**New definition:**

**Large object**

A large object shall mean a solid object which is contaminated with radioactive material and because of its size cannot be transported in a type of package described in these Regulations.

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**CA/2015/02**

**WG 1**

**SSR-6 Table 1**

| Change UN 2913 PROPER SHIPPING NAME and description to: |
| "RADIOACTIVE MATERIAL, SURFACE CONTAMINATED OBJECTS (SCO-I or SCO-II or SCO-III), non fissile or fissile-excepted" |

See CA/2015/01 above.

**Comments WG 5**

- The proposed change is appropriate.

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**CA/2015/03**

**WG 1**

413. **SCO** shall be in one of three groups:

(a) **SCO-I**: (as is)

(b) **SCO-II**: (as is)

(c) **SCO-III**: A large object for which:

(i) All openings are sealed to prevent release of radioactive material during routine conditions of transport;

(ii) The inside of the object is as dry as reasonably achievable;

(iii) The non-fixed contamination on the external surface does not exceed the limits specified in para. 508;

(iv) The non-fixed contamination plus the fixed contamination on the inaccessible surface averaged over \(300 \text{ cm}^2\) does not exceed \(8 \times 10^5 \text{ Bq/cm}^2\) for beta and gamma emitters and low toxicity alpha emitters, or \(8 \times 10^4 \text{ Bq/cm}^2\) for all other alpha emitters, unless it can be demonstrated that in accident conditions of transport, the activity intake by a person in the vicinity of the accident does not exceed \(10^{-6} \text{ A}^2\) or a corresponding inhalation dose of 50 mSv.

See CA/2015/01 above.

**Comments WG 5**

- We agree in principle but a check for consistency with SCO-I and SCO-II requirements should be done.

References and examples on (i) could be given in the guidance. "As reasonably achievable" should be checked to be used in regulatory text.

Supplementary submission:

- 413 (c)(i)(ii) The inside of the object is as dry as reasonably achievable practicable;

- 413 (c)(iii) The non-fixed contamination on the external surfaces does not exceed the limits specified in para. 508;

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**CA/2015/01**

**WG 1**

**SSR-6 Para. 224 bis.**

There is an increasing demand in many countries for transporting large radioactive objects, such as equipment from decommissioning or refurbishment activities at nuclear facilities (steam generators, pressurizers, reactor pressure vessels and heads, coolant pumps, etc.). However, many nuclear reactor components are difficult to package because of their large size and weight, making it challenging or impractical to meet standard packaging requirements. This often requires them to be shipped under special arrangement. Over a hundred shipments of these types of components from replacement or dismantlement of nuclear facilities have been conducted under special arrangement around the world. The advisory material from the IAEA Regulations includes specific guidance for the transport of large components under special arrangement. However, as experience with this type of transport has grown and is becoming more routine, specific regulatory requirements are needed to allow the movement of large radioactive objects without the need for special arrangement. A set of standard provisions for transport of large objects as surface contaminated objects (new SCO-III category), based on the IAEA “performance package” concept, have been developed for possible incorporation into the SSR-6 Regulations and Advisory Material as presented here in comments CA/2015/01 through 16.

Note that the proposed provisions do not include components such as reactor vessels at this time, due to the more limited experience and greater radioactivity levels. LSA large object provisions may be proposed in the future to cover such components.

**Comments WG 5**

- Further justification is needed for the fact that how is it justified that the object cannot be packed into a type of package? This problem is similar to justification of Special Arrangement.

- The applicant should include the justification for choosing SCO-III in the application.

Supplementary submission:

- Added 8X2 (a) A statement of the respects in which, and of the reasons why, the consignment is considered a large object.

See CA/2015/11.

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**CA/2015/02**

**WG 1**

**SSR-6 Table 1**

| Change UN 2913 PROPER SHIPPING NAME and description to: |
| "RADIOACTIVE MATERIAL, SURFACE CONTAMINATED OBJECTS (SCO-I or SCO-II or SCO-III), non fissile or fissile-excepted" |

See CA/2015/01 above.

**Comments WG 5**

- The proposed change is appropriate.

