



# **Strategic Trade Control Enforcement (STCE)**

## Implementation Guide



WORLD CUSTOMS ORGANIZATION

2019



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## **Executive Summary**

This implementation guide (updated in 2019) responds to requests from World Customs Organization (WCO) Members for practical assistance related to enforcing strategic trade controls. It should serve as a guide for WCO Members in the development and review of their Strategic Trade Control Enforcement (STCE) processes and procedures and provide a framework for training along those lines. Depending on each administration's situation this guide will serve different purposes, whether it is to know how to take the first step or how to enhance the effectiveness of an existing system. As a guide, the recommendations included are not mandatory.

It is divided into two principal sections, one for senior Customs managers and policy officials and one for operational Customs officers. The section for senior managers discusses the importance of strategic trade controls, the role of Customs, and how to establish STCE procedures and processes and create conditions for their success. The section for operational Customs officers discusses techniques used to carry out those activities. In particular, this section outlines the major functions that comprise the overall strategic trade control process and several related activities.

Several Annexes follow those two sections. Annex I tabulates some of the international STCE commitments taken by WCO Members relative to the international framework discussed in section 1.1.2. Annex II provides a concise background on the weapons of mass destruction that largely determine what goods are considered strategic in the international context. Annex III provides profiles of many strategic goods. This Annex has been organized following the Chapters of the Harmonized System (HS) to provide a reference on strategic goods from a Customs perspective. Annex IV provides good practices for Customs to employ when reaching out to industry to promote compliance with strategic trade control requirements. Annex V provides a concise list of strategic chemicals by Chemical Abstracts Service (CAS) registry number. Annex VI provides a guide to the HS codes applicable to chemical-weapons related chemicals, while Annex VII provides UN hazard numbers related to strategic goods. Finally, Annex VIII provides a glossary of terms and Annex IX provides an alphabetical index.

# 1. STCE for Customs Management and Policy Officials

## 1.1 Introduction

Customs Administrations implement a broad range of government policies including revenue collection, trade and traveller compliance, protection of society, cultural heritage, intellectual property, collection of statistics, and environmental protection, often on behalf of other government ministries and agencies. Strategic Trade Control (STC) protects society from trans-national acquisition of strategic weapons and goods used to develop or deliver them. Customs plays a crucial role in STC enforcement due to its unique authority and responsibility for monitoring and controlling cross-border flows of goods, people, and conveyances.<sup>1</sup>

To assist the WCO's 183 Member States, the WCO Enforcement Committee unanimously endorsed in March 2013 the Secretariat's Strategic Trade Control Enforcement (STCE) Project focused on providing technical assistance on STCE. This WCO document and its Annexes are intended as a resource for WCO Members in establishing or reviewing their national STCE program.

United Nations Security Council Resolution (UNSCR) 1540 and related UNSCRs call upon all states to "take and implement effective measures" to prevent proliferation, but success ultimately depends on effective leadership within states to ensure that those measures are taken and implemented. The STCE Programme helps WCO Member States meet their obligations. Furthermore, adoption of the STCE principles and practices described in this document will help WCO Members better secure and facilitate global trade, consistent with the principles of the SAFE Framework of Standards,

*Customs plays a crucial role  
in STC enforcement.*

better protect their ports and territory from exploitation by criminal actors, and heighten the security of their nation and of their trade partners. Effective STCE measures identify potentially high-risk consignments while simultaneously allowing a much higher volume of lower-risk cargo to be expedited through ports to encourage greater and faster legitimate trade.

One major output of the STCE Programme is this implementation guide. Part 1 is directed toward senior Customs management and policy officials to help them establish strategic trade control procedures and create conditions for their success. Part 2 is directed toward operational Customs officers who must implement the programs, giving them the technical information needed to enforce strategic trade controls.

### 1.1.1 Definition and Importance of Strategic Goods

Customs faces two strategic threat scenarios: the possibility of the supply chain being used as a WMD delivery system (the "bomb in a box" scenario) and the possibility of the supply chain being used to transport the materials, equipment, and components needed to produce a weapon. The first threat scenario is addressed through supply chain security initiatives such as the SAFE Framework of Standards<sup>2</sup>, while the latter is addressed through Strategic Trade Control.

In the context of this project, the term "strategic goods" refers to weapons of mass destruction<sup>3</sup> (WMD),

<sup>1</sup> The term "Strategic Trade Control" is used rather than "Export Control" to recognize the importance of controlling strategic goods in various international transactions, including import, export, re-export, transit, and transshipment.

