Feedback from the Secretariat on the Russian proposals for development of SS Control of contaminated non-food commodities

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Background

Requirement 5.22 of the BSS (Chapter 5 - Existing Exposure Situations), requires Member States to:

“establish specific reference levels for exposure due to radionuclides in commodities……..which shall typically be expressed as, or based on, an annual effective dose to the representative person generally that does not exceed a value of about 1 mSv”.

To date, no supporting guidance material has been developed in relation to the control of contaminated non-food commodities in existing exposure situations.
RASSC requested that a discussion document be prepared, reviewing existing IAEA documents in order to identify the extent to which these may be applicable and, consequently, the additional specific topics on which further guidance is required in relation to the control of contaminated non-food commodities in existing exposure situations.
Emergency exposure situations

Addressed in IAEA Safety Standards in emergency preparedness and response which provide criteria for use and trade of non-food commodities in a nuclear or radiological emergency

• Generic criterion for international trade of non-food commodities in emergency situation: 1 mSv effective dose in a year; and 1 mSv equivalent dose to the foetus for the full period of in-utero development.

• OILs to support this criterion in relation to trade of non-food commodities in an emergency are under development within EPR Series (*expected 2015*).
Consultancy meeting (6-8 November 2014)

- to consider further clarification of current IAEA safety standards and technical documents dealing with the radiation safety of contaminated non-food commodities in existing exposure situations;

- to consider consistency in the approach to the control of contaminated non-food commodities between existing exposure situations and emergency exposure situations;

- to consider if guidance can be developed for surface contamination independent of contamination incorporated within commodities;

- to consider how contamination due to natural radioactivity can be identified and treated;

- to advise on the technical work necessary to support any advice that is to be developed.
Consultancy meeting - Expected Output

A proposal, for consideration at the next meetings of RASSC, WASSC and TRANSSC, on the scope of guidance to be developed in relation to the control of non-food commodities in existing exposure situations, including the nature of such advice and the technical work necessary to develop such guidance.
Consultancy meeting - participants

Mr V. Repin           Russian Federation
Mr T. Van Dillen     The Netherlands

IAEA Participants:
Ms S. Nestoroska Madjunarova (IEC)
Mr J. Raicevic (WES)
Mr S. Whittingham (TSU)
Mr I. Gusev (RPU)

IAEA TECDOC-1449 and SUDOQU models (Mr Van Dillen) were discussed.
Potential individual doses to members of the public due to the use and transport of non-food commodities

Recently, The National Institute for Public Health and the Environment (RIVM) in the Netherlands has developed a new methodology to assess the individual annual effective dose brought about by radiologically surface contaminated non-food commodities. The model, entitled SUDOQU (SURface DOse QUantification), considers exposure scenarios for both non-radiological workers and consumers and takes into account several removal processes (e.g. resuspension, wipe-off) by which contamination levels become time-dependent. The proposal is to consider this methodology within the broader audience and to present and discuss the corresponding results.
Exemplary calculation: contamination

Use/exposure: 8 h/day, 5 days/week, 52 weeks/year
Contaminated area: 1000 cm² (tablet, both sides)
Exemplary calculation – dose counter plot

**Fig. 1:** A typical contour plot of the annual effective dose resulting from the use of a surface-contaminated object in an indoor environment. The annual dose (per unit of surface contamination, Cs-137+) is plotted as a function of the area of contamination and the fraction of the year exposed.
Dose calculations for dock workers handling contaminated containers (at 4 Bq/cm²)

<table>
<thead>
<tr>
<th></th>
<th>Eff. Dose, µSv/yr 100% cont.</th>
<th>Eff. Dose, µSv/yr 4% cont.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cs-137+</td>
<td>72.6</td>
<td>2.9</td>
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<tr>
<td>Cs-134</td>
<td>161</td>
<td>6.5</td>
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<tr>
<td>I-131</td>
<td>66.7</td>
<td>2.7</td>
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<tr>
<td>Co-60</td>
<td>211</td>
<td>8.5</td>
</tr>
<tr>
<td>Sr-90+</td>
<td>73.9</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Other exemplary calculations were also discussed.

The preliminary conclusion followed from the meeting discussion is as follows: doses could be from several 10s microSv/yr up to about 100 microSv/yr.
Why BSS exemption levels are not sufficient?

Control of radioactive surficial contamination of non-food commodities can (and should) be developed separately from that on radioactivity incorporated in the commodity, but still taking into account general concepts of exemption, the transport regulations and related work for emergency situations.

The need to address the control of non-food commodities incorporating radionuclides may also be considered.
Proposed Scope of guidance – WASSC opinion is requested

The guidance should provide an overview on the radiation safety issues involved in non-food commodities traded and contaminated with radioactive material in the framework of existing exposure situations, with special attention to residual radioactivity resulting from nuclear or radiological emergency after it has been declared ended.

Of special interest for consideration should be the cases of contamination with long-lived radionuclides, primarily surface contamination, and the corresponding screening and detection protocols.

Any further work on the topic should be in line with (and make use of) existing safety standards and technical guidance, should be practicable and manageable, and should offer a harmonized approach to each country dealing with such situations.
Scope: possible solution

- Within the proposed development the generic reference level will be suggested.
- For all non-food commodities allow the working level of \( \sim \frac{1}{10} \)th of the generic reference level, i.e. \( \sim 100 \) microSv/yr per commodity item, thereby allowing for multiple exposure pathways.
- Define/identify categories of non-food commodities that do not satisfy this requirement (e.g. toys, carpets).
Further steps for WASSC consideration

1. To provide an estimation of annual individual effective doses based on realistic and low-probability exposure pathway scenarios for existing exposure situations related to the transport and use of contaminated non-food commodities for both adults and children.

2. To take into account experience, including existing practices and standards, on the issue of transport, trade and use of non-food commodities contaminated with residual radioactive material (from past activities, nuclear tests, nuclear or radiological emergencies, etc.) and with radioactive materials of natural origin.
Further steps for WASSC consideration

3. To address the issue of control of contamination of non-food commodities, taking into account considerations contained in items 1 and 2, in existing exposure situations and to develop example protocol for monitoring contaminated non-food commodities.

4. To consider a plain language explanation that provides for the effective implementation of specific protocols and recommendations regarding control of contaminated non-food commodities in existing exposure situation.
Thank you for your attention!

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