



Report on implementation of recommendations and suggestions from the Euratom Article 35 verification visit to Denmark 2024



Danish Health Authority, 2026

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Introduction

In May 28 through May 30 2024 the European Commission conducted an Euratom Treaty Article 35 verification visit to Denmark.

Under Article 35 of the Euratom Treaty, all Member States must establish the facilities necessary to carry out continuous monitoring of the levels of radioactivity in air, water and soil and to ensure compliance with basic safety standards. Article 35 also gives the European Commission the right of access to such facilities to verify their operation and efficiency.

The main purpose of the verifications under Article 35 of the Euratom Treaty is to provide an independent assessment of the adequacy of monitoring facilities for:

- Liquid and airborne discharges of radioactivity from a site into the environment;
- Levels of environmental radioactivity at the site perimeter and in the marine, terrestrial and aquatic environment around the site, for all relevant exposure pathways;
- Levels of environmental radioactivity on the territory of the Member State.

The verification visit to Denmark was focused on the system for measuring and monitoring radioactivity in the environment, with a focus on Copenhagen and the surrounding area, including emergency preparedness measurement and monitoring. The visit also covered Denmark's measurement and monitoring of radioactivity in drinking water, food and feed.

Prior to the verification visit, the European Commission sent out a questionnaire, which Denmark responded to by submitting a report [1] to the European Commission. As the national contact point, the Danish Health Authority, Radiation Protection (SIS), acted as coordinator for the European Commission's verification visit. SIS collected contributions to and compiled the report with answers to the European Commission's questions. Contributors to the report include the Danish Emergency Management Agency, Danish Decommissioning, DTU Sustain, the Danish Veterinary, Food, Agriculture and Fisheries Agency, and the Danish Environmental Protection Agency.

The agenda for the meeting included an introduction to the Danish programme for measuring and monitoring radioactivity in the environment, a visit and introduction to the laboratories at SIS, and visits to a gamma monitoring station near Copenhagen, DTU Sustain, Risø and the Danish Emergency Management Agency in Birkerød.

In January 2025, the European Commission published two reports from the verification visit to Denmark. A technical report [2] that describes observations from the verification visit and Denmark's response to the questionnaire. The overall conclusions of the verification visit and the European Commission's recommendations derived from the verification visit are set out in the report with the main conclusions [3].

The European Commission concluded that Denmark's programme for monitoring radioactivity in the environment and its measurement capacity comply with the provisions of Article 35 of the EURATOM Treaty. Denmark has the necessary and adequate facilities for monitoring radioactivity in the environment. It also concluded that these facilities would be able to support environmental monitoring in the event of a radiological emergency.

The verification visit resulted in two recommendations to Denmark:

- a) *In Denmark the information on monitoring of radioactivity is not available to the public on regular base. The monitoring results were previously published on the DTU Sustain website. However, since this website is currently under reconstruction, the results of national radioactivity monitoring programme are not accessible to the public.*

The verification team recommends making the environmental monitoring results available for the public.

- b) *Danish Emergency Management Authority operates the network of environmental radiation dose rate monitoring stations. The dose rate data is sent to the European Union Radiation Data Exchange Platform (EURDEP), but it is not available on any other public website in Denmark.*

The verification team recommends making the on-line dose rate monitoring data available for the public. Currently the public can access these data only on the EURDEP platform through a link provided on the DEMA website.

In addition, Denmark received nine suggestions for improvement to the national programme and system for monitoring radioactivity in the environment (Section 1.3). These suggestions are related to:

- a) *Monitoring frequencies,*
- b) *drinking water,*
- c) *radionuclide identification and quantification laboratory*
- d) *sample reception,*
- e) *air sampler, and*
- f) *automatic dose rate equipment.*

The present report describes the planned measures in Denmark to comply with the European Commission's recommendations and suggestions to Denmark's programme and system for monitoring radioactivity in the environment under the obligations of Article 35 of the EURATOM Treaty.

