

Implications of Export/Import Reporting Requirements in the United States – International Atomic Energy Agency Safeguards Additional Protocol

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February 2001



Prepared for the U.S. Department of Energy
Office of Nuclear Transfer and Supplier Policy (NN-43)
under Contract DE-AC06-76RL01830

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Pacific Northwest National Laboratory
Richland, Washington 99352

Executive Summary

- Most exports that must be reported to the International Atomic Energy Agency (IAEA) require a specific license from the Nuclear Regulatory Commission (NRC), meaning that for these exports the U.S. Government (USG) will have the necessary information in sufficient time to meet the IAEA's reporting requirements. The NRC export regulations apply to government agencies such as the Department of Energy (DOE), as well as to the private sector. See Section 4.
- Exports of certain dilute natural/depleted uranium and thorium currently require no notification to the USG. It appears the NRC may need to modify its regulations to require annual reports from exporters, which includes government agencies like DOE as well as the private sector. If this is done, DOE should inform its organizational units of the new requirement. See Section 4.1.
- The USG should seek confirmation that the IAEA defines "source material" narrowly. If not, the NRC may need to modify its definition in order to obtain export/import information required by the IAEA. See Sections 4.1 and 4.2.
- Under current regulations, the NRC is not informed when a specifically licensed export actually takes place. To avoid reporting to the IAEA exports that have not yet taken place, it appears the NRC may need to revise 10 CFR Part 110 to require persons to annually report exports of source material for non-nuclear purposes that actually took place during the previous calendar year. If this is done, DOE should inform its organizational units of the new requirement. See Section 4.1.
- Information on some generally licensed reactor component exports will not reach the USG in time to meet IAEA reporting requirements. It appears the NRC will need to modify its general license in 10 CFR 110.26(c) to require quarterly (instead of annual) reports on these exports. If this is done, DOE should inform its organizational units of the change. The NRC has indicated it would make this regulatory change. See Section 4.3.

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1.0 Purpose

The central components of the International Atomic Energy Agency's (IAEA) Strengthened Safeguards System are increased access to information and increased physical access to locations. The vehicle whereby a State party to an Additional Protocol will provide increased information on its nuclear activities is the set of declarations prescribed in Article 2 of the Model Protocol.^(a) Among the information to be provided to the IAEA are reports on certain nuclear-related exports and imports. In preparation for U.S. ratification of the Additional Protocol, this report identifies and assesses the issues associated with the U.S. making those reports. In order of priority, the project considers issues associated with 1) exports from the DOE Complex, 2) imports into the DOE Complex, and 3) exports/imports of private U.S. companies. Secondly, the report attempts to predict the impact on the DOE Complex by assessing the historical flow of exports and imports that would be reportable if the Additional Protocol were in force.

(a) *Protocol Additional to the Agreement(s) between ... and the International Atomic Energy Agency for the Application of Safeguards*, INFCIRC/540, adopted by the IAEA Board of Governors in May 1997.

2.0 Background

Non-nuclear Weapons States party to the Non-Proliferation Treaty (NPT) commit to not develop or acquire nuclear weapons, and submit to comprehensive IAEA safeguards. Despite Iraq having a comprehensive safeguards agreement with the IAEA that allows the Agency to inspect all its declared nuclear activities, the 1990 Gulf War revealed that Iraq had violated its safeguards agreement and the NPT by having *undeclared* nuclear activities as part of a clandestine nuclear weapons program. Consequently, in the early 1990s the IAEA Board of Governors authorized the Agency to develop new safeguards techniques to detect undeclared nuclear activities. The development effort, known as *Programme 93+2*, produced several techniques and culminated in the Model Protocol, which countries may voluntarily sign and add to their existing safeguards agreement(s) with the Agency. One of the techniques is collecting and analyzing a larger set of information on States' nuclear activities. This information includes export/import information that is required of States that sign the Additional Protocol.

Despite the United States being a Nuclear Weapons State, President Clinton stated that the U.S. will accept the Additional Protocol in its entirety except where it involves information of national security significance. U.S. and IAEA negotiators reached agreement on the text of the Additional Protocol on May 1, 1998; the U.S./IAEA Additional Protocol is slightly modified from the Model Protocol to accommodate a national security exclusion. In June 1998, the U.S./IAEA Additional Protocol was approved by the IAEA Board of Governors. Finally, the Additional Protocol must be ratified by the President after the advice and consent of the U.S. Senate. It will then be added to the current U.S./IAEA Safeguards Agreement, which deals with traditional safeguards.

Implementation of the Additional Protocol will create some strange situations, especially in the DOE Complex, due to the different natures of the Additional Protocol and the U.S./IAEA Safeguards Agreement. Generally, the U.S./IAEA Safeguards Agreement applies only to private nuclear facilities, and actual inspections (as opposed to reporting only) take place only at a small subset of those facilities. In contrast, the Additional Protocol applies universally. Because exports of, for example, SNM are addressed in the U.S./IAEA Safeguards Agreement, DOE does not need to report them.^(a) However, DOE facilities will have to report exports of source material for non-nuclear purposes because such exports are addressed in the Additional Protocol. So the proliferation sensitivity of an export/import does not necessarily indicate whether it must be reported to the IAEA.

(a) Exports of U.S. "excess material" that is under IAEA safeguards would need to be reported because of the special safeguards arrangement for such weapons material, but exports of this SNM are unlikely.

3.0 Applicable Requirements in the Additional Protocol

In the Additional Protocol, reports to the IAEA are addressed in Articles 2 and 3, which make up the section entitled “Provision of Information.” Two types of exports/imports are required to be reported: 1) source material for non-nuclear purposes and 2) specified equipment and non-nuclear material. The following includes excerpts of interest.

