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PART V

NON-ROUTINE ACTIVITIES IN RP GROUP IN 1997

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1 INTRODUCTION

This Part describes activities not directly concerned with daily routine, but which are nevertheless important as they ensure constant quality and steady progress in radiation protection at CERN. New projects, another non-routine activity, require in most cases profound studies to prove their feasibility with respect to radiation protection requirements. All these activities are documented in Divisional Reports, Internal Reports and Technical Memoranda, and are listed in the Tables of this Part.

2 LHC

2.1 Radiological impact

Studies for the environmental radiological impact of the LHC continued, with new estimates of the radioactivity released via the drains, and the publication of a report summarizing all aspects. Extracts from the latter were included in the formal Impact Report of the LHC.

2.2 Shielding verification

Considerable effort was spent verifying the shielding of the LHC using the actual plans for the civil engineering construction. The geometrical configurations of areas such as Point 2, where ALICE will be installed, and Point 8, the area planned for LHC-B, were simulated in detail when calculating the doses from possible beam losses. The methodology used in these calculations was recorded in detail to facilitate future justification of their validity. The effects of new ICRP factors for converting hadron fluence to dose equivalent was considered in detail and found not to modify present procedures for determining dose equivalent by more than 10–20%.

2.3 Beam dumps

Other subjects for investigation were the implications of the use of ISR magnets for the LHC dump shielding and the dose to components in the LHC ring tunnel due to beam losses and beam–gas interactions.

2.4 Installation working groups

Planning for future operation of the LHC began with the setting up of working groups for access control and interlocks for the LHC underground areas. A start was made to define areas with respect to their radiation hazard, which will allow plans to be made for the future

installation of radiation monitors, both inside the underground installations and in and around the surface buildings.

3 OTHER ACTIVITIES

3.1 Long base line neutrino experiment

Studies to consider the radiological implications of the target station, decay tunnel, and hadron stopper areas associated with the CERN/INFN project to supply neutrinos to the Gran Sasso detectors also began.

3.2 Radiation Protection Procedures (PRP)

Following the coming into force of the 1996 CERN Radiation Safety Manual (RSM) it was obvious that what had formerly been called Complementary Documents to the 1983 RSM had to be either updated or rewritten. These documents, in fact, complemented the information in the RSM, giving detailed procedures in radiation protection, naming the persons responsible and giving telephone numbers on subjects as varied as the shipment of radioactive materials in- and outside the Organization's premises, and personal dosimetry. Looking closer, however, revealed that many more procedures than the nine previously available had been issued over the years to fulfil the sometimes rather specific needs of the various sectors of radiation protection within the Organization. These papers either in French or English, and sometimes in both official languages, were scattered around and in various states of being up-to-date. It was therefore decided to group them under one heading as Radiation Protection Procedures, with an identical layout, make a person in the RP Group responsible, and indicate the date when a revision is necessary. Their total number at present is 45 (likely to increase), some of them are still in draft form, and others are in their old format awaiting an update as shown in the table below. The PRPs add to the quality assurance of the RP Group's daily work and their periodic update will ensure their continuous validity.

PRP	Titre / Title	Mise en circulation Issued
0b	Liste des procédures de radioprotection List of Radiation Protection Procedures	08.01.98
1a	La signalisation des zones de travail	06.11.97
2a	Les responsabilités d'un technicien affecté aux sections de surveillance	11.11.97
3a	Enregistrement à la section dosimétrie individuelle du Groupe Radioprotection	25.11.97
4a	Dosimétrie individuelle	25.11.97

