Exhibit II dated 03/31/04
Contract No. TBD

EXHIBIT II

CONTRACT DATA REQUIREMENTS LIST

AND

DATA REQUIREMENTS DESCRIPTION

FOR THE

MID-INFRARED INSTRUMENT (MIRI) DEWAR SUBSYSTEM

On

THE JAMES WEBB SPACE TELESCOPE

The following Contract Data Requirements List (CDRL) summarizes the documentation deliverable under this contract, identifies the deliverable items, the delivery schedule, the quantity and type of each item, and the frequency of issuance. The Data Requirement Descriptions (DRDs) to which the CDRL refers describes the specific requirements for the item(s) for delivery, reference documents and other instructions as to content, format and preparation.

The following shall apply to all submittals:

All dates are based on calendar days.

Non-Design Document Identification

The Contractor provides on the cover or title page of all deliverable, non-design documentation (all documents, except drawings and specifications) the following minimum information:

(1) Document title
(2) Contractor's name
(3) Contract number
(4) Project Identification - "MIRI Dewar Subsystem"
(5) Date of issue or publication
(6) CDRL and DRD line item number
(7) Revision or change identification

Design Document Identification

The Contractor identifies design documents (drawings and specifications) in accordance with the JPL-approved Contractor Configuration Management Plan.

Data Approval Requirements

After receipt of a submittal, JPL reviews the Contractor's submittal and either provides written review comments or a written approval with a letter from JPL. In the event JPL does not provide a formal disapproval of the submittal in a time period of time designated in the Statement of Work, then the Contractor may assume the submittal has an approval as tendered, unless otherwise indicated on the CDRL or unless otherwise agreed.

The following requirements apply to all submittals for JPL approval:

(1) The Contractor tenders the submittal on or before the date indicated in the applicable CDRL item block 9.

(2) If JPL approves the submittal, JPL transmits the signed cover or title page to the Contractor.

(3) If the submittal requires modification before JPL grants approval, the following steps apply:

(a) The JPL Contract Technical Manager, Contract Negotiator (or designate), discusses changes necessary with the Contractor, then sends written JPL-required modifications to the Contractor.

(b) The Contractor tenders an updated submittal, containing the required modifications within two weeks (unless otherwise specified) after receipt of written notice of the required modifications.

(c) If JPL approves the updated submittal, JPL transmits the signed cover or title page to the Contractor.

Note: The Contractor tenders any revisions or updates to any submittal requirements set forth herein. Unless otherwise specified in the CDRL or DRD, the requirements, approvals and the number of required copies of the data items originally submitted also apply to the revision submittals.

Data Distribution

Block 10 of the CDRL specifies the number of copies for delivery. The Contractor delivers all data by a letter of transmittal to the JPL Cognizant Contract Negotiator, unless otherwise specified. Interpret Block 10, "ORIG." (Original) as a reproducible copy. Where indicated in the CDRL, the original may be an electronic copy on magnetic media (MM).

If Block 10 requests MM as QUANTITY, provide magnetic media, as the ORIG. (original) and provide as COPIES quantity indicated as paper hardcopies. For magnetic media (MM) submittals, provide in accordance with the following:

Disk Size: Zip disk or CD-ROM
Disk Format: DOS Compatible
File Format: (TBR)
Word Processing: Word
Spread Sheet: Excel
Scheduling: Microsoft Project
Presentations: Power Point

After start of contract, establish a baseline MM disk and file format, with JPL concurrence. As an alternative, or in addition to floppy disks, consider the establishment of an FTP site with appropriate security, or use of electronic mail to deliver CDRL data items and other files with JPL concurrence.

Codes found in the Approval Code column (7) and the Due Date column (9) are defined on page 3 of the CDRLs.

CONTRACT DATA REQUIREMENTS LIST

1. CONTRACT NUMBER		2. CONTRACTOR			2A. PROGRAM **MIRI Dewar Subsystem**			3. DRL NUMBER CM
4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
		NOTES: **1. Approval code (APP CODE)** **A= Requires JPL approval** **X= Does not require JPL approval** **2. After date of contract (ADOC)** **3. After receipt of JPL's review comments (AJRC)**						
	CM 001	Configuration Management Plan						
001		Preliminary	X	Once	14 days ADOC	MM	4	
002		Final	A	Once	14 days AJRC	MM	4	
003		Updates	A	As required	As required	MM	4	

1. CONTRACT NUMBER		2. CONTRACTOR			2A. PROGRAM **MIRI Dewar Subsystem**			3. DRL NUMBER CM
4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	CM 002	Engineering Documentation and Data Lists						
001		STM/ETU Data List	A	Once	With delivery	MM	4	
002		STM/ETU Updates	A	As required	Within 7 days of revision	MM	4	
003		FM Data List	A	Once	With delivery	MM	4	
004		FM Revisions	A	As required	Within 7 days of revision	MM	4	
005		SE Data List—STM/ETU	X	Once	With delivery of SE and - STM/ETU	MM	4	
006		SE Data List--FM	X	Once	With delivery of SE and FM	MM	4	
007		SE Revision	X	As generated	Within 7 days of revision	MM	4	

1. CONTRACT NUMBER		2. CONTRACTOR			2A. PROGRAM **MIRI Dewar Subsystem**			3. DRL NUMBER CM
4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	CM 002	(Continued)						
		Engineering Documentation						
008		Draft	X	As requested	As requested	MM if available	4	Make avail. at Contractor's facility
009		Final	X	Once	14 days after generation.	MM if available	4	
010		Revisions	X	As required	Within 7 days of revision	MM if available	4	
	CM 003	Photographs						
001		Photographs and negatives	X	1 Time per delivery	7 days after photography	1 set of VGs & negatives	4 Copies of each Photo	See DRD for subject matter
	EV 001	Earned Value Management Plan						
001		Initial	A			MM		
002		Updates	A			MM		
	EV002	Work breakdown Structure and WBS Dictionary						
001		Initial	A			MM		
002		Updates	A			MM		
	EV003	Schedules						
001		Initial	A			MM		
002		Updates	A			MM		

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						ORIG.	COPIES	
	EV004	Contract Budget Baseline (CBB) Profile						
001		Initial	A			MM		
002		Updates	A			MM		
	EV005	Cost/Schedule Performance Report						
001		Initial	A			MM		
002		Updates	A			MM		
	EV006	NASA Financial Management Report						
001		NASA Form 533M	X	Monthly	15 days > EOM	MM		Begin 30 days > ADOC
002		NASA Form 533Q	X	Quarterly	15 days > EOQ	MM		Begin 90 days > ADOC

1. CONTRACT NUMBER		2. CONTRACTOR			2A. PROGRAM **MIRI Dewar Subsystem**			3. DRL NUMBER MA
4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	MA 001	Correction and Preventive Action Plan						
001		Initial	A	Once	14 days ADOC	MM	4	
002		Updates	A	As required	As generated	MM	4	
	MA 002	Internal Audit Findings Report						
001		As issued		As issued		MM	6	
	MA 003	Risk Management Plan and Reporting						
001		Initial	A	As Required	30 days before PDR	MM	6	
	MA004	Project Implementation Plan						
001		Initial	A	Once	45 days ADOC	MM	4	
002		Updates	A	As Required	As generated	MM	4	

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4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	MA 005	Program Status Review and Reports						
001		MMR Presentation Materials	X	Monthly	30 days ADOC	MM	10	For attendees
002		MMR Reports	X	Monthly	7 days after MMR	MM	4	Beginning 30 days ADOC
003		Weekly Status Reports	X	Weekly	7 days ADOC	MM	4	e-mail or FAX to CTM & CN
004		Tech. Interchange Meetings Materials	X	As Required	7 days before meeting	MM	4	
005		Tech. Interchange Meeting Reports	X	As Applicable	7 days after meeting	MM	4	
006		Interface Working Group Meetings		As Required		MM	4	
007		Kickoff Meeting	X	Once		MM	4	
008		Inheritance Review/Requirements Review	X	Once			4	
009		PDR	X	Once			4	
010		CDR	X	Once			4	
011		PITRR	X	Once			4	
012		PSR	X	Once			4	
							4	

1. CONTRACT NUMBER		2. CONTRACTOR			2A. PROGRAM **MIRI Dewar Subsystem**			3. DRL NUMBER PMP
4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	PMP 001	Parts Program Plan						
001		Preliminary	X	Once	21 days ADOC	MM	4	
002		Final	A	Once	14 days AJRC	MM	4	
	PMP 002	Parts Data						
		Parts List (Contractor and Subcontractors)						
001		Preliminary	A	Once	60 days ADOC	MM	4	
002		Updates to Preliminary	A	Monthly	Beginning 30 days after first release	MM	4	
003		As-designed List	A	Once	30 days prior to CDR	MM	4	
004		As-Built List	A	Once	14 days before EM/PF delivery	MM	4	
005		NSPARS/Associated Specifications	A	As required	Begin 90 days ADOC	MM	4	

1. CONTRACT NUMBER		2. CONTRACTOR			2A. PROGRAM **MIRI Dewar Subsystem**			3. DRL NUMBER PMP
4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	PMP 002	(Continued)						
006		Waivers Associated Information	A	As required	As required	MM	4	
007		Failure Analysis Reports	A	As required	7 days after completion	MM	4	
008		Part Specifications	A	As required	As generated	MM	4	
	PMP 003	Materials And Processes Plan						
001		Preliminary	X	Once	14 days ADOC	MM	4	
002		Final	A	Once	14 days AJRC	MM	4	

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4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	PMP 004	Materials and Process Data						
		Materials Identification & Usage List (MIUL)						
001		Preliminary	A	Once	21 days prior to PDR	MM	4	
002		Final	A	Once	21 days prior to CDR	MM	4	
003		Updates	A	As required	7 days after generation	MM	4	
		Material Usage Agreement (MUA)						
004		Preliminary	A	As required	7 days after generation	MM	4	
005		Final	A	As required	14 days AJRC	MM	4	
		Stress Corrosion Evaluation						
006		Preliminary	X	Once	As required; at least 14 days before CDR	MM	4	
007		Final	A	Once	14 days AJRC	MM	4	

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4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	PMP 004	(Continued)						
		Qualification Plans and Associated Data for Non-Standard Materials and Design Items						
008		Preliminary	X	As generated	60 days before CDR	MM	4	
009		Final	A	As generated	14 days AJRC	MM	4	
		Waivers that pertain to Materials and Processes						
010		Preliminary	X	As required	2 days after generation	MM	4	
011		Final	A	As required	14 days AJRC	MM	4	

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4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	PMP 004	(Continued)						
		Failure Analysis Reports that Involve Materials and Processes						
012		Preliminary	X	As required	2 days after generation	MM	4	
013		Final	A	As completed	14 days AJRC	MM	4	
		Materials and Processes Specifications						
014		Preliminary	X	Once	45 days prior to PDR	MM	4	
015		Final	A	Once	45 days prior to CDR	MM	4	
016		Updates	A	As required	2 days after generation	MM	4	

1. CONTRACT NUMBER		2. CONTRACTOR			2A. PROGRAM **MIRI Dewar Subsystem**			3. DRL NUMBER QA
4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	QA 001	Quality Assurance (QA) And Inspection System Plan						
001		Preliminary	X	Once	21 days ADOC	MM	4	
002		Final	A	Once	14 days AJRC	MM	4	
003		Updates/Revisions	A	As required	7 days after generation	MM	4	
		Product Inspection & Flow Charts						
004		Preliminary	X	Once	60 days prior to CDR	MM	4	
005		Final	A	Once	14 days AJRC	MM	4	Require approval prior to build of flight hardware
		Storage Handling & Shipping Procedures						
006		Preliminary	X		30 days before Pre-Ship Review	MM	4	
007		Final	A	Once	At relevant Pre-Ship Review	MM	4	

1. CONTRACT NUMBER		2. CONTRACTOR			2A. PROGRAM **MIRI Dewar Subsystem**			3. DRL NUMBER QA
4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	QA 001	(Continued)						
		Hardware Travelers						
008		Preliminary	X	Once	Prior to use		N/A	Make available at Contractor's facility
009		Final	A	Once	5 days after generation with JPL comments included; prior to usage		N/A	Make available at Contractor's facility Approval applies to mandatory inspection points, also.
010		Updates	A	As required	5 days after generation		N/A	Make available at Contractor's facility Approval applies to mandatory inspection points also.
		Workmanship Standards						
011		Preliminary	X	Once	21 days ADOC		N/A	Make available at Contractor's facility.
012		Final	A	Once	14 days AJRC		N/A	Make available at Contractor's facility.
013		Updates	A	As required	2 days after generation		N/A	Make available at Contractor's facility.

1. CONTRACT NUMBER		2. CONTRACTOR			2A. PROGRAM **MIRI Dewar Subsystem**			3. DRL NUMBER QA
4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	QA 001	(Continued)						
014		Sampling Plan	A	Once	21 days ADOC		N/A	Make available at Contractor's facility.
015		Electronic Packaging Plan	A	Once	With QA Plan		N/A	Make available at Contractor's facility.
016		Training Plans	X	Once	21 days ADOC		N/A	Make available at Contractor's facility.
017		Inspection Procedures/Specifications	X	Once	21 days ADOC		N/A	Make available at Contractor's facility.
018		Rework Procedures and Repair Instructions	X	Once	With QA Plan; As generated	MM	4	Std. proc. w/ QA Plan; Others, as generated.
019		Discrepancy Reports	X	As required	Within 2 days of discrepancy		N/A	Make available at Contractor's facility.
020		Procedures Implementing the QA Plan	X	Once	60 days ADOC		N/A	Make available at Contractor's facility.

1. CONTRACT NUMBER		2. CONTRACTOR			2A. PROGRAM **MIRI Dewar Subsystem**			3. DRL NUMBER QA
4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	QA 001	(Continued)						
021		Workmanship Standards for Non-Flight Hardware	X	Once	21 days ADOC		N/A	Make available at Contractor's facility.
022		Procedures that Implement the Inspection Plan	X	Once	21 days ADOC		N/A	Make available at Contractor's facility.
023		Process Control Procedures	X	Once	21 days ADOC		N/A	Make available at Contractor's facility for review.
	QA 002	End Item Data Package						
001		Preliminary	X	With each delivery item	30 days prior to Pre-Ship Review		N/A	Make available at Contractor's facility.
002		Final	A	With each article for delivery	At Pre-Ship Review	MM	4	

1. CONTRACT NUMBER		2. CONTRACTOR			2A. PROGRAM **MIRI Dewar Subsystem**			3. DRL NUMBER QA
4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	QA 003	Electrostatic Discharge Control Plan						
001		Preliminary	X	Once	21 days ADOC	MM	4	With preliminary QA plan
002		Final	A	Once	21 days AJRC	MM	4	
003		Revisions	A	As required	7 days after generation	MM	4	
	QA 004	Contamination Control Plan						
001		Preliminary	X	Once	30 days ADOC	MM	4	
002		Final	A	Once	14 days AJRC	MM	4	
003		Revisions	A	As required	2 days after generation	MM	4	
	QA 005	EMC Control Plan						
004		Preliminary	X	Once	30 days ADOC	MM	4	
005		Final	A	Once	14 days AJRC	MM	4	
006		Revisions	A	As required	2 days after generation	MM	4	

1. CONTRACT NUMBER		2. CONTRACTOR			2A. PROGRAM **MIRI Dewar Subsystem**			3. DRL NUMBER RA
4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	RA 001	Reliability Assurance Plan						
001		Preliminary	X	Once	21 days ADOC	MM	4	
002		Final	A	Once	21 days AJRC	MM	4	
003		Revisions	A	As required	2 days after generation	MM	4	
	RA 002	Reliability Assurance Data and Safety Data Analyst						
001		Preliminary	X	Once	30 days prior to PDR	MM	4	
002		Final	A	Once	30 days prior to CDR	MM	4	

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4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	RA 002	(Continued)						
003		Updates	A	As required	Within 14 days of design change	MM	4	
	RA 003	Problem Failure Reports						
001		Initial Report	X	Once	Within 1 day of incident	MM	4	
002		Final Report	A	Once	After completion of all details	MM	4	Requires closures of PFRs prior to Pre-Ship Review

1. CONTRACT NUMBER		2. CONTRACTOR			2A. PROGRAM **MIRI Dewar Subsystem**			3. DRL NUMBER RE
4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	RE 001	Review Plan and Advance Review Packages						
001		Preliminary Review Plan	X	Once	30 days ADOC	MM	4	
002		Final Review Plan	A		14 days ARJC	MM	4	
003		Revisions	A	As required	5 days after generation	MM	4	
004		Inheritance Review/Requirements Review (IR/RR) Advance Review Package	X	Once	14 days prior to Review	MM	13	
005		Preliminary Design Review (PDR) Advance Review Package	X	Once	30 days prior to Review	MM	13	
006		Critical Design Review (CDR) Advance Review Package	X	As required	30 days prior to Review	MM	13	
007		Pre-Integrated Test Readiness Review Advance Review Package	X	As required	30 days prior to Review	MM	13	Review for STM/ETU
008		Pre-Ship Review Advance Review Package	X	As required	30 days prior to Review	MM	13	Review for STM/ETU