<sup>2</sup> <http://www.wcoomd.org/-/media/wco/public/global/pdf/topics/facilitation/instruments-and-tools/tools/safe-package/safe-framework-of-standards.pdf?la=en>

<sup>3</sup> Weapons of mass destruction (WMD) include nuclear weapons (designed to cause mass destruction through the explosive release of nuclear energy), chemical weapons (designed to inflict injury such as choking, blistering, or nervous system malfunction through chemical reactions), biological weapons (designed to employ microorganisms to cause illness in humans, livestock, or crops), and radiological

conventional weapons, and related items involved in the development, production, or use of such weapons and their delivery systems.<sup>4</sup> Goods may be identified as strategic by their inclusion on national control lists<sup>5</sup> or by being destined for WMD end use or for use by a WMD-related end user.

Development and production of these weapons and delivery systems depend on various manufacturing equipment, electronics, materials, and chemicals, most of which also have legitimate commercial applications, making them so-called “dual-use goods”. These goods are procured by various means, both licit and illicit, and many countries have adopted laws and regulations to control strategic trade. Nevertheless, some suppliers and uninformed traders may be unaware of trade restrictions related to these goods or they may be tricked by procurement agents who disguise the true end use of the items. Alternatively, complicit suppliers, brokers, or traders may knowingly attempt to circumvent restrictions using misdeclaration, exploiting loopholes, or smuggling.

*Strategic goods are weapons of mass destruction (WMD), conventional weapons, and related items involved in the development, production, or use of such weapons and their delivery systems.*

#### **Case Study – Audit and risk profiling**

Based on [risk assessment](#), a company was selected for [audit](#). During the audit, [unlicensed](#) exports of [lead glass](#) for [hot cells](#) (shielded nuclear radiation containment chambers) were discovered, and the exporter, as a first-time offender, was issued a warning. In addition, a risk [profile](#) for the exporter was created in the export declaration database. Only a few months later there was a match with an export declaration. A [check](#) of the documents was followed by a physical check. An export of four hot cells was confirmed, and the exporter had again not applied for the required licence. During further [investigation](#) at the premises of the exporter, another export of hot cells without the required licence was discovered. The items were [seized](#) and the exporter was fined.

Implementing effective control over trade in these commercial products without unduly impeding trade for peaceful purposes is one of the greatest STCE challenges. It is important to underscore that strategic goods represent a small fraction of global trade. For example, capacitors are very common electronic components, and while certain special capacitors are considered strategic, more than 99% of capacitors in trade do not present any WMD threat. The examples shown in Table 1 can help clarify the definition of strategic goods and hence the focus of the STCE Project.

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weapons (designed to cause illness and mass disruption through the spread of radioactivity). Annex II contains background information on these weapons of mass destruction and their delivery systems (e.g., ballistic missiles, cruise missiles, and unmanned aerial vehicles).

<sup>4</sup> Some have suggested that hazardous chemicals and wastes also represent a threat to national security and should be included here. However, these subjects are already addressed by the WCO’s “Green Customs” eLearning modules. In addition, the Basel Convention Secretariat has prepared a “Basel Convention Training Manual on Illegal Traffic for Customs and Enforcement Agencies”, available at <http://archive.basel.int/legalmatters/illegtraffic/trman-e.pdf>. Finally, interested readers are referred to the Green Customs Initiative website (<http://www.greencustoms.org>).

<sup>5</sup> Export control lists specify materials, equipment, software, and technology subject to trade control. Generally listed goods require licences or permits for various international transactions, especially for export.