1. Significant changes in the set-up of the monitoring programme

1.1. Framework agreement

Monitoring of radioactivity in the environment, food and feed is managed through a framework agreement between the Danish Health Authority, the Danish Veterinary, Food, Agriculture and Fisheries Agency, the Danish Environmental Protection Agency and the Danish Technical University. The Danish Health Authority is lead signatory on the agreement on behalf of relevant government agencies. The framework agreement provides for research-based consultancy and services to government agencies with responsibilities regarding monitoring of radioactivity in the environment and food. The framework agreement is supported by an underlying task agreement, detailing more specific assignments needed in the monitoring efforts. Both agreements are presented in the appendix of the [Questionnaire for the Euratom Article 35, verification visit to Denmark \(2024\)](#) [1]. The agreements were originally formulated in 2005, and they are renewed every 4 years. The latest set of agreements were signed in December 2025 and are valid for the period 2026 to 2029.

According to the Framework Agreement, environmental radioactive monitoring is carried out by the Danish Technical University, DTU Sustain.

DTU Sustain carries out the radiological surveillance of:

- Surface- and groundwater in Denmark in accordance with the requirements of the Danish Environmental Protection Agency
- Food in accordance with the requirements of the Commission recommendation 2000/473/Euratom.

According to the Task Agreement, DTU Sustain is tasked with the reporting of the relevant monitoring data to the EU Commission, OSPAR-convention and HELCOM. In addition, DTU Sustain is to make information on reporting of environmental monitoring data and the environmental monitoring data available to parties of the Framework agreement as well as to the public via the DTU website.

Additional environmental monitoring programs

The nuclear regulatory authorities (Danish Health Authority and Danish Emergency Management Agency) require that Danish Decommissioning conduct a specific environmental monitoring of the areas surrounding the nuclear research facilities under decommissioning at the Risø site, North of Roskilde. Danish Decommissioning has commissioned DTU Sustain to conduct this monitoring.

As part of the Danish nuclear emergency preparedness the Danish Emergency Management Agency is in charge of a nationwide automatic monitoring network for external gamma dose rate.

Review and update of the framework agreement and task agreement

As part of the continuous assessment of the framework agreement and the underlying task agreement and in light of the findings of the Article 35 verification visit, the Danish Health Authority has initiated a review of the agreements. The purpose is to collect experience feed-back on the current agreement and its implementation and to assess future needs with respect to scope, content and implementation, also taking into account recent developments in the geopolitical landscape. The review process will be

carried out as a collaborative effort involving all parties contributing to the current framework and task agreements and is scheduled for 2026. First updates to the framework and task agreements are expected to take effect by January 2027.

The recommendations and suggestions addressed below depict how the various topics are addressed within the current Framework and Task agreements, and in some places make reference to planned or expected initiatives needed to address the recommendation or suggestion. Some of these initiatives may become integral to the updated Framework and Task agreements taking effect in the near future.

1.2. Recommendations

1.2.1. Recommendation a

- a. *In Denmark the information on monitoring of radioactivity is not available to the public on regular base. The monitoring results were previously published on the DTU Sustain website. However, since this website is currently under reconstruction, the results of national radioactivity monitoring programme are not accessible to the public.*

The verification team recommends making the environmental monitoring results available for the public.

Publication of environmental monitoring results

The following results from environmental monitoring are currently available to the public.

Environmental monitoring in the vicinity of the nuclear research site at Risø.

The results of the monitoring programme of the environment in the vicinity of the nuclear research site at Risø is reported to the nuclear regulatory authority twice a year. The content of the monitoring programme is described in the Operational Limits and Conditions for Danish Decommissioning prepared by the Nuclear Regulatory Authorities (Danish Health Authority and Danish Emergency Management Agency). The content of the monitoring programme of the environment of the Risø site is given in the **Table 1**.

The monitoring programme is carried out by DTU Sustain on the behalf of and as a contractor to Danish Decommissioning. The latest report: "[Radioactivity in the Risø District, January-June 2025](#)" is available via the homepage of Danish Decommissioning, and older reports can be obtained upon request by contacting Danish Decommissioning.

