

**MWI 8071.1
REVISION G**

**EFFECTIVE DATE: December 11, 2019
EXPIRATION DATE: December 11, 2024**

MARSHALL WORK INSTRUCTION

ED01

FRACTURE CONTROL BOARD

COMPLIANCE IS MANDATORY
DIRECTIVE IS UNCONTROLLED WHEN PRINTED
Verify current version before use at <https://dml.msfc.nasa.gov/directives>

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DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Change/ Revalidation/ Canceled)	Document Revision/ Change	Effective Date	Description
Baseline		10/28/99	
Revision	A	3/22/2004	Added reference to NASA-STD-5007, updated Master List URL, updated appendix B, updated paragraph formatting (per MPG 1410.2)
Revision	B	10/28/2004	Update to current format, complied with HQ rules review action
Revision	C	6/22/2005	Update for current MSFC organization
Revision	D	1/23/2008	Update references, records, and Appendix B.
Revision	E	5/13/2008	Revised 2. Applicability statement to address the applicability of this directive to the Michoud Assembly Facility.
Revision	F	10/25/13	Revised to address 5-year expiration, format to new MWI template, and remove responsibilities statements.
Revision	G	12/11/2019	Revised to address 5-year expiration, adjust organizational codes following reorganization, and remove references to obsolete technical standards. Updated 5.4.4.

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1. PURPOSE

To provide instructions for the Fracture Control Board (FCB) process in order to comply with NASA-STD-5019A and NPR 1441.1.

2. APPLICABILITY

2.1 This MWI applies to Center personnel, programs, projects, and activities, including contractors and resident agencies to the extent specified in their respective contracts or agreements. (“Contractors,” for purposes of this paragraph, include contractors, grantees, Cooperative Agreement recipients, Space Act Agreement partners, or other agreement parties.)

2.2 This MWI applies to the Michoud Assembly Facility.

2.3 This MWI applies the following: all mandatory actions (i.e., requirements) are denoted by statements containing the term “shall.” The terms: “may” or “can” denote discretionary privilege or permission, “should” denotes a good practice and is recommended, but not required, “will” denotes expected outcome, and “are/is” denotes descriptive material.

2.4 This MWI applies the following: all document citations are assumed to be the latest version unless otherwise noted.

2.5 This MWI applies to all spaceflight hardware per NASA-STD-5019A.

3. AUTHORITY

3.1 NPR 1441.1, NASA Records Management Program Requirements

3.2 NRRS 1441.1, NASA Records Retention Schedules

3.3 NASA-STD-5019A, Fracture Control Requirements for Spaceflight Hardware

4. APPLICABLE DOCUMENTS AND FORMS

None.

5. INSTRUCTIONS

5.1 FCB Process. The fracture control programs for applicable MSFC spaceflight hardware shall be reviewed by the FCB.

5.1.1 Fracture control related data shall be developed by the Project/Program Organization (PPO) and submitted to the FCB for review and approval according to the schedule of the project/program design reviews as detailed below.

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Project/Program Design Review	Data Required
circa the Systems Requirements Review	Fracture Control Plan
circa the Preliminary Design Review	Fracture Control Plan Update Preliminary Fracture Mechanics Analysis Results
circa the Critical Design Review	Fracture Control Plan Update Fracture Mechanics Analysis Results Update
30 days prior to the Functional Certification Audit or Pre-shipment Review	Complete Fracture Control Report

5.1.1.1 Fracture control data shall be provided to the FCB in written form and/or oral presentation.

5.1.1.2 When requested by the PPO, the FCB shall also review specific fracture control issues during the design process, after shipment, and/or during the service life of the hardware.

5.1.2 Following each meeting or review by the FCB of project/program fracture control issues, a memorandum shall be prepared detailing the discussions, any action items, and FCB approval or concurrence, and communicated following the procedure detailed in Appendix D.

