SWARM MPPF-CVQ

DQC Processor ICD

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Document Change Record

Version	Date (yyyy-mm-dd)	Prepared by	Change Description
1.0	2009-01-09	Sander Niemeijer	Initial version
1.1	2009-02-27	Sander Niemeijer	Made [PDS-IPF-ICD] an applicable document (MPPF-CVQ-47). Added Level 0 products (MPPF-CVQ-105-1). Added MAGXEUL_1B product (MPPF-CVQ-66). Added comment to Table 1 (MPPF-CVQ-48). RPRO is now allowed as file class for the Test Definition File (MPPF-CVQ-105-2). Replaced 'Thin Layer' by 'Management Layer'. Fixed entry of Product List file. The DQC will generate a Product Report (MPPF-CVQ-49). Replaced PDS and LTA by APF/PDF (MPPF-CVQ-84). Changed rule for product type name of Test Report (MPPF-CVQ-105-3). Added Format_Definition_File to Variable Header of Test Report. Added description of Task Table content (MPPF-CVQ-105-5, MPPF-CVQ-92). Several changes to make the Task Table and Job Order file descriptions compliant with the SWARM PDS-IPF ICD (MPPF-CVQ-51). Improved description of command line option tables (MPPF-CVQ-83).
1.2	2009-05-13	Sander Niemeijer	Updated Reference documents Section. Changed test report file type to REPx_REPDQC in various sections (MPPF-CVQ-107). Added example test report (Appendix C) and product report (Appendix D) (MPPF-CVQ-107). Fixed typos in Validity_Period and Validity Stop xml fields.
1.3	2009-07-17	Sander Niemeijer	Updated document references Updated list of supported Level 0 products in Section 3.1.2 to be in line with [L0-PROD] Issue 2. Fixed type of Test_Expression in Table 12. Fixed file type of Product Report in example Task Table and Job Order files and in the Table in Section 3.12.2. Added support for Dynamic_Processing_Parameter 'File_Class' and 'File_Counter' in Job Order files. Fixed allowed values for File_Class in Fixed_Header. Updated reference to DQC SUM.

1.4	2009-08-26	Sander Niemeijer	Addressed RID MPPF-CVQ-141. Updated document references Section 3.3.1: Any 4-character value for file class is allowed. Section 3.4.1, 3.4.2, 3.5.2: File_Class dynamic processing parameter in Job Order file is mandatory. Section 3.5.2: Added requirement on CDATA absence in Job Order file. Section 3.6.1: Removed the -d/--debug command line option for the standalone mode of the DQC, since this feature is not available. Section 3.8.1: Include reference to SUM for list of log messages. Section 3.11: Product Report format has changed. The format is now equal to that of the L1b processor. Section 3.11.1: Described conditions for when Product Report is created. Section 5.4: Added section for Product Reports. Updated Example files in the appendices.
1.5	2009-11-01	Joost Smeets	Changed reviewer. Updated Documentation list Updated products list in Table 2 to match L1b processor update (ICD v5.3).
1.6	2010-10-25	Sander Niemeijer	Section 1.2.1: Added CCN as reference Section 1.2.1: Updated list to latest versions of applicable documents Section 2.1.1, 3.1.1, 3.12.2, Appendix A/B/C/D: Update for new File_Name_Type=Stem JobOrder approach for dual .DBL/.HDR file input product Section 2.1.1, 3.12.1, 3.13.1, 3.13.2, Appendix A/B/C/D: Update for new combined TaskTable file for all Product Types for a single satellite. Section 3.1.2: Changed GPS_AGN_0_ and GPS_AGS_0_ to GPSxAGN_0_ and GPSxAGS_0_, with x={A,B,C} Section 3.12.1: Fixed incorrect naming of Task Table files (no underscore between 'Task' and 'Table').
1.7	2011-02-03	Sander Niemeijer	Updated version for Phase 2 Preliminary Design Review Updated document references in Section 1.2. Addressed RID MPPF-CVQ-153 (CVQ-V2_02). Added TIIx_DC_1B to product format specification in Section 3.1.2. Changed naming convention for task table (ref. MPPF-CVQ action 136) in Section 3.12.1 and in example processor entry in Workstation Configuration file in Section 3.13.2.

1.8	2012-07-02	Sander Niemeijer	Section 1.2.1: Updated versions of Applicable Documents and added L2 PFS Section 3.1.2: Added list of supported L2 products Section 3.3.2, 3.6.1, 5.3: Added support for setting limit on maximum number of warning/error messages per test. Section 3.4.2: Clarified that Test_Mode and Path can be empty within the Message element.
1.9	2012-08-06	Sander Niemeijer	Section 1.2.1: Updated versions of Applicable Documents
1.10	2012-09-07	Sander Niemeijer	Section 1.2.1: Updated versions of Applicable Documents and added L1A PFS Section 3.1.2: Added list of supported L1A products

1 Introduction

1.1 *Purpose and scope*

This document describes the interfaces from and to the SWARM Data Quality Control (DQC) module.

The DQC is a SWARM PDGS module that performs rudimentary screening of products immediately after production by the APF/PDF processing facilities. The DQC can also be used manually to screen static Auxiliary Data Files and/or Data Products.

The DQC is the name of the SWARM specific configuration of the APPROVE (Application for Product Verification) tool. For the remaining part of the document we will keep using the term DQC and only use the term 'approve' when we refer to the binary executable of the tool.

The DQC is developed as part of the SWARM Mission Performance & Planning System (MPPF) project.

This work is done under contract no 21883/08/I-OL.

Note: Header image source: ESA.

1.2 *Bibliography*

1.2.1 Applicable Documents

AD1 [CVQ-SoW] SOW SWARM Mission Performance & Planning System Implementation for ICM (Instrument Calibration Monitoring) DVT (Data Validation Tool) and DQC (Data Quality Control), SWAM-GSEG-EOPG-SW-08-0008, Issue 1/0, 9 June 2008
AD2 [GS-MASTER-ICD] SWARM Ground Segment Master ICD, SW-IC-ESA-IC-0117, Issue 1.6, 14 November 2011
AD3 [L0-PFS] SWARM L0 Product Format, SWARM-GSEG-EOPG-05-001, Issue 1 revision 7, 13 January 2010
AD4 [L0-PROD] SWARM Level 0 Products, SW-IF-EAD-GS-00017, Issue 11, 2 July 2012
AD5 [L1B-PFS] SWARM Level 1b Product Definition, SW-RS-DSC-SY-0007, Issue 5.11, 1 March 2012
AD6 [ECCS-E-40B] ECSS-E-40 Part 1B; Space Engineering – Software, 28 November 2003
AD7 [ECCS-Q-80B] ECSS-Q-80; Space product assurance, 10 October 2003
AD8 [FMT-GDL] Earth Explorer Ground Segment File Format Standard, PE-TN-ESA-GS-0001, Issue 1.4, 13 June 2003
AD9 [FMT-TAIL] Tailoring of File Format Standard, SW-TN-ESA-GS-0074, Issue 1.5, August 2009
AD10 [PDS-IPF-ICD] PDS-IPF ICD Generic Interface Guidelines, SW-ID-ESA-GS-0001, Issue 2.0, 2 May 2007
AD11 [L1B-PROCINT] IPF Swarm L1b Processor Interfaces, SW-ID-GMV-GS-0001, Version 3.5, 30 April 2012
AD12 [CVQ-CCN-PHASE2] CCN for Phase 2 Swarm Mission performance & planning Facility implementation (MMPF-CVQ), SWAM-GSEG-EOPG-CN-10-0015, Issue 1.0, 5 July 2010
AD13 [CEFI-TII-ICD] SWARM MPPF-CVQ CEFI-TII Calibration Data Processor ICD, ST-ESA-SWARM-ICD-0003, Issue 1.3, 12 October 2011
AD14 [L2-PFS] Product specification for L2 Products and Auxiliary Products, SW-DS-DTU-GS-0001, Rev 2E~~dD~~, ~~13~~30 ~~July~~August 2012
AD15 [CVQ-SOW3] SoW for SWARM MPPF-CVQ CCN 03, SWAM-GSEG-EOPG-SW-12-0021, issue 1.2, 14 June 2012
AD16 [L1A-PFS] SWARM Level 1a Product Definition, SW-ID-GMV-GS-0003, Issue 3.1, 30 April

2012

1.2.2 Reference Documents

RD1 [PDGS-ICD] SWARM Payload Data Ground Segment Overall ICD, SWAM-GSEG-EOPG-ID-08-0019, Issue 1.48, 31 ~~December 2009~~July 2012
RD2 [DQC-SUM] DQC User Manual, ST-ESA-SWARM-SUM-0001, Issue 1.4, 12 October 2011
RD3 [CODA] Common Data Access toolbox. Documentation is available at http://www.stcorp.nl/coda/doc/. Documentation of the CODA expression language as can be used in the Test Expressions is also provided as html documentation in the DQC software package.

1.3 List of Abbreviations

Abbreviation	*Explanation*
ADF	Auxiliary Data File
APPROVE	Application for Product Verification
BEAT	Basic ENVISAT Atmospheric Toolbox
CODA	Common Data Access
DQC	Data Quality Control
ESA	European Space Agency
HK/TM	House-Keeping/Telemetry
HTML	HyperText Mark-up Language
ICD	Interface Control Document
IPF	Instrument Processing Facility
L0	Level-0
L1	Level-1
L2	Level-2
S&T	Science and Technology B.V.
TBC	To Be Confirmed
TBD	To Be Determined
TBW	To Be Written
TC	Tele-command
TM	Telemetry
XML	Extensible Mark-up Language

2 Communication Definition

2.1 Functional Interface Definition

The DQC is the name of the SWARM specific configuration of the APPROVE (Application for Product Verification) tool. APPROVE is a single mission independent application that will be able to take a product and a test definition file, perform a series of tests on the product, and produce a test report for the screened product. A product can either be a single file or be split into separate header and datablock files in which case a single test report will be produced with the results for the screening of both the header and datablock file.

For the remaining part of the document we will keep using the term DQC and only use the term 'approve' when we refer to the binary executable of the tool.

The DQC performs three types of checks on a product:

- *Standard consistency check*: Structural check of the product and a read of all data.
- *Configurable product specific tests*: These are tests that work on a single file. The tests are defined in a Test Definition File. By editing this xml-file, the user can define additional product specific tests that are included into the test procedure when the approve utility is run.
- *Configurable consistency check across data block and header files*: In case a product consists of a data block file (.DBL) and header file (.HDR) then the Test Definition File can optionally contain user defined tests to check consistency of specific values between the data block and header file.

The DQC has two modi operandi:

- As an IPF processor: The DQC on the APF/PDF will be an IPF processor compliant with [PDS-IPF-ICD]. This operation of the DQC will be referred to as 'DQC processor'.
- As a standalone executable: It will also be possible to run the DQC from the command line to manually screen e.g. Auxiliary Data Files. This operation is similar to the DQC processor, but without the IPF requirements. It is referred to as 'standalone DQC'.

2.1.1 DQC as an IPF processor

A DQC processor consists of a single task. The executable for this single task will be the 'approve' application.

Within the scope of a job only a single product will be checked and only a single Test Report will be produced. A product can consist of both a header and a data block file. In those cases, the DQC should be provided the 'stem' of the product (i.e. filename without extension) as parameter and the DQC will then automatically first find the datablock file (by appending .DBL to the Stem filename) and then also look for the header file in the same location and include the screening report for both files in the Test Report.

The definition of the DQC processor will be made known to the processing platform (Management Layer) by means of two configuration files: the Task Table file and the Workstation Configuration file.

There will be a separate 'logical' DQC processor per satellite, which will support all product types for that satellite. This means that there will be a separate Workstation Configuration file entry and Task Table file per satellite. The executables for the DQC will be the same for each processor configuration.

The Management Layer software will run the approve executable as the first and only task of the DQC processor with the location of the Job Order file as command-line parameter. The approve executable will take from this Job Order file the location of the product that has to be screened and the location of the Test Definition file. Log messages will be written to stdout and stderr and will be collected by the Management Layer. When the product screening is finished the approve executable will generate a Test Report file together with a Product List and Product Report file.

