



WORKING PAPER

**DANGEROUS GOODS PANEL (DGP)
MEETING OF THE WORKING GROUP OF THE WHOLE**

Atlantic City, United States, 4 to 8 April 2011

Agenda Item 6: Other business

**AMENDMENT TO THE TECHNICAL INSTRUCTIONS IN RESPONSE TO
A REQUEST FROM THE IAEA**

(Presented by the Secretary)

SUMMARY

This working paper presents an amendment to the Technical Instructions which would allow persons contaminated from radioactive material to be flown for the purpose of medical treatment. The proposal is based on a request by the IAEA. Guidance material prepared by the IAEA on how such a person could be safely transported is also presented for the working group's consideration.

Action by the DGP-WG is in paragraph 2.

1. INTRODUCTION

1.1 The International Atomic Energy Agency (IAEA) has recently requested ICAO to consider incorporating into the Technical Instructions a proposed change to the IAEA Regulations for the Safe Transport of Radioactive Material (TS-R-1) (see Appendix A).

1.2 This proposed change was based on the IAEA's Incident and Emergency Centre (IEC) identifying the need to review requirements to allow contaminated casualties to be flown for the purpose of medical treatment. An amendment to TS-R-1 to exempt the carriage of contaminated passengers is nearing completion within the IAEA but requires formal agreement. Normally, this would then be processed via the UN Sub-Committee of Experts before coming to the DGP for consideration; the earliest this would likely be is at DGP/24 with a resultant change in the 2015/2016 Edition of the Instructions.

1.3 Recognizing the urgent situation in Japan following the recent earthquake and tsunami and the resultant damage to the Fukushima Daiichi nuclear power plant, and given that the exemption was created for a situation like this, the IAEA has requested ICAO to consider expediting the review and approval process.

1.4 Guidance material has been developed by the IAEA which outlines the conditions under which a person who has been subjected to the accidental intake of radioactive material or the external contamination from radioactive material could be transported. It is presented in Appendix B.

2. ACTION BY THE DGP-WG

2.1 The DGP-WG is invited to:

- a) consider the proposed amendment presented in the appendix;
- b) decide if additional requirements are necessary, e.g. prior approvals of the State of the Operator and of the operator;
- c) consider the optimum location for the amendment, e.g. is 1;6.1.4 e) sufficient as proposed by the IAEA or should it be included additionally in 1;1.1.3 and 8;1.1.2;
- d) consider the optimum location for the guidance material e.g. the Supplement or the ICAO website; and
- e) request the Air Navigation Commission to consider approval of the amendment under the fast track mechanism.

APPENDIX A
PROPOSED AMENDMENT

Part 1

GENERAL

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Chapter 6

GENERAL PROVISIONS CONCERNING CLASS 7

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6.1 SCOPE AND APPLICATION

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6.1.4 These Instructions do not apply to:

- a) radioactive material implanted or incorporated into a person or live animal for diagnosis or treatment;
- b) radioactive material in consumer products which have received regulatory approval, following their sale to the end user;
- c) natural material and ores containing naturally occurring radionuclides which are either in their natural state or have only been processed for purposes other than for extraction of the radionuclides, and are not intended to be processed for use of these radionuclides, provided the activity concentration of the material does not exceed 10 times the values specified in 2;7.2.2.1 b) or calculated in accordance with 2;7.2.2.2 to 7.2.2.6;
- d) non-radioactive solid objects with radioactive substances present on any surfaces in quantities not in excess of the limit specified in the definition of contamination in 2;7.1.1;
- e) a person who has been subject to accidental or deliberate intake of or contamination from radioactive material and is to be transported for medical treatment.

APPENDIX B

GUIDANCE MATERIAL FOR TRANSPORTING

Transport of persons for medical treatment

For many years there has been an exemption in the dangerous goods regulations relating to the carriage of a person who contains radioactive material as a result of medical diagnosis or treatment. In 2009 it was noted that this exemption did not apply to cases where the radioactive material in the person was not as a result of medical diagnosis or treatment (e.g. accidental intake). This anomaly is rectified in the latest edition of the regulations. One significant difference is that, in these new scenarios, there is a low risk of some external contamination of the patients. This guidance is intended to be sufficiently generic to allow it to be used for initial urgent transport of a first responder from the incident scene (normally by road) and also for later urgent transport for specialist treatment (normally by air). It will be usual for a casualty to be decontaminated as soon as practicable, however this may be after removal to a safe location by road transport, or by dedicated air ambulance. Patients who are externally contaminated are very unlikely to travel by international commercial air transport.

The Transport Regulations are not presently intended to be applied to movements of a person for medical treatment in case the person has been subjected to the accidental intake of radioactive material or the external contamination from radioactive material. Some adjustment is therefore required.

Normally a person being transported for urgent medical treatment will be accompanied by an appropriate medical professional. The responsible medical professional should give advice on radiological safety (if not, locally available appropriate expertise is likely to be available at the destination). Levels of radioactive material in a person who is being flown for medical treatment will be self-limiting to some degree, however the degree to which material internal to the patient can affect others is easy to measure. If the dose rate at 50 cm from the patient exceeds 25 microSv per hour then any adjacent seats should only be occupied by informed and willing carers and it would be sensible for the carer to carry a dosimeter badge. Where there is loose contamination surgical gloves should be worn. If the dose rate at 50 cm from the patient exceeds 100 microSv per hour then expert advice on radiological protection should be sought and followed.