3.1 Exports/Imports of Source Material for Non-Nuclear Purposes

“a. [Country] shall provide the Agency with a declaration containing:

...

(vi) Information regarding source material which has not reached the composition and purity suitable for fuel fabrication or for being isotopically enriched, as follows:

...

b) the quantities, the chemical composition and the destination of each *export* out of [country], of such material for specifically non-nuclear purposes in quantities exceeding:

(1) ten metric tons of uranium, or for successive exports of uranium from [country] to the same State, each of less than ten metric tons, but exceeding a total of ten metric tons for the year;

(2) twenty metric tons of thorium, or for successive exports of thorium from [country] to the same State, each of less than twenty metric tons, but exceeding a total of twenty metric tons for the year;

c) the quantities, chemical composition, current location and use or intended use of each *import* into [country] of such material for specifically non-nuclear purposes in quantities exceeding:

(1) ten metric tons of uranium, or for successive *imports* of uranium into [country] each of less than ten metric tons, but exceeding a total of ten metric tons for the year;

(2) twenty metric tons of thorium, or for successive *imports* of thorium into [country] each of less than twenty metric tons, but exceeding a total of twenty metric tons for the year;

It being understood that there is no requirement to provide information on such material intended for non-nuclear end-use once it is in its non-nuclear end-use form.”^(a)

The United States will need to provide to the Agency by May 15 of each year a report of such exports and imports during the previous calendar year.^(b)

(a) Verbatim excerpt from Protocol Article 2.

(b) Protocol Article 3.c.

Reports to the IAEA of exports/imports of source material for *nuclear* purposes are already required of the private sector under the current U.S./IAEA Safeguards Agreement.

3.2 Exports/Imports of Specified Equipment and Non-Nuclear Material

“a. [Country] shall provide the Agency with a declaration containing:

...

- (ix) The following information regarding specified equipment and non-nuclear material as follows:
 - a) for each *export* out of [country] of such equipment and material: the identity, quantity, location of intended use in the receiving State and date or, as appropriate, expected date of *export*;
 - b) upon specific request by the Agency, confirmation by [country], as *importing* State, of information provided to the Agency in accordance with paragraph (a) above.”^(a)

The United States will need to provide to the Agency on a quarterly basis a report of such *exports*.^(b) The report must be provided within 60 days of the end of each quarter. Confirmation of *imports* must be made within 60 days of the Agency’s request.^(c)

The subject equipment and non-nuclear material is specified in Annex II of the Additional Protocol. The Annex II list is essentially the same list as that contained in the Nuclear Suppliers Guidelines part I, known as the Trigger List.^(d)

^(a) Verbatim excerpt from Protocol Article 2.

^(b) Protocol Article 3.d.

^(c) Protocol Article 3.g.

^(d) *Guidelines for Nuclear Transfers*, INFCIRC/254/Rev. 2/Part I/Add. 1, 7 June 1996.

4.0 Assessment of Requirements in the Additional Protocol

It appears that the best way to obtain export/import information for reports to the IAEA is through the U.S. agency that licenses those exports/imports. Licensing agencies are a central repository of information and they are a part of the U.S. Government, which is responsible for reporting to the IAEA. This section therefore identifies which reportable exports/imports require licensing and, if so, which U.S. agency has jurisdiction. For exports/imports that do not require licensing, or where there is some problem envisioned in making required reports, possible solutions are offered.

Typically, licenses are either specific or general. Specific licenses require an application to be submitted and approved before the export or import can take place. General licenses require no prior approval, but sometimes require after-the-fact reporting. These license applications and reports are an excellent source of information for export/import reports required by the IAEA under the Additional Protocol.

4.1 Reporting of Exports of Source Material for Non-Nuclear Purposes

Exports of source material, whether for nuclear or non-nuclear purposes, are licensed by the NRC under 10 CFR Part 110. For exports, the licensing requirements apply equally to the private sector and to USG exporters like DOE. Most source material exports required to be reported to the IAEA must be specifically licensed. Applications for specific export licenses contain all the information that needs to be reported to the IAEA.^(a) For those exports requiring a specific license, the USG should therefore have sufficiently in advance the information needed to report annually to the IAEA.^(b)

However, in 10 CFR 110.22 the NRC has issued a general license for export to most countries of several forms and quantities of source material. Such exports do not even require after-the-fact reporting to the NRC unless a person exports “source material as incidental radioactive material.”^(c) Fortunately, all but two types of generally licensed exports are for quantities well under the minimum required to be reported to the IAEA. The other two types of exports are for 1) uranium and thorium in concentrations of less than 0.05% by weight and 2) thorium in incandescent gas mantles or in alloys in concentrations of 5% or less.^(d) Such exports, if for non-nuclear purposes, are to be reported since the IAEA definition of

(a) In fact, applications for an NRC export license contain much information that is not required by the IAEA. Some of this information may be proprietary and possibly sensitive. This issue is addressed in Section 5.3.1 of this report.

(b) A caveat to this statement is discussed in the final paragraph of Section 4.1.

(c) See definition at 10 CFR 110.2.

(d) 10 CFR 110.22(a)(1) and (2).

source material includes “any of the foregoing [thorium and natural/depleted uranium] in the form of metal, alloy, chemical compound, or concentrate.”^(e)

For the two types of source material exports where no reporting is currently required, DOE could require its organizational units to report such exports to the DOE Office of Nuclear Transfer and Supplier Policy Division (NN-43) or to the NRC on an annual basis. However, in order to meet IAEA reporting requirements for private exporters of the two types of source material, it appears the NRC may need to modify its regulations to require annual reports from such exporters. Since 10 CFR Part 110 applies to both private and government exporters, such a regulatory modification would resolve the entire problem, and DOE could just inform its organizational units of the new requirement.