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**CA/2015/03**

**WG 1**

413. **SCO** shall be in one of three groups:

(a) **SCO-I**: (as is)

(b) **SCO-II**: (as is)

(c) **SCO-III**: A large object for which:

(i) All openings are sealed to prevent release of radioactive material during routine conditions of transport;

(ii) The inside of the object is as dry as reasonably achievable;

(iii) The non-fixed contamination on the external surface does not exceed the limits specified in para. 508;

(iv) The non-fixed contamination plus the fixed contamination on the inaccessible surface averaged over \(300 \text{ cm}^2\) does not exceed \(8 \times 10^5 \text{ Bq/cm}^2\) for beta and gamma emitters and low toxicity alpha emitters, or \(8 \times 10^4 \text{ Bq/cm}^2\) for all other alpha emitters, unless it can be demonstrated that in accident conditions of transport, the activity intake by a person in the vicinity of the accident does not exceed \(10^{-6} \text{ A}^2\) or a corresponding inhalation dose of 50 mSv.

See CA/2015/01 above.

**Comments WG 5**

- We agree in principle but a check for consistency with SCO-I and SCO-II requirements should be done.

References and examples on (i) could be given in the guidance. "As reasonably achievable" should be checked to be used in regulatory text.

Supplementary submission:

- 413 (c)(i)(ii) The inside of the object is as dry as reasonably achievable practicable;

- 413 (c)(iii) The non-fixed contamination on the external surfaces does not exceed the limits specified in para. 508;
Para. 517

Single Type IP-1, Type IP-2, Type IP-3, large object, object or collection of objects, whichever is appropriate, shall be so restricted that the external radiation level at 3 m from the unshielded material or object or collection of objects does not exceed 10 mSv/h.

Comments WG5: The proposed change is appropriate.

Para. 520

LSA material and SCO in groups LSA-I and SCO-I and SCO-III may be transported, unpackaged, under the following conditions:

(a) through (d) as is; …

(e) For SCO-III:

(i) Transport shall be under exclusive use by road, rail or vessel;

(ii) Stacking shall not be permitted;

(iii) The requirements of para. 624 for a Type IP-2 package shall be satisfied, except that the “maximum damage” requirement of para. 722 may be met using orientation restrictions specified in the transport plan (para. 8X2(d)), and the requirements of para. 723 are not applicable.

See CA/2015/11 for proposed text for para. 8X2(d).

Comments WG5: We agree to the proposal. But in (iii) the “maximum damage” wording has to be edited to regulatory text.

Supplementary submission:

(e) (iii) The requirements of para. 624 for a Type IP-2 package shall be satisfied, except that the “maximum damage” requirement of maximum damage referred to in para. 722 may be met using orientation restrictions specified determined based on provisions in the transport plan (para. 8X2(d)), and the requirements of para. 723 are not applicable.

Para. 522

The total activity in a single hold or compartment of an inland waterway craft, or in another conveyance, for carriage of LSA material or SCO in a Type IP-1, Type IP-2, Type IP-3 package or unpackaged, shall not exceed the limits shown in Table 6. For SCO-III, the limits in Table 6 may be exceeded provided it can be demonstrated that, in accident conditions of transport, the activity intake by a person in the vicinity of the accident does not exceed $10^9 A_2$ or a corresponding inhalation dose of 50 mSv.

See CA/2015/01 above.

Comments WG5: We agree with the principle but what is the reason for this addition? We have doubts, this may not be appropriate in regulatory text. Consider including SCO-III in Table 6.

Supplementary submission:

Retract additional proposed wording to paragraph 522 and modify Table 6 to read as follows:

Table 6:

| SCO-I and SCO-II | 100A_2 | 10A_2 |
| SCO-III | No limit | No limit |

Explanatory note regarding proposed change to Table 6: SCO III: no limit because it will be limited by the $10^9 A_2$ intake (413(c)(iv)) and the field requirement of 2 mSv at surface and 0.1 mSv at 2 meters from the conveyance (para. 566(b)).

