

		Work Instruction			
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Approvals				
Title	Org	Name	Signature	Date
Process Owner	NASA	Robert Vernier	Original Signature on File	9/16/03
Originator	MIC	William Chambers	Original Signature on File	9/4/03
Safety	MIC	Melonie Scofield	Original Signature on File	9/5/03
Function Manager	MIC	Nabil Copty	Original Signature on File	9/5/03
Quality Assurance	MIC	John Schwabe	Original Signature on File	9/5/03

Reference Documents	
Document Number	Document Title
NASA: 5405-048-98	Mechanical Systems Center Safety Manual

1. Purpose

The purpose of this WI is to define the safety evaluation process for test and integration services provided by the Environmental Test Engineering and Integration Branch, Code 549.

2. Scope

The safety evaluation process defined in this WI is applicable to potential hazards introduced to the Building 7/10/15/29 Environmental Test and Integration Complex from test or support items introduced to the facility by facility customers. The safety evaluation is not required for simple proof testing or annual load testing of lifting devices and equipment, or dollies.

3. Definitions and Acronyms

Customer	The term Customer refers to the organization or person responsible for Test Articles that are delivered to the I&T Complex for integration and test. Customers can be internal to GSFC such as from the Flight Projects Directorate, or external from GSFC such as other NASA Centers, Universities, other Government Agencies, or contractors working on NASA programs. The service provider to these customers is GSFC. Customers can also be industry or commercial enterprises that have access to the facility resources through the Non-Government Use clause of the Environmental Test and Integration Services (ETISS) Contract. The service provider to these customers is the ETISS contractor. The safety evaluation process is the same for both types of customers, however the review and approval of the safety evaluation is different. Attachment II provides Signature/Routing sheet pages to be used depending whether the service provider is GSFC or the ETISS contractor.
EPE	Environmental Project Engineer
I&T Complex	The term I&T Complex refers to the GSFC Buildings 7/10/15 and 29 Test and Integration Complex, including the 300 Area Magnetic Test Facility.

