LHC EXPERIMENT MACHINE INTERFACE COMMITTEE

(LEMIC)

Minutes of the 97th meeting held on 10th June 2008

Present: P. Bonnal, E. Bravin, G. Corti, M. Ferro-Luzzi, V. Hedberg, D. Macina (Scientific Secretary), A.L. Perrot, D. Swoboda, E. Tsesmelis (Chairperson), R. Veness, M. Wilhelmsson, W. Witzeling

1. MINUTES OF THE LAST MEETING

There were no comments to the minutes of the last meeting.

2. REPORT ON THE BEAM FACILITIES SAFETY PANEL

(P. Bonnal)

P. Bonnal introduced the newly formed "Beam Facilities Safety Panel" which is an advisory panel to the *Chef d'Installation* in matters of safety in the course of the operation of CERN's beam facilities. The mandate, approved by the Director-General, is to create an information forum for the dissemination of experience on matters of general and radiation safety in relation with beams throughout CERN and, as a result, to improve the coherency in the way which safety is treated at CERN in all Departments. An outcome of this will be to avoid duplication of work and waste of resources. The panel should also examine near-misses, incidents and accidents prior they are investigated by the Safety commission and SAPOCO and propose improved safety measures. The Panel is convened on a regular basis at the request of the *Chef d'Installation* to whom it reports and provides advice. All decisions are taken by the *Chef d'Installation* who is responsible to implement and defend the related technical and organizational choices. The *Chef d'Installation* keeps the CERN Director-General, the Department Heads, the Head of the Safety Commission and SAPOCO informed of the work of the Panel. The

membership of the Panel is decided by the *Chef d'Installation.* The beam facilities are:

- Tunnels of accelerators and transfers lines.
- Target areas and experimental areas.
- All surrounding areas and facilities that are necessary for beam operation or could be impacted by beam operation.

In accordance with the "Safety Policy at CERN" (SAPOCO/42), safety covers the four aspects of:

- Occupational health and safety.
- Operational safety, including facility integrity.
- Safety of equipment and installations.
- Protection of the public and environment.

In the context of the Panel, operation of CERN's beam facilities covers both operation with beam and without beam (shutdowns, technical stops, maintenance and periodic test periods).

Concerning LHC experiments, the actual membership includes all GLIMOS from the experiments and the Technical Coordinators are kept informed. Fourteen meetings have been held since January 2008 and a number of items have been discussed among which the incorrect functioning of the operational dosimeters when the experiment magnets are on.

3. PROCEDURES FOR REMOVAL OF MATERIAL FROM THE LHC

(P. Bonnal)

P. Bonnal reported on the procedure that has been agreed upon for the removal of the material and waste from the LHC. The LHC has been classified as Regulated Radiation Areas, most of them are Radiation Controlled Areas; a few of them are Supervised Areas. Each Area follows different rules in order to protect personnel when the equipment is not moved from its default location. In addition, all material and waste leaving the LHC underground areas (with a few exceptions) has to be subject to a radiological control. Subsequent handling procedures for the material and waste depend on the radiological classification of the material (non-radioactive or radioactive) and the so-called waste zoning:

- "Zone Déchets Conventionnels" (ZDC).
- "Zone Operationnel" (ZO). In general, it includes all zones which have seen beam directly, like the LHC machine tunnel.
- "Zone Déchets Radioactifs" (ZDR). It is embedded in the ZO and it depends on the exact location in the LHC. As an example, the zone around the magnet beam screens is declared to be ZDR.

The purpose of the "waste zoning" is to predict the nature and amount of radioactive waste produced at the time of dismantling of the facility. The assumption is 10 years of nominal LHC operation and 100 days of cooling (the experiments have different assumptions). Since radioactive waste is about 40 times more expensive than a normal one, the ZDR was kept to the minimum. The zoning definition has been done by SC-RP. A systematic control of the material and waste from SC-RP is required only for materials/waste leaving a ZO. All waste coming from the ZDR is declared radioactive and treated accordingly. Waste coming from the ZO at large needs to be labelled by the owner (nature, origin, ZDR yes or no etc) and it will be checked by SC-RP after 100 days cooling and declared as standard or radioactive material according to the measurement results.

For what concerns the removal of material coming from ZO the procedure is the following:

- RP controls all material from ZO.
- If the area is low radioactivity:
  - Equipment owners label their material and bring the material into the buffer zone.
  - RP controls the material (regular campaigns) and gives feed back to the owner.
  - The equipment owner traces all material that is radioactive and that comes from ZDR.
- If the area is of higher radioactivity:
  - Handling procedure needs to be established together with a dose planning and it is done in collaboration between the material owner and SC-RP (ALARA procedure).
  - SC-RP controls the material (regular campaigns) and gives feed back to the owner.
  - The equipment owner traces all material that is radioactive and that comes from ZDR.