**Table 1 Examples of Strategic Goods**

<a href="#"><u>Isostatic Press</u></a>	A very important piece of dual-use industrial equipment is the isostatic press, which forms parts by applying pressure to powdered metals and ceramics in a closed cavity. It can also create products with uniform density by eliminating pores and can bond dissimilar materials through diffusion bonding. Isostatic presses are used for forming metallic and ceramic powders into various products such as tool bits, turbine blades, and insulators. They are strategic commodities because they are also important to producing parts for nuclear explosive devices, re-entry vehicle nose tips, and nozzle inserts for ballistic missiles.
<a href="#"><u>Aluminium powder</u></a>	Aluminium powder is a metal that, like all metal powders, is shipped like a chemical. It is a highly flammable powder created by grinding aluminium into fine grains. It is used in the manufacturing of certain electronics, but is also used in the production of explosives and propellants for missiles. In addition to its strategic value as the most commonly used fuel component in composite propellants for rocket systems, it has also been identified by WCO Programme Global Shield as a precursor chemical related to production of improvised explosive devices (IED).
<a href="#"><u>Hydrogen Fluoride</u></a>	Hydrogen Fluoride is a chemical commonly used in the production of fluorocarbons (e.g., refrigerants and propellants) and fluoropolymers (e.g., Teflon®), but also can be used as a strategic ingredient (or precursor) in the production of chemical nerve agents.
<a href="#"><u>Pressure transducers</u></a>	Pressure transducers are instruments for measuring pressure of a liquid or gas and converting that measurement into an electronic signal for transmission to recording or process control equipment. Pressure transducers with certain characteristics can be important for process control in uranium enrichment facilities.
<a href="#"><u>Staphylococcal Enterotoxin B (SEB)</u></a>	SEB, a toxin produced by the bacterium <i>Staphylococcus aureus</i> , is a common cause of food poisoning. Inhalation exposure of these toxins is a WMD concern. It would produce fever, respiratory complaints (cough, chest pain), and gastrointestinal symptoms. Severe exposure would produce pulmonary edema, respiratory distress, shock, and death. Further, ocular exposure would also be a WMD concern, producing symptoms of conjunctivitis with facial swelling. Adding to the WMD concern is the ease with which <i>Staphylococcus</i> cultures can be obtained, grown, and dispersed.
<a href="#"><u>Gyro-astro compass</u></a>	A gyro-astro compass is a precision assembly of sensitive optical and electro-mechanical equipment used for navigation. They are used in missiles that fly a portion of their trajectory above the earth's atmosphere, but they can also be used on aircraft or on ships.

#### Case Study – Routine inspection

Customs [selected](#) a groupage load of assorted chemicals and laboratory equipment for [inspection](#). One package in the load, marked with UN number 3462 indicating [toxins](#), was [referred](#) to the export licensing agency to determine if a licence was required. The toxin, identified as SEB (see above), did require an export licence, which the exporter had not obtained.

### **Case Study – Reachback**

A Maltese company declared an export of electrical equipment, classified under HS 8543.90 (parts for electrical machines and apparatus having individual functions not specified elsewhere). Customs chose to refer the documents to the Non-Proliferation Unit of Maltese Customs for further verification. A physical inspection was conducted, and the cargo identified as 11 gyrocompasses. Each package included a detailed installation and user manual indicating export restrictions on the product. The Non-Proliferation Unit consulted with the licensing authority and with technical experts. The verification process concluded that the goods required export authorisation; the goods were incorrectly declared (should have been classified under HS 90.14), and the goods had been previously denied for export in the UK and diverted to Malta for another attempt. Maltese and UK authorities then launched investigations.

Many additional examples of strategic goods are given in Annex III.

### **1.1.2 International Legal Frameworks and Regimes to Govern Strategic Trade**

The international non-proliferation regime has many layers, including treaties (section 1.1.2.1), sanctions (section 1.1.2.2), and informal multilateral arrangements (section 1.1.2.3), all of which entail certain responsibilities to control trade. In addition, United Nations Security Council Resolution (UNSCR) 1540 (section 1.1.2.4) imposes additional binding obligations on all UN Member States. Some of the non-proliferation and trade control commitments made by WCO Members are identified in Annex I.

#### **1.1.2.1 Treaties**

The Treaty on Non-Proliferation of Nuclear Weapons<sup>6</sup> (NPT) entered into force in 1970, and 191 States Parties have joined the treaty. Among many other obligations, the treaty commits its parties not to provide certain nuclear materials or goods especially designed or prepared for the processing, use, or production of those materials, to any non-nuclear-weapon state for peaceful purposes, unless the material shall be subject to the safeguards.

*UNSCR 1540 imposes binding obligations on all States to take and enforce effective measures to regulate trade.*

The Chemical Weapons Convention<sup>7</sup> (CWC) is an arms control agreement which outlaws the development, production, stockpiling, and use of chemical weapons. 193 states are party to the CWC, which entered into force in 1997. The main obligation under the convention is the prohibition of use and production of chemical weapons, as well as the destruction of all chemical weapons, but there are also restrictions on the export of certain “Scheduled” chemicals (i.e., toxic chemicals and their precursors listed in the CWC’s Annex on Chemicals) to countries which are not party to the convention. Under CWC obligations, many WCO Member States are already providing reports confirming imports and exports of certain Scheduled chemicals, and Customs Administrations play a key role in collecting these data and enforcing restrictions.