Radioactive material external to the body is more difficult to deal with. Generally the principles applied to any medical treatment in terms of cleanliness apply equally to contaminated casualties. Skin decontamination of persons should be considered prior to their transport when the associated delay is estimated to have no health impact. The degree to which contamination is removable from the skin needs to be considered. The method of determining this is to wipe the skin and then measure the amount of radioactive material that is removed on the swab. **The goal is to remove any easily removable contamination, or to cover areas where this is not possible such that any contamination cannot spread.** Particularly difficult areas are open wounds. Guidance is provided in IAEA documents on contamination monitoring and skin decontamination, and is summarised in the table following.

Criteria for determining if decontamination is warranted.

There are two sets of limits established in dangerous goods regulations relating specifically to contamination.

Contamination level below which the object should not be considered as radioactive

- < 0.4 Bq/cm² beta/gamma emitters
- < 0.04 Bq/cm² for alpha emitters

Cleanliness limit for packages for transport

- < 4.0 Bq/cm² beta/gamma emitters
- < 0.4 Bq/cm² for alpha emitters
- < 5 µSv/h at the surface

Contamination limits are specified as being the average over 300 cm² and should be measured by an appropriately trained person. The cleanliness limits are set considering both worker and public exposure. Even taking into account the most restrictive conditions, these limits are very unlikely to result in exposures close to dose limits to any member of the public. These levels will apply to the conveyance following transport of a patient.

First Responders

IAEA advice to first responders, who may need to be transported away from the radiation source, gives the following limits:

- 1 µSv/h at 10 cm
- 10000 Bq/cm² beta/gamma emitters
- 1000 Bq/cm² for alpha emitters

Only one ambient dose rate criterion of 1 µSv/h is provided for assessing the first responder. This criterion can only be used to assess skin/clothing contamination from strong gamma emitters. The ambient dose rate criteria were established at levels for strong gamma emitters that can be easily detected under emergency conditions but still correspond to contamination levels more than 100 times below those at which deterministic health effects would be expected

Criteria in terms of concentrations (Bq/cm²) are provided for use by the radiological assessor for assessment of all types of radioactive materials. The criteria were established at levels which are below those at which contaminated people would experience deterministic health effects warranting medical treatment or follow-up. These limits demonstrate how restrictive the limits for packages are (over 1000 times lower).

The following were considered in the developing the first responder criteria:

- All the important isotopes,
- All members of the public, including children and pregnant women,
- Inadvertent ingestion of contamination from the skin,
- External dose from skin contamination, and
- Skin contamination as an indicator of inhalation dose.
- PPE for carers not being used

Generally conservative assumptions were used in the calculations (e.g. it is assumed that the skin contamination is undiminished for 4 days). For inhalation it was assumed that the skin contamination may have resulted from an airborne cloud and thus is an indicator of inhalation dose.

Conditions for carriage of patients.

Overall a prudent approach is to use the more limiting criteria, resulting in the following three cases based on the dose rate at 0.5m (the approximate distance between two seated individuals). The following scenarios take into account a long haul flight and a dose constraint of 0.3 mSv (i.e. no member of the public should get more than one third of the public dose limit from this activity, and no special precautions should be required other than the ones listed here). This low constraint ensures safety of all concerned.

CASE 1

Dose rate at 0.5m >100 microSv per hour – seek advice from radiological protection expert on separation from other people.

Beta/gamma contamination > 4.0 Bq/cm², or Alpha emitters > 0.4 Bq/cm² – decontaminate or cover the affected area (to reduce any alpha emission, but more importantly prevent the spread of radioactive material)

CASE 2

Dose rate at 0.5m >25 microSv per hour – adjacent seats should only be occupied by informed and willing carers.

Beta/gamma contamination > 4.0 Bq/cm², or Alpha emitters > 0.4 Bq/cm² – decontaminate or cover the affected area.

CASE 3

Dose rate at 0.5m <25 microSv per hour – no restriction on use of adjacent seats.

Where possible use 1 µSv/h at 10 cm, or 5 µSv/h at contact (ability to use these values will depend on dose from the patient at 0.5m).

Beta/gamma contamination > 4.0 Bq/cm², or Alpha emitters > 0.4 Bq/cm² – decontaminate or cover the affected area. If monitoring for contamination is impracticable (e.g. at an on-going major incident) then

consider taking simple precautions such as use of disposable covers, and clean (using routine cleaning methods) the conveyance before next use.

Monitoring for and dealing with skin contamination
Perform a radiological survey;
Decontaminate the skin with soap using warm water. Do not scrub too vigorously.
Handle any unknown metal objects with a hemostat or forceps;
Save samples and label them (smears of contamination, nasal smear, extracted tooth, hair and nails, purged bone pieces, etc.);
If a wound is contaminated, survey, rinse, debride only for surgical reasons;
If contamination persists, consider covering area (taking into account that contamination may be fixed to the skin or internal);
Perform a final radiological survey (by first responder monitor/radiological assessor).
Transfer the decontaminated patient to the clean area. Use clean gloves to move the patient to a clean stretcher and exit the contaminated area.
Control the spread of contamination:
Survey staff for possible contamination; remove contaminated clothing and shower before exiting contaminated area.
Survey medical equipment for contamination and decontaminate as required before removing it from the contaminated area.

Spread of contamination to the conveyance in significant levels is very unlikely and can be further limited by following this guidance. Generally it will be accurate to say that the risk to other passengers and workers, even in the most extreme circumstances, will be low compared to the risk to the casualty if they are not treated. Simple precautions such as the patient changing into clean clothes shortly before boarding or placing a sheet (e.g. a typical bed sheet) over the patient's seat can produce even greater protection with little cost.