MECA NON-IMAGING EDR AND RDR ARCHIVE VOLUME SOFTWARE INTERFACE SPECIFICATION

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DOCUMENT CHANGE LOG

Change	Date	Affected Portions
Initial Draft	6/27/07	All
Revised to apply to both EDR and RDR archives; completed some missing references in Applicable Documents	1/23/08	All
Added EDR and RDR delivery volume estimates	2/18/08	4.2, Data Product Sizes and Delivery Rates
Revised to include contents, format and naming of RDR archives	4/22/08	1.2.2, RDRs; 2.8, Catalog Directory Contents, 1.3, Applicable Documents and Constraints, 2.9, Label Directory Contents, 3.2.6, Science Data File Formats, 4.5.1, File Identification
Removed TYPE subdirectories in EDR data directories	12/11/08	2.4 Data Directory Contents and Naming

TBD ITEMS

Section	Description	By Whom
None	None	None

ACRONYMS AND ABBREVIATIONS

BCE	Bench Checkout Equipment
PEB	Payload Electronics Box
CODMAC	Committee on Data Management and Computation
CCSDS	Spacecraft Data Systems
CHDO	Compressed Header Data Object
DN	Digital Number
DSN	Deep Space Network
EDR	Experiment Data Record
EGA	Evolved Gas Analyzer
HTML	HyperText Markup Language
ICD	Interface Control Document
JPL	Jet Propulsion Laboratory
NSSDC	National Space Science Data Center
PAWG	Phoenix Archive Working Group
PDS	Planetary Data System
PECM	Power Emission Control Module
RDR	Reduced Data Record
SC	Scanning Calorimeter
SFDU	Standard Format Data Unit
SIS	Software Interface Specification
SOC	Science Operations Center
SOPC	Spacecraft Operations Processing Computer
TA	Thermal Analyzer
TBD	To Be Determined
TBW	To Be Written
TDS	Telemetry Data System
MECA	Thermal and Evolved Gas Analyzer
UA	University of Arizona

GLOSSARY

Archive – An archive consists of one or more data sets along with all the documentation and ancillary information needed to understand and use the data. An archive is a logical construct independent of the medium on which it is stored.

Archive Volume, Archive Volume Set – A volume is a unit of media on which data products are stored; for example, one CD-ROM or DVD-ROM. An *archive volume* is a volume containing all or part of an archive; that is, data products plus documentation and ancillary files. When an archive spans multiple volumes, they are called an *archive volume set*. Usually the documentation and some ancillary files are repeated on each volume of the set, so that a single volume can be used alone.

Catalog Information – Descriptive information about a data set (e.g. mission description, spacecraft description, instrument description), expressed in Object Description Language (ODL) which is suitable for loading into a PDS catalog.

Data Product – A labeled grouping of data resulting from a scientific observation, usually stored in one file. A product label identifies, describes, and defines the structure of the data. An example of a data product is a planetary image, a spectrum table, or a time series table.

Data Set – An accumulation of data products. A data set together with supporting documentation and ancillary files is an archive.

Standard Data Product – A data product generated in a predefined way using well-understood procedures, processed in "pipeline" fashion. Data products that are generated in a nonstandard way are sometimes called *special data products*.

1. Introduction

1.1. Purpose and Scope

This Software Interface Specification is intended to be used by those who wish to understand the format and content of the Phoenix Project Microscopy, Electrochemistry, and Conductivity Analyzer (MECA) Non-Imaging EDR and RDR (NASA Levels 0 and 1) Archives. Typical users of this SIS will be software engineers, data analysts, or planetary scientists.

The MECA instrument suite includes the Thermal and Electrical Conductivity Probe (TECP), the Atomic Force Microscope (AFM), the Optical Microscope (OM), and the Wet Chemistry Laboratory (WCL). The specifications in this document apply to MECA Non-Imaging EDRs, which are the products generated by the TECP, AFM, and WCL components. The MECA OM archive is described in the Phoenix Camera EDR and RDR Archive Volume SIS (Applicable Document 4).

