



Rapport

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Follow-up report regarding the EU-commissions Euratom article 35 verification visit to Sweden in December 2019

Introduction

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 radiation protection and nuclear safety unit of the European Commission's Directorate-General for Energy is responsible for undertaking these verifications. The Joint Research Centre Directorate-General provides technical support during the verification visits and in drawing up the reports.

The main purpose of the verifications under Article 35 of the Euratom Treaty is to provide an independent assessment of the efficiency and 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 pathways
- levels of environmental radioactivity on the territory of the Member State

For the purpose of such a review, a verification team from the EUC's Directorate-General for Energy visited Sweden on 4-6 December 2019. This mission dealt with:

- Facilities for routine monitoring of environmental radioactivity in Stockholm
- Facilities for emergency monitoring of environmental radioactivity in Stockholm
- Measuring laboratories, in particular infrastructure, analytical methods, quality assurance and control aspects
- Reporting of the environmental monitoring programme results.

Main conclusions of the verification

A report detailing the main conclusions by the verification team, referenced SE 19-03, was issued on 25 May 2020 (Ares(2020)3142431). These are summarised below.

All planned verification activities were completed successfully. The information supplied in advance of the visit, as well as the additional documentation received during and after the verification activities, proved very useful. The information provided and the verification findings gave rise to the following observations:

- Overall, the environmental radioactivity monitoring programmes in Stockholm comply with the requirements of Article 35 of the Euratom Treaty.
- The verification activities found that the facilities needed to carry out continuous monitoring of levels of radioactivity in air, water and soil in Stockholm are adequate. The Commission ascertained that these facilities are in operation and running efficiently.
- The verification activities found that the facilities needed to carry out monitoring of levels of radioactivity in the air, water and soil in the event of a radiological emergency in Stockholm are adequate. The Commission ascertained that these facilities are continuously available.
- A few recommendations and suggestions have been formulated. They concern in particular renewal of monitoring equipment, data availability and advance planning of emergency monitoring. Notwithstanding these recommendations, the verified parts of the monitoring system for environmental radioactivity in Stockholm are in conformity with the provisions laid down under Article 35 of the Euratom Treaty.

Technical recommendations and suggestions

The verification team formulated the following recommendations and suggestions.

Recommendations

The Swedish Radiation Safety Authority (SSM) operates a radio-analytical laboratory for analysis of environmental samples. During the verification, the laboratory had no capacity for sample analysis using liquid scintillation counting. The verification team recommends that the SSM restores the liquid scintillation counting capability in the laboratory.

The Swedish Radiation Safety Authority operates a sophisticated network of environmental radiation dose rate monitoring stations. The dose rate data produced by this network is made available at the European Union radiation data exchange platform (EURDEP), but it is not available on the SSM public website. The verification team recommends to make the on-line dose rate monitoring data available for the public also via the webpage of the SSM.

Suggestions

The verification team suggests:

- to consider increasing the number of permanent staff trained to carry out the analytical work in the laboratory
- introduction of a LIMS system with sample bar coding for the sample management if the number of samples analysed in the laboratory further increases
- that the SSM laboratory drafts an operational contingency plan for a situation where the number of incoming, possibly contaminated, samples significantly increases
- that the SSM proceeds towards laboratory accreditation
- making the data from the NPP ring networks available in EURDEP
- advance planning for the management of contaminated air filters in the event of a radiological emergency, in particular when planning the work arrangements at the sample preparation room



- SSM to include the Swedish air radioactivity concentration data to the EURDEP system data exchange

Implementation of the recommendations

Restoring the liquid scintillation counting capability

A new liquid scintillation counter (Hidex SL300) has been acquired and is being verified for the routine measurements of Sr-90, H-3 and gross alpha/gross beta in several sample types.

The verification for H-3 shows that with the applied method the detection limit according to ISO11929 is 3.1 Bq/l for water samples. Compared to the measurements on the former counter, the detection limit is higher (Quantulus, 2.5 Bq/l). The activity in sampled drinking- and seawater in Sweden is less than the decision threshold even for the old instrument. However, it complies with the EU-limit of 10 Bq/l. The standard operation procedures (SOP) for quantification and calibration of H-3 have been updated and approved.

The verification for Sr-90 is to be ready in January 2022 and preliminary results shows that the detection limit according to ISO11929 is 0.038 Bq/l for milk. Compared to the measurements on the former counter the detection limit is higher (Quantulus, 0.007 Bq/l). This is due to the significant higher background of the new instrument. This will have the impact, that the Sr-90 in some milk samples cannot be quantified since the activity is sometimes under the detection limit or even the decision threshold. However, it complies with the EU limit of 0.2 Bq/l. The detection limit for drinking water is 0.003 Bq/l. It is lower than the detection limit in milk, since more sample can be used in the sample preparation. This complies with the EU limit of 0.06 Bq/l.

