receipt	DBA-CN DN
72 Administer Data DN	Update TN Data Inventory	Discipline Node Inventory	Update the TN Data Inventory	NSSDC Archive Receipt & Inv Update Note		DN
73 Prepare Data CN	Release Data Set	Data Set Release	Store NSSDC Archive Receipt	NSSDC Archive Receipt		DBA-CN
74 Prepare Data CN	Release Data Set	Data Set Release	Generate Data Set Release Notice	flow	Data Set Release Notice	DA-CN DE-CN
75 Prepare Data CN	Load Catalog Data	Data Loading - SQL	Review SQL stmts generated by Loader	Data Set Release Notice		DBA-CN
76 Prepare Data CN	Load Catalog Data	Data Loading - SQL	Perform Test Load of SQL stmts	flow		DBA-CN
77 Prepare Data CN	Load Catalog Data	Data Loading - SQL	Perform Actual Load	flow		DBA-CN

B.2 Discipline Node

DAP PROCEDURE	SUB PROCEDURE	INITIATED BY	RESULT	INTERFACES
17 Data Set Proposal	Compile Relevant Data Set Info	Request To Submit Sci Data		DA-CN DE-CN DN DS
18 Data Set Proposal	Pre Prioritize Data Sets	flow		DN DS PDSMC
19 Data Set Proposal	Assemble Data Set Proposal & send to CN	flow	Data Set Proposal	DN DS
20 Data Set Feasibility Study	Determine Catalog Changes	Data Set Proposal		DA-CN DBA-CN DE-CN DN
22 Data Set Proposal	Final Prioritized list of Data Sets	Catalog Feasibility Report		DA-CN DN DS PDSMC
23 Data Set Proposal	Generate Request To Include Data & send to CN	flow	Request To Include Data	DN
30 Peer Review Preparation	Send Response To Include Data to DS	Response To Include Data & DS Subm Pkg		DN
31 Peer Review Preparation	Complete Catalog Templates	flow		DN DS
32 Peer Review Preparation	Receive Science Data Set Package from DS	flow		DN DS
33 Peer Review Preparation	Submit completed catalog templates	flow	Completed Catalog Templates	DE-CN DN
35 Template Validation	Review and Edit Templates	flow		DBA-CN DE-CN DN
37 Template Validation	Process templates and print report	flow	Summary Report	DBA-CN DE-CN DN
42 Peer Review Preparation	Determine Peer Review Committee	flow	Committee Roster	DA-CN DE-CN DN DS PRCOMM

DAP PROCEDURE	SUB PROCEDURE	INITIATED BY	RESULT	INTERFACES
43 Peer Review Preparation	Develop Peer Review Schedule	flow	Peer Review Schedule	DA-CN DN PRCOMM
44 Peer Review Preparation	Review Science Data Sets	flow	Peer Review Comments	DN DS PRCOMM
45 Peer Review Preparation	Review Catalog Templates	Receive Loaded Catalog Templates	Peer Review Comments	DE-CN DN DS PRCOMM
46 Peer Review Preparation	Review SFDU Headers and PDS Labels	flow	Peer Review Comments	DN DS PRCOMM
47 Peer Review Preparation	Review PDS Peer Review Catalog	flow	Peer Review Comments	DE-CN DN DS PRCOMM
48 Peer Review Preparation	Prepare Peer Review Package	Peer Review Comments	Peer Review Package	DN DS
55 Peer Review Preparation	Generate Response To Submit Sci Data & send to DS	Peer Review Results Data	Response To Submit Sci Data	DN DS
56 Peer Review Liens	Correct Science Data Liens	Peer Review Liens		DN DS
57 Peer Review Liens	Correct catalog template liens	Peer Review Liens		DN DS
58 Peer Review Liens	Correct PDS label liens	Peer Review Liens		DN DS
59 Peer Review Liens	Correct SFDU header liens	Peer Review Liens		DN DS
64 Data Set Archive Build	Complete archive DS with SFDU and Labels	Notice To Archive Data		DN
65 Data Set Archive Build	Complete NSSDC forms	flow		DN
66 Data Set Archive Build	Prepare NSSDC Archive Package	flow	NSSDC Archive Package	DN

DAP PROCEDURE	SUB PROCEDURE	INITIATED BY	RESULT	INTERFACES
67 NSSDC Archive	Send Archive Package to NSSDC	NSSDC Archive Package	NSSDC Archive Package	DN NSSDC
68 Discipline Node Archive	Archive peer reviewed Data Set	Notice to Archive Data		DN
69 Discipline Node Archive	Generate Inventory Update Notice	flow	Inventory Update Notice	DN
70 NSSDC Archive	Store NSSDC Archive Receipt	NSSDC Archive Receipt		DN NSSDC
71 NSSDC Archive	Forward NSSDC Archive Receipt to CN	flow	NSSDC Archive Receipt	DBA-CN DN
72 Discipline Node Inventory	Update the TN Data Inventory	NSSDC Archive Receipt & Inv Update Note		DN