1.2. Content Overview

This Software Interface Specification (SIS) describes the format, content, and generation of the MECA Non-Imaging EDR and RDR Archives. Section 2, Archive Volume Contents, describes the structure of the archive volumes and the contents of each file. Section 3, Archive Volume Format, describes the file formats used on the archive volumes. Section 4, Archive Volume Generation, describes methods for identifying, delivering, and validating the archives. Finally, Section 5, Support Staff and Cognizant Persons, lists the individuals responsible for generating the archive volumes.

1.2.1. EDRs

The MECA Non-Imaging EDR products are identified by the PDS data set ID "PHX-M-MECA-2-NIEDR-V1.0". All are processed to the NASA level 0 (CODMAC level 2) processing level (Applicable Document 9). Table 1-1 lists the sixteen different types of EDR products. The reader is referred to the MECA Non-Imaging EDR SIS (Applicable Document 3) for details.

Table 1-1 MECA Non-Imaging EDR Standard Data Products

Product Type	Instrument	Description
MECA-EM0	AFM	AFM frequency test results
MECA-EM1	AFM	Return codes from AFM microprocessor, sometimes with diagnostic scan data
MECA-EM2	AFM	Scan data from the AFM
MECA-EM3	AFM	AFM tip test results
MECA-EM4	Common Electronics	Data from miscellaneous direct commands to MECA FPGA. Chronopotentiometry data from the Pt electrode (CPC) is returned here, and this is an alternate return for data described under types 10-14.
MECA-EM5	Common Electronics	Power supply measurements (current and voltage)
MECA-EM6	Common Electronics	Downloaded contents of various tables: state table, parameter value table, parameter range table, AFM attribute table, coupons table, tips table.

MECA-EM7	TECP	Data from the TECP
MECA-EM8	WCL	WCL ion selective electrode and related measurements
MECA-EM9	WCL	WCL conductivity data
MECA-EM10	WCL	WCL dissolved oxygen data (diagnostic only)
MECA-EM11	WCL	WCL cyclic voltammetry data
MECA-EM12	WCL	WCL chronopotentiometry data from Ag electrode CPB
MECA-EM13	WCL	WCL anodic stripping voltammetry data
MECA-EM14	WCL	WCL chronopotentiometry data from Ag electrode CPA
MECA-EM15	WCL	WCL pressure and temperature data

The MECA Non-Imaging EDR data products are generated by the Multi-mission Image Processing Laboratory (MIPL) at the Jet Propulsion Laboratory and are delivered to the Phoenix Science Operations Center (SOC) at the University of Arizona. The SOC delivers the MECA Non-Imaging EDR archive to the PDS Geosciences Node at Washington University, St. Louis in accordance with the Phoenix Archive Plan.

1.2.2. RDRs

The MECA Non-Imaging RDR products are identified by the PDS data set ID PHX-M-MECA-4-NIRDR-V1.0. Table 1-2 lists the various types of RDR products. The reader is referred to the MECA Non-Imaging RDR SIS (Applicable Document 5) for details.

Table 1-2 MECA Non-Imaging RDR Standard Data Products

Product Type	Instrument	Description
SDR	AFM	Calibrated scan data assembled from the EDR data and converted from DN to engineering units (microns)
SDD	AFM	Line-by-line derivative of the calibrated scan data, simulating an overhead view
AFM REPORT	AFM	Text file describing the measurement day's events
EC	TECP	Time series electrical conductivity data
HUM	TECP	Time series relative humidity data
PRM	TECP	Time series relative permittivity (dielectric constant) data
TC	TECP	Time series temperature data from three needles, before, during, and after a probe. These data can be processed to yield thermal conductivity and heat capacity or (if the instrument is above the surface) wind speed.
ISEs	WCL	Time series of individual sensor data including chloride, bromide, iodide, sodium, potassium, calcium, magnesium, barium, etc.
COND	WCL	Time series of conductivity data
CV	WCL	Cyclic voltammetry data
CP	WCL	Chronopotentiometry data
PT	WCL	Time series of pressure and temperature data

1.3. Applicable Documents and Constraints

This Archive Volume SIS is intended to be consistent with the following documents:

