

THE BENEFITS OF SIMPLE SHORT AND CLEAR TRAINING FOR TARGETED AUDIENCES

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ABSTRACT

Material of use in training of those involved in the transport of radioactive material has been developed. This material provides the basis for short training of specific audiences. In addition efforts have been made to provide presentation material which can be easily adapted to any language. The benefits include the ability to incorporate training in the transport of radioactive material into existing training courses and thus provide a basic level of knowledge to a widespread audience. This paper sets out the target audiences, gives details of the material and the presentation material developed as well as highlighting some successes.

BACKGROUND

Regulatory requirement

Workers engaged in the transport of radioactive material are required to be provided appropriate training. [1]. The Regulations require that

“313. Individuals such as those who classify *radioactive material*; pack *radioactive material*; mark and label *radioactive material*; prepare transport documents for *radioactive material*; offer or accept *radioactive material* for transport; carry or handle *radioactive material* in transport; mark or placard or load or unload packages of *radioactive material* into or from transport *vehicles*, bulk *packagings* or *freight containers*; or are otherwise directly involved in the transport of *radioactive material* as determined by the *competent authority*; shall receive ... training”.

Training Programmes

There are many training programmes on safe transport of radioactive material conducted regularly in many countries. The International Atomic Energy Agency (IAEA) has developed a comprehensive training programme including teaching material and visual aids encompassing all aspects of safety of transport of radioactive material [2]. The various training programmes include the standards of safety incorporated in the regulations of transport of radioactive material and, in some cases, the basis for the standards. At the end of the training programme the participant is expected to be adequately equipped with the knowledge that would assure compliance with the regulations.

THE MISCELLANY OF THE TRAINING NEEDS

All-in-one training

It is generally observed that in any training programme the participants, that is, the audience do not constitute a homogeneous group. The audience is generally a mixture of representatives of Competent Authority, suppliers of isotopes, safety specialists, organization engaged in forwarding fissile material, institutions transporting spent nuclear fuel and the like. Everyone in the group needs to be trained in safe transport of radioactive material but the individual need of every one would not be identical. Consequently, every participant would be interested in some specific aspects of the subject and very few, for example, the safety specialists and the representatives of Competent Authority, may be interested in all the aspects of the subject.

Al a carte Training

The current programmes may be characterised as presentation of comprehensive material to an assortment of audience on a 'take-it-or-leave-it' basis. There is another shortcoming to this scheme. There are certain individuals who are licensed to handle radioactive material on the strength of their knowledge and experience related to radiation safety who need to be trained in the transport of the radioactive material which they handle. For example, persons handling industrial radiography sources are often required to move the sources from one site to another. They generally transport the sources either in their own conveyances or through contract vehicles on the basis of 'safety instructions' devised by the radiation safety officers of their institutions. The need for imparting specific training on the safe transport of industrial radiography sources for these persons cannot be overlooked. Persons who are licensed to handle sealed sources such as telegamma therapy sources, brachytherapy sources, blood irradiators, gamma chambers, nuclear gauges and well logging sources are required to send the decayed sources after their useful life to an authorised disposal facility. They should have complete knowledge of the requirements.

Persons engaged in forwarding uranium ore and ore concentrates need to know everything about LSA material but they need not undergo a comprehensive training programme that deals with Type B(U) / (M) packages, test and certification requirements, etc.

Very few of the transporting organizations may need to undergo a detailed training programme on the specific requirements for the transport of fissile material such as criticality safety evaluation for a single package and an array of packages and derivation of CSI.

TRAINING MODULES FOR TARGET AUDIENCES

The Agency Regulations [1], specify, in respect of the training requirements, that persons engaged in the transport of radioactive material shall receive training in the contents of these Regulations **commensurate** with their responsibilities.

The Agency Safety Guide on Radiation Protection Programme [3] recommends a graded approach for training as follows:

“10.5. Carriers will usually be required to provide specific training in accordance with the requirements of the pertinent modal organization.

10.6. The specific work situations vary greatly from one employer to another, or even within the same consignor or carrier entity, and therefore the training of workers for the transport of radioactive material should be oriented towards his or her specific or potential job functions and work environment. That is, a graded approach should be adopted, in which the amount, type and complexity of training is commensurate with the nature and degree of the hazards and the type and complexity of the duties in the transport of radioactive material.”