A possible additional complication arises due to the differing ways the IAEA and NRC define “source material.” The IAEA definition includes the statement:

...Under INFCIRC/153 type safeguards, the term “source material” is interpreted as not applying to ore or ore residue, in particular to yellowcake, a concentrate consisting essentially of U_3O_8 .^(a)

The complication concerns certain materials like monazite sands and potash that are exported from the U.S. private sector primarily for non-nuclear purposes (e.g., fertilizer) but are a source of uranium and thorium. In fact, large quantities of uranium and thorium have been extracted from monazite and potash. These materials are ores^(b) but not yellowcake nor U_3O_8 . If the IAEA’s intent is to exclude all ore and ore residue from the definition of source material, then exports of monazite and potash would not need to be reported. But if the IAEA’s intent is to only exclude yellowcake, then reports of monazite and potash exports would be required.

If the latter is true, a problem occurs because monazite and potash may not be included in the NRC’s definition of source material, which is:

- 1) Uranium or thorium, other than special nuclear material; or
- 2) Ores which contain by weight 0.05% or more of uranium or thorium, or any combination of these.^(c)

(e) IAEA *Safeguards Glossary*, INF/1, para. 32, 1987.

(a) IAEA *Safeguards Glossary*, INF/1, para. 32, 1987 and *The Structure and Content of Agreements between the Agency and States Required in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons*, INFCIRC/153, para. 112, 197. The Protocol is designed for NPT parties, which have INFCIRC/153 type safeguards agreements.

(b) “Ores” are defined economically as that material worth processing. Today’s ore may not be ore tomorrow if the price falls. However, it is assumed any material that is exported is worth processing and therefore “ore.”

(c) 10 CFR 110.2.

Monazite and potash are ores that typically contain less than 0.05% uranium or thorium, and would therefore not qualify as source material under the NRC definition. In such a case, such exports would not require NRC licensing so the USG would not have the information necessary to report annually to the IAEA. This problem could be rectified by the NRC 1) modifying 10 CFR 110.2 to redefine source material to include ores with lower weight percent uranium and thorium, 2) issuing a general license in 110.22 for export of the newly included source material, and 3) requiring an annual report of such exports.

Some in the NRC believe that the IAEA defines “source material” narrowly and that the above actions are therefore unnecessary. To confirm that this is true, it is recommended that the USG discuss this issue with the IAEA.

A final issue concerns the difference in time between the issuance of a specific license and the actual export. The NRC could issue a specific license for the export of source material, but the export may actually take place months or years later, or even never. The Additional Protocol requirement is that actual exports of source material for non-nuclear purposes be reported to the IAEA (see Section 3.1). If the NRC annually reports the specific licenses it issued during the previous calendar year, it could include some “exports” that have not actually taken place. To rectify this problem, the NRC may need to modify 10 CFR Part 110^(a) to require persons issued a specific license to annually report (sometime before May 15) exports of source material for non-nuclear purposes that actually took place during the previous calendar year. If this is done, DOE should inform its organizational units of the new requirement.

4.2 Reporting of Imports of Source Material for Non-Nuclear Purposes

Imports of all source material are under the jurisdiction of the NRC pursuant to 10 CFR Part 110. The NRC has issued a general license for the import of source material to any person who is authorized to possess the material under NRC license or contract with DOE.^(b) No after-the-fact report is required to be submitted to the NRC. Further, NRC regulations exempt DOE from import licensing requirements by excluding DOE from the definition of “person” with respect to imports.^(c)

However, under 10 CFR Part 40, the NRC requires private licensees to submit a Nuclear Material Transaction Report within 10 days of receiving any foreign origin source material. This information is input to the Nuclear Material Management and Safeguards System (NMMSS). DOE Order 5633.3B also requires tracking of DOE source material on NMMSS. Therefore, it appears the USG should have the information required to be reported to the IAEA, but it will be from a somewhat different source (i.e., NMMSS) than all the other reportable export/import information.

(a) Perhaps 110.19 “Types of Licenses” or 110.31 “Application for a Specific License.”

(b) 10 CFR 110.27.

(c) 10 CFR 110.2.

As discussed in Section 4.1, the IAEA could interpret its definition of source material in such a way that it is broader than the NRC's (and DOE's) definition. If so, the IAEA would require reports of imports of materials like monazite and potash, but the USG would have no record of their import. While such imports to the DOE Complex may be unlikely, DOE should require its organizational elements to report them annually to NN-43. DOE would need to make clear in its directive that reportable source material is broader than the DOE definition, i.e., it also includes materials such as monazite and potash. Regarding imports of such material to the private sector, the suggestions made above in Sections 4.1 and 4.2 (NRC redefining source material and requiring annual reports from private importers) would result in the USG obtaining the necessary import information to report on monazite and potash imports.

4.3 Reporting of Exports of Specified Equipment and Non-Nuclear Material

Annex II of the Additional Protocol lists the relevant equipment and non-nuclear material whose export must be reported to the IAEA. This list is the same as that approved by the IAEA Board of Governors in 1993 for the Voluntary Reporting Scheme. The IAEA invited countries to voluntarily report exports of those items. Among the countries that have done so, the United States has provided the most export information.

The Appendix to this report lists all the items in the Additional Protocol's Annex II. It also gives the applicable section of U.S. regulations that govern the export of each item.

Conveniently, all items in Annex II are under the export licensing authority of the NRC pursuant to 10 CFR Part 110, which in the case of exports applies to both private and government entities. The technical description of items licensed by the NRC is nearly identical to the descriptions of items required to be reported to the IAEA. Of the equipment items (as opposed to non-nuclear material), all except four require a specific license, meaning the NRC will have an immediate record of these exports. Applications for specific export licenses contain all the information that needs to be reported to the IAEA. For those exports requiring a specific license, the USG should therefore have in sufficient time the information needed to report quarterly to the IAEA. The reports are due 60 days after the end of each quarter.

