Radium Action Plan in Switzerland

Nicolas STRITT, Sébastien BAECHLER, Christophe MURRIT
Radiation Protection Division, Federal Office of Public Health, Bern, Switzerland

In June 2014, radium-contaminated waste was discovered during work carried out for motorway construction at a former landfill site in Switzerland. The press then published a list of about 90 buildings possibly contaminated with radium in Switzerland. The origin of the radium was from the shutdown of watchmaking workshops and private apartments where radium work had been carried out in the past. Due to this, the Swiss Federal Office of Public Health (SFOPH) as regulatory body in radiation protection communicated its intent to do its utmost to control once and for all the radiological legacy of the period 1920 to 1960.

Situation of radium in Switzerland

Radium was used to produce luminescent paint in the watchmaking industry between 1920 and 1960. In spite of the precautions taken to disperse as little radium as possible, given its cost, employees were exposed and surface contamination occurred in the workshops and in private apartments or buildings where work was carried out. At the time, given the limited management of the waste resulting from the use of radium, radium residues were found in household waste and, in the absence of any particular precautions, this waste was sent to ordinary landfill sites.

Once the radiation emitted by radium was found to be carcinogenic, its use in watchmaking was subjected to authorisation and rules for protection were imposed by the ordinance of 19 April 1963. This led to radium being abandoned and replaced by the significantly less radiotoxic radionuclide tritium. The industry regulatory body (Suva) then carried out checks on companies that had been granted radium authorisations. However, homes in which work with radium had been previously carried out were not subjected to a systematic contamination check. A radiological legacy therefore exists in certain private dwellings and their surroundings.

In 2003, the Federal Commission for Radiological Protection published a recommendation for the management of radiological legacies [1]. The Commission made proposals for an action plan that was principally aimed at adapting the legal basis to this problem, the creation of a land register, the justification for intervention when the limit of 1 mSv/year is exceeded for the public, and actively informing those concerned. The

implementation of these recommendations was not considered a priority; the program of job rationalisation led the SFOPH to review its strategy and to concentrate mainly on the protection of the population against risks associated with high doses.

Watchmaking workshop in Mont Lucelle (formally Canton of Bern) in the 1950s
Source: Keystone

Radium action plan

The specific problem of radium resulting from watchmaking mainly concerns the Swiss Jurassic Arc. After having examined the steps taken abroad, principally in France [4], the lessons learnt demonstrate that:

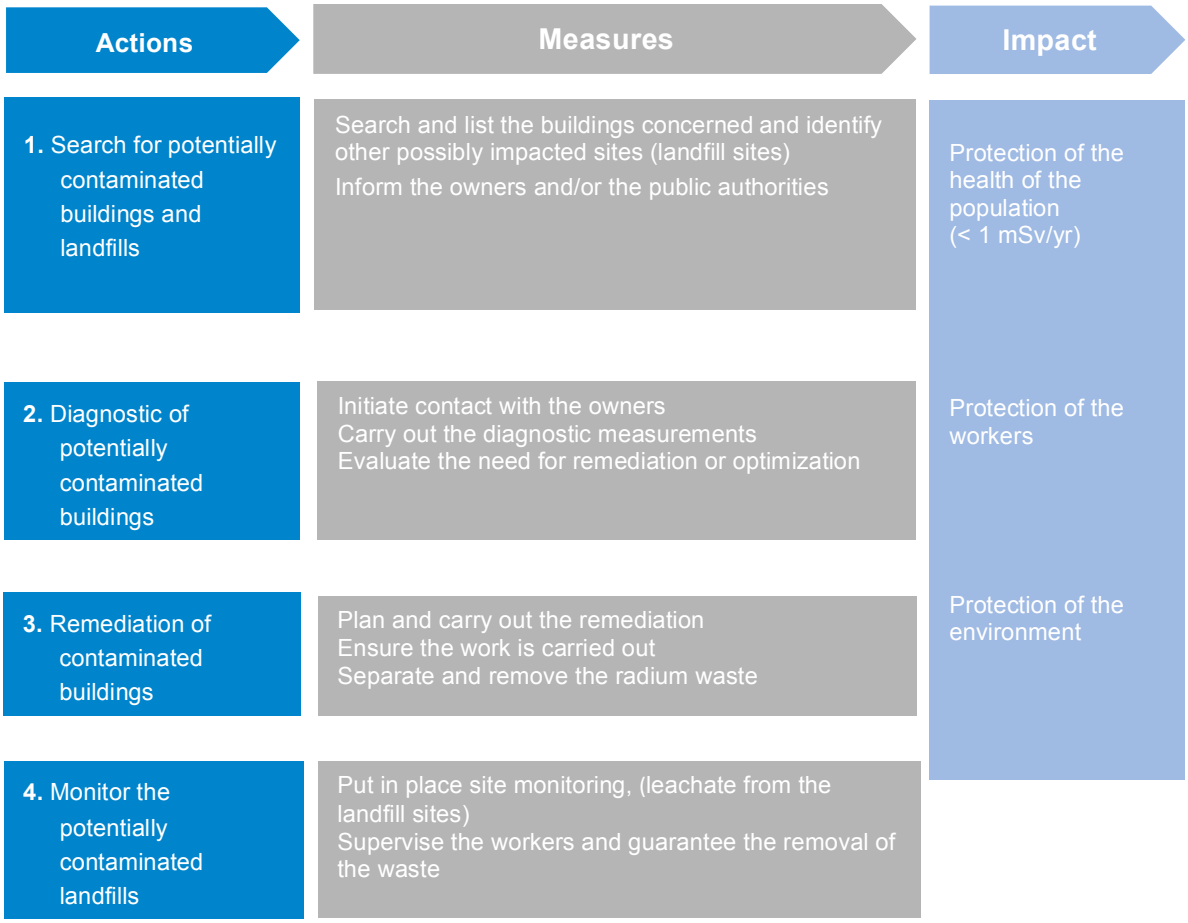
- action is necessary because legacy situations from the past can involve health issues and have an environmental impact;
- the inventory phase, the identification of the sites and the initial contact with the owners concerned is indispensable for the operation to run smoothly;
- the diagnostic phase is essential in order to confirm the absence of health issues;
- the remediation phase involves decontamination and waste management, as well as the rehabilitation of the concerned premises and lands.