The verification of gross alpha/gross beta will be finalised in 2022.

On-line dose rate monitoring data availability

SSM has developed a map service (illustrated in Figure A) to display dose rate data from the national network of environmental radiation dose rate monitoring stations. The implementation uses ArcGIS Dashboards in the on-premise installation of ArcGIS Enterprise from Esri. ArcGIS Dashboards will publish data in ArcGIS Online, allowing for public access to the map via the SSM web site.

In this work SSM has coupled a selection of database views of dose rate monitoring data to the functionality in ArcGIS Dashboards, documented the implemented maps compliance with the Web Accessibility Directive (Directive (EU) 2016/2102), and configured a dedicated database to store the displayed data (database managed via MS SQL Server 2019).

The implementation consists of several elements, including an interactive map, a chart, and four indicators showing different metrics for the measurements. There are also two selectors, allowing the user to display data for a given number of monitoring stations or a specific time interval. The interactive map has functionality for selecting one or more stations via the map, resulting in station data only being displayed for the particular selection in the time-series diagram.

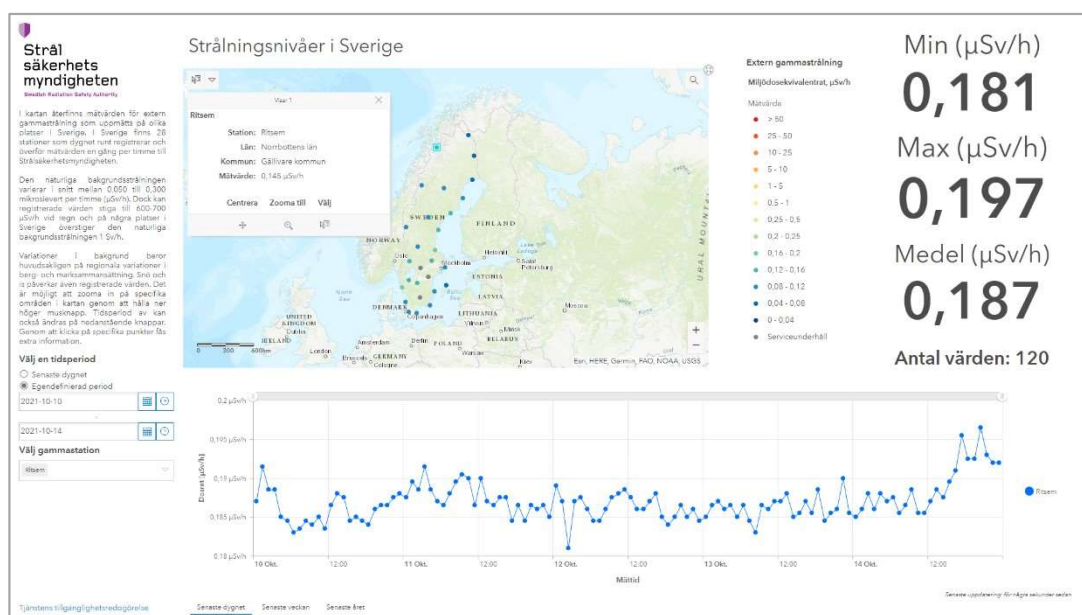


Figure A: Snapshot of ArcGIS Dashboards implementation of on-line map for dose rate monitoring data

Development of the map application will be completed during 2021. However, the commissioning of the map service on the public web site of SSM is temporarily put on hold until all details regarding the long-term maintenance of the service have been resolved.

Considerations of the suggestions

Number of permanent laboratory staff

To increase the number of permanent staff for analytical work has not been considered.

Introduction of a LIMS system

This is not prioritized since there are not resources to introduce a LIMS-system and at the same time continue with the analytical work.

Operational contingency plan for the laboratory

There are plans to draft an operational contingency plan during 2022.

Accreditation of SSM laboratory

There are not enough resources to complete the accreditation, but the technical staff will proceed to comply with the technical paragraphs in ISO17025.

NPP ring networks data available in EURDEP

In conjunction with the publication of the public map for the nationwide gamma station network, SSM will also look into the suggestion to include the monitoring stations surrounding the Swedish NPP:s in the public data as well as to include them in the



reporting through EURDEP. Whether or not this data will be included is dependent on maintenance routines pertaining to these monitoring stations.

Planning for the management of contaminated air filters

FOI has made rearrangement of the sample preparation rooms during the last year, yielding better possibility to handle incoming samples with higher activity levels. During 2022 specific routines for handling of such samples will be set up.