THE OPERATIONAL AND REGULATORY OUTLOOK FOR THE TRANSPORT OF RADIOACTIVE MATERIAL

Y. Sousselier
Commissariat à l'Energie Atomique, Fontenay-aux-Roses, FRANCE

In the transport sector more than in any other sector of the nuclear power industry, operational procedures have closely followed regulatory requirements. Although they did not exactly precede the first actual transport operation, the first regulations were at least drawn up before transport really expanded. Many exemples of this can be quoted : from transport by post to the transport of plutonium by air, for which strict regulations have been drawn up either by the IAEA or within some countries, at a time when there was not yet any real need for them.

That is very good. It is probably one of the reasons why the transport of radioactive material has never been the cause of any actual accidents. Therefore, it can and probably must continue in the same way. The real problem is, therefore, to examine the future for transport regulations. Should they and can they develop ? Have they now reached an optimum level which should be left alone ?

The questions is often raised of "How safe is safe ?" Are we perhaps tempted to strive towards a zero risk situation which is costly and which does not in fact exist. The real problem is to achieve an optimum situation.

It is generally difficult to speak of optimum or optimisation because these words are not always the same meaning for everyone and are often a source of misunderstanding.

In some circles optimisation is taken to be synonymous with phrases like "as low as is reasonably achievable", or "as low as is reasonably practicable" or the ICRP phrase "as low as is reasonably practicable, social and economic factors being taken into account". For others optimisation is akin to balancing two factors to achieve some best objective - cost-benefit analysis can be seen as optimisation in monetary terms, but does not normally take account of perceived risk.

In the case of transport, it would be extremely difficult to apply the concept of cost-benefit analysis as recommended by ICRP for the reason that transport of radioactive materials has resulted in so few accidents and very little detriment and the achievements are perhaps better than optimum.

Nevertheless, it is necessary to have an aim for our future actions and the search for an optimum, which is more or less synonymous with "as low as reasonably practicable" can constitute such an aim. But, of course, in some cases, it is useful to make a cost benefit analysis in order to determine what is "reasonable".

1. As regards the transport of radioactive material, it should be borne in mind that little has been done, despite the meeting in Vienna of a group of experts from the IAEA in July 1979. But has the current revision of the IAEA's regulations really been aimed at achieving these optimum conditions ?

It must be said that this is not obvious at the outset. Can an optimum be achieved for a droptest or for a leakage value ?

It is however possible to obtain optimum conditions in a number of sectors for a start and in this way achieve overall optimisation by gradual stages.

1.1. The first concerns our knowledge of the data used as a basis for design calculations for packaging. The following are two examples :

- More accurate measurements of the effective lead cross-sections enabling a more exact calculation of the shicldding thickness to be made so as to optimise the weight of packaging,

- The development of more effective computing codes for determining Keff, thus again allowing optimisation by increasing to the maximum the number of irradiated fuel elements that can be transported in a cask and thus contributing towards a reduction in the cost and number of transport operations.

1.2. Another sector is that of taking into consideration a whole interlinked series of operations and not just the transport factor. It is in fact difficult, as it already has been said, to achieve the optimum transport conditions as regards radiation doses. At the meeting of the group of IAEA experts on the application of the ICRP's recommendations, it was suggested that studies should be undertaken with a view to reducing the maximum permissible dose in transit from 200 mrem/h to 100 mrem/h. This idea has not been included in the draft document revising the IAEA's recommendations; in fact, it would first of all be necessary to be able to assess the effect this reduction would have on the overall dose received by workers and by the public. However, very little data is available in this sector and there again it would have been necessary to reach an agreement on the values for man x rem and we know that the figures put forward vary a great deal from country to country.

However, general optimum conditions can be pursued. The following are two examples of this :

a) The casks for the irradiated fuel. By increasing the number of fuel elements transported in one cask, the number of journeys is reduced and this can then effectively reduce the dose received if the same dose rate values are used. On the other hand, as there are generally limits to the total weight of the load, whether transported by road or by rail, the temptation would be to go right up to the limit of the acceptable values for dose rates, which would effectively increase the dose. An optimisation study for the whole loading-transport-unloading operation could be undertaken although,if the economic factors are to be taken into account,a value would also have to be allotted for man x rem, but this could be done at national level so that specified values could be used.

b) A further example is that of managing low activity waste. This waste can be transported either in bulk or packaged. In the second case, a removable or integral biological shield could be used (the packaging also acting as a biological shield). If only the actual transport is taken into consideration, it is difficult to see how optimum conditions can be achieved and despite the freedom offered by the regulations and the limited consequences of a possible accident, there is a danger that we will be striving for zero risk. But what we have to do is take into consideration all the operations involved including packaging, handling, loading, transport, unloading and final storage and try to find the optimum conditions for all these operations to reduce risks and radiation values with regard to the public and workers.