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With an appreciation of the training needs of specific segments of the transport community the Agency set about preparation of specific training modules. The following criteria were adopted in identifying the specific training modules:

- The radioactive material to be transported
- The specific segment(s) of the transport community engaged in the transport of the material
- The modes of transport applicable to the transport of the material

On the basis of these criteria the modules to be developed were identified. Please see Table 1.

It can be seen that certain modules identified as distinct in respect of the target audience could well have much in common in the contents. For example, the target audience for the module on transport of telegamma therapy sources would be suppliers of isotopes to cancer therapy facilities. The contents would equally apply to the licensed users of the sources, the cancer therapy centre, in this case, who may take up the responsibility for the transport of the decayed source (after its useful life) to the supplier or a facility authorised to receive decayed sources. In many cases, the original supplier of the source or the facility receiving the decayed source may take up the responsibility for the transport of the decayed source with the necessary authorization from the Competent Authority. This is an example of a given training module being applicable to different target audiences, viz., source suppliers, medical facility and source disposal facility.

It is also possible that a given target audience may need to be trained in many modules. For example, the modules for the transport of spent fuel, fissile material and low activity radioactive waste may be of interest to the operators of a nuclear power plant.

Under these circumstances it is the responsibility of the transport organization, for example, nuclear power plant operator, to ensure that the concerned persons are trained in the specific aspects of transport of radioactive material.

INTERLUDE: DoS

It becomes necessary here to bring in the subject of delay and denial of shipment by way of an interlude. There have been references to reported instances of denial of shipment despite conformance with the applicable regulations for the safe transport of radioactive material. This issue shot into prominence in the International Conference on Safety of Transport of Radioactive Material when it was flagged in a paper drawing international attention [4]. This issue then assumed significance in the Agency's Action Plan for safe transport of radioactive material. Accordingly the Agency held many consultancies and a Technical Meeting and has constituted an International Steering Committee on delay and denial of shipment. The various consultancies and other meetings identified many reasons for the delay and denial such as variations in State Regulations, perceptions about radiation, lack of familiarity with the uses of radiation and inadequate awareness among the various State Officials who have an interface with shipment of radioactive material. For example, a Customs officer or a civil Aviation functionary or a State Border Official may encounter a legitimate shipment of radioactive material but for one or more of the above reasons may cause delay or denial of shipment. The consequences of such delay or denial can be an aborted

Table 1
TRAINING MODULES FOR SPECIFIC TARGET AUDIENCE

Mode of transport →		Air	Sea	Road/ rail/ inland waterway
Target audience ↓	RAM/ shipments of interest ↓			
Competent Authority	All			
Cargo personnel	All			
Carriers	All			
Chief of crew	All			
Designers and test facility personnel	Special form, other than special form and LDRM			
Consignor / supplier of sources	Gamma Irradiator sources			
	Telegamma sources			
	Gamma cells / chambers			
	Blood irradiators			
	Industrial radiography sources			
	Brachytherapy sources			
	Calibration sources			
	Well logging sources			
Supplier of gauges	Nucleonic gauge sources			
Supplier of radioisotopes	Radiopharmaceuticals			
Supplier of consumer products and RIA kits	Consumer products			
	RIA kits / very low activity material			
Nuclear reactors	Spent fuel			
Nuclear reactors	Surface Contaminated Objects			
Nuclear reactors	Fresh ⁶⁰ Co rods			
Facilities handling fissile materials	Enriched U fuel / plutonium / Fissile material			
UF ₆ plants	UF ₆			
Uranium / thorium mine (mill) operators	LSA material			
Telegamma therapy facilities	Decayed telegamma sources			
Research facilities handling gamma cells / gamma chambers	Type B(U) / (M) packages			
Industrial radiography facilities	Radiography sources			
Brachytherapy source facilities	Decayed brachytherapy sources			
Radiation monitor calibration facilities	Decayed sources in Type B(U) / (M) packages			
Users of well logging sources	Well logging sources			
Users of gauges	Gauge sources			

appointment for medical diagnosis or treatment of cancer or hindrance to sterilization of surgical products, or to non-destructive testing of industrial products or non-availability of nucleonic gauges used in industrial processing for quality control or production of nuclear power. An effective way of addressing this issue is to conduct familiarization programmes for senior state officials who have the authority to amend State Regulations and also the officials who actually have an interface with shipment of radioactive material in the course of their official duties. It is hence that these officials have been identified as target audience for the training modules. However, the contents of the training modules intended for these officials would include less technical requirements.