B.3 Data Supplier

DAP PROCEDURE	SUB PROCEDURE	INITIATED BY	RESULT	INTERFACES
17 Data Set Proposal	Compile Relevant Data Set Info	Request To Submit Sci Data		DA-CN DE-CN DN DS
18 Data Set Proposal	Pre Prioritize Data Sets	flow		DN DS PDSMC
19 Data Set Proposal	Assemble Data Set Proposal & send to CN	flow	Data Set Proposal	DN DS
22 Data Set Proposal	Final Prioritized list of Data Sets	Catalog Feasibility Report		DA-CN DN DS PDSMC
31 Peer Review Preparation	Complete Catalog Templates	flow		DN DS
32 Peer Review Preparation	Receive Science Data Set Package from DS	flow		DN DS
42 Peer Review Preparation	Determine Peer Review Committee	flow	Committee Roster	DA-CN DE-CN DN DS PRCOMM
44 Peer Review Preparation	Review Science Data Sets	flow	Peer Review Comments	DN DS PRCOMM
45 Peer Review Preparation	Review Catalog Templates	Receive Loaded Catalog Templates	Peer Review Comments	DE-CN DN DS PRCOMM
46 Peer Review Preparation	Review SFDU Headers and PDS Labels	flow	Peer Review Comments	DN DS PRCOMM
47 Peer Review Preparation	Review PDS Peer Review Catalog	flow	Peer Review Comments	DE-CN DN DS PRCOMM
48 Peer Review Preparation	Prepare Peer Review Package	Peer Review Comments	Peer Review Package	DN DS
55 Peer Review Preparation	Generate Response To Submit Sci Data & send to DS	Peer Review Results Data	Response To Submit Sci Data	DN DS

DAP PROCEDURE	SUB PROCEDURE	INITIATED BY	RESULT	INTERFACES
56 Peer Review Liens	Correct Science Data Liens	Peer Review Liens		DN DS
57 Peer Review Liens	Correct catalog template liens	Peer Review Liens		DN DS
58 Peer Review Liens	Correct PDS label liens	Peer Review Liens		DN DS
59 Peer Review Liens	Correct SFDU header liens	Peer Review Liens		DN DS

B.4 Peer Review Committee

DAP PROCEDURE	SUB PROCEDURE	INITIATED BY	RESULT	INTERFACES
42 Peer Review Preparation	Determine Peer Review Committee	flow	Committee Roster	DA-CN DE-CN DN DS PRCOMM
43 Peer Review Preparation	Develop Peer Review Schedule	flow	Peer Review Schedule	DA-CN DN PRCOMM
44 Peer Review Preparation	Review Science Data Sets	flow	Peer Review Comments	DN DS PRCOMM
45 Peer Review Preparation	Review Catalog Templates	Receive Loaded Catalog Templates	Peer Review Comments	DE-CN DN DS PRCOMM
46 Peer Review Preparation	Review SFDU Headers and PDS Labels	flow	Peer Review Comments	DN DS PRCOMM
47 Peer Review Preparation	Review PDS Peer Review Catalog	flow	Peer Review Comments	DE-CN DN DS PRCOMM
49 Peer Review	Review PDS Peer Review Catalog	Peer Review Schedule & Peer Review Pkg.	List of liens, if any.	PRCOMM
50 Peer Review	Review Science data sets or samples	Peer Review Schedule	List of liens, if any.	PRCOMM
51 Peer Review	Review Catalog Templates	Peer Review Schedule	List of liens, if any.	PRCOMM
52 Peer Review	Review Balance of Peer Review Package	Peer Review Schedule	List of liens, if any.	PRCOMM
53 Peer Review	Generate Preliminary Peer Review Results Template	Flow	Preliminary Peer Review Results Data	PRCOMM
54 Peer Review	Compile all Liens	List of liens, if any.	Peer Review Liens	PRCOMM
60 Peer Review Liens	Generate Final Peer Review Results Template	flow	Final Peer Review Results Template	PRCOMM

