

Document No. FCF-PO-PLAN-0005

Revision Initial Release

Fluids and Combustion Facility Document

Software Critical Design Review Plan

Date: October 21, 2002

Approved by Robert Zurawski, FCF Project Manager, Microgravity Science Division, 6700

Distribution:

NASA (U.S. Gov. Only) Project Only Government and Contractor

Availability:

Public (No Restriction) Export Controlled Confidential/Commercial Internal Use Only

**NASA - Glenn Research Center
Cleveland, OH 44135**

Glenn Research Center Document	Title: Software Critical Design Review Plan	
	Document No.: FCF-PO-PLAN-0005	Rev.: Initial Release

Signature Page

(Official signatures on file with the FCF Project Control Specialist)

Prepared By:

David W. York
Chair, FCF Software CDR Board
Glenn Research Center

Joseph G. Ponyik
FCF Lead Software Engineer
Glenn Research Center

Concurred By:

Dennis W. Rohn
FCF Chief Engineer
Glenn Research Center

Gary G. Kelm
Program Assurance Manager
Safety and Assurance Technologies Directorate
Glenn Research Center

Kevin R. Carmichael
Chief, Flight Software Engineering Branch
Glenn Research Center

Approved By:

Robert Zurawski
FCF Project Manager
Glenn Research Center

Glenn Research Center Document	Title: Software Critical Design Review Plan	
	Document No.: FCF-PO-PLAN-0005	Rev.: Initial Release

Change Record

Rev.	Effective Date	Description
Initial Release	10/21/2002	Initial Release

Glenn Research Center Document	Title: Software Critical Design Review Plan	
	Document No.: FCF-PO-PLAN-0005	Rev.: Initial Release

TABLE OF CONTENTS

1.0	INTRODUCTION	6
1.1	Purpose	6
1.1.1	– Specific Purposes of the FCF SW CDR	6
1.2	Scope	8
2.0	REFERENCES	8
2.1	Applicable Documents	8
2.2	Reference Documents	9
2.3	Records and Forms	9
2.4	Acronyms	9
3.0	RESPONSIBILITIES	10
3.1	FCF Project Control Specialist	10
3.2	FCF Documentation Specialist	11
3.3	Review Team	11
3.3.1	Review Team Lead	11
3.3.2	Review Team Members	11
3.4	FCF SW CDR Board	12
3.4.1	Board Chair	12
3.4.2	FCF SW CDR Board Members	12
3.5	FCF Project Manager	13
3.6	Microgravity Science Division (MSD) Management	13
4.0	FCF SW CDR PROCESS	13
4.1	Delivery and Initial Screening and Distribution of Documents	13
4.2	Entry Criteria Evaluation	14
4.3	FCF SW CDR Data Package Review	14
4.4	FCF SW CDR Board Activity	15
4.4.1	Board Member Orientation	15
4.4.2	FCF SW CDR Presentations to the Board	15
4.4.3	RFA Generation	15
4.4.4	FCF SW CDR Board Report	16
4.5	RFA Closeout	16
4.6	FCF SW CDR Exit Criteria	16
5.0	FCF SW CDR RIDS	17
5.1	RID Tracking	18

Glenn Research Center Document	Title: Software Critical Design Review Plan	
	Document No.: FCF-PO-PLAN-0005	Rev.: Initial Release

5.1.1 Tracking Database..... 18

5.1.2 On-Line RID Collection Database 18

5.1.3 Disposition of RIDs 18

5.1.4 RID Database Fields..... 19

5.2 RID Closeout..... 21

APPENDIX A - FCF SW CDR SCHEDULE..... 22

APPENDIX B - FCF SW CDR – TEAMS AND BOARD MEMBERSHIP..... 23

APPENDIX C – FCF SW CDR DATA PACKAGE ITEMS..... 24

 C.1 Contractual Document Deliverables..... 24

 C.2 Supporting Documentation..... 26

 C.3 Documentation Related to the FCF SW CDR Board..... 26

APPENDIX D – FCF SW CDR EXTERNAL CONTACT LIST..... 27

APPENDIX E – DRAFT AGENDA..... 28

Glenn Research Center Document	Title: Software Critical Design Review Plan	
	Document No.: FCF-PO-PLAN-0005	Rev.: Initial Release

1.0 INTRODUCTION

This document describes the International Space Station (ISS) Fluids and Combustion Facility (FCF) Software (SW) Critical Design Review (CDR) objectives, requirements, and processes. The FCF SW is considered a subsystem of the FCF Project.

It is planned that this document will not be revised after baseline. Errata for this document will appear on the web site, <https://fcf.grc.nasa.gov/cdr/sw.html>

The FCF software is currently being developed by Northrop Grumman Information Technology (NGIT) through the Microgravity Research, Development, and Operations Contract (MRDOC).

Oversight of the software development is being performed by the Glenn Research Center (GRC) Flight Software Engineering Branch (FSE), organization code 7750, and the GRC Safety and Assurance Technologies Directorate (SATD), organization code 8000.

1.1 Purpose

The ISS FCF Software CDR will demonstrate that FCF software critical designs have sufficient detailed design to allow progression to the project implementation phase of the project software as defined in NPG 7120.5, NASA Program and Project Management Processes and Requirements.

The SW CDR will be conducted as defined herein and according to the GRC Work Instruction, GRC-W6000.002, Project Implementation Reviews. This SW CDR is designated as a "Peer Design Review," as described in the work instruction.

The Review Team shall: assess the status of the project with respect to the matters itemized below; recommend if the project should proceed to the final software coding, integration, and test phase; identify any concerns that should be addressed; and recommend any actions that should be taken to enhance the success of the next phase of the project.

Completion of the FCF SW CDR and resolution of all of the Review Item Discrepancies (RIDs) and Requests for Action (RFAs) generated by it constitutes the baseline design for the item to be built. Following the FCF SW CDR, the final designs are released and formal configuration control begins.

1.1.1 – Specific Purposes of the FCF SW CDR

The specific purposes of the FCF SW CDR are to determine if detailed design satisfies design and functional requirements established in the governing specification(s) and determine if said requirements and design is sufficient to begin flight and ground software coding, testing, and verification/validation. This includes the following:

1. Review design and major changes since the Preliminary Design Review (PDR) (with justification).
2. Review closure of actions from the previous reviews including the FCF PDR.
3. Review final software requirements and design, including internal and external interface requirements and design, and software architecture.

