Meeting on Access Conditions for the LHC RF and Damper Systems

9th January 2002

Present:
Jean-Francois Juget, Serge Di Luca ST/AA, Isabel Brunner, Doris Forkel-Wirth,
Jean-Claude Gaborit TIS/RP, Ghislain Roy SL/OP, Roberto Losito SL/CT,
Thomas Bohl, Edmond Ciapala, Wolfgang Hofle, Trevor Linnecar, Eric Montesinos, Volker Rodel, Joachim Tückmantel SL/HRF.
Excused:
Olivier Brunner SL/HRF.

The meeting was triggered by:

- The need for understanding, by those responsible for RF installations, of the general rules and conditions concerning access in LHC underground areas,
- The resulting bearing on the location of certain RF equipment (UX &UA or SR) - decisions on this being required very soon for cabling estimates and other reasons.
- The need for general input to those responsible for the access and radioprotection systems on RF system access requirements.

Ghislain Roy explained that the RF underground areas fall into two categories – Beam Zones and Service Zones. Access to either can be Supervised (via PCR operator) or Automatic. Neither can be accessed with circulating beam. The Service Zone can be accessed with the machine ON without beam. This is in contrast to the situation in LEP where access to the klystron gallery was always possible, even with circulating beam. If an uncontrolled beam loss has occurred access to the Beam Zone will probably require the presence of an RP technician. This will not be needed for the Service Zones. Catastrophic heavy beam losses in IP4, due for example to failure of a magnet in the dog-leg, are estimated as being extremely rare (fortunately) and would in any case result in losses largely spread right round the machine. Uncontrolled beam losses are not expected to produce sufficient radiation to damage equipment or electronics in the Service Zones.

With the shielding envisaged for personnel protection in the ACS klystron and racks areas in UX45 for cavity conditioning, this zone can be considered as a Service Zone. This zone together with the US, ULs, UJs, and klystron gallery UAs can be grouped into one single Service Zone. (*Action 1– agreement on this by all RF group members)*. A single RF beam zone, comprised of the SC cavity shielded area in UX45 and both RBs, extending into both RAs can be envisaged if there is no need to access one system (ACS, AND or ADT) while another is running. (*Action 2 – agreement on this by all RF group members*). Since both ACS and ACN cavities, which can both produce high levels of radiation during conditioning, are now positioned close to the interaction point IP4 the radiation produced is expected to be negligible at the far ends of the RF beam zone, near the arcs. Hence shielding in the beam zone should not be required. The expected X-ray levels should be verified at the far ends of the UAs *(Action 3 - RP group)* From this the exact limits of the RF beam zones should be defined. *(Action 4 - AA group).* Expected radiation levels due to particles carried by air flow through the waveguide holes in the shielding between the Service and Beam Zones in UX45 will be checked. *(Action 5 - RP group)* Access to the beam zone area where the waveguides pass between the outer cavity shielding and the second shielding wall can be via the passage under the cavity support platform and/or by a special door in the second shielding wall. (*Action 6 – Examine solutions for access to area between shielding walls in UX45 - RF and RP Groups.)*

Giving access in the Service Zone is estimated to take around 15-20 minutes, while for the Beam Zones up to 30 minutes may be needed to allow fully switching off the machine. An RP technician is generally not required for access to the Service Zone while it may be required to

remove a radiation veto before access in the Beam Zone. Switching back on will take another 30 minutes. The general safety rules which require at least two people for an intervention will be strictly applied in both Beam and Service Zones.

In spite of the general condition of no access to either Service or Beam Zones the question was raised as to whether it would nevertheless be possible to allow access to the Service Zones with a low intensity pilot beam. This could be of interest in setting up or if unexpected problems with beam are found. So far no other group has made a request for this but the radioprotection issues will be checked. *(Action 7 - RP Group).* Interlocking of the SPS or the LHC injection transfer lines would also be necessary. In the event that this would be acceptable from the radioprotection point of view the overall procedural issues will be studied. *(Possible action 8- G. Roy)*

List of actions:

1. Agreement on grouping US, ULs, UJs, and klystron gallery UAs into one single Service Zone - *RF group*
2. Agreement on a single beam zone for all RF and damper equipment. - *RF group*.
3. Verification of expected X-ray levels at the far ends of the UAs - *RP group.*
4. Definition of limits of the RF Beam Zones at the far ends of the UAs - *AA group.*
5. Check of expected radiation levels due to the waveguide holes in the shielding in UX45 - RP group
6. Examine solutions for access to area between shielding walls in UX45 - *RF and RP Groups.*
7. Access to Service Zone with pilot beam: RP Issues - *RP group*
8. Access to Service Zone with pilot beam: Procedural issues in the event that RP conditions would permit - *G. Roy*.

V. Rodel, E. Ciapala 11th January 2002