B.5 Data Administrator - Central Node

DAP PROCEDURE	SUB PROCEDURE	INITIATED BY	RESULT	INTERFACES
2 Catalog Design Document	Publish and distribute and archive CDD	Request	CDD	DA-CN DBA-CN DE-CN
17 Data Set Proposal	Compile Relevant Data Set Info	Request To Submit Sci Data		DA-CN DE-CN DN DS
20 Data Set Feasibility Study	Determine Catalog Changes	Data Set Proposal		DA-CN DBA-CN DE-CN DN
21 Data Set Feasibility Study	Generate Report & send to DN	flow	Catalog Feasibility Report	DA-CN DBA-CN DE-CN
22 Data Set Proposal	Final Prioritized list of Data Sets	Catalog Feasibility Report		DA-CN DN DS PDSMC
24 Data Set Submission Package	Generate Catalog Update Notice	Request To Include Data	Catalog Update Notice	DA-CN DE-CN
42 Peer Review Preparation	Determine Peer Review Committee	flow	Committee Roster	DA-CN DE-CN DN DS PRCOMM
43 Peer Review Preparation	Develop Peer Review Schedule	flow	Peer Review Schedule	DA-CN DN PRCOMM
61 Data Set Release	Review the final Validation Report	Peer Review Results Data		DA-CN DBA-CN DE-CN
62 Data Set Release	Review Peer Review Results	flow		DA-CN DE-CN
63 Data Set Release	Generate Notice to Archive Data & send to DN	flow	Notice To Archive Data	DA-CN DE-CN
74 Data Set Release	Generate Data Set Release Notice	flow	Data Set Release Notice	DA-CN DE-CN

B.6 Data Engineer - Central Node

DAP PROCEDURE	SUB PROCEDURE	INITIATED BY	RESULT	INTERFACES
2 Catalog Design Document	Publish and distribute and archive CDD	Request	CDD	DA-CN DBA-CN DE-CN
17 Data Set Proposal	Compile Relevant Data Set Info	Request To Submit Sci Data		DA-CN DE-CN DN DS
20 Data Set Feasibility Study	Determine Catalog Changes	Data Set Proposal		DA-CN DBA-CN DE-CN DN
21 Data Set Feasibility Study	Generate Report & send to DN	flow	Catalog Feasibility Report	DA-CN DBA-CN DE-CN
24 Data Set Submission Package	Generate Catalog Update Notice	Request To Include Data	Catalog Update Notice	DA-CN DE-CN
25 Catalog Schema Updates	Review Feasibility Report	Catalog Update Notice		DBA-CN DE-CN
26 Catalog Schema Updates	Perform Database Modifications	flow		DBA-CN DE-CN
28 Data Set Submission Package	Generate Data Set Submission Package & send to DN	Catalog Update Completed Notice	Data Set Submission Package	DE-CN
29 Data Set Submission Package	Generate Response to Include Data & send to DN	flow	Response To Include Data	DE-CN
33 Peer Review Preparation	Submit completed catalog templates	flow	Completed Catalog Templates	DE-CN DN
34 Template Review	Store catalog templates	Completed Catalog Templates		DBA-CN DE-CN
35 Template Validation	Review and Edit Templates	flow		DBA-CN DE-CN DN
37 Template Validation	Process templates and print report	flow	Summary Report	DBA-CN DE-CN DN

DAP PROCEDURE	SUB PROCEDURE	INITIATED BY	RESULT	INTERFACES
41 Data Loading - SQL	Send copies of loaded catalog templates to PRCOMM	flow	Loaded Catalog Templates	DBA-CN DE-CN
42 Peer Review Preparation	Determine Peer Review Committee	flow	Committee Roster	DA-CN DE-CN DN DS PRCOMM
45 Peer Review Preparation	Review Catalog Templates	Receive Loaded Catalog Templates	Peer Review Comments	DE-CN DN DS PRCOMM
47 Peer Review Preparation	Review PDS Peer Review Catalog	flow	Peer Review Comments	DE-CN DN DS PRCOMM
61 Data Set Release	Review the final Validation Report	Peer Review Results Data		DA-CN DBA-CN DE-CN
62 Data Set Release	Review Peer Review Results	flow		DA-CN DE-CN
63 Data Set Release	Generate Notice to Archive Data & send to DN	flow	Notice To Archive Data	DA-CN DE-CN
74 Data Set Release	Generate Data Set Release Notice	flow	Data Set Release Notice	DA-CN DE-CN

B.7 Database Administrator - Central Node

DAP PROCEDURE	SUB PROCEDURE	INITIATED BY	RESULT	INTERFACES
2 Catalog Design Document	Publish and distribute and archive CDD	Request	CDD	DA-CN DBA-CN DE-CN
20 Data Set Feasibility Study	Determine Catalog Changes	Data Set Proposal		DA-CN DBA-CN DE-CN DN
21 Data Set Feasibility Study	Generate Report & send to DN	flow	Catalog Feasibility Report	DA-CN DBA-CN DE-CN
25 Catalog Schema Updates	Review Feasibility Report	Catalog Update Notice		DBA-CN DE-CN
26 Catalog Schema Updates	Perform Database Modifications	flow		DBA-CN DE-CN
27 Catalog Schema Updates	Generate Catalog Update Completed Notice	flow	Catalog Update Completed Notic	DBA-CN
34 Template Review	Store catalog templates	Completed Catalog Templates		DBA-CN DE-CN
35 Template Validation	Review and Edit Templates	flow		DBA-CN DE-CN DN
36 Template Validation	Store Corrected Templates	flow		DBA-CN
37 Template Validation	Process templates and print report	flow	Summary Report	DBA-CN DE-CN DN
38 Data Loading - SQL	Review SQL stmts generated by Loader	flow		DBA-CN
39 Data Loading - SQL	Perform Test Load	flow		DBA-CN
40 Data Loading - SQL	Perform Actual Load	flow		DBA-CN
41 Data Loading - SQL	Send copies of loaded catalog templates to PRCOMM	flow	Loaded Catalog Templates	DBA-CN DE-CN