All these steps require resources for planning, coordination, diagnostics, detailed protocols, dose assessments, contacts with individuals, owners and local authorities, the press, the companies involved in the remediation, etc.

The key objective of the radium action plan is to guarantee that the annual exposure of the population from residual radium contamination does not exceed 1 mSv, and to ensure the protection of workers and the environment against risks associated with the remobilisation of the radium present in the buildings, ground and landfill sites.

Content and time-line of the action plan

The radium action plan 2015-2019 is made up of four elements: to account for the sites where radium was handled, to diagnose its presence or absence, to plan and to carry out remediation justified from the viewpoint of radiological protection, and to put in place monitoring of the landfill sites in which radioactive waste was placed. In the light of the above, the action plan was launched without delay so as to assess the present situation relating to residual contamination from radium, to determine the resulting exposure of the population, and to reduce it when it exceeds the limit of 1 mSv per year.



Searching for potentially contaminated site

The search for radium-contaminated sites will involve the use of the following different information sources:

- historical information (federal, cantonal and municipal archives)
- contacting the professionals concerned (watchmaking industry, radium suppliers)
- contacting individuals (information requests).

A databank of potentially contaminated sites will be created. The conditions for data protection and confidentiality will be the subject of a decision to be confirmed by a steering committee.

Diagnostic of the potentially contaminated buildings, accompanying measures

A diagnostic plan was established with a timeline, based on the list of the potential radium-contaminated sites, the results of the pilot diagnostics and the procedures drawn up in the preparatory phase.

For each group of sites (canton or region) a coordination with the cantonal and municipal services is required. In particular, they need to be informed of the programme and agree on their participation in contacting the residents;

The following actions are to be carried out for each potentially contaminated site:

- contact with the residents of the site (tenants and owners) and definition of the conditions for the diagnostic (timing, duration, implications for the residents);
- carrying out the diagnostic according to the established procedure;
- initially inform the residents at the end of the diagnostic; when needed, propose immediate arrangements in the case of significant contamination;
- prepare the diagnostic report with proposals on the follow-up (release or remediation);
- submit the report to the steering committee in cases of proven contamination (higher than 1 mSv per year);
- those responsible for the action plan (FOPH) will officially inform the persons concerned (tenants and owners) and the authorities.

Remediation of the contaminated buildings

Remediation is a very specific procedure at the site in question and requires good collaboration between the occupants of the site and the owner. The remediation procedure is preceded by a campaign of measures that are complementary to the diagnostic programme in order to determine the extent and nature of the contamination. This partially invasive process (moving furniture, carpets, floor coverings) is carried out in close collaboration with the inhabitant.

Based on these measurements, and with the support of a construction specialist, an action plan is established, and submitted to the project supervisor (in principle the owner). The aim is to reduce the contamination to a minimum and to guarantee the habitability of the premises without unacceptable risk.

The project supervisor chooses a construction company to carry out the remediation work. This company must be informed of the presence of radium and required to respect the radiation safety instructions laid down on a case by case basis by the SFOPH, who in collaboration with Suva, provides support for the work.

