

Importing and Exporting Radioactive Materials and Waste for Treatment, Processing and Recycling

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ABSTRACT

The paper will address an overview of the licensing process, requirements and experience for importing radioactive waste and metals from international sources and processing and return or recycling. Items to be discussed would center on obtaining regulatory approval for importing radioactive materials for example metals into the U.S. for recycling. The paper will discuss the differentiation between "recycling" options versus "waste" processing options. International standards and agreements that address such transfer of radioactive materials and waste will be described.

INTRODUCTION

This paper addresses the importation to and exportation from the United States of radioactive material and focuses primarily on radioactively contaminated material. The non radioactive component of material with radioactive contamination, as well as, the radioactive component may have market value. Firms in the United States have the experience in processing imported material to effectively recover and recycle materials. This paper describes the regulatory process that has opened up the global market for beneficial reuse of contaminated material that would otherwise just be treated as unwanted waste.

By radioactive material we are referring to source, byproduct, and special nuclear material as those terms are used in the Atomic Energy Act of 1954, as amended. Importing and exporting such radioactive material in the United States is governed primarily by the Atomic Energy Act and the regulations of the United States Nuclear Regulatory Commission (NRC)¹. These regulations are found at 10 CFR Part 110. NRC's regulations which form the basis for NRC import and export licensing are fully consistent with the International Atomic Agency (IAEA) Code of Practice on the International Transboundary Movement of Radioactive Material and the IAEA Code of Conduct on the Safety and Security of Radioactive Sources.

The IAEA Code of Practice arose out of international concerns about the potential for improper transfer and disposal of radioactive material. A basic principle of the Code which the United States approved in 1990 was that international movements of radioactive material should take

¹ There are also regulations issued by the US Department of Commerce and Department of State that addresses export restrictions and controls for certain radioactive materials.

place with the prior notification and consent of the sending, receiving, and transit countries. No receiving country should permit the receipt of radioactive waste for management or disposal unless it has the technical and administrative capacity and regulatory structure to manage and dispose of the waste in a manner consistent with international standards. The regulations in Part 110 were amended in 1995 to reflect these considerations.

LICENSING

The licensing requirements for importing special nuclear material, source material, and byproduct material (radioactive material) are set out in 10 CFR Part 110.² As provided in 10 CFR 110.1, the scope section of Part 110, the regulations in Part 110 apply to all persons in the United States importing radioactive material with the exception of persons importing certain munitions, deuterium, nuclear grade graphite, certain nuclear equipment, and in bond shipments passing through the United States. Pursuant to 10 CFR 110.5 and 110.9a, importing and exporting of material contaminated with radioactive material into the United States require either a specific or general license issued by the NRC.

In addition to the import license, a separate license issued either by the NRC or an Agreement State, where the material is to be used or possessed, is required to possess and use the material in the United States. An Agreement State is a state to which the NRC has relinquished its federal authority for the regulation of certain radioactive material thereby allowing the state to regulate the material subject to the oversight of the NRC. It is important to emphasize that a license to possess, use, and process radioactive material in the United States whether issued by the NRC or an Agreement State does not authorize the import or export of radioactive material.

As more fully described below, a general license can be used to import and export radioactively contaminated material for recycle. However, under a general license such material can not be processed to remove its radioactivity prior to reuse such that a radioactive waste stream is developed. A specific license is required if the processing of the imported material creates a radioactive waste stream or if disposal of radioactive waste is involved. In addition, a specific license is required regardless of use if certain quantities of radioactivity are involved.

Radioactive waste is defined in the NRC regulations as any waste that contains or is contaminated with source, byproduct, or special nuclear material, including that which contains or is contaminated with "hazardous" waste as that term is used in the Solid Waste Disposal Act or RCRA as it is commonly called. However, radioactive waste does not include radioactive material that is:

² An NRC license is not required for the importation of naturally-occurring radioactive material, other than source material and 11e(2) byproduct material, as such material is not subject to the Atomic Energy Act of 1954, as amended.