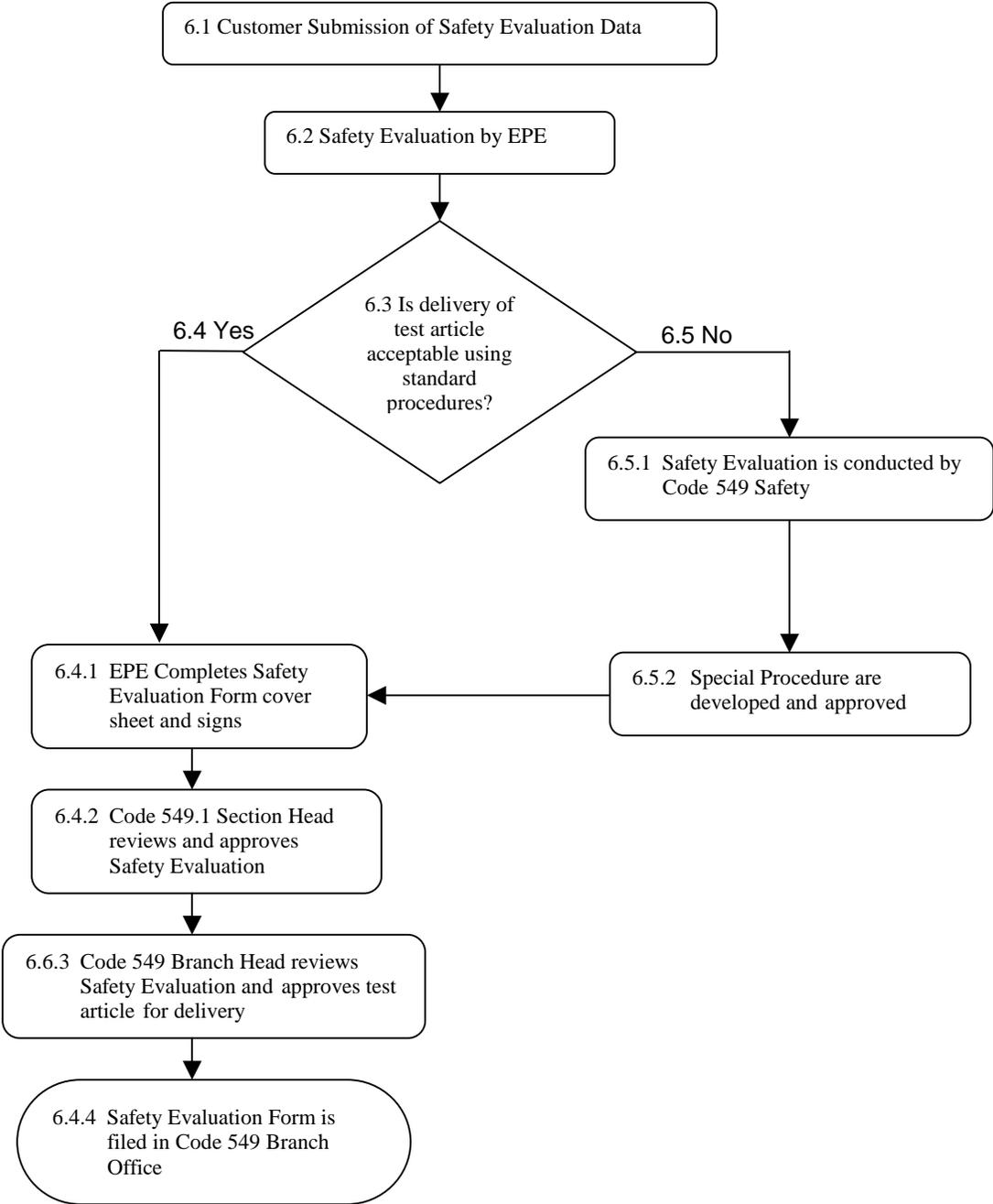
	<h1>Work Instruction</h1>	 <small>MANTECH INTERNATIONAL CORPORATION</small>
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Safety Evaluation Form	The Safety Evaluation Form is a questionnaire that was developed to facilitate the identification of hazards that are introduced to the I&T Complex by the delivery, test, integration, or operation of Test Articles. The Safety Evaluation Form format is controlled via this WI. The current version is attached to this WI.
PSM	Code 302 Project Safety Manager