Quantity	Type	Place	Frequency	Measurement
1	Air sample	The Risø site	Weekly	γ-spectrometry
1	Precipitation sample	The Risø site	Monthly	γ-spectrometry
1	Precipitation sample	The Risø site	Monthly	Tritium
1	Sediment sample	Roskilde Fjord the area between of Risø site and Bolund	Annual	γ-spectrometry
1	Water sample	Roskilde Fjord by the Risø site pier	Quarterly	Tritium
1	Water sample	Roskilde Fjord by the Risø site pier	Annual	¹³⁷ Cs
1	Grass sample	The Risø site	Monthly	γ-spectrometry
9	Grass sample	At a distance of 16 km to the Risø site	Quarterly	γ-spectrometry
1	Sea plant sample	Roskilde Fjord the area between the Risø site and Bolund	Annual	γ-spectrometry
1	Waste water sample	Waste Management Plant	Weekly	Total β-activity
25	External radiation	The Risø site	Annual	Scintillation counter and TL dosimeters

Table 1: Monitoring program of the environment at the Risø site and its nearby surroundings (Risø District). The results of the monitoring program are presented in the half-yearly-monitoring report.

The measurement data from the monitoring stations of the nationwide automatic monitoring network for external gamma dose rate are reported in real time to the European Radiological Data Exchange Platform EURDEP.

DTU Sustain report monitoring data, as relevant, to the Radioactivity Environmental Monitoring database at the European Commission, OSPAR and HELCOM. All monitoring data are archived at DTU Sustain.

Initiative for future communication of data

As part of the process of review and update of the Framework and Task agreements, the Danish Health Authority has launched an initiative to enhance the management and publication of environmental monitoring data in the future. The purpose is to ensure that both historical as well as new data are made more easily available to the parties of the agreements and the public.

A system for management of environmental monitoring data will be embedded in updates to the Framework agreement and the underlying Task agreement.

As part of the updated approach:

- DTU Sustain will make data publicly available and communicate findings via own channels.
- All environmental monitoring data obtained via the Framework Agreement and Task Agreement (including historic data) will be compiled and reported to the Danish authorities,
- Danish Health Authority will establish an archive for management of the complete set of environmental monitoring data obtained via Framework Agreement and Task Agreement. This will include a solution for making environmental monitoring results available for the public.

Potential expansion of environmental monitoring database

The potential for extracting additional data relevant for the environmental monitoring of radioactivity from already existing databases of groundwater quality will be explored. For example, Danish authorities will examine the possibilities and appropriateness of including the monitoring results in already existing databases presenting water quality data. The data would be included in the archive of environmental monitoring data hosted by the Danish Health Authority.

1.2.2. Recommendation b

- b. Danish Emergency Management Authority operates the network of environmental radiation dose rate monitoring stations. The dose rate data is sent to the European Union Radiation Data Exchange Platform (EURDEP), but it is not available on any other public website in Denmark.*

The verification team recommends making the on-line dose rate monitoring data available for the public. Currently the public can access these data only on the EURDEP platform through a link provided on the DEMA website.

DEMA will explore alternatives for displaying on-line dose rate monitoring data to the public.

1.3. Suggestions I to IX

1.3.1. Monitoring frequencies

- I. The verification team suggest increasing the frequency of groundwater monitoring as it is the main source for drinking water production.*

Currently, groundwater is monitored every three years for ⁹⁰Sr at eleven designated locations and every three years for ¹³⁷Cs at a single location (see section 4.4 in [1]). At present, increasing the frequency of groundwater monitoring is not considered under normal conditions, as the primary source of radioactivity in groundwater is atmospheric fallout, which reaches the subsurface mainly via precipitation. Given that

the source terms have stabilized, the levels of radioactivity in groundwater are expected to remain stable. Over decades, there has been extremely little variation, as both ^{137}Cs and ^{90}Sr levels were in the range 10^{-2} to 10^{-1} Bq/m³. Moreover, changes in groundwater radioactivity typically occur over extended periods due to the slow dynamics of subsurface transport.

The Danish authorities will consider the possibilities of supplementing the monitoring of radioactivity in groundwater with analyses carried out on the basis of the existing monitoring of the quality of groundwater which includes, among other things, measuring the occurrence of uranium. Such analyses could be carried out annually as a supplement to the monitoring of radioactivity.