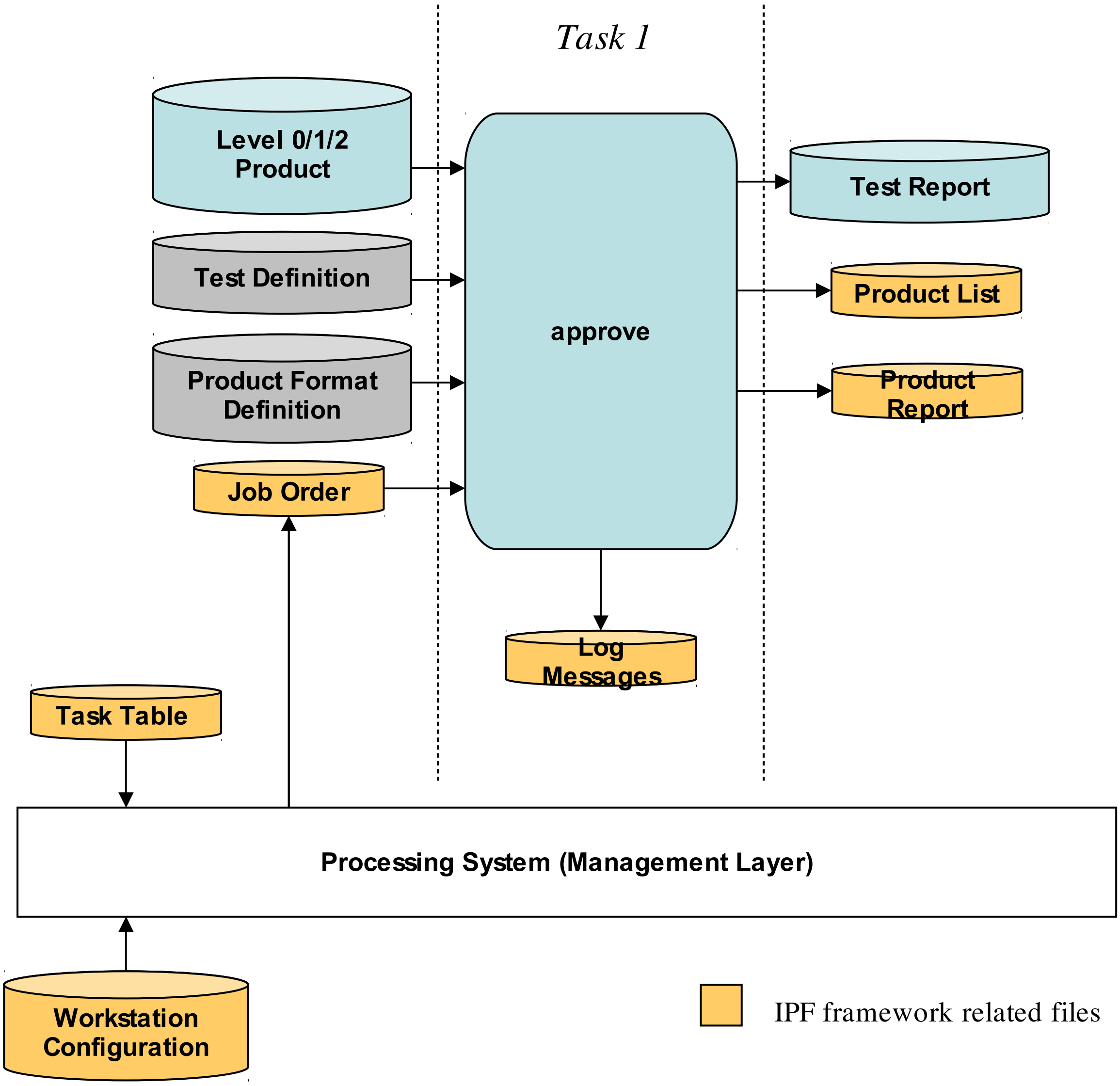

Figure 1 DQC Processor Overview

2.1.2 DQC as a standalone application

The standalone DQC will be operated using command-line parameters. The approve executable will take one or more product filenames (and optional additional options) and perform a validation on these products. By default approve will only apply the build-in tests on the product files, but it is possible through either an environment variable or via a command-line option to specify the location of a Test Definition file that should be used. Test results and messages will be sent to standard output (stdout and stderr). It is also possible, using a command-line option, to generate a Test Report (one for each product) like the DQC processor instead.

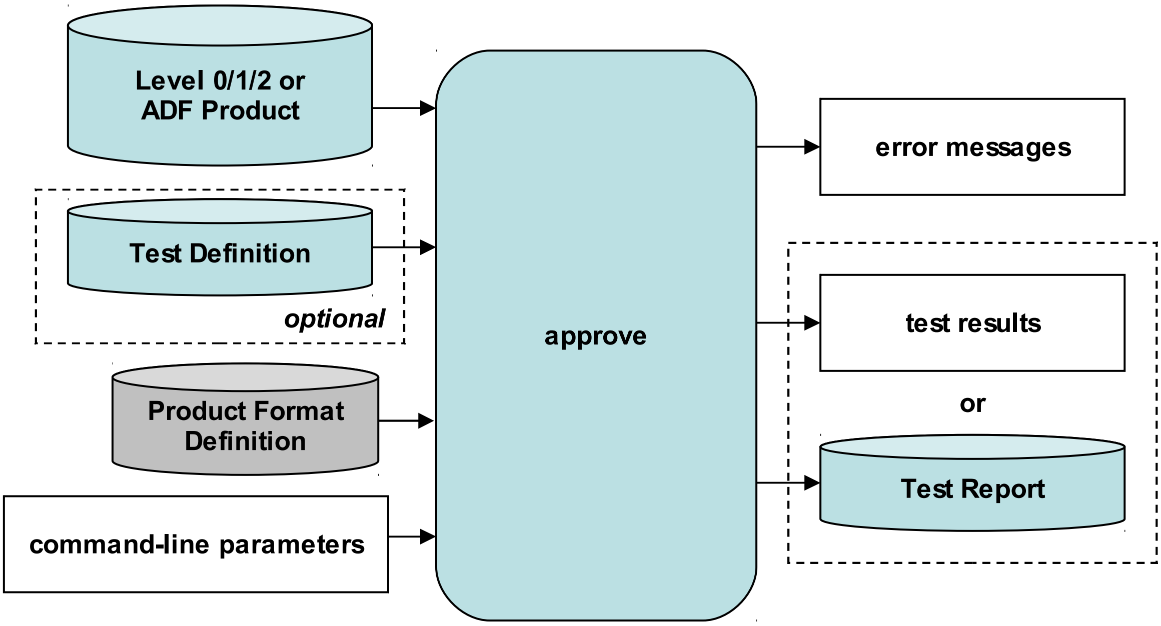

Figure 2 DQC Standalone Overview

A product can consist of both a header and a data block file. If the standalone DQC does not have to produce a Test Report, the screening will be performed on a file by file basis (i.e. the header file will not be included with a check of a data block file, and no HDR/DBL cross-file checks will be performed). If a Test Report *is* requested then the standalone DQC will also include a check of the header file (and perform cross-file HDR/DBL checks) if a check of the data block file is performed. The reverse is however not true (i.e. a check of the header file will only produce a report for the header file).

2.2 Interface Details Summary

Table 1 Input and output interfaces of the DQC

Interface	Description	Relevancy	Type
Input product file(s)	Product file(s) to be checked by the DQC	Processor, standalone	Input
Product Format Definition file	A single file containing descriptions of the product format for each supported product. This file is used by the data access library of APPROVE.	Processor, standalone	Input
Test Definition file	A list of screening tests for each product type	Processor, standalone	Input
Test Report	Contains the results of the product screening as performed by the DQC	Processor, standalone	Output

Job Order	Definition of tasks to be performed by the processor including all configuration input parameters	Processor	Input
Command line parameters	Switches for configuring the function of the DQC	Standalone	Input
Environment variables	Variables for configuring the function of the DQC	Standalone	Input
Logging	The DQC will write log messages to stdout and stderr	Processor, standalone	Output
Exit Code	Exit status of the DQC	Processor, standalone	Output
Product List	The Product List file will be an ASCII file containing the full filename of the Test Report	Processor	Output
Product Report	The Product Report is a file containing log messages in an XML format	Processor	Output
Task Table	Specifies the tasks that a processor is composed of and the input/output file definitions	Processor	*
Workstation Configuration file	The Workstation Configuration file defines the full list of processors for an IPF	Processor	*

* Note that the Task Table and Workstation Configuration files are inputs to the Management Layer and not direct inputs to the DQC.

3 Interface details

In this section we describe details for each relevant interface.

3.1 *Input Product File*

3.1.1 Description

The input product file is the file to be checked by the DQC. The DQC will be able to screen the product types as mentioned in the table below. For each product type a link is provided to the document that defines its format.

A product can be a single .EEF file or can be split into separate .HDR header and .DBL data block files. The screening of the DQC will be product based. This means that the product screening of a product that is stored in separate header and data block files will produce a single report for two separate physical files.

If the File_Name_Type of the input product in the JobOrder file is STEM, then the DQC will try to find both the .DBL file and .HDR file and include both files in the screening.

If the DQC is running in standalone mode and the DQC is presented a .DBL file *and* the DQC is requested to product a Test Report file the DQC will also try to find the .HDR file in the same location and include this in the screening (otherwise the single input file is screened).

3.1.2 Format

Table 2 Product types supported by DQC

Product Type	Description	Definition
ACCANOM_0_	Science Data, Standard measurement mode, Satellite A	[L0-PFS], [L0-PROD]
ACCBNOM_0_	Science Data, Standard measurement mode, Satellite B	[L0-PFS], [L0-PROD]
ACCCNOM_0_	Science Data, Standard measurement mode, Satellite C	[L0-PFS], [L0-PROD]
ACCATEST0_	Science Data, Selftesting mode, Satellite A	[L0-PFS], [L0-PROD]
ACCBTEST0_	Science Data, Selftesting mode, Satellite B	[L0-PFS], [L0-PROD]
ACCCTEST0_	Science Data, Selftesting mode, Satellite C	[L0-PFS], [L0-PROD]
ASMASCA_0_	Scalar Mode Science Data, Satellite A	[L0-PFS], [L0-PROD]
ASMBSCA_0_	Scalar Mode Science Data, Satellite B	[L0-PFS], [L0-PROD]
ASMCSCA_0_	Scalar Mode Science Data, Satellite C	[L0-PFS], [L0-PROD]
ASMAVEC_0_	Vector Mode Science Data, Satellite A	[L0-PFS], [L0-PROD]
ASMBVEC_0_	Vector Mode Science Data, Satellite B	[L0-PFS], [L0-PROD]
ASMCVEC_0_	Vector Mode Science Data, Satellite C	[L0-PFS], [L0-PROD]
ASMABUR_0_	Burst Mode Science Data, Satellite A	[L0-PFS], [L0-PROD]
ASMBBUR_0_	Burst Mode Science Data, Satellite B	[L0-PFS], [L0-PROD]
ASMCBUR_0_	Burst Mode Science Data, Satellite C	[L0-PFS], [L0-PROD]
ASMAMAG_0_	SpectroMag Mode Science Data, Satellite A	[L0-PFS], [L0-PROD]

ASMBMAG_0_	SpectroMag Mode Science Data, Satellite B	[L0-PFS], [L0-PROD]
ASMCMAG_0_	SpectroMag Mode Science Data, Satellite C	[L0-PFS], [L0-PROD]
ASMALAS_0_	SpectroLaser Mode Science Data, Satellite A	[L0-PFS], [L0-PROD]
ASMBLAS_0_	SpectroLaser Mode Science Data, Satellite B	[L0-PFS], [L0-PROD]
ASMCLAS_0_	SpectroLaser Mode Science Data, Satellite C	[L0-PFS], [L0-PROD]
ASMAPOW_0_	SpectroPowerLaser Mode Science Data Rep, Satellite A	[L0-PFS], [L0-PROD]
ASMBPOW_0_	SpectroPowerLaser Mode Science Data Rep, Satellite B	[L0-PFS], [L0-PROD]
ASMCPOW_0_	SpectroPowerLaser Mode Science Data Rep, Satellite C	[L0-PFS], [L0-PROD]
GPSAOBS_0_	GPS Observation Data, Satellite A	[L0-PFS], [L0-PROD]
GPSBOBS_0_	GPS Observation Data, Satellite B	[L0-PFS], [L0-PROD]
GPSCOBS_0_	GPS Observation Data, Satellite C	[L0-PFS], [L0-PROD]
GPSANAV_0_	GPS Navigation Data, Satellite A	[L0-PFS], [L0-PROD]
GPSBNAV_0_	GPS Navigation Data, Satellite B	[L0-PFS], [L0-PROD]
GPSCNAV_0_	GPS Navigation Data, Satellite C	[L0-PFS], [L0-PROD]
GPSAGPS_0_	GPS Low Frequency Data, Satellite A	[L0-PFS], [L0-PROD]
GPSBGPS_0_	GPS Low Frequency Data, Satellite B	[L0-PFS], [L0-PROD]
GPSCGPS_0_	GPS Low Frequency Data, Satellite C	[L0-PFS], [L0-PROD]
GPSAAGN_0_	AGC Status Data - Navigate, Satellite A	[L0-PFS], [L0-PROD]
GPSBAGN_0_	AGC Status Data - Navigate, Satellite B	[L0-PFS], [L0-PROD]
GPSCAGN_0_	AGC Status Data - Navigate, Satellite C	[L0-PFS], [L0-PROD]
GPSAAGS_0_	AGC Status Data - Standby, Satellite A	[L0-PFS], [L0-PROD]
GPSBAGS_0_	AGC Status Data - Standby, Satellite B	[L0-PFS], [L0-PROD]
GPSCAGS_0_	AGC Status Data - Standby, Satellite C	[L0-PFS], [L0-PROD]
GPSANOIS0_	Noise Histogram Data, Standby, Satellite A	[L0-PFS], [L0-PROD]
GPSBNOIS0_	Noise Histogram Data, Standby, Satellite B	[L0-PFS], [L0-PROD]
GPSCNOIS0_	Noise Histogram Data, Standby, Satellite C	[L0-PFS], [L0-PROD]
EFIANOM_0_	EFI Normal Mode Data, Satellite A	[L0-PFS], [L0-PROD]
EFIBNOM_0_	EFI Normal Mode Data, Satellite B	[L0-PFS], [L0-PROD]
EFICNOM_0_	EFI Normal Mode Data, Satellite C	[L0-PFS], [L0-PROD]
EFIALPC_0_	EFI LP-Calibration Mode Data, Satellite A	[L0-PFS], [L0-PROD]
EFIBLPC_0_	EFI LP-Calibration Mode Data, Satellite B	[L0-PFS], [L0-PROD]
EFICLPC_0_	EFI LP-Calibration Mode Data, Satellite C	[L0-PFS], [L0-PROD]
EFIATIC_0_	EFI TII-Calibration Mode Data, Satellite A	[L0-PFS], [L0-PROD]
EFIBTIC_0_	EFI TII-Calibration Mode Data, Satellite B	[L0-PFS], [L0-PROD]
EFICTIC_0_	EFI TII-Calibration Mode Data, Satellite C	[L0-PFS], [L0-PROD]
STRANOM_0_	STR Attitude Data, Nominal electronic, Satellite A	[L0-PFS], [L0-PROD]