1. CONTRACT NUMBER		2. CONTRACTOR			2A. PROGRAM **MIRI Dewar Subsystem**			3. DRL NUMBER SA
4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	SA 001	Contractor Project Safety Plan						
001		Preliminary	X	Once	14 days ADOC	MM	4	
002		Final	A	Once	14 days AJRC	MM	4	
003		Safety Data Package Phase 0/1 Input	A	As required		MM	4	
004		Safety Data Package Phase 2 Input	A	As required		MM	4	
005		Safety Data Package Phase 3 Input	A	As required		MM	4	
001	SA 002	Crane and Handling Equipment Inspection and Proof Test Certificate (as applicable)	X	Once per article of handling equipment	10 days after proof test; more than 14 days prior to usage	MM	4	
	SA 003	Safety and Health Plan						
001		Draft	X	Once	With proposal	MM	4	
002		Final	A	Once	14 days AJRC	MM	4	

1. CONTRACT NUMBER		2. CONTRACTOR			2A. PROGRAM **MIRI Dewar Subsystem**			3. DRL NUMBER TD
4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	SE 001	Support Equipment and Handling Fixtures Design Documentation						
		DOCUMENTATION						
001		Draft	X	Once	30 days prior to PDR	MM	4	
002		Preliminary	A	Once	At CDR	MM	4	
003		Final	A	With Each Delivery	With each delivery of SE and handling fixtures and equipment	MM	4	
		PROCEDURES						
004		Preliminary	X	Once	30 days prior to CDR	MM	4	
005		Final	A	Once	14 days AJRC	MM	4	
006		Updates	A	As required	5 days after generation	MM	4	

1. CONTRACT NUMBER		2. CONTRACTOR			2A. PROGRAM **MIRI Dewar Subsystem**			3. DRL NUMBER SW
4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	SW 001	Software Management Program Plan						
001		Preliminary	X	Once	45 days ADOC	MM	4	
002		Final	A	Once	14 days AJRC	MM	4	
003		Updates	A	As required	5 days after generation	MM	4	
		Software Work Implementation Plan/Schedule						
004		Preliminary	A	Once	21days ADOC	MM	4	
005		Final	A	Once	14 days AJRC	MM	4	
006		Updates	A	As required	5 days after generation	MM	4	
		Software Requirements						
007		Preliminary	A	Once	45 days ADOC	MM	4	
008		Final	A	Once	14 days AJRC	MM	4	
009		Updates	A	As required	5 days after generation	MM	4	

1. CONTRACT NUMBER		2. CONTRACTOR			2A. PROGRAM **MIRI Dewar Subsystem**			3. DRL NUMBER SW
4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	SW 001	(Continued)						
		Software Interface Control Specification						
010		Preliminary	A	Once	14 days prior to PDR	MM	4	
011		Final	A	Once	21 days prior to CDR	MM	4	
012		Updates	A	As required	5 days after generation	MM	4	
		Software Interface Control Drawings						
013		Preliminary	A	Once	21 days prior to PDR	1	4	MM, if available
014		Final	A	Once	21 days prior to CDR	1	4	MM, if available
015		Updates	A	As required	5 days after generation	1	4	MM, if available
		Software Configuration Management and Risk Management Plan						
016		Preliminary	X	Once	21 days ADOC	MM	4	
017		Final	A	Once	14 days AJRC	MM	4	
018		Updates	A	As required	5 days after generation	MM	4	

1. CONTRACT NUMBER		2. CONTRACTOR			2A. PROGRAM **MIRI Dewar Subsystem**			3. DRL NUMBER SW
4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	SW 001	(Continued)						
		Software Product and Performance Assurance Plan						
019		Preliminary	X	Once	21 days ADOC	MM	4	
020		Final	A	Once	14 days AJRC	MM	4	
021		Updates	A	As required	5 days after generation	MM	4	
		Resource Management Plan						
022		Preliminary	X	Once	21 days ADOC	MM	4	
023		Final	A	Once	14 days AJRC	MM	4	
024		Updates	A	As required	5 days after generation	MM	4	
		Software Test Plan						See TD 002
		Software Test Procedure						See TD 003
		Software Test Data and Results						See TD 004

1. CONTRACT NUMBER		2. CONTRACTOR			2A. PROGRAM **MIRI Dewar Subsystem**			3. DRL NUMBER SW
4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	SW 001	(Continued)						
		Flight and Ground Software						
025		Initial	X	Once	45 days prior to PDR	MM	4	
026		Intermediate	A	Once				
027		Final	A	Once	14 days AJRC	MM	4	
028		Updates	A	As required	5 days after generation	MM	4	
		User's Guide/Operator's Manual						
029		Preliminary	X	Once	21 days ADOC	MM	4	
030		Final	A	Once	14 days AJRC	MM	4	
031		Updates	A	As required	5 days after generation	MM	4	
		Release Description Document						
032		Preliminary	X	Once	At PDR			Make available at Contractor's for review.
033		Intermediate	X	Once	At			See above
034		Final	X	Once	With EM	MM	4	

1. CONTRACT NUMBER		2. CONTRACTOR			2A. PROGRAM **MIRI Dewar Subsystem**			3. DRL NUMBER TD
4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	TD 001	Interface Control Documentation						
		Interface Control Specification						
001		Preliminary	A	Once	14 days prior to PDR	MM	4	
002		Final	A	Once	21 days prior to CDR	MM	4	
003		Updates	A	As required	5 days after generation	MM	4	
		Interface Control Drawings						
004		Preliminary	A	Once	21 days prior to PDR	1	4	MM, if available
005		Final	A	Once	21 days prior to CDR	1	4	MM, if available
006		Updates	A	As required	5 days after generation	1	4	MM, if available

1. CONTRACT NUMBER		2. CONTRACTOR			2A. PROGRAM **MIRI Dewar Subsystem**			3. DRL NUMBER TD
4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	TD 001	(Continued)						
		Circuit Data Sheets						
007		Draft	A	Once	30 days prior to PDR	MM	4	
008		Preliminary	A		30 days prior to CDR	MM	4	
009		Final	A	Once	14 days AJRC	MM	4	
010		Updates	A	Once	5 days after generation	MM	4	
		Mandatory Inspection Point Notification						
011		Final	A	As Required	7 days prior to occurrence	MM		email

1. CONTRACT NUMBER		2. CONTRACTOR			2A. PROGRAM **MIRI Dewar Subsystem**			3. DRL NUMBER TD
4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	TD 002	Verification and Acceptance Test Plan (H/W and S/W)						
001		Draft	X	Once	30 days prior to PDR	MM	4	Require JPL approval prior to test starts
002		Preliminary	X	Once	45 days prior to CDR	MM	4	Require JPL approval prior to test starts
003		Final	A	Once	30 days prior to EM/PF Pre-Integrated Test Readiness Review	MM	4	Require JPL approval prior to test starts
003		Updates	A	As required	14 days prior to test.	MM	4	Require JPL approval prior to test starts
	TD 003	Test Procedures (H/W and S/W)						
001		Preliminary	X	Once	30 days before test start	MM	4	Separate procedures for test type as necessary
002		Final	A	Once	14 days before test start	MM	4	Separate procedures for test type as necessary.
003		Updates	A	Once	5 days after generation	MM	4	

1. CONTRACT NUMBER		2. CONTRACTOR			2A. PROGRAM **MIRI Dewar Subsystem**			3. DRL NUMBER TD
4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	TD 004	Test Data & Analyses (H/W and S/W)						
		Analyses						Apply to analyses not requested in other DRDs
001		Draft	X	Once	30 days prior to Inheritance Review	MM	4	As applicable
002		Preliminary	X	Once	30 days prior to PDR	MM	4	As applicable
003		Final	A	Once	30 days prior to CDR	MM	4	
004		Test Data	A	Once/test	5 days after tests	MM - if availa ble	4	Maintain a copy at Contractor's facility; provide in EIDP.
005		Test Reports (H/W and S/W)	A	Once/test	14 days after tests	MM - if availa ble	4	

1. CONTRACT NUMBER		2. CONTRACTOR			2A. PROGRAM **MIRI Dewar Subsystem**			3. DRL NUMBER TD
4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	TD 005	Structural Math Models and Documentation						
		Detailed Math Models/Documentation						
001		Initial Version	X	Once	60 days prior to MIRI instrument PDR	2 MM	4	Informal copy
002		Intermediate Version	A		60 days prior to MIRI instrument CDR	2 MM	4	
003		Final Version	A	Once	With PF Delivery	2 MM	4	
		Reduced Math Models/Documentation						
004		Initial	X	Once	60 days prior to MIRI instrument PDR	2 MM	4	
005		Intermediate Version	A	Once	60 days prior to MIRI instrument CDR	2 MM	4	
006		Final Version	A	Once	With PF Delivery	2 MM	4	

1. CONTRACT NUMBER		2. CONTRACTOR			2A. PROGRAM **MIRI Dewar Subsystem**			3. DRL NUMBER TD
4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	TD 005	(Continued)						
		Design Drawings and Stress Analyses Documentation						
007		Initial Version	X	Once	60 days prior to MIRI instrument CDR	2 MM	4	Informal copy; includes latest version of applic. drawings, Detailed Math Model, and any analyses performed so far
008		Final Version	A	Once	With PF delivery	2 MM	4	

1. CONTRACT NUMBER		2. CONTRACTOR			2A. PROGRAM **MIRI Dewar Subsystem**			3. DRL NUMBER TD
4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	TD 006	Thermal Models and Documentation						
		Reduced Models/Documentation						
001		Initial Version 1	X	Once	30 days prior to PDR	MM	4	
002		Final Version	A	Once	30 days prior to CDR	MM	4	
		Detailed Models/Documentation						
003		Initial	X	Once	120 days after CDR	MM	4	
004		Detailed Validation Results	X	Once	14 days after thermal balance test	MM	4	
005		Final Detailed Thermal Model	A	Once	At CDR	MM	4	

1. CONTRACT NUMBER		2. CONTRACTOR			2A. PROGRAM **MIRI Dewar Subsystem**			3. DRL NUMBER TD
4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	TD 006	(Continued)						
		Geometric Surface Model						
006		Preliminary	X	Once			4	
007		Final	A	Once			4	
008		Updates	A	As required	5 days after generation	MM	4	

4. ITEM NO.	5. DRD NO.	6. TITLE OR DESCRIPTION OF DATA	7. APP CODE	8. FREQUENCY OF ISSUE	9. DATE DUE TO JPL	10. QUANTITY		11. REMARKS
						ORIG.	COPIES	
	TD 007	Structural Analyses Reports						
001		Initial Version	A	Once	30 days prior to PDR	MM	4	Bases for Structural and Thermal Math Model
		Updates	A	As Required	5 days after generation	MM	4	
		Preliminary	X		30 days prior to CDR	MM	4	Design Data
		Final	A		30 days prior to PITRR	MM	4	
		Updates	A	As Required	5 days after generation	MM	4	

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
CONFIGURATION MANAGEMENT PLAN	CM 001

3. USE	4. DATE
The plan describes the technical and administrative activities necessary to assure the proper level of configuration visibility, identification, control, accountability and verification for all changes affecting form, fit, function and any impact on performance, cost or schedule during design fabrication, assembly of the hardware, software, interfaces and documentation. .	5. PROGRAM MIRI DEWAR SUBSYSTEM

7. INTERRELATIONSHIP	6. REFERENCES
DRDs CM 002 and DRD QA 002	JPL D-25633, MIRI Info Mgt/ Config Mgt Plan

8. PREPARATION INFORMATION

1. Prepare and submit a configuration management plan in accordance with the requirements of JPL D-25633, MIRI Info Mgt/ Config Mgt Plan with the following clarifications and additions:

   a. Maximize use of the Contractor's existing configuration management system.
   b. Use Solidworks (TBR) and PDF format for drawings with Contractor's drawing numbers. Prepare and submit drawing tree.
   c. Use Contractor's format for specifications with Contractor's drawing numbers. Prepare and submit specification tree.
   d. Selected engineering documentation may require JPL review and approval.
   e. Maintain configuration control of all engineering documentation after release.
   f. Maintain configuration control of special tooling, special test equipment, support equipment, and ground handling fixture documentation after release.
   g. Provide 'As-Built Data' in accordance with the requirements of DRD QA 002.

2. The configuration management plan contains, as a minimum, the following:

   a. Contractor's configuration management organization and assignment of personnel responsibilities for meeting all JPL configuration management requirements.
   b. Contractor's configuration identification system, including drawing and specification preparation standards.
   c. Configuration approval cycle within the Contractor's plant. The plan shall accommodate the requirements of the Contract relative to JPL technical direction and approvals.
   d. Differences in control relative to flight hardware, engineering hardware, special tooling, special test equipment, support equipment, and ground handling fixtures.
   e. Contractor's change control system along with sample change document(s).
   f. Interface definitions between the Contractor's change control system and JPL.
   g. Contractor's engineering data management activities, documentation approvals, release procedures, and categories of release.
   h. Definition of the relationship between configuration management and quality assurance activities and "as-built" documentation and configuration audit procedures.
   i. Contractor's configuration status accounting system including samples of lists and reports used.

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
ENGINEERING DOCUMENTATION AND DATA LISTS	CM 002
3. USE Provides the engineering documentation baseline for fabrication of flight and support equipment hardware.	4. DATE 5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP DRDs CM 001 and QA 002	6. REFERENCES JPL D-25633, MIRI Info Mgt/ Config Mgt Plan

8. PREPARATION INFORMATION

Preparation

Prepare engineering documentation such as drawings, specifications, cable and connector definition list(s) and data necessary to specify, procure, manufacture, inspect, test and integrate STM/ETU and flight hardware and support equipment in accordance with DRD CM 001 and the applicable references (above). Prepare a data list for each JPL-identified configured item assembly (deliverable end-item assembly). Ensure document quality of submittals conforms to JPL D-25633, MIRI Info Mgt/ Config Mgt Plan.

Submittals

Submittals in support of this data item include the following:

1. A data list (such as Drawing Tree, Consolidated Indentured Parts List, etc.) and revisions for each JPL-identified 'Deliverable End-Item Assembly.'
1. Magnetic media (PDF and native format (Solidworks-TBR)) of drawings and associated lists identified in the data list, except JPL-controlled drawings.
1. Magnetic media (PDF and native format (Solidworks-TBR)) of all subsequent changes to drawings and associated lists, including all change authorization and implementation paper.
1. One reproducible of each drawing and associated list in the data list, except JPL-controlled documents and government or nationally-recognized industry documents.
1. One reproducible of subsequent changes of each drawing and associated list, including all change authorization and implementation paper.
1. Computer aided design (CAD) files are to be provided in PDF format and in native format (Solidworks-TBR).

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
PHOTOGRAPHS	CM 003
3. USE Provides a photographic record visual record of STM, ETU, EM, and PF hardware and support equipment configuration, and a visual record of key tests for use at reviews, subsystem and assembly packaging evaluations, and troubleshooting.	4. DATE
	5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP	6. REFERENCES

8. PREPARATION INFORMATION

1. Photographs

The Contractor shall photograph the following:

A. Each mechanical and electrical subassembly, assembly, and internal components (such as printed circuits before conformal coating) with: (1) two or more sides of the subsystem and each subassembly and module as appropriate; and (2) all sides of each subsystem and subsystem assembly.

B. Placement of parts, routing of wires and cables, and the relationship of parts. When possible, arrange the items to show component and subassembly serial numbers.

C. Applicable part number (JPL number) and serial number.

D. Complex test set ups with interconnection and support equipment.

E. With each photograph, provide the following information:

1. A concise title, accurately describing the subject matter photographed, including part number (JPL number) and serial number.
2. Project name (i.e., MIRI Project, Dewar Subsystem).
3. Any internal file or contract numbers.
4. Date photographed.
5. Where photographed.
6. Where necessary indicate the top of the photograph.
7. Ruler or scale to indicate relative size.

F. Delivery requirement to JPL: complete sets of 8” x 10” photographs, VGs and negatives, magnetic media using 5 megapixels (TBR) format.

DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER:
Earned Value Management Plan	EV 001 (Sheet 1 of 2)
USE: Provides an overview of the management processes for work organization and for schedule cost planning and control; provides the documentation required to demonstrate compliance with JPL's Earned Value Management requirements.	PROJECT:
INTERRELATIONSHIP: EV 002, EV 003, EV 004, and EV 005	REFERENCES:

PREPARATION INFORMATION:

(1) The responsibilities and methods needed to meet EVM requirements, plus any additional procedures the Contractor deems necessary to adequately manage its Resources, shall be documented in either an Earned Value Management (EVM) Plan or a validated EVM System Description.

(1) The Contractor shall describe the management system to be used to:
- a. Organize, clearly describe, and authorize the work to be performed to meet the Contractual requirements;
- b. Schedule, authorize, and budget the work;
- b. Establish metrics and performance measurement baseline; and
- d. Monitor and control cost performance and schedule progress during the Contract.

(3) Specifically, the Contractor's EVM Plan shall include, but not be limited to:
- a. A narrative description of the following processes:
  - i) Work Definition, Organization, and Integration with project organization structure
  - ii) Scheduling
  - iii) Baseline Budgeting and Baseline Change Control
  - iv) Work Authorization
  - v) Actual Cost Collection
  - v) Indirect Cost Management
  - vii) Monthly Earned Value measurement and assessment
  - viii) Reporting of monthly EVM data to internal management and JPL
  - ix) Subcontract management and material cost control and accountability

  As appropriate provide graphic examples, i.e., flow charts, diagrams, report formats, etc., of the processes described above.
- b. Specific discussion of Item (3)(a)(i) above to include:
  - i The process used to assign organizational responsibility/integrate the Organization structure with the Work Breakdown Structure
- c. Specific discussion of Item (3)(a)(iii) above to include:
  - i) The lowest applicable Work Breakdown Structure (WBS) level (i.e., Control Account) at which cost and schedule integration occurs in the Contractor's EVM system;
  - i) The process used to integrate the Project Schedule (milestones and activities) with the Baseline Budget;
  - i) The process and controls used to establish the Performance Measurement Baseline (PMB);
  - i) The process and controls used to revise the PMB with internally authorized changes
  - v) The establishment and use of a Budget Transaction Log and MR Log;
  - vi) The processes and controls used to establish and distribute Undistributed Budget and/or Management Reserve;
  - vii) The processes and controls used to implement authorized Contract changes into the PMB.

DATA REQUIREMENT DESCRIPTION	
TITLE: Earned Value Management Plan	NUMBER: EV 001 (Sheet 2 of 2)
USE: Provides an overview of the management processes for work organization and for schedule cost planning and control; provides the documentation required to demonstrate compliance with JPL's Earned Value Management requirements.	PROJECT:
INTERRELATIONSHIP: EV 002, EV 003, EV 004, and EV 005	REFERENCES:

PREPARATION INFORMATION (cont.):

d. Specific discussion of Item (3)(a)(vii) above to include:
   - i) The methods for computing earned value at the Work Package level, and the criteria for their usage;
   - i) The policy which requires establishment of discrete means of earned value measurement for all appropriate tasks, and which limits the level-of-effort method of earned value measurement to only those tasks which cannot be measured discretely;
   - i) The methods and report formats for control account variance analysis as determined by the thresholds established to identify "significant" variances at the control account level.
   - i) The methods used to identify and implement corrective actions in response to variances generated during the reporting period;
   - i) The methods used to project the Contract cost Estimate-At-Completion (EAC) for both direct and indirect costs.

e. Specific discussion of Item (3)(a)(viii) above to include:
   - i) The method used to summarize or rollup EV control account data by either the WBS or the Organization structure

f. Specific discussion of Item (3)(a)(ix) above to include:
   - i) The method used for scheduling Subcontract and material procurements;
   - i) The method used for Subcontract and material cost budgeting;
   - i) The method used for Subcontract and material earned value measurement;
   - i) The method used to recognize Subcontract and material actual costs;
   - i) The procedure for analyzing material price and usage variances; and
   - i) The procedure for analyzing Subcontract cost and schedule variances.

g. Identification of personnel (either by name or by functional title) who are responsible for planning the work and reporting work progress. Also identify individuals responsible for reviewing reported accomplishments, monitoring the EVM activities, and verifying earned value calculations.

(4) After initial JPL approval, the Earned Value Management Plan shall be modified only with the prior consent of JPL's Acquisition Division.

DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER:
Work Breakdown Structure and WBS Dictionary	EV 002
USE: The WBS and WBS Dictionary establish the basic framework within which all effort necessary to meet the requirements of the Contract is identified and defined. It provides the logical product-oriented structure for cost planning, performance assessment, and cost control.	PROJECT:
INTERRELATIONSHIP: EV 001, EV 003, EV 004, and EV 005	REFERENCES:

PREPARATION INFORMATION:

(1) Prepare and maintain Work Breakdown Structure (WBS) and WBS dictionary that does not change without JPL approval to provide a common framework for all Summary and Detail Network Schedules, cost estimates and reports required to implement the Statement of Work. Use lower levels of the WBS to define the elements of work and their interrelationships. The lowest level of the WBS consists of Work Item activities (WBS level 4), each of which covers relatively short time spans (ideally time spans should cover approximately one month in duration). However, each of these activities has clear start and completion dates representative of physical accomplishments. Code each element of the WBS to reflect the various levels of the WBS and to identify each element to the next higher level, where the Contractor may identify elements of the WBS with Contractor's internal coding system.

(2) The Contractor shall include a detailed Contract Budget Baseline (CBB) Profile consistent with the Program WBS and milestone schedules for the management, design, fabrication, assembly, testing and delivery of the MIRI DEWAR. The CBB profile shall be the basis for cost performance monitoring and updated if and when significant contractual modifications/redirection occur.

The Contractor shall establish a project organization structure wherein individual organizations are assigned responsibility for implementing the control accounts within the Work Breakdown Structure (WBS).

The lowest level of the WBS shall correspond to at least the lowest level at which work scheduled, work accomplished, and actual costs can be compared (i.e., control account). This level shall be agreed upon during Contract negotiations. The WBS shall be coded to establish the relationship among all of its levels. The WBS coding shall be used to identify each particular WBS Item on all project budgets, schedules and financial reports. The WBS Items that require monthly financial reporting shall be negotiated with JPL's Acquisition Division.

A WBS Dictionary statement shall be prepared to define each Item of the WBS down to the Cost Accounts. These definitions shall describe the scope of work to be performed, the criteria for completing work, and the major receivables(s) and deliverable(s) involved (as applicable).

After initial JPL approval, the WBS and WBS Dictionary shall be modified only with the prior consent of JPL. All changes to the WBS and WBS Dictionary required by negotiated changes to the scope of the Contract, or by authorized but not negotiated Contract changes, shall be incorporated as directed by JPL's Acquisition Division.

DATA REQUIREMENT DESCRIPTION	
TITLE: Schedules	NUMBER: EV 003 (Sheet 1 of 2)
USE: To provide a time-phased project plan consistent with Contract requirements. To display project activities and milestones with their expected performance duration's in their planned sequence of events. To provide Management with the capability for schedule analysis and a clear picture of overall project schedule status.	PROJECT:
INTERRELATIONSHIP: EV 001, EV 002, EV 004, and EV 005	REFERENCES:

PREPARATION INFORMATION:

(1) The Contractor shall establish, within its organization, responsibility for implementing the schedule requirements specified in the Contract. The responsibilities and methods needed to meet these requirements, plus any additional procedures the Contractor deems necessary to adequately report schedule status, shall be documented in DRD EV 001

(2) The Contractor shall prepare Schedules that represent the plan for accomplishing all of the authorized activities necessary to meet the requirements of the Statement of Work within the time constraints imposed by the Performance and Delivery Schedule of the Contract. During initial development of the Schedules, the Contractor shall integrate all schedule levels by establishing common activities or milestones among the various levels. All schedule items shall be traceable to the WBS.

(3) After approval of the Initial Schedules by JPL's Acquisition Division, the start and completion dates on the Initial Schedules shall become the baseline start and completion dates reflected on all monthly updates to the Schedules. The Contractor shall not revise these baseline start and completion dates without prior consent from JPL's Acquisition Division. Monthly updates shall reflect any progress the Contractor has made toward accomplishing scheduled activities, and any projected (i.e., forecasted/estimated) start and completion dates of scheduled activities.

(4) The Contractor shall prepare the following types of schedules:

(a) Detailed Network Schedule – The detailed Schedule shall portray the following information for each of the Contractor's lowest level activities:

i) Activity Description

ii) WBS Number (for Reference/Cross-Reference)

iii) Schedule Start Date

iv) Schedule Completion Date

v) Forecast/Estimated Start Date

vi) Forecast/Estimated Completion Date

vii) Actual Start Date

viii) Actual Completion Date

ix) Predecessor-Successor task relationships

x) Receivables or Deliverables from external sources such as GFP providers

xi) Schedule Margin or "Float," if applicable

The Contractor shall be responsible for establishing the schedule interdependencies among these lowest – level activities and for identifying the critical path that runs through them.

DATA REQUIREMENT DESCRIPTION	
TITLE: Schedules	NUMBER: EV 003 (Sheet 2 of 2)
USE: To provide a time-phased project plan consistent with Contract requirements. To display project activities and milestones with their expected performance duration's in their planned sequence of events. To provide Management with the capability for schedule analysis and a clear picture of overall project schedule status.	PROJECT:
INTERRELATIONSHIP: EV 001, EV 002, EV 004, and EV 005	REFERENCES:

PREPARATION INFORMATION (continued),

(b) Intermediate Schedules – The Contractor shall prepare a separate Intermediate Schedule for each major subsystem or component of their deliverable product to JPL. Each Intermediate Schedule shall portray the information in Items (4) (a) i) through (4) (a) xi) of this DRD for each of the Contractor's activities required to produce the subject subsystem or component. The Contractor shall be responsible for establishing the schedule interdependencies among these activities and for identifying the critical path that runs through them.

(c) Project Summary Schedule- – The Contractor shall prepare a Project Summary Schedule. The Schedule shall portray the information in Items (4) (a) i) through (4) (a) xi) of this DRD for each of the Contractor's major activities and milestones. In addition, the Summary Schedule shall portray the sequential relationship and interdependence among each of the Contractor's major activities and milestones. A distinctive marking shall identify each activity on the Summary Schedule that falls on the "critical path."

(d) Slack Table To Accompany Detailed Network Schedule & Summary Network Schedule--Each network schedule, whether a detailed network schedule or summary network schedule, requires a corresponding "slack table" and the following:

- i) Show key activities from network schedule.
- i) Show slack common to all network activities in a single entry in the table; critical path activities therefore have zero slack indicated.
- i) Show related activities (e.g., all thermomechanical assembly activities) in the same area within the slack table and in chronological sequence.
- i) Uniquely mark all critical path activities (e.g., boldface type or use red color).
- i) Change baseline completion dates and slacks only after JPL grants approval of baseline schedule changes.
- i) Slack table contains approximately 20% of the activities shown on the network schedule.

(e) Bar Chart Schedules - The Bar Chart Schedules display the following information on each activity:

- i) Activity
- i) WBS Cross-Reference Number
- i) Schedule Start Date
- i) Schedule Completion Date
- i) Forecast Start Date
- i) Forecast Completion Date
- i) Actual Start Date
- i) Actual Completion Date
- i) Critical Path defined by a distinctive marking.

f. Detailed Bar Chart - The Detailed Bar Chart Schedule communicates schedule requirements at the milestone level. These bar charts shall reflect the current negotiated schedule, current schedule status, and a forecast of schedule plans to the lowest level of the expanded WBS. Use one-week to two-week nominal durations.

g. Summary Bar Chart - The Summary Bar Chart Schedule summarizes the major milestone and activities reflected on the detailed schedule and reflects the current negotiated schedule, current schedule status, and a forecast of schedule plans.

DATA REQUIREMENT DESCRIPTION

TITLE:	NUMBER:
Contract Budget Baseline (CBB) Profile	EV 004
USE: The Contract Budget Baseline (CBB) consists of the performance measurement baseline (PMB), plus management reserve (MR). The CBB Profile is a special, by month, rendering of the time-phased cost and schedule plan (the PMB) for the entire period of Contract performance. The CBB Profile also includes other specially rendered cost management data: the calendarized resource data by element of cost, a Workforce profile, and the projected use of management reserve.	PROJECT:
INTERRELATIONSHIP: EV 001, EV 002, EV 003, and EV 005	REFERENCES:

PREPARATION INFORMATION:

(1) The Contractor shall prepare Baseline Budgets at the lowest levels of the WBS (i.e., control account). These shall be summarized at successively higher levels of the WBS to the Total Contract performance measurement baseline. A time-phased baseline budget (for entire period of performance) shall be submitted for each WBS item reported on the Cost Performance Report (see EV 005)

(2) Each baseline budget shall be broken out by element of cost (e.g.: direct labor hours, Full Time Equivalents (FTEs), direct labor cost, material cost, overhead costs, and G&A cost) and summarized through total cost. It shall also be time-phased by month and subtotaled by calendar year, and then totaled for the budget at completion (BAC).

(3) Each reportable WBS item's baseline budget shall be accompanied by a workforce profile (in planned hours, monthly conversion factor, and the resulting FTEs) which shall also be time-phased by month and subtotaled by calendar year, and then totaled at completion.

(4) The initial performance measurement baseline (PMB) for the total project shall equal the original negotiated Contract Total Cost (fee excluded), less any Management Reserve. The PMB profile shall be accompanied by a Management Reserve expenditure plan, which projects the potential use of Management Reserve.

(5) After initial JPL approval, the PMB shall be modified with instant notice to JPL. Any PMB modification that would consume all management reserve in a given year will require the prior consent of JPL. All negotiated changes to the scope of the Contract shall be incorporated into the Performance Measurement Baseline as directed by JPL's Acquisition Division. On occasion, JPL may require the Contractor to incorporate authorized but not negotiated changes to the Contract into the Performance Measurement Baseline.

DATA REQUIREMENT DESCRIPTION	
TITLE: Cost/Schedule Performance Report	NUMBER: EV 005 (Sheet 1 of 2)
USE: To provide a monthly update of the status of Schedule, Earned Value, and Cost performance on the Contract effort.	PROJECT:
INTERRELATIONSHIP: EV 001, EV 002, EV 003, EV 004, and EV 006	REFERENCES:

PREPARATION INFORMATION:

(1) The Report shall include the following:

a. Schedule

i) A detailed update to the master network schedule comprising tasks and milestones that depict all work activities and procurements under this Contract.

- Identified schedule margins (slack).
- Including tasks which are identified as "receivables" or "deliverables" from external sources such as instrument or GFP providers

i) Project Level 1 or 2 rollup schedule

i) All other schedules generated for managing and reporting status to internal management.

b. Schedule metrics

i) Milestone trend charts

i) Slack tables,

i) Critical path tables,

i) Schedule margin plan vs. consumption,

i) All other schedule metrics generated for managing and reporting status to internal management.

b. Significant schedule changes in:

i) Schedule slack,

i) Critical path

b. Schedule recovery plans

b. Cost performance data

i) CPR Format 1

ii) Provide a list of control accounts with Significant Variances

iii) The impact of significant variances and the corrective actions planned to rectify these variances will be briefly described.

iv) JPL-approved changes to the Contractor's Performance Measurement Baseline will be discussed.

v) Detail data that supports the reported cost information will be retained at the Contractor's facility and made available for JPL review.

DATA REQUIREMENT DESCRIPTION	
TITLE: Cost/Schedule Performance Report	NUMBER: EV005 (Sheet 2 of 2)
USE: To provide a monthly update of the status of Schedule, Earned Value, and Cost performance on the Contract effort.	PROJECT:
INTERRELATIONSHIP: EV 001, EV 002, EV 003, EV 004, and EV 006	REFERENCES:

PREPARATION INFORMATION (cont.):

b. Cost management status of major Subcontracts:
   - i) Supplier name,
   - i) Negotiation status
   - i) Proposed price vs. negotiated price,
   - i) Assigned WBS element
   - i) Estimated/Actual definitization dates
   - i) Plan vs. Projected/Actual delivery dates

b. Long-Lead items to be procured during Phase A/B (if applicable):
   - i) Supplier name,
   - i) Estimated vs. proposed price,
   - i) Negotiations status, and
   - i) Estimated definitization dates
   - i) Plan vs. Projected/Actual delivery dates

b. Management Reserve
   - i) Cost/schedule reserves remaining vs. estimated cost-to-go

b. Status of Significant Risk List
   - i) List known or perceived programmatic and technical risk items
   - i) Include a ROM cost for each item, should it occur
   - i) Include a ROM probability of its occurrence (low, medium, or high).
   - i) Identify any item to which reserves were applied
   - i) Identify the definitized, time-phased allocated cost of the item

DATA REQUIREMENT DESCRIPTION	
TITLE: NASA Financial Management Report	NUMBER: EV 006
USE: Provides cost and commitment information for financial management of the Contract	PROJECT:
INTERRELATIONSHIP: EV 005	REFERENCES:

PREPARATION INFORMATION:

(1)A NASA Form 533M report shall be completed in accordance with the instructions on the reverse side of the form. A 533M shall be prepared for the total project and for each Level 2 WBS Item or below, as mutually agreed upon during negotiations. Reporting categories on each 533M shall be the elements of cost (e.g. labor hours, labor dollars, overhead costs, material, Subcontracts, other direct costs, G&A) and profit or fee.

