

		<b>CERN/LHC – US/LHC MOU ON ACCELERATOR MECHANICAL SAFETY</b>	
<i>US LHC Accelerator Project Document No. (if required)</i>  <b>N/A</b>	<i>CERN LHC Document No. (if required)</i>  <b>TIS-TE-MB-98-74</b>	<i>Created</i> <b>14-DEC-98</b>	<i>Page</i> <b>1 of 6</b>
		<i>Modified</i>	<i>Rev. No.</i> <b>1.0</b>

## MEMORANDUM OF UNDERSTANDING

### **I. Purpose**

This Memorandum of Understanding (MOU) defines the mutual interactions between the CERN Technical Inspection and Safety Commission (TIS) and the US LHC Accelerator Project with respect to the structural safety of mechanical equipment manufactured or purchased by the US Laboratories and delivered to CERN for installation in the LHC. This MOU is compliant with the Implementing Arrangement between CERN and the US Laboratory Collaboration and the US LHC Accelerator Project Management Plan. This MOU does not address non-safety related QA tests, inspections, certifications, etc. that will be required such as leak checks or acceptance tests upon arrival at CERN. These requirements will be defined in other documents.

### **II. Transfer of Responsibilities from CERN/TIS to the US Laboratories**

Each US Laboratory has procedures that require the independent review of devices, culminating in formal certifications authorizing the operation of the device in that laboratory. The US Project and CERN/TIS-TE (Technical Services and Environment Group) personnel will review the safety program of each of the US laboratories to verify that the individual safety structures are equivalent to those of TIS.

Upon satisfactory completion of the review, TIS will transfer the following responsibilities to the US Project:

- Assessment of design details and fabrication checks/tests by the relevant US Lab. This corresponds to the work usually done at CERN by TIS-TE between steps a and b in the Table 1 below.
- Verification by the relevant US Lab that all fabrication checks/tests are successfully completed with acceptable results. This corresponds to the work done at CERN by TIS-TE between steps b and c in Table 1 below.

Table 1 – Equivalence Between CERN and US Laboratory Approvals	
CERN	US Labs
a) Issue of general remarks, based on preliminary information provided to TIS-TE in support of the initial safety discussion.	Approval to proceed with engineering design based on the results of the Conceptual Design Review (CDR).
	Approval to proceed with detailed design, parts and tooling based on the results of the Engineering Design Review (EDR).
b) Issue of the TIS Safety Study Report, completion of the design assessment based on the Engineering File, authorization within CERN to issue tender or begin fabrication.	Approval to begin fabrication based on the results of the Production Readiness Review (PRR).
c) Issue of the Safety Inspection Report and CERN authorization to install based on positive results of all fabrication checks and of final testing.	Issue of US Laboratory certification authorizing use of the device for its intended purpose.

These responsibilities will be executed by the safety structure of the relevant US Laboratory for each of the items provided by the CERN-US Laboratory Collaboration. The standard safety procedures of the US Laboratory will apply except where different agreements are reached between the US Project and TIS.

