



DENIAL OF SHIPMENT

Geoff Leach

Manager, Dangerous Goods Office
Civil Aviation Authority

ABSTRACT

The international transport of radioactive material by air is an essential element of healthcare across the globe. Bone scans, cancer treatments and sterilisation of medical equipment all depend on the expeditious transport by air of radioactive isotopes. The issue of the denial of shipments is a world-wide problem and comes in different forms e.g. from the individual pilot who is unhappy at seeing a package bearing a trefoil in the hold of his aircraft, and so offloads it, to the major airline which has decided, because of the costs associated with compliance, that it is simply not commercially viable to carry this type of goods. Both scenarios could fall under the heading of “Denial of shipment” but whilst the former may be relatively easily addressed by improved training, the latter is a far more difficult subject. Whereas “Denial” is often thought of as a transport issue the costs of compliance with the transport requirements are only one part of the story because there are many other expenses relating to storage, worker safety, security etc which would still impact on commercial viability even if transport compliance costs were zero. Consequently, until the issue of denial is addressed holistically, involving all agencies with a vested interest, it is suggested problems will continue to be experienced for the foreseeable future.

Another common issue is the failure of a radioactive consignment to pass an airline’s acceptance check (which all consignments of dangerous goods undergo). Some such failures may be entirely justified, due to significant omissions or faults with a package, but there are also occasions when consignments are rejected for very minor reasons. Whilst this is often blamed on the airline or their handling agent, the prime cause of the rejection is often because of the fear of sanction by an over zealous regulator.

I propose a presentation and panels to discuss the importance of:

1. engagement with all agencies either directly or indirectly involved in the air transport of radioactive material; and
2. the reasonable application by regulatory agencies of regulations.

INTRODUCTION

There is a need for radioactive material to be carried throughout the world for the purposes of medical treatment. For example:



- **Molybdenum-99** (technetium-99m): diagnosing heart conditions; bone, brain disorders. Used in nearly 80% of nuclear medicine or diagnostic scans
- **Iodine-131**: diagnosis/treats thyroid cancer and hyperthyroidism; also used to treat non-Hodgkin's lymphoma, infant neuroblastoma
- **Iodine 125**: treats prostate cancer
- **Iodine-123**: detecting thyroid, brain disorders, heart function
- **Gallium-67**: studying tumours, abscesses, Hodgkin's disease and infections
- **Indium-111**: detecting very small tumours
- **Palladium-103**: treating early stage prostate cancer
- **Thallium-201**: detecting clogged arteries
- **Xenon-133**: pulmonary embolisms; lung function
- **Yttrium-90**: cancer treatment

Many isotopes have very short half-lives which drive the need for air transport. For example:

- **Technetium-99m**: 6.0 hours
- **Iodine-123**: 13.2 hours
- **Yttrium-90**: 64.1 hours
- **Thallium-201**: 3.0 days

Most countries are importers of medical isotopes, and it was recently estimated that 20 million nuclear medicine procedures are carried out per year. Some isotopes may even be required for same/next day medical procedures and so can only be effectively transported by air. It is therefore vital that such shipments are not held up.

Radioactive materials are in one of the nine Classes of dangerous goods. They are subject to requirements specified in the International Civil Aviation Organization's Technical Instructions for the Safe Transport of Dangerous Goods by Air. For radioactive materials, the provisions of the Technical Instructions are derived from the Regulations for the Safe Transport of Radioactive Material produced by the International Atomic Energy Agency. Operators (airlines) around the world have a choice as to whether they will carry dangerous goods on their aircraft. In many States operators are approved/licensed by their State of Registry to carry all classes of dangerous goods; in



others operators declare themselves as either “will carry” or “will not carry” operators. Most radioactive materials can be carried on any type of aircraft; however, some may be restricted to cargo aircraft only and some to the use of a dedicated aircraft. Packages of radioactive material which have an external radiation level above a certain value must be loaded on an aircraft so they are separated from the passengers and/or crew by a distance which gives adequate protection; the required distances are set down in the Technical Instructions.

THE PROBLEM OF “DENIAL”

Types of denial

Over recent years impediments to the expeditious transport of radioactive material have been reported and have been regarded under the heading of “denial” of shipments. However, it is important to consider the various types of denial.

Operator Policy

Generally, approved operators will be able to carry all classes of dangerous goods, but some have elected not to transport radioactive material. This is generally a commercial decision after a determination that the costs of compliance negate any profit which would otherwise be made from the carriage of such cargo. An unfortunate consequence of this is that if an operator which has elected not to carry radioactive material acts as a handling agent for other operators, their policy is by default extended to those other operators, Whilst it is true that radioactive material is subject to additional specific requirements over and above those which apply to the other classes of dangerous goods, these *transport* requirements are not unduly onerous; the most obvious difference from other classes is that packages of radioactive material must be loaded in such a way that a distance is maintained between them and passengers and crew, based on the Transport Index and irrespective of length of journey.