In the case where no person or company can be held responsible for the contamination, and that therefore the costs are borne by the Confederation, the offer from the company charged with the remediation is to be sent to the SFOPH for financial approval. The SFOPH shall engage a specialist in the field of construction to judge the adequacy of the offer. Once the SFOPH has accepted, the remedial work will be carried out under the radiological surveillance of the SFOPH or the Suva. A final check of the remediation is made by the SFOPH at the end of the work. The report of this inspection contains a proposal for future actions.

For the implementation of the remediation, priority will be given to sites where the highest contamination levels have been observed. The total duration of this step depends on the number of remediations to be carried out and on the construction and administrative difficulties that are met. It is hoped that the action plan will be completely realised in five years.

The decision to release the site, based on the final control report, is taken by the SFOPH and sent to the steering committee for approval. The decision for release may contain conditions in the form of restricted use in the case of reassignment or transformation of the site or easements. The terms for defining the conditions (updating the land registry etc.) are defined with the competent administrative authorities (municipality, canton). The persons concerned (tenants, owners) are informed of the decision of release. This decision is also registered by the administrative authorities. In the case where the results of the remediation do not permit a total or conditional release of the site, an ad hoc approach is proposed by the SFOPH, approved by the steering committee and submitted to those responsible for the site (tenants, owners) and to the authorities competent for construction matters and domestic hygiene.

Surveillance of the landfill sites and other contaminated sites

In the landfill sites and other sites identified as being contaminated with radium, the SFOPH is in charge of implementing appropriate radiological surveillance and monitoring. This action, which has the principal aim of guaranteeing the protection of the workers and the environment during the work, may lead to a remobilisation and a dispersal of the contamination, and will be done in close collaboration with the Swiss Federal Office of the Environment and the relevant municipalities and cantons. In regard to the potentially contaminated public landfill sites, it is not envisaged to search and eliminate radioactive traces present in the mass of waste. Involvement will simply consist of a visit to each site concerned, measurement of the exposure levels at the surface of the site and measurement of the radioactive concentration of the leachates from the site. On this basis, an approach that enables the site workers to avoid exposure and to monitor the activity of the leachates could be implemented as needed.

Information and contact policy relating to the action plan

A code of conduct for informing the involved parties (owners, tenants, administration, and media) will be drawn up and submitted for approval from the steering committee prior to informing the support group and the involved parties.

Transparency is limited by the rights to privacy and the interests of the individuals. Although the existence of potentially contaminated sites in a region may be openly stated, a precise location of the sites must be avoided in order to protect the interests of the individuals. The press will be informed of this strategy and committed to accept and respect it.

The arrangements for contacting the inhabitants (owners, tenants) are to be defined in collaboration with the local authorities (cantons and municipalities).

Statutory conditions

The SFOPH has instructed an external expert to prepare a legal opinion on the question as to whether the Confederation has the power to take appropriate action to rehabilitate contaminated properties and who must support the costs.

The legal opinion essentially concluded that, according to the federal jurisprudence, the Confederation is required to proceed to any remediation measures required in connection with an implementation by substitution and that a transfer of costs onto the current owners of the affected buildings is hardly conceivable for reasons of proportionality and expediency. To effectively trace to those responsible for the contaminations would be possible only in very rare cases, as today they are no longer traceable and identifiable or because they no longer exist.

It should be noted here that the Confederation shall pay the costs of remediation only when they are associated with the limit value being exceeded. Below this value, the remediation is borne by the owner, who benefits from the skills of the SFOPH in the protection of the workers and in the removal of the radioactive waste.

Status of the Radium Action Plan at the end of 2015

Until the end of 2015, 90 buildings covering 564 apartments or commercial units or rooms, have undergone a radium diagnostic. Remediation is necessary for 24 buildings. Eight of them have already been remediated. The status of the diagnostic measurements and the remediation number are listed in the next table below. The radium action plan has foreseen to measure more than 500 buildings or sites which are disseminate mainly in the Jura region.

Action	Building	Details, number of units, apartments, commercial rooms
Diagnostic already realized	90	564
Case where a remediation is needed	24	19 apartments, 11 garden
Case without remediation	66	545
Remediation already finished (31.12.2015)	8	7 apartments, 5 garden

References

[1] Recommandations 2003 de la Commission fédérale de radioprotection
[2] Plan d'action national radon 2012 - 2020
[3] Rapports de mesure sur les décharges des Fléoles (Lieschenweg) à Bienne
[4] La gestion des sites et sols pollués par la radioactivité. Revue Contrôle, n° 195