5.2 FCB Actionee Instructions

<u>Actionee</u>	<u>Shall Perform All Actions</u>
ED01/QD01	5.2.1 Jointly issue FCB appointment letters. (See Appendix E.)
ED01	5.2.2 Approve all assignments from ED01 to the FCB.
QD01	5.2.3 Approve all assignments from QD01 to the FCB.
Chairperson	5.2.4 Perform the duties assigned to the MSFC FCB.
	5.2.5 Assign action items as necessary to correct deficiencies identified in the review process.
FCB	5.2.6 Support the MSFC FCB Chairperson in performing the duties assigned to the FCB.
	5.2.7 Participate in all scheduled FCB meetings.
	5.2.8 Review and comment on documents submitted to the FCB for review.

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- 5.2.9 Act as liaison with parent organization on issues concerning fracture control.
- FCBTS 5.2.10 Schedule FCB meetings and provide meeting notification.
- 5.2.11 Distribute documents submitted to the FCB for review.
- 5.2.12 Collect FCB members' comments on reviewed documents.
- 5.2.13 Participate in all scheduled FCB meetings.
- 5.2.14 Draft FCB review and approval letters.
- EM21 Records Custodian 5.2.15 Maintain records and files of FCB activity.
- PPO 5.2.16 Submit necessary fracture control documents to the FCB for review and approval per the schedule in 6.1.1.
- 5.2.17 Participate and support scheduled FCB meetings.
- 5.2.18 Respond to action items as assigned.

5.3 FCB Organization. The MSFC QD01 Director and the ED01 Director shall assign FCB members and their alternates from the following organizations:

Position	Organization
Chairperson	EM21
Technical Secretary	EM21
Safety and Mission Assurance	QD01
Non-Destructive Evaluation	EM21
Materials/Fracture Mechanics	EM21
Materials/Welding	EM31/EM32
Propulsion/Fracture Mechanics	ER41
Spacecraft/Fracture Mechanics	EV31/EV32
Payload/Fracture Mechanics	ES22

5.3.1 The members and their alternates shall be appointed by letter sent to Center-wide standard distribution (SDL-1). An example letter is given in Appendix E.

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5.4 Procedure For Processing FCB Memoranda

5.4.1 The FCB Technical Secretary (FCBTS) shall draft a memorandum to transmit information and submit the memorandum draft to the EM21 Records Custodian.

5.4.2 The EM21 Records Custodian shall record the memorandum in the EM21 FCB Memorandum Log Book, and assign a unique memorandum number to each draft memorandum.

5.4.3 The EM21 Management Support Assistant shall type the memorandum making grammatical and format corrections as needed.

5.4.4 Memorandum concurrence shall be provided by the FCBTS, the FCB Alternate Chairperson, and approved by the FCB Chairperson.

5.4.5 Upon approval of the memorandum, the EM21 Records Custodian shall record the memorandum's approval in the EM21 FCB Memorandum Log Book and file a copy of the memorandum as a record.

5.4.6 The EM21 Records Custodian shall also provide copies of the memorandum (and attachments) per distribution instructions provided in the memorandum.

5.5 Notes

Appendix E contains a sample FCB appointment letter. Actual appointment letters are to be prepared on official MSFC letterhead.

6. CANCELLATION

MWI 8071.F, Fracture Control Board dated October 25, 2013.

Electronically approved by

Jody Singer
Director

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APPENDIX A

Definitions

Chairperson. The individual designated by the Director, Engineering Directorate (ED01) to lead the FCB.

Chairperson, Alternate. An FCB member appointed by the Chairperson to lead the FCB in his/her absence.

Director, ED01. The management official in charge of approving ED01 assignments to the FCB.

Director, Safety and Mission Assurance Directorate (QD01). The management official in charge of approving QD01 assignments to the FCB.

FCB. A team of MSFC personnel that review and approve the fracture control of all human-rated MSFC spaceflight hardware.