STRBNOM_0_	STR Attitude Data, Nominal electronic, Satellite B	[L0-PFS], [L0-PROD]
STRCNOM_0_	STR Attitude Data, Nominal electronic, Satellite C	[L0-PFS], [L0-PROD]
STRARED_0_	STR Attitude Data, Redundant electronic, Satellite A	[L0-PFS], [L0-PROD]
STRBRED_0_	STR Attitude Data, Redundant electronic, Satellite B	[L0-PFS], [L0-PROD]
STRCRED_0_	STR Attitude Data, Redundant electronic, Satellite C	[L0-PFS], [L0-PROD]
VFMANOM_0_	VFM Science Data 50Hz, Satellite A	[L0-PFS], [L0-PROD]
VFMBNOM_0_	VFM Science Data 50Hz, Satellite B	[L0-PFS], [L0-PROD]
VFMCNOM_0_	VFM Science Data 50Hz, Satellite C	[L0-PFS], [L0-PROD]
VFMAN10_0_	VFM Science Data 10Hz, Satellite A	[L0-PFS], [L0-PROD]
VFMBN10_0_	VFM Science Data 10Hz, Satellite B	[L0-PFS], [L0-PROD]
VFMCN10_0_	VFM Science Data 10Hz, Satellite C	[L0-PFS], [L0-PROD]
VFMAN_1_0_	VFM Science Data 1Hz, Satellite A	[L0-PFS], [L0-PROD]
VFMBN_1_0_	VFM Science Data 1Hz, Satellite B	[L0-PFS], [L0-PROD]
VFMCN_1_0_	VFM Science Data 1Hz, Satellite C	[L0-PFS], [L0-PROD]
HK_ANOM_0_	Auxiliary HK, Satellite A	[L0-PFS], [L0-PROD]
HK_BNOM_0_	Auxiliary HK, Satellite B	[L0-PFS], [L0-PROD]
HK_CNOM_0_	Auxiliary HK, Satellite C	[L0-PFS], [L0-PROD]
ASMASCI_1A	ASM scientific data, 1 Hz, Satellite A	[L1A-PFS]
ASMBSCI_1A	ASM scientific data, 1 Hz, Satellite B	[L1A-PFS]
ASMCSCI_1A	ASM scientific data, 1 Hz, Satellite C	[L1A-PFS]
VFMASCI_1A	VFM scientific data, 1 Hz, Satellite A	[L1A-PFS]
VFMBSCI_1A	VFM scientific data, 1 Hz, Satellite B	[L1A-PFS]
VFMCSCI_1A	VFM scientific data, 1 Hz, Satellite C	[L1A-PFS]
STRASCI_1A	STR scientific data, 1 Hz, Satellite A	[L1A-PFS]
STRBSCI_1A	STR scientific data, 1 Hz, Satellite B	[L1A-PFS]
STRCSCI_1A	STR scientific data, 1 Hz, Satellite C	[L1A-PFS]
ACCASCI_1A	ACC scientific data, 1 Hz, Satellite A	[L1A-PFS]*
ACCBSCI_1A	ACC scientific data, 1 Hz, Satellite B	[L1A-PFS]*
ACCCSCI_1A	ACC scientific data, 1 Hz, Satellite C	[L1A-PFS]*
EFIA_LP_1A	LP sweep mode data, 1/128 Hz, LP harmonic mode data, 2 Hz, Satellite A	[L1A-PFS]*
EFIB_LP_1A	LP sweep mode data, 1/128 Hz, LP harmonic mode data, 2 Hz, Satellite B	[L1A-PFS]*
EFIC_LP_1A	LP sweep mode data, 1/128 Hz, LP harmonic mode data, 2 Hz, Satellite C	[L1A-PFS]*
EFIATII_1A	TII data, 2 Hz, and 1 Hz (HK), Satellite A	[L1A-PFS]
EFIBTII_1A	TII data, 2 Hz, and 1 Hz (HK), Satellite B	[L1A-PFS]

EFICTII_1A	TII data, 2 Hz, and 1 Hz (HK), Satellite C	[L1A-PFS]
GPSANOM_1A	GPS data, 1Hz (MDR_GPS_LEO) and 0.8Hz (MDR_GPS_GPS), Satellite A	[L1A-PFS]*
GPSBNOM_1A	GPS data, 1Hz (MDR_GPS_LEO) and 0.8Hz (MDR_GPS_GPS), Satellite B	[L1A-PFS]*
GPSCNOM_1A	GPS data, 1Hz (MDR_GPS_LEO) and 0.8Hz (MDR_GPS_GPS), Satellite C	[L1A-PFS]*
HK_AAOCS1A	AOCS housekeeping data, 1 Hz (Mag_HK and Thru_HK) and 1/32 Hz (Prop_HK), Satellite A	[L1A-PFS]*
HK_BAOCS1A	AOCS housekeeping data, 1 Hz (Mag_HK and Thru_HK) and 1/32 Hz (Prop_HK), Satellite B	[L1A-PFS]*
HK_CAOCS1A	AOCS housekeeping data, 1 Hz (Mag_HK and Thru_HK) and 1/32 Hz (Prop_HK), Satellite C	[L1A-PFS]*
HK_ABUS_1A	BUS housekeeping data, 0.25 Hz, Satellite A	[L1A-PFS]*
HK_BBUS_1A	BUS housekeeping data, 0.25 Hz, Satellite B	[L1A-PFS]*
HK_CBUS_1A	BUS housekeeping data, 0.25 Hz, Satellite C	[L1A-PFS]*
MAGA_HR_1B	Mag-H Satellite A	[L1B-PFS]
MAGB_HR_1B	Mag-H Satellite B	[L1B-PFS]
MAGC_HR_1B	Mag-H Satellite C	[L1B-PFS]
MAGA_LR_1B	Mag-L Satellite A	[L1B-PFS]
MAGB_LR_1B	Mag-L Satellite B	[L1B-PFS]
MAGC_LR_1B	Mag-L Satellite C	[L1B-PFS]
MAGA_CA_1B	Mag-C Satellite A	[L1B-PFS]
MAGB_CA_1B	Mag-C Satellite B	[L1B-PFS]
MAGC_CA_1B	Mag-C Satellite C	[L1B-PFS]
MAGAMAN_1B	Magnetic Calibration Manoeuvre report, Satellite A	[L1B-PFS]
MAGBMAN_1B	Magnetic Calibration Manoeuvre report, Satellite B	[L1B-PFS]
MAGCMAN_1B	Magnetic Calibration Manoeuvre report, Satellite C	[L1B-PFS]
MAGAEUL_1B	Euler angle estimation of the CRF <- VFM transformation, Satellite A	[L1B-PFS]
MAGBEUL_1B	Euler angle estimation of the CRF <- VFM transformation, Satellite B	[L1B-PFS]
MAGCEUL_1B	Euler angle estimation of the CRF <- VFM transformation, Satellite C	[L1B-PFS]
EFIA_PL_1B	Plasma product, Satellite A	[L1B-PFS]
EFIB_PL_1B	Plasma product, Satellite B	[L1B-PFS]
EFIC_PL_1B	Plasma product, Satellite C	[L1B-PFS]
LP_A_CA_1B	Langmuir Probe offset calibration data, Satellite A	[L1B-PFS]
LP_B_CA_1B	Langmuir Probe offset calibration data, Satellite B	[L1B-PFS]

LP_C_CA_1B	Langmuir Probe offset calibration data, Satellite C	[L1B-PFS]
TIIA_CA_1B	Thermal Ion Imager circular fit calibration data, Satellite A	[L1B-PFS]
TIIB_CA_1B	Thermal Ion Imager circular fit calibration data, Satellite B	[L1B-PFS]
TIIC_CA_1B	Thermal Ion Imager circular fit calibration data, Satellite C	[L1B-PFS]
MODA_SC_1B	Ephemeris product, Satellite A	[L1B-PFS]
MODB_SC_1B	Ephemeris product, Satellite B	[L1B-PFS]
MODC_SC_1B	Ephemeris product, Satellite C	[L1B-PFS]
STRAATT_1B	Attitude of S/C, 1Hz, Satellite A	[L1B-PFS]
STRBATT_1B	Attitude of S/C, 1Hz, Satellite B	[L1B-PFS]
STRCATT_1B	Attitude of S/C, 1Hz, Satellite C	[L1B-PFS]
GPSANAV_1B	On-board GPSR navigational solution - S/C position, 1Hz, Satellite A	[L1B-PFS]
GPSBNAV_1B	On-board GPSR navigational solution - S/C position, 1Hz, Satellite B	[L1B-PFS]
GPSCNAV_1B	On-board GPSR navigational solution - S/C position, 1Hz, Satellite C	[L1B-PFS]
GPSA_RO_1B	RINEX Observation data, Satellite A	[L1B-PFS]
GPSB_RO_1B	RINEX Observation data, Satellite B	[L1B-PFS]
GPSC_RO_1B	RINEX Observation data, Satellite C	[L1B-PFS]
GPSA_RN_1B	RINEX Navigation message, Satellite A	[L1B-PFS]
GPSB_RN_1B	RINEX Navigation message, Satellite B	[L1B-PFS]
GPSC_RN_1B	RINEX Navigation message, Satellite C	[L1B-PFS]
ACCA_PR_1B	Acceleration product, Satellite A	[L1B-PFS]
ACCB_PR_1B	Acceleration product, Satellite B	[L1B-PFS]
ACCC_PR_1B	Acceleration product, Satellite C	[L1B-PFS]
ASMAAUX_1B	Magnetic stray fields at ASM sensor position, Satellite A	[L1B-PFS]
ASMBAUX_1B	Magnetic stray fields at ASM sensor position, Satellite B	[L1B-PFS]
ASMCAUX_1B	Magnetic stray fields at ASM sensor position, Satellite C	[L1B-PFS]
VFMAAUX_1B	Magnetic stray fields at VSM sensor position, Satellite A	[L1B-PFS]
VFMBAUX_1B	Magnetic stray fields at VSM sensor position, Satellite B	[L1B-PFS]
VFMCAUX_1B	Magnetic stray fields at VSM sensor position, Satellite C	[L1B-PFS]
TIIA_DC_1B	Product Report output from CEFI-TII, Satellite A	[CEFI-TII-ICD]
TIIB_DC_1B	Product Report output from CEFI-TII, Satellite B	[CEFI-TII-ICD]
TIIC_DC_1B	Product Report output from CEFI-TII, Satellite C	[CEFI-TII-ICD]
MSW_EULi2C	Euler angles for all satellites	[L2-PFS]
MSW_VALi2C	Intermediate validation report	[L2-PFS]
MSW_EULi2D	Euler angles for all satellites	[L2-PFS]