Glenn Research Center Document	Title: Software Critical Design Review Plan	
	Document No.: FCF-PO-PLAN-0005	Rev.: Initial Release

4. Review results of engineering model software and hardware/software integration tests and identify impact on end item software specifications or design.
5. Review of software risks and issues, including mitigation or closure rationale, open items, and to be determined (TBD) items.
6. Review the software development schedules and identify schedule issues and risks. The schedules will include ground software and operations information.
7. Review the software configuration management plan, the lower level CM procedures, processes for software documentation, code, and testing. Determine if said software configuration management is sufficient to support sustained software configuration management for the Flight Units, Combustion Integrated Rack (CIR) and Fluids Integrated Rack (FIR), the Engineering Design Unit (EDU), and the Ground Integration Unit (GIU).
8. Review software analyses performed to substantiate the final software design. Analyses include algorithm performance, resource allocation and usage, processor and memory usage, critical timing considerations, bus loading, throughput, data storage and management, and other analyses to support performance requirements.
9. Review of the software requirements verification matrices.
10. Review software requirements and design traceability matrices.
11. Review of quality of user manuals for the Common Base Classes, the Space Station Computer (SSC) and other software manuals required by users of the FCF software, e.g., Principal Investigators (PIs), Flight or Ground Crews.
12. Review the results of peer reviews (SW formal inspections) for all deliverable software requirements and design documentation, including interface control documentation.
13. Review the software project metrics.
14. Review the software development and configuration management of software designed to support hardware testing and interface simulations.
15. Review information technology (IT) security requirements for development environments, software development products, and access to these items. Special attention should be paid to the Export Administration Regulations (EAR), and the International Traffic in Arms Regulations (ITAR).
16. Review the results of safety reviews and software quality assurance audits.
17. Review and evaluate compliance with appropriate safety and software quality assurance requirements. This evaluation will include reviews and audits from both the government and the contractor.
18. Identify actions to control safety hazards and identify procedures used during the software development lifecycle to address safety related commands and data.
19. Evaluate software test plans and procedures, and preparation of any supporting test software or equipment.

Glenn Research Center Document	Title: Software Critical Design Review Plan	
	Document No.: FCF-PO-PLAN-0005	Rev.: Initial Release

20. Review the reliability, maintainability, and usability of the software design.
21. Review qualification/environmental test plans and test flow.
22. Review of any COTS software or firmware used in the design, including functionality, source code availability, and version tracking methodology, and contingency plans if Commercial Off-The-Shelf (COTS) vendor(s) are unavailable in the future.
23. Review ground software and operations documentation.
24. Review contractor's progress on attaining Capability Maturity Model (CMM) Level III certification.
25. Review of plans for maintenance and sustaining engineering including software upgrade paths (e.g., process of upgrading on-board software).
26. Presentations by the contractor's Software Product Assurance Team including the results of audits and corrective action reports.

1.2 Scope

This FCF SW CDR should represent a complete and comprehensive presentation of the entire software design for FCF being developed under the MRDOC contract, Exhibit 1. This includes the review of the proposed development of the flight software for the CIR and FIR of the ISS. The SW CDR also includes the review of the proposed FCF ground software and operations related thereto, and any additional software built to support FCF hardware development and testing.

The SW CDR also includes review of EDU and GIU software, where the software for these units are treated differently than the flight software, e.g., in software configuration management. For the initial increment, the EDU will be also be used for astronaut training. Software unique to this training function is also included in the scope of this review.

Software, as defined for this document, includes government or contractor developed software, COTS software, government or contractor developed firmware, and COTS firmware.

2.0 REFERENCES

2.1 Applicable Documents

Applicable documents are those documents that form a part of this document. These documents, as the revisions listed below, carry the same weight as if they were stated within the body of this document.

Document Number	Document Title
NPG 7120.5A	NASA Program and Project Management Processes and Requirements
FCF-PO-PLAN-0001	ISS Fluids and Combustion Facility Project Plan
GRC-W6000.002	Project Implementation Reviews
NAS3-99155	MRDOC Contract

Glenn Research Center Document	Title: Software Critical Design Review Plan	
	Document No.: FCF-PO-PLAN-0005	Rev.: Initial Release

2.2 Reference Documents

Reference documents are those documents that, though not a part of this document, serve to clarify the intent and contents of this document.

Document Number	Document Title
NASA-GB-8719.13	SW Safety Guidebook (Draft Revision 2a)

2.3 Records and Forms

The following records and forms are generated from this process:

- Board Report to FCF Project Manager
- RFAs
- RIDs
- Actions
- Presentations
- Directive letters and letters of agreement between the FCF Project Manager and contractor

2.4 Acronyms

Acronym	Definition
CAN-Bus	FCF
CDR	Critical Design Review
CIR	Combustion Integrated Rack
CMM	Capability Maturity Model – Software Engineering Inst.
DID	Data Item Description (template)
E&TS	GRC Engineering and Technical Services Directorate/7000
EAR	Export Administration Regulations
EDU	Engineering Development Unit
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
FCF	Fluids and Combustion Facility
FIR	Fluids Integrated Rack
FOMA	Fuel/Oxidizer Management Assembly
FSAP	Fluids Science and Avionics Package
FSEB	GRC Flight Software Engineering Branch/7750
GIU	Ground Integration Unit
GRC	Glenn Research Center
HRDL	High Rate Data Link
IA	Independent Assessment
IAM	Image Acquisition Module

Glenn Research Center Document	Title: Software Critical Design Review Plan	
	Document No.: FCF-PO-PLAN-0005	Rev.: Initial Release

Acronym	Definition
IOP	Input/Output Processor
ISS	International Space Station
IT	Information Technology
ITAR	International Traffic in Arms Regulations
IV&V	Independent Verification and Validation
MCB	Microgravity Science Division Control Board
MRDL	Medium Rate Data Link
MRDOC	Microgravity Research, Development and Operations Contract
MSD	Microgravity Science Division
Nd:YAG	Neodymium:Yttrium Aluminum Garnet
NPD	NASA Policy Directive
NPG	NASA Policy Guidelines
PDR	Preliminary Design Review
RFA	Request for Action
RID	Review Item Discrepancy
ROM	Rough Order of Magnitude (Estimate)
RT	FCF SW CDR Review Team
SATD	GRC Safety and Assurance Technologies Directorate/8000
SDL	Serial Data Link
SEIB	Systems Engineering and Integration Branch /781
SMO	Systems Management Office
SW	Software
TBD	To Be Determined
WBS	Work Breakdown Structure

3.0 RESPONSIBILITIES

This section includes the description and responsibilities for the FCF SW CDR including: FCF Project Control Specialist, FCF Documentation Specialist, the Review Team Lead, the Review Team members, the SW CDR Board Chair, the SW CDR Board members, and MSD/FCF Management.