2. We can also try to optimise conditions in a very different sector, i.e. the regulations. Future regulations need not be more and more restrictive and detailed, but more and more effective.

We must avoid the risk of making transport operations impossible and creating insurmountable difficulties when applying these regulations. In fact these ideas are often present in the background in discussions during the meeting on the IAEA's regulations. Would it not be a good idea to pursue this further and more systematically ?

We could submit two proposals.

2.1. As regards the administrative aspects of the regulations, we should try to achieve a reduction in the number of documents, a simplification of some of them to making them easier to apply to international traffic.

If, for this last aspect, we take the case of endorsement of appro val certificats or procedures for making special arrangements :

- An attempt to obtain envelope values for the allowable contents is likely to restrict the number of extensions to the approval.

- Standardisation of the documents on an international scale (at least those intended for international transport) should provide a better understanding by the competent authorities in a country other than the country of origin and should avoid long and costly complete translations in most cases.

However, in some cases, optimisation could mean producing more detailed documents : this probably applies to the checklists which show that all the operations have been done correctly as regards maintenance, loading and storage of packagings.

2.2. This last point is connected with quality control. Optimum conditions should also be pursued in this sector.

Is it necessary to aim at the same rigorous and detailed quality control programme for type A packaging designed for transporting 1 Ci of 99 Tc as for type B packaging for transporting several kg of plutonium ? Even in the latter case, could we not just identify the key points which should be the subject of detailed quality control procedures and those for which more conventional controls would suffice ?

A further aspect of quality control is that involved in operation and one basic factor is a complete and adequate understanding by all those who carry out the work. Those involved in handling, transport and control operations require a knowledge of the regulations and the materials transported and the potential risks. But there again, a certain optimum level is needed since all the people involved at each stage in the transport operation do not necessarily have to understand all the factors in the same way that it is probably not essential to have the same degree of knowledge of the regulations or of health physics to transport samples which will be sent by post or to transport large quantities of radioactive liquids in tanks.

3. To achieve these optimum conditions, it is of course essential to study in depth all the stages of the transport operation and all the procedures carried out. However, this can only be put into practice if we first of all convince the general public that transporting radioactive materials is perfectly safe and then that optimum conditions are in their interest.

These are, moreover, linked together : it is above all because the public are not convinced that this degree of safety has been achieved that they demand even stricter safety measures. But by demanding increasingly strict measures, a certain sector of the public are then led to believe that these operations are not safe in the first place.

The public can only be convinced by making more information available. However, in our own sector, we have paradoxically become the victims of our own excellent record. Journalists often say : "1000 trains which is behind schedule - that's news" or even "10,000 cars driving around safely is not news, but one car in an accident - that's news". Thus, since there are no accidents involving the transport of radioactive materials, no news is ever published about it, except when an opponent to nuclear power draws people's attention to this sector and the hazards attributed to it.

It is difficult to move out of this situation. But perhaps we could exploit the following events like :

- Introducing a new type of packaging into use.
- Starting the regular transport of some particular substance,

to invite journalists and mention the number of transport operations carried out without accident.

Then, we could try to promote the idea of "optimum conditions", by using specific examples to which it could be applied and for which we could suggest, in various ways, that they should be applied to all transport involving dangerous materials and not only the transport of radioactive materials and that these studies could in some cases give rise to stricter measures and in others to the adoption of less restrictive values.

These "optimum conditions" must not be regarded as a universal panacea. We must continue our work in the present lines, carrying out in-depth studies on all the problems which could be raised by applying the regulations or all the imperfections which this could involve.

However, optimisation must be our guide when carrying out these studies, and keep us from a never-ending search for even more perfect safety standards no matter what the cost, and enable us to maintain the current very high safety level which has already been achieved when transporting radioactive matter, while reconciling this with reasonable economic constraints.