(2)A NASA Form 533Q shall be completed in accordance with instructions on the reverse side of the form. Reporting levels and categories shall be the same as those required for the 533M.

(1) An overhead report shall provide a listing of the latest bidding, billing and actual overhead and G&A rates by cost centers. The accounting calendar shall also be included.

(1) A reconciliation report shall be prepared in accordance with instructions on the reverse side of the 533 forms and those included in NHB 9501.2D.

(1) The potential termination liability shall be identified as well as a projection by month for the current and subsequent fiscal years.

DATA REQUIREMENT DESCRIPTION	
TITLE Corrective and Preventative Action Plan	NUMBER MA 001
USE This plan is to define and describe the corrective and preventative actions that result from the Contractor's internal audit processes.	PROJECT
INTERRELATIONSHIP	REFERENCES

PREPARATION INFORMATION

The Corrective and Preventative Action Plan shall provide the following established procedures.

1. Corrective Actions

The procedures for corrective action shall include:

a) The effective disposition of customer concerns or complaints and reports of product non-conformances.

a) Investigation of cause of non-conformance relating to products and processes.

a) Determination of corrective action needed to eliminate the cause of non-conformances.

a) Application of controls to ensure that corrective action is taken and that it is effective.

1. Preventative Actions

The procedures for preventative action shall include;

a) The use of appropriate sources of information such as processes, work operations, etc., which affect product quality, waivers, audit results, quality records, and customer complaints to detect, analyze, and eliminate potential causes of non conformances.

b) determination of the steps needed to effectively deal with problems requiring preventative action.

b) Execution of preventative action and controls to ensure that preventative action is effective

b) Confirmation that all relevant information on actions taken shall be submitted for management review.

DATA REQUIREMENT DESCRIPTION

TITLE	NUMBER
Internal Audit Findings Reports	MA 002 age 1 of 1
USE To report corrective or preventive action taken to eliminate the causes of actual or potential non conformance to contract requirements.	PROJECT
INTERRELATIONSHIP	REFERENCES

PREPARATION INFORMATION

The contractor shall report any internal audit findings; risk items or deviations that have been determined to potentially affect mission success.

This report shall include, but not be limited to, the following:

A. The effective disposition of concerns and reports of product non conformance.

B. Investigation of cause of non conformance related to products and processes.

C. Determination of corrective action needed to eliminate the cause of the non conformance.

D. Application of controls to ensure that corrective action is taken and that it is effective.

E. Appropriate close-out signatures, including the Cog Engineer and the Contractor's Project Manager.

DATA REQUIREMENT DESCRIPTION

TITLE	NUMBER
RISK MANAGEMENT PLAN AND REPORTING	MA 003
USE	**PROJECT**
The Risk Management Plan establishes the framework within which the contractor will identify potential risks to schedule, cost or technical performance. Regular reporting of all identified risks to JPL is critical to allow JPL to balance overall project risks.	MIRI DEWAR SUBSYSTEM
INTERRELATIONSHIP	**REFERENCES**
	MIRI Risk Management Plan, JPL D-25638

PREPARATION INFORMATION

The Contractor shall prepare a Risk Management Plan establishing processes for regular input from “line” organizations regarding any aspect of the job, which poses a risk to completion on schedule, within budget or to technical performance requirements. As a minimum all high-risk disciplines should be listed in the plan with a process, that ensures weekly input. Additionally a process that facilitates input from anyone in the organization that perceives a risk item should be included in the plan.

The plan should further provide for a method of categorizing risk items as to their severity and likelihood of occurrence; provide a method of tracking corrective or mitigating actions and final disposition.

The risk items reported as a result of the Risk Management Plan shall be provided on a bi-weekly basis to the JPL Contract Technical Manager with a copy to the JPL Negotiator. On a monthly basis the contractor shall provide to the Contract Technical Manger a status of the corrective/mitigating actions that have been taken on each risk item.

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
PROJECT IMPLEMENTATION PLAN	MA 004 (Sheet 1 of 2)
3. USE Provides the Program Manager's plan and identifies how the Program Manager intends to manage the work within his company to assure that the contract requirements are met. The plan describes the technical and management activities to accomplish the Statement of Work, integrating all the Project resources to deliver the hardware.	4. DATE 5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP	6. REFERENCES

1. Project Implementation Plan

The Project Manager shall prepare a Project Implementation Plan that addresses the following:

Title page and approvals
Table of contents
1. Introduction
1. Applicable/Reference Documents
1. Objectives
1. Background, Contractor organization, and brief summary of relevant experience
1. Requirements and Constraints
1. Statement of Work
1. Inputs to Project
1. Deliverables
1. Acceptance criteria
1. Technical Plan
    a. Design and analyses
    a. Software
    a. Traceability
    a. Parts and materials
    a. Fabrication and assembly
    a. Performance Verification
    a. Safety, Handling and operations
    a. Method for Establishing Specifications
    a. Method for Establishing and Controlling Design Margins
11. Management plan
    a. Functional/Block diagram
    a. Work Breakdown Structure
    a. Work Package Descriptions
    a. Master Schedule and Reportable Milestones
    a. Flow Plan Schedule
    a. Management operating procedures - interface management; software management; make/buy decisions
    a. Organization/composition of the project team (contractor and subcontractor) and their responsibilities
    a. Reliability Plan - H/W and S/W
    a. Review Plan
    a. Procurement Plan
    a. Quality Assurance Plan - H/W and S/W
    a. Risk Management Plan and Reporting
    a. Engineering Standards
    a. Safety Plans
    a. Environmental Requirements Plan - program policy and requirements for environmental qualification
    a. Reports
    a. Configuration Management - H/W and S/W
    a. Reserves

Note: the above topics may be included in the Project Implementation Plan or may be summarized in the Project implementation plan and detailed in a separate supporting plan.

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
PROJECT IMPLEMENTATION PLAN	MA 004 (Sheet 2 of 2)
3. USE	4. DATE
	5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP	6. REFERENCES

8. PREPARATION INFORMATION

1. Project Implementation Plan (cont.)

11. Management plan (cont.)
    a. Fiscal Resources
    a. Personnel resources - list key personnel and the extent of their responsibilities and authorities
    a. Facilities
    a. Project control - description of the means to control resource expenditures and technical activities
    a. Corrective and Preventative Action Plan

Note: the above topics may be included in the Project Implementation Plan or may be summarized in the Project Implementation Plan and detailed in a separate supporting plan(s).

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
PROGRAM STATUS REVIEWS & REPORTS	MA 005 (Sheet 1 of 4)
3. USE Communicates program status to JPL and Contractor's management on a timely basis of accomplishments versus planned milestones, resource expenditures versus planned expenditures, and major problems, especially those requiring management assistance, resolution or action.	4. DATE
	5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP DRDs in the MA-series, DRDs in the RA-Series, DRDs in the PMP-Series	6. REFERENCES

8. PREPARATION INFORMATION

I. Kickoff Meeting

Kickoff meeting shall be held at the Contractor's facility in accordance with the Program Schedule. The Kickoff meeting is intended to be a one day meeting and assure the following: identification of critical issues, developmental tests, concerns, risks and an understanding of the Statement of Work, Specification and Contractor's plans to accomplish the work.

II Monthly Management Reviews (MMRs)

A. General/Background

Each month, prepare for, and hold a Monthly Management Review (MMR) with an agenda mutually agreed upon in advance with the CTM. Prepare and submit a MMR Report that summarizes, with attachments as necessary, the significant issues and action items, schedules, updated action item log. Some reviews occur via video or telephone conference from Contractor to JPL (possibly with a few JPL personnel present at Contractor's facility), and other reviews at the Contractor's facility with JPL attendees present. Typical JPL attendees: CTM, Cog. E, Dewar Subsystem Project Element Manager, Mission Assurance Representative, Mechanical Engineer, Negotiator, MIRI Project Representatives (3), and others deemed necessary (i.e.: cognizant representatives of NASA). Contractor Attendees: Contractor's counterpart personnel to JPL attendees, as mutually agreed upon in advance with the CTM. With CTM concurrence, the Contractor may combine a major design review meeting with a MMR to minimize travel and other meeting costs.

B. Presentation & Presentation Materials

In accordance with an agreed upon agenda, present (with overhead projector and handouts as necessary) a summary of technical, management, financial, and contractual activities for the past period:

1. Accomplishments/Status/Progress/Costs/Workforce/Obligations during the past reporting period versus the plan. This requires a presentation of schedules (milestone charts, summary network schedules, and slack table (slack table requires emphasis); and as necessary detailed network schedules), Dewar contract performance parameters (earned value, estimate at completion) versus time (nominal, worst case, allocation) with narrative descriptions.
1. Status/Progress/Costs/Workforce/Obligations of activities planned though not accomplished and related impact and work-around plans as applicable. Work-around plans require charts, summary network schedules and slack tables as applicable and sufficient to describe them.
1. Plans for the next report period. This requires a narrative description of activities along with the appropriate schedules and slack tables.
1. Technical and management discussions that highlight major technical issues to include, but not be limited to, the following:

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
PROGRAM STATUS REVIEWS & REPORTS	MA 005 (Sheet 2 of 4)
3. USE	4. DATE
	5. PROGRAM: MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP	6. REFERENCES

8. PREPARATION INFORMATION

Presentation & Presentation Materials (Continued)

a. Subcontract status.
a. Parts issues (parts list submittals/reviews, NSPAR/Waiver processing and status, parts procurement status, failure analysis results, responses to GIDEP alerts, test results (screening, demonstration, upgrade, TID & SEE) problems/resolutions.
a. Reliability Assurance analyses status & approvals.
a. Resource summary reports, to cover in a tabular manner at assembly and subassembly levels, with prior estimates or actual data, mass, & power (each resource with margins versus allocation and capability).
a. Materials and Process activities status including Material Identification and Utilization List (MIUL)/ Material Utilization Agreement (MUA) submittals/reviews, non-standard design items/qualification plans, waiver processing, materials and processes issues/resolutions, failure analysis results, responses to GIDEP alerts.
a. Waiver status to include the status of waivers submitted, and waivers contemplated for submittal.
a. Problem/Failure Report (PFR) Summary Status as follows (in two parts): Part 1 includes--For each component number of PFRs initiated, number of PFRs closed, number of red flag PFRs, number of PFRs open longer than 60 days, number of PFRs closed since previous report. Part 2 includes--A discussion of potentially significant and Red Flag PFRs.

5. Contractor maintains, updates, provides, and discusses a program action item summary log in the presentation materials and updates the action items to reflect closures and additional items identified during the meeting.
5. Issues/concerns/problems that relate to technical and schedule. For each item in this category, within presentation materials and handouts, provide a tabular analysis of the issues, problems, & concerns with a clear statement of the problem, action taken, probable outcome, and expected resolution date.

III. Weekly Status and Major Problem Report

Prepare and submit via fax or e-mail, to the CTM and negotiator, a concise weekly status report on the Monday following the week reported with the following information:

A. Accomplishment/Schedule Status. Identify progress versus planned accomplishments for the past week and any major (to JPL) status of activities and anticipated changes in scheduled milestones, rationale for missed milestones, and specific actions to prevent impact to the critical path.
A. Planned accomplishments for the coming week.
A. Problems Status. State progress toward solving or averting problems previously identified. Discuss new major problems identified during the past week and any actions by or assistance from Contractor's management or JPL. Identify potential problem areas and recommend actions for JPL.

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
PROGRAM STATUS REVIEWS & REPORTS	MA 005 (Sheet 3 of 4)
3. USE	4. DATE
	5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP	6. REFERENCES

8. PREPARATION INFORMATION

IV. Technical Interchange Meetings (TIMs)

Prepare for and conduct Technical Interchange Meetings (approximately every 3 months) at Contractor's facility a day before or a day after Monthly Management Reviews to review and resolve open technical issues and concerns in areas Contractor or JPL judge as significant or potential problems. Contractor also performs the following:

A. Develops an agenda and attendee list for meetings and coordinates the agenda with the JPL Contract Technical Manager.
A. Contractor holds the meeting and records meeting minutes, action items and publishes a meeting report for each TIM.
A. Contractor then delivers the meeting report for each Technical Interchange Meeting to JPL.

V. Interface Working Group Meetings

Contractor person(s) prepare for and participate at interface working meetings (two for purposes of proposals) which involve travel to JPL to accomplish the following in accordance with a mutually agreed upon meeting agenda:

A. Provide interface information to the Contractor or disseminate interface information from the Contractor.
A. Discuss and resolve interface issues.
A. Provide and discuss Interface Circuit Data Sheets, Thermal Models, Structural Models, Interface Control and Assembly Drawings, etc.
A. Discuss and track action items.

VI. Other Meetings (TBD)

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
PROGRAM STATUS REVIEWS & REPORTS	MA 005 (Sheet 4 of 4)
3. USE	4. DATE
	5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP	6. REFERENCES

8. PREPARATION INFORMATION

VII. Inheritance Review/Requirements Review

Contractor shall prepare for and participate in an Inheritance Review (IR) that evaluates compatibility of the inherited or commercial off-the-shelf product or process with JPL requirements. The IR assesses the potential risk associated with use of the inherited product or process, and also assesses the need for modification or additional testing. Contractor shall prepare for and participate in a Requirements Review (RR) that evaluates the completeness, consistency, and achievability system, subsystem, or assembly or program set requirements necessary to fulfill the mission need statement. Additionally, the review evaluates the completeness of the flow-down of the project-level requirements to a complete set of system, subsystem, and assembly or program set design specifications.

VIII. Preliminary Design Review

Contractor shall prepare for and participate in a Preliminary Design Review (PDR) that evaluates the readiness of the Contractor to proceed with detail design. The PDR assesses the compliance of the design with applicable JPL requirements.

IX. Critical Design Review

Contractor shall prepare and participate in a Critical Design Review (CDR) that evaluates the readiness of the Contractor to proceed with the development, including fabrication, assembly, integration, and test. The CDR assesses the compliance of the design with applicable JPL requirements.

X. Pre-Integrated Test Readiness Review

Contractor shall prepare and participate in a Pre-Integrated Test Readiness Review (PITRR) that evaluates the readiness of the MIRI DEWAR SUBSYSTEM hardware to be tested and the readiness of test procedures, test equipment, and test facilities for use.

XI. Pre-Ship Review

Contractor shall prepare and participate in Pre-Ship Reviews (PSRs) that evaluate the readiness of the Contractor to deliver the MIRI DEWAR SUBSYSTEM hardware to JPL. The basis for delivery is the Hardware Review/Certification Requirement (HRCR), Support Equipment/Certification Requirement (SECR) and Firmware Review/Certification Requirement (FRCR) that assess the status of flight hardware prior to delivery to JPL for integration into the MIR instrument. The Contractor shall discuss all modifications to the design due to deviations during fabrication.

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
PARTS PROGRAM PLAN	PMP 001
3. USE Defines parts control activities	4. DATE
	5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP DRDs RA 001, RA 003 and QA 001	6. REFERENCES JPL D-25631, MIRI Mission Assurance Plan

8. PREPARATION INFORMATION

Prepare and submit an Electronic Parts Program Plan in compliance with JPL D-25631, MIRI Mission Assurance Plan and in accordance with the following:

1. Identifies all hardware covered in the parts program.
1. Identifies and describes all affected organizations both within and external to the Contractor, including organizational responsibilities, relationships; identifies key managerial, programmatic and technical personnel.
1. Defines parts radiation Total Integrated Dose (TID) & Single Event Effects (SEE), life and other specifications.
1. Identifies parts selection sources, parts acquisition policies/procedures, and parts application requirements.
1. Identifies and provides a schedule of all parts program activities, including presentation of parts status at Monthly Management Reviews, parts list releases (preliminary, updated, as-designed, and as-built), parts procurements, and parts data/application analyses.
1. Use and approval of Nonstandard Part Approval Requests (NSPAR) and part waivers.
1. Parts failure analysis reporting and analysis requirements.
1. Methodology and procedures to address parts issues identified on Government Industry Data Exchange Program (GIDEP) Alerts.