3.1 FCF Project Control Specialist

The FCF Project Control Specialist has been assigned by the FCF Project Manager to support the Review Team Lead, SW CDR Board Chair, and the FCF Project Manager for the FCF SW CDR.

The FCF Project Control Specialist is responsible for the following:

- Programming and administration of the RID and RFA databases.
- Recording of actions during the FCF SW CDR process.

Glenn Research Center Document	Title: Software Critical Design Review Plan	
	Document No.: FCF-PO-PLAN-0005	Rev.: Initial Release

- Logging and tracking of RIDs and RFAs.
- Serving as recording secretary for the Review Team and SW CDR Board activities, generating actions from these activities.
- Developing and maintaining an FCF SW CDR website providing access to FCF SW CDR documentation, both contractor and government generated documents, access to RID/RFA forms, on-line entry of RID/RFA data, and access to other information as needed.
- Ensure that databases and actions are preserved as required by the FCF Project Business Management System and processes.

3.2 FCF Documentation Specialist

The FCF Documentation Specialist has been assigned by the FCF Project Manager to support the Review Team Lead, SW CDR Board Chair, and the FCF Project Manager for the FCF SW CDR.

The FCF Documentation Specialist is responsible for the following:

- Acting as official receptionist for the review.
- Handling logistics for the review location.
- Taking attendance for official record.
- Obtaining hard copies of documents or drawings as needed for the board.
- Setting up a messages board/area.
- Distribute presentation packages.
- Providing on-line access to the internet for drawings and documents.
- Typing of information and printing as needed.
- Providing photocopies and supplies as needed.

3.3 Review Team

3.3.1 Review Team Lead

The FCF Lead Software Engineer from the GRC Flight Software Engineering Branch (FSEB) or an FSEB Manager appointee will act as the FCF SW CDR Team Lead. The Review Team Lead is listed in Appendix B.

The Review Team Lead is responsible for the following:

- Convening a Review Team, the membership to be approved by the FCF Project Manager.
- Obtaining support and assigning specific document review responsibilities of each Review Team member.
- Working with the administrative support assistant(s) to ensure the proper numbering, logging of hardcopy and electronic RIDs, the proper recording of actions and attendance lists from Review Team activities.
- Briefing the Review Team members on the conduct of initial document screening, document review and RID generation.
- Performing duties as described in Sections 4 and 5.

3.3.2 Review Team Members

Members on the Review Team includes software engineering specialists and/or other expertise associated with the FCF Project and, if required, government personnel and/or contractor personnel not associated with FCF. Contractor specialists and/or other government personnel may be included to ensure a comprehensive technical review for the FCF SW CDR. The members are listed in Appendix B.

Glenn Research Center Document	Title: Software Critical Design Review Plan	
	Document No.: FCF-PO-PLAN-0005	Rev.: Initial Release

The Review Team Members are responsible for the following:

- Attending the Review Team Lead's briefing session.
- Performing duties as described in Sections 4 and 5.
- Other duties as assigned by the Review Team Lead.

3.4 FCF SW CDR Board

3.4.1 Board Chair

The FCF Project Manager, as the delegated Convening Authority, appoints the FCF SW CDR Board Chair.

The Board Chair is responsible for the following:

- Chairing the FCF SW CDR Review.
- Preparing the Board designation letter.
- Developing a consensus on RFAs, findings, and recommendations.
- Ensuring that a Review Board Report documenting the RFAs, findings, and recommendations is prepared and delivered on a timely basis.
- Performing duties as described in Sections 4 and 5.
- Directing the work performed by the FCF Project Control Specialist and FCF Documentation Specialist.

3.4.2 FCF SW CDR Board Members

By the authority of the FCF Project Manager, as the delegated Convening Authority, the FCF Project Manager, convenes the FCF SW CDR Board. The Board will include the following government and/or independent contractor employee representation:

- From FSEB, the FCF Lead Software Engineer or the FSEB Manager
- From SATD, a representative of Software Product Assurance
- From SED, the FCF Chief Engineer
- FCF Project representative from MSD
- Science community representative from MSD
- Operations community representative from MSD
- Representative from the NASA IV&V Center
- External, independent software management/development expert

The required membership organizations may appoint alternative representation with the approval of the FCF SW Board Chair or the FCF Project Manager.

The FCF SW Board Chair may add additional FCF SW CDR Board representation with concurrence of the FCF Project Manager.

The Board Members are listed in Appendix B.

Members of the Board are responsible for the following:

- Reviewing the data package and otherwise becoming familiar with the FCF SW before the Board convenes.
- Attending the orientation provided by the Board Chair.
- Attending the presentations prepared for the Board by the contractor and FCF Project Team.
- Working with the Board Chair to arrive at a consensus on RFAs, findings, and recommendations.
- Preparing and delivering a report for the Board Chair on selected RFAs, findings, and recommendations of interest to the Board Member.
- Performing other duties as described in Sections 4 and 5.

Glenn Research Center Document	Title: Software Critical Design Review Plan	
	Document No.: FCF-PO-PLAN-0005	Rev.: Initial Release

3.5 FCF Project Manager

The FCF Project Manager is the delegated Convening Authority for the FCF SW CDR, as set forth by the applicable document, GRC-W6000.002, Project Implementation Reviews Work Instruction (WI). This delegation is by the authority of MSD management. The responsibilities below are taken from the WI.

The FCF Project Manager is responsible for the following:

- Appointing and/or approving positions defined in Sections 4 and 5.
- Issuing a memorandum that officially convenes the FCF SW CDR Board defining the objectives and scope of the review.
- Approving the review agenda.
- Ensuring that the items supplied by the contractor, listed in Appendix C, are consistent with the review objectives and agenda and are distributed to the appropriate teams when received from the contractor.
- Specifying the date and location of the review.
- Performing other duties as described in Sections 4 and 5.
- Preparing a memorandum to the Board concerning the disposition of the findings and recommendations.

3.6 Microgravity Science Division (MSD) Management

MSD management, organization code 6700, delegates the FCF Project Manager as the Convening Authority for the FCF SW CDR.

MSD management may also elect to review/approve the RFAs, RFA actions, RIDs, RID actions and disposition, and other aspects of the FCF SW CDR through the MCB or other management review. Specifically, RFAs and/or RIDs with significant cost, schedule, or unresolved issues will likely be handled through the MCB. Minutes and actions will be recorded per standard procedures for this process.

