

Trip Report

Travel Dates: September 18 - 22, 2006

Location: Vienna, Austria

Organization/Committee: International Atomic Energy Agency (IAEA),

Desired Outcome:

Development of a final draft guidance document for security of radioactive waste that provides a scheme for categorizing or prioritizing waste streams and determining the security measures required to protect these wastes. The document should be consistent with other draft IAEA documents such as the IAEA *"Code of Conduct on Safety and Security of Radioactive Sources"* document.

Results Achieved:

The desired results were achieved. A draft document that was consistent with security approach in other IAEA documents was developed. The document provides a scheme for categorizing (graded approach) radioactive waste and identifies security measures for different security levels.

Summary of Trip:

During the week of September 18, 2006, an Office of Nuclear Security and Incident Response staff member participated in a Consultancy Service Meeting (CSM) to develop final draft guidance document for security of radioactive waste. Other members of the consultancy were: Leigh Gunn, Department of Energy; Daniel Robeau, Commissariat à l'Energie Atomique, France and, Steve Skelton, Office for Civil Nuclear Security, United Kingdom.

This was the fifth consultancy meeting held to help develop this guidance document. Previous consultancies were unable to develop a clear and practical basis for categorization of radioactive waste for security purposes. This CSM spent a large portion of the time developing a scheme to categorize waste streams. The discussion focused on ensuring the scheme considered malevolent acts of sabotage and theft involving radioactive waste that could lead to unacceptable radiological consequences. The CSM used the IAEA *"Code of Conduct on Safety and Security of Radioactive Sources"* (*Code of Conduct*) and draft IAEA *"Security of Radioactive Sources"* documents as the starting point.

The first step in the process of establishing security requirements was the characterization of the activity of waste stored in a facility (i.e., the maximum expected inventory of radioactive waste in the facility and its corresponding radionuclide activity levels). Where appropriate, the facility may be divided into independent areas where the waste is located. For characterization purposes, each radionuclide activity level was expressed as a ratio of the radionuclide activity divided (scaled) by the corresponding "D" value as used in the *"Code of Conduct"* and *"Security of Radioactive Sources"* documents. (The D-values method is further explained in the draft IAEA report "Dangerous Quantities of Radioactive material (D-values)"). A dimensionless

number, R, representing the hazard of the total activity was calculated by summing these scaled radioactivity levels to the “D” values. To be compatible with the security principles for radioactive sources developed from the “*Code of Conduct*,” the same threshold break points were used. In particular, the highest level of security is associated to an R value greater than 1000. Four categories of security were prescribed, ranging from security category W1 (highest level) to security category W4 (lowest level).

Using R, a default security category was then assigned for theft and another for radiological sabotage associated with the highest level of security that should be considered for the facility. A table was developed for each of these primary concerns as a starting point. For theft, the initial levels were discriminated using the weight of the package(s), the total and the concentration of the radionuclide. For radiological sabotage, the initial levels were discriminated using primarily the total activity and the concentration of the radionuclide. This initial categorization assumed a worst case with the radioactive waste concentrated in a small volume and dispersible.

Because all facilities posed different risk, the application of modifying factors was developed to reduce the security levels to the appropriate level based on the risk of the material. As described above, each facility was assigned an initial security category that is determined on a conservative basis. The security category may then be reduced using modifying factors. Examples of modifying factors were physical form of the material in the waste (solid, liquid, ashes, powder or granulate), concentration of the activity, combustibility, containment, toxicity, homogeneity of the radioactivity and accessibility of the material. In developing modifying factors, the concept of passive safety was considered in defining the appropriate modifying factors.

If appropriate, the modifying factors could be applied to reduce these two security categorizations (theft and radiological sabotage). The security categorization of the facility or independent area is the higher of the two categories.

For each corresponding security level, CSM used the previous CSM document and ensured security measures were consistent with draft IAEA “*Security of Radioactive Sources*” document.

Next Steps:

Within the document, a discussion of the overall objective of the security measures was provided. The CSM was not able to complete the review of this section. IAEA staff plans to review and edit this section to ensure this section is logical and coherent from a reader perspective.

In addition, sections dealing with subjects developed by other IAEA working groups, such as design basis threat, will be provided to other IAEA staff members for review to ensure the philosophy is consistent between documents.

A Technical Meeting is to be held in Vienna, Austria, early 2007, after completing editorial revision.

Policy Issues:

No new policy issues for the NRC were identified. No formal trip report will be prepared.

Contact Information:

Francis Young,
Senior Program Manager
Materials, Transportation & Waste Security Branch
Division of Nuclear Security Policy
Office of Nuclear Security and Incident Response