



One of the new water-quality-measuring stations installed in 2015, with a hydrocarbon detector designed to detect pollution immediately. (CERN-PHOTO-201603-064-6)

Safety and environment

CERN constantly measures the quality of the water and air expelled from its installations as a means of monitoring the impact of its activities on the environment. More than one hundred measuring stations keep track of numerous parameters, including those linked to ionising radiation and certain physico-chemical aspects. In addition to this data, samples taken from the sites and the surrounding areas are analysed.

This monitoring programme is regularly upgraded. In 2015, five new stations measuring atmospheric emissions from the experiments and the accelerator tunnels were installed. Six sites were newly equipped with hydrocarbon detectors that can immediately detect pollution in the water that CERN evacuates into nearby watercourses. A total of 12 sites will have been equipped with these detectors by the summer of 2016. A new tool for monitoring water-quality-measuring stations was also developed.

Guardians of the water

Installing hydrocarbon detectors was one of the first actions of a plan designed to minimise the impact of using chemical products. In order to carry out its research, CERN uses many technical installations that contain chemicals, such as hydrocarbons in the case of electrical equipment. A working group produced a full report on the matter in 2015, including an update of the inventory of areas at risk of pollution, a risk assessment and recommended priority actions.

Radiation under control

Particular attention is given to controlled radiation work areas. Only two of the 9800 or so people issued with a dosimeter received a radiation dose of 1 to 2 millisieverts (mSv). All others received doses of less than 1 mSv; 87% received a dose of 0. To put that in context, the average dose received annually by



A new facility for testing radiation-measuring devices was put into operation. (CERN-PHOTO-201411-230-2)



The new 100%-electric domestic-waste-collection vehicle, commissioned in the framework of the contract between CERN and the Transvoirie company. (BUL-NA-2015-148)

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) approach greatly contributed to this result. This approach is now firmly embedded in the CERN culture. In addition, a new installation for testing radiation-measuring devices was put into operation, allowing the calibration and verification of all the instruments used at CERN to measure beta, gamma, X-ray and neutron radiation.

All data on radiation is passed on to CERN's two Host States: France and Switzerland. A tripartite agreement signed between CERN and its Host States in 2011 replaced the previous bilateral agreements covering radiation protection and the safety of the Laboratory's installations. In the framework of this new agreement, CERN provides the safety authorities in the two countries with all its measurements of ionising radiation. The safety authorities also carry out regular inspections. In 2015, an important inspection took place at Linac4, the future linear accelerator currently under construction (see p. 25), for which CERN submitted a safety file.

Better waste recycling

CERN is constantly optimising its waste recovery efforts. In 2015, the Laboratory produced around 5000 tonnes of conventional waste, which was managed entirely by specialised companies. A large proportion of it was repurposed via various recycling schemes; for example, 1590 tonnes of metal were sold to recycling companies. Also, to fulfil its contract with CERN, the company responsible for collecting domestic waste started using a 100%-electric waste-collection lorry – the first in French-speaking Switzerland.

Energy efficiency

The supply of electricity is a key concern for the Organization, since the operation of the accelerators requires a huge amount of electrical power. CERN entered into a new electricity supply

contract following a call for tenders after the market was opened up to competition. This contract guarantees the supply of electricity for the whole of LHC Run 2 and includes assistance in optimising consumption on the conventional parts of the sites. CERN is taking steps to improve its energy efficiency under the guidance of an energy coordinator. A working group was formed with a view to defining ways to move forward. Elsewhere, CERN took part in the third edition of a series of workshops that it co-founded on energy for sustainable science in research infrastructures.

Bike to the Lab

Another measure taken by CERN to reduce its environmental impact is promoting "public" transport (i.e. the shuttle services around and between the sites), car sharing and cycling. Boasting around 600 self-service bikes, CERN's bicycle fleet is one of the largest in Switzerland. In 2015, the CERN community took to the saddle to participate for the third time in Bike2Work, an initiative that encourages commuting by bike. 504 people took part in the challenge at CERN – more than at any other participating organisation in French-speaking Switzerland. The CERN teams cycled a total of 97 500 kilometres, equating to a saving of around 15 tonnes of carbon-dioxide emissions.

Effective online training

Safety at CERN relies heavily upon the effective training of users of the infrastructure. In 2015, more than 5000 people attended a total of 580 classroom training sessions, while approximately 40 000 online courses were completed. An overhaul of the 26 online training courses began; the new courses are more interactive and modular, and they follow a coherent structure and graphic-design theme.

Safety exercises are conducted at the Laboratory on a regular basis. A large-scale exercise took place at the nuclear physics installation, ISOLDE, in October. The simulation involved roughly



Some of the 504 CERN participants in the Bike2Work initiative, which aims to promote cycling as a means of transport for the commute to and from work. (CERN-PHOTO-201506-142-11)

The mobile emergency response service based at CERN was inaugurated by CERN Director-General Rolf Heuer and HUG Director-General Bertrand Levrat. The service ensures a better handling of medical emergencies on the CERN sites. (CERN-PHOTO-201505-083-7)

20 people from ISOLDE, Radiation Protection, the Fire and Rescue Service, the CERN Medical Service and the mobile emergency response and resuscitation service. The aim of the exercise was to train the teams in the techniques and procedures that they should use in the event of an accident involving ionising radiation.

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A win-win rescue situation

At the beginning of May, a mobile emergency response and resuscitation service (SMUR) started operating on the Meyrin site. This new facility is the result of a cooperation agreement between CERN and the Geneva University Hospitals (HUG). CERN provided the infrastructure while the HUG manages the facility, providing a vehicle, a doctor and a paramedic ready to respond to emergencies on both 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 dispatch centres of the Canton of Geneva and CERN ensures that the appropriate service can respond to medical emergencies on the Laboratory's sites. The new system guarantees better handling of medical emergencies at CERN and quicker responses in the west Geneva area. During its eight months of operation, the SMUR vehicle has participated in 47% of call-outs on the CERN sites. The effectiveness of the new collaboration was firmly underlined at the end of the year when the victim of a cardiac arrest was saved quickly thanks to the SMUR being so close at hand. Meanwhile, the CERN firefighters were called upon to assist in a carbon monoxide poisoning incident nearby. Specialists from the HUG also began training CERN's medical personnel and firefighters, a highlight being a session on emergency protocols.