1. Mars Exploration Program Data Management Plan, R. E. Arvidson et al., Rev. 3.0, March 20, 2002.
2. Phoenix Project Archive Generation, Validation and Transfer Plan, January 17, 2008, JPL D-29392.
3. Phoenix Project Microscopy, Electrochemistry and Conductivity Analyzer (MECA) – Non-imaging Experiment Data Record (EDR) Software Interface Specification, JPL D-33230.
4. Phoenix Project Camera EDR and RDR Archive Volume SIS, Version 1.0, JPL D-33250.
5. Phoenix Project Microscopy, Electrochemistry and Conductivity Analyzer (MECA) Non-imaging Reduced Data Record (RDR) Software Interface Specification, JPL D-33232.
6. *Planetary Data System Archive Preparation Guide*, August 29, 2006, Version 1.1, JPL D-31224.
7. *Planetary Data System Standards Reference*, March 20, 2006, Version 3.7. JPL D-7669, Part 2.
8. ISO 9660-1988, Information Processing - Volume and File Structure of CD-ROM for Information Exchange, April 15, 1988.
9. 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

1.4. Relationships with Other Interfaces

This Archive Volume SIS could be affected by changes to the design of the MECA Non-imaging EDR standard data products (Applicable Document 3) and RDR standard data products (Applicable Document 5).

2. Archive Volume Contents

This section describes the contents of the MECA Non-Imaging EDR and RDR Archives, including the file names, file contents, file types, and organization responsible for providing the files, either the PDS Geosciences Node or the MECA Science Team.

2.1. Online and Physical Storage

The MECA Non-Imaging EDR and RDR Archives will be made available through the Planetary Data System via online Internet access. The PDS will maintain backup copies of the MECA archives at the PDS Geosciences Node and the National Space Science Data Center (NSSDC) on physical media for long-term preservation.

The archives are organized as one volume (that is, one directory tree) per data set. The following descriptions of files and directories apply to both the EDR volume and the RDR volume(s) except as noted.

2.2. Archive Volume Directories

MECA Non-Imaging archive volumes include the following directories.

Directory	Contents
Volume root directory	Introduction and errata text files
CALIBRATION	MECA calibration reports
CATALOG	Descriptions of data sets, instruments, spacecraft, and mission as found in the PDS Catalog
DATA	Data files with attached PDS labels
DOCUMENT	Documentation files
INDEX	Volume and cumulative index tables
LABEL	Descriptions of data file formats, referenced by PDS labels
SOFTWARE	Information about how MATLAB scripts may be obtained directly from MECA team

The contents of these directories are described in detail below.

2.3. Root Directory Contents

Files in the Root Directory include an overview of the archive, a description of the volume for the PDS Catalog, and a list of errata or comments about the archive. The following files are contained in the Root Directory.

File Name	File Contents	File Provided By
AAREADME.TXT	Volume content and format information	Geosciences
ERRATA.TXT	A cumulative listing of comments and updates concerning all archive volumes published to date	Geosciences
VOLDESC.CAT	A description of the contents of this volume in a PDS format readable by both humans and computers	Geosciences

2.4. Data Directory Contents and Naming

Immediately beneath the DATA directory are sub-directories differentiated on the basis of sol. Each sol sub-directory name represents one Martian sol and begins with the word "SOL", followed by a three digit sol number, e.g. SOL001. On an RDR archive volume the sol subdirectories are further divided by instrument, e.g. AFM, TECP, and WCL. The following diagrams show a sample portion of the DATA directory structure for EDR and RDR archives:

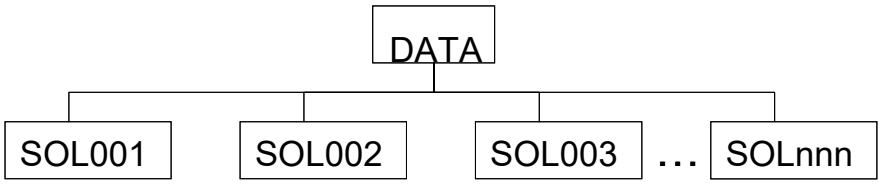

Figure 1. EDR data directory structure.