PRP	Titre / Title	Mise en circulation Issued
5a	Sources et matériaux radioactifs	15.01.98
6a	Service de piquet radioprotection	26.01.98
7a	Matériel de récupération	09.12.97
8a	Consignes relatives aux contrôles radioactifs des poubelles du CERN	01.11.96
9a	Mesures d'urgence en cas d'accident ou d'incendie comportant une possible exposition externe ou une contamination importante	24.11.97
10a	Le système d'acquisition de données ARCON	Draft available
11a	Visiteurs dans les zones contrôlées du CERN	07.01.98
12a	Dispositions à prendre en cas d'alarme sur les moniteurs de rayonnements ionisants placés aux sorties du CERN	10.11.97
13a	Directives concernant les demandes d'expéditions des matières radioactives	20.02.98
14a	Radiation safety instructions for LEP / Instructions de sécurité concernant les rayonnements ionisants dans le LEP	08.12.97
15a	Travaux dans les anneaux PS/PSB et les lignes des faisceaux éjectés pendant l'arrêt des machines du complexe PS	01.02.98
16a	Access to the ISOLDE target area	27.01.98
17a	Radiation safety rules for material irradiations at CERN	26.11.97
18a	Consignes à suivre pour tout accès à la cave neutrino	19.11.97
19a	Consignes pour le changement des filtres dans les stations des accélérateurs et des zones radioactives	01.02.98
20a	Radiation Safety for ISOLDE Experiments	25.01.98
21a	Le dosimètre électronique DMC 100/The Electronic Dosimeter DMC 100	28.01.98
22a	Utilisation de l'équipement radiographique dans le LEP	Drafted
23a	L'utilisation du PCMA (Picomur)	Drafted
24a	Personnes autorisées à signer les fiches de transfert jaunes	03.11.97
25a	Periodic Calibration of Radiation Protection Instruments	Drafted
26a	Radioactive Sources in the Calibration Laboratory	Drafted
27a	Calibration Instructions for Radiation Protection Instruments	Drafted
28a	Règles à observer pour le contrôle des pièces radioactives	To be drafted

PRP	Titre / Title	Mise en circulation Issued
29a	Transport des matériaux entre les différents sites/ Transport of radioactive material between the various sites	Old version
30a	Règles pour la radiographie industrielle/ Rules for industrial radiography	Old version
31a	Working rules for the medical X-ray equipment	Old version
32a	Working rules for the industrial radiographic equipment	Old version
33a	Working rules for radioactive waste storage	Old version
34a	Working rules for the RP « hot » laboratory	Old version
35a	Emergency procedure in case of fire for the radiation areas of TIS Division	Old version
36a	L'exploitation de l'irradiateur au bâtiment 14-5.004	Old version
37a	L'atelier radioactif du bâtiment 109	Old version
38a	Nettoyage des pièces radioactives	Old version
39a	Instructions pour intervention sur la station cible-collecteur d'AAC pendant le cycle de production d'antiprotons	Old version
40a	Instructions pour intervention sur la station cible-collecteur d'AAC pendant les arrêts de maintenance	Old version
41a	Utilisation des logiciels d'enregistrement au service de dosimétrie individuelle	Drafted
42a	Les sources de l'américium 241 dans l'expérience DELPHI	Old version
43a	Les sources radioactives dans l'expérience OPAL	Old version
44a	Consignes de radioprotection pour les salles de contrôle MCR, PCR, TCR	To be drafted
45a	Laser Safety at CERN	Old version

3.3 The CERN EC experiment

Despite the fire in the BA3 building on 13 May 1997 that retarded the experimental programme of the SPS and LEP considerably, the CERN/EU collaboration using the CERN-European Reference Radiation Facility (CERF) set up at the H6 beam in the North Experimental Area, again provided an excellent service. In addition to two scheduled runs (13–20 August and 24–29 September), extra beam time became available: from 24 to 28 April, from 29 July to 6 August, and from 29 September to 14 October.

In the research contract with the EU, RP Group's responsibility is to operate the facility, to co-ordinate the needs of the participants, and provide beam monitoring and reference information on the intensity and quality of the radiation field. In addition, the RP group tests its own instrumentation. Hence RP Group used part of this additional beam time for field characterization of the CERF facility. Access to the irradiation cave now passes through a maze which reduces the scattered neutron component coming from the access door that might have added a dose contribution to the field alongside the 160 cm side-shielding. The irradiation cave downstream of the concrete roof-shield is now completely covered with 80 cm concrete, thus reducing to zero the already small contribution to the reference field from neutrons escaping the dump downstream of the copper target. Over a limited surface the shielding thickness can be reduced to 40 cm or even 20 cm, creating an area to be used for the irradiation of passive dosimeters with higher dose rates than usual. It is planned to assess the LET spectrum and the neutron spectral fluence in 1998 for this part of the shielding.