Para. 523

The TI for a package, overpack or freight container, or for unpackaged LSA-I, SCO-I or SCO-III, shall be the number derived in accordance with the following procedure:

(a) Determine the maximum radiation level in units of millisieverts per hour (mSv/h) at a distance of 1 m from the external surfaces of the package, overpack, freight container or unpackaged LSA-I, SCO-I and SCO-III. The value determined shall be multiplied by 100 and the resulting number is the TI.

See CA/2015/01 above.

Comments WG5: The proposed change is appropriate.
For uranium and thorium ores…

(b) For tanks, freight containers and unpackaged LSA-I, and SCO-I and SCO-III, the value determined in step (a) shall be multiplied by the appropriate factor from Table 7.

| CA/2015 | SSR-6 Table 7 | Modify the title to: Multiplication Factors for Tanks, Freight Containers and Unpackaged LSA-I, and SCO-I and SCO-III | See CA/2015/01 above. Comments WG5: The proposed change is appropriate. |
| CA/2015 | SSR-6 Para. 540 | 540. Each label conforming to the applicable models in Figs 2–4 shall be completed with the following information: (a) Contents: (i) Except for LSA-I material, the name(s) of the radionuclide(s) as taken from Table 2, using the symbols prescribed therein. For mixtures of radionuclides, the most restrictive nuclides must be listed to the extent the space on the line permits. The group of LSA or SCO shall be shown following the name(s) of the radionuclide(s). The terms “LSA-II”, “LSA-III”, “SCO-I”, “SCO-II” and “SCO-III” shall be used for this purpose. | See CA/2015/01 above. Comments WG5: The proposed change is appropriate. |
| CA/2015 | SSR-6 Para. 546 | 546. The consignor shall include in the transport documents with each consignment the identification of the consignor and consignee, including their names and addresses, and the following information, as applicable, in the order given:… (n) For LSA-II, LSA-III, SCO-I, and SCO-II and SCO-III, the total activity of the consignment as a multiple of \( A_2 \). For radioactive material for which the \( A_2 \) value is unlimited, the multiple of \( A_2 \) shall be zero. | See CA/2015/01 above. Comments WG5: The proposed change is appropriate. |
| CA/2015 | SSR-6 Section VIII Approval and Administration Requirements | Add: APPROVAL FOR LARGE OBJECT SHIPMENTS 8X1. Each consignment transported as a large object shall require multilateral approval. 8X2. An application for approval of large object shipments shall include: (a) A detailed description of the proposed radioactive contents with reference to their physical and chemical states and the nature of the radiation emitted; (b) A detailed statement of the design of the large object, including complete | See CA/2015/01 above. Comments WG5: The applicant should include the justification for choosing SCO-III in the application. CS shall discuss where this separate chapter in the regulations should come exactly. Supplementary submission: 8X2 new (a) A statement of the respects in which, and of the reasons why, the consignment is considered a large object. 8X2 (d) A transport plan covering all activities associated with the transport, including radiation protection, emergency response, and any special precautions or special administrative or operational controls which are to be employed during transit; |
engineering drawings and schedules of materials and methods of manufacture;
(c) All information necessary to satisfy the competent authority that the requirements of para. 520(e) and the requirements of paras. 413(c)(iv) and 522, if applicable, are satisfied;
(d) A plan covering all activities associated with the transport, including radiation protection, emergency response, and any special precautions or special administrative or operational controls which are to be employed during transit;
(e) A specification of the applicable management system as required in para. 306.

8X3. Upon approval of large object shipments the competent authority shall issue a certificate of approval.

CA/2015/12
WG 1
SSR-6 Annex I Summary of Approval and Prior Notification Requirement
Table, modify “LSA material c,d,e and SCO-Ic,e and SCO-IIc,e” in Part 1 to “LSA material c,d,e and SCO-Ic,e and SCO-IIc,e”.
Table, add a row to Part 4 for SCO-III as follows:

<table>
<thead>
<tr>
<th>Key paragraphs in the Regulations</th>
<th>Class of package or material</th>
</tr>
</thead>
<tbody>
<tr>
<td>413, 520, 522, 8X1, 8X2, 8X3</td>
<td>SCO-III shipments</td>
</tr>
</tbody>
</table>

Competent authority approval required – Country of Origin: Yes
Competent authority approval required – Countries en route: Yes
Consignor required to notify country of origin and countries en route of each shipment: Yes

See CA/2015/01 above.