Additionally, the Contractor shall:

1. Identify ASICs, hybrids, and special electronics parts to JPL.

1. Identify what steps are to be taken to mitigate adverse performance consequences due to variation between ‘flightgrade’ components used in the flight electronics and ‘commercial-grade’ components used in the development hardware (i.e., laboratory electronics, or flight-like electronics).

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
PARTS DATA	PMP 002
3. USE	4. DATE
Provides parts data for the proposed designs	
	5. PROGRAM
	MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP	6. REFERENCES
DRD PMP 001	JPL D-25631, MIRI Mission Assurance Plan

8. PREPARATION INFORMATION

Prepare and submit technical data in accordance with the requirements of JPL D-25631, MIRI Mission Assurance Plan and the JPL-approved Contractor's Electronic Parts Program Plan developed in accordance with DRD PMP 001 which governs the item selection, application status and problems/concerns during selection, procurement, design/development, fabrication and testing and, includes, but is not limited to the following:

1. Parts lists, including:

    a. Preliminary design lists (includes: manufacturer part number, generic part number, proposed manufacturer, procurement specification, screening/demonstration/upgrade specification, applicable NSPARs/waivers with revision letter and status, and quantities used).
    b. As-designed lists (same information as preliminary design lists).
    c. As-built lists, same as-designed list with the following additional information:
        1. Actual part number and revision letter of each item.
        2. Reference designation where each part is used.
        3. Serial number of part (if serialized).
        4. Screening/demonstration/upgrade lot number, as applicable.
        5. Manufacturer lot date code.
        6. Traceability number as applicable.
        7. Serial number and part number of the next assembly into which the part is installed.

2. Nonstandard Part Approval Requests (NSPARs) and all associated procurement and screening/demonstration (test) documentation.

3. Waivers and all associated back-up information.

4. Failure Analysis Reports.

5. Contractor-prepared parts specifications.

DATA REQUIREMENT DESCRIPTION

1. TITLE

MATERIALS AND PROCESSES PLAN

2. NUMBER

PMP 003

3. USE

Establishes a plan to select materials and processes data and obtain approvals and data for the designs.

4. DATE

5. PROGRAM

MIRI DEWAR SUBSYSTEM

7. INTERRELATIONSHIP

DRDs MA 004 and PMP 004

6. REFERENCES

JPL D-25631, MIRI Mission Assurance Plan

8. PREPARATION INFORMATION

Prepare and submit Materials and Process Control plan in accordance with JPL D-25631, MIRI Mission Assurance Plan .To govern the selection of materials and processes, qualification, specifications and use. The plan describes the Contractor's plan to conform to the requirements of the reference document (see above), and identifies the methods to prepare and develop the data necessary to secure JPL's approvals of the materials and processes used in the Contractor's designs and subcontractor's designs.

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
MATERIALS AND PROCESSES DATA	PMP 004
3. USE Provides parts, material, and processes data for the proposed designs and secure JPL's approvals for the materials and processes that go into the designs.	4. DATE
	1. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP DRD PMP-003	6. REFERENCES JPL D-25631, MIRI Mission Assurance Plan

8. PREPARATION INFORMATION

Prepare and submit data in accordance with JPL D-25631, MIRI Mission Assurance Plan and the following:

1. Materials Identification and Usage Lists (MIUL) for organic materials, inorganic materials, process and lubricants. lists include nomenclature, expected environment and application, process description, and material/process specifications.
1. Materials Usage Agreements (MUA), as required, for all materials and processes that do not conform to the requirements of JPL D-25631, MIRI Mission Assurance Plan
1. Stress Corrosion Evaluation Forms for all materials that do not meet the corrosion/stress corrosion-cracking requirement of JPL D-25631, MIRI Mission Assurance Plan
1. Qualification plans and associated data for non-standard materials and processes design items.
1. Contractor-developed material and process specifications.
1. Waivers that pertain to material and/or process issues, and all associated back-up information.
1. Failure analysis reports that involve material and/or process issues.

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
QUALITY ASSURANCE AND INSPECTION SYSTEM PLAN	QA 001 (Sheet 1 of 2)
3. USE Provides documents that define the details of the Contractor's Quality Assurance activities.	4. DATE
	5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP Configuration Management Plan, DRD CM-001, Contractor's Reliability Program Assurance Plan, DRD RA-001.	6. REFERENCES JPL D-25631, MIRI Mission Assurance Plan

8. PREPARATION INFORMATION

Prepare and submit a Quality Assurance Plan and Supporting Documentation in accordance with the Statement of Work to include each of the following submittals:

1. Quality Assurance Plan.

The plan describes all quality assurance (QA) and inspection activities for Contractor's compliance with the applicable requirements of the references and serves as the master QA and inspection planning and control document. The plan uses as many of the Contractor's current practices as possible and includes the following:

i. Narrative explanations of the existing QA inspection system, including inspection methods used, when they are applied, and by whom they are performed.
ii. List of Contractor QA and inspection policies and instructions applicable to the DEWAR.
iii. Charts and narrative statements describing the functions, responsibilities, and relationships of each element in the Contractor's organization that implements the quality and inspection program, including procurement, engineering, fabrication, test and quality control.
iv. A description of the QA interfaces between JPL and the Contractor, between the Contractor and his suppliers, and between Contractor interdivisional quality organizations.
v. A definition of any variations between provisions applicable to flight and support equipment hardware, particularly with regard to workmanship standards.
vi. The QA and inspection planning discusses the following sections separately:
    a. QA/inspection support of parts and materials screening.
    b. Flight hardware fabrication and assembly.
    c. Ground support equipment, handling fixtures, and test equipment.
    d. Flight acceptance and environmental testing.
    e. Identifies each major procurement (subassembly or critical component).
    f. Identifies the requirements and corresponding Contractor-approved supplier/subcontractor QA/inspection plan(s).
vii. The plan discusses specific supplier/subcontractor QA and inspection requirements.
viii. The plan discusses the conduct of Material Review Board (MRB) meetings, activities, and JPL participation in the meetings; MRB activities as applicable to subcontractors, etc..
ix. The plan shall provide a detailed build-flow schedule identifying fabrication, assembly, integration of hardware and software, test events, and the critical-path schedule to complete each hardware build, including key (mandatory) inspection points.

Note: JPL construes references in any existing plan with respect to "government" activities as "JPL" activities.

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
QUALITY ASSURANCE AND INSPECTION SYSTEM PLAN (Continued)	QA 001 (Sheet 2 of 2)
3. USE	4. DATE
	5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP	6. REFERENCES

8. PREPARATION INFORMATION

2. Quality Assurance Plan Supporting Documentation

Supporting documentation includes, as a minimum, each of the following:

a. Submittals for JPL's review and approval:
   - i. Product Inspection and Test Flow Charts.
   - ii. Storage, handling and shipping procedures.

b. Documents available for JPL's Review:
   - i. Process control procedures.
   - ii. Workmanship Standards for Contractor and subcontractors for Engineering Model units, and for the Protoflight (PF) units. (Note: Workmanship standards for flight hardware may have a basis from DOD, NASA, or JPL specifications so long as they have JPL approval)
   - iii. Sampling plan.
   - iv. Electronic Packaging Plan.
   - v. Training Plans.
   - vi. Inspection Procedure/Specifications (including, but not limited to, incoming inspection procedures).
   - vii. Rework Procedures and Repair Instructions.
   - viii. Discrepancy Reports.
   - ix. Procedures that implement the QA plan.
   - x. Workmanship Standards for Non-flight Hardware.
   - xi. Procedures that Implement the Inspection Plan.
   - xii. Hardware Travelers.

DATA REQUIREMENT DESCRIPTION

1. TITLE

END ITEM DATA PACKAGE

2. NUMBER

QA 002

3. USE

To provide a comprehensive data package to include both a history and current record for each item offered for delivery.

4. DATE

5. PROGRAM

MIRI DEWAR SUBSYSTEM

7. INTERRELATIONSHIP

As Built Documentation DRD CM 001 and Quality Assurance Plan DRD QA 001

6. REFERENCES

FS 503624

8. PREPARATION INFORMATION

Prepare and submit an End Item Data Package for each controlled assembly offered for delivery (STM, ETU, PF, Handling Fixtures, Support Equipment, etc.) in accordance with the reference documents and in a Contractor-determined form. The EIDP delineates the fabrication and assembly history, operation history and performance characteristics of the hardware. The contents of the package include, but are not limited to, the following information:

(1) As-built data in conformance with JPL FS 503624 or JPL approved Contractor equivalent for all flight hardware, where "As-built" hardware documentation consists of a compilation of items describing exactly the configuration of a fabricated serialized assembly, including: (a) Part number and revision letter of each item; (b) Part description (title) of each item; (c) Electronic part reference designation*; (d) Serial number of each item, or if no serial number, the screening lot number when required*; (e) Screening/demonstration/upgrade lot number, as applicable*; (f) Procurement or other specification*; (g) Generic part number*; (h) Manufacturer*; (i) Applicable NSPAR and Waiver numbers (with latest revision letters)*; (j) Manufacturer lot date code*; (k) Traceability number (as applicable).*

(2) Assembly and subsystem test data and test reports. (Not applicable to Ground Handling Fixtures.)

(3) Log book with a chronological history of day-to-day activities on the subsystem starting with first application of power to the subsystem and accumulated operating time, and number of on/off cycles (and temperature conditions).*

(4) A complete shortage list (parts, assembly, testing and other activities, as applicable).

(5) Operating time data on the controlled assembly or other time-sensitive items, as applicable.

(6) Number of operations for operationally limited items (not applicable for support or test equipment).

(7) A complete list of the tests and test results performed at individual level of assembly, with test data (last acceptance test at each level as a minimum) organized and indexed to the list. (Not applicable to Ground Handling Fixtures.)

(8) A list, including open or closed status, of all problem/failure reports generated against the equipment, including the support equipment.

(9) All Material Review Board (MRB) actions generated against the equipment and a status list for open MRB actions.

(10) A summary of all deviations and waivers applicable to the deliverable items.

(11) Removal/re-installation record and log of mate/demates of flight interfaces (not applicable for support and test equipment).

(12) Contractor's Certification, with JPL Quality Assurance Representative concurrence, that the deliverable items conform to applicable specifications and the contract.

(13) Environmental test report(s) (for each test environment), and completed Test Result Summary Forms for the deliverable item.*

(14) Vendor parts, cable definition and material certification forms (as applicable).

*Note: Does not apply to STM Support Equipment and Ground Handling Fixtures.

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
ELECTROSTATIC DISCHARGE CONTROL PLAN	QA 003
3. USE Ensure compliance with electrostatic discharge control and safety related issues.	4. DATE
	5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP Quality Assurance Program Plan DRD QA 001	6. REFERENCES JPL D-1348

8. PREPARATION INFORMATION

Prepare and submit a document in conformance with JPL D-1348 that describes the plans and procedures for the protection of electrostatic-sensitive flight parts, subassemblies, assemblies, subsystems during all phases of the contract, makes maximum use of the Contractor's existing and current Electrostatic Discharge (ESD) requirements, documentation, and control practices appropriate for the static-sensitive levels of hardware, and includes, but is not limited to the following issues:

1. Identification of parts, subassemblies and assemblies that the plan covers.
2. Procurement of static-sensitive parts and hardware.
3. In-house ESD controls and practices, and how the Contractor plans to impose ESD requirements on subcontractors.
4. Organizational responsibilities and functions that implement and control the ESD requirements.
5. Define the maximum static voltage and humidity level allowed during kitting, assembly, and integration and test.

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
CONTAMINATION CONTROL PLAN	QA 004
3. USE Provides the design approaches and procedures employed to ensure satisfaction of contamination control requirements.	4. DATE
	5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP	6. REFERENCES MIRI (TBD)

8. PREPARATION INFORMATION

Prepare and submit a Contamination Control Plan consistent with MIRI (TBD) that describes the design approaches and procedures the Contractor uses to ensure that effects due to contamination lie within specifications. (NOTE: Maximize the use of Contractor's existing plans/procedures.)

DATA REQUIREMENT DESCRIPTION

1. TITLE

ELECTROMAGNETIC COMPATIBILITY CONTROL PLAN

2. NUMBER

QA 005

3. USE

Provides the design approaches and procedures employed to ensure satisfaction of electromagnetic compatibility control requirements.

4. DATE

5. PROGRAM

MIRI DEWAR SUBSYSTEM

7. INTERRELATIONSHIP

6. REFERENCES

JPL D-25631, MIRI Mission Assurance Plan

8. PREPARATION INFORMATION

Prepare and submit an Electromagnetic Compatibility Control Plan consistent with the requirements of the Dewar Specification and the MIRI Mission Assurance Plan, that describes the design approaches and procedures the Contractor uses to ensure that effects due to electromagnetic radiation lie within specifications. (NOTE: Maximize the use of Contractor's existing plans/procedures.)

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
RELIABILITY ASSURANCE PLAN	RA 001
3. USE Provides a document that defines in detail and governs the Contractor's Reliability Assurance Program and required reliability assurance data.	4. DATE
	5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP DRDs RA 002, RA 003, and EV 006	6. REFERENCES JPL D-10401, JPL D-5703

8. PREPARATION INFORMATION

Prepare and submit a Reliability Assurance Plan that takes advantage of existing Contractor reliability process and procedures, to the maximum extent possible.

The plan, as a minimum, contains, but is not limited to, the following information:

1. Document change log.
2. Table of Contents.
3. Applicable Documents List.
4. Description, including appropriate charts, of the Reliability Assurance organization, management, and responsibilities for the accomplishment of various activities; and the relationships to the elements for the Contractor's organization and its institutional organization.
5. A schedule of reliability assurance activities that indicates time-phase relationships with design, development, procurements, design reviews, hardware reviews, fabrication, system tests, and shipment.
6. A description of responsibilities and techniques for accomplishment of reliability assurance activities by or with subcontractors and suppliers and how the Contractor plans to impose reliability assurance requirements on subcontractors and suppliers.
7. A description of the assumptions and preparation guidelines (with compliance where possible with JPL D-5703) followed in generation of the Reliability Analyses for delivery in accordance with DRD RA 003.
8. A description of plans to implement the Problem/Failure Reporting and management program requirements to identify, document, track, resolve and verify reportable incidents associated with flight-configured hardware and soft/firm-ware (qualification, flight and flight-type), flight support equipment software, and support and test equipment problem/failures.
9. A description of plans to include the analyses of DRD RA-002 as part of the review process (JPL D-10401).

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
RELIABILITY ASSURANCE DATA AND SAFETY DATA ANALYSES	RA 002
3. USE To provide data for review and evaluation of design status and progress.	4. DATE
	5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP DRDs RA 001, RA-003, TD 007, TD 008 and SA 001.	6. REFERENCES JPL D-5703, JPL D-560.

8. PREPARATION INFORMATION

Prepare and submit data for the following analyses as contained in the JPL-approved Contractor Reliability Assurance Plan (DRD RA 001) and the guidelines of JPL D-5703:

1. Failure Modes, Effects, and Criticality Analysis (FMECA) (including a single failure point summary).

2. Worst-Case Circuit Analysis and Worst-Case Power Supply Transient Analysis.

3. Stress Analysis:
   a. Electrical part stress analysis and piece-part level thermal analysis.
   b. Structural stress as required for safety.
   c. Thermal stress as required for safety.

4. Fault Tree for Mechanical and Electromechanical Elements.

5. Single Event Effects (SEE).

6. Protection and Redundant Services/Circuit

7. Risk Assessment.

Prepare and submit Safety Analyses Documentation required to show compliance with applicable safety requirements needed to support MIR Instrument Safety Reviews (Phase 0/I, II, III), for both Ground and Flight Safety Data Packages.

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
PROBLEM/ FAILURE REPORTS	RA 003

3. USE

Provide JPL with timely notice of problems or failures associated with the hardware and/or software and also provide JPL the data necessary to assess

the adequacy of the analysis and corrective action, so as to prevent recurrence of problems/failures and to assess the residual risk following corrective action.

