



CERN has some 100 environmental monitoring stations on and around its sites. New stations capable of taking even more precise measurements were installed in 2014. (CERN-PHOTO-201504-073 – 6)

Safety and Environment

Entailing dozens of work projects taking place in parallel and with activities as diverse as handling, welding, electronics and mechanics, the long shutdown that came to an end in 2014 was a major focus for safety. Despite the impressive number of working hours (3.4 million) and personnel involved (1600), the frequency and severity of accidents remained very low. This excellent performance is a testament to the effective organization of the tasks, in which safety constraints were taken into account at every stage. The active involvement of supervisors and safety coordinators also helped to limit the number of accidents.

Particular attention was paid to work in supervised and controlled radiation areas. Some 10 000 people were issued with a dosimeter during the 18-month shutdown; only two of them received doses slightly above 3 millisieverts (mSv), the

objective set for the maximum dose per person per year. More than 98% of people carrying dosimeters received a dose of less than 1 mSv. To put that in context, the average dose received annually by residents of France as a result of natural radiation and medical procedures is 3.7 mSv. Systematically applying the ALARA (As Low As Reasonably Achievable) principle greatly contributed to the outcome. This involved creating ALARA committees for higher-risk activities and conducting studies for work in controlled radiation areas in order to minimize the doses received.

The long shutdown provided an opportunity to carry out exercises to re-evaluate some of the safety standards in the LHC tunnel, in particular in the areas around the valves designed to evacuate helium in the event of a build-up of pressure. In February, three



Three helium-leak tests were performed in the tunnel. (OPEN-PHO-SAFETY-2014-001)



Several evacuation exercises were carried out at CERN, including one at the nursery. (OPEN-PHO-SAFETY-2014-002)

helium-leak tests were performed in order to measure the speed of gas propagation, the temperature, the oxygen level in the tunnel and the impact on the machine and infrastructures.

Safety exercises are regularly conducted at the Laboratory. In October, a large-scale evacuation exercise involving ten buildings on the Meyrin site took place, in which approximately 400 people were evacuated in just a few minutes. The exercise was preceded by information sessions for around 100 people, including safety officers and the emergency guides who provide assistance during evacuations. The exercise helped to identify ways of improving the level of safety in these buildings and to raise awareness among the occupants. Several similar exercises took place at the LHC experiment sites, the Globe of Science and Innovation and even the nursery.

Training is a fundamental aspect of CERN's safety policy. In 2014, more than 5600 people took part in group training courses and 23 700 people took online courses. New, more-interactive and user-friendly online courses were developed. New courses featuring practical exercises and scenario simulations were also introduced at the Safety Training Centre on the Prévessin site, where the installations were enhanced and a training workshop on electrical hazards and the use of lasers was launched. In addition, the tunnel segment and mock-up of the LHC were equipped with a TETRA radio-system for use in training in emergency communications, and new training rooms were opened with a view to centralizing safety-training courses in the centre.

In order to formalize and improve the prevention of occupational hazards, a strategy known as ProSanTra (Promotion de la Santé au Travail – promoting health at work) was implemented. Particular emphasis was placed on chemical hazards; several visits were made to work-posts that were particularly exposed to hazards relating to the use of dangerous chemicals. These visits

were an opportunity to remind personnel about good practices and to introduce new work-post-specific task-sheets explaining measures to protect against and mitigate chemical hazards. This was the last stage of a three-year project to tackle this issue. Chemical hazards were also the theme of the World Day for Safety and Health at Work on 10 April, when some 420 people took part in outreach activities held at CERN.

Given the scale of CERN's sites and the growing number of users, road safety is an important consideration of safety at work. In 2014, certain sections of CERN's roads were equipped with traffic-calming measures.

With regard to medical and emergency infrastructures, the Finance Committee approved a partnership agreement between CERN and the Hôpitaux Universitaires de Genève (Geneva university hospitals, HUG). Under this agreement, an emergency response unit (a vehicle providing mobile intensive care) will be installed on the Meyrin site and run by HUG, which will thus be able to respond to incidents on the French and Swiss parts of the CERN sites and in the western part of the Canton of Geneva. An emergency-call triangulation system integrating the emergency call centres of both the Canton of Geneva and CERN will ensure the best possible response to medical emergencies on the CERN sites. In addition, HUG will provide training for CERN's medical personnel and firefighters.

Efforts to reduce the impact of CERN's activities on the environment continued. The shutdown of the accelerators provided an opportunity to replace many stations for monitoring air, water and radiation, especially on the Prévessin site. CERN has around 100 monitoring stations on and around its sites. New radiation-measuring stations, capable of detecting even lower levels of radiation, were also installed. All of the measurements demonstrated that the radiological impact of CERN's activities on the environment in 2014 was negligible;



An electrical work certification course in the Safety Training Centre's new installation dedicated to electrical and laser hazards. (CERN-HSE-PHO-2015-006-4)

One of the stands set up to mark the World Day for Safety and Health at Work. (CERN-HSE-PHO-2014-003-6)

following the standard procedure, they were forwarded to the Swiss and French authorities. CERN remains committed to its policy of continuous improvement in this area. A working group was established to update the inventory of areas at CERN at risk of water pollution and to propose a plan of priority actions involving the installations in 2015. A hydrocarbon detector has been installed as a pilot test in the wastewater network on the Prévessin site. Depending on the results, other detectors of the same type may be installed in the coming years. These actions were taken in response to three isolated cases of wastewater pollution at CERN.

The long shutdown allowed improvements to be made to the accelerators and detectors to reduce their impact on the environment. Renovation work was carried out on several installations to reduce water consumption. The operating mode

of the LHC's untreated water-supply ring, which is linked to the firefighting system and the cooling towers, was modified. The cooling systems of large installations such as ISOLDE were replaced. Tens of thousands of cubic metres of water will be saved with no reduction in performance.

To reduce the consumption of electricity, a new control system for the SPS accelerator's power supplies came into service. Previously, the magnet circuits had been powered without interruption from the moment the accelerator was ready to receive beam. The new system automatically adjusts the power supply to the magnets according to the intensity of the beam injected into the SPS, beam requests from users and the requirements of the accelerator operators. A similar renovation project to be carried out during the second long shutdown is being investigated for the power supplies for the North Area.



A new Safety Policy

CERN has expanded considerably since its creation 60 years ago, welcoming an increasing number of experiments and users. Large international collaborations have emerged and the number of firms working on the CERN sites has grown. On the day of its 60th anniversary, CERN adopted a new set of reference documents that adapt its Safety Policy to take account of this evolution and of internationally recognized best practices. A new general Safety Policy statement, designed to be more concise and enduring than its predecessor, was adopted. The organizational structure and the responsibilities relating to safety are now set out in a Safety Regulation and its accompanying documents. The new regulation reaffirms that responsibilities in matters of safety follow the hierarchical line, but it also takes account of the matrix management structure adopted for many activities and of the practical constraints within the large experiments. The document also reasserts that partner institutes and contractors must comply with CERN's Safety Rules. Finally, it emphasizes that every individual must take responsibility for safety.