MSW_VALi2D	Intermediate validation report	[L2-PFS]
MCO_SHAi2C	Spherical harmonic model of the main (core) field and its temporal variation	[L2-PFS]
MCO_VALi2C	Intermediate validation report	[L2-PFS]
MCO_SHAi2D	Spherical harmonic model of the main (core) field and its temporal variation	[L2-PFS]
MCO_VALi2D	Intermediate validation report	[L2-PFS]
MLI_SHAi2C	Spherical harmonic model of the lithospheric field	[L2-PFS]
MLI_VALi2C	Intermediate validation report	[L2-PFS]
MLI_SHAi2D	Spherical harmonic model of the lithospheric field	[L2-PFS]
MLI_VALi2D	Intermediate validation report	[L2-PFS]
MLI_SHAi2E	Spherical harmonic model of the lithospheric field	[L2-PFS]
MLI_VALi2E	Intermediate validation report	[L2-PFS]
Q3D_CI_i2_	Q-matrix of 3D mantle conductivity including oceans	[L2-PFS]
MIN_1DMi2_	1D model of mantle conductivity	[L2-PFS]
MI1_VALi2_	Intermediate validation report	[L2-PFS]
MIN_3DMi2a	3D model of mantle conductivity (frequency domain)	[L2-PFS]
MIN_3DMi2b	3D model of mantle conductivity (time domain)	[L2-PFS]
MI3_VALi2_	Intermediate validation report	[L2-PFS]
MCR_1DMi2_	1D C-response	[L2-PFS]
MC1_VALi2_	Intermediate validation report	[L2-PFS]
MCR_3DMi2_	3D C-response maps	[L2-PFS]
MC3_VALi2_	Intermediate validation report	[L2-PFS]
MMA_SHAi2C	Spherical harmonic model of the large-scale magnetospheric field and its Earth-induced counterpart	[L2-PFS]
MMA_VALi2C	Intermediate validation report	[L2-PFS]
MIO_SHAi2C	Spherical harmonic model of the daily geomagnetic variation at middle latitudes (Sq and low latitudes – EEJ)	[L2-PFS]
MIO_VALi2C	Intermediate validation report	[L2-PFS]
MIO_SHAi2D	Spherical harmonic model of the daily geomagnetic variation at middle latitudes (Sq and low latitudes – EEJ)	[L2-PFS]
MIO_VALi2D	Intermediate validation report	[L2-PFS]
MSW_EUL_2C	Euler angles describing transformation from STR-CRF to VFM frame for satellites A, B, and C	[L2-PFS]
MSW_EUL_2D	Euler angles describing transformation from STR-CRF to VFM frame for satellites A, B, and C	[L2-PFS]
MSW_VAL_2C	Validation report about Euler angles	[L2-PFS]
MSW_VAL_2D	Validation report about Euler angles	[L2-PFS]

MSW_VAL_2_	Validation report about Euler angles	[L2-PFS]
MSW_EUL_2F	Euler angles describing transformation from STR-CRF to VFM frame for satellites A, B, and C	[L2-PFS]
MCO_SHA_2C	Spherical harmonic model of the main (core) field and its temporal variation	[L2-PFS]
MCO_SHA_2D	Spherical harmonic model of the main (core) field and its temporal variation	[L2-PFS]
MCO_VAL_2C	Validation report on core magnetic field	[L2-PFS]
MCO_VAL_2D	Validation report on core magnetic field	[L2-PFS]
MCO_VAL_2_	Validation report on core magnetic field	[L2-PFS]
MCO_SHA_2F	Spherical harmonic model of the main (core) field and its temporal variation	[L2-PFS]
MLI_SHA_2C	Spherical harmonic model of the lithospheric field	[L2-PFS]
MLI_SHA_2D	Spherical harmonic model of the lithospheric field	[L2-PFS]
MLI_SHA_2E	Extended spherical harmonic model of the lithospheric field	[L2-PFS]
MLI_VAL_2C	Validation report on lithospheric field	[L2-PFS]
MLI_VAL_2D	Validation report on lithospheric field	[L2-PFS]
MLI_VAL_2E	Validation report on lithospheric field	[L2-PFS]
MLI_VAL_2_	Validation report on lithospheric field	[L2-PFS]
MIN_1DM_2_	1D model of mantle conductivity	[L2-PFS]
MIN_3DM_2a	3D model of mantle conductivity (frequency domain)	[L2-PFS]
MIN_3DM_2b	3D model of mantle conductivity (time domain)	[L2-PFS]
MCR_1DM_2_	1D C-response maps	[L2-PFS]
MCR_3DM_2_	3D C-response maps	[L2-PFS]
MI1_VAL_2_	Validation report on 1D mantle conductivity	[L2-PFS]
MI3_VAL_2_	Validation report on 3D mantle conductivity	[L2-PFS]
MC1_VAL_2_	Validation report on 1D C-response	[L2-PFS]
MC3_VAL_2_	Validation report on 3D C-response	[L2-PFS]
MMA_SHA_2C	Spherical harmonic model of the large-scale magnetospheric field and its Earth-induced counterpart	[L2-PFS]
MMA_VAL_2C	Validation report magnetospheric magnetic model	[L2-PFS]
MMA_SHA_2F	Spherical harmonic model of the large-scale magnetospheric field and its Earth-induced counterpart	[L2-PFS]
MIO_SHA_2C	Spherical harmonic model of the daily geomagnetic variation at middle latitudes (Sq and low latitudes – EEJ)	[L2-PFS]
MIO_SHA_2D	Spherical harmonic model of the daily geomagnetic variation at middle latitudes (Sq and low latitudes – EEJ)	[L2-PFS]
MIO_VAL_2C	Validation report on ionospheric magnetic model	[L2-PFS]
MIO_VAL_2D	Validation report on ionospheric magnetic model	[L2-PFS]

MIO_VAL_2_	Validation report on ionospheric magnetic model	[L2-PFS]
IBIATMS_2F	Ionospheric bubble index	[L2-PFS]
IBIBTMS_2F	Ionospheric bubble index	[L2-PFS]
IBICTMS_2F	Ionospheric bubble index	[L2-PFS]
TECATMS_2F	Time series of the ionospheric total electron content	[L2-PFS]
TECBTMS_2F	Time series of the ionospheric total electron content	[L2-PFS]
TECCTMS_2F	Time series of the ionospheric total electron content	[L2-PFS]
FAC_TMS_2F	Time series of field-aligned currents	[L2-PFS]
FACATMS_2F	Time series of field-aligned currents	[L2-PFS]
FACBTMS_2F	Time series of field-aligned currents	[L2-PFS]
FACCTMS_2F	Time series of field-aligned currents	[L2-PFS]
EEFATMS_2F	Equatorial Electric Field	[L2-PFS]
EEFBTMS_2F	Equatorial Electric Field	[L2-PFS]
EEFCTMS_2F	Equatorial Electric Field	[L2-PFS]
SP3ACOM_2_	Time series of position and velocity of the center of mass of each satellite (reduced-dynamic POD)	[L2-PFS]
SP3BCOM_2_	Time series of position and velocity of the center of mass of each satellite (reduced-dynamic POD)	[L2-PFS]
SP3CCOM_2_	Time series of position and velocity of the center of mass of each satellite (reduced-dynamic POD)	[L2-PFS]
SP3AKIN_2_	Time series of position and velocity of the center of mass of each satellite (kinematic POD)	[L2-PFS]
SP3BKIN_2_	Time series of position and velocity of the center of mass of each satellite (kinematic POD)	[L2-PFS]
SP3CKIN_2_	Time series of position and velocity of the center of mass of each satellite (kinematic POD)	[L2-PFS]
SP3AVAL_2_	Validation report for SP3ACOM_2_	[L2-PFS]
SP3BVAL_2_	Validation report for SP3BCOM_2_	[L2-PFS]
SP3CVAL_2_	Validation report for SP3CCOM_2_	[L2-PFS]
ACCACAL_2_	Accelerometer calibration parameters from the POD process	[L2-PFS]
ACCBCAL_2_	Accelerometer calibration parameters from the POD process	[L2-PFS]
ACCCCAL_2_	Accelerometer calibration parameters from the POD process	[L2-PFS]
ACCAPOD_2_	Time series of non-gravitational accelerations estimated by POD	[L2-PFS]
ACCBPOD_2_	Time series of non-gravitational accelerations estimated by POD	[L2-PFS]
ACCCPOD_2_	Time series of non-gravitational accelerations estimated by	[L2-PFS]

	POD	
ACCA_AE_2_	Time series of calibrated and pre-processed accelerometer observations and of aerodynamic accelerations from satellite A	[L2-PFS]
ACCB_AE_2_	Time series of calibrated and pre-processed accelerometer observations and of aerodynamic accelerations from satellite B	[L2-PFS]
ACCC_AE_2_	Time series of calibrated and pre-processed accelerometer observations and of aerodynamic accelerations from satellite C	[L2-PFS]
DNSAWND_2_	Time series of neutral thermospheric density and wind speed	[L2-PFS]
DNSBWND_2_	Time series of neutral thermospheric density and wind speed	[L2-PFS]
DNSCWND_2_	Time series of neutral thermospheric density and wind speed	[L2-PFS]
TDWAVAL_2_	Validation report for DNSAWND_2_	[L2-PFS]
TDWBVAL_2_	Validation report for DNSBWND_2_	[L2-PFS]
TDWCVAL_2_	Validation report for DNSCWND_2_	[L2-PFS]
MAG_QL__2_	Quick Look of magnetic field products MAGx_LR_1B	[L2-PFS]
EFI_QL__2_	Quick Look of EFIx_PL_1B	[L2-PFS]
REP__L2PS_	Report for each product release	[L2-PFS]
AUX_KP__2_	Planetary index of geomagnetic activity	[L2-PFS]
AUX_DST_2_	Equivalent equatorial magnetic disturbances index	[L2-PFS]
AUX_F10_2_	Index of daily solar radio flux	[L2-PFS]
AUX_IMF_2_	Interplanetary magnetic field, 3-component magnetic field, solar wind density and velocity	[L2-PFS]
AUX_KP__2F	Planetary index of geomagnetic activity	[L2-PFS]
AUX_DST_2F	Equivalent equatorial magnetic disturbances index	[L2-PFS]
AUX_F10_2F	Index of daily solar radio flux	[L2-PFS]
AUX_IMF_2F	Interplanetary magnetic field, 3-component magnetic field	[L2-PFS]
AUX_SWV_2F	Solar wind density and velocity	[L2-PFS]
AUX_IRZ_2F	12 month smoothed sunspot number	[L2-PFS]
AUX_APX_2F	Apex magnetic coordinates	[L2-PFS]
AUX_GPSEPH	GPS ephemeris	[L2-PFS]
AUX_USLEAP	Leap second information	[L2-PFS]
AUX_DCB_2F	GPS satellite differential code biases	[L2-PFS]
AUX_OBS_2_	Geomagnetic observatory data; 3-component magnetic field at INTERMAGNET and other magnetic observatories	[L2-PFS]
AUX_IGR_2_	IGRF (International Geomagnetic Reference Field) latest	[L2-PFS]

	generation, model of the Earth's core magnetic field	
AUX_COR_2_	Model for the core magnetic field	[L2-PFS]
AUX_LIT_2_	Model for the lithospheric magnetic field	[L2-PFS]
AUX_IGR_2F	IGRF (International Geomagnetic Reference Field) latest generation, model of the Earth's core magnetic field	[L2-PFS]
AUX_COR_2F	Model for the core magnetic field	[L2-PFS]
AUX_LIT_2F	Model for the lithospheric magnetic field	[L2-PFS]
AUX_PMF_2F	Magnetospheric model	[L2-PFS]
AUX_PSM_2F	Coefficients to transform from Solar Magnetic (SM) to geographic coordinates for computing the external magnetic field	[L2-PFS]
AUX_PGM_2F	Coefficients to transform from Geocentric Solar Magnetospheric (GSM) to geographic coordinates for computing the external magnetic field	[L2-PFS]
AUX_MTI_2_	Model of magnetic signals of major tidal constituents	[L2-PFS]
AUX_MCM_2_	A priory radially-symmetric (1D) model of mantle conductivity	[L2-PFS]
AUX_OCM_2_	2D model of surface conductance	[L2-PFS]

Note that for L2 products only L2 CAT-2 products (which are IBIxTMS_2F, TECxTMS_2F, FAC_TMS_2F, FACxTMS_2F, and EEFxTMS_2F) are supported by the DQC in processor mode. The other L2 products (CAT-1 and Auxiliary) are only supported by the DQC in standalone mode. This means that L2 CAT-1 and Auxiliary products are not included in the DQC Task Table files.

L1A products are only supported by the DQC in standalone mode and not in processor mode. So the L1A products are not included in the DQC Task Table files either.

* These L1A products are compliant with issue 3.1 of the product format specification plus the corrections proposed in GMV SWARM_L1B_OP RIDs SW_CDR3_OSAT_21 – SW_CDR3_OSAT_33.

3.2 Product Format Definition file

3.2.1 Description

The Product Format Definition file is a private configuration file of the DQC. It contains a description of the product format for each supported product and this is used by the data access component, the CODA (Common Data Access) library, of APPROVE to access and structurally verify a product.

There will only be one Product Format Definition file and it is provided as part of the DQC software package. The file does *not* fall under configuration control of the PDGS and the filename and contents are therefore not regulated by [FMT-GDL].

The filename of the file will be:

SWARM-<last modification date>.codadef

Where last modification date is the date in YYYYMMDD format of the last modification to the format definitions.