All in all, fifteen groups from various EU and non-EU countries participated in the experiments. The smooth operation of the SPS and the high beam intensity available in the H6 beam allowed every participant to complete their data-taking as planned. The aim of these experiments is to intercompare dosimetric instrumentation (both active and passive) used for monitoring the radiation field at aviation altitudes, the fields at CERF being similar. Their composition is accurately known with respect to particle type and energy from both Monte Carlo calculations and measurements.

4 SEMINARS AND LECTURES IN 1997

A total of nine seminars and lectures were given in 1997, mostly by visitors and some by students who reported on the results of the studies they performed within the RP Group.

Date	Title	Lecturer
13.03	Activation induite dans les composants des accélérateurs	Yann Donjoux, Stagiaire d'Ecole d'ingenieurs de Genève
20.03	Mesures de la radioactivité des échantillons prélevés au CERN et dans son environnement	Claudia Reichenbach, Technical Student, Berlin University
17.04	The LHC injection lines	Dr. Graham R. Stevenson, CERN
29.05	The status of the Italian hadron therapy project CNAO	Dr. Sandro Rossi, TERA Project, Bologna, Italy
16.07	Summary of radiation measurements in LEP after the first year of Doctoral thesis	Luisa Ulrici, CERN Doctoral Student, Università di Milano, Italy
24.07	The estimation using passive doseimeters of aircraft crew dose	Dr. David Bartlett, NRPB, UK
05.08	Calibration of neutron fluence measuring devices	Dr. Elisa Nava, Università di Milano, Italy

Date	Title	Lecturer
25.09	Neutron fields around high-energy proton accelerators	Dr. G. I. Britvich, IHEP, Russia
06.11	A year in the life of a Fluka fellow	Ian Dawson, CERN Fellow

5 DIVISIONAL REPORTS IN 1997

No.	Author	Date	Title
97-03/E	M. Höfert, Editor	25.03	Radiation Protection Group Annual Report (1996)
97-04/CF	M. Höfert, T. Otto	01.02	The CERN-EU reference radiation facility and the NTA film
97-05/PP	G. Stevenson, Editor	20.02	Proceedings of the second workshop on simulating accelerator radiation environments
97-06	M. Höfert, L. Moritz, G. Stevenson	01.03	Impact radiologique du projet LHC sur l'environnement
97-09/CF	S. Agosteo, M. Silari	15.04	Radiation calculations for the new muon/photon test facility at CERN
97-11/CF	M. Höfert	01.04	The 1996 European Directive and radiation protection at CERN, or why 15 plus 14 is unequal to 19
97-12/CF	C. Birattari, A. Ferrari, M. Höfert, T. Otto, T. Rancati, M. Silari	05.05	Recent results at the CERN-EC high energy reference field facility
97-14/CF	A. Ferrari, M. Huhtinen, S. Rollet, G. Stevenson	17.05	Procedures used during the verification of shielding and access-ways at CERN's Large Hadron Collider (LHC) using the Fluka code
97-15	G. Stevenson	30.05	The implications of ICRP Publication 74 for the design of the LHC shielding
97-16/CF	U. Amaldi, M. Silari	17.07	Hadron accelerators in cancer therapy
97-19/CF	M. Höfert, G. Stevenson, P. Vojtyla, D. Wittekind	01.08	Environmental monitoring at CERN, present status and future plans for the Large Hadron Collider (LHC)
97-20/CF	G. Stevenson	05.09	La radioprotection au LHC
97-23/PP	S. Agosteo, C. Birattari, A. Foglio Para, E. Nava M. Silari, L. Ulrici	01.12	Neutron measurements in the stray field produced by 158 GeV/c lead ion beams