4.0 FCF SW CDR PROCESS

4.1 Delivery and Initial Screening and Distribution of Documents

The contractor's FCF SW CDR data package, containing all the FCF SW CDR contractor deliverables, will be delivered from the contractor to the FCF Project Manager. The FCF Project Manager will provide the contractor's data package to the Review Team Lead for initial screening to determine if each document is suitable to be entered into the formal FCF SW CDR document review process. The FCF Project Control Specialist will create a web page for the team to access the documents to be screened.

The Review Team Lead will hold a briefing session for Review Team members regarding this process and their roles in this process.

The Review Team members will be assigned the responsibility for providing an initial assessment of the preparedness level of each document. Each Review Team member will communicate to the Review Team Lead stating that the documents they reviewed are either satisfactory or unsatisfactory to be entered into the FCF SW CDR data package and become available to all reviewers.

Glenn Research Center Document	Title: Software Critical Design Review Plan	
	Document No.: FCF-PO-PLAN-0005	Rev.: Initial Release

If a document is found to be unsatisfactory (e.g., it has major content deficiencies), the Review Team member who screened the document will coordinate with the Review Team Lead and the FCF Project Manager to determine if the document should be returned to the document author and omitted from the FCF SW CDR data package. The FCF Project Manager's decisions will be final. The Review Team Lead will also notify the FCF Project Control Specialist for tracking purposes and for website updates.

The Review Team Lead will prepare a final list of screened, satisfactory documents.

The screened, satisfactory documents will be further distributed to the Board Chair for distribution to Board Members and posting on the FCF SW CDR website for review and, if necessary, generating of RIDs against the documents.

4.2 Entry Criteria Evaluation

The Review Team will collaborate in the preparation an entry criteria evaluation to be delivered to the FCF Project Manager by the Review Team Lead. This evaluation will take the following topics into consideration:

- Are requirement documents, including interface requirements and verification/traceability matrices, at least 95% complete?
- Are design documents, including interface design and verification/traceability matrices, at least 80% complete?
- For each of the items Section 1.1.1, which items are or will be adequately addressed in the contractor's data package and/or the proposed agenda for presentations to the Board?

The FCF Project Manager has the authority to adjust the FCF SW CDR schedule based on contractor preparedness for the FCF SW CDR. Input to the FCF Project Manager's decision, in part, will be based on the entry criteria evaluation submitted by the Review Team Lead.

4.3 FCF SW CDR Data Package Review

When the FCF Project Manager has given the approval to conduct the FCF SW CDR, and the screened, satisfactory contractor documents are identified, the data package review will commence.

The FCF SW CDR data package review activities will be initiated with a Kickoff Meeting presented by the Board Chair. The purpose of this meeting will be to discuss the logistics of the FCF SW CDR process, answer questions, deliver data package documentation, provide a software overview, identify software or project-level issues that are in work, and to receive training on the RID System and SW CDR website configuration. Review Team members should attend the FCF SW CDR Kickoff Meeting. SW CDR Board Members and other associated government FCF Project parties are also encouraged to attend. By the day of the Kickoff Meeting, the entire data package and RFA forms will be available to the Review Team and external reviewers for RID generation. In addition, the RID system will be on-line through the SW CDR website.

Others not specifically requested to review the documentation might also do so by accessing the FCF SW CDR website <http://fcf.grc.nasa.gov/pages/cdr.html> managed by the FCF Project Control Specialist. Since some of the documentation on this site may be export controlled or otherwise sensitive, access must be obtained in advance from the FCF Project Control Specialist. The main CDR page is public access with links stating how to obtain access.

Glenn Research Center Document	Title: Software Critical Design Review Plan	
	Document No.: FCF-PO-PLAN-0005	Rev.: Initial Release

This review process may include informal discussions and/or interviews with the appropriate technical personnel on the FCF Project contractor's development team.

The Review Team Lead shall work with the RID Initiator to screen RIDs upon entry to ensure that technical issues identified are clearly stated and understood. The Review Team Lead may combine similar RIDs with approval from the RID initiators. Each RID will automatically be assigned a unique number in the RID System. RIDs that are deleted, changed, or combined shall be recorded in a tracking log. At this point, all accepted/screened RIDs will be tracked as an official RID by the Review Team Lead. A tracking log shall be maintained by the Review Team Lead for those RIDs that were not accepted by the RID Initiator and the RID Initiator shall be notified.

The RID disposition process is described in detailed in Section 5.

4.4 FCF SW CDR Board Activity

The Board will convene as specified on the schedule as shown in Appendix A. The Board Members and Board Chair are listed in Appendix B.

4.4.1 Board Member Orientation

The Board Members will convene the evening before the Board presentations for an orientation session given by the Board Chair. This orientation will include a review of the processes described in this document; Board member duties; and an overview of the status of the contractor's data package, the most current agenda of presentations, and known issues with the FCF software. Other government managers are welcome to attend.

4.4.2 FCF SW CDR Presentations to the Board

The presentations will take place at a location specified on the SW CDR website as soon as logistics are established. The agenda for the presentations, covering two to three days will be provided to the Board members prior to the presentations and will be available on the website. A draft agenda appears in Appendix E.

The FCF SW CDR contractor presentations are expected to cover the topics outlined in Section 1.1.1. Reference/supporting documentation is also expected to be available from the contractor as outlined in Appendix C.2.

4.4.3 RFA Generation

The Board Chair will provide the RFA forms to the Board members. The RFA Form template which will be used is FCF-PO-FORM-0002, which is available on the FCF website at the following URL: <http://fcf.grc.nasa.gov/forms/form0002.doc>

RFAs will be accepted only from the FCF SW CDR Board members. An RFA is also generated from the RIDs as described in Section 5.

RFAs shall identify the most significant issues and/or RIDs found in review of the FCF software design during the presentations given to the Board. A single RFA will cover the RIDs generated during the Review Team activities.

Where possible, RFA disposition should be targeted to occur no later than 45 days from when the RFA was assigned.

Glenn Research Center Document	Title: Software Critical Design Review Plan	
	Document No.: FCF-PO-PLAN-0005	Rev.: Initial Release

All RFAs shall reflect a consensus of the entire FCF SW CDR Board. If there are any dissenting opinions by individual Board Members, these shall be recorded and included in the Board Report.