However, the export of four nuclear reactor components is generally licensed to 22 countries (see Appendix). The items are: reactor internals, control rod drive mechanisms (referred to in Additional Protocol Annex II as "control rod support structures"), reactor pressure tubes, and zirconium tubes. Exporters of these items to the specified countries need only report annually to the NRC. They must submit by February 1 of each year a report of all such components exported during the previous calendar year. While the reports contain all the information required by the IAEA, this is obviously not frequent enough for the USG to in turn meet the IAEA's requirement for quarterly reports. For such exports from the DOE Complex, DOE could require its organizational units to report such exports to NN-43 or directly to the NRC on a quarterly basis. However, it appears the NRC will need to modify its general license in

10 CFR 110.26(c) to require quarterly reports from exporters, which includes private and government entities. Such a regulatory change would resolve the entire problem, and DOE could just inform its organizational units of the new requirement. The NRC has indicated it will make this regulatory change.

The NRC has issued a general license for exports of deuterium/heavy water, but this is for quantities less than that required to be reported to the IAEA. The NRC requires a specific license for all deuterium/heavy water exports that are reportable to the Agency, meaning they will have the necessary information in sufficient time to report quarterly.

The NRC has issued a general license for exports of nuclear grade graphite, but this is for quantities much less than that required to be reported to the IAEA. The general license also allows the export of fabricated, nonnuclear-related nuclear grade graphite in unlimited quantities to certain countries. However, the IAEA Additional Protocol only requires the report of nuclear grade graphite for use in nuclear reactors. Therefore, the NRC requires a specific license for all nuclear grade graphite exports that are reportable to the Agency, meaning they will have the necessary information in sufficient time to report quarterly.

As pointed out in Section 4.1, an additional issue concerns the difference in time between the issuance of a specific license and the actual export. In the case of exports of equipment and non-nuclear material, however, the IAEA will accept the “expected date of export” (see Section 3.2). Applications for NRC specific licenses include the dates of proposed first and last shipments. Therefore, whether the Agency intended it or not, reporting of these dates to the IAEA meets the Additional Protocol requirements.

4.4 Reporting of Imports of Specified Equipment and Non-Nuclear Material

The NRC has no licensing requirement for the import of equipment and non-nuclear material listed in Additional Protocol Annex II. Besides, DOE is exempted from NRC importing requirements, as noted in Section 4.2. After a review of the U.S. Department of Commerce (DOC) Export Administration Regulations,^(a) we found no Commerce regulation that requires a license or report on such imports. Therefore, unless informed informally, the USG would have in hand no record of such an import at the time the IAEA requests confirmation of an import.

This lack of information, however, may not be problematic because a confirmation report is not due until 60 days after the Agency’s request. Since the Agency would presumably provide to the USG the item’s identity, quantity, location of intended use, and date or expected date of export, it seems possible for DOE (in the case of the Complex) or NRC (in the case of the private sector) to contact the end-user, confirm the import, and report in time to the IAEA. It should be noted that since the IAEA may have only the *expected* date of export, the USG may not be able to confirm the associated import because it may be delayed.

(a) 15 CFR Parts 730-774.

5.0 Historical Exports/Imports of Reportable Items

To help DOE prepare for implementation of the export/import reporting requirements of the Additional Protocol, it is useful to predict the volume and type of exports/imports that will need to be reported to the IAEA. Knowledge of the past helps predict the future. In this case, we sought information on the past volume and type of reportable exports/imports at two DOE sites that include national laboratories and production facilities. This sample of two sites was deemed sufficient to extrapolate a rough estimate of the impact on the DOE Complex when the Additional Protocol enters into force. Unless trends change, the future volume and type of reportable items will be similar to the past.

5.1 Exports/Imports at Hanford, Washington

In March and April 1999, Mark Killinger and Gary McNair of PNNL held a series of discussions with both DOE-RL and Hanford contractor management and staff to obtain historical information on reportable exports/imports, i.e.,

- Source material for non-nuclear purposes
- Specified equipment and non-nuclear materials (specified in Annex II of the Additional Protocol)

The discussions were focused on the following items:

- Historical volumes of these materials and equipment exported/imported at Hanford
- Current systems in place to track the export/import of these items
- Potential sensitivities that might arise from reporting these exports/imports to the IAEA
- Potential impact of future reporting requirements under the Additional Protocol

A summary of the individual discussions is provided below, followed by an overall assessment on the potential impacts at Hanford following future implementation of the Additional Protocol.

5.1.1 Discussions with DOE-RL Safeguards and Security

Historically, the primary export of source material from Hanford has been confined to efforts focused at reducing the natural uranium stockpile remaining as a result of Hanford's previous plutonium production mission. The last major export of this material was made in the mid-90s and involved the sale/export of natural uranium to the UK for future enrichment, and therefore for "nuclear purposes" (an export like this

would not require reporting under the Additional Protocol). The export of this material is tracked and reported under DOE Order 474.1 and is recorded in the NMMSS data system. No specific incidents of exporting source material for non-nuclear purposes were noted. In addition, due to the nature of Hanford's clean-up mission, no imports of these materials/equipment are anticipated.

A topic of general interest to the entire DOE Complex was raised. It concerns the U.S./Russian "Megatons to Megawatts Program" in which the United States buys Russian LEU that was blended down from Russian weapons HEU. In March 1999, the US and Russia signed a government-to-government agreement that included a provision that DOE would keep certain nuclear material off the market for 10 years. Because it appears that this provision deals only with material destined for nuclear use, this "moratorium" should have no impact on export/import reporting requirements of the Additional Protocol since those requirements apply to source material only if for non-nuclear use.