- Contained in a sealed source or device containing a sealed source, being returned to any manufacturer qualified to receive & possess the sealed source or device containing a sealed source;
- A contaminant on service equipment (including service tools) used in nuclear facilities, if the service equipment is being shipped for use in another nuclear facility & not for waste management purposes or disposal; or
- Generated or used in a United States government waste research & development testing program under international arrangements

NRC has provided some flexibility for material that some might describe as waste because it recognized the need to encourage waste management practices being mindful that regulatory restrictions add to the already rising cost of waste disposal. In that regard, NRC has made special provisions for certain shipments intended for recycling or resource recovery by creating the concept of “incidental radioactive material” which is discussed further in this paper.

Requirements for a General License

A general license is in effect as a result of the NRC regulations. It does not require an application nor does the NRC issue a document evidencing the issuance of a license. Other than the requirement to hold a separate license to possess and use the imported material, the only substantive requirements for a general license for import pertain to quantities of specified radioisotopes eligible for a general license and the importation of irradiated fuel. Utilization of a general license to export incidental radioactive material, discussed below, in a shipment that exceeds 100 kilograms in total weight requires the prior submission of NRC Form 7 which addresses the volume, classification (as defined in 10 CFR 61.55), physical and chemical characteristics, route of transit of the shipment, and ultimate disposition (including forms of management) of the waste.

Incidental Radioactive Material

In the United States a general license is used for importing and exporting contaminated material only if the radioactive material is not considered to be waste. NRC describes this non-waste category as incidental to the use of the non-radioactive material. Material is incidental radioactive material when the radioactive material is contained in, or a contaminant of, any non-radioactive material that:

- (1) is exported or imported for recycling or resource recovery of the non-radioactive component and (2) will not be processed for separation of the radioactive component before the recycling or resource recovery occurs or as part of the resource recovery process.

In addition incidental radioactive material can not contain "hazardous waste" as defined in section 1004(5) of the Solid Waste Disposal Act, 42 U.S.C. 6903(5).

Incidental radioactive material is an important concept for those interested in importing contaminated material into the United States for processing. A good example for applying the

concept of incidental radioactive material and using a general license is for importing contaminated metal for purposes of melting it into shield blocks, provided the imported metal is not decontaminated prior to or during the metal processing.

A person considering the use of the general license for importing incidental radioactive material needs to analyze carefully the processing steps to understand how waste streams are created. If incidental radioactive material is left in the United States, but not recycled for beneficial reuse or resource recovery, it would be subject to disposal requirements of either the NRC or Agreement states depending on where the material was located. In such cases, to whom the waste stream is attributable to, that is, is it considered to be residual waste from the processor or is it waste from the supplying country, become important considerations. However, if the material is being returned to the country of origin for purposes of reuse, then it would be considered incidental radioactive material subject to the general license. If it is being returned with no foreseeable use, then it would be considered waste subject to a specific license even though it was imported under a general license.

It is important to recognize that there is controversy in applying the concept of incidental radioactive material. Questions can be raised as to whether the importer is recycling with waste being incidental to that recycling, e.g., slag residue from melting contaminated steel, or processing waste, e.g. creating useable material as a result of removing the contamination. For example, in June of this year, NRC held a public meeting on whether importing contaminated clothing for purposes of recycling should be done under a general license on the basis of it being incidental radioactive material. In the past NRC has allowed nuclear laundries to import contaminated clothing, launder the clothing, and then reuse the clean clothing. Though it was recognized that there was a waste stream, the laundry process was not considered to be waste processing. Now, NRC appears to take the position that since the clothing is processed first to remove the radioactive component as part of the resource recovery process, the contaminates cannot be considered to be incidental radioactive material. In November 2006, it issued a specific license (IW016) to Eastern Technologies Inc. to provide for importing contaminated clothing for laundering and reuse. However, UniTech Services Group, Inc., another laundry has contested the need for a specific license as it has in the past been using the general license for importing. Hopefully, NRC's final position on this controversy will provide clarification. Until that time, the message for those considering importing material under the general license based on the incidental radioactive material concept is to coordinate with the NRC in advance. This may avoid potential enforcement situations and delays in your business activities.