3.2.2 Format

The .codadef file is a zip file containing xml files that describe the format of the supported SWARM products.

3.3 Test Definition Files

3.3.1 Description

The Test Definition file contains a list of screening tests for each product type that is supported by the DQC. The file is in XML format and follows [FMT-GDL]. The product type of the Test Definition file is AUX_PAR_QC.

There will be one Test Definition file. The Test Definition file will contain test definitions for all product types that are supported by the DQC.

The filename of the Test Definition file will be:

```
SW_<file class>_AUX_PAR_QC_<validity start time>_<validity stop time>_<version
number>.EEF
```

The file class can be any sequence of 4 characters.

As a default, the OPER file class is used for the operational Test Definition file and TEST for special Test Definition files that are used to verify the correctness of the DQC.

The validity start time is the start time of the period for which the file is applicable in yyyymmddThhmmss format. The validity stop time is the stop time of the applicability period. Since there is no real applicable date for the Test Definition file content the validity period will be set to 00000000T000000_99999999T999999 in line with [FMT-TAIL].

Mind that a Test Definition file should not be modified after it has been created. Only new Test Definition files may be created.

The version number of the Test Definition file is included as a 4 digit number in the filename and guarantees that the file has a unique name. The first version number is 0001 and each time a new version of the Test Definition file is created the version number should be increased by 1. Each file class will have a different version numbering scheme. For example, you can have both version 0001 for OPER and version 0001 for TEST and these will refer to different Test Definition files.

An example of a real filename is:

`SW_OPER_AUX_PAR_QC_00000000T000000_99999999T999999_0001.EEF`

3.3.2 Format

Table 3 Test Definition file

Tag name	Type	Attributes	Description
Earth_Explorer_File	structure		See Earth_Explorer_File definition

Table 4 Earth_Explorer_File

Tag name	Type	Attributes	Description
Earth_Explorer_Header	structure		See Earth_Explorer_Header definition
Data_Block	structure	type="xml"	See Data_Block definition

Table 5 Earth_Explorer_Header

Tag name	Type	Attributes	Description
Fixed_Header	structure		See Fixed_Header definition
Variable_Header	structure		See Variable_Header definition

Table 6 Fixed_Header

Tag name	Type	Attributes	Description
File_Name	string		Format: "SW_cccc_AUX_PAR_QC_yyyymmddThhmmss_yyyymmddThhmmss_vvvv"
File_Description	string		Value: "DQC Test Definition File"
Notes	string		
Mission	string		Value: "Swarm" Should correspond with the Mission element of the file name
File_Class	string		Should equal the File Class element of the file name

			Format: Any 4 character value.
File_Type	string		Size: 10 bytes Value: "AUX_PAR_QC"
Validity_Period	structure		See Validity_Period definition
File_Version	integer		Size: 4 Format: "0001" Should start at 1 (not 0) Should equal the File Version element of the file name
Source	structure		See Source definition

Table 7 Validity_Period

Tag name	Type	Attributes	Description
Validity_Start	string		Value: "UTC=0000-00-00T00:00:00"
Validity_Stop	string		Value: "UTC=9999-99-99T99:99:99"

Table 8 Source

Tag name	Type	Attributes	Description
System	string		Value: "DQC"
Creator	string		Value: "DQC"
Creator_Version	string		Value: "01.00"
Creation_Date	string		Size: 23 bytes Format: "UTC=2001-01-01T00:00:00" Should equal the creation time of the file

Table 9 Variable_Header

Tag name	Type	Attributes	Description
Max_Error	integer		Maximum number of error messages that the DQC should show per product file. The value 0 indicates that there is no limit.
Max_Warning	integer		Maximum number of warning messages that the DQC should show per product file. The value 0 indicates that there is no limit.
Max_Error_Per_Test	integer		Maximum number of error messages that the DQC should show for a single named test per product file. The value 0 indicates that there is no limit.

Max_Warning_Per_Test	integer		Maximum number of warning messages that the DQC should show for a single named test per product file. The value 0 indicates that there is no limit.

Table 10 Data_Block

Tag name	Type	Attributes	Description
List_of_Named_Tests	structure	count	See List_of_Named_Tests definition
List_of_Named_Cross_File_Tests	structure	count	See List_of_Named_Cross_File_Tests definition
List_of_Test_Definitions	structure	count	See List_of_Test_Definitions definition

Table 11 List_of_Named_Tests

Tag name	Type	Attributes	Description
Named_Test	structure		See Named_Test definition

Table 12 Named_Test

Tag name	Type	Attributes	Description
Name	string		Name that uniquely identifies this test.
Description	string		Optional description. This information will be included in the log message when the test fails.
Criticality	string		Indicates the severity of failure if this test fails. Valid values are "Error" and "Warning".
Test_Expression	string		CODA boolean expression (see [CODA]). If the expression evaluates to False, the test failed.

Table 13 List_of_Named_Cross_File_Tests

Tag name	Type	Attributes	Description
Named_Cross_File_Test	structure		See Named_Cross_File_Test definition

Table 14 Named_Cross_File_Test

Tag name	Type	Attributes	Description
Name	string		Name that uniquely identifies this test.
Description	string		Optional description. This information will be included in the log message when the test fails.

Criticality	string		Indicates the severity of failure if this test fails. Valid values are "Error" and "Warning".
Value_Expression_Dbl	string		CODA expression (see [CODA]) that returns the value for the data block file that needs to be compared.
Value_Expression_Hdr	string		CODA expression (see [CODA]) that returns the value for the header file that needs to be compared.

Table 15 List_of_Test_Definitions

Tag name	Type	Attributes	Description
Test_Definition	structure		See Test_Definition definition

Table 16 Test_Definition

Tag name	Type	Attributes	Description
Product_Type	string		Name of the product type to which this test definition applies. A combination of product type and product format version (see below) uniquely identifies the test definition that should be used. Header and Datablock files are treated as separate 'products' in order to assign separate tests for each file. To this end the product type of a .HDR file is the product type of the .DBL file appended with _HDR.
Format_Version	integer		The product format version number (This number corresponds to the product version number as returned by the CODA software for the product).
List_of_Tests	structure	count	See List_of_Tests definition.
List_of_Named_Test_References	structure	count	See List_of_Named_Test_References definition.
List_of_Cross_File_Tests	structure	count	See List_of_Cross_File_Tests definition. (this list will be empty for HDR and EEF product file test definitions)
List_of_Named_Cross_File_Test_References	structure	count	See List_of_Named_Cross_File_Test_References definition. (this list will be empty for HDR and EEF product file test definitions)

Table 17 List_of_Tests

Tag name	Type	Attributes	Description

Test	structure		See Test definition

Table 18 List_of_Named_Test_References

Tag name	Type	Attributes	Description
Named_Test_Reference	structure		See Named_Test_Reference definition

Table 19 List_of_Cross_File_Tests

Tag name	Type	Attributes	Description
Cross_File_Test	structure		See Cross_File_Test definition

Table 20 List_of_Named_Cross_File_Test_References

Tag name	Type	Attributes	Description
Named_Cross_File_Test_Reference	structure		See Named_Cross_File_Test_Reference definition

Table 21 Test

Tag name	Type	Attributes	Description
Path	string		Location in product hierarchy where this test should be applied.
Name	string		Name of this test. The name is for convenience and will be used in the test report. It does not need to be unique but it is recommended that it is descriptive and unique in the scope of a Test_Definition.
Description	string		Optional description. This information will be included in the log message when the test fails.
Criticality	string		See Criticality in Named_Test definition
Test_Expression	string		CODA boolean expression (see [CODA]). If the expression evaluates to False, the test failed.

Table 22 Named_Test_Reference

Tag name	Type	Attributes	Description
Path	string		Location in product hierarchy where this test should be applied.
Name	string		Cross reference to a Named_Test. The value must be a Name of a Named_Test defined in the List_of_Named_Tests.

Table 23 Cross_File_Test

Tag name	Type	Attributes	Description
Name	string		Name that uniquely identifies this test.
Description	string		Optional description. This information will be included in the log message when the test fails.
Criticality	string		Indicates the severity of failure if this test fails. Valid values are "Error" and "Warning".
Value_Expression_Dbl	string		CODA expression (see [CODA]) that returns the value for the data block file that needs to be compared.
Value_Expression_Hdr	string		CODA expression (see [CODA]) that returns the value for the header file that needs to be compared.

Table 24 Named_Cross_File_Test_Reference

Tag name	Type	Attributes	Description
Name	string		Cross reference to a Named_Cross_File_Test. The value must be a Name of a Named_Cross_File_Test defined in the List_of_Named_Cross_File_Tests.

3.4 Test Report

3.4.1 Description

The Test Report file contains the results of the product screening as performed by the DQC. The file is in XML format and follows [FMT-GDL]. For the DQC processor the product type of the Test Report file is determined from the the File_Type of the first Output entry in the JobOrder file. The product type will take the format REPx_DQC__, where 'x' equals '_', 'A', 'B', or 'C'. For the standalone DQC, the product type will always be AUX_REP_QC.

The filename of the Test Report file will be:

```
SW_<file class>_<product type 1>_<creation time>_<product type
2><product_start_time>.EEF
```

If the DQC is run in standalone mode the file class will always be MANU. If the DQC is run in processor mode, the file class is taken from the value of the (mandatory) 'File_Class' dynamic processing parameter in the Job Order file.

Product type 1 is the product type of the DQC report (REP__DQC__, REPA_DQC__, REPB_DQC__, REPC_DQC__, or AUX_REP_QC).

The creation time is the creation time of the file in yyyymmddThhmmss format.

The second product type is the product type of the file that was checked.

The product start time is the start time of a product (or validity start time for auxiliary products) in yyyymmddThhmmss format.

An example of a real filename is:

`SW_OPER_REPA_DQC___20100901T000000_MAGA_HR_1B20080704T104509.EEF`

3.4.2 Format

Table 25 Test Report file

Tag name	Type	Attributes	Description
Earth_Explorer_File	structure		See Earth_Explorer_File definition

Table 26 Earth_Explorer_File

Tag name	Type	Attributes	Description
Earth_Explorer_Header	structure		See Earth_Explorer_Header definition
Data_Block	structure	type="xml"	See Data_Block definition

Table 27 Earth_Explorer_Header

Tag name	Type	Attributes	Description
Fixed_Header	structure		See Fixed_Header definition
Variable_Header	structure		See Variable_Header definition

Table 28 Fixed_Header

Tag name	Type	Attributes	Description
File_Name	string		Format: "SW_cccc_xxxxxxxxxx_yyyymmddThhmmss_ppppppppppyyyymmddThhmmss"
File_Description	string		Value: "APPROVE Test Report File"
Notes	string		Will contain the name and version of the approve executable if (and only if) the DQC is run in processor mode. Format: "APPROVE 1.0"
Mission	string		Value: "Swarm" Should correspond with the Mission element of the file name
File_Class	string		Value: Taken from the File_Class dynamic processing parameter from the Job Order file.

			Format: Any 4 character value For the standalone DQC this field will be set to "MANU".
File_Type	string		Size: 10 bytes For the DQC processor this field will be equal to the value of File_Type of the first Output entry in the Job Order file. For the standalone DQC this field will be set to "AUX_REP_QC".
Validity_Period	structure		See Validity_Period definition
File_Version	integer		Value: Taken from the File_Counter dynamic processing parameter from the Job Order file. For the standalone DQC this field will be set to "0001".
Source	structure		See Source definition

Table 29 Validity_Period

Tag name	Type	Attributes	Description
Validity_Start	string		Format: "UTC=2000-01-01T00:00:00" Will be equal to the Validity_Start field of the screened product.
Validity_Stop	string		Format: "UTC=2000-01-01T00:00:00" Will be equal to the Validity_Stop field of the screened product.

Table 30 Source

Tag name	Type	Attributes	Description
System	string		For the DQC processor this field will be equal to the value of Processing_Station in the Job Order file. For the standalone DQC this field will be set to 'Standalone'
Creator	string		For the DQC processor this field will be equal to the value of Processor_Name in the Job Order file. For the standalone DQC this field will be set to 'APPROVE'

Creator_Version	string		For the DQC processor this field will be equal to the value of Version in the Job Order file. For the standalone DQC this field will be set to the software version of APPROVE (e.g. "1.0")
Creation_Date	string		Size: 23 bytes Format: "UTC=2001-01-01-T00:00:00" Gives the creation time of the report file. This should be equal to the creation time element of the report file name.