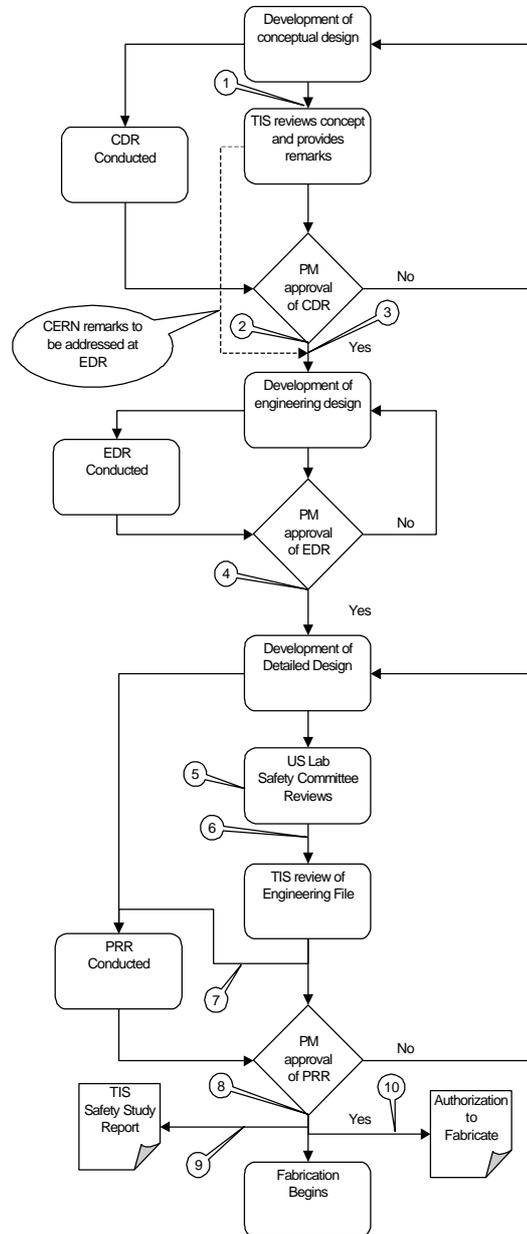
### **III. General Approach**

TIS will ensure that the equipment provided by the US Project conform to CERN safety standards as specified in Paragraph III.F of the Implementing Arrangement by issuing formal documents as indicated in the general approach outlined below. This general approach is consistent with the CERN Safety Policy, in particular with CERN Safety Code D2 Rev 2 and is valid for any systems or devices produced or procured by the US Laboratories.

1. At the time of the CDR for each design type, the US Project will provide TIS-TE with preliminary technical information describing the equipment. This is intended to provide TIS-TE with sufficient information with which to confirm the nature of the design type, e.g. pressure vessel.
2. The US Project will provide TIS-TE with a copy of the official report documenting the CDR.
3. TIS-TE will issue a formal document (step a) to the US Project Manager stating that either there are no remarks or there are comments or recommendations that must be

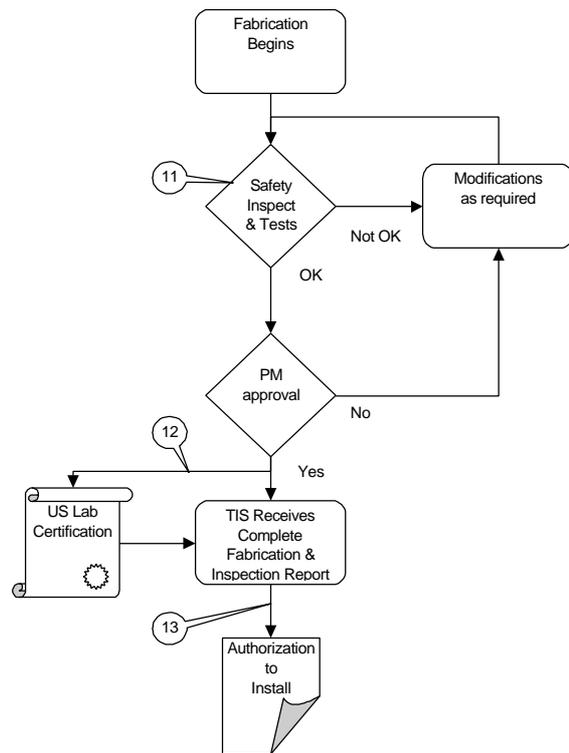
addressed in the EDR. TIS-TE may also make arrangements through the EDR Committee Chairman to attend the EDR.

4. The US Project will provide TIS-TE with a copy of the official report documenting the EDR.
5. The safety structure of the relevant US Lab will monitor and assess the detailed design and the fabrication, inspection, and quality assurance plans to be followed.
6. Prior to the PRR the US Project will provide TIS-TE with a copy of the design contents of the Engineering Safety File described in Section IV. Fabrication related contents of the file that are specific to each individual unit (e.g. material certifications) will be provided with the device.
7. Before the PRR, TIS-TE will notify the US Project Manager stating that either there are no remarks or there are comments that must be addressed at the PRR. TIS may make arrangements through the PRR Committee Chairman to attend the PRR if desired.
8. The US Project will officially communicate the results of the PRR to TIS-TE immediately after the PRR. The US Project will provide TIS-TE with a copy of the PRR report.
9. TIS-TE will issue a Safety Study Report immediately after the PRR, addressed to the US Project Manager, confirming that there are no open issues regarding safety of the design or the readiness for production.
10. The US Project Manager will authorize production to begin (step b). This authorization is based on a positive recommendation by the PRR Committee and the confirmation from both the PRR Committee and TIS-TE that there are no open issue regarding safety of the design.
11. The safety structure of the relevant US Lab will verify that all of the planned inspections, checks, and tests are successfully carried out.