The Biological Weapons Convention<sup>8</sup> (BWC) has 182 States Parties, each obligated to take any necessary measures to prohibit and prevent the development, production, stockpiling, acquisition, or retention of biological weapons in its territory and anywhere under its jurisdiction or control. In addition, the BWC requires all States Parties to refrain from transferring biological weapons to anyone and from

<sup>6</sup><https://www.un.org/disarmament/wmd/nuclear/npt/>

<sup>7</sup> The full name of the CWC is the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction. See <https://www.opcw.org/chemical-weapons-convention/>

<sup>8</sup> The full name of the BWC is The Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction. See <https://www.un.org/disarmament/wmd/bio>

assisting, encouraging or inducing anyone to manufacture or acquire them. The BWC entered into force in 1975.

The Hague Code of Conduct against Ballistic Missile Proliferation<sup>9</sup> (HCOC) was established as an arrangement to prevent the proliferation of ballistic missiles that can potentially deliver weapons of mass destruction. The HCOC does not ban ballistic missiles, but it does call for restraint in their production, testing, and export. The HCOC entered into force in 2002 and currently has 139 subscribing states.

The Arms Trade Treaty<sup>10</sup> (ATT) was adopted by the UN General Assembly on 02 April 2013 to regulate international trade in conventional arms, from small arms to war weapons like battle tanks, combat aircraft, and warships. The ATT entered into force on 24 December 2014 with many implications for strategic trade control implementation and enforcement, including legally binding commitments to establish and maintain national control systems to regulate international trade in conventional weapons, ammunition, and related parts and components. The Treaty has 102 States Parties and 135 Signatory States.<sup>11</sup>

### 1.1.2.2 Embargoes and Sanctions

A key trade control responsibility for Customs is the enforcement of embargoes and sanctions. The United Nations Security Council maintains a number of targeted sanctions lists. The individuals and entities included in these lists are subject to the relevant measures imposed by the Security Council, and all Member States are obliged to implement these measures in connection with listed individuals and entities. Detailed information about each list, including a description of the relevant measures that apply, can be found on the United Nations website.<sup>12</sup> Updates to this list are also notified to countries periodically by the UN and should be disseminated to Customs Administrations.

Of particular interest in relation to STCE are UNSCRs which entail specific requirements related to inspections, detentions, seizures, and reporting. To assist States in implementing these resolutions, their implementing Committees provide Implementation Assistance Notices<sup>13</sup>, such as the 1718 Committee's Implementation Assistance Note No. 1<sup>14</sup>.

*Of particular interest in relation to STCE are the UNSCRs that entail specific requirements related to inspections, detentions, seizures, and reporting.*

### 1.1.2.3 Multilateral Arrangements

Multilateral export control arrangements comprise a very important layer of the non-proliferation regime. The Nuclear Suppliers Group<sup>15</sup> (NSG), for example, seeks to contribute to the non-proliferation of nuclear weapons through the implementation of two sets of Guidelines, including control lists, for nuclear and nuclear-related dual-use exports. Similarly, the Australia Group<sup>16</sup> (AG) seeks to ensure that exports do not contribute to the development of chemical or biological weapons. The AG's Guidelines and Common Control Lists assist adherents in fulfilling their CWC and BWC obligations. The Missile

<sup>9</sup> <http://www.hcoc.at/>

<sup>10</sup> <https://www.un.org/disarmament/convarms/att/>

<sup>11</sup> <https://thearmstradetreaty.org/treaty-status.html?templateId=209883>

<sup>12</sup> <https://www.un.org/securitycouncil/>

<sup>13</sup> <https://www.un.org/securitycouncil/sanctions/1718/implementation-notices>

<sup>14</sup>

[https://www.un.org/securitycouncil/sites/www.un.org.securitycouncil/files/implementation\\_assistance\\_notice\\_1.pdf](https://www.un.org/securitycouncil/sites/www.un.org.securitycouncil/files/implementation_assistance_notice_1.pdf)

<sup>15</sup> <http://www.nuclearsuppliersgroup.org>

<sup>16</sup> <http://www.australiagroup.net>

Technology Control Regime<sup>17</sup> (MTCR) aims to prevent proliferation of unmanned delivery systems capable of delivering WMD. Finally, the Wassenaar Arrangement<sup>18</sup> (WA) promotes transparency and greater responsibility in transfers of conventional arms and related dual-use goods and technologies.