DAP PROCEDURE	SUB PROCEDURE	INITIATED BY	RESULT	INTERFACES
61 Data Set Release	Review the final Validation Report	Peer Review Results Data		DA-CN DBA-CN DE-CN
71 NSSDC Archive	Forward NSSDC Archive Receipt to CN	flow	NSSDC Archive Receipt	DBA-CN DN
73 Data Set Release	Store NSSDC Archive Receipt	NSSDC Archive Receipt		DBA-CN
75 Data Loading - SQL	Review SQL stmts generated by Loader	Data Set Release Notice		DBA-CN
76 Data Loading - SQL	Perform Test Load of SQL stmts	flow		DBA-CN
77 Data Loading - SQL	Perform Actual Load	flow		DBA-CN

Appendix C

AIM and DIF Forms

AIMDM-1
NSSDC AIM FILE MATRIX FIELD INPUT
SHEET FOR DATA SET ENTRIES

Spacecraft Common Name:

VOYAGER 1

Review Cycle

Originator _____ Date _____
Agent Assigned _____ Date _____
Data Repos. _____ Date _____
Sys. Coord. _____ Date _____

D001 NSSDC DATA SET ID | | | | | | | | | | | | | | | |

D004¹ Data Set Personnel (DPER)

Card Columns
74 75 76 77 78 79

New Replace Row # ____ Replace Part of Row # ____

\$DPER = (_____)

\$XDTYPE = SO!
(Type Code)

\$XDTITL = DR.!
(Title)

\$XDINIT = R. J.!
(Initials)

\$XDLNAM = WALKER!
(Last Name)

\$XDAFFL = UNIVERSITY OF CALIF.!
(Current Affiliation)

\$XCITS = LOS ANGELES, CA!
(City and State)

New Replace Row # ____ Replace Part of Row # ____

\$DPER = (_____)

\$XDTYPE = | | | | | | | | | | | | | | | |

\$XDTITL = | | | | | | | | | | | | | | | |

\$XDINIT = | | | | | | | | | | | | | | | |

\$XDLNAM = | | | | | | | | | | | | | | | |

\$XDAFFL = | | | | | | | | | | | | | | | |

\$XCITS = | | | | | | | | | | | | | | | |

D002² NSSDC Data Set Name-Other Names (DSNAME)

New Replace Row # ____

\$DSNAME = (\$CODEN=NSSDC) MAGNETOMETER

\$DSNAME1=VOYAGER 1 INSTRUMENT RESAMPLED

\$DSNAME2=DIATIA 141-1A 151C

¹D004 - Data Set Personnel

XDTYPE - Personnel Type Code

<u>Code</u>	<u>Meaning</u>
PG	Programmer
CO	General Contact
SO	Data Source (Person Submitting Data)

XDTITL - Title

<u>Code</u>	<u>Meaning</u>	<u>Code</u>	<u>Meaning</u>
ADM	Admiral	LCOL	Lieutenant Colonel
BGEN	Brigadier General	LGEN	Lieutenant General
CAPT	Captain	LTJG	Lieutenant, junior grade
CDR	Commander	MAJ	Major
COL	Colonel	MGEN	Major General
1/LT	First Lieutenant	PROF.	Professor
GEN	General	RADM	Rear Admiral
GOV.	Governor	2/LT	Second Lieutenant
HON.	Honorable	SUPT.	Superintendent
LT	Lieutenant	VADM	Vice Admiral
LCDR	Lieutenant Commander	DR.	Doctor (M.D., Ph.D., etc.)
MR.	Mister	MRS.	Married Woman
SIR	Sir	MISS	Unmarried Woman

XDAFFL - Current Affiliation

See list of codes in Appendix G in AIM File Users Guide.

²D002 - NSSDC Data Set Name - Other Names

DCODEN - Source Code

The allowable codes are NSSDC, EXPER, or OTHER.

AIMDF-1

Spacecraft Common Name:

Review Cycle

NSSDC AIM DATA SET FIXED FIELD INPUT SHEET

VOYAGER

New Entry
 Add/Replace

Originator _____ Date _____
Agent Assigned _____ Date _____
Data Repos. _____ Date _____

D001 NSSDC DATA SET ID _____

D003A Data Set Name \$CDNAME= VGLJ-MAG-4-48-0SEC _____

D003B Data Set Contact \$DCONTC= WALKER _____

D027 Agent Group Code \$DGROUP= []!

D051A Experimenter's First Date of Data (MMDDYY) \$FPEREX= 09,21,88!