4. DATE

5. PROGRAM

MIRI DEWAR SUBSYSTEM

7. INTERRELATIONSHIP

6. REFERENCES

8. PREPARATION INFORMATION

Prepare and submit each report in accordance with the JPL-approved Reliability Assurance Plan, DRD RA 001. The Contractor shall provide notification by telecon, e-mail, or FAX to the CTM and CN of a malfunction or failure within 24 hours of the occurrence. Each report includes, but is not limited to, the following:

Phase 1 Report - problem/failure identification

1. Complete identification of the hardware;
2. Date the problem/failure occurred;
3. Estimated accrued operating hours and/or cycles at the time the problem/failure occurred;
4. Location of the hardware when the problem/failure occurred;
5. Hardware environmental conditions when the problem/failure occurred;
6. Test/operation being performed;
7. A description of the problem/failure incident and the potential impact on the functional performance;

Phase 2 Report - problem/failure resolution and verification

8. A description of the problem/failure analysis, including impact on hardware;
9. Cause of the problem/failure;
10. A description of the corrective action taken;
11. A description of the method used to verify that the corrective action was effective;
12. Safety rating;
13. Numeric rating of the failure effect on the hardware/software - Note: Do not consider redundancy in making this assessment*;
14. Numeric rating of the failure risk (confidence in the effectiveness of the corrective action on the Contractor's hardware)*;
15. Mission risk assessment for potential Red Flag (PFRs with significant/catastrophic effect and with residual risk of recurrence)*;
16. Supporting material provided to allow JPL to perform the mission risk assessment;
17. Appropriate close-out signatures, including Contract Product Assurance Manager, and for potential Red Flag PFRs, the Contractor's Project Manager.

*Notes:

1. Contractor annotates these items on Contractor's standard practice form.
2. JPL can make available an electronic PFR system to the Contractor, if helpful.

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
REVIEW PLAN AND ADVANCE REVIEW PACKAGES	RE 001 (Sheet 1 of 6)
3. USE Define the approach for reviews.	4. DATE
	5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP RA-Series DRDs, PMP-Series DRDs	6. REFERENCES JPL D-10401.

8. PREPARATION INFORMATION

I. Review Plan Requirements

Prepare and submit a plan to establish the Contractor's approach to the conduct and participation of personnel for the following reviews at Contractor's facility before JPL review boards (to have at least one mutually agreed upon Contractor member) to include each of the following review types: (1) Inheritance Review/Requirements Review; (2) Preliminary Design Review; (3) Critical Design Review; (4) Pre-Integrated Test Readiness Review(s); and (5) Pre-Ship Review(s). Each review requires a compliance matrix of all requirements and verifications, and comparison (requirements vs. performance values) of compliance to requirements. Reviews cover all deliverable items including STM, PF, firmware, support equipment and handling fixtures, schedules, costs and expenditures, and other non-deliverable items and relevant analyses. Reviews require compliance with items herein and the following requirements:

For each review type, the plan addresses, as a minimum, the following:

1. Purpose of the review.
2. Formality.
3. Review Board members (suggested areas of expertise) and responsibilities.
4. Typical agenda (See this DRD for Inheritance Review Agenda topics).
5. Content of the data package versus the presentation material.
6. Peer reviews.
7. Review protocol pertaining to distribution of data packages, generation of formal minutes, disposition of Requests for Actions (RFAs), tracking and closeout of action items, nominal schedule for the above items.
8. Use of the End Item Data Package (as applicable).
9. Use of JPL HRCR/SRCR/SECR or JPL-approved Contractor forms (as applicable).
10. Provide the technical review requirements applicable to significant subcontractors (requires as a minimum PDR and CDR for critical subcontracts and/or the item is deemed technically difficult and of major significance to the production of the Dewar.

II. Advance Review Package Data Submittal Requirements.

For each review, prepare and submit an advance review package prior to the review.

1. Inheritance Review advance review package.
2. Preliminary Design Review advance review package.
3. Critical Design Review advance review package.
4. Pre-Integrated Test Readiness Review(s) advance review package.
5. Pre-Ship Review(s) advance review package.

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
REVIEW PLAN AND ADVANCE REVIEW PACKAGES	RE 001 (Sheet 2 of 6)
3. USE	4. DATE
	5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP	6. REFERENCES

8. PREPARATION INFORMATION

III. Inheritance/Requirements Review

Objective:

The Inheritance/Requirements review evaluates:

1. The system compatibility of the inherited or commercial off-the-shelf (COTS) functionality (design or product or process) with project level 3 and 4 requirements. It assesses potential risk associated with use of the inherited product or process. It also assesses the need for modification or additional testing.
2. the project requirements for clarity, achievability, consistency, understanding, responsiveness to the Contractor commitments to JPL. This review also evaluates the results of requirement decomposition, partitioning, and flowdown. The inheritance review

Scope:

The following elements describe the scope of the assessment

1. Inheritance Review
   - i) Description and prior history.
   - ii) Application in project.
   - iii) Compatibility with project requirements.
   - iv) Cost.
2. Requirements Review
   - i) Project requirements process
   - ii) Requirements and capabilities
   - iii) Requirements decomposition, partition, and flowdown
   - iv) Requirements assessment

Success Criteria:

The review board is able to conclude that:

1. Inheritance Review
   - i) The history of the inherited product or process is adequately known.
   - ii) The inherited design meets the requirements, constraints, and risk policy of project.
   - iii) Where the product or process does not meet requirements, the work necessary to achieve requirements is defined.
   - iv) Necessary documentation is available.
2. Requirements Review
   - i) The requirements, if met, are sufficient to fulfill the project commitments
   - ii) Good understanding of the requirements exists among the project participants
   - iii) The project requirements process is sound, and can reasonably be expected to continue to identify and flow requirements in a timely manner throughout the development
   - iv) The requirements represent realistic performance goals
   - v) The requirements are consistent with the available resources
   - vi) Plans exist to resolve open requirement items

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
REVIEW PLAN AND ADVANCE REVIEW PACKAGES	RE 001 (Sheet 3 of 6)
3. USE	4. DATE
	5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP	6. REFERENCES

8. PREPARATION INFORMATION

IV. Preliminary Design Review

Objective:

The subsystem preliminary design review evaluates the readiness of the subsystem to proceed with the detail design. It assesses the compliance of the design with applicable requirements.

Scope:

This review addresses all design aspects related to both development and mission operations.

1. Design specifications
2. Preliminary descriptions of the form, fit, function, and performance of the product or process to be fabricated or programmed
3. Analysis of the design of the product
4. Results of the testing and evaluation of earlier models or prototypes of the product or process
5. Preliminary fabrication or programming instructions or processes
6. Preliminary test plans and procedures for the stand-alone testing of the product or process
7. Cost estimates

Success Criteria:

1. The review board is able to conclude that:
2. The preliminary designs and processes meet the requirements and are sufficiently defined, documented, and controlled to proceed with the detail design within the risk policy of the project.
3. Plans for resolving open items and unresolved problems are consistent with available resources and risk policy.
4. Requirements and design are compatible with operability and availability objectives. The operations concept is reasonable and acceptable.
5. The functional definitions for all interfaces are proceeding at an acceptable rate.
6. The make-buy decision and contracting decisions are reasonable and acceptable.
7. The requirements and design are testable.
8. The test approach and product status is thorough and acceptable.
9. The life-cycle implementation approach, the planning, schedule and cost estimates are reasonable and justifiable.

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
REVIEW PLAN AND ADVANCE REVIEW PACKAGES	RE 001 (Sheet 4 of 6)
3. USE	4. DATE
	5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP	6. REFERENCES

8. PREPARATION INFORMATION

V. Critical Design Review

Objective:

The subsystem critical design review evaluates the readiness of the subsystem to proceed with the development, including fabrication, assembly, integration, and test. It assesses the compliance of the design with applicable requirements.

Scope:

1. Detailed descriptions of the form, fit, and function of the product or process to be fabricated or programmed.
2. Detailed analysis of the design of the product.
3. Results of the testing and evaluation of earlier models or prototypes of the product or process.
4. Detailed fabrication or programming instructions or processes.
5. Detailed test plans and procedures for the stand-alone testing of the product or process.
6. Detailed plans for the handling of products.
7. Cost estimates, including cost of the test program.

Success Criteria:

The review board is able to conclude that:

1. The designs and processes meet the requirements and are sufficiently defined and documented to proceed within the risk policy of the project.
2. Plans for resolving remaining problems are consistent with available resources and risk policy.
3. The test approach and test product status is thorough and acceptable.

DATA REQUIREMENT DESCRIPTION	
1. TITLE	2. NUMBER
REVIEW PLAN AND ADVANCE REVIEW PACKAGES	RE 001 (Sheet 5 of 6)
3. USE	4. DATE
	5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP	6. REFERENCES

8. PREPARATION INFORMATION

VI. Pre Integrated Test Readiness Review

Objective:

A test readiness review evaluates the readiness of the product or process to be tested plus the readiness of test procedures, test equipment, and test facilities for use. This review is held at any level where the testing requires significant preparation and involves significant resources, and also when scheduling requires high degree of success in testing in the allocated time frame.

Scope:

1. Test requirements and test criteria.
2. Test plans and procedures.
3. Test instrumentation (hardware and software) qualifications.
4. Test data or other simulated inputs.
5. Test facility qualifications.
6. Adequacy of status of all products and processes to be tested.
7. Safety.

Success Criteria:

The review board is able to conclude that:

1. Products or processes are ready to be tested, such that the test can be successfully completed as planned.
2. Test plans and procedures fulfill the test requirements within the test criteria.
3. Test procedures, test equipment, input simulators, test facilities, and test teams are ready to begin testing.

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
REVIEW PLAN AND ADVANCE REVIEW PACKAGES	RE 001 (Sheet 6 of 6)
3. USE	4. DATE
	5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP	6. REFERENCES

8. PREPARATION INFORMATION

VII. Pre-Ship Review

Objective:

The pre-ship review evaluates the completeness of the flight system (instrument) test program, and assesses the readiness to proceed with shipment of the flight system to the launch site (or instrument to the spacecraft contractor facility), and integration and test at the next higher level of integration. The review also assesses the progress toward completion of the development activities planned before launch.

Scope:

This review addresses the following aspects:

1. Status of the verification and validation program, and open items and plans
2. Results of the system environmental testing including (at least preliminary) results of thermal model correlation to the test results
3. Status of the Incompressible Test List items
4. Exceptions/deviations to Flight Project Practices and Design Principles
5. Flight system (instrument) performance capabilities and margins
6. Red flag and significant P/FRs, and plans for open P/FRs
7. Hardware, software, and documentation status including plans for close-out of open items e.g., engineering change requests, waivers, etc.
8. Potential single point failures
9. Project action items
10. Plans for and status of preparations for testing at the launch site (spacecraft contractor facility)
11. Transportation plan(s)
12. Safety assessment including flight equipment shipment, and launch site facility survey(s)
13. Flight system (instrument) idiosyncrasies
14. Open items and resolution plans

Success Criteria:

The review board is able to conclude that:

1. The requirements verification planned to be completed before moving to the launch site (spacecraft contractor facility) has been accomplished, or adequate plans exist to complete this verification before committing to operational use.
2. Adequate preparations for integration, test and operations at the launch site (spacecraft contractor facility) have been accomplished, or can be completed within the time remaining.
3. Safety of personnel and flight equipment, both during shipment to and operation at the launch site (spacecraft contractor facility), have been adequately addressed.
4. The project plans for dealing with the identified open items is adequate.
5. The project is ready to proceed with integration and test at the next higher level of integration.

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
Contractor Project Safety Plan	SA 001 (Sheet 1 of 2)
3. USE	5. PROGRAM
To define and describe the Dewar Contractor's Project Safety Policy and Safety Data requirements	Mid Infrared Instrument (MIRI) Project
7. INTERRELATIONSHIP	6. REFERENCES
MIRI Mission Assurance Plan (MAP)	MIRI MAP JPL D-25631

8. PREPARATION INFORMATION

The Contractor shall comply with the requirements of the MIRI Mission Assurance Plan in addition to the Safety and Health requirements as specified in the Additional General Provisions (AGP) of this Contract and the following:

1. Project Safety Plan:

Contractor's existing Safety Plan(s), tailored to the MIRI Project, may by submitted for JPL Systems Safety assessment of adequacy in meeting the intent of this document.

The Project Safety Plan shall assure adequate safety for personnel, critical hardware, and ground support equipment. The safety plan shall address assembly, inspection, handling (including shipping), test, and operations conducted in all facilities (contractor, subcontractor, JPL, NASA centers, university, or others). In general, the contractor's Project Safety Plan shall be in keeping with the complexity and risk tolerance of the contract and shall clearly specify the level and scope of hardware safety to be implemented on the project. The plan shall include, as appropriate:

(1) Purpose and scope
(2) Interpretation of applicable safety requirements and methods of implementation
(3) System Safety Program (including all safety tasks)
(4) Project Organization (including Systems Safety reporting)
(5) System Safety Schedules (relative to contract/project milestones)
(6) System Safety outputs (including deliverable data)
(7) Hazard Analyses (when requested for Safety Data Package input)
(8) Hardware protection methods (eg: contamination, ESD, transportation, etc.)
(9) System Safety Assurance
(10) Training
(11) Audit Program
(12) Mishap Reporting and Investigation
(13) Safety oversight at sub-contractors

2. Safety Data Package Iputs: (for F/S assemblies, GSE and Science Instruments)

Ground processing and in-flight hazards shall be identified as appropriate for this project. The responsibility for generation of data for incorporation into the Range Safety Data Package will be specified in the contract. The Data Package input will, as a minimum, consist of the following:

(1) Description of assembly/sub-system, GSE, Science Instrument, etc.
(2) Mechanical Diagram
(3) Functional Block Diagram
(4) Description of hazards, controls and control verifications for hazard related items.

DATA REQUIREMENT DESCRIPTION	
1. TITLE Contractor Project Safety Plan	2. NUMBER SA 001 (Sheet 2 of 2)
3. USE To define and describe the Dewar Contractor's Project Safety Policy and Safety Data requirements	5. PROGRAM Mid Infrared Instrument (MIRI) Project
7. INTERRELATIONSHIP MIRI Mission Assurance Plan (MAP)	6. REFERENCES MIRI MAP JPL D-25631

3. Safety Surveys:

All operations or activities involving hazards to personnel and/or critical hardware shall be reviewed prior to initiating the operation or activity. The MIRI Project Safety Engineer and/or contractor designee(s) shall conduct Facility Safety Surveys (FSS), Operations Safety Surveys (OSS) and Transportation Safety Surveys (TSS) to assure safety compliance and hardware protection. Contractor may use their equivalent forms or processes, providing all significant areas of safety are addressed. The following survey forms will be provided by JPL:

Systems Safety Surveys (SSS) - shall be performed to assure specific facilities and operations are appropriate for the planned flight hardware activities.

Transportation Safety Surveys (TSS) - shall be performed for all significant movements of flight hardware.

Above forms are available (electronically or hard copy) from the JPL Systems Safety Office.

4. Waivers, Exceptions, Deviations, and Non-conformances Processing

Requirements specified in this contract may be waived/excepted or deviated from when alternate methods are employed to achieve the required protection and the risk of injury to personnel or loss of or damage to hardware is acceptably low. Waiver approval authority rests only with the contract management authority that established the requirement in conjunction with the waiver review by Project Safety.

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
CRANE AND HANDLING EQUIPMENT INSPECTION AND PROOF TEST CERTIFICATE	SA 002
3. USE Assures compliance with handling equipment safety requirements.	4. DATE 5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP DRD SA-001	6. REFERENCES JPL (TBD)

8. PREPARATION INFORMATION

Prepare and submit certificates that document the proof loading and inspection results on all cranes and handling equipment used on flight-critical hardware at all locations. Certification can be by test or analysis, or a combination of both, or can be waived on submittal of appropriate information.

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
SAFETY AND HEALTH PLAN	SA 003
3. USE This plan is to define the Contractor's methods of implementing the safety and health requirements of the AGP.	4. DATE
	5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP	6. REFERENCES AGP

8. PREPARATION INFORMATION

The safety and health plan required to be submitted by the Contractor shall implement the requirements of the AGP and shall describe the means to be employed by the Contractor to monitor and enforce safety and health requirements. The plan shall also include the Contractor's standards and criteria for imposing safety and health standards upon its subcontractors of any tier and its plans and procedures for monitoring compliance with such standards. A safety and health plan for similar work performed by the Contractor on a federal contract may be submitted for review and approval under this Contract which satisfy the requirements of the AGP .

DATA REQUIREMENT DESCRIPTION

1. TITLE
SUPPORT EQUIPMENT AND HANDLING FIXTURES DESIGN DOCUMENTATION

2. NUMBER
SE 001 (Sheet 1 of 2)

3. USE
Defines the design necessary to describe the support equipment, ground handling fixtures and equipment, shipping & shipping containers (for STM, PF, handling fixtures and equipment, and support equipment items).

4. DATE

5. PROGRAM
MIRI DEWAR SUBSYSTEM

7. INTERRELATIONSHIP

6. REFERENCES
IEEE Standard 315 (TBC)

8. PREPARATION INFORMATION

Prepare and submit all documentation to define the handling fixtures and equipment, support equipment, and shipping containers, to include, but not be limited to, the following:

NOTE: Documentation standard guidelines: Graphic Symbols for Electrical and Electronics Diagrams IEEE Standard 315. (May have manually-generated drawings or drawings from a computer aided design system.)

