

Summative Evaluation des Aktionsplans Radium 2015-2023

Management Summary – English
26 June 2024



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Introduction

Radium is a radioactive element that was used by the watch industry to produce luminous paint for dials, among other things. It was used in Switzerland between 1920 and 1960. During this time, workers were exposed and rooms in factories and home workshops were contaminated. The fluorescent paint was disposed of together with household waste in normal landfills. As the watchmaking industry in particular generated this waste, the Jura region is mainly affected. In 2014, radium-contaminated waste was discovered during work on the A5 highway at the site of an old landfill in Biel. As a result, the media published the addresses of former radium-setting workshops. In order to tackle the radium problem throughout Switzerland, the Federal Council adopted the Radium Action Plan in 2015 and commissioned the Federal Office of Public Health (FOPH) to manage the action plan in collaboration with the Federal Office for the Environment (FOEN) and the Swiss National Accident Insurance Fund (Suva). The implementation of the action plan was extended twice and completed at the end of 2023.

The action plan consisted of two sub-projects with their own objectives. The "Buildings" sub-project aimed to identify sites potentially contaminated with radium, measure the contamination and, where necessary, remediate the buildings. The "Landfills" sub-project aimed to identify former landfills that could contain radium-contaminated waste in order to define suitable measures to protect public health and the environment from the risks. To achieve these goals, four packages of measures were implemented: a) historical research on buildings and landfills potentially contaminated with radium, b) diagnostic investigations in potentially contaminated buildings, c) remediation of contaminated buildings and d) monitoring of potentially contaminated landfills.

The aim of this evaluation, commissioned by the FOPH, is to obtain an assessment of the implementation and achievement of the objectives of the Radium Action Plan. To this end, 5 main questions are examined and assessed: communication and cooperation, remediation of buildings, monitoring of landfills, achievement of impact and cost-effectiveness. The evaluation also shows how to proceed with those activities that have not yet been completed at the end of the action plan. The results of the evaluation serve as the basis for the final report "Review of the Radium Action Plan 2015-2023" for the attention of the Federal Council.

Methodical approach

The method design according to the evaluation concept includes the analysis of the relevant documents and data, semi-structured interviews with members of the monitoring group and the steering group of the evaluation, two online surveys with the monitoring group and those affected by the Radium action plan and a half-day workshop with the monitoring and steering group. Where possible, different survey and evaluation methods were used for each evaluation question in order to obtain a broader basis.

Key findings

The objectives of the action plan and the sub-projects were achieved. In total, the implementation of the action plan cost around CHF 10 million, with the federal government bearing the majority of these costs. In addition, the Confederation created two full-time positions for the implementation.

As part of the "Buildings" sub-project, 1'093 properties with around 6'200 apartments (or commercial premises) were examined for radium by the end of 2023. Remediation was required for 163 of these properties. Of these, 161 properties had been remediated by the end of the action plan. The average cost of remediation amounted to just under CHF 40'000, although the remediation costs were highly variable and depended heavily on local conditions. The remediation work generated waste that was either incinerated in waste incineration plants (for low-level radioactive waste; 5.45 %), landfilled (for low-level radioactive inert waste; 94.4 %) or delivered to Paul-Scherrer-Institut (PSI) as radioactive waste (0.15 %). A total of 4'674 m³ of waste was disposed of.

As part of the "Landfills" sub-project, a list was drawn up of 250 old landfills that require protective measures during excavation work (as of October 2023). Only one old landfill site requires monitoring measures.

Assessment of the main questions of the evaluation

In addition to descriptive aspects of implementation and target achievement, evaluative assessments were also made by the evaluation team. The following table contains an overview of the evaluation team's assessments of the 5 main questions:

Main question	Assessment by the evaluation team
Communication and collaboration	<ul style="list-style-type: none"> ▪ Highly relevant communication with authorities and affected parties ▪ Efficient communication, improved over time ▪ No structural deficits in cooperation, individual shortcomings ▪ Expedient cooperation of the FOPH with cantonal and communal authorities ▪ FOPH assumed a clear and strong leadership role
Refurbishment of buildings	<ul style="list-style-type: none"> ▪ Investigations into potentially contaminated buildings extensive, targeted and therefore very relevant ▪ No objective statement possible on the completeness of the register of potentially radium-contaminated buildings ▪ Highly coherent approach to technical standards for investigations, organization and prioritization of the same ▪ Procedure for investigations scientifically well supported ▪ High effectiveness of the examinations ▪ Procedure for dealing with mixed contamination (mixture of radiological and chemical contamination) very relevant and effective ▪ Building remediations (and remediation costs) generally proportionate, with major differences in individual cases ▪ High acceptance of the remediations by those affected indicates high implementation quality of the measures ▪ Remediations were sustainable, as habitability is permanently guaranteed after the refurbishment ▪ High effectiveness of the remediations
Monitoring of landfills	<ul style="list-style-type: none"> ▪ Cadastral data (cadastre of contaminated sites KbS) of the cantons of varying quality depending on the canton and not always sufficient to locate potentially radium-contaminated old landfills ▪ Registration of landfills using cadastral data and supplementary historical research effective and relevant ▪ Long-term management and monitoring of old landfills designed to be sensible and sustainable
Achievement of impact	<ul style="list-style-type: none"> ▪ Goals were ambitious and relevant ▪ Specificity and measurability of the formulations of goals could be improved ▪ Effectiveness of the action plan in both sub-projects very high
Cost-effectiveness	<ul style="list-style-type: none"> ▪ Action plan was cost-effective and paid off ▪ action plan was sustainable and relevant, as abandoning the measures in the action plan would have led to chronic and long-term exposure of the residents in the now renovated properties. In addition, this could have led to a spread of radiological contamination (waste incineration plants, landfills, recycling systems)