D028 Agent ID Code \$DAGENT= []!

D051B Experimenter's Last Date of Data (MMDDYY) \$LPEREX= 09,21,88!

D029 Agent Priority Code \$DPRIOR= []!

D052A NASA Headquarters Program Interest Area \$DHQINT= []!

D012A First Date of Data (MMDDYY) \$FPRIOD= 03,03,79!

D052B Type of Data Set \$DSTYPE= 4!

D012B Last Date of Data (MMDDYY) \$LPRIOD= 03,16,79!

D006A Availability Code \$AVAIL= []!

D006B Date of Change in Availability Code (MMDDYY) \$AVDATE= 1,0,31,89!

D046 Date, Form and Quantity of Data Received (DFQDAT)

New Replace Row # _____

Card Columns
74 75 76 77 78 79 80

\$DFQDAT -(\$DATERC= []! \$DAFORM= []! \$DSQNTY= []!)

M _____ 0 1

(This section is not for use by keypunch.)

D026 Data Set Materials for Distribution (DMATER) New Delete Add

M _____ 0 1

M _____ 0 2

D022 Data Set Miscellaneous Remarks (DREMRK) New Delete Existing Data and Add Add-on to Existing Data

633-54c (9/86)

D006A - Availability Code

<u>Code</u>	<u>Meaning</u>
A	Data at NSSDC Ready for Distribution
B	Data in Published Report(s)
C	Data at Another Center
D	Data at NSSDC Being Processed
E	Data at NSSDC Processing Deferred
F	Data Available from Experimenter
G	NSSDC Not Ready To Accept Data
H	Data Identified but Not Received
I	Data Exchange
J	Proprietary Data
K	Data Purged from NSSDC
L	Deleted Data Set

D006A - Availability Code (Continued)

<u>Code</u>	<u>Meaning</u>
M	Data at Another Center that NSSDC Processes
N	Mixed Proprietary and Nonproprietary Data
O	CDAW Proprietary Data

D052B - Type of Data Set

<u>Code</u>	<u>Meaning</u>
1	Data (Analyzed)
2	Data (Reduced)
3	Data (Reduced and Analyzed)
4	Catalog
5	Supporting Data
7	Other

D006B - Date of Change in Availability Code

The date of change is applicable for availability codes A, B, C, D, E, F, I, and M. The date of change has another meaning for the remaining availability codes. The meanings for the respective codes are:

G	Date that NSSDC received written notification of the experimenter's readiness to submit data.
H	Date the first data are expected to arrive.
J	Date the experimenter's exclusive rights to use the data will expire.
K	Date the data were purged from the NSSDC data base.
L	Date the data set was deleted from active records.

SAMPLE DIF

Entry_ID: VG1-J-MAG-4-48.0SEC
Entry_Title: VOYAGER 1 JUPITER MAGNETOMETER RESAMPLED DATA
48.0SEC
Start_date: 1979-03-03:00:00:35.978
Stop_date: 1979-03-16:23:59:56.185
Sensor_name: MAG>MAGNETOMETER
Source_name: VG1>VOYAGER 1
Group: Investigator

Last_name: NESS
First_name: NORMAN
Middle_name: F.
Phone: (302) 451-8116
Group: Address
BARTOL RESEARCH INSTITUTE
UNIVERSITY OF DELAWARE
NEWARK, DE 19716

End_group

End_group

GROUP: Technical_contact

Last_name: WALKER
First_name: RAYMOND
Middle_name: J.
Email: SPAN>UCLASP::RWALKER
Email: TELEMAIL>[RWALKER/NASA] NASAMAIL
Phone: (213) 825-7685
Group: Address

INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS
UNIVERSITY OF CALIFORNIA, LOS ANGELES
LOS ANGELES, CA 90024-1567

End_group

End_group

GROUP: Author

Last_name: PAULARENA
First_name: KAROLEN
Middle_name: I.
Email: SPAN>JPLPDS::KPAULARENA
Email: TELEMAIL>[KPAULARENA/NASA] NASAMAIL
Phone: (818) 354-1468
Group: Address

MS 301-320
JET PROPULSION LABORATORY
4800 OAK GROVE DRIVE
PASADENA, CA 91109

End_group

End_group

Group: Data_Center

Data_Center_Name: PDS>PLANETARY DATA SYSTEM

Dataset_ID: VG1-J-MAG-4-48.0SEC

Group: Data_Center_Contact

Last_name: WALKER

First_name: RAYMOND

Middle_name: J.