NRC in examining the incidental radioactive material question may look behind the licensee's statements to see if the waste is really incidental to recycling and recovering or whether in reality waste processing is occurring. For example, importing contaminated combustible material for incineration is clearly waste processing assuming no use for the ash. However, it could be considered resource recovery if the energy from the incineration process was captured for use such as making steam, or if the ash was recovered for use. Another question might be whether the contamination in shipping containers of contaminated metals intended for recycle into contaminated shield blocks is considered incidental to the recycling process.

Specific License

A specific license is needed when the primary purpose of the import or export is to decontaminate material and dispose of the waste. A specific license is required when waste is being imported or exported for the purpose of disposal. Thus, if radioactive material is defined as radioactive waste (i.e., not as incidental radioactive material), it is required to be imported and exported under a specific license. The definition of radioactive waste includes material, e.g., metal, which is contaminated by radionuclides such that the material needs to be processed for separation of the radioactive component before the recycling or resource recovery of the material occurs. It also includes material where separation of the radioactive component occurs as part of the resource recovery process. In both of these cases the radioactive component of the import is considered a waste stream necessitating a specific license.

Requirements for a Specific License

A specific license requires the submission of a written application with a licensee fee and upon approval of the application, the NRC issues a document evidencing the issuance of the license. In accordance with 10 CFR 110.70, the NRC publishes notice of applications for specific licenses for importing radioactive waste in the Federal Register. The application is public as provided for by 10 CFR 110.72 and an opportunity for both submitting comments and a hearing is provided by 10 CFR 110.81 and 110.82. In deciding whether to grant a hearing, the Commission in accordance with 10 CFR 110.84 will seek the views of the United States Department of State on the application. The hearing process is governed by the provisions in 10 CFR Part 110, Subparts H and I. Ordinarily the presiding officer for the hearing is the full Commission itself as provided for in 10 CFR 110.104.

Import Licenses

An application for import requires submission of the following information described in 10 CFR 110.32:

- 1) The volume, classification (as defined in 10 CFR 61.55), physical and chemical characteristics, route of transit of the shipment, and ultimate disposition (including forms of management) of the waste;
- 2) The process used for the generation of the waste, and the status of the arrangements for disposition, e.g., any agreement by a low-level waste compact or State to accept the material for management purposes or disposal; and
- 3) The description of the end uses by all consignees in sufficient detail to permit evaluation of the justification for the proposed export or import, including the need for shipment by the dates specified.

In reviewing an import application, the NRC may consult with the State Department. The standards for NRC issuing a specific license to import radioactive waste include:

- 1) The proposed import is not inimical to the common defense and security;

- 2) The proposed import does not constitute an unreasonable risk to the public health and safety; and
- 3) An appropriate facility has agreed to accept the waste for management or disposal.

In essence, this last provision requires that the person agreeing to accept the radioactive waste be licensed by either the NRC or an Agreement State for the disposal of such material. While not stated in the regulations, the Statements of Considerations for Part 110 provides that the NRC will consult during the licensing process with the appropriate Federal and State agencies including Low-level Waste Compacts. The NRC has stated that it will not grant an import license for waste intended for disposal unless it is clear that the waste will be accepted by a disposal facility, host state, and compact (where applicable). These consultations will be part of the determination regarding the appropriateness of the facility that has agreed to accept the waste for management or disposal.

The intent of the NRC requirements is to provide a clear disposal path to ensure that importation of radioactive waste does not become an unfunded public responsibility. In that regard, NRC may second guess the importer's determination that the imported material is not waste. In one case, an importer sought to import depleted uranium arguing it was a valuable commodity. NRC disagreed on the basis that the person had significant quantities of the material without a foreseeable use and, therefore, NRC concluded that any additional importation of depleted uranium under the circumstances would be considered importation of waste requiring assurance in advance that there was path for waste disposal.

There maybe additional requirements depending on the nature of the material. For example, for most material an environmental assessment is not needed for importing radioactive waste pursuant to 10 CFR 51.21 and 51.22(c)(15) before a license is granted pursuant to 10 CFR 110.43 (c) and 110.45(b). If depleted uranium is involved associated with munitions, certain State Department regulations may be applicable. There may also be additional requirements for materials covered by provisions in the International Atomic Energy Agency (IAEA) Code of Conduct on the Safety and Security of Radioactive Sources (Code of Conduct) which NRC codified in 2005.

