

## Status Summary Report #1

Validity Date/Time: 2020-07-02 10:00 UTC

The IAEA will issue additional Status Summary Reports, as appropriate, as the event develops. Previously released reports are referenced at the end of this document.



# IAEA

International Atomic Energy Agency

## Incident and Emergency Centre

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**The purpose of this report is to present a consolidated summary of the event, and the status of different aspects of the response activities including an analysis of available information and a prognosis of possible scenarios (where appropriate and/or possible).**

## Ruthenium and Cesium detections in air in Europe

This Status Summary Report described the actions taken by IAEA in relation to the detections of Ruthenium (Ru) and Cesium (Cs) isotopes in Europe in June 2020 and is prepared based on the information received up to the validity date and time, indicated at the top of this page.

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<sup>1</sup> If this summary or portions of it are made public, it is advisable to provide plain language explanations of the technical terminology and concepts. To preclude public concern, the measurement data should be placed in context to emphasize that the levels measured are far below background radiation levels and pose no risk to either public health or the environment.

## Situation summary

On 26 June 2020, the IAEA was asked by the media about its awareness of a tweet from the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) in regard to the detection of Ru-103, Cs-134 and Cs-137 in air at a CTBTO radionuclide monitoring station in Sweden.

In accordance with the established procedure, in order to receive authenticated and verified information from Member States and to answer the media query, the IAEA's IEC sent out a formal request to 44 Member States in the European region, through their emergency contact points on 27 June 2020 at 15:00 UTC, to answer the following questions:

1. *Whether there were Ru or Cs isotopes measurements in air performed in their country in the last weeks and if yes, could they possibly share results with IAEA and Member States.*
2. *Whether there were any recent events in their country associated with an atmospheric release of Ru or Cs isotopes and if yes, could they possibly share any relevant information with IAEA and Member States.*
3. *Whether they agree that IAEA refers to response from their country (i.e. by naming the country and numerical values of measurements) in answering media questions and questions from other countries.*

For the purpose of voluntary sharing of information via USIE, the IEC created an event on USIE, "Ruthenium and Caesium detections in air in Europe", with the confidentiality category "Free for public use", to allow free sharing of information and/or measurement data with the public and the media. All Member States, to whom the above questions were sent, were asked whether they agree to the setting of confidentiality of the USIE event as "Free for public use".

Member States started to respond to the IAEA's questions via USIE on 27 June 2020. Up to now there are 34 Standard Reporting Forms (SRF), 9 Event Notice Forms (ENF) and 6 Short Messages from Member States within the event on USIE "Ruthenium and Caesium detections in air in Europe".

## Measurement data provided to the IAEA

37 Member States<sup>2</sup> voluntarily shared information with the IAEA in response to IAEA's request for information to Member States in the European region: Albania, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, North Macedonia, Norway, Poland, Portugal, Romania, Russian Federation, Serbia, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine and United Kingdom. In addition, 10 Member States<sup>3</sup>, including Algeria, Canada, Georgia, Japan, Kuwait, Morocco, Qatar, Tajikistan, United Arab Emirates, and United States of America which have not been asked for information by the IAEA, also voluntarily reported to the IAEA.

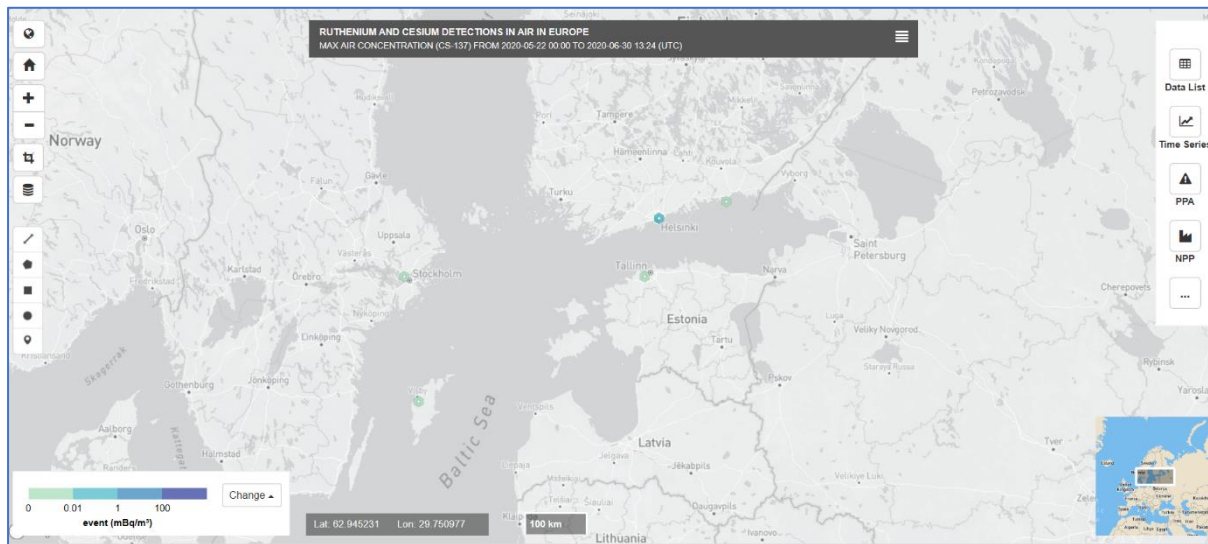
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<sup>2</sup> 19 Member States reported results of measurements and 18 Member States informed that they have ongoing analysis that will be shared with the IAEA once ready.

<sup>3</sup> Two of these Member States have indicated that they do not have the capability to perform measurements of Ru or Cs isotopes in the air.