4.4.4 FCF SW CDR Board Report

Following the last day of FCF SW CDR presentations, within (45) forty-five days the Board Chair shall prepare and submit to the FCF Project Manager a signed Board Report. This report will respond to the objectives of the review that were documented in the charter provided in the appointment letter. All significant findings relative to those objectives shall be documented. A specific written recommendation shall be made for each objective. These recommendations shall reflect the consensus opinion of the review board members, derived during their discussions following the reviews. Recommendations can be conditioned, as long as the conditions are stated clearly. Any significant concerns that the review board wishes to express shall also be documented in the report.

The report will contain all the final RFAs generated and agreed to by consensus of the SW CDR Review Board at the review, including the RFA covering the RIDs. The report may also contain individual reports from each Board member. The GRC MSD/6700 Deputy Division Chief shall be copied on distribution when this report is issued.

In summary the report contains:

- Introduction, including a Board Membership listing and date of review
- Charter: The objectives as stated in the appointment letter
- Executive Summary of the report
- Board Report: detailed findings, concerns, and recommendations
- Copy of the Board designation letter sent to Board members
- Requests For Action (RFA) list produced by the Board
- Requests For Action RFA incorporating the RIDs, reviewed by Board
- Dissenting opinions, if applicable

The findings of the review board are considered advisory until the FCF Project Manager (and the MCB, if applicable) responds to them.

4.5 RFA Closeout

When the action has been completed, the project prime contractor will document the implementation to the CDR Review Board Chairperson by e-mail (including an attachment of the implemented change), and copy to the FCF Project Control Specialist.

If the CDR Review Board Chair concurs with the implementation, he/she will notify the Project Manager and send a copy to the FCF Project Control Specialist (i.e., CDR database/web administrator). Otherwise, the RFA will remain open until the CDR Review Board Chair concurs with the implementation.

The FCF Project Manager, as the designated Convening Authority, will provide closure approval on all RFAs. The FCF Project Manager will produce a final closure report for the Board.

4.6 FCF SW CDR Exit Criteria

The FCF SW CDR will be considered complete when:

- The FCF Project Manager has approved all assigned RID actions
- The contractor has been notified of the document status (approved or disapproved) within 30 days following the CDR
- The SW CDR Board Report has been received by the FCF Project Manager

Glenn Research Center Document	Title: Software Critical Design Review Plan	
	Document No.: FCF-PO-PLAN-0005	Rev.: Initial Release

- RFAs have been accepted by the FCF Project Manager
- FCF SW CDR results have been presented to the FCF Project Team
- The Authority to Proceed has been formally requested

RID and RFA closeout activities will continue per the RID/RFA instructions and will be coordinated with the FCF Project Control Specialist. All Type I RIDs and RFAs generated at the SW CDR must be closed before the project formally gives status at interim major project element milestone reviews.

5.0 FCF SW CDR RIDS

A RID is utilized to record issues found with the project documentation. Each approved RID becomes an official project commitment to correct the deficiency. An on-line RID collection system will be used to collect RIDs. After collection, the RID database will be converted to an Excel spreadsheet for processing.

Each RID must reference a document listed in the document deliverable list provided in Appendix C and the RID must identify a specific paragraph within the document.

A RID must show that the software design does not meet a requirement, interfaces are not compatible, or required information to support the design is missing.

A RID should be written when the document reviewer determines that a requirement is missing, under-specified, inappropriate, in error; the design does not meet a requirement; that an interface issue exists; or when essential information has been omitted.

An addition of, or a change in, requirements is a valid basis for a RID, if the software is to meet its interface, safety, performance, traceability or verification needs.

The Review Team Lead should evaluate the appropriateness of all RIDs. If the Review Team Lead determines that a RID is inappropriate, every effort should be made to resolve the issue or concern with the RID initiator and have the RID withdrawn. At any time, a RID initiator may withdraw their RID by informing the Review Team Lead who in turn will direct the FCF Project Control Specialist to update the RID database appropriately.

RIDs from outside the identified review teams will be accepted. The Review Team Lead will process all such RID submittals. The Review Team Lead may disapprove a RID if it is judged to be inappropriate or out of scope, but the RID initiator may appeal that decision through a process described in Section 5.1.3, Disposition of RIDs.

The Review Team Lead may also collect "Comments." Comments, while not tracked by the government or contractor for disposition, are items which might be useful to the contractor. The Comments are observations made by reviewers. The Review Team Lead may dispose a RID as a Comment with the RID initiator's approval. The Review Team Lead will pass the Comments to the Contractor's Software Lead. An on-line Comment collection system will also be provided on the SW CDR website.

Glenn Research Center Document	Title: Software Critical Design Review Plan	
	Document No.: FCF-PO-PLAN-0005	Rev.: Initial Release

5.1 RID Tracking

5.1.1 Tracking Database

RIDs will be tracked using an on-line collection system provided on the SW CDR website. Access is provided by the FCF Project Control Specialist. Instructions for using the system will be provided at the Kickoff Meeting and on the SW CDR website.

RIDs will be collected until 21 days before the SW CDR Board convenes for the presentations.

The database will then be converted to an Excel Workbook. The workbook consists of the following worksheets: "RID Entry," "Review Team," and "Other Disposition." Additional worksheets may be added as needed. Regular updates to the RIDs, as they go through the processing, will be available, as views of this workbook, on the SW CDR website.

The Review Team Worksheet will be used by the Review Team to record their disposition, or recommendation of disposition, for all RIDs entered.

The Other Disposition Worksheet is used to record RID activities by the Board, MCB, or other entities that may disposition or modify an existing disposition.

All data fields should be completed. If field is not applicable, mark "n/a."

Review Team disposition recommendations remain recorded in the Review Team Worksheet. If these dispositions change, the Review Team Worksheet should remain unaltered and the new disposition information recorded on the Other Disposition Worksheet. The purpose of this requirement is to leave a record of the Review Team activity.

5.1.2 On-Line RID Collection Database

Separate instructions will be provided for using the on-line RID collection system. All data fields should be completed. If field is not applicable, mark "n/a."

Note: Of special importance is the Initiator's Recommended Action. The RID initiator must supply specific from/to wording.

5.1.3 Disposition of RIDs

The Review Team Lead will attempt to disposition all RIDs of Type II, III, IV. The Review Team will also recommend disposition for Type I RIDs.

Disposition of a RID consists of:

- Checking the RID for proper completion of the entry form fields.
- Checking the RID as being within the scope of this review.
- Checking the RID as being appropriate.
- Comparing the RID to other RIDs received. If appropriate, the RID may be assigned a child of parent RID.
- Determining if the RID recommended action is acceptable to the document author.
- If disagreement exists between the RID initiator and document author, an attempt is made to approve the RID with modifications acceptable to the RID initiator and document author.
- For some RIDs, disapproval may be necessary due to scope or other issues.
- RIDs initiators may be asked to withdraw RIDs under certain conditions, such as misunderstanding of the document's purpose and is later.