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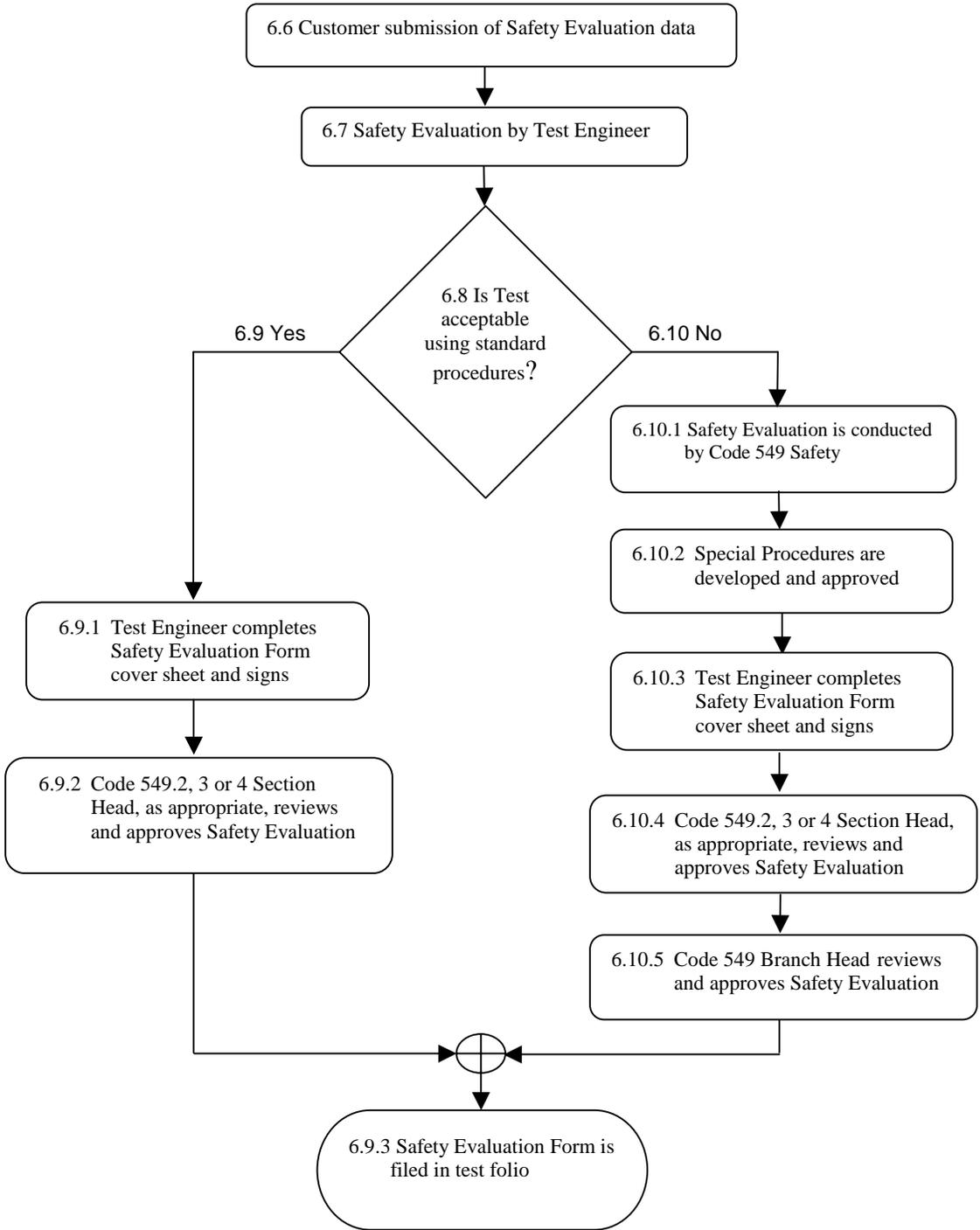
4. Flowcharts

Initial Safety Evaluation Prior to Test Article Delivery



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Subsequent Safety Evaluation Prior to Testing



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5. Authority and Responsibility

5.1 Customer Project Manager

- a. Responsible for information provided in the Safety Evaluation Form concerning potential hazards involved with the test article, it's support equipment, or intended operations within the I&T Complex.
- b. The Project Manager or his designated safety representative signs the Safety Evaluation Form thereby certifying that the information provided is complete and correct.
- c. Responsible for submission of the completed Safety Evaluation Form to the Environmental Project Engineer or Test Engineer as appropriate.

5.2 Environmental Project Engineer (EPE)

- a. Responsible for reviewing the initial submittal of the Safety Evaluation Form data and conducting a safety evaluation to ensure that any hazard associated with the delivery of the test item and support equipment, or the delivery operation, are mitigated properly. EPEs may request support from the Code 549 Safety Engineer or Code 302 Project Safety MGR (PSM).
- b. Ensure that completed Safety Evaluation Forms are delivered to the Code 549 Branch Head at least one week prior to the delivery of Test Articles to the I&T Complex.
- c. Responsible for ensuring that delivery of Test Articles to the I&T Complex is performed in accordance with procedures identified during the safety evaluation.

5.3 Code 549.1 Environmental Project Engineering Section Head

- a. Responsible for reviewing and approving the initial submission and updates for specific tests of the Safety Evaluation form and ensuring that it is received by the Code 549 Branch Head one week prior to arrival of the test article.