It should also be noted that as provided in 10 CFR 110.19 (a) that issuance of an NRC license does not relieve the importer from compliance with applicable Environmental Protection Agency requirements for waste that contains or is contaminated with hazardous material, i.e., involves mixed waste.

Since 1995, NRC has considered 24 import applications and amendments involving waste material and issued 11 licenses. Seven applications were withdrawn or returned without action. As of December 2006, six applications are pending. The principal sources of waste coming into the United States are Canada, Mexico, Germany, United Kingdom, and Taiwan. Table I lists examples of issued licenses.

Table I. Examples of NRC Waste Import Licenses

APPLICANT	Material type	END USE	Country of Origin
Allied Technology Group	Contaminated condenser tubes	Decontamination and recovery of the metal for recycling.	Taiwan
Philotechnics,Ltd	Depleted uranium	Recycled and if necessary, disposal	United Kingdom
Starmmet CMI,Inc	Depleted uranium turnings, solid cylindrical pieces & contaminated oil	DU recycled; oil processed and reused	United Kingdom
Framatome ANP	Combustible material contaminated	Incinerated into ash. Ash will be sold and exported for uranium recovery	Germany
Diversified Scientific Services	Class A mixed waste containing Tritium, C14 and mixed fission products radionuclides	Processing, incineration, and return residue to Canada	Canada
Eastern Technologies	Class A waste (Co-60, C0-58, and Mn-54)	Laundering and decontamination of clothing and related products	Mexico
Duratek(Energy Solutions)	Class A Radioactive Waste consisting of source, special nuclear and byproduct materials in varying combinations as surface or volumetric contaminants.	Recycling for beneficial reuse; free release, or conditionally released to authorized RCRA Subtitle D landfills. Nonconforming material or waste not released or processed in accordance with the Tennessee license to be returned to Canada.	Canada
Diversified Scientific Services	Radioactive waste in form of liquid products	Processing into solid waste & return to Canada	Canada

Export License

An export application requires essentially the same information as a specific import license with the exception of the description of the process to generate the waste and the status of arrangements for disposition. It is also a public document which is noticed in the Federal

Register for an opportunity for a hearing as provided in 10 CFR 10.70. In addition, the NRC consults with the State Department before authorizing an export involving radioactive waste. The standards for NRC issuing a specific license to export radioactive waste include:

- 1) The proposed export is not inimical to the common defense and security;
- 2) The receiving country finds it has the administrative and technical capacity and regulatory capability to manage and dispose of the waste and consents to the receipt of the waste.

Since 1995, NRC has considered 21 export applications and amendments involving waste material and issued 17 licenses. Three applications were withdrawn or returned without action. As of December 2006, two applications are pending. Exports of waste have been to Canada and Germany. Table 2. lists examples of issued licenses.

Table 2. Examples of NRC Waste Export Licenses

APPLICANT	Material type	Importing Country
Diversified Scientific Services	Class A radioactive mixed waste (primarily mixed fission product radionuclides) contained in baghouse salts and ash	Canada
Framatome ANP	LEU, 5.0% in Class A radioactive waste (slightly contaminated non- combustibles)	Germany
Westinghouse	LEU as UO ₂	Canada
Framatome ANP	Zirconium tubing; 25,000 kilograms Molybdenum metal pieces contaminated with low-enriched uranium	Canada
Westinghouse	LEU in Class A Radwaste containing zirconium and Molybdenum scrap	Canada
Duratek(Energy Solutions)	Imported Class A radioactive waste needed to be returned to Canadian generator for disposal that cannot be recycled for beneficial reuse, does not conform to import, it was processed for volume reduction, or it was residue from processing attributable to imported waste	Canada

CONCLUSION

The non radioactive component of material with radioactive contamination, as well as, the radioactive component may have market value. Firms in the United States have the experience in processing imported material to effectively recover and recycle materials. There is an effective regulatory process that provides for general and specific licenses that has opened up the global market for beneficial reuse of contaminated material that would otherwise just be treated as unwanted waste.