In accordance with Commission recommendation of 8 June 2000 on the application of Article 36, and as part of Danish Health Authority's remit as competent regulatory authority for radiation protection, the Danish Health Authority may decide on the need for changes to the environmental monitoring program. Changes to the environmental monitoring, e.g. increasing the frequency of groundwater monitoring, may be introduced as a function of the evolution of levels of radioactivity, measurement technology, and the needs in view of emergency response.

- ii. *The verification team suggests increasing the monitoring frequency of mixed diet to at least quarterly in line with Recommendation 2000/473/Euratom (13).*

Currently, mixed diet samples are monitored annually for ^{137}Cs and ^{90}Sr across nine zones in Denmark (see section 4.6 in [1]). Based on recent results (Figure 1), there is minimal variability in the measured radioactivity levels, therefore, increasing the monitoring frequency is not considered at the present time.

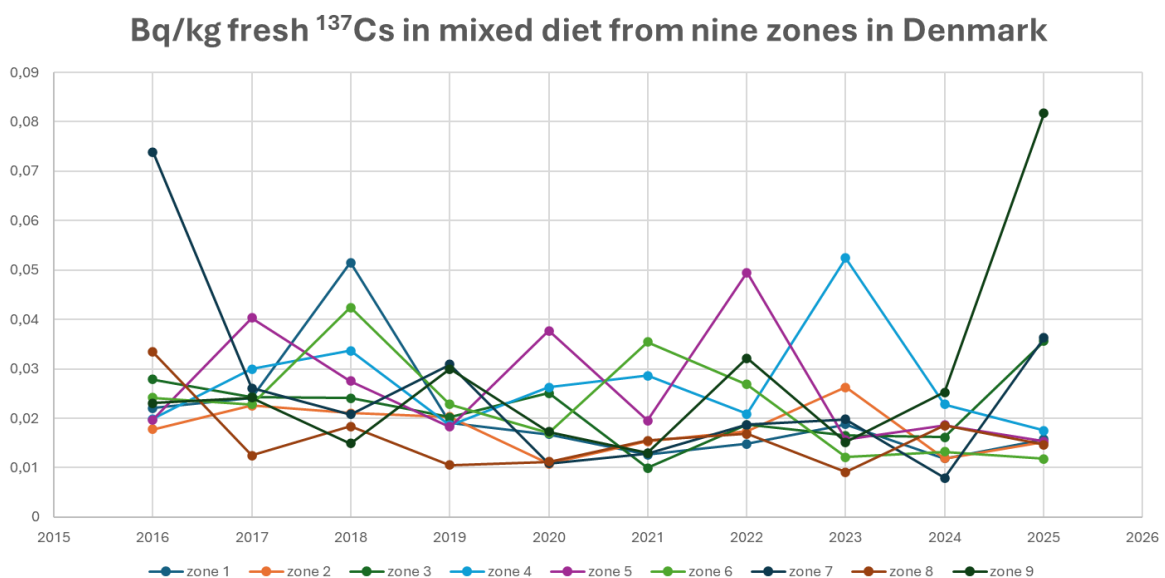


Figure 1: ^{137}Cs in annually collected samples of mixed diet from nine zones in Denmark.

In accordance with Commission recommendation of 8 June 2000 on the application of Article 36, and as part of Danish Health Authority's remit as competent regulatory authority for radiation protection, the Danish Health Authority may decide on the need for changes to the environmental monitoring program. Changes to the environmental monitoring, e.g. increasing the frequency of mixed diet monitoring, may be introduced as a function of the evolution of levels of radioactivity, measurement technology, and the needs in view of emergency response.

III. Verification team suggest increasing the monitoring frequency of milk at least once a month at few monitoring zones.

Currently, milk is monitored biannually for ^{137}Cs across eight zones, and seasonally (grouped into three periods: January–April, May–October, and November–December) for ^{90}Sr in two regions of Denmark (see section 4.6 in [1]). At present, increasing the frequency of milk monitoring is not considered, as existing data show minimal variability in radionuclide concentrations. Looking at milk samples over later decades, the levels of ^{137}Cs in milk generally lie within the range of 5–50 Bq/m³. The levels are generally three times as high for Northern Jutland as for the other regions of Denmark, which probably links to the local geology and feed.