Table 31 Variable_Header

Tag name	Type	Attributes	Description
Product	string		Name of the screened product (this is the filename including extension). For a product that was split in a separate header and data block file, this field will contain the name of the data block file.
Test_Definition_File	string		Product name of the Test Definition file that was used (i.e. without path or extension).
Format_Definition_File	string		File name of the CODA Product Format Definition file that was used (without path, but with extension).
Product_Quality	enum		Possible values: 'VALID_PRODUCT': no errors or warnings were found in the product 'PRODUCT_HAS_ERRORS': the product contained errors 'PRODUCT_HAS_WARNINGS': the product contained warnings (but no errors)

Table 32 Data_Block

Tag name	Type	Attributes	Description
List_of_Test_Modes	structure	count	See List_of_Test_Modes definition Contains a list of the different Test Modes that have been executed on a product.
List_of_Messages	structure	count	See List_of_Messages definition

Table 33 List_of_Test_Modes

Tag name	Type	Attributes	Description
Test_Mode	enum		Possible values: "STRUCTURE_SIZE_AND_READ": This test performs a structural check of a file and successfully tries to read each data element from a file "STRUCTURE_SIZE_AND_READ_HEADER": The same test as STRUCTURE_SIZE_AND_READ but performed on the header file that belongs to the screened file (if the screened file is already a header file, then you will only get STRUCTURE_SIZE_AND_READ) "EXPRESSION": This test executes all tests in the Test Definition File that are available for the screened file. "EXPRESSION_HDR": The same as EXPRESSION but performed on the header file (if the screened file is already a header file, then you will only get EXPRESSION) "DATA_HEADER_CROSS_CHECK": This test executes all tests in the Test Definition file that check consistency between the data block and header file.

Table 34 List_of_Messages

Tag name	Type	Attributes	Description
Message	structure		See Message definition

Table 35 Message

Tag name	Type	Attributes	Description
Criticality	enum		Indicates the severity of failure. Valid values are 'Error' and 'Warning'.
Test_Mode	enum		See Test_Mode field of List_of_Test_Modes definition. Indicates the test mode within which this failed test falls. This field can be empty if no test mode is applicable.
Notes	string		Message details. If the message was

			related to a failed test and a description was provided for the test then the test description will be included in this field.
Path	string		Location within the file where the failure occurred. This field can be empty if no path is applicable.
Name	string		Name of the test that produced this message (name can be empty depending on the value of Test_Mode).

3.5 Job Order

3.5.1 Description

The Job Order file is generated by the Management Layer based on the contents of the Task Table file and user input.

3.5.2 Format

The format of the Job Order file is described in [PDS-IPF-ICD].

The contents of the Job Order file should follow from the Task Table content as specified in [PDS-IPF-ICD], with the exception of the specific values for the dynamic processing parameter variables. The DQC requires the dynamic processing parameters with name "File_Class" and "File_Counter" to be present in the Job Order file. The DQC will use their values as file class and file version (respectively) for the Test Report and Product Report files.

Note that the Job Order file may not contain any CDATA sections, otherwise this will break the generation of the Product Report (where the Job Order file is included inside a CDATA section).

An example Job Order file is given in Appendix B.

3.6 Command-line Parameters

3.6.1 Description

If the approve executable is run with the location of an IPF Job Order file as single command-line parameter then the DQC will operate as a DQC processor. In all other cases (i.e. number of parameters is not equal to 1 or the single parameter does not point to an IPF Job Order file) the DQC will operate in the standalone DQC mode.

The approve application can be operated in the following ways:

Table 36 Command line parameters

Use case	Description
approve <Job Order file>	Runs approve as a DQC processor task. All configuration information will be taken from the Job Order file.
approve [<options>] <files>	Run DQC as a standalone application. The product files whose file locations are passed as parameter to approve will be screened.
approve -h, --help	Provides a short description on stdout of the possible use cases and applicable parameters for the approve application
approve -v, --version	Write the name, version, and copyright information of the executable to stdout

When run as a standalone application, approve supports the following options:

Table 37 APPROVE Standalone command line options

Use case	Description
--report	Instead of writing test results to stdout, results will be written to a Test Report file using the DQC processor Test Report format. Per product a single Test Report file will be generated. If this option is provided when checking DBL files, then approve will also look for the accompanying HDR file and check that file (including cross file checks). Otherwise HDR files are not checked together with DBL files.
--test <Test Definition file>	By default approve will only apply its build-in checks on each of the product files. With this parameter you can specify a Test Definition file with additional tests that will be performed on the product files. If both the --test parameter and the APPROVE_TEST_DEFINITION environment variable are set, then the command-line parameter will have precedence.
--stdout <Logging Level>	Overrides the logging default log level for messages sent to standard output. Valid values are DEBUG, INFO, PROGRESS, WARNING and ERROR.
--stderr <Logging Level>	Overrides the logging default log level for messages sent to standard error. Valid values are DEBUG, INFO, PROGRESS, WARNING and ERROR.
--errors <Max Number>	Overrides the Max_Error number specified in the Test Definition File.
--warnings <Max Number>	Overrides the Max_Warning number specified in the Test Definition File.
--errors-per-test <Max Number>	Overrides the Max_Error_Per_Test number specified in the Test Definition File.
--warnings-per-test <Max Number>	Overrides the Max_Warning_Per_Test number specified in the Test Definition File.

3.7 Environment variables

3.7.1 Description

Environment variables are only applicable if the DQC is run in standalone mode. For the DQC in processor mode the environment variable settings are overruled by the information in the Job Order file.

Table 38 Environment variables

Environment variable	Description
APPROVE_TEST_DEFINITION	Set this environment variable to a full path to your test definition file to have the DQC use that test definition file for screening products. This environment variable can be overruled with the --test command line parameter.
CODA_DEFINITION	In order to run the DQC in standalone mode you will have to set this environment variable and have it point (with a full path) to the

	Product Format Definition file. If this variable is not set the DQC will not be able to recognise any products and give an 'unsupported' error for each product it is passed.

3.8 Logging

3.8.1 Description

The DQC will write log messages to stdout and stderr. The DQC processor will format its messages according to [PDS-IPF-ICD]. The standalone DQC will use a different format for its log messages.

Log messages are categorized as DEBUG, INFO, PROGRESS, WARNING, and ERROR (in that order) in line with [PDS-IPF-ICD]. For the DQC processor the minimum category of messages to be printed can be controlled via the Management Layer (resulting in appropriate values for the Stdout_Log_Level and Stderr_Log_Level fields in the job order file). For the standalone DQC the default minimum category is WARNING for both stdout and stderr and this can be changed using the --stdout and --stderr command line options.

An overview of log messages for the DQC can be found in the User Manual [DQC-SUM].

3.8.2 Format

The DQC processor log messages will contain the current date/time, the node name, the processor name, the processor version, the PID, a header separator, the message type, and the message text. An example is given below:

```
2006-09-01T12:00:00.000000 ipf1ws1 DQC_MAGA_HR_1B 02.01 [0000014711]: [I] starting screening of product
```

The Processor Name and Version are taken from the Processor_Name and Version fields of the Job Order file. If there were problems with extracting the necessary information from the Job Order file any error messages will be written with the name and version of the executable as values for Processor Name and Version.

The log messages for the standalone DQC will be less verbose as that for the DQC processor. The messages will be a subset of the messages that are produced by the DQC processor and only the message text will be written to stdout/stderr. The message text will be prefixed by 'WARNING: ' or 'ERROR: ' in case of a warning or error condition.

3.9 Exit code

3.9.1 Description

The DQC processor and standalone DQC will use different exit codes.

The *DQC processor* will use the following exit codes:

Table 39 DQC processor exit codes.

Exit code	Description
0	The product screening was successful
128	An error occurred that was not related to the product format of the test product.

If the DQC returns with exit code 128 then an error log message will have been written to stderr indicating the cause of the error.

The *standalone DQC* will use the following exit codes:

Table 40 Standalone DQC exit codes.

Exit code	Description
0	No problems were found (neither in the operation of the DQC, nor in the test products)
1	An error occurred that was not related to the product format of the test product.
2	One or more errors were found in the test products. This exit code will also be used if a product type or product format version was not recognised or is not supported.
3	One or more warnings were found in the test products (but no errors were found)

If the DQC returns with exit code 1 or higher then appropriate error/warning messages will have been written to stderr.

Note that the DQC processor will return an exit code 0 even if the product contained errors/warnings. The standalone DQC will return an exit code 2 or 3 in such cases.

3.10 Product List

3.10.1 Description

The Product List file will be an ASCII file containing the product filenames of the Test Report (i.e without path, but with extension) and Product Report, each filename followed by a NewLine character. The Product List file will be named <order_id>.LIST, where <order_id> is the order id that was extracted from the Job Order filename.

3.10.2 Format

An example of the content of a Product List file is:

```
SW_OPER_REPA_DQC___20100901T000000_MAGA_HR_1B20080704T104509.EEF
SW_OPER_REPA_DQCRP_20100901T000000_MAGA_HR_1B20080704T104509.EEF
```

3.11 Product Report

3.11.1 Description

The Product Report file will be an XML file with the same format as the Product Report for the L1b processor [L1B-PROCINT], containing all messages that were sent to the log file in XML format and some additional information.

A Product Report will only be generated for the DQC in processor mode and only if the Job Order file was successfully read (i.e. all required parameters that are needed to determine the Product Report filename and header contents need to be available before the file can be produced).

The filename of the Product Report file will be:

```
SW_<file class>_<product type 1>_<creation time>_<product type
2><product_start_time>.EEF
```

Product type 1 is the product type of the product report (REP__DQCRP, REPA_DQCRP, REPB_DQCRP, or REPC_DQCRP).

The file class and instance id of the filename will be the same as that of the Test Report file.

An example of a real filename is:

```
SW_OPER_REPA_DQCRP_20100901T000000_MAGA_HR_1B20080704T104509.EEF
```

3.11.2 Format

The format of the Product Report file is defined in Section 4.5 of [L1B-PROCINT]. The Variable Header will be empty and the Fixed Header will have the following contents:

Table 41 Fixed Header

Task Table element	Value
File_Name	Format: "SW_cccc_xxxxxxxxxx_yyyymmddThhmmss_zzzzzzzzzzyyyymmddThhmmss"
File_Description	Value: "DQC Product Report File"
Notes	
Mission	Value: "Swarm"
File_Class	Same as File_Class of Test Report File
File_Type	This field will be equal to the value of File_Type of the second Output entry in the Job Order file.
Validity_Period	Same as Validity_Period of Test Report File
File_Version	Value: "0001" or taken from File_Counter dynamic processing parameter from the Job Order file.
Source	Same as Source of Test Report File

The Data Block will have the following format:

Table 42 Data_Block

Tag name	Type	Attributes	Description
Product_Report	structure		See Product_Report definition

Table 43 Product_Report

Tag name	Type	Attributes	Description
Processor_Name	string		Value: equal to the value of Processor_Name in the Job Order file.
Processor_Version	string		Value: equal to the value of Version in the Job Order file.
PID	integer		Equal to the system process id of the APPROVE task
Date_Time_of_Operation	structure		See Date_Time_of_Operation definition
List_of_Input_File_Names	structure	count	See List_of_Input_File_Names definition
List_of_Output_File_Names	structure	count	See List_of_Output_File_Names definition
List_of_Messages	structure	count	See List_of_Messages definition
Synthetic_Exit_Code	integer		Value: "FAILURE" in case of a processing error and "SUCCESS" in case the screening of the product succeeded.
Job_Order			This element contains the full contents of the Job Order file encapsulated in a CDATA section.

Table 44 Date_Time_of_Operation

Tag name	Type	Attributes	Description
Start	string		Format: "UTC=2000-01-01T00:00:00.000000" Will be equal to the time of the first log message in List_of_Messages
Stop	string		Format: "UTC=2000-01-01T00:00:00.000000" Will be equal to the creation time of the Product Report

Table 45 List_of_Input_File_Names

Tag name	Type	Attributes	Description
File_Name	string		There will only be one 'File_Name' entry

			containing the filename of the product that was screened (as referenced in the Job Order file)

Table 46 List_of_Output_File_Names

Tag name	Type	Attributes	Description
File_Name	string		There will be two 'File_Name' entries. The first entry will contain the file name (including path and extension) of the generated Test Report. The second entry will contain the file name (including path and extension) of the generated Product Report (i.e. this file).

Table 47 List_of_Messages

Tag name	Type	Attributes	Description
Message	struct		See Message definition

Table 48 Message

Tag name	Type	Attributes	Description
Date_Time	string		Format: "UTC=2000-01-01T00:00:00.000000" Generation time of log entry in UTC time
Type	string		Format: "[c]" With 'c' being either 'D' (DEBUG), 'I' (INFO), 'P' (PROGRESS), 'W' (WARNING), or 'E' (ERROR).
Text	string		Contains the log message text. The text will use xml entities &lt;, &gt;, and &amp; to escape the xml reserved characters '<', '>', and '&' respectively.

3.12 Task Table

3.12.1 Description

This is a static file that specifies the executables that a processor is composed of and specifies which input, output, and intermediate files are involved for each executable.

There will be one Task Table file per logical processor. This means that there is one Task Table file per satellite.

The name of the Task Table file is the concatenation of 'TaskTable_SWARM', the letter of the satellite (A, B, or C), an '_', the name of the processor, which is DQC, and the '.xml' extension. The (e.g. TaskTable_SWARMA_DQC.xml).