5.1.2 Discussions with Pacific Northwest National Laboratory

Discussions were held with the management of PNNL's Transportation and Logistics Department as well as with staff from PNNL's Export Control Office. The management and staff within the transportation function are trained to recognize and question all export shipments that may require export licensing. The transportation staff works closely with the export control office to flag any shipments that might not have been previously processed for the necessary export control licenses.

It was determined through these conversations that PNNL's historical number of shipments (export or import) containing the type and quantity of source material or equipment listed within the Additional Protocol is small. It was estimated that in a typical recent year there were no PNNL exports of source material for non-nuclear purposes, and few or no exports of specified equipment and non-nuclear material. For Hanford as a whole, it was estimated that there were annually approximately 10 exports of specified equipment and non-nuclear material. Regarding imports to PNNL, it was estimated that none have occurred in recent years.

Routine tracking of all DOE shipments is required under present DOE Orders. Each shipment is logged and tracked through the SMAC database operated at Oak Ridge National Laboratory. Currently the database tracks the destination and total tonnage of each shipment. There is no specific reference to the contents of the shipment. However, it was suggested that this database structure could be expanded to contain a specified field for coding DOE shipments that may fall under the Additional Protocol. This would provide a centralized location and source for potential future reporting of this information. PNNL also noted that it would be difficult but feasible to confirm imports of specified equipment and non-nuclear material within 60 days of the Agency's request.

5.1.3 Discussions with Waste Management Federal Services Northwest Operations

Waste Management Federal Services is currently contracted to manage the transportation and logistics function for the majority of the Hanford Site (excluding operations at PNNL and Bechtel). The management and staff are trained in export control licensing requirements and maintain records of all export shipments handled through their office.

Discussions indicated the number of historical exports from Hanford of reportable items was, once again, very small. The primary contents of the export shipments made over the past few years have been radioisotopes utilized for medical purposes, which are not reportable under the Additional Protocol.

5.1.4 Discussions with DynCorp Surplus Property Management

DOE material and equipment that has been declared to be of minimal value toward achieving the DOE mission at Hanford is declared as surplus and sold/auctioned through the DynCorp Surplus Management Warehouse. DynCorp is currently contracted to hold a surplus auction/sale on a quarterly basis. All surplus material and equipment that is received at the warehouse is accompanied by a declaration of excess that asks the originator to certify if any of the material/equipment is subject to nuclear related export control. In addition, DynCorp has specifically contracted a nuclear export control specialist from PNNL to review the material/equipment to further assure appropriate export control. DynCorp does not export any of the material/equipment sold for surplus and therefore does not seek specific export licenses for transport. However, DynCorp does require all purchasers of material/equipment that is subject to export control to certify that they are a U.S. company, organization or citizen and that they are aware of and will abide by all export control requirements. Signed certifications for all nuclear related export control material/equipment is maintained on file at DynCorp. It is estimated that approximately 50-60 lots per year are subject to this certification.

5.1.5 Implications at Hanford

The total amount of historical exports/imports at Hanford that would be reportable under the IAEA Additional Protocol appears to be very small. Unless this trend changes, the impact of future Additional Protocol reporting at Hanford will be minimal. The necessary infrastructure is in place to appropriately handle necessary export control licensing for this material. Additional recording/reporting to meet the requirements of the Additional Protocol appear to be minimal.

The largest source of *potential* reportable exports appears to be processed through the DynCorp surplus sales/auctions. However, this material/equipment would only be reportable under the Additional Protocol if it were eventually exported by the non-DOE purchaser. Therefore, this would have no impact on DOE itself, although DOE may decide to warn the potential exporter of the reporting requirements.

Finally, a potential source for future use in tracking complex-wide exports may be the SMAC transportation database. If it is determined that other DOE sites may have many reportable exports in the future, then this database, with minor changes, may become a useful centralized data source for DOE reporting under the Additional Protocol.

5.2 Exports/Imports at Oak Ridge, Tennessee

On March 14-15, 2000, Mark Killinger and Gene Benjamin of PNNL held a series of meetings in Oak Ridge to assess the likely impact of export/import reporting requirements under the US/IAEA Additional Protocol. Killinger and Benjamin were accompanied and assisted by Mike Younkin and Cameron Coates of the Oak Ridge National Security Program Office (NSPO) during the meetings.

At the end of each contractor meeting account, a summary assessment is given of the potential impact of future implementation of the Additional Protocol.

5.2.1 Initial Meeting

Meeting attendees included Pat Belland and Richard Green (DOE-ORO/Security), Harvey Heckman (DOE-ORO/MC&A), Michael Whitaker and Steve Baker (NSPO). Background on the project was presented. The reportable exports/imports consist of: 1) source material for non-nuclear purposes and 2) specified equipment and non-nuclear materials (the Nuclear Suppliers Group Guidelines, “Trigger List”) whose export is under NRC jurisdiction. It was explained to DOE-ORO that the discussions with Oak Ridge contractor personnel would be intended to identify: 1) historical volumes of potentially reportable exports/imports at Oak Ridge, 2) current systems in place to track exports/imports, 3) potential sensitivities of reporting to the IAEA, and 4) potential impacts of future reporting requirements. Killinger presented a proposed schedule of meetings; further contacts for the three Oak Ridge sites were identified and the meeting schedule was finalized. Oak Ridge staff described the site as including facilities for enrichment, research reactors, stored heavy water, and some reprocessing.