Email: SPAN>UCLASP::RWALKER

Email: TELEMAIL>[RWALKER/NASA] NASAMAIL

Phone: (213) 825-7685

Group: Address

INSTITUTE OF GEOPHYSICS AND PLANETARY PHYSICS

UNIVERSITY OF CALIFORNIA, LOS ANGELES

LOS ANGELES, CA 90024

End_group

End_group

Originating_center: PDS

Storage_medium: 3 MAGNETIC TAPES

Storage_medium: ONLINE DISK

Parameter: MAGNETIC FIELD INTENSITY

Discipline: PLANETARY SCIENCE

Minimum_latitude: NOT APPLICABLE

Maximum_latitude: NOT APPLICABLE

Minimum_longitude: NOT APPLICABLE

Maximum_longitude: NOT APPLICABLE

Location: JUPITER

Keyword: MAGNETOSPHERE

Keyword: MAGNETOSHEATH

Revision_date: 1988-2-12

Science_review_date: 1988-1-5

Group: Reference

BEHANNON, K. W., M. H. ACUNA, L. F. BURLAGA, R. P.

LEPPING, N. F. NESS AND F. M. NEUBAUER, MAGNETIC FIELD

EXPERIMENT FOR VOYAGERS 1 AND 2, SPACE SCIENCE REV., 21,

3, 235, 1977.

End_group

Group: Summary

Dataset Description

This dataset contains Triaxial Fluxgate magnetometer data that have been resampled at a 48.0 second sampling rate. The data in this dataset were collected during the Jupiter encounter of the Voyager 1 mission. Data values include: 1) Cline Time - seconds after Jan 1 1966, 2) br - the magnetic component in the radial direction, 3) btheta - the magnetic component in the Latitudinal direction, 4) bphi - The magnetic component in the Longitudinal direction, 5) bmag - the magnitude of the total magnetic field strength, 6) RJ\$ - the radial distance from Jupiter measured in Jupiter radii, LATJ\$S3 - the spacecraft latitude in degrees, and 10) LONJ\$S3 - the spacecraft longitude in degrees. All magnetic readings are given in units of gammas. Actual data are collected at a rate of one sample per 60 milliseconds. The resultant 1500 data values are then averaged and the time center is given as the sample time.

Instrument Description

A magnetometer is a direct sensing instrument that measures astronomical magnetic fields. The most common type is the flux-gate magnetometer. This is the type of magnetometer used on Voyagers 1 and 2.

To insure long term reliability, the instrument design includes both dual magnetometer systems and redundancy of all critical internal functions. In addition, the dual LFM configuration permits removal of the magnetic field of the spacecraft from the measurements throughout the mission. Magnetic field measurements may also complement plasma and energetic particle measurements and radio astronomy observations, both in the vicinity of the planets and in interplanetary space.

The Voyager fluxgate magnetometers provide vector field measurements. The enclosed data is a time series (48.0 sec. averages) of the three critical components of the field in spherical jovian coordinates and the field magnitude. Br is the radial component, Btheta is the latitudinal component, and Bphi is the longitudinal component.
End_group



Appendix D

Notes from Peer Review Process Review

Review of the Planetary Data System Data Set Peer Review Process

Report on the meeting held Sept. 29, 1989 at JPL; notes by T.Z. Martin

Attendees:

T.Z. Martin, convenor and PDS Science Mgr.

W. Kurth, PDS Project Scientist

J.T. Renfrow, PDS Project Mgr.

P. Jansma, PDS Version 1.0 Development Mgr.

D. Childs, PDS System Engineer

E. Dobinson, PDS Data Engineering Team

G. Woodward, PDS Data Engineering Team

S. W. Lee, Prototype Atmospheres Node, LASP

R. Walker, Prototype Fields and Particles Node, UCLA

C. Acton, NAIF

H. Neilan, NAIF

This meeting was called to collect what has been learned about the process of reviewing data sets for PDS during Version 1.0 development. All those in attendance have been either on the contributing or reviewing side of the process, or both. The agenda for the meeting consisted of a short introduction, followed by attention to this list of questions:

- (1.) Siting for meetings: on what should this be decided?
- (2.) What is the optimum agenda for a PR meeting?
- (3.) How can the meetings be carried out more efficiently?
- (4.) Data Set Labelling: is this something that the Peer Review committee should address, or are these issues too technical for outside experts?
- (5.) How can we avoid last-minute loading of data into the Catalog?
- (6.) Review of the Catalog: hard-copy or electronic? Are the templates too obscure for outside experts?
- (7.) How can we avoid last-minute viewing of data by committee members?
- (8.) What constitutes adequate sampling of a data set?

- (9.) How should the data set review process be designed for flight project data?
- (10.) Who should be the players in the review? Who leads the meetings, and who must attend or be represented?
- (11.) How should lien items be identified and resolved?
- (12.) How can the data set submission to NSSDC be smoothed?

This report organizes comments and conclusions by agenda topic, unless items are naturally grouped under a general heading.

(1.) SITING OF PEER REVIEW MEETINGS

In the future it is planned that the new Discipline Nodes ("DN") take a much more active role in the Peer Review ("PR") process; therefore it is natural that the default site for a PR be at the DN site. However, this may be altered for purposes of cost containment. It was not felt that video conferencing is sufficiently available yet to act as a replacement for physical meetings.