All of these multilateral arrangements establish export policy guidelines and common control lists to coordinate national export control efforts. Customs administrations in participating governments can have an important voice in the development of these guidelines and control lists through a mechanism in each arrangement known as the Licensing and Enforcement Officers Meeting (LEOM) or the Licensing and Enforcement Experts Meeting (LEEM). Senior policy officials are encouraged to represent the Customs perspective in these forums.

It should be noted that the European Union (EU) has consolidated the control lists of the NSG, the AG, the MTCR, the WA<sup>19</sup>, and most<sup>20</sup> CWC Scheduled chemicals into a single control list<sup>21</sup>, maintained as an Annex to the EU's dual-use regulation.<sup>22</sup> While this list only has force of law within the EU, it has also emerged as a *de facto* international standard control list, with many countries around the world beyond the EU-28 choosing to use it as a model for their own national control lists. Because it integrates the control lists of all four multilateral export control arrangements, which in turn attempt to promote adherence to treaty commitments, the EU consolidated list is a very important strategic goods reference.

#### 1.1.2.4 Proliferation Security Initiative

The Proliferation Security Initiative (PSI) is a multinational response to the challenge posed by the threat of the proliferation of weapons of mass destruction (WMD). It strives to coordinate participating states' efforts, consistent with national legal authorities and relevant international law and frameworks, to stop proliferation related trade in WMDs, related materials and delivery systems.<sup>23</sup> Endorsers of the PSI commit to undertake the commitments specified in PSI's Statement of Interdiction Principles and to cooperate with any state whose ships, flags, ports, territorial waters, airspace, or and might be used for proliferation purposes by states and non-state actors of proliferation concern.

Specifically, countries endorsing the PSI Interdiction Principles have committed to:

- Undertake effective measures, either alone or in concert with other states, for interdicting the transfer or transport of WMD, their delivery systems, and related materials to and from states and non-state actors of proliferation concern.
- Adopt streamlined procedures for rapid exchange of relevant information concerning suspected proliferation activity, protecting the confidential character of classified information provided by other states as part of this initiative, dedicate appropriate resources and efforts to interdiction operations and capabilities, and maximize coordination among participants in interdiction efforts.
- Review and work to strengthen their relevant national legal authorities where necessary to accomplish these objectives, and work to strengthen when necessary relevant international law and frameworks in appropriate ways to support these commitments.

<sup>17</sup> <http://www.mtcr.info>

<sup>18</sup> <http://www.wassenaar.org>

<sup>19</sup> Only the WA dual-use list is included. The WA Munitions List is included in the EU's Common Military List (CML), which is also an important reference for strategic trade control.

<sup>20</sup> CWC Schedule 1 chemicals (and one Schedule 2 chemical) are included in the EU's Common Military List (CML) rather than the consolidated dual-use list.

<sup>21</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1527179601283&uri=CELEX:02009R0428-20171216>

<sup>22</sup> <http://ec.europa.eu/trade/import-and-export-rules/export-from-eu/dual-use-controls/>

<sup>23</sup> <https://www.psi-online.info/>

*The EU consolidated list is a very important strategic goods reference, available in all official languages of the EU.*

- Take specific actions in support of interdiction efforts regarding cargoes of WMD, their delivery systems, or related materials, to the extent their national legal authorities permit and consistent with their obligations under international law and frameworks.

Over 100 states have endorsed the PSI Statement of Interdiction Principles, as shown in Annex I. By doing so, these states have committed themselves to establish a coordinated and effective basis through which to impede and stop the trafficking in WMDs, their delivery systems, and related material. Within the PSI framework, 21 states have formed an Operational Experts Group (OEG), playing a leading role in the initiative, developing and seeking to enhance PSI states' capabilities and operational practices.<sup>24</sup>

#### **1.1.2.5 UNSCR 1540**

In United Nations Security Council Resolution 1540 (2004), the Security Council decided that all States shall refrain from providing any form of support to non-State actors that attempt to develop, acquire, manufacture, possess, transport, transfer or use nuclear, chemical or biological weapons and their means of delivery, in particular for terrorist purposes. The resolution requires all States to adopt and enforce appropriate laws to this effect as well as other effective measures to prevent the proliferation of these weapons and their means of delivery, including *inter alia* export, transshipment and border controls and law enforcement to block illicit trafficking in related materials. The next section (1.2) explores the components of national systems of strategic trade control needed to make such measures effective.