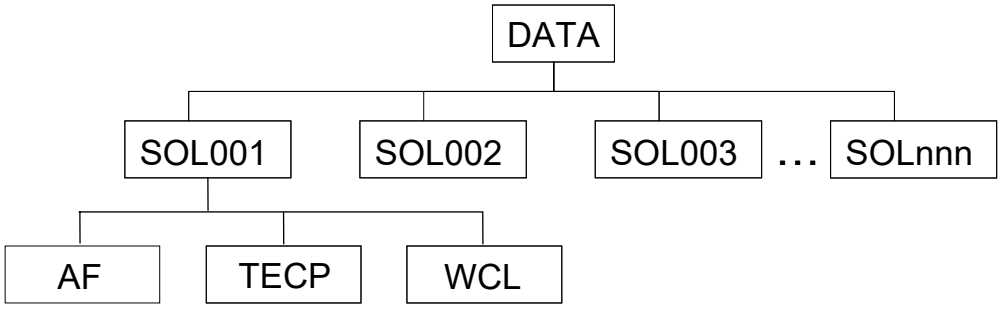

Figure 2. RDR data directory structure.

The file naming rules are described in section 4.5.

2.5. Index Directory Contents

Files in the Index Directory are provided to help the user locate products on the archive volume. The following files are contained in the Index Directory.

File Name	File Contents	File Provided By
INDXINFO.TXT	A description of the contents of this directory	Geosciences
INDEX.TAB	A table listing all data products on this volume	MECA Team
INDEX.LBL	A PDS detached label that describes INDEX.TAB	MECA Team

The index table contains one row for each product on an archive volume. Table 2-1 lists the columns of the index table.

Table 2-1 MECA Non-Imaging EDR and RDR Index Table Contents

Column Name	Description	Source
VOLUME_ID	PDS archive volume on which a data product is stored	Specified at time of index table creation
PATH_NAME	Directory path to data product, relative to volume root	Determined by location of product file
FILE_NAME	Name of file containing data product's label (since MECA EDR labels are attached, this will be the data product file itself)	Label file name
INSTRUMENT_ID	Instrument identifier, i.e. MECA_AFM, MECA_TECP, MECA_WCL, or MECA_ELEC	PDS label
INSTRUMENT_MODE_ID	Instrument mode identifier, i.e. FRQTEST, RESPONSE, SCAN, ISES, etc.	PDS label
PRODUCT_ID	Unique identifier for the data product	PDS label
PRODUCT_TYPE	Type of EDR product, i.e. MECA-EM0, MECA-EM1, etc.	PDS label
PRODUCT_CREATION_TIME	Date and time of data product creation	PDS label
PRODUCT_VERSION_ID	Version identifier of data product	PDS label
RELEASE_ID	Identifier of scheduled data release to PDS in which this product was included, e.g. 0001	PDS label
OPS_TOKEN	Command sequence code	PDS label
START_TIME	UTC date and time of start of observation, given as yyyy-mm-ddThh:mm:ss.xxxxxx	PDS label
STOP_TIME	UTC date and time of end of observation, given as yyyy-mm-ddThh:mm:ss.xxxxxx	PDS label
SPACECRAFT_CLOCK_START_COUNT	Spacecraft clock count at start of observation	PDS label
SPACECRAFT_CLOCK_STOP_COUNT	Spacecraft clock count at end of observation	PDS label
PLANET_DAY_NUMBER	Sol number, counting from 0 on day of landing	PDS label
LOCAL_TRUE_SOLAR_TIME	Local time on Mars	PDS label

2.6. Document Directory Contents

The Document Directory contains documentation to help the user understand and use the archive data. The following files are contained in the Document Directory:

File Name	File Contents	File Provided By

DOCINFO.TXT	A description of the contents of this directory	Geosciences
EDRSIS.PDF or RDRSIS.PDF	The EDR or RDR Data Product SIS as a PDF file	MECA Team
EDRSIS.HTM or RDRSIS.HTM	The Data Product SIS as an HTML file	Geosciences
EDRSIS.LBL or RDRSIS.LBL	A PDS detached label that describes both the HTML and PDF versions of the Data Product SIS	Geosciences
ARCHSIS.PDF	The Archive Volume SIS (this document) as a PDF file	MECA Team
ARCHSIS.HTM	The Archive Volume SIS as an HTML file	Geosciences
ARCHSIS.LBL	A PDS detached label that describes both ARCHSIS.HTM and ARCHSIS.PDF.	Geosciences

2.7. Calibration Directory Contents

The Calibration Directory contains calibration reports.