FCB Technical Secretary (FCBTS). An FCB member assigned from the Damage Tolerance Assessment Branch (EM20) who acts as an assistant to the Chairperson.

Project/Program Organization (PPO). The MSFC organization charged with project management responsibility for the project or program.

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APPENDIX B

Acronyms

FCB	Fracture Control Board
FCBTS	Fracture Control Board Technical Secretary
PPO	Program/Project Organization

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APPENDIX C

Verification Matrix

(NONE)

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APPENDIX D

Records

D.1 The FCB's policy is to document meetings and reviews by memorandum. EM21 maintains the following FCB records if produced during the MSFC FCB process:

D.1.1 Review and approval letter containing action items, if any.

D.1.2 Attendance list.

D.1.3 Similar documentation produced by any follow-on board activity.

D.2 FCB documentation is maintained at least 6 years after program/project termination per NRRS schedule 8/103, 8/107, and NASA-STD-5019A section 4.4. Older documents may be stored as space allows and then archived or destroyed. The documentation is maintained in EM21.

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APPENDIX E

Example of the Appointment of FCB Members

ED01(022-19)

TO: Distribution

FROM: ED01/Joe L. Leopard
QD01/Richard K. Burt

SUBJECT: Marshall Space Flight Center (MSFC) Fracture Control Board (FCB) Membership

Effective July 1, 2019, the FCB Chairperson and members, per MWI 8071.1, are as follows:

Dr. Gregory Swanson/EM21	Chairperson
Dr. Preston McGill/EM21	Alternate Chairperson
Mr. Jonathan Burkholder/EM21	Technical Secretary
Mr. Samuel Cordner/EM21	Alternate Technical Secretary
Ms. Lisa Roth/ES22	Payload/Fracture Mechanics
Ms. Sarah Sandridge/ES22	Payload/Fracture Mechanics (Alternate)
Mr. Brian Steeve/EV31	Spacecraft/Fracture Mechanics
Ms. Dawn Phillips/EV31	Spacecraft/Fracture Mechanics (Alternate)
Mr. Jeffery Rayburn/ER41	Propulsion/Fracture Mechanics
Mr. Jim Hawkins/ER41	Propulsion/Fracture Mechanics (Alternate)
Mr. Craig Bryson/EM21	Non-Destructive Evaluation
Dr. Samuel Russell/EM21	Non-Destructive Evaluation (Alternate)
Mr. Jeffery Sowards/EM32	Materials/Welding
Ms. Kristina Rodgers/EM31	Materials/Welding (Alternate)
Mr. Joel Hobbs /EM21	Materials/Fracture Mechanics
Mr. Nathan Butler/EM21	Materials/Fracture Mechanics (Alternate)
Mr. Douglas Wells/EM21	Additive Manufacturing/Fracture Mechanics
Mr. Kevin Wallace/QD01	Safety and Mission Assurance
Mr. James Rogers/QD35	Safety and Mission Assurance (Alternate)

Joe L. Leopard	Richard K. Burt
Director	Director
Engineering Directorate	Safety and Mission Assurance Directorate

Distribution:

SDL-1

EM21/Mr. Butler/Mr. Bryson/Mr. Burkholder/Dr. McGill/Dr. Russell/Dr. Swanson
/Mr. Wells/Mr. Cordner/Mr. Hobbs

EM32/Mr. Sowards/Ms. Rodgers

ER41/ Mr. Hawkins/Mr. Rayburn

ES22/Ms. Roth/Ms. Sandridge

EV31/Ms. Philips/Mr. Steeve

QD35/Mr. Rogers

QD01/Mr. Wallace

E X A M P L E

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APPENDIX F

References

NASA-HDBK-5010, Fracture Control Implementation Handbook for Payloads, Experiments, and Similar Hardware

MSFC-RQMT-3479, Fracture Control Requirements for Composite and Bonded Vehicle and Payload Structures