



## MEMORANDUM

From : ***to be filled***  
To : EN, TE, BI, GS Group Leaders  
Subject : **A&T Radiation Test Preparation and Follow-up Procedure**

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### Executive Summary

CERN through the R2E project ensures both the availability and operation costs of radiation test facilities, intensively used by numerous equipment groups over the last years and responding to the increasing demand in the future. Partly complex test campaigns need to be prepared in detail and documented respectively including the obtained results, this way making them available in an effective way to the entire community. Building upon already applied 'best practice' across several equipment groups, the below described preparation and analysis procedure ensures a formal check of requirements for radiation test campaigns. Respective activity summary reports shall be provided on an annual basis to the A&T management in order to ensure that all campaigns can be performed and followed in the required way.

### Radiation Test Procedure

Radiation testing of components and systems form an essential part of the A&T R2E activities aiming to mitigate radiation induced failures on electronic systems, thus minimizing the respective impact on accelerator operation. For a large number of equipment groups, during the past few years, an increasing amount of radiation tests have been performed, both at CERN and at numerous external facilities. In this context, blanket contracts were established with PSI (for the usage of the proton beam facility) and Fraunhofer (for total dose tests). This, together with the new dedicated radiation test facility (CHARM) currently under construction at CERN and the optional total dose test facility currently under study, ensures and optimizes the availability for long-term radiation test requirements.

For the A&T equipment groups, all respective radiation test campaigns are thoroughly carried out either directly by the responsible equipment group or in close collaboration with EN/STI. This is successfully coordinated through the 'Radiation Working Group (RadWG)' together with the responsible facility and contract managers. The respective costs are covered by the R2E project and detailed radiation test reports are provided by the test teams in an increasing number of cases. In this context and following numerous discussions in the RadWG it has been agreed that a careful analysis of test results and respective documentation is of utmost importance so that obtained component and system qualifications can be effectively used by the concerned equipment group, as well as other CERN groups interested in the same electronic components or systems.

For this purpose the following formal preparation and follow-up procedure is proposed together with a dedicated annual R2E testing budget and facility availability planning.



Informal preparation and follow-up meetings are to be established, consisting of a pure technical discussion, aiming to optimize both test preparations and documentation of results, however by only involving a small team of concerned people and experts:

- Test procedure coordinator (R2E/RadWG coordination)
- Radiation test team representative(s) (A&T equipment group in charge)
- R2E A&T Expert (RadWG chair/secretary or R2E project leader/deputy)
- PH/ESE representative (optional)
- External expert (optional)

Along the preparation and test analysis, the team will meet (lasting at a maximum 1-2 hours each) for three iterations:

1. 1-2 months prior scheduled radiation test campaign
  - Technical presentation by the test team representative
  - Preliminary discussion/verification of test procedure
  - Check of representativeness for accelerator application
  - Optimization of test parameters and scheduling
2. 2-4 weeks prior test:
  - test readiness check consisting only of a first formal email exchange, verifying that all equipment is ready and tested
  - an optional meeting can be scheduled in case points need to be clarified between the previous preparation step and the eventual radiation test campaign
3. ~2 weeks after the measurement campaign
  - Brief discussion and possible interpretation of test results
  - Review of ambiguous test data
  - Discussion of optional follow-up investigations
  - Iteration of test report template to be fully adopted for the specific case
4. at latest 2 months after the measurement campaign
  - Presentation of final results
  - Verification of final report to be presented to the RadWG and the report to be published within two weeks afterwards

The above listed procedure shall ensure:

- an optimized (result and cost oriented) preparation of radiation test campaigns
- an effective way to build upon existing knowledge across the R2E community
- a complete documentation of the obtained test results
- a comprehensive study of the implication for the concerned equipment group on future CERN operation
- an efficient sharing of test data and results