Glenn Research Center Document	Title: Software Critical Design Review Plan	
	Document No.: FCF-PO-PLAN-0005	Rev.: Initial Release

- If the recommended action would result in cost or schedule impact, the RID is classified as a Type I RID, and the action remains only “recommended” for later disposition. The classification of a Type I RID is the result of the contractor’s review. Since the contractor may not have adequate time to estimate the cost or schedule impact prior to the Board, it is only necessary to indicate the RID is a Type I (e.g., ROM estimate is not absolutely necessary). Cost and schedule thresholds for Type I RIDS should be determined by the Review Team Lead and the contractor Software Team Lead. For example, a RID with a cost impact of greater than \$15K and/or 2 months of non-critical path schedule impact would indicate that the RID is of Type I.
- For RIDs of Type II, III, IV, the RID actionee (typically the document author) should be assigned along with an action due date. The contractor should provide someone with the authority to accept these actions during RID dispositioning.
- Updating all fields the RID workbook.
- Informing the RID initiator.

RIDs dispositioned thusly will be signed and dated by the Review Team Lead.

The Review Team Lead has the option of converting certain RIDs into non-RID information, or “Comments”, with RID initiator concurrence. The RID would be withdrawn and the Comment passed to the contractor. RIDs may also be withdrawn for a number of reasons including duplication, misunderstanding, clarification, etc.

The Review Team may create a new “parent” RID to capture similar “child” RIDs. However, care should be taken when the parent RID recommended action is written. Parent RIDs to child RIDs should contain specific, recommended actions which, when executed, will close the child RIDs. That is, the actionee will need only focus on the parent RID recommended action, not each child RID. When the parent RID is closed, the children RIDs are automatically closed. When a RID becomes a child, the Review Team should inform the child RID initiator.

If a document author provides a response to a RID and the RID initiator disagrees with the response, or the RID initiator disagrees with the Review Team disposition, then the following steps will be taken as each step fails to resolve the issue:

- Review Team Lead will do a quick iteration with the document author and RID initiator to determine if there was a misunderstanding and the issue can be resolved.
- The FCF Project Manager can accept or reject the RID.
- If the FCF Project Manager rejects the RID, the RID initiator can appeal to any SW CDR Board member to have the RID included in the RID RFA (the RFA which covers RIDs submitted by the Review Team to the SW CDR Board).

Type I RIDs must be reviewed by the FCF Project Manager and likely by the MCB as well. They may accept the recommended action from the Review Team, modify the recommended action, assign a new action, or disapprove the RID. RIDs thus dispositioned will be passed back to the Review Team Lead for update of the RID workbook and tracking.

The Review Team will continue to function until the Project Manager has approved all RID actions.

5.1.4 RID Database Fields

Final Disposition Status – Fields Accept/Modify Review Team Disposition, Assigned RFA #, and Comments (including name) are to be completed during the final disposition of a RID beyond the Review Team activities.

RID Number: Number automatically created by the RID System.

Glenn Research Center Document	Title: Software Critical Design Review Plan	
	Document No.: FCF-PO-PLAN-0005	Rev.: Initial Release

RID Subject: Provide a brief (one sentence or phrase) description of the issue.

RID Classification: RID classified by Approved, Approved With Mods, Disapproved, Withdrawn. Approved RIDs are accepted as written.

- Approved With Mods RIDs are accepted with modifications agreed upon with the RID initiator. The modifications typically affect from/to wording in the initiator's recommended action.
- Disapproved RIDs - . Disapproved RIDs are RIDs that the initiator will not withdraw, but are out-of-scope, incorrect, or not suitable.
- Withdrawn RIDs – Withdrawn RIDs are RIDs withdrawn by the initiator. The Review Team is encouraged to have initiators withdraw RIDs that are out of scope, duplicates of existing RIDs, or other such reasons.

Mods to RID Entry Wording: If a RID is Approved With Mods, record modifications in these fields.

RID Type:

- Type I RIDs are those that have cost or schedule impact and normally represent a significant change in design or planning.
- Type II RIDs involve changes in design implementation or planning but do not impact cost or schedule. Normally a Type II RID is of a technical nature and may require some additional design or analysis effort.
- Type III RIDs represent concerns or issues, which do not identify a deficiency in meeting project requirements or planning, but which should be corrected in future submittal of documentation, such as typographical errors, grammar, style, format, clarification, and other suggestions for improvement of the documentation.
- Type IV RIDs identify a missing document or other information that is necessary to demonstrate that the design is compliant with a particular requirement or set of requirements.

Action Required: The proposed action to be taken to satisfy the RID.

Actionee : Who (organizationally) is responsible to perform the action.

Action Completion Date: When the action is to be completed. This date is nominally 30 days after the assignment of the action.

Status: Provides a status of the RID, either Open, Pending Closure, or Closed.

Status Date: Date when last update was made to the RID status.

Disposition Comments: Comments on why the RID is either recommended to be closed without further work, or why the proposed action is suggested.

New Parent RID: During disposition, it is encouraged to group similar RIDs under a new "Parent RID", with the initiators' approvals. The new Parent RID shall have numbers in the 9000-9999 range and this new Parent RID number will be recorded in this field.

Scope Change: Yes/No indication that implementing the RID would be a scope change.

ROM Cost Impact: Rough Order of Magnitude (ROM) cost estimate of implementing RID, rounded to nearest \$1K.

ROM Schedule Impact: Rough Order of Magnitude estimate of schedule impact to implement the RID, rounded to nearest month. Include hours of labor required.

Glenn Research Center Document	Title: Software Critical Design Review Plan	
	Document No.: FCF-PO-PLAN-0005	Rev.: Initial Release

Who Estimated ROM(s): Who provided the ROM estimates.

Initiator Contact Date: Comments by the initiator if they disagree with the proposed disposition, and the date of the comments.

Initiator Approves/Disapproves: Indicate in this field whether the initiator approves or disapproves with the disposition.

Initiator Contacted By: Name of person who contacted the initiator.

Initiator Comments: Comments from the initiator regarding the RID disposition.

RID Closure Approval Date: Date of FCF Project Manager approval that the RID can be closed.

Closure Comments: Any comments that should be captured when the RID is closed.

RFA No.: This will reflect the RFA document number assigned that incorporates the RID.