It was noted that the Additional Protocol list of specified equipment and non-nuclear materials is open to interpretation because of the generic phrase “especially designed or prepared” (EDP). For example, item 3 on the list is:

Plants for the reprocessing of irradiated fuel elements, and equipment especially designed or prepared therefore. ...Items of equipment that are considered to fall within the meaning of the phrase “and equipment especially designed or prepared” for the reprocessing of irradiated fuel *include*: (emphasis added)

This raises the question of whether the list that follows is exhaustive. For the purpose of the interviews, we focused only on the specifically listed equipment.

5.2.2 Discussions with Y-12 Plant (Lockheed Martin Energy Systems)

The contacts were Bill Chappell (Y-12 Export Control), Dartis Francis (Y-12 Transportation), and Pat Buntrock (NSPO). Chappell indicated that if any items are identified that are potentially reportable to the IAEA, then Lockheed Martin Corporate Export Control Office would need to be involved. Most exports from Y-12 are made by NSPO within the MPC&A program or other Russian programs. Historically, these items have been covered under the MPC&A International Cooperative License or, for other programs, Individual Validated Licenses and do not constitute potentially reportable items because they are not EDP. These items are tracked by DOE databases. Y-12 averages about one export per week, essentially all dual-use under Commerce jurisdiction. Historical records from the past few years were reviewed and no potentially reportable exports (source material or Trigger List items) were identified. No potentially reportable imports of Trigger List items were identified, although there was mention of possible imports from the UK or France. They had no knowledge of imports of source material. Y-12 has shipped some HEU to ORNL, but this is not a reportable item under the Additional Protocol. Y-12 has some stored source material, but has not shipped reportable quantities (>10 metric tons/yr) although this is a possibility in the future. In a subsequent meeting, it was noted that Y-12 performed barrier research for gaseous diffusion enrichment, but no known exports have been made.

In summary, it appears that if this trend continues there will be little or no reporting impact or sensitivities for most Y-12 exports/imports, with the caveat that historical imports of source material for non-nuclear purposes is unknown. However, some special projects at Y-12 were identified and discussed during another meeting (see last section).

5.2.3 Discussions with Oak Ridge National Laboratory

The contacts were Dave Hamrin (ORNL Technical Information and Classification) and C. W. Cross (ORNL Transportation). ORNL exports are mainly radioisotopes from the isotopes sales office. These exports do not require licenses because of the small quantities involved. Also, they do not involve potentially reportable items. These exports include isotopes produced at Y-12, which are all handled by ORNL. The isotope shipments are tracked at ORNL by the Automated Transportation Management System (ATMS) which feeds the Complex-wide Shipment Mobility and Accountability Control (SMAC) system. No exports of potentially reportable items were identified from historical records. No imports of potentially reportable items have been made. Cleanup at Portsmouth and Paducah are also under DOE-ORO; while reportable (Trigger List) items are present at these facilities, it is unlikely that there will be any exports or imports of reportable items there.

In summary, it appears that if this trend continues there will be no reporting impact or sensitivities for ORNL exports/imports.

5.2.4 Discussions with East Tennessee Technology Park/K-25 (Bechtel-Jacobs)

The contacts were Rose Mason (Bechtel-Jacobs Property Management), Jack McGaugh (Bechtel-Jacobs Classification), and Gerry Palau (BNFL). Since taking over the contract to dismantle and cleanup the East Tennessee Technology Park (ETTP) about 1 ½ years ago, Bechtel-Jacobs has had no exports or imports. However, a small potential exists for exports of source material (they have hundreds of thousands of tons of depleted uranium (DU) tails) and/or Trigger List items. While tails have been exported in the past, recent efforts to sell it have been unsuccessful and it is foreseen that there is only a slight to no possible market for DU, even from the military which has switched to other alloys. Portsmouth has imported Russian blended-down weapons U and HEU, but this material has not been diluted down to natural enrichment and would therefore not be reportable source material. Further, DU probably is not reportable anyway because it doesn't appear to meet the criterion of "source material which has not reached the composition and purity suitable for fuel fabrication or for being isotopically enriched."

Typically, the Trigger List items recovered from dismantlement have been destroyed per DOE directive. However, there is some slight possibility that DOE could permit the export of a Trigger List item through an exception at some time in the future. They are currently dismantling centrifuges and some are being sold. It is possible but rare for them to export a centrifuge. A U.S. buyer could in turn export a centrifuge, but they are required to inform the ETTP seller. Bechtel-Jacobs works with NN-43 on these issues. Trigger list items are tracked in the PRISM property management system.

BNFL is not exporting or importing anything. They are decommissioning K-29, 31, and 33 diffusion plants and may have EDP equipment requiring reporting if exported. However, to date this equipment is being melted down and recycled.

In summary, it appears that if this trend continues there will be little reporting impact or sensitivities for ETTP exports/imports.

5.2.5 Discussions with Y-12 Special Projects

The contacts were Cameron Coates (NSPO) and Tony Keller (Y-12 Defense Programs). Bill Chappell (Y-12 Export Control) also attended. Coates (who had worn a Defense Programs hat in previous work) described some special projects which have occurred over the years at Y-12 and involved exports and imports of source and other material. For example, Y-12 exported DU liners for an accelerator in Cern, Switzerland. Also, Y-12 has imported heavy water from Switzerland for use by other US agencies. It would be possible for these types of exports and imports to occur again in the future, although they would probably be infrequent. There have been many attempts to market DU but with little success, except for DU penetrators and tank shielding for the Department of Defense (DOD). However, DU probably is not reportable anyway because it doesn't appear to meet the criterion of "source material

which has not reached the composition and purity suitable for fuel fabrication or for being isotopically enriched.” In summary, it appears that if this trend continues there will be little reporting impact and no sensitivities for these Y-12 exports/imports.