(2.) PERSONNEL

The Chairman of a PR should be the lead DN scientist, unless that person is also the submitter of the data set; in that case, the PDS Project Scientist or Science Manager is responsible for leading the PR. This statement of policy is in accord with the procedure in the PDS Data Administration Plan ("DAP"). Other personnel required include the data set preparer or submitter, the PDS Data Administrator or representative, a PDS-external scientist interested in and capable of reviewing the data set, and a representative from another DN. The latter, along with the Project Scientist or Science Manager, are useful to provide continuity as PR's occur at different nodes.

A notetaker should be identified at the start of the PR meeting. That person should issue minutes as soon as possible. They can be revised before inclusion in the chairman's official report of the meeting.

(3.) AGENDA FOR PEER REVIEW MEETINGS

An introduction provides an opportunity to present the personnel, identify the agenda items, and restate the criteria for reviewing the data set. It should be noted that it is very easy for discussions to get out of hand at PR meetings; the chairman should be attentive to the schedule and keep discussion focussed. It is usually the case that some committee members are present for a limited time.

The data set preparer should then give a formal presentation, including the scope of the data set; the steps that have been gone through to get to the data set in its current state; the validation techniques that have been applied; how the labels were generated and the format chosen. Finally, the preparer should present problems, concerns, and open items. Identification of problems at this stage in the review alleviates the need to discover such problems later on.

It was felt that too much time has been spent during reviews on detailed examination of material in the catalog templates. Certainly, details such as spelling errors and other grammatical phenomena should NOT occupy the time of the committee. It is still valuable to have a hardcopy version of the catalog information available at the review for reference. However, the current templates are not thought ideal for this purpose. They are hard to interpret for those new to them, and contain much redundant material. Revision of the template structure, or creation of a "template report", is an action for the Data Engineering Team.

Data review should occupy some of the time of the meeting. Ideally, committee members will have spent time reviewing the data PRIOR to the PR, and will come armed with relevant comments, to be addressed during this part of the meeting.

(4.) LABEL REVIEW

It has been a concern that labelling of data is an esoteric activity that may not be a fruitful item for discussion at the Peer Review meeting, especially considering the limited exposure to this topic of outside committee members. Probably this problem will be alleviated by the revised schedule detailed below. Both PDS and external committee members will have a chance to look at label content prior to the meeting, and there should be less bogging down of the meeting. The bulk of the responsibility for label format review should be given to the PDS technical personnel who best understand the subtleties. There should be a slot in the PR meeting itself for label issues to arise.

(5.) DATA SAMPLING

What constitutes an adequate sampling of a data set in order to review it? This is a difficult problem. The distribution of flaws in data sets is not necessarily random; changes in error rate or processing can induce time-dependent changes in the occurrence of flaws. Removal of noise is not necessarily the preparer's responsibility; noise in data is a fact of life, and its removal is a matter of opinion. For the Peer Review, the intent is to satisfy the committee that the data set is ready for release to the community. This implies that data sets may be of varying quality, depending on the committee's views about what is possible with the data set.

(6.) OVERALL SCHEDULE FOR THE REVIEW PROCESS

One of the most significant outcomes of this meeting was to identify the need for a more drawn-out peer review process, in order to prevent the last-minute pileup of work for both committee members and the Data Engineering Team. The process should occur in stages, broken down as follows:

- (a.) Loading. At this point, some weeks to months before the PR, catalog data is be loaded into the PDS Catalog. Also, at this milestone the data set itself is to be made available through whatever software are relevant, or through distribution of adequate samples. Draft labels are also complete at this time. The Peer Review itself, item c. below, is not even scheduled until this step is complete.

- (b.) Review of loaded material. At this point, roughly halfway between milestones a. and c., committee members complete their review of the PDS Catalog material, the data set itself, and the content (not format) of the labels. Comments are due back to the preparer and the Data Engineering Team at this time.
- (c.) Peer Review meeting. At this point, the preparer has ingested the committee's comments, and resubmitted catalog material to the Data Engineering Team. During his/her presentation, changes made are summarized.
- (d.) Lien resolution. At this time, identified at the PR meeting, all major and minor liens are to be resolved.
- (e.) NSSDC submission. The data set is to be sent to the NSSDC for archiving at this point, with all liens resolved in the data set and the corresponding catalog information, with labels reworked if needed.

It is the responsibility of the Discipline Node to schedule these phases of the review process, but it must be noted that the Data Engineering Team is part of the process; the overall schedule of PR's for data sets should maintain a relatively constant workload on the Data Engineering Team.

(7.) LIENS

Liens of a major or minor nature must be identified at the PR meeting itself, and noted in the minutes. Redlined material can be submitted directly to the preparer; all such comments need not be identified as liens. A firm schedule for lien resolution is one of the most important products of the PR meeting.