Documentation.	Assembly Level	Developed Items	Commercial Items
1. Parts lists.	Yes	Yes	No
2. Pictorial layout.	Yes	No	No
3. Drawings.	No	No	No
4. Schematics.	No	Yes	No
5. Interface Control Drawings (ICDs).	Yes	Yes	No
6. Interface Circuit Data Sheets.	Yes	Yes	No
7. Cabling & Connectors.	Yes	Yes	No
8. Chassis drawings, Contractor-modified off-the-shelf rack equipment assembly drawings.	No	Yes	No
9. Failure Modes, Effects, & Criticality Analysis (FMECA) between the test equipment to the flight-interfaces.	Yes	No	No
10. Mechanical Fault Tree (MFT) for flight-interfaces. (Note: May use proof tests in lieu of mechanical fault tree.)	Yes	No	No
11. Rack layout drawing.	Yes	No	No
12. Interconnect (outer rack) cable diagram.	Yes	No	No
13. Interconnect (inner rack) cable diagram.	Yes	Yes	Yes
14. Manufacturers' documentation, including as a minimum the following: calibration and maintenance procedures and instruction manuals.	No	No	Yes

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
SUPPORT EQUIPMENT AND HANDLING FIXTURES DESIGN DOCUMENTATION	SE 001 (Sheet 2 of 2)
3. USE	4. DATE
	5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP	6. REFERENCES

8. PREPARATION INFORMATION

Procedures For Support Equipment.

Support Equipment Calibration Procedure.
Support Equipment Operating Procedures (hardware and software).
Support Equipment Programming Procedures.
Support Equipment Maintenance Document.

Contents/Preparation For Support Equipment Maintenance Document.

General. Include explanation of operation, block diagrams, software programs, and instructions for fault isolation, and provide the following major sections in the document:

Section I. Provide: Instructions for use; index indicating the kinds of tests in each of the procedure to permit the operator to select the applicable procedure for a particular condition and reduce the time to repair the support equipment. In most instances the procedures identify the faulty assembly, and if direct fault isolation is not possible, the operator may probe test points, disconnect cables, or otherwise interact with the procedures. The procedures direct operator actions either directly or by reference to the appropriate paragraphs of the document.

Section II. Provide: Block diagrams and text explanations of the equipment at the subsystem support equipment level; provide information for conventional signal tracing to locate difficulty as necessary; subsystem block diagram and accompanying test relates to the corresponding tests in Section I so that when the test program and processes indicate a failure, the operator can directly relate these failures to the circuits described in Section II. Also provides waveforms (with levels) and other appropriate information to facilitate fault isolation; depicts replaceable assemblies in block diagram form to the extent necessary to relate to the Dewar SE, and does not require description of the internal workings of the replaceable assemblies; provides references to subsystem support equipment and vendor manuals when applicable to avoid duplication in the Support Equipment Maintenance Document. Note: Not the intent of Section II to provide a detailed maintenance manual type of description.

Section III. Provide: Dewar fault isolation procedures in the system level context to provide JPL maintenance personnel with the means to ascertain the integrity of only those portions of the Dewar SE relevant to system-level tests.

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
SOFTWARE MANAGEMENT PROGRAM PLAN	SW 001
3. USE Provides the methods, organization, personnel and documentation utilized in the implementation of the flight and ground software management program.	4. DATE 5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP	6. REFERENCES CM001, MA 003

8. PREPARATION INFORMATION

Prepare and submit a Software Management Program Plan that identifies the methods to control the preparation of the flight and ground software and **firmware** for the Dewar. The plan describes all activities for Contractor's compliance with applicable documents and serves as the governing document for software generation, inspection, version control, validation, verification, and test. The plan uses as many of the Contractor's current practices as possible and includes, but is not limited to the following:

1. Work Implementation Plan/Schedule.
2. Method of documentation for software requirements.
3. Approach to software interface documentation that consists of interface control specifications and interface control drawings (i.e., diagrams, protocol, codes, format, and data management items) that interface with the MIR instrument software.
4. Definition and implementation method for software configuration and risk management requirements (including margin).
5. Definition and implementation method for software product and performance assurance requirements.
6. Definition of resource management requirements, including presentation of the estimated versus actual resources used. As a minimum data will be presented at the Dewar PDR, CDR and PSR.
7. Method of documentation for the software Test Plan, Test Procedure, and Test Data and Results for the flight and ground software.
8. Approach to software documentation including, but not limited to: flight and ground software User's Guide/Operator's Manual, and Release Description Document.
9. Method of documentation for software certification requirements.

Note: the above topics may be included in a number of other project documents (Project Implementation Plan, Configuration Management Plan), or may be summarized in these other documents and detailed in the Software Management Program Plan.

The goal of the Software Management Program Plan is to prepare, generate, document and submit the necessary software and software documentation (e.g., User's Guide/Operating manual, Release Description Document, etc.) to checkout, monitor, and operate the Dewar and process and transmit data between the Dewar and the MIR Instrument in accordance with the Statement of Work and Specification.

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
INTERFACE CONTROL DOCUMENTATION (ICD)	TD 001 (Sheet 1 of 3)
3. USE Obtain and maintain control of interfaces and interface information.	4. DATE 5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP DRD CM 002	6. REFERENCES

8. PREPARATION INFORMATION

Prepare and submit each of the following items in accordance with the applicable instructions:

1. Interface Control Specification (ICS)

Prepare an Interface Control Specification, including as a minimum, the following:

a. Mechanical alignment references.
b. Structural and thermal analysis assumptions and criteria.
c. Detailed command and control items to include:
    i. Signal levels, timing, triggering.
    ii. Command word dictionary.
    iii. Signal flow diagram
d. Circuit data sheets for all electrical interfaces (See JPL form)
e. Electrical signal definitions.
f. Connector types, dimensional locations, mating connector types.
g. Cable names, identification, connector types, reference designator for each connector, pin types, cable construction (shields, wire types & sizes, shield routing, cable lengths (nominal, maximum & minimum), interfacing of cables (ends where mated).

2. Interface Control Drawings

Prepare interface control drawings in accordance with DRD CM 002 for the subsystem, each assembly, and each subassembly in accordance with CM 001 to depict physical and functional interface requirements of each item which affects the design or operation of co-functioning or mating items, whenever necessary to document, approve and control interface requirements prior to preparation of detail design documents (e.g., for procured items and for items delivered from one subsystem to another) and to include, but not be limited to, the following requirements:

a. Envelope, shows the maximum sizes of dimensions with tolerances, including Support Equipment (SE) mechanical devices, such as coldfinger vacuum housing with pumpout port, attached for testing.
b. Intentionally blank

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
INTERFACE CONTROL DOCUMENTATION (ICD)	TD 001 (Sheet 2 of 3)
3. USE	4. DATE
	5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP	6. REFERENCES

8. PREPARATION INFORMATION

c. Center of mass: (1) Show location of mass center relative to MIRI MICD coordinate system reference datum. (2) Flag center of mass location and include in general/applicable notes the subsystem orbit mass inertia and inertia variations; cage configuration deviations from specified data, or (3) note where location of center of mass description is documented, and allow deviations from that location.
d. Electrical and mechanical connection, showing type, gender, orientation, reference designator number, and dimensioned location of connectors (including location and identification of first pin), tubing fittings, mounting flanges, etc.
e. Features of handling fixtures and support equipment that require access or clearance after installation, beyond the envelope of the item, such as view angles, fill ports, test jacks, lifting equipment, red tag/green tag items, and components requiring adjustment or tuning, showing size, point of attachment, and location dimensions.
f. External surface finishes, and other treatments mandatory for temperature control or other purposes. If JPL has to apply such treatments, stipulate such on the drawing.
g. Identify general location for identification marking.
h. Coordinate system and datum references that parallel the MIR Instrument coordinate systems shown in MIRI Mechanical Interface Control Drawing (MIRI MICD).
i. Dewar interface details for instrument installation with: (1) Fastener "assembly stack" views with parts list references to include attach fasteners, thermal isolation washers, case electrical bonding strap washers, and thermal blanket grounding strap washers; (2) Mounting hole configuration and locations to the designated coordinate system and dimensional tolerance of MIRI MICD; (3) Type and size of panel insert required on instrument side of interface (refer to typical cross-section view on MIRI MICD; (4) Mounting surface planarity of the subsystem/instrument attach plane.
j. Minimum access requirements for installation and removal of the Dewar with its mechanical handling fixtures attached for lifting or positioning. Assume capability of operations without removal of other (adjacent) instrument subsystems or components.
k. Flag locations for attaching mechanical handling fixtures (used for lifting/positioning operations) and all hardware that either requires addition or removal prior to flight.
l. Add to general/applicable notes on the drawing that the MIRI Dewar complies with the MIRI MICD (including the JPL MIRI MICD drawing number).
m. Provide a set of drawings that would enable build of a “mockup” of the Dewar.

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
INTERFACE CONTROL DOCUMENTATION (ICD)	TD 001 (Sheet 3 of 3)
3. USE	4. DATE
	5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP	6. REFERENCES

8. PREPARATION INFORMATION

3. Circuit Data Sheets

To permit JPL's formal documentation of the details of each circuit at each end, and the circuit between each end of all interface circuits, provide interface documentation sufficient for JPL to complete circuit data sheet forms in accordance with the example/sample form. NOTE: Use individual circuit sheet submittals as a coordination vehicle with JPL, and when agreed upon, include the approved circuit data sheets in the Interface Control Specification. The information requires schematic details of cables, connectors, connector pin assignments, shield wiring, shield configuration, and the schematic of each end circuit whether a driver or receiver, and the typical signal levels associated with each circuit at the interfaces between the Dewar and the MIRI Instrument. This task requires coordination between the Contractor's personnel and the JPL counterparts to define and document the circuit data sheet information to JPL's standards. Interface Circuit Data Sheets include, but not necessarily limited to the following:

a. Schematic description of sending and receiving 'end circuits' with the following:
   - Identification of standard interface circuits (with identification where used as standard interface circuits).
   - Sending end-circuit source voltage and impedance.
   - Receiving end-circuit input filter and first active device.
   - Cable shielding, connectors, reference designator of each connector, pin numbers, harness numbers, etc..
   - Grounding and isolation of end-circuits and their respective excitation power supplies.
   - Interface circuit ground tree reference.
   - Cross-strapping implementation in cabling.
   - Interconnects to other circuits (e.g., circuit protection/fusing, heaters, control, and data).

b. Other Information:
   - Function name
   - Expected waveform on interface.
   - Signal/Power flow direction.
   - Special operation notes.
   - Signatures, revision status and ECR numbers.

4. Notification of Mandatory Inspection Points and Qualification/Acceptance Tests (HW and SW)

Provide notification to JPL CTM of Mandatory Inspection Points and Qualification/Acceptance Tests (HW and SW) seven working days prior to their occurrence.

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
VERIFICATION AND ACCEPTANCE TEST PLAN	TD 002

3. USE

Provides an overall accountability for all aspects of verification of all requirements. The following shall be provided:

- Hardware Verification Plan
- Software Validation Plan
- Acceptance Test Plans
- Thermal and Structural Mathematical Model Verification and Validation Plans

4. DATE

5. PROGRAM

MIRI DEWAR SUBSYSTEM

7. INTERRELATIONSHIP

6. REFERENCES

8. PREPARATION INFORMATION

Prepare and submit a Dewar verification and test plan that defines the approach and methods the Contractor plans to implement to verify that the Dewar deliverables meet all requirements in the Statement of Work. The plan requires the following as a minimum:

1. Verification matrix of all requirements with traceability and accountability to all Contract specifications (Dewar, assembly, subassembly, spare hardware, cables, support equipment, handling fixtures, etc.).

2. Detailed flow chart of all planned test verification activities from subassembly level to assembly level and including test interrelationships, functional verification, hardware verification/software validation and interactions, dynamic and environmental test, inspections, analyses, and other activities planned by the Contractor and subcontractors to verify subsystem compliance with all requirements.

3. The plan requires descriptions of the following:

    a. Description of all verifications (inspections, analyses, tests).
    b. Configuration of hardware during each verification activity.
    c. Test levels and durations (as applicable).
    d. Pass/Fail criteria for all verification activities, including software.
    e. Method of testing, facilities (including location), instrumentation and controls used.
    f. List of required test procedures.
    g. Test data and analysis methodology (also see requirements below).
    h. Plans and approach for developing measurement uncertainties for verification tests (as applicable).
    i. Contractor's plans for Test Readiness Reviews and/or post-test result reviews.
    j. Safety issues and concerns.
    k. Summary schedule of verification activities.

4. The plan must specify the applicability of all verification activities to the engineering model, protoflight model subsystem deliverables, spare assembly deliverables, and all support equipment and handling fixture deliverables.

5. Where analyses verify requirements the plan must specify the analysis methodology, verification procedures, and uncertainties. Also, the plan must specify the source and method of collection of data supplied to the analyses.

6. Where appropriate, the plan specifies the relationships, interdependencies, and any planned calibration activities. The Verification and Test Plan and Calibration Section, if applicable, are intended as complementary and together provide a thorough definition of the Contractor's plan for verification, test, and calibration activities.

7. The plan must specify which tests are to be used to validate the structural/thermal models.

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
TEST PROCEDURES	TD 003
3. USE Provides procedures for testing all deliverable hardware and software under the contract. Ensures (1) satisfaction of test specifications requirements, (2) equipment and personnel safety, (3) test consistency and (4) traceability of requirements from the Dewar Specification and other specifications.	4. DATE 5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP DRD TD 002	6. REFERENCES JPL Form 2816-S (TBD)

8. PREPARATION INFORMATION

The Contractor shall prepare and submit test procedures in accordance with the JPL-approved Contractor test plan and the following:

1. Detailed step-by-step test procedures for the Dewar, assemblies, and spares, with the detailed test set ups, including special test equipment, cables, adapters, connector savers, flange savers, commercial test equipment, and tooling normally associated with the assembly and test of the unit in all electrical and environmental test conditions. Environmental test procedures define all environmental test operations to be performed, and all procedures in the operation of environmental testing of the equipment. JPL recommends that each test measurement step contain an acceptable range of measurement, a place to record the actual measurement, and a place for the operator and Quality Assurance witness to initial the test measurement result. Procedures require consideration for the safety of personnel and for safety and protection of delivery hardware items

2. Preparation information:

    a. Prepare one document for each article under test.
    b. Describe and document equipment interfacing with flight hardware. Provide details on interfaces, grounding, shielding in the interfaces.
    c. Define requirements applicable for auxiliary hardware, personnel, and facility safety equipment.
    d. Define and document the test configurations, pass/fail criteria with expected range of measurement including measurements made and step-by-step procedures for the conduct of each test.
    e. Each procedure requires space to record test results and QA certification within the step-by-step procedure and a summary table for consolidation of test results in a tabular form.

3. Launch Preparation Prepare documentation to describe the test procedure for preparing the FM Dewar Subsystem for launch. This test procedure shall be performed at the subsystem level prior to delivery as well as for the actual launch.

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
TEST DATA AND ANALYSIS DATA	TD 004
3. USE Provide test data, analyses, inspections, other verification data and reports to JPL. Provide visibility and review of environmental test documentation to ensure satisfaction of test specification requirements, test consistency, and traceability.	4. DATE
	5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP DRDs from the TD-series	6. REFERENCES

8. PREPARATION INFORMATION

Analyses

This DRD collects submittals of analyses as required in the Statement of Work where no other DRD/CDRL specifically calls for such submittals.

Test Data

General Submittals. Contractor maintains all test data available for inspection at his facility.

Test Reports

Prepare one document for each test or test series for each assembly, and subsystem level test for delivery to JPL in accordance with the delivery schedule (CDRL) . As a minimum, each report requires the following information:

a. Description of the test configuration and instrumentation, and test sequence.
b. Compilation of the test results.
c. A list and description of specific deviations/changes from the approved test plan or test procedures.
d. Copies of all non-conformance reports, PFRs, MRB actions or other documents that define problems/changes/deviations from the approved test plans or test procedures.
e. Copies of all test data recorded during test.
f. Copy of logs with mate/demates on all flight-interface connectors and flight flanges.
g. Environmental test report documentation:
    1. Environmental Analysis Completion Statement (EACS) (JPL Form 2566)*, one for each required environmental analysis; all detailed supporting information appended to the form. (Have available at Test Readiness Review.)

    2. Environmental Test Specification Summary (ETSS) (JPL Form 2014)*, consisting of completed forms for each test article and one for every retest. (Have available at Test Readiness Review.)