The DYMCAS (Dynamic Material Control and Accounting System) tracks materials, including heavy water. Over the past 10 years, several shipments of heavy water have been made to domestic DOD facilities.

Another type of export/import was discussed that involved mutual defense agreements with partner countries of the U.S. Reporting to the IAEA of any potential exports or imports in this area, if they were to occur, would be considered to be sensitive. However, such exports/imports probably do not meet the Additional Protocol requirements of what is reportable.

6.0 Level 1 Heading

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Appendix

U.S. Export Licensing Requirements for Specified Equipment and Non-Nuclear Material

Appendix

U.S. Export Licensing Requirements for Specified Equipment and Non-Nuclear Material

Additional Protocol Annex II #	Item	Applicable Section of 10 CFR Part 110	Comments
1.1	Complete nuclear reactors	110.8(a)	
1.2	Reactor pressure vessels	Appendix A(1)	
1.2	Reactor internals	Appendix A(7)	For countries listed in 110.26, only an annual report is required*
1.3	Reactor fuel charging and discharging machines	Appendix A(2)	
1.4	Reactor control rods	Appendix A(3)	
1.4	Control rod support structures	Appendix A(8)	For countries listed in 110.26, only an annual report is required*
1.5	Reactor pressure tubes	Appendix A(5)	For countries listed in 110.26, only an annual report is required*.
1.6	Zirconium tubes	Appendix A(6)	For countries listed in 110.26, only an annual report is required*
1.7	Primary coolant pumps	Appendix A(4)	
2.1	Deuterium and heavy water	110.9(d)	
2.2	Nuclear grade graphite	110.9(e)	
3	Plants for the reprocessing of irradiated fuel elements, and equipment especially designed or prepared therefore	110.8(d)	
3.1	Irradiated fuel element chopping machines	Appendix I(1)	
3.2	Dissolvers	Appendix I(2)	
3.3	Solvent extractors and solvent extraction equipment	Appendix I(3)	
3.4	Chemical holding or storage vessels	Appendix I(4)	
3.5	Plutonium nitrate to oxide conversion system	Appendix I(5)	
3.6	Plutonium oxide to metal production system	Appendix I(6)	
4	Plants for the fabrication of fuel elements	110.8(e)	
5	plants for the separation of isotopes of uranium and equipment, other than analytical instruments, especially designed or prepared therefore	110.8(b)	

Additional Protocol Annex II #	Item	Applicable Section of 10 CFR Part 110	Comments
5.1	Gas centrifuges and assemblies and components especially designed or prepared for use in gas centrifuges	Appendix B.1	
5.1.1(a)	Complete rotor assemblies	Appendix B.1.1(a)	
5.1.1(b)	Rotor tubes	Appendix B.1.1(b)	
5.1.1(c)	Rings or Bellows	Appendix B.1.1(c)	
5.1.1(d)	Baffles	Appendix B.1.1(d)	
5.1.1(e)	Top caps/Bottom caps	Appendix B.1.1(e)	
5.1.2(a)	Magnetic suspension bearings	Appendix B.1.2(a)	
5.1.2(b)	Bearings/Dampers	Appendix B.1.2(b)	
5.1.2(c)	Molecular pumps	Appendix B.1.2(c)	
5.1.2(d)	Motor stators	Appendix B.1.2(d)	
5.1.2(e)	Centrifuge housing/recipients	Appendix B.1.2(e)	
5.1.2(f)	Scoops	Appendix B.1.2(f)	
5.2	Especially designed or prepared auxiliary systems, equipment and components for gas centrifuge enrichment plants	Appendix B.2	
5.2.1	Feed systems/product and tails withdrawal systems	Appendix B.2(a)	
5.2.2	Machine header piping systems	Appendix B.2(b)	
5.2.3	UF ₆ mass spectrometer/ion sources	Appendix B.2(c)	
5.2.4	Frequency changers	Appendix B.2(d)	
5.3	Especially designed or prepared assemblies and components for use in gaseous diffusion enrichment	Appendix C	
5.3.1	Gaseous diffusion barriers	Appendix C.1.1	
5.3.2	Diffuser housings	Appendix C.1.2	
5.3.3	Compressors and gas blowers	Appendix C.1.3	
5.3.4	Rotary shaft seals	Appendix C.1.4	
5.3.5	Heat exchangers for cooling UF ₆	Appendix C.1.5	
5.4	Especially designed or prepared auxiliary systems, equipment and components for use in gaseous diffusion enrichment	Appendix C	
5.4.1	Feed systems/product and tails withdrawal systems	Appendix C.2.1	
5.4.2	Header piping systems	Appendix C.2.2	
5.4.3	Vacuum systems	Appendix C.2.3	
5.4.4	Special shut-off and control valves	Appendix C.2.4	
5.4.5	UF ₆ mass spectrometers/ion sources	Appendix C.2.5	
5.5	Especially designed or prepared systems, equipment and components for use in aerodynamic enrichment plants	Appendix D	
5.5.1	Separation nozzles	Appendix D(1)	
5.5.2	Vortex tubes	Appendix D(2)	
5.5.3	Compressors and gas blowers	Appendix D(3)	
5.5.4	Rotary shaft seals	Appendix D(4)	