5.4 Code 549 Environmental Test Engineering and Integration Branch Head

- a. Responsible for reviewing the initial submittal of the Safety Evaluation Form and approving the acceptance of delivery of the test article to the Integration and Test Complex.
- b. Responsible for reviewing and approving all Safety Evaluation Forms that indicate that non-standard procedures are required to mitigate hazards.
- c. Responsible for safe operations within the I&T Complex.

5.5 Code 549 Test Engineer

- a. Responsible for reviewing the Safety Evaluation Form data and conducting a safety evaluation to ensure that any hazards associated with the planned test are mitigated properly.
- b. Responsible for safe test operation.

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5.6 Code 549 Safety Engineer

Provides safety consulting services to Code 549 engineers. This responsibility includes reviewing customer provided safety evaluation data and ensuring that acceptable safety controls or procedures are in place when standard procedures are inadequate to mitigate identified hazards.

5.7 Test Engineering Section Heads for Code 549.2, Code 549.3 and Code 549.4

- a. Responsible for review and approval of Safety Evaluations that are conducted for testing to be performed under the cognizance of their Section.
- b. Responsible for safe test operations within Section facilities.

5.8 Code 302 PSM

The Code 302 PSM provides system safety engineering support to the Code 549 Safety Engineer and EPE on an as needed basis.

6. Procedure

Initial Safety Evaluation Prior to Test Article Delivery

6.1 Customer submission of safety evaluation data The Project Manager or his delegate completes the Safety Evaluation Form and signs the form certifying that the information is correct and complete. The completed form and required backup data is then submitted to the Code 549 Environmental Project Engineer (EPE).

6.2 Safety evaluation by EPE The EPE conducts a safety evaluation and determines if standard operational procedures are sufficient to address any identified hazards that may be associated with delivery and receipt of the test article to the I&T Complex.

6.3 Is delivery of test article acceptable using standard procedures? The EPE decides if standard procedures are sufficient or not and proceeds to step 6.4 or 6.5 as appropriate.

6.4 Yes Standard procedures are acceptable.

6.4.1 EPE completes Safety Evaluation Form cover sheet and signs The EPE completes the safety evaluation summary table on the cover sheet, inserts and signs the appropriate signature page from Attachment 2, and submits the form to the Code 549.1 Section Head.

6.4.2 Code 549.1 Section Head reviews and approves Safety Evaluation

6.4.3 Code 549 Branch Head reviews Safety Evaluation and approves test article for delivery The Completed Safety Evaluation Form must be submitted to the Branch Head at least one week prior to the delivery of the Test Article to the Test and Integration Complex.

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6.4.4 Safety Evaluation Form is filed in Code 549 Branch Office

6.5 No Standard procedures are not sufficient to mitigate potential hazards.

6.5.1 Safety Evaluation is conducted by Code 549 Safety The Safety Evaluation Form is submitted by the EPE to Code 549 Safety Engineer for review. Code 302 PSM is consulted as necessary.

6.5.2 Special procedures are developed and approved The Code 549 Safety Engineer working with the EPE and project personnel manage the development of special controls or procedures that mitigate the hazard. After special procedures or controls have been developed the WI process goes to step 6.4.1.

Subsequent Safety Evaluation Prior to Testing

6.6 Customer submission of Safety Evaluation data Prior to the start of each test series another Safety Evaluation is performed that is specific to the test to be conducted. The reason for this is that the configuration of the test article may have changed from the initial delivery, such as the addition of energy storage devices, or that new hazards may be present due to the specific test or test facility to be used. The term “test series” refers to work to be performed in Code 549 that requires a test folio. If no changes have occurred to the test article from its initial delivery, the project manager or his delegate may initial and date a copy of the original Safety Evaluation Form and submit the copy.

6.7 Safety Evaluation by Test Engineer The Test Engineer conducts a safety evaluation to determine if standard procedures are sufficient to address any identified hazards that may be associated with the planned test.