    3. Environmental Test Results Summary Form (TRSF) (JPL Form 2816-S)*, consisting of completed forms with environmental test, durations, test dates, etc., performed on the specified test article, one form completed for each test on the test article in accordance with the preparation instructions on the form.

    4. Environmental Test Reports that state the results of the test as well as any anomalies, discrepancies, failure (references to relevant PFRs as a result of the test), etc., encountered during the test, "as-tested" specification and explanation of any differences between ETSS and "as-tested" specifications, and pass/fail status for each phase of the test.

*or JPL-approved, Contractor equivalent forms

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
STRUCTURAL MATH MODELS AND DOCUMENTATION	TD 005 (Sheet 1 of 3)

3. USE

Provides the Structural Mathematics Model documentation requirements.

The Contractor shall develop an analytical structural model and prepare a mathematical model verification plan for the Dewar subsystem; and shall perform validation tests to verify that the static and dynamic characteristics of this model agrees with those of the Dewar subsystem hardware. The model is to be in a format compatible in NASTRAN, and is to include sufficient details to predict stresses and dynamic responses during launch, on-orbit operations, and during dynamic testing at the spacecraft system, instrument system and subsystem levels. The NASTRAN model, in the form of a Data Deck file in text format, shall be delivered to JPL for verification analyses and for integration with the MIRI Instrument model and the spacecraft analytical model.

4. DATE

5. PROGRAM

MIRI DEWAR SUBSYSTEM

7. INTERRELATIONSHIP

Dewar Assembly Drawing & Structural/Mechanical Design Interaction

6. REFERENCES

8. PREPARATION INFORMATION

Develop and submit Detailed and Reduced Structural Math Models in accordance with the following:
A NASTRAN Model shall be delivered.

NOTE: Interim version submittals allow JPL to support the spacecraft contractor activities.

a. Detailed Models. Provide detailed models to JPL of the complete subsystem in NASTRAN format. If either analysis or a frequency verification test shows any significant mode below 200 Hz while rigidly constrained at its interface and with supporting mass attached, verify these modes by test. The analytical frequency predictions require agreement with the dynamic test data to within 5 percent for the fundamental mode and to within 10 percent for all remaining significant modes up to 200 Hz. (TBR)

b. Reduced Models. Provide reduced models to JPL of the complete subsystem in NASTRAN format. The reduced models are as small as possible (no more than 500 static degrees of freedom) and require agreement with the detailed models as follows: (a) The fundamental frequency requires agreement to within 3 percent, and (b) all remaining modes up to 200 Hz require frequencies which agree to within 5 percent. Larger numbers of degrees of freedom are allowed only with prior consent of JPL. (TBR)

c. Other Detailed & Reduced Structural Analytical Model development and submittal requirements. Units of Measurement In The Models. Develop and deliver models that use Standard International (SI) units defined as follows: mass, kilogram (kg); length, millimeter (mm); time, seconds; temperature, Celsius degrees (^{o}C); Note: Derive force, pressure, modulus, etc., from these quantities.

d. NASTRAN Model Requirements. TBR

1. Do not use the "free field format" nor the "replication" features of NASTRAN.
2. Define the model in coordinate system(s) other than the basic (i.e., coordinate system 0). Define all constraints internal to the subsystem and output data in the local coordinate system(s). Only one local coordinate system, however, may be defined relative to the basic coordinate system directly.
3. Do not use the following: NASTRAN bulk data cards, ASET, BARO R, GRDSET, PARAM K6ROT, PARAM WTMASS and PARAM AUTOSPC in the bulk data deck.
4. The element (i.e., for CBAR, CBEAM) coordinate system are to be defined by the specification of vector coordinate components in lieu of a referenced grid.
5. Make all models "full models" with no symmetry assumptions or super-elements used to reduce model size. Models shall recover the correct mass and stiffness properties.

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
STRUCTURAL MATH MODELS AND DOCUMENTATION	TD 005 (Sheet 2 of 3)
3. USE Provides structural math models	4. DATE
	5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP	6. REFERENCES

8. PREPARATION INFORMATION

6. Ensure the NASTRAN model has the capability to represent different dynamic response characteristics (if any) resulting from planned configuration changes between launch and deployment.
7. Use a subsystem unique numbering system for all NASTRAN model identification numbers (for grids, coordinate systems, elements, property, and material identifications as well as constraint and loading identifications). Model major subassemblies separately within unique identification numbers ranges. Identification number duplications are not allowed within the complete NASTRAN Model. Use a numbering scheme that fits within a mutually agreeable (JPL/Contractor) range in order to facilitate integration with the instrument and spacecraft models.
8. The model requires the capability to define the loads at the subsystem interface to the instrument due to gravity, structural element temperature changes, and other loading conditions.

e. Structural Model Validity Checks: Perform and deliver (to JPL) the following analyses to confirm the mathematical validity of the detailed and reduced models (Note that the delivery for each of the following analyses should included the NASTRAN .DAT and .F06 files -- TBR.):

1. Static analysis for unit gravity in each of the three axis directions. Ensure that reaction forces from this analysis equal the weight of the structure as given by the grid point weight generator output. No large displacements or forces are to be present.
2. Eigenvalue analysis for modes up to 200 Hz with the instrument constrained at the subsystem interface. Constrain only those degrees of freedom actually used to attach the subsystem to the instrument in this analysis.
3. Eigenvalue value analysis for the modes up to 200 Hz of the instrument in the free-free (unconstrained) condition. Analyze this condition both with and without the SUPORT NASTRAN bulk data card. Rigid body modes from the analysis without the SUPORT card must be less than 0.01 Hz.
4. Static analysis with a unit enforced displacement in all six degrees of freedom at one grid point. From this analysis the equivalent values of displacement for all grid points whose displacement coordinate system is defined as being parallel to the input coordinate system of the referenced point must be equal. In addition, do not allow observations of element forces greater than 0.1 pound (18 millinewtons) or moments greater than 1.0 inch-pound (1.1E5 mm-millinewton).
5. Grid point weight generator must provide the correct weight, center of mass location, and moment of inertia.
6. Ensure the use of case control command "SPCFORCES=ALL" reveals no constraint forces at points other than legitimate boundary constraint points.
7. "Epsilon Sub E" error check for each static subcase cannot exceed 10E-11.
8. Static analysis with a unit temperature increase from ambient. The model requires a stress-free boundary condition (i.e., kinematic mount or single constrained grid point) with all thermal expansion coefficients changed to simulate identical materials. The grid point force balance cannot reveal any force greater than 44 millinewtons (0.01 pound). Ensure that rigid elements do not constrain thermal expansion.

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
STRUCTURAL MATH MODELS AND DOCUMENTATION	TD 005 (Sheet 3 of 3)
3. USE	4. DATE
	5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP	6. REFERENCES

8. PREPARATION INFORMATION

f. Structural Model Documentation. Prepare and submit the following data and information as part of the delivery of the NASTRAN model: TBR

1. The NASTRAN structural math model of the subsystem requires the capability to: (a) define the loads at the subsystem interface due to gravity loads and structural element temperature changes and (b) has sufficient detail to represent accurately the dynamic behavior of the instrument up to 100 Hz.
2. Deliver the NASTRAN models on CD-ROM. Deliver two sets of disks for each model. Data transfer method: By mutual agreement (JPL/Contractor).
3. Provide a the following written information:
    a. Description of the model, any special modeling features used, and rationale for the modeling methodology.
    b. A list of all material properties used in the model.
    c. Copies of the mass and stiffness calculations used to generate the input data for the model and a description of how the masses were distributed throughout the structure.
    d. Detailed plots of the NASTRAN model clearly showing all grid points, element numbers, and element types. Hardcopy plots showing element connectivity. Identify clearly all subsystem attachment points with the respective degrees of freedom.
    e. Mechanical and functional description of all mechanisms in the subsystem, whether or not modeled.
    f. A "tree" diagram showing the relationship (and location) of the coordinate systems to each other starting with the basic coordinate system (i.e., coordinate system 0).

4. Deliver the following along with the test-verified model:
    a. Latest available design drawings of the subsystem used in the model and analysis.
    b. Copy of the stress analysis (input and output) of all loading combinations performed on the detailed model, with cross-references to the NASTRAN model and drawing numbers. Clearly label all fracture critical parts.

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
THERMAL MODELS AND DOCUMENTATION	TD 006 (Sheet 1 of 3)
3. USE Provides the Thermal Model. The Contractor shall develop thermal models and prepare a model verification plan for the dewar subsystem; and shall perform validation tests to verify that the analytical models are consistent with actual dewar subsystem performance. The models are to be used in support of the MIRI Instrument thermal model. The thermal models shall be delivered to JPL in a form that permits integration into the overall MIRI Instrument thermal model.	4. DATE 5. PROGRAM MIRI SUBSYSTEM
7. INTERRELATIONSHIP Assembly Drawing & Thermal Design Interaction; Reliability	6. REFERENCES

8. PREPARATION INFORMATION

Develop and submit Detailed and Reduced Thermal Analytical Models to JPL in accordance with the following:

1. Dewar Detailed Thermal Model
The Dewar Contractor shall create and provide a dewar Detailed Thermal Model (DTM), along with associated geometric surface model. These models shall be of sufficient detail to allow the Contractor to demonstrate the following model capabilities and requirements:

- Demonstrate that all internal dewar thermal requirements are met for all specified modes of operation.
- Form the basis for a reduced thermal model to be used by the MIRI Project in the development of the overall MIRI thermal model.
- Validate their math models by using their detailed model to predict and analyze the results of the dewar subsystem thermal balance test.
- Update the DTM to correlate with test results following dewar subsystem thermal balance testing.
- The following shall be used as correlation goals:
  - For identical boundary conditions, the detailed model should predict key node/element steady state temperatures to within 1K of measured values.
  - The model should predict key internal steady state heat flows to within +/- 5% of measured values.
  - For simple cool down or warm up transients, the detailed model should predict key transient temperatures whose rates of change match the measured values to within +/- 12% during agreed time periods (TBD).
- The System Internationale shall be the system of units for all models.

The dewar DTM shall include:

- All significant steady state and transient radiation interchanges and boundary temperatures, provided by the MIRI Project, shall be incorporated into the models.
- All thermal and optical properties shall be consistent with the thermal and optical properties databases maintained by the MIRI Project. The Contractor shall document any properties unique to the dewar (i.e., not in the database).

The dewar DTM Report shall include:

- A detailed model nodal description with all significant assumptions.
- Comprehensive descriptions of nodes, masses, materials, thermo-physical and thermo-optical properties.
- Key conductive and radiative couplings.
- All significant geometric surface model details, used to provide radiation interchange factors for the detailed thermal math models.
- Heater locations and power dissipations (average and profiled) for all modes of operation.
- Steady state and transient results (temperatures and heat flows) for all modes of operation.

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
THERMAL MODELS AND DOCUMENTATION	TD 006 (Sheet 2 of 3)
3. USE Provides the Thermal Model.	4. DATE
	5. PROGRAM MIRI SUBSYSTEM
7. INTERRELATIONSHIP	6. REFERENCES

8. PREPARATION INFORMATION

Develop and submit Detailed and Reduced Thermal Analytical Models to JPL in accordance with the following:

2. Dewar Reduced Thermal Model

Develop a dewar Reduced Thermal Model (RTM) with enough fidelity to predict accurate temperatures in critical areas affecting the dewar performance. The dewar RTM will be incorporated into the overall MIRI thermal models developed by the MIRI project for the purpose of determining dewar heat loads, temperatures, and thermal interactions.

Reduced Model Format

The reduced node thermal model (a reduced version of the detailed thermal model) shall be developed and delivered.

The RTM is required to meet the following:

- The reduced model shall provide similar results to the detailed model in the key areas of interface heat flow (both radiation and conduction) and average internal temperatures of major dewar components.
- The reduced model shall be capable of steady state and transient analysis (nodal mass and specific heats as a function of temperature must be included). Nodal thermal capacitances include representative mass values so that cool down and thermal stabilization durations are not underestimated. The total thermal capacitance of the model should be representative of actual mass and materials properties of the dewar.
- The reduced model shall not exceed 80 nodes including nodes used for the dewar control electronic boxes.
- All heat energy data shall be input to the reduced model in watts.
- The overall energy balance summation, of the reduced node thermal model with its boundaries, shall agree with the detailed thermal model to +/- 5% for any set of dewar steady state operational boundary conditions and internal power dissipations.
- The heat transferred by conduction or radiation from key node to key node of the reduced node thermal model shall agree with the heat transferred from the corresponding nodes in the DTM within +/- 12% for any set of steady state operational/non-operational boundary conditions and internal power dissipations.
- The temperature relationship between each flight temperature sensor and the reduced thermal model node that contains the flight sensor shall be provided.
- Each external node of the reduced node thermal model shall have a one-to-one correspondence with a surface or group of surfaces from the surface model.
- All steady state and transient radiation interchanges and boundary temperatures, provided by the MIRI Project, shall be incorporated into the models.
- All thermal and optical properties shall be consistent with the thermal and optical properties databases maintained by the MIRI Project. The Contractor shall be required to document any properties unique to the dewar (i.e., not in the database).
- The System Internationale shall be the system of units for all models.
- Dewar geometric models and thermal math models shall use the following numbering scheme:

Node and Surface Number Range	Linear Conductor Number Range	Radiation Conductor Number Range	User Constant Range	Array Range
7700-7999	77000-79999	2770000-2799999 (internal)	1770-1799	1770-1799

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
THERMAL MODELS AND DOCUMENTATION	TD 006 (Sheet 3 of 3)
3. USE Provides the Thermal Model.	4. DATE
	5. PROGRAM MIRI SUBSYSTEM
7. INTERRELATIONSHIP	6. REFERENCES

8. PREPARATION INFORMATION

2. Reduced Thermal Model (cont)

Reduced Node Thermal Model Documentation

The following information, in sufficient detail so as to allow recreation of the model by JPL, will be included in the reduced math model documentation:

- A table listing for each node, name/numbers, a brief description, its type (i.e., arithmetic, diffusion, boundary, or heater), corresponding surface model node number (if any), predominant material, mass, specific heat as a function of temperature, power dissipation (by mode, including average, minimum, peak, duty cycle), temperature limits/requirements (by mode).
- A detailed description of the internal radiative and conductive networks of thermal couplings and how they were obtained.
- A list and description of all heaters, identifying the type of control (i.e., on/off ground command, thermostatic or proportional), control node location, model power dissipation (and if known, actual heater circuit impedance and area).
- A description of all engineering assumptions made to reduce the model's complexity or to enhance the accuracy.
- A list of any nodes using adiabatic surfaces.
- Output for a sample case, which shall include a complete list of nodal output temperatures, plus a heat flow map, indicating key internal, and all external, heat flows to the milliwatt level.
- All calculations necessary to analytically verify that the design satisfies the thermal requirements defined in the Mid-Infrared Instrument Dewar Subsystem Specification [JPL D-25647].
- A table demonstrating the correspondence of the reduced model results to those generated by the detailed model for dewar key analysis cases.

3. Dewar Reduced Geometric Mathematical Model

Geometric Surface Model Format

The dewar Reduced Geometric Mathematical Model (RGMM) corresponding to the delivered RTM shall be provided. This surface model must meet the following requirements:

- The model shall be developed either in a finite element/Thermal Model Generator (TMG, written by Maya, Inc.) or Thermal Synthesizer System (TSS) compatible format. Translation via STEP-TAS is encouraged if the proper protocols are operable within the Systems Improved Numerical Differencing Analyzer (SINDA) and TMG import capabilities. If these analysis tools are not available to the Contractor, then the Contractor shall provide a detailed surface description via a specific report. The reporting detail should be sufficient to re-create the geometry.
- The reduced node surface model of the dewar shall not exceed 25 nodes.
- Each reduced node surface model shall form a completely closed volume.
- Each external node of the dewar reduced node thermal model shall be represented by a surface or set of surfaces in the surface model.
- Any surface of special interest (i.e., an aperture or a radiator) in the delivered reduced node surface model shall be modeled separately.
- The local coordinate system shall be rectangular with the same orientation as the MIRI coordinate system.
- The System Internationale shall be the system of units for all models.

DATA REQUIREMENT DESCRIPTION

1. TITLE	2. NUMBER
STRUCTURAL ANALYSIS REPORTS	TD007
3. USE Provide the basis of the structural analysis.	4. DATE
	5. PROGRAM MIRI DEWAR SUBSYSTEM
7. INTERRELATIONSHIP	6. REFERENCES

8. PREPARATION INFORMATION

Prepare and submit the design data (i.e., contents of notes and records) from the structural design activities that contain the assumptions, boundary conditions, material properties, loads, stress, margins of safety, preliminary calculations, utilities, and other background information that pertains to analytical modeling performed for use later as a reference. Sort the data by analytical model and chronological order.