3.12.2 Format

The format of the Processor Task Table file is defined in [PDS-IPF-ICD].

The contents of the Task Table file will be filled as follows:

Table 49 Task Table File

Task Table element	Value
Processor_Name	"DQC_<single character id of satellite>"
Version	Current version of the DQC in "XX.YY" format
Test	"No"
Min_Disk_Space	"1024"
Max_Time	"0"
List_of_Cfg_Files	There will be 2 configuration files. The first entry should describe the Product Format Definition file and the second entry the Test Definition File.
.../Cfg_File[0]/Version	The last modification date of the CODA product definition file for SWARM in YYYYMMDD format.
.../Cfg_File[0]/File_Name	The full path to the SWARM codadef file. Example: "/usr/local/DCC-01.00/config/SWARM-20090101.codadef"
.../Cfg_File[1]/Version	Version of the DQC Test Definition File Example "0001"
.../Cfg_File[1]/File_Name	The full path to the DQC Test Definition File. Example: /usr/local/DQC-01.00/config/SW_OPER_AUX_PAR_QC_00000000T000000_99999999T999999_0001.EEF"
List_of_Dyn_ProcParam	There will be 2 dynamic processing parameters.
../Dyn_ProcParam[0]/Param_Name	"File_Class"
../Dyn_ProcParam[0]/Param_Type	"String"
../Dyn_ProcParam[0]/Param_Default	"OPER"
../Dyn_ProcParam[1]/Param_Name	"File_Counter"
../Dyn_ProcParam[1]/Param_Type	"Number"
../Dyn_ProcParam[1]/Param_Default	"0001"
List_of_Pools	There will only be one pool
Pool[0]/Detached	"false"
Pool[0]/Killing_Signal	"15" (SIGTERM)
Pool[0]/List_of_Tasks	There will be 1 task
.../Task[0]/Name	"APPROVE"

.../Task[0]/Version	This value should be the same as the internal version of the approve executable. (run 'approve -v' to retrieve the version)
.../Task[0]/Critical	"true"
.../Task[0]/Criticality_Level	"2"
.../Task[0]/File_Name	Full path to the approve executable. Example: "/usr/local/DQC-01.00/bin/approve"
.../Task[0]/List_of_Inputs	There will be 1 input to this task
.../Input[0]/Mode	"ALWAYS"
.../Input[0]/Mandatory	"Yes"
.../Input[0]/List_of_Alternatives	There will be one entry for each product type for the satellite that is covered by the tasktable file.
.../Alternative[...]/Order	"0"
.../Alternative[...]/Origin	"DB"
.../Alternative[...]/Retrieval_Mode	"LatestValCover"
.../Alternative[...]/T0	"0"
.../Alternative[...]/T1	"0"
.../Alternative[...]/File_Type	File type of the file that this DQC processor is able to screen. Example: "MAGA_HR_1B"
.../Alternative[...]/File_Name_Type	This can be either "Stem" (in case of a dual-file .DBL/.HDR product) or "Physical" (for single file products). In case of a dual-file .DBL/.HDR product (i.e. File_Name_Type=Stem) the File_Name input provided should be the product filename without the filename extension. The DQC will then find the header and datablock files for the product by appending the .DBL and .HDR extension to the filename. If File_Name_Type is Physical a reference to the full filename (including extension) should be provided and the product should consist of only a single file.
.../Task[0]/List_of_Outputs	There will be 2 outputs: The first output should describe the Test Report File and the second output the Product Report File.
.../Output[0]/Destination	"DB"
.../Output[0]/Mandatory	"Yes"
.../Output[0]/File_Type	The product type of the report depends on the type of the product that this processor can screen and is one of "REP__DQC__", "REPA_DQC__", "REPB_DQC__", or "REPC_DQC__".
.../Output[0]/File_Name_Type	"Directory"
.../Output[1]/Destination	"DB"

.../Output[1]/Mandatory	"Yes"
.../Output[1]/File_Type	The product type of the report depends on the type of the product that this processor can screen and is one of "REP__DQCRP", "REPA_DQCRP", "REPB_DQCRP", or "REPC_DQCRP".
.../Output[1]/File_Name_Type	"Directory"
.../Task[0]/List_of_Breakpoints	This list will be empty (i.e. count="0")

An example Task Table file can be found in Appendix A.

3.13 Workstation Configuration File

3.13.1 Description

The Workstation Configuration file defines the full list of processors for an IPF. For the DQC there will be one logical processor per satellite. For each logical processor an entry has to be added to the Workstation Configuration file.

The name of a DQC processor is the concatenation of the name 'DQC', an underscore '_', and the single-character indicator of the satellite. For instance, the processor that will screen products for Satellite A will be named DQC_A.

3.13.2 Format

The format of the Workstation Configuration file is described in [PDS-IPF-ICD].

An example <Processor> fragment of the Workstation Configuration file for the DQC for satellite A is provided below:

```
<Processor>
    <Processor_Name>DQC_A</Processor_Name>
    <Version>01.00</Version>
    <Log_Level>INFO</Log_Level>
    <Stdout_Log_Level>DEFAULT</Stdout_Log_Level>
    <Stderr_Log_Level>DEFAULT</Stderr_Log_Level>
    <Task_Table>/usr/acs/processors/DQC-01.00/config/TaskTable_SWARMA_DQC.xml</Task_Table>
    <List_of_Orders count="3">
        <Order>
            <Order_Type>Systematic</Order_Type>
            <Status>enabled</Status>
        </Order>
        <Order>
            <Order_Type>Reprocessing</Order_Type>
            <Status>enabled</Status>
        </Order>
        <Order>
            <Order_Type>Backlog_Processing</Order_Type>
            <Status>enabled</Status>
        </Order>
    </List_of_Orders>
</Processor>
```

4 Data Exchange

All data exchange from and to the DQC when the DQC is operated in processor mode is handled by the Management Layer software (see [PDS-IPF-ICD]). Files will be provided to the DQC in a working directory and the DQC will store all generated files in this directory as well.

For the DQC in standalone mode the user will be responsible for making all required input files available on the host machine and providing the proper paths to these files using the command line options of the approve executable. If a report is generated then this file will be saved to the location as indicated by the '--report' command line option. The user will be responsible for further handling of this file.

5 Data Volumes

This section details the information needed to calculate estimates for the volume of data that is provided as input to the DQC and the amount of data that the DQC produces.

5.1 Input Product Files

The volume of input products depends on the configuration of the platform on which the DQC operates. It can be calculated based on the PDGS System Budget information as provided in [PDGS-ICD] and filtering on the list of supported product type for the platform as provided in Table 2 of this document.

5.2 Test Definition Files

There will be one Test Definition Files per platform. It's size depends on the amount of tests that are defined for each of the products, but is roughly in the order of a few 100KB to 1MB.

5.3 Test Report

The amount of test reports produced by the DQC depends on the amount of product files that a platform will perform quality control on. Indicative amounts for these numbers can be found in [PDGS-ICD]. The size of a report for a product depends on the amount of errors/warnings that the DQC has found. The minimum size of a report (in case no issues were found) is 1.5KB. The maximum size can be controlled using the Max_Error, Max_Warning, Max_Error_Per_Test, and Max_Warning_Per_Test parameters in the Test Definition file. Each message takes about 250 bytes (depending on the size of the description/path/etc. information). The total file size can thus be roughly estimated using the formula: 1500 + 250 x (num_errors + num_warnings) bytes.

5.4 Product Report

The data volume rules for Product Reports are similar to that of Test Reports. However, the estimate for the total file size is slightly different. The minimum size of a report is about 7KB but the size of each product error/warning message is still about 250 bytes. So a rough estimate of the total file size for a Product Report is: 7000 + 250 x (num_errors + num_warnings) bytes.

Appendix A Example Task Table File

Note that this example only contains definitions for 3 different kinds of input product types. The real Task Table file will list all possible product types for a satellite in the List_of_Alternatives section of the Input.

```
<?xml version="1.0" ?>
<Ipf_Task_Table xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="TaskTable.xsd">
  <Processor_Name>DQC_A</Processor_Name>
  <Version>01.00</Version>
  <Test>No</Test>
  <Min_Disk_Space>1024</Min_Disk_Space>
  <Max_Time>0</Max_Time>
  <List_of_Cfg_Files count="2">
    <Cfg_File>
      <Version>20090101</Version>
      <File_Name>/usr/local/DQC-01.00/config/SWARM-20090101.codadef</File_Name>
    </Cfg_File>
    <Cfg_File>
      <Version>0001</Version>
      <File_Name>/usr/local/DQC-
01.00/config/SW_OPER_AUX_PAR_QC_00000000T000000_99999999T999999_0001.EEF</File_Name>
    </Cfg_File>
  </List_of_Cfg_Files>
  <List_of_Dyn_ProcParam count="2">
    <Dyn_ProcParam>
      <Param_Name>File_Class</Param_Name>
      <Param_Type>String</Param_Type>
      <Param_Default>OPER</Param_Default>
    </Dyn_ProcParam>
    <Dyn_ProcParam>
      <Param_Name>File_Counter</Param_Name>
      <Param_Type>Number</Param_Type>
      <Param_Default>0001</Param_Default>
    </Dyn_ProcParam>
  </List_of_Dyn_ProcParam>
  <List_of_Pools count="1">
    <Pool>
      <Detached>false</Detached>
      <Killing_Signal>15</Killing_Signal>
      <List_of_Tasks count="1">
        <Task>
          <Name>APPROVE</Name>
          <Version>1.0</Version>
          <Critical>true</Critical>
          <Criticality_Level>2</Criticality_Level>
          <File_Name>/usr/local/DQC-01.00/bin/approve</File_Name>
          <List_of_Inputs count="1">
            <Input>
              <Mode>ALWAYS</Mode>
              <Mandatory>yes</Mandatory>
              <List_of_Alternatives count="3">
                <Alternative>
                  <Order>0</Order>
                  <Origin>DB</Origin>
                  <Retrieval_Mode>LatestValCover</Retrieval_Mode>
                  <T0 units="sec">0</T0>
                  <T1 units="sec">0</T1>
                  <File_Type>ACCANOM_0_</File_Type>
                  <File_Name_Type>Stem</File_Name_Type>
                </Alternative>
                <Alternative>
                  <Order>0</Order>
                  <Origin>DB</Origin>
                  <Retrieval_Mode>LatestValCover</Retrieval_Mode>
                  <T0 units="sec">0</T0>
                  <T1 units="sec">0</T1>
                  <File_Type>MAGA_HR_1B</File_Type>
                  <File_Name_Type>Stem</File_Name_Type>
                </Alternative>
                <Alternative>
                  <Order>0</Order>
                  <Origin>DB</Origin>
                  <Retrieval_Mode>LatestValCover</Retrieval_Mode>
                  <T0 units="sec">0</T0>
                  <T1 units="sec">0</T1>
                  <File_Type>MAGAEUL_1B</File_Type>
                  <File_Name_Type>Physical</File_Name_Type>
                </Alternative>
              </List_of_Alternatives>
            </Input>
          </List_of_Inputs>
          <List_of_Outputs count="2">
            <Output>
              <Destination>DB</Destination>
              <Mandatory>Yes</Mandatory>
              <Type>REPA_DQC__</Type>
              <File_Name_Type>Directory</File_Name_Type>
            </Output>
            <Output>
              <Destination>DB</Destination>
              <Mandatory>Yes</Mandatory>
              <Type>REPA_DQCRP</Type>
              <File_Name_Type>Directory</File_Name_Type>
            </Output>
          </List_of_Outputs>
          <List_of_Breakpoints count="0">
          </List_of_Breakpoints>
        </Task>
      </List_of_Tasks>
    </Pool>
  </List_of_Pools>
</Task_Table>
```