Comments WG5:
We agree with the addition but suggest the drafting of the complete table (Annex I part 4) and the verification of the key paragraphs.

Supplementary submission:
Part 1 of Annex I to read as follows:

<table>
<thead>
<tr>
<th>Key paragraphs in the Regulations</th>
<th>Class of package or material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excepted package**</td>
<td></td>
</tr>
<tr>
<td>LSA material c,d,e and SCO-Ic,e</td>
<td>Type IP-1</td>
</tr>
<tr>
<td>SCO-IIc,e</td>
<td>Type IP-2 or Type IP-3</td>
</tr>
<tr>
<td>Type A**</td>
<td></td>
</tr>
</tbody>
</table>

Part 4 of Annex I to read as follows:

<table>
<thead>
<tr>
<th>Key paragraphs in the Regulations</th>
<th>Class of package or material</th>
</tr>
</thead>
<tbody>
<tr>
<td>413 (c)</td>
<td>SCO-III shipments</td>
</tr>
<tr>
<td>520 (c)</td>
<td></td>
</tr>
<tr>
<td>522</td>
<td></td>
</tr>
<tr>
<td>8X1, 8X2, 8X3</td>
<td></td>
</tr>
</tbody>
</table>

See CA/2015/01 above.

Comments WG5:
Modify bullet (a) to “Unpackaged LSA-I material, SCO-I and SCO-III (see para. 520).”
<table>
<thead>
<tr>
<th>WG 1</th>
<th>Summary of Consignments Requiring Exclusive Use</th>
<th>The proposed change is appropriate</th>
</tr>
</thead>
</table>

**CA/2015/14**  
**WG 1**  
SSG-26 Para. 224 bis.  
**New text based on SSG-26 para. 310.5:**  
For large objects generated from refurbishment or decommissioning of nuclear facilities, over a hundred transports have been conducted under special arrangements in the Member States. As experience with this type of transport has grown and is now more routine, specific regulatory requirements were needed to allow the movement of large objects without the need for special arrangement. On the basis of these experiences, a set of standard provisions for transport of large objects as surface contaminated objects (SCO-III category), based on the IAEA “performance package” concept, have been developed. Note that these provisions do not include components such as reactor vessels, due to the more limited experience and greater radioactivity levels.  
See CA/2015/01 above.  
**Comments WG5:**  
The proposed change is appropriate. Instead of using “standard provisions” using the terminology “regulatory requirements”.  
**Supplementary submission:**  
For large objects generated from refurbishment or decommissioning of nuclear facilities, over a hundred transports have been conducted under special arrangements in the Member States. These objects are quite large and massive, for example, measuring up to 6 m in diameter, up to 20 m in length and weighing over 400,000 kg. As experience with this type of transport has grown and is now more routine, specific regulatory requirements were needed to allow the movement of large objects without the need for special arrangement. On the basis of these experiences, a set of standard provisions for transport of large objects as surface contaminated objects (SCO-III category), based on the IAEA “performance package” concept, have been developed. Note that these provisions do not include components such as reactor vessels, due to the more limited experience and greater radioactivity levels.  

**CA/2015/15**  
**WG 1**  
SSG-26 Para. 310.5  
**Remove paragraph 310.5 and move the applicable guidance to 224 bis., removing any references to special arrangement (see CA/2015/14).**  
See CA/2015/01 above.  
**Comments WG5:**  
The proposed change is appropriate.  
**Supplementary submission:**  
Refer to supplementary submission for CA/2015/14.  

**CA/2015/16**  
**WG 1**  
SSG-26 Appendix VII  
**Once changes to SSR-6 are approved (CA/2015/1 through 13), remove Appendix VII and distribute the applicable guidance to appropriate paragraphs of the Regulations and remove any references to special arrangement. Note that in many cases the guidance currently in Appendix VII has been moved to the proposed Regulations and may be removed altogether. Also note that guidance should be added for paragraph 413 indicating that contamination on the inaccessible surface may be determined by conservative estimates and/or analysis by methods other than direct contamination measurements.**  
See CA/2015/01 above.  
**Comments WG5:**  
The proposed change is appropriate. This editorial work still needs to be done by the CS.  
**Supplementary submission:**  
See distribution of Appendix VII guidance to appropriate paragraphs below. Most of Appendix VII has been moved to the regulations except as noted below.  