File Name	File Contents	File Provided By
CALINFO.TXT	A description of the contents of this directory	MECA Team
MECA_MICROSCOPY CALIBRATION_REPORT.PDF	Describes AFM, OM, AND SWTS instrument calibration performed by the MECA team (note that OM data is not stored in this archive.	MECA Team
MECA_TECP_CALIBRATION_REPORT.PDF	Describes TECP instrument calibration performed by the MECA team.	MECA Team
MECA_WCL_CALIBRATION_REPORT.PDF	Describes Wet Chemistry Laboratory instrument calibration performed by the MECA team.	MECA Team

2.8. Catalog Directory Contents

The files in the Catalog Directory provide a top-level understanding of the mission, spacecraft, instruments, and data sets. The files in this directory are coordinated with the PDS data engineer, who is responsible for loading them into the PDS catalog. The following files are found in the Catalog Directory.

File Name	File Contents	File Provided By
CATINFO.TXT	A description of the contents of this directory	Geosciences
MECA_EDR_DS.CAT or MECA_RDR_DS.CAT	Data set information for the PDS catalog]	MECA Team
INSTHOST.CAT	Instrument host (i.e., spacecraft) information for the PDS catalog	Phoenix Project
MECA_AFM_INST.CAT	AFM instrument information for the PDS catalog	MECA Team
MECA_ELEC_INST.CAT	Common Electronics instrument information for the PDS catalog	MECA Team
MECA_TECP_INST.CAT	TECP instrument information for the PDS catalog	MECA Team

MECA_WCL_INST.CAT	WCL instrument information for the PDS catalog	MECA Team
MISSION.CAT	Mission information for the PDS catalog	Phoenix Project
PERSON.CAT	Personnel information for the PDS catalog (Team and PDS personnel responsible for generating the archive)	Geosciences
REF.CAT	References mentioned in other *.CAT files	Geosciences

2.9. Label Directory Contents

The Label Directory contains files that describe data format and organization. These files are referred to in the PDS labels that accompany the data products. They are "include" files that are intended to be parsed as if they were part of the PDS labels that refer to them. The following files are contained in the Label Directory in the EDR or RDR archive as applicable.

File Name	File Contents	File Provided By
LABINFO.TXT	A description of the contents of this directory	Geosciences
AFM_D_HEADER.FMT	Column definitions for AFM SDD (derivative) RDR products	MECA Team
AFM_FREQUENCY_SAMPLE.FMT	Column definitions for Type 0 EDR products	MECA Team
AFM_HEADER.FMT	Column definitions for AFM SDR (calibrated) RDR products	MECA Team
AFM_TIPS.FMT	Column definitions for Type 3 EDR products	
TBL_0_STATE_DATA.FMT	Column definitions for Type 6 EDR State Table products	MECA Team
TBL_1_PARAMETER_VALUES_DATA.FMT	Column definitions for Type 6 EDR Parameter Values Data Table products	MECA Team
TBL_2_PARAMETER_RANGE_DATA.FMT	Column definitions for Type 6 EDR Parameter Range Data Table products	MECA Team
TBL_3_AFM_ATTRIBUTE_DATA.FMT	Column definitions for Type 6 EDR AFM Attribute Data Table products	MECA Team
TBL_4_COUPONS_DATA.FMT	Column definitions for Type 6 EDR Coupons Data Table products	MECA Team
TBL_5_TIPS_DATA.FMT	Column definitions for Type 6 EDR Tips Data Table products	MECA Team
TECP_SAMPLE.FMT	Column definitions for Type 7 EDR products	MECA Team

2.10. Software Directory Contents

The Software Directory is a placeholder for utilities or application programs to aid the user in viewing or extracting data from the data product files. MECA extracts data using scripts written in the MATLAB programming language. Since MATLAB is closed source and does not conform to an industry standard, the scripts are not considered archival. They may, however, be obtained directly from the MECA science team. The file SOFTINFO.TXT contains information about available software and how to obtain it.