6 INTERNAL REPORTS AND TECHNICAL MEMORANDA 1997

Ref.	Author	Date	Title
TM-01	C. Kitis, J. Tuyn	21.04	Dosimetry in CERN-CEC reference high energy radiation field using TLD-700 TL dosimeters
TM-02	C. Kitis, J. Tuyn	22.05	Sensitivity of LiF: Mg, Ti Thermoluminescence detectors after various annealing procedures
TM-03	C. Kitis, J. Tuyn	22.05	Dosimetry in various radiation fields using Cd-covered and uncovered TLD-600, TLD-700 pairs inside a 25 cm polyethylene sphere
IR-04	H. Nakashima, M. Huhtinen, G. Stevenson	27.01	Radiation calculations for some possible configurations of the shielding for the LHC-B detector
IR-05	P. Fattibene, J.C. Gaborit, F. Pirotte, M. Silari, L. Ulrici	31.01	Mesures de rayonnement synchrotron dans le LEP à 80,5 GeV
TM-06	C. Lamberet	01.01	Bilan des contrôles et traitements des déchets radioactifs du CERN, année 1996
IR-07	M. Höfert, D. Wittekind	17.02	Rapport trimestriel de la section d'environnement
IR-08	M. Silari, L. Ulrici	20.02	Induced activity in the injection region of LEP
TM-09	M. Pelliccioni, M. Silari, L. Ulrici	26.02	Ozone measurements in LEP P.A.4
IR-10	J.C. Gaborit, F. Pirotte, M. Silari	25.02	Bilan 1996 des contrôles radiologiques sur le LEP
TM-11	T. Otto, D. David	26.02	Developer exhaustion for Kodak type 2 dosimeter film
IR-12	M. Höfert, G. Stevenson	21.04	An update of estimates of radioactivity released via the drains of the LHC
IR-13	F. Wallen, G. Stevenson	01.02	Shielding properties of the PGC2 shaft at the Alice experiment
IR-14	C. Reichenbach	01.03	Measurement of radioactivity in samples taken from the CERN site and in its surroundings
IR-15	P. Fattibene, J.C. Gaborit, F. Pirotte, M. Silari, L. Ulrici	21.03	Mesures de rayonnement synchrotron dans le LEP à 86 GeV
TM-16	J.C. Gaborit, F. Pirotte, M. Silari	15.04	Règles à observer pour le contrôle des pièces radioactives
TM-17	M. Höfert, G. Roubaud	14.05	Compte rendu de l'inspection des matières nucléaires de base (MNB) par l'AIEA et inventaire des MNB 1997
TM-18	Denis Boulicault	30.05	Mesures des rayonnements en tête des cavités accélératrices du LEP
TM-19	Luisa Ulrici	04.06	Mesures d'ozone au CERN

Ref.	Author	Date	Title
IR-20	Ian Dawson	16.06	Hadron fluence spectra in the caverns of the LHC beam-dumps
IR-21	T. Otto	04.07	Traceability to International standards of CERN's photon sources for instrument calibration
TM-22	E. Nava, T. Otto, M. Silari	12.08	Reference doses for the 1997 CERN-EC runs
TM-23	J.C. Gaborit	12.08	Réaménagement du contrôle des rayonnements par détecteurs fixes dans la zone Ouest du SPS.
TM-24	E. Nava	04.09	Calibration of neutron fluence measuring devices
TM-25	R. Sanfilippo	15.09	Mesures gamma et neutrons sur des cavités RF supraconductrices du LEP
TM-26	Annulé		
IR-27	R. Müller, T. Otto	04.09	Irradiation of Passive Neutron dosimeters at CERF
TM-28	G. Stevenson	05.09	Proposal for access control of the LHC underground areas
TM-29	J. Tuyn	09.10	Radiation safety aspects of the Nice test program
IR-30	M. Silari, L. Ulrici	15.10	The effect of the polarisation wigglers on radiation levels in the LEP tunnel
IR-31	S. Roesler, G. Stevenson	21.10	Radiation studies for the design of the main shielding wall of the LHC-B experiment
TM-32	J. Tuyn, C. Kitis	01.12	Thermal gradient effects on the thermoluminescence glow-curves
TM-33	J. Tuyn, C. Kitis	01.12	Glow-curve deconvolution functions for first, second and general order of kinetics
TM-34	P. Vojtyla, D. Wittekind	02.12	Investigation of the high gamma dose measurements of the CERN stray radiation monitor PMS18
TM-35	C. Lamberet	01.12	Bilan des contrôles et traitements des déchets radioactifs du CERN
TM-36	S. Roesler, G. Stevenson	15.12	The radiation environment AT IP 6 in beam loss situations
IR-37	R. Müller, T. Otto	01.12	Automatic scanning of NTA films irradiated with ^{238}Pu -Be source neutrons