6.8. Is test acceptable using standard procedures? The test Engineer decides if standard procedures are sufficient or not and proceeds to step 6.9 or 6.10 as appropriate.

6.9 Yes Standard procedures are acceptable.

6.9.1 Test Engineer completes Safety Evaluation Form cover sheet and signs The Safety Evaluation Form is then submitted to the appropriate Code 549 Section Head.

6.9.2 Code 549.2.3.4 Section Head reviews and approves Safety Evaluation

6.9.3 Safety Evaluation Form is filed in the test folio

6.10 No, Standard procedures are not sufficient to mitigate potential hazards.

6.10.1 Safety Evaluation is conducted by Code 549 Safety The Safety Evaluation Form is submitted to Code 549 Safety Engineer for review. Code 302 PSM is consulted as necessary.

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6.10.2 Special procedures are developed and approved The Code 549 Safety Engineer working with the test Engineer and project personnel manages the development of special controls or procedures that mitigate the hazard.

6.10.3 Test Engineer completes Safety Evaluation Form cover sheet and signs The Safety Evaluation Form is then submitted to the appropriate Code 549 Section Head.

6.10.4 Code 549.2,3,4 Section Head reviews and approves Safety Evaluation

6.10.5 Code 549 Branch Head reviews and approves Safety Evaluation The Form is then filed in test folio, Step 6.9.3.

7. Records

The following Quality Records (QR) are associated with this process and are maintained by ManTech-ATAC or Code 549.

Name	Type P/E	Contact	Location	Index	Archive Rqmnt
Safety Evaluation Form and data	P	Applicable Section	Test folio	By test & date	5 Year(s)

P/E= Paper or Electronic



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Revision History			
Rev	Description of Change	Author	Effective Date
0	Initial Release	William Chambers	9/16/03



**Environmental Test and Integration
System, Subsystem, or Equipment
Safety Evaluation Form**

Project: _____

Subsystem: _____

Test Item: _____

- Operation: Initial Delivery to I&T Complex or Mag Test Facility – Code 549.1
 Structural Dynamics Test – Code 549.2
 Electromagnetic Test – Code 549.3
 Space Simulation Test – Code 549.4

Note: The initial submission must be presented to the Code 549 Branch Head for review at least one week prior to arrival of hardware at the Environmental Test and Integration Facility. Safety evaluation updates will then occur as required.

Evaluation Summary to be completed by Code 549

Hazard	N/A	Standard Operating Procedures	Hazard Mitigation Required (TBD)	Hazard Mitigation Procedures Complete
1. Mechanical Handling				
2. Ordnance				
3. Pressure and Vacuum Systems				
4. Stored Energy Devices				
5. Hazardous Materials & Hazardous Waste				
6. Non-ionizing Radiation Systems				
7. Ionizing Radiation Sources				
8. Electrical Systems & Equipment				
9. Noise				
10. Unique/Experimental Systems				
11. Vacuum Compatible Materials				

Replace This Page With Appropriate Signature Page

Environmental Test and Integration System, Subsystem or Equipment Safety Evaluation Form

The Environmental Test and Integration Branch (Code 549) will use this information to evaluate the safety aspects of your system, subsystem, or equipment and how your hardware interfaces with facility systems. The following checklist must be completed and submitted to the Code 549 Evaluator for review one week prior to arrival of your equipment at the Environmental Test and Integration Complex (Buildings 7/10/15/29 and the Magnetic Test Site). If other than Standard Operating Procedures are required to control a hazard, then a Hazard Mitigation Plan must be submitted to the Code 549 Branch Head and Safety Office for approval. All residual hazards must be mitigated prior to testing. Procedures must be submitted for all hazardous operations and approved by Code 549 prior to the start of the operation.

Please answer yes or no to the following statements. The status column is to be used for approval, references, or certification dates. Shaded boxes indicated areas where resolution may be necessary.