**CA/Supplementary Submission**  
**WG 1**  
**Supplementary submission:**  
New proposed SSG-26 guidance, transferred from App VII and new;  
413(c)(i) – new guidance added – not currently in App VII.  
Although typically welded, openings may be sealed by any method provided it is justified to prevent release of the radioactive material during routine conditions of transport. Openings should be sealed such that they may only be opened by destructive techniques such as machining, sawing, drilling or flame cutting.
413(c)(ii) – was App VII.23. Though a threshold value for dryness is not given, drain out of water, air blow and air ventilation are procedures employed to dry an object from the viewpoint of transport. More stringent dryness specifications may be required for disposal.

413(c)(iv) – new guidance added for determination of inaccessible surface contamination (first sentence) and rest is from App VII.9. Contamination on the inaccessible surface may be determined by conservative estimates and/or analysis by methods other than direct contamination measurements. In the Q system, which was developed to establish a radiological basis for the Transport Regulations, five radiation exposure routes, i.e. external photon dose (QA), external beta dose (QB), inhalation dose (QC), skin and ingestion dose due to contamination transfer (QD) and submersion dose (QE) are considered. Among these, the inhalation dose (QC) can be taken as a major exposure route for large objects under accident conditions, since most of the activity that is dispersed is from the surface contamination that comes from the surfaces of the object which may be scratched during the accident. Therefore, to assess the level of safety of transport of large objects, evaluation of inhalation dose from surface contamination can be considered as being essential (see Appendix VII).

520(c)(iii) – was VII.8 and VII.36(b) The basic concept of allowing transport of SCOs unpackaged is that, though unpackaged, the objects (including large objects) should comply with the applicable Type IP package requirements, when the outer envelope (shells, etc.) is considered as packaging. In addition to being allowed to be transported unpackaged, certain requirements for Type IP packages may be excluded, provided that compensatory safety measures in the form of more stringent operational controls are demonstrated in order to ensure the same level of safety.

The transport orientation restriction, administratively controlled by the transport plan, may be considered when applying the free drop test requirement of para. 722 of the Transport Regulations that the specimen must drop on the target so as to suffer maximum damage. The free drop test requirement of para. 722 of the Transport Regulations should be applied to the component, without the benefit of any securing devices or systems, as prepared for transport and including attached covers and shielding.

As addressed in para. 722.6 in this publication, if the conditions in the transport plan effectively prevent the large object from dropping or colliding in certain orientations, then these orientations could be ignored in assessing the maximum damage. Demonstration of compliance may be performed in accordance with any of the methods referred to in para. 701 of the Transport Regulations.

8X2(d) – was VII.35. A written transport plan is used to govern the transport of large objects. The transport plan should contain lines of authority, responsibilities, requirements, precautions, prerequisites, instructions, personnel restrictions, emergency response actions, a radiation protection programme that includes any conveyance transfers, and the sequence of events regarding the transport. Special attention should be paid to the radiation protection programme, since the transport of large objects would be conducted in a different manner from the routine transport of ordinary packages and may involve workers not familiar with transport operations. As such, it should take into account all steps and activities of transport and all relevant transport workers and members of the public. Radiation levels of the object, transport and handling methods, including durations and distances of workers from the object in each operation, should be carefully examined and doses to workers should be optimized with the proper dose constraint.

Appendix VII
• Rename to GUIDANCE FOR CALCULATION OF ACTIVITY INTAKE FOR TRANSPORT OF LARGE OBJECTS
• Remove all sections except VII.11, VII.12, and VII.13. These become VII.1, VII.2 and VII.3, respectively
• Replace component(s) with object(s) throughout
• Replace “of special arrangement” with “for” in VII.12 (new VII.2)
• Renumber references VII.11 and VII.12 to VII.1 and VII.2. Remove all other references.