Additional Protocol Annex II #	Item	Applicable Section of 10 CFR Part 110	Comments
5.5.5	Heat exchangers for gas cooling	Appendix D(5)	
5.5.6	Separation element housings	Appendix D(6)	
5.5.7	Feed systems/product and tails withdrawal systems	Appendix D(7)	
5.5.8	Header piping systems	Appendix D(8)	
5.5.9	Vacuum systems and pump s	Appendix D(9)	
5.5.10	Special shut-off and control valves	Appendix D(10)	
5.5.11	UF ₆ mass spectrometers/ion sources	Appendix D(11)	
5.5.12	UF ₆ /carrier gas separation systems	Appendix D(12)	
5.6	Especially designed or prepared systems, equipment and components for use in chemical exchange or ion exchange enrichment plants	Appendix E	
5.6.1	Liquid-liquid exchange columns (Chemical exchange)	Appendix E.A(1)	
5.6.2	Liquid-liquid centrifugal contactors (Chemical exchange)	Appendix E.A(2)	
5.6.3	Uranium reduction systems and equipment (Chemical exchange)	Appendix E.A(3)	
5.6.4	Feed preparation systems (Chemical exchange)	Appendix E.A(4)	
5.6.5	Uranium oxidation systems (Chemical exchange)	Appendix E.A(5)	
5.6.6	Fast-reacting ion exchange resins/adsorbents (ion exchange)	Appendix E.B(1)	
5.6.7	Ion exchange columns (Ion exchange)	Appendix E.B(2)	
5.6.8	Ion exchange reflux systems (Ion exchange)	Appendix E.B(3)	
5.7	Especially designed or prepared systems, equipment and components for use in laser-based enrichment plants	Appendix F	
5.7.1	Uranium vaporization systems (AVLIS)	Appendix F(1)	
5.7.2	Liquid uranium metal handling systems (AVLIS)	Appendix F(2)	
5.7.3	Uranium metal “product” and “tails” collector assemblies (AVLIS)	Appendix F(3)	
5.7.4	Separator module housings (AVLIS)	Appendix F(4)	
5.7.5	Supersonic expansion nozzles (MLIS)	Appendix F(5)	
5.7.6	Uranium pentafluoride product collectors (MLIS)	Appendix F(6)	
5.7.7	UF ₆ /carrier gas compressors (MLIS)	Appendix F(7)	
5.7.8	Rotary shaft seals (MLIS)	Appendix F(8)	
5.7.9	Fluorination systems (MLIS)	Appendix F(9)	
5.7.10	UF ₆ mass spectrometers/ion sources (MLIS)	Appendix F(10)	
5.7.11	Feed systems/product and tails withdrawal systems (MLIS)	Appendix F(11)	
5.7.12	UF ₆ /carrier gas separation systems (MLIS)	Appendix F(12)	
5.7.13	Laser systems (AVLIS, MLIS, and CRISLA)	Appendix F(13)	

Additional Protocol Annex II #	Item	Applicable Section of 10 CFR Part 110	Comments
5.8	Especially designed or prepared systems, equipment and components for use in plasma separation enrichment plants	Appendix G	
5.8.1	Microwave power sources and antennae	Appendix G(1)	
5.8.2	Ion excitation coils	Appendix G(2)	
5.8.3	Uranium plasma generation systems	Appendix G(3)	
5.8.4	Liquid uranium metal handling systems	Appendix G(4)	
5.8.5	Uranium metal “product” and “tails” collector assemblies	Appendix G(5)	
5.8.6	Separator module housings	Appendix G(6)	
5.9	Especially designed or prepared systems, equipment and components for use in electromagnetic enrichment plants	Appendix H	
5.9.1	Electromagnetic isotope separators	Appendix H(1)	
5.9.2	High voltage power supplies	Appendix H(2)	
5.9.3	Magnet power supplies	Appendix H(3)	
6	Plants for the production of heavy water, deuterium and deuterium compounds and equipment especially designed or prepared therefore	Appendix K	
6.1	Water-Hydrogen sulphide exchange towers	Appendix K.C.2(i)	
6.2	Blowers and Compressors	Appendix K.C.2(ii)	
6.3	Ammonia-hydrogen exchange towers	Appendix K.C.2(iii)	
6.4	Tower internals and stage pumps	Appendix K.C.2(iv)	
6.5	Ammonia crackers	Appendix K.C.2(v)	
6.6	Infrared absorption analyzers	Appendix K.C.2(vi)	
6.7	Catalytic burners	Appendix K.C.2(vii)	
7	Plants for the conversion of uranium and equipment especially designed or prepared therefore	Appendix J	
7.1	Especially designed or prepared systems for the conversion of uranium ore concentrates to UO_3	Appendix J(1)	
7.2	Especially designed or prepared systems for the conversion of UO_3 to UF_6	Appendix J(2)	Annex II says “UO to UF_6 ,” undoubtedly a typo
7.3	Especially designed or prepared systems for the conversion of UO_3 to UO_2	Appendix J(3)	
7.4	Especially designed or prepared systems for the conversion of UO_2 to UF_4	Appendix J(4)	
7.5	Especially designed or prepared systems for the conversion of UF_4 to UF_6	Appendix J(5)	
7.6	Especially designed or prepared systems for the conversion of UF_4 to U metal	Appendix J(6)	
7.7	Especially designed or prepared systems for the conversion of UF_6 to UO_2	Appendix J(7)	

Additional Protocol Annex II #	Item	Applicable Section of 10 CFR Part 110	Comments
7.8	Especially designed or prepared systems for the conversion of UF ₆ to UF ₄	Appendix J(8)	

* The NRC has granted a general license for the export of certain nuclear reactor components (as indicated in the chart) to the following countries. By February 1 of each year, exporters must submit to the NRC a report of all such items they exported during the previous calendar year, including approximate shipment dates and recipient countries and end users.

Austria	Japan
Belgium	Luxembourg
Canada	Netherlands
Denmark	Philippines
Finland	Portugal
France	Republic of Korea
Germany	Spain
Greece	Sweden
Indonesia	Switzerland
Ireland	Taiwan
Italy	United Kingdom