5.2 RID Closeout

For RIDs dispositioned by the Review Team, an action will be assigned on the RID form. The action closeout will be processed as follows:

When the action has been completed, the contractor will document the implementation, including an attachment of the implemented change. The contractor will deliver the information to the Review Team Lead who, after reviewing the information, will close the RID and update the RID workbook appropriately. If the RID initiator does not concur with the implementation, the RID will remain open until the RID initiator concurs or the FCF Project Manager approves closure of the RID.

For Type I RIDs which carry cost or schedule impact or which contain unresolved issues, the RID action is assigned by the FCF Project Manager (and/or the MCB). When the action is completed, the contractor will document the implementation, including an attachment of the implemented change. The contractor will deliver the information to the FCF Project Manager for approval of RID closure. The FCF Project Manager will direct the Review Team Lead to close the RID and update the RID workbook appropriately.

Where possible, closure should be targeted to occur no later than 45 days from when the RID/RFA action was assigned.

RIDs which are parent RIDs to child RIDs should contain specific, recommended actions which, when executed, will close the child RIDs. That is, the actionee need only focus on the parent RID recommended action, not each child RID. When the parent RID is closed, the child RIDs are automatically closed.

When all the RIDs are closed, the RFA which was written for the RIDs will be closed.

Glenn Research Center Document	Title: Software Critical Design Review Plan	
	Document No.: FCF-PO-PLAN-0005	Rev.: Initial Release

APPENDIX A - FCF SW CDR SCHEDULE

The following is a summary of the FCF SW CDR Schedule. The most current schedule is available on the SW CDR website at the following URL: <https://fcf.grc.nasa.gov/cdr/sw/sched.pdf>

Calendar Days from FCF SW CDR Board Presentation Start Date (T=0)	Activity	Responsible Parties
T-75	This Plan approved	FCF Project Manager
T-50	Review Team Briefing	Review Team Lead
T-45	Appendix C.1 deliverable documentation submitted to NASA for review	Source: MRDOC Destination: FCF Project Manager
T-43	Initial screening for Entry Criteria Evaluation	Review Team
T-43	Document Review and RID Process starts	Review Team
T-35	Entry Criteria Evaluation due	Source: Review Team Lead Destination: FCF Project Manager
T-32	Go / no-Go Decision on SW CDR	FCF Project Manager
T-21	RID cutoff date (no more RIDs accepted)	Review Team Lead
T-20	RID Disposition starts	Review Team, RID initiators, Document Authors and other Contractor support
T-5	RID Disposition ends	Review Team, RID initiators, Document Authors and other Contractor support
T-14	Appendix C.2 supporting/reference documentation delivered to NASA	Source: MRDOC Destination: FCF Project Manager
T-14	Government presentations for Board Complete	FCF Project Mgr, FCF SW Oversight Lead, SATD representative from SW CDR Board
T-1	FCF SW CDR Board Member briefing	FCF SW CDR Board Chair
T-1	RID Disposition Complete	Review Team Lead
T-1	RFA covering RIDs drafted	Review Team Lead
T-0	Presentations begin to FCF SW CDR Board	Contractor/Government
T+2	Presentations end to FCF SW CDR Board	Contractor/Government
T+30	Individual Reports due	Source: Board Members Destination: Board Chair
T+45	Board Report due	Source: Board Chair Destination: FCF Project Manager
T+60	All RFAs and RIDs dispositioned/approved	FCF Project Manager, MCB

Glenn Research Center Document	Title: Software Critical Design Review Plan	
	Document No.: FCF-PO-PLAN-0005	Rev.: Initial Release

APPENDIX B - FCF SW CDR – TEAMS AND BOARD MEMBERSHIP

The most current membership lists will be provided on the SW CDR website at <https://fcf.grc.nasa.gov/cdr/sw.html>

FCF SW CDR Review Team:

Team Lead: Kevin R. Carmichael/GRC 7750
Reviewer: David W. York/GRC 7750
Reviewer: Joseph G. Ponyik/GRC 7750
Reviewer: Laura Maynard-Nelson/GRC 7750
Reviewer: Lisa Van Der Arr/GRC 7750
Reviewer: Phuoc H. Thai/GRC 7750
Reviewer: Michael Mackin/GRC 7750
Reviewer: Klaus H. Gumto/GRC 7750
Reviewer: Pamela A. Mellor/GRC 7750
Reviewer: Denise Varga/GRC 7750
Reviewer: Timothy J. Ruffner/GRC 7715
Reviewer: Carl J. Daniele/Alphaport
(As needed for Systems issues): FCF Chief Engineer: Dennis Rohn /GRC 7810
(As needed for approvals) FCF Project Manager: Bob Zurawski/GRC 6700

FCF SW CDR Board:

Chair: David W. York/GRC 7750
FCF Software Oversight Lead: Joseph G. Ponyik/GRC 7750
FCF Chief Engineer: Dennis Rohn /GRC 7810
Science Representative: Karen J. Weiland /GRC 6711 (Backup: Myron E. Hill/GRC 6712)
SATD Representative: Phuoc H. Thai/GRC 0510
Independent Representative: Carl J. Daniele/Alphaport
Operations Representative: Diane C. Malarik/GRC 6724
MSD Representative: Kathleen E. Schubert/GRC 6700
NASA IV&V Center Representative: Marcus Fisher/IV&V (ex-officio board member)
NASA ISS Payload Software Control Board Co-Chair: Gerald Esquivel/JSC

FCF SW CDR Support:

FCF Project Control Specialist: Debbi Sedlak/Zin Technologies 6700
FCF Documentation Specialist: Annette Wood/Zin Technologies 6700

Glenn Research Center Document	Title: Software Critical Design Review Plan	
	Document No.: FCF-PO-PLAN-0005	Rev.: Initial Release

APPENDIX C – FCF SW CDR DATA PACKAGE ITEMS

The most current document lists will be provided on the SW CDR website at <https://fcf.grc.nasa.gov/cdr/sw.html>

C.1 Contractual Document Deliverables

Documents in this section include Plans, Interface Control, SW Development Environment, Ground SW Concept, Requirements and Design Documents for the FCF and CSCIs.