In accordance with Commission recommendation of 8 June 2000 on the application of Article 36, and as part of Danish Health Authority's remit as competent regulatory authority for radiation protection, the Danish Health Authority may decide on the need for changes to the environmental monitoring program. Changes to the environmental monitoring, e.g. increasing the frequency of milk monitoring, may be introduced as a function of the evolution of levels of radioactivity, measurement technology, and the needs in view of emergency response.

IV. The verification team suggest including analyses of I-131 in milk samples. In an emergency the ingestion of milk contaminated with I-131 is the major radiation exposure pathway.

Currently, milk samples are collected every second month from 8 zones in Denmark (see section 4.6 in [1]). The milk samples are analysed for ^{137}Cs and ^{90}Sr following drying and ashing as the standard sample preparation method prior to gamma spectrometry. The volatile nature of ^{131}I leads to its loss during the ashing process, which renders ^{131}I undetectable. Thus, including ^{131}I analysis in milk is not possible as part of the current monitoring protocol.

DTU Sustain operates a highly sensitive aerosol monitoring station for ^{131}I at Risø. If ^{131}I is not detected in airborne particulates, it is highly unlikely to be present in milk from this zone.

In accordance with Commission recommendation of 8 June 2000 on the application of Article 36, and as part of Danish Health Authority's remit as competent regulatory authority for radiation protection, the Danish Health Authority may decide on the need for changes to the environmental monitoring program. Changes to the environmental monitoring, e.g. including analyses of ^{131}I in the monitoring of milk, may be introduced as a function of the evolution of levels of radioactivity, measurement technology, and the needs in view of emergency response.

1.3.2. Drinking water

- V. *The verification team suggest carrying out new studies on the monitoring of radioactivity in drinking water and/or groundwater, including radon measurements.*

The radioactivity in drinking water has been investigated in two national studies:

- Radioactive substances in Danish drinking water, a study from 1997 [4]
- Radioactive isotopes in Danish drinking water, a study from 2006 [5]

The main conclusions of the studies were:

- The radioactivity in Danish drinking water is mainly due to naturally occurring radionuclides, since drinking water in Denmark is obtained from groundwater.
- The results show low concentrations of natural radioactivity in Danish drinking water and even the highest measured concentrations meet the required limit for the total indicative dose.

The Danish Health Authority, Radiation Protection will re-visit these two main studies on Danish drinking water as well as additional data, to assess the need for updates to the data population. Follow-up initiatives may include re-sampling of drinking water from selected locations for reassurance measurements. Based on the outcomes of such a series of sampling and analyses, the needs for more extensive surveys will be assessed. The initiative will include examination of the possibilities for utilizing data from existing monitoring of the quality of groundwater which includes, among other things, measuring the occurrence of uranium. Options for using such data for e.g. screening purposes will be explored.

1.3.3. Radionuclide identification and quantification laboratory

- VI. *The verification team suggest involving new staff member(s) that will be trained to carry out the analytical work at the radionuclide identification and quantification laboratory of DHA/RP.*

The division of Radiation Protection within the Danish Health Authority employs approximately 40 full-time staff. The division consists of three sections, one of which is the section for dosimetry, environment and emergency preparedness. This section hosts the three technical support units of the division; the standard dosimetry laboratory, the personal dosimetry laboratory, and the environmental laboratory.

The functions of the section are supported by 4 scientific and 2 technical staff members emphasizing the need for knowledge and competence sharing in order to ensure fulfilment of the mission targets for the section.

To ensure that all instruments in the laboratories can be operated at any given time, the goal is that at least two scientific staff members are capable of operating each instrument in the laboratory. This is ensured through a peer training program. In addition, technical staff supports performance of tasks that do not require specialist skills, e.g. sample preparation and operating of liquid scintillation equipment. This serves to reduce the need for specialist resources and frees up time to focus on tasks requiring specific

capacities. Furthermore, daily tasks for which technical staff is not strictly needed, are being carried out by student assistants.