Appendix B Example Job Order File

```
<?xml version="1.0" ?>
<Ipf_Job_Order xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="JobOrder.xsd">
  <Ipf_Conf>
    <Processor_Name>DQC_A</Processor_Name>
    <Version>01.00</Version>
    <Stdout_Log_Level>INFO</Stdout_Log_Level>
    <Stderr_Log_Level>INFO</Stderr_Log_Level>
    <Test>false</Test>
    <Breakpoint_Enable>true</Breakpoint_Enable>
    <Acquisition_Station>PDS</Acquisition_Station>
    <Processing_Station>PDS</Processing_Station>
    <Config_Files>
      <Conf_File_Name>/usr/local/DQC-1.0/config/SWARM-20090101.codadef</Conf_File_Name>
      <Conf_File_Name>/usr/local/DQC-
01.00/config/SW_OPER_AUX_PAR_QC_00000000T000000_99999999T999999_0001.EEF</Conf_File_Name>
    </Config_Files>
    <Sensing_Time>
      <Start>20090704_103655123456</Start>
      <Stop>20090704_103655123456</Stop>
    </Sensing_Time>
    <Dynamic_Processing_Parameters>
      <Processing_Parameter>
        <Name>File_Class</Name>
        <Value>OPER</Value>
      </Processing_Parameter>
      <Processing_Parameter>
        <Name>File_Counter</Name>
        <Value>0001</Value>
      </Processing_Parameter>
    </Dynamic_Processing_Parameters>
  </Ipf_Conf>
  <List_of_Ipf_Procs count="1">
    <Ipf_Proc>
      <Task_Name>APPROVE</Task_Name>
      <Task_Version>1.0</Task_Version>
      <Breakpoint>
        <List_of_Brk_Files count="0">
        </List_of_Brk_Files>
      </Breakpoint>
      <List_of_Inputs count="1">
        <Input>
          <File_Type>MAGA_HR_1B</File_Type>
          <File_Name_Type>Stem</File_Name_Type>
          <List_of_File_Names count="1">
            <File_Name>/SOMEPATH/SW_OPER_MAGA_HR_1B_20090704T103655_20090704T104509_0001</File_Name>
          </List_of_File_Names>
          <List_of_Time_Intervals count="1">
            <Time_Interval>
              <Start>20040704_103655123456</Start>
              <Stop>20040704_103655123456</Stop>
              <File_Name>/SOMEPATH/SW_OPER_MAGA_HR_1B_20090704T103655_20090704T104509_0001</File_Name>
            </Time_Interval>
          </List_of_Time_Intervals>
        </Input>
      </List_of_Inputs>
      <List_of_Outputs count="2">
        <Output>
          <File_Type>REPA_DQC__</File_Type>
          <File_Name_Type>Directory</File_Name_Type>
          <File_Name>/SOMEPATH/</File_Name>
        </Output>
        <Output>
          <File_Type>REPA_DQCRP</File_Type>
          <File_Name_Type>Directory</File_Name_Type>
          <File_Name>/SOMEPATH/</File_Name>
        </Output>
      </List_of_Outputs>
    </Ipf_Proc>
  </List_of_Ipf_Procs>
</Ipf_Job_Order>
```

Appendix C Example Test Report File

```
<?xml version="1.0" ?>
<Earth_Explorer_File>
  <Earth_Explorer_Header>
    <Fixed_Header>
      <File_Name>SW_OPER_REPA_DQC___20090513T113051_MAGA_HR_1B20090704T103655</File_Name>
      <File_Description>APPROVE Test Report File</File_Description>
      <Notes>APPROVE 1.0</Notes>
      <Mission>Swarm</Mission>
      <File_Class>OPER</File_Class>
      <File_Type>REPA_DQC__</File_Type>
      <Validity_Period>
        <Validity_Start>UTC=2009-07-04T10:36:55</Validity_Start>
        <Validity_Stop>UTC=2009-07-04T10:45:09</Validity_Stop>
      </Validity_Period>
      <File_Version>0001</File_Version>
      <Source>
        <System>PDS</System>
        <Creator>DQC_A</Creator>
        <Creator_Version>01.00</Creator_Version>
        <Creation_Date>UTC=2009-05-13T11:30:51</Creation_Date>
      </Source>
    </Fixed_Header>
    <Variable_Header>
      <Product>SW_OPER_MAGA_HR_1B_20090704T103655_20090704T104509_0001</Product>
      <Test_Definition_File>SW_TEST_AUX_PAR_QC_00000000T000000_99999999T999999_0001</Test_Definition_File>
      <Format_Definition_File>SWARM-20090101.codadef</Format_Definition_File>
      <Product_Quality>PRODUCT_HAS_ERRORS</Product_Quality>
    </Variable_Header>
  </Earth_Explorer_Header>
  <Data_Block type="xml">
    <List_of_Test_Modes count="1">
      <Test_Mode>STRUCTURE_SIZE_AND_READ</Test_Mode>
      <Test_Mode>STRUCTURE_SIZE_AND_READ_HEADER</Test_Mode>
      <Test_Mode>EXPRESSION</Test_Mode>
      <Test_Mode>EXPRESSION_HEADER</Test_Mode>
    </List_of_Test_Modes>
    <List_of_Messages count="1">
      <Message>
        <Criticality>ERROR</Criticality>
        <Test_Mode>EXPRESSION_HEADER</Test_Mode>
        <Notes>test failed (The file class does not match any of the predefined values); actual value =
'')</Notes>
        <Path>/Earth_explorer_Header/Fixed_Header/File_Class</Path>
        <Name>RangeFileClass</Name>
      </Message>
    </List_of_Messages>
  </Data_Block>
</Earth_Explorer_File>
```

Appendix D Example Product Report File

```
<?xml version="1.0" ?>
<Earth_Explorer_File>
  <Earth_Explorer_Header>
    <Fixed_Header>
      <File_Name>SW_OPER_REPA_DQCRP_20090513T113051_MAGA_HR_1B20090704T103655</File_Name>
      <File_Description>APPROVE Product Report File</File_Description>
      <Notes>APPROVE 1.0</Notes>
      <Mission>Swarm</Mission>
      <File_Class>OPER</File_Class>
      <File_Type>REPA_DQCRP</File_Type>
      <Validity_Period>
        <Validity_Start>UTC=2009-07-04T10:36:55</Validity_Start>
        <Validity_Stop>UTC=2009-07-04T10:45:09</Validity_Stop>
      </Validity_Period>
      <File_Version>0001</File_Version>
      <Source>
        <System>DQC</System>
        <Creator>DQC_A</Creator>
        <Creator_Version>01.00</Creator_Version>
        <Creation_Date>UTC=2009-05-13T11:30:51</Creation_Date>
      </Source>
    </Fixed_Header>
    <Variable_Header></Variable_Header>
  </Earth_Explorer_Header>
  <Data_Block type="xml">
    <Product_Report>

      <Processor_Name>DQC_A</Processor_Name>
      <Processor_Version>01.00</Processor_Version>
      <PID>39115</PID>
      <Date_Time_of_Operation>
        <Start>UTC=2009-05-13T11:30:51.049913</Start>
        <Stop>UTC=2009-05-13T11:30:51.073318</Stop>
      </Date_Time_of_Operation>
      <List_of_Input_File_Names count="1">
        <File_Name>/SOMEPATH/SW_OPER_MAGA_HR_1B_20090704T103655_20090704T104509_0001</File_Name>
      </List_of_Input_File_Names>
      <List_of_Output_File_Names count="2">
        <File_Name>./SW_OPER_REPA_DQC___20090513T113051_MAGA_HR_1B20090704T103655.EEF</File_Name>
        <File_Name>./SW_OPER_REPA_DQCRP_20090513T113051_MAGA_HR_1B20090704T103655.EEF</File_Name>
      </List_of_Output_File_Names>
      <List_of_Messages count="13">
        <Message><Date_Time>2009-05-13T11:30:51.049913</Date_Time><Type>I</Type><Text>processor starting
(DQC_MAGA_HR_1B 01.00, APPROVE 1.0, CODA 1.0)</Text></Message>
        <Message><Date_Time>2009-05-13T11:30:51.049957</Date_Time><Type>I</Type><Text>input Job Order file
is JobOrder.0.xml</Text></Message>
        <Message><Date_Time>2009-05-13T11:30:51.049997</Date_Time><Type>I</Type><Text>input CODA definition
file is ../config/SWARM-20090402.codadef</Text></Message>
        <Message><Date_Time>2009-05-13T11:30:51.050063</Date_Time><Type>I</Type><Text>input Test Definition
file is SW_TEST_AUX_PAR_QC_00000000T000000_99999999T999999_0001.EEF</Text></Message>
        <Message><Date_Time>2009-05-13T11:30:51.050096</Date_Time><Type>I</Type><Text>input Product file is
SW_OPER_MAGA_HR_1B_20090704T103655_20090704T104509_0001</Text></Message>
        <Message><Date_Time>2009-05-13T11:30:51.055001</Date_Time><Type>I</Type><Text>starting screening of
product</Text></Message>
        <Message><Date_Time>2009-05-13T11:30:51.061311</Date_Time><Type>I</Type><Text>finished screening of
product</Text></Message>
        <Message><Date_Time>2009-05-13T11:30:51.065001</Date_Time><Type>I</Type><Text>starting screening of
header file</Text></Message>
        <Message><Date_Time>2009-05-13T11:30:51.071165</Date_Time><Type>E</Type><Text>test failed (The file
class does not match any of the predefined values); actual value = '') for test 'RangeFileClass' at
/Earth_explorer_Header/Fixed_Header/File_Class</Text></Message>
        <Message><Date_Time>2009-05-13T11:30:51.071311</Date_Time><Type>I</Type><Text>finished screening of
header file</Text></Message>
        <Message><Date_Time>2009-05-13T11:30:51.072384</Date_Time><Type>I</Type><Text>product has
errors</Text></Message>
        <Message><Date_Time>2009-05-13T11:30:51.072452</Date_Time><Type>I</Type><Text>output Test Report is
./SW_OPER_REPA_DQC___20090513T113051_AUX_PAR_QC00000000T000000.EEF</Text></Message>
        <Message><Date_Time>2009-05-13T11:30:51.072739</Date_Time><Type>I</Type><Text>created test report
'./SW_OPER_REPA_DQC___20090513T113051_AUX_PAR_QC00000000T000000.EEF'</Text></Message>
```

```
        <Message><Date_Time>2009-05-13T11:30:51.072929</Date_Time><Type>I</Type><Text>added
'SW_OPER_REPA_DQC___20090513T113051_AUX_PAR_QC00000000T000000.EEF' to list file '0.LIST'</Text></Message>
        <Message><Date_Time>2009-05-13T11:30:51.073306</Date_Time><Type>I</Type><Text>processor stopping,
exit code is 0 (SUCCESS), product screened</Text></Message>
      </List_of_Messages>
      <Synthetic_Exit_Code>SUCCESS</Synthetic_Exit_Code>
      <Job_Order>
<![CDATA[<?xml version="1.0" ?>
<Ipf_Job_Order xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="JobOrder.xsd">
  <Ipf_Conf>
    <Processor_Name>DQC_A</Processor_Name>
    <Version>01.00</Version>
    <Stdout_Log_Level>INFO</Stdout_Log_Level>
    <Stderr_Log_Level>INFO</Stderr_Log_Level>
    <Test>false</Test>
    <Breakpoint_Enable>true</Breakpoint_Enable>
    <Acquisition_Station>PDS</Acquisition_Station>
    <Processing_Station>PDS</Processing_Station>
    <Config_Files>
      <Conf_File_Name>/usr/local/DQC-1.0/config/SWARM-20090101.codadef</Conf_File_Name>
      <Conf_File_Name>/usr/local/DQC-
01.00/config/SW_OPER_AUX_PAR_QC_00000000T000000_99999999T999999_0001.EEF</Conf_File_Name>
    </Config_Files>
    <Sensing_Time>
      <Start>20090704_103655123456</Start>
      <Stop>20090704_103655123456</Stop>
    </Sensing_Time>
    <Dynamic_Processing_Parameters>
      <Processing_Parameter>
        <Name>File_Class</Name>
        <Value>OPER</Value>
      </Processing_Parameter>
      <Processing_Parameter>
        <Name>File_Counter</Name>
        <Value>0001</Value>
      </Processing_Parameter>
    </Dynamic_Processing_Parameters>
  </Ipf_Conf>
  <List_of_Ipf_Procs count="1">
    <Ipf_Proc>
      <Task_Name>APPROVE</Task_Name>
      <Task_Version>1.0</Task_Version>
      <Breakpoint>
        <List_of_Brk_Files count="0">
        </List_of_Brk_Files>
      </Breakpoint>
      <List_of_Inputs count="1">
        <Input>
          <File_Type>MAGA_HR_1B</File_Type>
          <File_Name_Type>Stem</File_Name_Type>
          <List_of_File_Names count="1">
            <File_Name>/SOMEPATH/SW_OPER_MAGA_HR_1B_20090704T103655_20090704T104509_0001</File_Name>
          </List_of_File_Names>
          <List_of_Time_Intervals count="1">
            <Time_Interval>
              <Start>20040704_103655123456</Start>
              <Stop>20040704_103655123456</Stop>
              <File_Name>/SOMEPATH/SW_OPER_MAGA_HR_1B_20090704T103655_20090704T104509_0001</File_Name>
            </Time_Interval>
          </List_of_Time_Intervals>
        </Input>
      </List_of_Inputs>
      <List_of_Outputs count="2">
        <Output>
          <File_Type>REPA_DQC__</File_Type>
          <File_Name_Type>Directory</File_Name_Type>
          <File_Name>/SOMEPATH/</File_Name>
        </Output>
        <Output>
          <File_Type>REPA_DQCRP</File_Type>
          <File_Name_Type>Directory</File_Name_Type>
          <File_Name>/SOMEPATH/</File_Name>
        </Output>
      </List_of_Outputs>
    </Ipf_Proc>
  </List_of_Ipf_Procs>
</Ipf_Job_Order>
]]>
      </Job_Order>
    </Product_Report>
  </Data_Block>
</Earth_Explorer_File>
```