Item	Document Name	Document No.
1	FOMA Control Unit Main Processor Software Design Document	CIR-DOC-0082
2	FOMA Control Unit CAN Bus Processor Software Design Document	CIR-DOC-0088
3	FOMA Control Unit Main Processor Software Requirements Document	CIR-REQ-0080
4	FOMA Control Unit CAN Bus Processor Software Requirements Document	CIR-REQ-0087
5	Common IPSU Main Processor Software Design Document	FCF-DOC-0070
6	IOP Main Processor Software Design Document	FCF-DOC-0071
7	Diagnostics Control Module Main Processor Software Design Document	FCF-DOC-0073
8	Space Station Computer Software Design Document	FCF-DOC-0074
9	Fluids Combustion Facility Software Design Document	FCF-DOC-0078
10	IOP HRDL Processor Software Design Document	FCF-DOC-0088
11	IOP Video Switch Software Design Document	FCF-DOC-0090
12	IOP CAN Bus Processor Software Design Document	FCF-DOC-0092
13	FCF Software Development Environment	FCF-DOC-1111
14	Serial Data Link Software Design Document	FCF-DOC-1130
15	FCF CAN Bus Devices Software Design Document Air Thermal Control Unit Water Thermal Control System FSAP CAN Bus Processor Common IPSU CAN Bus Processor Color Camera Package Nd:YAG Laser Package White Light Package AMA Package	FCF-DOC-1485
16	FCF Common Base Classes Software Design Document	FCF-DOC-1487
17	FCF Software Interface Control Document	FCF-ICD-0076
18	FCF Software Management & Development Plan	FCF-PLN-0051
19	FCF Software Verification and Validation Plan	FCF-PLN-1110
20	FCF Software Requirements Document	FCF-REQ-0063
21	Common IPSU Main Processor Software Requirements Document	FCF-REQ-0064
22	IOP Main Processor Software Requirements Document	FCF-REQ-0065
23	Diagnostics Control Module Main Processor Software Requirements Document	FCF-REQ-0067
24	Space Station Computer Software Requirements Document	FCF-REQ-0068
25	IOP HRDL Processor Software Requirements Document	FCF-REQ-0087

Glenn Research Center Document	Title: Software Critical Design Review Plan	
	Document No.: FCF-PO-PLAN-0005	Rev.: Initial Release

Item	Document Name	Document No.
26	IOP Video Switch Processor Software Requirements Document	FCF-REQ-0089
27	IOP CAN Bus Processor Software Requirements Document	FCF-REQ-0091
28	Serial Data Link Software Requirements Document	FCF-REQ-1118
29	FIR CAN Bus Devices Software Requirements Document Air Thermal Control Unit Water Thermal Control System FSAP CAN Bus Processor Common IPSU CAN Bus Processor Color Camera Package Nd:YAG Laser Package White Light Package AMA Package	FCF-REQ-1484
30	FCF Common Base Classes Software Requirements Document	FCF-REQ-1486
31	Fluids Science Avionics Package Main Processor Software Design Document	FIR-DOC-0174
32	Fluids Science Avionics Package Main Processor Software Requirements Document	FIR-REQ-0173

Glenn Research Center Document	Title: Software Critical Design Review Plan	
	Document No.: FCF-PO-PLAN-0005	Rev.: Initial Release

C.2 Supporting Documentation

Documents in this section include contractor supplied information to support the design and functional requirements as enumerated in Section 1.1.1. Some of this information is expected to be included with the contractor's presentation to the FCF SW CDR Board, but the contractor is encouraged to supply as much of this information as possible for the Review Team Lead to complete the Entry Criteria Evaluation in a timely manner; see Section 4.2 Entry Criteria Evaluation. The contractor may provide other documentation not listed here.

Item	Type of Document
1	Analyses documentation to support design
2	Summary of PDR SW action status
3	Test Plans, Procedures and results to support design including hardware integration tests
4	SW Peer Review (Formal Inspection) Metrics
5	SW Risks and Issues Status
6	SW Schedules (including risks and issues)
7	SW User Manuals drafts/status
8	Results of Safety Reviews as applied to SW
9	SW Product Assurance audit results
10	IT Security policies
11	Policy for handling safety related commands and data
12	Reliability, maintainability and usability analyses
13	COTS SW/Firmware documentation
14	Progress towards CMM certification
15	Document templates (DIDs)
16	Results of investigation of SW/HW tools to support SW testing

C.3 Documentation Related to the FCF SW CDR Board

Documents in this section include the charts for the FCF SW CDR Board and information which should be on-hand to support the FCF SW CDR Board members.

Item	Type of Document
1	FCF SW CDR presentation charts
2	FCF Reference documents such as System Specs, C-Specs, documents referenced in traceability matrices
3	Agenda, location, time, tour possibilities, and other information related to the Board activities

Glenn Research Center Document	Title: Software Critical Design Review Plan	
	Document No.: FCF-PO-PLAN-0005	Rev.: Initial Release

APPENDIX D – FCF SW CDR EXTERNAL CONTACT LIST

The following people should be on distribution for the FCF SW CDR correspondence:

Marcus Fisher (FCF SW CDR Board Member from the NASA IV&V Facility)
2101 NASA Road 1
Houston, TX 77058
Phone: 304-367-8337
Email: Marcus.S.Fisher@ivv.nasa.gov

James E. Sykes (MSFC)
George C. Marshall Space Flight Center
Code SD11
Marshall Space Flight Center, AL 35812
256-544-1761
James.E.Sykes@msfc.nasa.gov

Daniel W. Hartman - JSC Code OZ
Lyndon B. Johnson Space Center
Code OZ3
2101 NASA Road 1
Houston, TX 77058
281-244-7048
dhartman@ems.jsc.nasa.gov

Judith L. Robey (HQ - Code UG)
NASA Headquarters
Code UG
Washington DC 20546-0001
202-358-3091
jrobey@mail.hq.nasa.gov

Mike Miller - JSC Code OZ3
Lyndon B. Johnson Space Center
Code OZ
2101 NASA Road 1
Houston, TX 77058
281-244-7710
michael.d.miller1@jsc.nasa.gov

Martha Wetherholt (HQ)
NASA Headquarters
Code QS
Washington DC 20546-0001
202-358-0470
mwetherh@mail.hq.nasa.gov

John Temple (ISS Payload Integration Manager)
Lyndon B. Johnson Space Center
Code OZ2/USA
2101 NASA Road 1
Houston, TX 77058
281-244-8552
john.h.temple1@jsc.nasa.gov

Gerald Esquivel (JSC - PSCB)
Lyndon B. Johnson Space Center
Code OZ3
2101 NASA Road 1
Houston, TX 77058
281-226-6075
gerald.a.esquivel1@jsc.nasa.gov

Glenn Research Center Document	Title: Software Critical Design Review Plan	
	Document No.: FCF-PO-PLAN-0005	Rev.: Initial Release

APPENDIX E – DRAFT AGENDA

The most current agenda will be provided on the SW CDR website at <https://fcf.grc.nasa.gov/cdr/sw.html>