1. Mechanical Handling

Yes No Status

Are crane or forklift or personnel lift operations required?

--	--	--

If no, proceed to #2.

- a. Will personnel be required to be underneath a crane-suspended load? (If yes a waiver is required.)
- b. Have stress and stability analyses been performed? Attach report.
- c. Are slings tagged indicating the equipment identifier, safe working load, test load, and due date of recertification?
- d. Have lifting slings/devices been tested/certified to NPG 8619.9? Attach test report.
- e. If components can be disassembled, have they been serialized, color coded, or equivalently identified, to ensure components have not been replaced or the configuration changed?
- f. Have your critical welds, hoist rings, eyebolts, and hooks been nondestructive tested(if the weld is removed, the sling will fail)? Attach NDI reports, along with NDI inspector's certification.
- g. Has your handling dollie been proof tested? Attach report.
- h. Have your jacks used for critical loads been annually load tested?

Comments/additional information: _____

2. Ordnance

Yes No Status

Does the system, subsystem, or equipment have or will have ordnance (electro-explosive devices, pyrotechnics, Pyrophorics, etc.) installed?

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If no, proceed to #3.

- a. Will ordnance be installed or fired in the MSC facilities? Indicate the DOT class of ordnance.

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Comments/additional information: _____

Note: Prior to ordnance arrival on the Center, GSFC Safety and Environmental Branch must be notified as to the DOT class and quantity of all ordnance. Ordnance must not be stored in MSC facilities without prior approval of GSFC Safety and Environmental Branch.

3. Pressure & Vacuum Systems

Yes No Status

Are there systems/components, including cold plates or cryopanel, which are or will be pressurized (flight/ground)?

--	--	--

If no, proceed to #4.

- a. Are proof pressurization tests planned for the MSC facilities?
 b. Do the systems have a safe factor of less than 4 to 1?
 c. Have coldplates or cryopanel been LN₂ shocked?

Procedures are required for all pressure testing. Data on proof test, leak test and burst pressures and test reports on coldplates/cryopanel are required.

Comments/additional information: _____

4. Stored Energy Devices

Yes No Status

- a. Are there batteries?
 b. Do systems have stored energy (springs, booms, etc.)?
 c. Are there non-solid state gyros?
 d. Will there be solar array or other deployments?
 e. Will reaction wheels be operated?
 f. Are there kinetic or rotational systems?
 g. Are there pyrophoric devices?

Comments/additional information: _____

7. Ionizing Radiation Sources

(NRC licensed sources, x-ray producing machines, particle accelerators, accelerator produced radioisotopes, or radium and its daughter products)

Yes No Status

Are there ionizing radiation sources?

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Copies of GSFC form 23-35IP, 23-6I and 23-28I for NRC sources or 23-6I (Device) and 23-28I (Device) for ionizing radiation producing equipment must be approved by GSFC Health Physics Office, Code 250.9 prior to arrival on GSFC.
 Comments/additional information: _____

8. Electrical Systems & Equipment

Yes No Status

Are there electrical systems, subsystems, or equipment?

--	--	--

If no, proceed to #9.

- a. Is the equipment commercial?
- b. Is the equipment non-commercial or has the commercial equipment been modified?
- c. Is the equipment grounded?
- d. Does the equipment have exposed, live electrical components, which may be accidentally contacted by personnel?
- e. Does the equipment have adequate fuses or breakers?
- f. Are connectors keyed to prevent improper connection?

Comments/additional information: _____

9. Noise

Yes No Status

Do systems, subsystems, or equipment create noise above 80 dBA?

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Comments/additional information: _____

10. Unique/Experimental Systems

Yes No Status

- a. Is the payload sensitive to unusually high atmospheric concentrations of helium?
- b. Would the presence of Hydrocarbons interfere with the operation or sensitivity of any instruments or detectors?
- c. Are there potentially hazardous systems that are not addressed by this questionnaire?