File Name	File Contents	File Provided By
SOFTINFO.TXT	Information about obtaining software to read the data in this archive	MECA Team

3. Archive Volume Format

This section describes the format of MECA EDR and RDR Archives. Data that comprise the Archives will be formatted in accordance with Planetary Data System specifications [Applicable Documents 6 and 7].

3.1. Disk Format

The MECA EDR and RDR Archive Volumes are intended to be maintained online for Internet access. When necessary for backup or other purposes, the PDS may make copies of the archives on removable media such as CD or DVD. These media will be written using a format that is compatible with the computer operating systems Windows, Macintosh, and SunOS. The volume format will be in accordance with ISO 9660 level 2 Interchange Standard [Applicable Document 8].

3.2. File Formats

This section describes file formats for the kinds of files contained on the MECA Non-Imaging EDR and RDR Archive Volumes.

3.2.1. Document File Format

Document files with the .TXT suffix exist in the Root, Index, Software, Catalog, Document, and Label directories. They are ASCII files which may have embedded PDS labels. Lines in a .TXT file end with a carriage return character (ASCII 13) and a line feed character (ASCII 10). This allows the files to be readable under various operating systems.

Documents in the Document directory may contain formatting and figures that cannot be rendered as ASCII text. Therefore each document is given in two formats, hypertext and PDF. The hypertext file contains ASCII text plus hypertext markup language (HTML) commands that enable it to be viewed in a Web browser such as Netscape Navigator or Microsoft Internet Explorer. The hypertext file may be accompanied by ancillary files such as images and style sheets that are incorporated into the document by the Web browser. The second format, PDF (Portable Document Format) is a proprietary format of Adobe Systems Incorporated that is frequently used for distributing documents. Adobe offers free software, Acrobat Reader, for viewing PDF files.

3.2.2. Tabular File Format

Tabular files (.TAB suffix) exist in the Index directory. Tabular files are ASCII files formatted for direct reading into many database management systems on various computers. All fields are separated by commas, and character fields are enclosed in double quotation marks ("). (Character fields are padded with spaces to keep quotation marks in the same columns of successive records.) Character fields are left justified, and numeric fields are right justified. The "start byte" and "bytes" values listed in the labels do not include the commas between fields or the quotation marks surrounding character fields. The records are of fixed length, and the last two bytes of each record contain the ASCII carriage return and line feed characters. This allows a table to be treated as a fixed length record file on computers that support this file type and as a text file with embedded line delimiters on those that don't.

All tabular files are described by PDS labels, either embedded at the beginning of the file or detached. If detached, the PDS label file has the same name as the data file it describes, with the extension .LBL; for example, the file INDEX.TAB is accompanied by the detached label file INDEX.LBL in the same directory.

3.2.3. PDS Label Format

All data files in the archive have PDS labels, either attached at the beginning of the file or detached in a separate file. For examples of PDS labels for each type of data product, see the MECA EDR Data Product SIS [Applicable Document 3]. All MECA Non-Imaging EDR labels are attached.

A PDS label, whether attached or detached from its associated file, provides descriptive information about the associated file. The PDS label is an object-oriented structure consisting of sets of 'keyword=value' declarations. The object to which the label refers (e.g. IMAGE, TABLE, etc.) is denoted by a statement of the form:

```
^object = location
```

in which the carat character (^, also called a pointer in this context) indicates where to find the object. In an attached label, the location is an integer representing the starting record number of the object (the first record in the file is record 1). In a detached label, the location denotes the name of the file containing the object, along with the starting record or byte number, if there is more than one object in the file. For example:

```
^HEADER = ("F01.IMG",1)
^IMAGE = ("F01.IMG",1025 <BYTES>)
```

indicates that the IMAGE object begins at byte 1025 of the file F01.IMG, in the same directory as the detached label file

Lines of text in labels end with a carriage return character (ASCII 13) and a line feed character (ASCII 10). This allows the files to be readable under various operating systems.