Table 1. Minimum distance from surface of packages, overpacks and freight containers of radioactive material to the nearest inside surface of passenger cabin or flight deck partitions or floors, irrespective of carriage duration (Extract from Table 7-2 of the ICAO Technical Instructions)

Total sum of transport indexes	Minimum distance (metres)
0.1 – 1.0	0.30
1.1 – 2.0	0.50
2.1 – 3.0	0.70
3.1 – 4.0	0.85
4.1 – 5.0	1.00
5.1 – 6.0	1.15
6.1 – 7.0	1.30
7.1 – 8.0	1.45
8.1 – 9.0	1.55

9.1 – 10.0	1.65
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However, the operator is faced with a number of other requirements which are not related to transport *per se*, such as those related to radiological protection, where operators have been required to provide purpose built storage areas with suitable alarms, radiological dose assessments for staff, and the appointment of Radiological Protection Advisers (RPAs), to name but a few. Such requirements place a far higher financial burden on the operator than the relatively modest additional transport requirement costs. Consequently, it is suggested that this type of denial must not be considered an air transport issue; even if the cost of compliance with the additional air mode requirements was zero operators would still be faced with considerable expense which may well lead them to decide that carriage of radioactive material is not commercially viable. The “non-transport” requirements may well be justified, but if any progress is to be made in this area they must be subject to the same review and scrutiny and justification, by appropriate experts, that the air transport requirements have undergone.

Another factor which may sway an operator’s decision on whether or not to carry radioactive material is passenger perception i.e. a passenger may not relish the prospect of traveling on the same aircraft as such cargo because of the concern the trefoil causes the general public. This obviously goes way beyond the transport issue and highlights the need for continuing efforts by the IAEA and others to educate the general public on the importance and benefits of the air transport of radioactive material.

Failure to pass an airline acceptance check and the attitude of regulators

In the air mode, with few exceptions, all packages of dangerous goods (including radioactive material) and their associated documentation are subject to an acceptance check by staff of the operator or their agent. The check is to determine as far as practicable that the requirements of the Technical Instructions have been met. Much of the check is based on trusting what the shipper has declared to the operator i.e. no physical measurement of the Transport Index is carried out by the operator, this is simply taken from the associated Dangerous Goods Transport Document.

Failure to pass an acceptance check, along with flight crew interpretation which is addressed below, is far more difficult to deal with than the Operator Policy issue above; as with an Operator Policy issue the shipper will at least know not to offer his consignment to the operator as it will simply be refused, whereas failure to pass an acceptance check will be unexpected and the time taken to rectify the situation will often mean that, depending on the half life, the product might no longer be of any use. Clearly, if a consignment failed the check because of gross errors or damage to a package then failure would be justified. However, experience has shown that consignments can fail an acceptance check for very minor reasons which would have no bearing on safety, despite the Technical Instructions stating that minor errors should not be regarded as reasons for rejection. There is even anecdotal evidence to suggest that some acceptance staff (of all types of dangerous goods) are paid a bonus for each rejection thus giving an incentive to find errors however small.

Whilst the previous paragraphs may appear to suggest that acceptance failures are solely because of over-zealous acceptance staff, this fails to recognize the role played by regulators in this area. It is

Comment [g1]: Page: 4
 Is this problem specific to carriage of radioactive cargo, or endemic across the DG freight market? If it is you should say so.

imperative that a regulatory regime fosters a climate whereby operators are able to apply common sense when accepting dangerous goods. If an operator faces enforcement action from a regulator because his staff have accepted a consignment of dangerous goods with minor errors, they can hardly be blamed for adopting an over-zealous approach. Unjustified rejections not only cause financial penalty for a shipper and in the case of radioactive material the possible impact on a vital medical treatment, they also encourage less scrupulous shippers to not declare their consignment at all, which has a far greater impact on safety than, say, a minor error in documentation.

Similarly, for minor infringements of associated handling or storage, regulators need to take account of the consequences of handing down of a draconian penalty, because the operator may simply feel that it is not worth the risk to their business by continuing to carry radioactive material. However, a balance needs to be struck because an impression must not be given that operators can act with impunity.

Flight crew interpretation

There have been accounts of radioactive material not being carried by air because of a pilot's misplaced concern over seeing a (compliant) package of radioactive material loaded on his aircraft. For example instances have occurred when livestock was being carried in the same hold which the pilot has assumed wrongly, is not acceptable. As with acceptance check failures, this is potentially ruinous to a consignment of radioactive material with the possible associated impact on a medical procedure. Not surprisingly, flight crew training tends to be geared towards what must not be loaded on an aircraft, but the "denial" issue suggests that in the case of radioactive material, the importance of air transport and the serious implications for healthcare if compliant consignments are not carried should also be addressed.

Comment [g2]: Page: 5
These last two sentences appear to contradict one another. Can you clarify if it is important that the crew understand the importance of the carriage of radioactive material, or not?

CONCLUSIONS

1. The "denial" issue comes in different forms in air transport; company policy, acceptance check failure and flight crew interpretation;
2. The "denial" issue must not be thought of as being solely an air transport, or even a transport, issue. Progress can only be made if all affected parties and applicable requirements are considered;
3. Acceptance staff of operators and handling agents should be encouraged not to reject consignments of radioactive material for minor errors which would have no bearing on safety;
4. 3. can only succeed if aviation regulators apply a reasonable attitude to enforcement and not prosecute operators or handling agents for accepting consignments of radioactive material (and indeed any other type of dangerous goods) which have been prepared with minor errors;



5. As with 4. regulators need to consider the consequences of any punitive measures taken against operators or handling agents for minor infringements relating to handling or storage i.e. the operator or handling agent may decide not to continue in the business of radioactive material;
6. Flight crew training should cover the importance of the transport of radioactive material by air i.e. it should not concentrate solely on the conditions under which it may or may not be carried;

REFERENCES

ICAO Doc 9284 - International Civil Aviation Organization's Technical Instructions for the Safe Transport of Dangerous Goods by Air.