(8.) FLIGHT PROJECTS AND THE DATA SET REVIEW PROCESS

This subject has not been fleshed out in much detail by the Mission Interface Team (MIFT) to date, although the Workbook deals with it to first order. A great deal of progress was made at this meeting to identify PDS goals with respect to mission data. In particular, discussion focused on how and when PDS should present its needs to the mission personnel, and how the experiment teams can be eased into a new era of data management. The figure accompanying this report is an attempt to capture the temporal relationship between generic mission events and the PDS interaction.

An important distinction is to be made between data that emerge from SFOC and the project central apparatus, and those data that emerge from the diverse experiment teams. The first category contains all raw data, uplink products, and high-level descriptive information about the project and spacecraft. Also included are EDR- level data that are delivered to science teams, and centrally- developed SPICE kernels.. The second category contains all RDR or archive products developed by the science teams themselves, including second-order products, as well as experiment-specific data such as calibration files.

The handling of these two kinds of data is necessarily different. Quality control or review of the first kind of data is performed by the project itself, in response to QQC (quality, quantity, continuity) requirements developed by the project. It is unlikely

that the means could be found to modify the QQC characteristics of basic products after their final forms are delivered by the project to PDS. Therefore, the review of these items by PDS can be minimal. Any demands for improvement in the QQC characteristics will have been made by the science teams themselves, during the time frame that the project has resources to address such demands.

The second kind of data, those developed by science teams, can be influenced by PDS only if the teams (and the project that supplies funding to them) are made aware early in the mission of PDS desires and the reasons for them. To that end, we developed a set of interactions with projects that should help them develop their data management plans, ensure that PDS needs are identified up front, and then keep the science teams on track (see attached figure).

The PDS will provide to a project guidelines for writing its Data Management Plan. The project DMP may not contain, however, sufficient detail to ensure that PDS desires are met by the teams. Therefore, an appendix to the DMP, or separate Data Archive and Transfer Plan, should be delivered once the list of products is fairly well defined.

The next major interaction of PDS with the project is the Data Design Workshop, which occurs after the PDMP is in place. This meeting of PDS and project data management personnel is a forum for exchange of requirements. PDS hands over its Data Dictionary, guidelines for catalog development, suggested data set list, labelling standards, needs for catalog information (templates), and discusses what should happen to software and ancillary data. The project indicates its likely data set list, if this is not present in the PDMP, and details the schedule for science teams to develop their data processing capability. The latter is needed so that PDS can interact later with the teams directly, in the Data Design Reviews.

Attendees at the Workshop would include project data management personnel, science team data managers, science coordinators, PDS MIFT personnel, PDS labelling expert, Data Administrator, and relevant representatives from Discipline Nodes. The meeting would be normally led by the MIFT manager.

The generation of project Software (or System) Interface Specifications (SIS) can occur between the project and PDS after the Workshop. These documents describe in detail which data sets go where, and in what format. Traditionally the SIS are used for formal internal use in projects, but they are the natural means of specifying agreements with PDS too.

The next step is the Data Design Review, which is separately done for project-generated and science team-generated products. The former are handled in a review that covers the SIS, which includes uplink products, SFOC items, and mission-level information for the PDS Catalog. After this meeting, no further interaction with PDS is needed formally until data delivery begins.

For the science teams, the Data Design Review is a means of ensuring at a relatively early stage that PDS needs are being met in the teams' plans. At this point, the

opportunity exists to ensure that the approach to data processing is valid. It would be desirable for the Discipline Nodes interested in a team's data to participate in this review, so that they may learn how processing is envisioned, and comment upon it for the benefit of the team. The team should present its plans for extraction of catalog type information, labelling, and archiving of ancillary information. The appropriate time for this meeting was thought to be approximately the final software testing stage for the team's data processing software.

The next and final stage of interaction between PDS and the projects is the Data Delivery Review. Again, these are separated for the project and team-derived data. At this point, there will have been a considerable lapse of time since the Design Review, during which most of the data acquisition and processing will have occurred. The teams will have been too busy to think much about archiving. But before they deliver data, we want a last chance to influence what comes to PDS, before project funding runs out.

For project-derived products, the Delivery Review will consist of a presentation by the project Data Engineering Team leader, stating his view of the QQC status of downlink data. Review of uplink products and mission level catalog information is also accomplished. This review can occur with Central Node personnel alone, with the Mission Interface Team in particular involved.

The science teams' Delivery Reviews will be handled primarily by the Discipline Nodes, with MIFT coordinating. The QQC status of the teams' products will be assessed. The review will be similar in nature to Peer Reviews that PDS has carried out to date, with a committee chosen ahead of time, and ample time before the review for committee members to examine the submitted material (see above). Since these teams are not being paid by PDS, as would be the case for data restoration work, the resolution of liens will probably have a different character. It may be necessary to have a project official present (the Science Manager?) who can authorize additional effort.