3.2.4. Software File Format

Not Applicable.

3.2.5. Catalog File Format

Catalog files (suffix .CAT) exist in the Root and Catalog directories. They are text files containing descriptive information about the data set, instrument, spacecraft, and missions. These files are used as input to the PDS Catalog so that the information can be available to users who search the catalog. These files are formatted using 'keyword=value' statements similar to those in a PDS label, so that they can be read both by humans and by computers.

3.2.6. Science Data File Formats

MECA EDR data files are in a binary format with alternating header and tabular information. All binary values are most-significant-byte-first (“big-endian”).

MECA RDR data files are formatted as ASCII tables.

For more information about the format and content of the data products, see the MECA Non-Imaging EDR Data Product SIS [Applicable Document 3] and the MECA Non-Imaging RDR Data Product SIS [Applicable Document 5].

4. Archive Volume Generation

4.1. Data Transfer and Validation Methods

MECA products are generated by the MECA Science Team at the Jet Propulsion Laboratory, Pasadena, CA. The products are delivered by Internet transfer to the Phoenix Project Science Operations Center (SOC) at the University of Arizona, Tucson, AZ. For the first delivery, the SOC will assemble complete archive volumes including data products, documentation, and ancillary materials and deliver the archive volumes to the designated PDS Nodes (for MECA non-imaging products the designated node is the Geosciences Node at Washington University in St. Louis). For subsequent deliveries, the SOC will deliver a partial archive volume containing new files and revised files in the directory structure specified in this document. The PDS Node will merge the partial volume with the existing volume from previous deliveries. Accompanying each delivery from the SOC will be a manifest of the delivery contents and a checksum file.

The MECA Science Team will validate the EDR and RDR products for science content as part of the product generation process. The Geosciences Node will compare the delivered files with the manifest and checksum file, and validate the products and complete archive volume for compliance with PDS standards and with the Data Product SIS and Archive Volume SIS documents.

MECA Non-Imaging archive volumes are made available via Internet web access and FTP access at the Geosciences Node web site, http://pds-geosciences.wustl.edu, and the PDS web site, http://pds.nasa.gov.

The Geosciences Node will maintain backup copies of the MECA archive on offline media, and will ensure that copies of the archive for long-term storage are delivered to the National Space Science Data Center.

4.2. Data Product Sizes and Delivery Rates

The MECA Science Team releases EDR and RDR data products to the SOC and subsequently the PDS according to the schedule outlined in the Phoenix Project Archive Generation, Validation, and Transfer Plan [Applicable Document 2]. The Phoenix Project Level 1 requirements state that Level 0 and Level 1 imaging data shall be archived with PDS within six months of the end of the mission, and all other Level 0 and Level 1 data shall be archived within 12 months of the end of the mission [Applicable Document 2]. The actual delivery schedule will exceed these requirements: the Phoenix Project will make at least two deliveries to the PDS, the first one no later than six months after Sol 30 data are received on Earth, and the second one no later than six months after Sol 90 data are received on Earth. In the event of an extended mission, subsequent data releases will occur for every 90 sols; for example, Sol 180 plus six months, then Sol 270 plus six months, with the final delivery occurring no later than six months after the last data have been received on Earth.

The estimated volume of EDR and RDR data per delivery is as follows:

Delivery	EDR volume	RDR volume
1	10 MB	25 MB
2	20 MB	50 MB
3+	30 MB	75 MB

4.3. Interface Media Characteristics

All volumes in the MECA Non-Imaging Standard Product Archives conform to ISO 9660 standards [Applicable Document 8].

4.4. Backup and Duplicates

Backup copies of the MECA Non-Imaging Archives will be stored by the MECA Team until the final versions of the products have been archived with the PDS.