It should be noted with regard to the results that there was no comprehensive external view of the procedure and implementation of the action plan from the support group of the evaluation and from those affected. An evaluation of this external view was therefore only possible to a limited extent.

Strengths of the action plan

- The FOPH assumed central responsibility for the conception, implementation and, in part, the execution of the action plan. The key decisions were taken by the steering committee with representation from the FOEN and Suva.
- The methods for measurement and dose determination were based on scientific principles that were validated as part of the peer review.
- Thanks in part to the financing of the remediation work by the federal government, the radium problem was overcome in less than a decade.
- Dedicated financial and human resources (including two additional FOPH employees for the action plan) were made available as part of the action plan.
- A prioritizing (based on reasonable suspicion) and therefore also cost-efficient approach was taken when selecting buildings for measurement and for refurbishment (refurbishment target).
- The FOPH's communication and cooperation with it was good overall and improved over the implementation period of the action plan.

Weaknesses of the action plan

- Although it had been clear since the mid-1980s that there were radiological contaminated sites, the action plan was not launched until much later. As part of the federal government's abandonment planning, the action plan was not implemented as a priority and the recommendations of the Federal Commission on Radiological Protection from 2003 were not implemented.
- The watch industry hardly contributed financially and could hardly be held legally accountable.
- The sometimes low level of involvement of the monitoring group of the action plan entailed the risk of the problem being "forgotten" by the cantons and municipalities.
- With the focus on buildings with reasonable suspicion of radium contamination, there is a possibility that radioactive material from untraceable and demolished properties has been used as building material or has ended up undetected in disposal facilities. Since radiation detectors have only been mandatory for material transports to municipal solid waste incinerator plants (MSWI) and recycling companies since 2021, it cannot be assumed that such radioactive sources from buildings that have already been demolished will still be found.

Recommendations

The evaluation team recommends to the FOPH:

- Ensure that people within the FOPH continue to be familiar with both the radium problem and on-site support (for investigations/remediation/landfill openings), possibly with the involvement of external specialist offices
- Provide affected municipalities and cantons with an extract from the current radium property inventory (extract of relevant cases for municipality/canton) so that the enforcement authorities can ensure the traceability of residual contamination in properties

- Inform all affected municipalities and cantons regularly (e.g. twice a year) electronically about general developments and innovations in the radium issue; in addition, contact affected municipalities and cantons directly in the event of changes and encourage an exchange on technical issues
- Provide on-site support on request and have open points clarified externally if necessary
- Ensure that the agencies involved make efforts to create the necessary capacities for radiological contamination in landfills
- Continue cooperation between the FOPH and FOEN on dealing with mixed contamination, including excavation work in former landfills that could contain radium-contaminated waste

The evaluation team recommends the building permit authorities:

- When issuing building permits, the communes and cantons impose conditions to ensure that radiation protection measures are taken during construction work in properties with residual traces of radium, so that workers are protected and waste is disposed of in a compliant manner

Open questions remain for the time after the action plan

Although the action plan has achieved its objectives, there are still open points that need to be clarified after the end of the action plan. Some of these are related to possible future basic services provided by the FOPH:

- It remains unclear how the FOPH will finance the future remediation of properties where the source of the radium contamination cannot be identified.
- Due to the ongoing partial revision of the Radiation Protection Act StSG and the resulting lack of enforcement practice, it is unclear whether and to what extent the FOPH intends to take recourse against property owners (as the party responsible for the condition) of properties contaminated with radium during future remediation work.
- In contrast to the legislation on contaminated sites, there is no legal basis in radiation protection legislation for keeping a publicly accessible cadastre of properties and land contaminated with radium (e.g. as part of the Cadastre of public-law restrictions on landownership PLR).

Conclusion

The Radium Action Plan has successfully tackled the problem of radium contamination from the watchmaking industry. Due to the long period of use of radium-containing fluorescent paint, it can be assumed that individual cases of radium-contaminated properties, land and old landfills will continue to come to light in the future. The basic services still to be determined by the FOPH should take this into account so that knowledge about radium-contaminated sites from the watchmaking industry is not lost.