DURATION OF THE TRAINING PROGRAMME

The duration of each module is short and can be completed over a period of 2 hours to one day depending upon the topic of the module. If demonstrations, visits and tutorials are included in a training programme (it would be indeed fruitful to include them) the programme may extend beyond one day. The actual duration would be determined by the course contents and the needs of the target audience which would have to be determined by the organizers of the training programme.

COURSE CONTENTS - GENERIC AND SPECIFIC

The course contents for each training module have been determined on the basis of the specific needs of the target audience adopting the graded approach that is characteristic of the Regulations [1]. The major heads identified as course contents are as follows:

- What are radioactive materials?
- Uses of radioactive material
 - Healthcare applications
 - *Medical Diagnosis, Treatment of cancer, Sterilization of medical products, Preservation of food*
 - Industrial applications
 - *Process control, Industrial radiography, Power production, Consumer products*
 - Other uses
- Importance of effective and efficient transport
- Regulations for the transport of radioactive material
 - *National Regulations, International Instruments (Modal Regulations and Conventions)*
- Regulatory requirements
 - Package design safety
 - Handling and carriage of radioactive cargo
 - Markings, Labels on packages, freight containers and vehicle
 - Transport documents
 - Accumulation of packages in conveyances and storage areas
 - Non-compliance
 - Responsibilities of the staff, Checklist for routine operations
 - Radiation protection
 - *Segregation during transport and storage in transit, Radiation protection programmes*

- Emergency situations
- Conclusion
- Exercise
- Appendices

The course contents are so devised that all the modules have certain common features which are generic in nature, applicable to all radioactive material and each module contains the requirements and guidance specific to the needs of the target audience. A consultancy established by the Agency recommended that the number of modules could be reduced. For example, the modules need not be made mode-specific. Taking into account the recommendations, the Agency has restructured the training modules.

SIMPLE CLEAR LANGUAGE

The hallmark of the training modules is that the language adopted is simple. This is necessitated by the need for ease of translation of the contents to other languages not only the UN languages but others too. Long sentences are kept to a minimum. One sentence conveys only a single idea. This would enable easy translation. The modules avoid regulatory language for the sake of clarity and reader-friendliness. The training modules intended for public authorities focus on the use of radioactive material and how they impact our daily lives and the high standards of safety assured by the regulations. Detailed and specific regulatory provisions are not included in these modules. The Agency Staff have informally attempted to translate the material into other languages and the results are encouraging.

VISUAL AIDS

The training material developed by the Agency includes visual aids which are presently in the form of PowerPoint slides. The number of slides for each module is adequate to cover the entire contents of the module. In order to avoid translating the contents of the slides, the Agency has prepared slides without words or with very few words. That is, each slide has figures which demonstrate a specific concept. However, the person presenting the slides may include notes in his file which will not disturb the audience. This approach would ensure that while explaining a slide the presenter does not leave out any important point. Photographs and sketches are used liberally in the preparation of the slides. If, however, a presenter prefers having words, he may well include them in the slides for his presentation.

TRIED AND TESTED

The Agency undertook to test these training modules so that the efficacy of this approach could be tested and the shortcomings identified for correction. In a training programme that was organized in China in 2010, these training modules were used for a pre-identified target audience. The modules could be translated and the audience reaction was entirely positive. Copies of some of the specific modules have been made available for use by experts from various Member States of the Agency and the feedback is encouraging.

CONCLUSIONS

Currently the Agency conducts comprehensive training programmes on the Safe Transport of Radioactive Material in different parts of the world at intervals ranging from 1 to 2 years. The

frequency of such programmes and the number of participants in a given training programme are subject to resource constraints. The current training programme is so comprehensive that it includes all possible shipments of radioactive material from excepted packages to spent nuclear fuel shipments over a range of a wide variety of materials such as LSA materials, SCO, radiopharmaceuticals, telegamma therapy sources, gamma irradiator sources and fissile material. Safety experts and representatives of the Competent Authority could certainly benefit from such a comprehensive course. The short and specific training modules for target audiences would serve the purpose for which they have been produced, viz., to impart training to specific *segments of the transport community* providing complete information on all *relevant* of the regulations *commensurate* with the *specific needs* of the audience. Experience gained from trials so far is encouraging. The Agency proposes to develop detailed notes and visual aids for all the training modules soon. A consultancy for this purpose is to be established shortly. Upon completion of this task, the lecture modules would be formally made available for all the Member States. There

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