Comments/additional information: _____

11. Vacuum Compatible Materials

Yes No Status

Will a thermal vacuum test be performed on the system, subsystem, or equipment?

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If no, proceed to signature page.

- a. Is the system, subsystem, or equipment fabricated entirely of vacuum compatible materials with a Total Mass Loss of $\leq 1.0\%$ and Collected Volatile Condensable Material $\leq 0.1\%$?
- b. Is all chamber GSE (harnesses, auxiliary equipment, etc.) fabricated entirely of vacuum compatible materials with a Total Mass Loss of $\leq 1.0\%$ and Collected Volatile Condensable Material $\leq 0.1\%$?
- c. Are tape adhesives vacuum compatible?

Comments/additional information: _____

Attachment 2 Signature/Routing Sheets

- 1) Routing Sheet for Approval for Delivery of Government Project Test Articles and Equipment**
- 2) Routing Sheet for Approval for Delivery of Non-Government Project Test Articles and Equipment**
- 3) Routing Sheet for Approval for Test of Government Project Test Articles**
- 4) Routing Sheet for Approval for Test of Non-Government Project Test Articles**

Environmental Test and Integration Safety Evaluation Form

Routing Sheet for Approval for Delivery of Government Project Test Articles and Equipment

1) Project Manager Safety Delegate:

Printed Name _____ Title _____ Date _____

Signature _____

I, _____ certify that the enclosed information is correct and complete:

2) Safety Evaluation Conducted by Code 549 Environmental Project Engineer

Printed Name _____ Signature _____ Date _____

3) Reviewed by Code 549.1 Section Head

Printed Name _____ Signature _____ Date _____

4) Approved for delivery by Code 549 Branch Head

Printed Name _____ Signature _____ Date _____

5) Other signatures if required

a) Printed Name _____ Title _____

Signature _____ Date _____

b) Printed Name _____ Title _____

Signature _____ Date _____

Environmental Test and Integration Safety Evaluation Form

Routing Sheet for Approval for Delivery of Non-Government Project Test Articles and Equipment

1) Project Manager Safety Delegate:

Printed Name _____ Title _____ Date _____

Signature _____

I, _____ certify that the enclosed information is correct and complete:

2) Safety Evaluation Conducted by MANTECH

Printed Name _____ Title _____

Signature _____ Date _____

3) Approved by MANTECH Management

Printed Name _____ Title _____

Signature _____ Date _____

4) Approved for delivery by Code 549 Branch Head

Printed Name _____ Signature _____ Date _____

5) Other Signatures if required

a) Printed Name _____ Title _____

Signature _____ Date _____

b) Printed Name _____ Title _____

Signature _____ Date _____

Environmental Test and Integration Safety Evaluation Form

Routing Sheet for Approval for Test of Government Project Test Articles

1) Project Manager Safety Delegate:

Printed Name _____ Title _____ Date _____

Signature _____

I, _____ certify that the enclosed information is correct and complete:

2) Safety Evaluation Conducted by Code 549 Test Engineer

Printed Name _____ Signature _____ Date _____

3) Approved for Test by Code 549 Section Head

Printed Name _____ Signature _____ Date _____

4) Other Signatures if required

a) Printed Name _____ Title _____

Signature _____ Date _____

b) Printed Name _____ Title _____

Signature _____ Date _____

Environmental Test and Integration Safety Evaluation Form

Routing Sheet for Approval for Test of Non-Government Project Test Articles

1) Project Manager Safety Delegate:

Printed Name _____ Title _____ Date _____

Signature _____

I, _____ certify that the enclosed information is correct and complete:

2) Safety Evaluation Conducted by MANTECH

Printed Name _____ Signature _____ Date _____

3) Approved for Test by Code 549 Section Head

Printed Name _____ Signature _____ Date _____

4) Other Signatures if required

a) Printed Name _____ Title _____

Signature _____ Date _____

b) Printed Name _____ Title _____

Signature _____ Date _____