For what concerns the removal of material from ZDC the procedure is the following:

- RP clears the ZDC by representative measurements (sampling, gamma-spectroscopy mapping)
- If clearance okay:
  - material is non-radioactive,
  - can be removed by equipment owner,
  - equipment owner performs control measurements using "Picomur" (for 2008).
- In case of alarm: call SC-RP immediately.
- Clearance of area to be reconsidered.
- In the worst case: up-grade of ZDC to ZO.
- In any case, never bring radioactive material into ZDC.

4. REPORT ON THE MACHINE LUMINOSITY MONITOR

(E. Bravin)

E. Bravin gave a status report on the BRAN project. The BRAN project consists of two different systems: BRAN-A, installed in IR1 and IR5, is a fast ionization chamber suited for the high luminosity operation; BRAN-B, installed at IR2 and IR8, is a Cadmium Telluride solid state detector suited for low(er) luminosity operation.

BRAN-B has been developed by CERN in collaboration with CEA-LETI. The project started around 1997 as an R&D and then stopped in 2003 for lack of resources (never endorsed by the LHC Project). The project restarted in 2006 from where it had been left. A minimum amount of the electronics is placed in the LHC tunnel (only the preamplifier) while all remaining electronics is placed in the service gallery. All DAQ functions are included in a single custom designed VME board. All four detectors have been successfully tested on the SPS test beam and the data collected are useful for calibration purposes. The detector efficiencies with LHC beams have been calculated with FLUKA as function of different absorbers' lengths. All parts are ready and the electronics has been already installed. The detectors will be installed as soon as vacuum and bake-out will be final to avoid possible damage. All functionalities will be ready for the LHC start-up. The commissioning of system is to be done entirely remotely as there is no access to the electronics.

BRAN-A was developed by LBNL in the framework of LARP. The project started in 1997 and it was endorsed by CERN in 1999. It is included in LARP since 2003 and LBNL is fully responsible for the delivery and commissioning of the system. However, CERN is responsible for local support and integration in the control system. The ionization chamber has a 40 MHz bunch resolution and a very low noise (not so fast) preamplifier. The pulses are shortened by a shaper circuit (pole-zero cancellations). The digital acquisition is done using CERN DAB cards. At the end of 2007, the chambers were found to be sparking, requiring design modifications. Only two detectors in the "final" configuration have been delivered to CERN so far, installed one in the LSS1L and one in the LSS5R. At the moment no delivery date has been provided for the installation of the two remaining detectors. Taking into account that the preamplifiers are still in the prototype state, the shapers are ready to be assembled and installed but that the programming of DAB firmware has just started, CERN concluded that BRAN-A is too late to be operational for the start-up of LHC in 2008. Therefore, CERN decided to build normal scintillators (BRAN-PMT) as replacement for the start-up. They will be much more sensitive and simple to use even though they are not radiation hard and they have no spatial information (no crossing angle measurements). Radiation hardness and spatial information are not necessary

during the 2008 run but clearly indicate that scintillators cannot be used for the 2009 run. CERN sent a letter to LBNL and LARP to express its disappointment and to describe the back up plan. The BRAN-PMT is a simple plastic scintillating pad connected to the existing acquisition board. The DAQ is done in counting mode and makes use of the BRAN-B VME acquisition board with modified firmware. The same board acquires the signal from both IP sides. At IP1, the BRAN-PMT will be installed behind the first ZDC module (this decision has been taken after LEMIC and therefore it updates what is written on slide 16) in order to have always enough converter in front independently of the position of the LHCf detector. In fact, during the 2008 run, the LHCf detector, which is placed in front of the ZDC and the BRAN, will move remotely in and out according to the luminosity (it is designed for luminosities lower than 10^{30} $cm^{-2}s^{-1}$).

E. Bravin concluded telling that all collision rate monitors will be available for LHC start-up on all 4 points even though at IP1 and IP5 only a temporary solution has been installed. If LBNL/LARP does not speed up, there are risks for the 2009 run as the scintillators are not radiation hard. A possible back up solution could be the use of radiation-hard Cherenkov pads (a prototype will be developed this year by AB-BI, if time allows).

5. NEXT LEMIC MEETING

The next meeting of LEMIC will be held at 14:00 on Tuesday 14 October 2008.

Daniela Macina