Copies of the MECA archive volumes on physical media will be stored at the PDS Geosciences Node and the NSSDC.

4.5. Labeling and Identification

4.5.1. File Identification

The file naming scheme defined for the Phoenix Lander instrument products adheres to and is compliant with the PDS Level II 27.3 filename standards. The file naming convention described here divides the filename into two parts (none consecutive). The first part is instrument-independent, or generic, containing a minimal set of fields, which apply to all instruments aboard the Phoenix Lander. The second part is reserved for instrument-specific fields.

Each product name must be uniquely identifiable throughout the mission by incorporating a combination of relevant fields such as Spacecraft Clock count (SCLK), instrument identifier, data source, observation identifier, product token, etc.

The generic portion of the file name as described here, is not sufficient for uniqueness. The information saved in the instrument-specific portion, in conjunction with the generic portion, must guarantee uniqueness.

The file naming rules are as follows:

I. Only letters A-Z, digits 0-9 and the underscore ("_") may be used.
II. All characters must be in upper case.
III. The full length of product name must be 31 characters, 27 for the filename followed by a "." and a three-character file extension.
IV. All fields and sub-fields must be filled or padded with "_" (ASCII underscore) as needed to maintain proper length. For number fields, zeros should be used instead.

V. The convention used for/by instrument must guarantee uniqueness throughout the whole mission.

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A template for general filename is shown below, and the table that follows provides additional detail for individual fields.

Table 4-2 File Naming Template

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Instrument	Source/Epic	Sol			Product Type			*Instrument Specific*																	Producer	Version	.	Extension			

The "Instrument Specific" portion is reserved for each instrument/team to use as needed, within the boundaries stated by the above rules.

Table 4-3 gives the details of MECA EDR and RDR file names. Both the generic and MECA-specific fields are described.

Table 4-3 MECA EDR and RDR File Naming Scheme

Position	Name	Description/value
1	Instrument	**O** MECA-OM **P** MECA-TECP **F** MECA-AFM **W** MECA-WCE X MECA-Misc
2	Source/Epic	Spacecraft **S** Surface, flight model **T** Test-bed **C** Cruise, flight model
3-5	SOL	Solar days since first full day on Mars. Landing day is Sol zero. If Source/Epic is T, day of year should is used (ERT or SCET). For cruise phase, it is always set to " C ".

6-8	Product Type	3-char identifiers to differentiate products as either EDR (Level 0) or RDR (Level 1+) products. If the identifier begins with an "E", then the product is a type of EDR. Otherwise, it is a type of RDR, defined as needed. For MECA non-Imaging EDRs, this field is always set to "EMx", where x is a hex digit representing one of 16 MECA data types.
9	Reserved	Always set to "_" (underscore) character
10-11	Revision	EDR or RDR revision number, 0-255, represented at a 2-digit Hex value.
12-13	Reserved	Always set to "_" (underscore) character
14-17	Record Length	Length of records represented as a 4-digit Hex value.
18-25	Ops Token	Token value represented as an 8-digit Hex value
26	Producer	Producer's id. **M** EDRs generated by MIPL **A** RDRs generated by MECA-AFM team **T** RDRs generated by MECA-TECP team **W** RDRs generated by MECA-WCL team
27	Version	Version number, 0-9,A-Z (36 total) MIPL EDRs are always set to 0.
28	Period	Always set to "." (ASCII period)
29-31	File Extension	PDS file extension. For MECA non-Imaging EDRs, this is always set to "DAT", and for RDRs, to TAB.

4.5.2. Volume Identification

MECA archive volumes use the following naming scheme.

Volume ID	Contents
USA_NASA_JPL_PHXMEC_0XXX	MECA EDRs
USA_NASA_JPL_PHXMEC_1XXX	MECA RDRs

5. Support Staff and Cognizant Persons

Michael Hecht, MECA Principal Investigator, Jet Propulsion Laboratory

Susan Slavney, PDS Geosciences Node, Washington University

Questions and comments regarding the MECA EDR Archive Volume may be directed to the PDS Geosciences Node, Washington University, geosci@wunder.wustl.edu, 314-935-9295.