Three Member States (Estonia, Finland and Sweden) have reported measured levels of Ru and Cs isotopes which are higher than usual. In addition, some other artificial radionuclides were reported.

**Figure 1** provides locations where concentrations of Cs-137 in air samples higher than usual have been detected and reported to the IAEA. The results of measurements of other radionuclides, if any, are also reported for the same locations but not included on this Figure.



**Figure 1:** Locations where concentrations of Cs-137 in air samples higher than usual have been detected and reported to the IAEA

The majority of reported measurements are based either on one day or seven days high volume air samples<sup>4</sup>. In general, measurements (by Estonia, Finland and Sweden) have been reported within the following ranges:

- Ru-103 - 0.1 to 5.1 microBq/m<sup>3</sup>
- Cs-134 - 0.61 to 22.0 microBq/m<sup>3</sup>
- Cs-137 - 0.5 to 16.9 microBq/m<sup>3</sup>

In addition, measurements of the following radionuclides (and their associated measurement ranges) have also been reported to the IAEA:

- Co-60 - 0.22 to 7.6 microBq/m<sup>3</sup> (by Sweden, Finland and Estonia)
- Nb-95 - 0.4 to 0.99 microBq/m<sup>3</sup> (by Sweden and Finland)
- Zr-95 - 0.2 to 0.69 microBq/m<sup>3</sup> (by Sweden and Finland)
- Ru-106 - 1.44 microBq/m<sup>3</sup> (by Sweden)
- Ce-141 - 0.2 microBq/m<sup>3</sup> (by Finland)

A Technical Attachment to this Status Summary Report provides all measurement data that has been reported to the IAEA as of 2020-07-02 at 10:00 UTC.

Measurement data provided by emergency contact points has and will continue to be published on USIE.

<sup>4</sup> Fiberglass/paper filters and not active charcoal retainers were used for the air sampling. Note that fiberglass/paper filter sampling is inefficient for the purpose of I-131 retention. Charcoal filter sampling/analysis results were not reported.

## Event related information provided to the IAEA

All those Member States that responded to the IAEA stated that they have not identified any events on their territories that might have been associated with an atmospheric release of Ru or Cs isotopes.

## Background technical data

Background technical data for the radionuclides, levels of which were detected in Europe and reported to the IAEA are as follows:

- Cs-137 is a fission product. It has a half-life of approximately 30 years and decays by beta emission to Ba-137.
- Cs-134 is a fission/activation product, produced from electron capture on stable Cs-133. It has a half-life of approximately 2 years and decays by beta emission to Ba-134.
- Ce-141 is a fission/activation product with a half-life of 32.5 days and decays by beta emission to Pr-141.
- Ru-103 is a fission product. It has a half-life of approximately 39 days and decays by beta emission to Rh-103.
- Zr-95 is a fission product. It has a half-life of approximately 64 days and decays by beta emission to Nb-95.
- Nb-95 is a fission product, produced by the decay of Zr-95. It has a half-life of approximately 35 days and decays by beta emission to Mo-95.
- Co-60 is an activation product, produced from neutron activation of Co-59 or multiple stages of neutron activation of iron isotopes. It has a half-life of approximately 5.25 years and decays by beta emission to Ni-60.

The detected radionuclides are characteristic for the radionuclide inventory of the reactor core in the nuclear reactors. Under certain conditions (either during normal operations or in maintenance operations such as refuelling or when fuel is taken out of the core), fission and activation products might be released inside the facility. If filtration systems are not totally effective, fractions of the fission and activation products might be released to the environment and dispersed in the atmosphere over short or long distances (depending, *inter alia*, on the quantity of the released material and on the atmospheric conditions).

## Assessment of the current situation

*The IAEA has collaborated with Member States in collecting, analysing and sharing data with emergency contact points via USIE. This has facilitated the exchange of information and contributed to national assessments.*

*The reported measurements of radionuclides in air are in the range of a fraction of microBq/m<sup>3</sup> to tens of microBq/m<sup>3</sup>. The radiological significance of such concentrations of identified radionuclides in the air is very low. The IAEA considers that levels reported to the IAEA pose no risk to human health and the environment.*

*Due to the mix of reported detected radionuclides, the possibility that this detection of radionuclides is related to the improper handling of a radioactive source (either under or out of regulatory control) is excluded.*

*Also, it is likely that this detection of radionuclides does not relate to any application of radiation in industry or medicine. This detection of radionuclides is not related to the use of radioisotopes for power generation in space objects applications, either.*

*Based on the mix of radionuclides and the ratio of Cs-137/Cs-134 (including burn-up factor considerations) calculated from the reported values by Member States, it seems unlikely that a release of radioactivity might have taken place at a nuclear fuel processing plant.*

*Due to the reported Cs-137 and Cs-134 values and considering the calculated Cs-137/Cs-134 ratio, an event at a spent fuel pool at a nuclear power facility is also unlikely.*

*As reported by Finland and Sweden, apart from the Cs and Ru isotopes, measurements of air samples collected in the period 15 – 22 June 2020, indicate the presence of Zr-95, Nb-95. Additionally, the measurement of the air sample collected by Finland (in the period 15 – 22 June 2020) indicated the presence of Ce-141. Based on reported data about the mix of measured artificial radionuclides, it is likely that this event is related to a nuclear reactor either in operation or in maintenance (where certain very low radioactive releases might occur).*

*Based on the monitoring data and the information provided by the Member States to the IAEA, no specific event or location for the dispersal of referred radionuclides into the atmosphere have been determined. It is currently not possible for the IAEA to make conclusions towards identifying a location of the release without reporting from a State of the origin of the release. IAEA continues to collaborate with Member States in collecting, analysing and sharing data.*