12. The relevant US Lab will produce official laboratory certification indicating that the device was fabricated, inspected, and tested according to the agreed criteria and is considered safe for its intended purpose in the LHC at CERN. Relevant inspection, check, and test documentation will accompany the certification. Material certifications and tests are expected to be available at this time.

13. TIS-TE will issue a formal document, addressed to the CERN LHC Project Leader or his designee, with a copy to the US Project Manager, granting the authorization to install the device at CERN (step c). This is based on receipt of the official US Lab certification.



#### IV. *Delivery of Specified Documents*

The Engineering Safety File for each device will be supplied to TIS-TE. The standard contents of the Engineering Safety File will be:

- Design Specifications and Calculations
- Material Certifications and Tests
- Operating and Installation Procedures
- Equipment Drawings
- Planned Inspections and Tests
- Descriptions of Planned Safety Devices
- Results of US Laboratory safety reviews

Additional documents will be included as appropriate.

#### V. *Use of the ASME Pressure Vessel Code*

The ASME Code will be used for the design, construction, and testing of mechanical equipment, or parts of mechanical equipment, that are designated as pressure vessels. In addition, the requirements of CERN Safety Code D2 Rev 2 will be applied when they are more stringent than those of the ASME Code.

- In the case of pressure equipment *purchased from industry* the equipment will bear the ASME Code stamp.

- In the case of pressure equipment *manufactured within the participating laboratories* of the US LHC Accelerator Project the intent of the ASME Code will be followed, however, the US Laboratories do not have the ability to apply the ASME Code stamp. Instead, the equipment will bear the certification of the responsible laboratory.

#### **VI. Evaluation of Equipment not Designated as Pure Pressure Vessels**

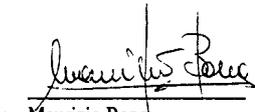
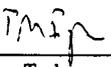
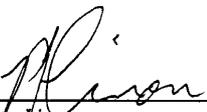
Some equipment may be designated as not being pure pressure vessels. Their design, fabrication, and testing may require provisions other than or beyond that specified by the ASME Pressure Vessel Code. Such equipment will be subjected to additional engineering evaluation as agreed upon between the US Project and TIS-TE, consistent with good engineering practice and the requirements of the responsible laboratory.

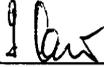
#### **VII. Evaluation of Equipment Provided by CERN**

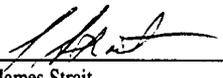
Some equipment may be supplied by CERN for assembly into systems provided by the US Project and tested at one of the US Laboratories. For the equipment, CERN will provide sufficient documentation to enable the laboratory to meet its internal safety requirements. It is anticipated that an Engineering Safety File as described above will be available for each equipment item and will contain the information needed. Additional information will be requested as necessary.

Done in two copies in the English language and agreed to by:

	<u>14.1.99</u>		<u>15/1/99.</u>		<u>25 Jan 99</u>
Helmut Schönbacher Head, Technical Inspection and Safety Commission, CERN	Date	Lyndon Evans Director LHC Project Leader, CERN	Date	Michael Harrison RHIC Associate Project Director (Collider), BNL	Date

	<u>14 Jan 99</u>		<u>14, 1, 99</u>		<u>25 Jan 99</u>
Maurizio Bona Head, TIS-TE Group CERN	Date	Thomas Taylor LHC Deputy Division Leader CERN	Date	Peter Limon Technical Division Head, Fermilab	Date

	<u>14.01.99</u>		<u>25 Feb 99</u>
Gunther Rau LHC Project Safety Officer, CERN	Date	William Barletta Accelerator and Fusion Research Division Head, LBNL	Date

	<u>14 Jan 99</u>
James Strait US LHC Accelerator Project Manager, Fermilab	Date