The section is continually seeking opportunities to optimize use of available resources through automation or simplification of tasks as well as addressing technical and staff vulnerabilities through duplication of equipment or knowledge and competence sharing. In the current situation, where no plans for additional funding or staff increases in the laboratory exist, such initiatives are crucial for the section to be able to meet mission targets.

1.3.4. Sample reception

- VII. *The verification team suggests that the laboratory of DTU Sustain/RTS puts in place a documented procedure for the management of increased number of incoming (contaminated) environmental, food and feed samples in the event of an emergency.*

Management of sampling and analysis of environmental samples in the event of an emergency is a matter of national emergency preparedness planning and may involve authorities as well as private organisations/companies. DTU Sustain is one of the organisations which possesses relevant competences and analytical capacities. In addition to the current Task agreement, separate arrangements exist for DTU Sustain to provide assistance in an emergency situation. The assistance may be in the form of analytical services or may be restricted to a purely advisory role, depending on specific circumstances.

The Danish Health Authority is currently reviewing and updating the radiological emergency preparedness plan. This work includes a description of emergency scenarios and expected needs for a monitoring program of radioactivity in the environment to be implemented. The work may include further specification of programs for collections of samples and methods for analysing samples, and may involve a suite of governmental agencies as well as private undertakings.

The extent to which DTU Sustain may be involved in the management of a potential future emergency situation and the nature of the assistance provided by DTU Sustain will ultimately be determined by the requirements identified in the emergency preparedness planning. Such provisions may be further integrated in the revised Framework and Task agreements and subsequent updates entering into force in the coming years.

1.3.5. Air sampler

- VIII. *The verification team suggest reestablishing the procedures for analysing the gaseous radioactive iodine in the event of an emergency to ensure that laboratory staff is adequately trained in this method.*

It is worth noting that particulate-bound ¹³¹I, which typically represents approximately one-third of total airborne radioactive iodine, can already be detected with the current setup at the stations.

The DTU Sustain operated air monitoring station at the Risø site is not designed to capture gaseous iodine species. Retrofitting the station to enable reliable gaseous ¹³¹I sampling would require a significant investment of time and resources and will not be pursued at this time.

The filter method used by DEMA captures most airborne iodine. Establishment of other procedures is not a priority at the moment.

1.3.6. Automatic dose rate equipment

- IX. The measurement performance of NaI(Tl) detectors is sensitive to the environmental conditions, its efficiency may decline in time, hence the verification team commends the efforts made to renew the aging equipment of the national dose rate monitoring network.*

The acknowledgement of the verification team is appreciated. DEMA has renewed the aging equipment of the national dose rate monitoring system and new NaI(Tl) detectors replaced the older generation during the fall of 2025.

Summary

The Framework Agreement and its underlying Task Agreement underpins activities necessary to ensure monitoring of radioactivity in the environment. The periodic reviews of these agreements as part of the renewal every 4 years and the yearly adjustments ensure that the monitoring program for radioactivity in the environment in Denmark is commensurate with the nature, scale and complexity of the current situation.

The Danish Health Authority has initiated a review of the agreements. The purpose is to collect experience feed-back on the current agreement and its implementation and to assess future needs with respect to scope, content and implementation, also taking into account recent developments in the geopolitical landscape. The review process will be carried out as a collaborative effort involving all parties contributing to the current Framework and Task agreements and is scheduled for 2026. First updates to the Framework and Task agreements are expected to take effect by January 2027.

In addressing the specific recommendations of the verification team, the Danish authorities have launched a number of initiatives, including:

- Short as well as longer term efforts to enhance the availability of environmental monitoring results for the public. (Recommendation a)
- An effort to explore alternative ways of displaying on-line dose rate monitoring data to the public. (Recommendation b)

In addressing the suggestions of the verification team, the Danish authorities have in several cases reached the conclusion that in the current situation, the monitoring efforts may be deemed adequate for the purpose. At the same time, it is acknowledged that changes to the environmental monitoring may be introduced as a function of the evolution of levels of radioactivity, measurement technology, or in view of the needs in case of an emergency.

Over time the robustness of the program for monitoring of radioactivity in the environment will be further integrated with the needs identified for the management of emergency situations. Such provisions will be integrated in the revised Framework and Task agreements and subsequent updates entering into force in the coming years.

References

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