#### **1.1.2.6 The Punta Cana Resolution**

Issued by the Policy Commission of the WCO in December 2015, the Punta Cana Resolution<sup>25</sup> affirms the critical importance of the security role that Customs Administrations play through prevention and detection of smuggling of restricted, prohibited, and strategic goods. The Resolution highlights several recommended actions for Customs Administrations, such as:

- Including security as a part of the Customs mandate and functions, incorporating security into Customs' strategic plans, and disseminating the goal to the front lines
- Cooperating closely at national, regional, and international level between Customs authorities and between Customs and other law enforcement authorities
- Using the full range of detection and investigative techniques, including risk profiling, API/PNR analysis, intelligence sharing, and controlled deliveries
- Making use of the available WCO Security Programme training and reference materials.

### **1.2 Strategic Trade Controls (STC)**

#### **1.2.1 Components of National STC Systems**

The international obligations discussed in section 1.1.2 must be implemented through national legislation and regulations by various government bodies, especially one or more licensing or permitting agencies<sup>26</sup> and enforcement agencies<sup>27</sup>, often coordinated by an inter-ministerial working group or commission. The national laws and regulations (including control lists) determine the universe of goods considered strategic for each country (generally including both listed goods and a catch-all provision allowing for governmental control over unlisted goods under certain circumstances<sup>28</sup>), define a licensing regime and

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<sup>24</sup> <https://www.psi-online.info/psi-info-en/themen/-/2077926>

<sup>25</sup> <http://www.wcoomd.org/-/media/wco/public/global/pdf/about-us/legal-instruments/resolutions/resolution-of-the-wco-policy-commission-on-the-role-of-customs-in-the-security-context.pdf?db=web>

<sup>26</sup> Agencies or ministries involved in export licensing or permitting often include the Ministries of Foreign Affairs, Trade, Commerce, Industry, Development, and Defense, as well as competent technical agencies such Energy, Science, etc.

<sup>27</sup> Enforcement agencies typically include both border control and investigative agencies.

<sup>28</sup> Catch-all controls subject goods to trade controls even if they are not included in national control lists if there is information indicating that they will be used for a proscribed activity or by a proscribed end user.

associated offences, and establish penalties for violations. In a well-functioning STC system, traders apply for permits or licences as required, proactively complying with trade control obligations, and commerce proceeds. However, compliance with the law may not be perfect, and enforcement agencies must detect, deter, and ideally prevent noncompliance. Both administrative and criminal enforcement measures are needed to deal effectively with STC violations.<sup>29</sup>

### **1.2.2      Role of Customs in STCE**

STCE requires a “whole of government” approach where Customs plays an essential role. STCE is built on a foundation of core Customs capabilities such as risk assessment, targeting, inspection, and audit. Using these capabilities, Customs ensures that cross-border movements of goods comply with national laws and regulations.

Customs administrations may or may not have law enforcement responsibilities under their legislation, and yet they are central to STCE due to their fundamental legal authority to detect, inspect, and interdict shipments.<sup>30</sup> Using this authority, Customs may interdict shipments subject to requirements of other agencies that are not located at the border. This is generally the case for STCE, where the international movement of strategic goods is typically subject to the authorization of a licensing or permitting agency. This highlights a key dependency for Customs in STCE, with the need for the licensing or permitting agency to confirm to Customs whether a violation exists. Nevertheless, “Customs offences” such as false declarations may be sufficient basis to detain or seize goods and are a valuable means to interdict consignments of concern. After Customs initiates a seizure on behalf of another agency, the case may be turned over for further disposition. Thus, a close working relationship between Customs and other regulatory, investigative, and enforcement agencies is necessary for effective STCE.

*Customs ensures that cross-border movements of goods comply with national laws and regulations. Trade controls are essential for both compliance and facilitation.*

## **1.3      Setting Up a STCE Program within Customs**

In addition to fulfilling international obligations, trade controls are also essential to maintaining strong trading relationships and are increasingly important to provide confidence to suppliers of strategic goods on which economies rely. In this sense, trade controls are essential for both compliance and facilitation. No matter what goods are considered strategic, once national commitments have been made and policies put into place to control certain goods, Customs will be called upon to ensure their control.

### **1.3.1     STCE Maturity Model**

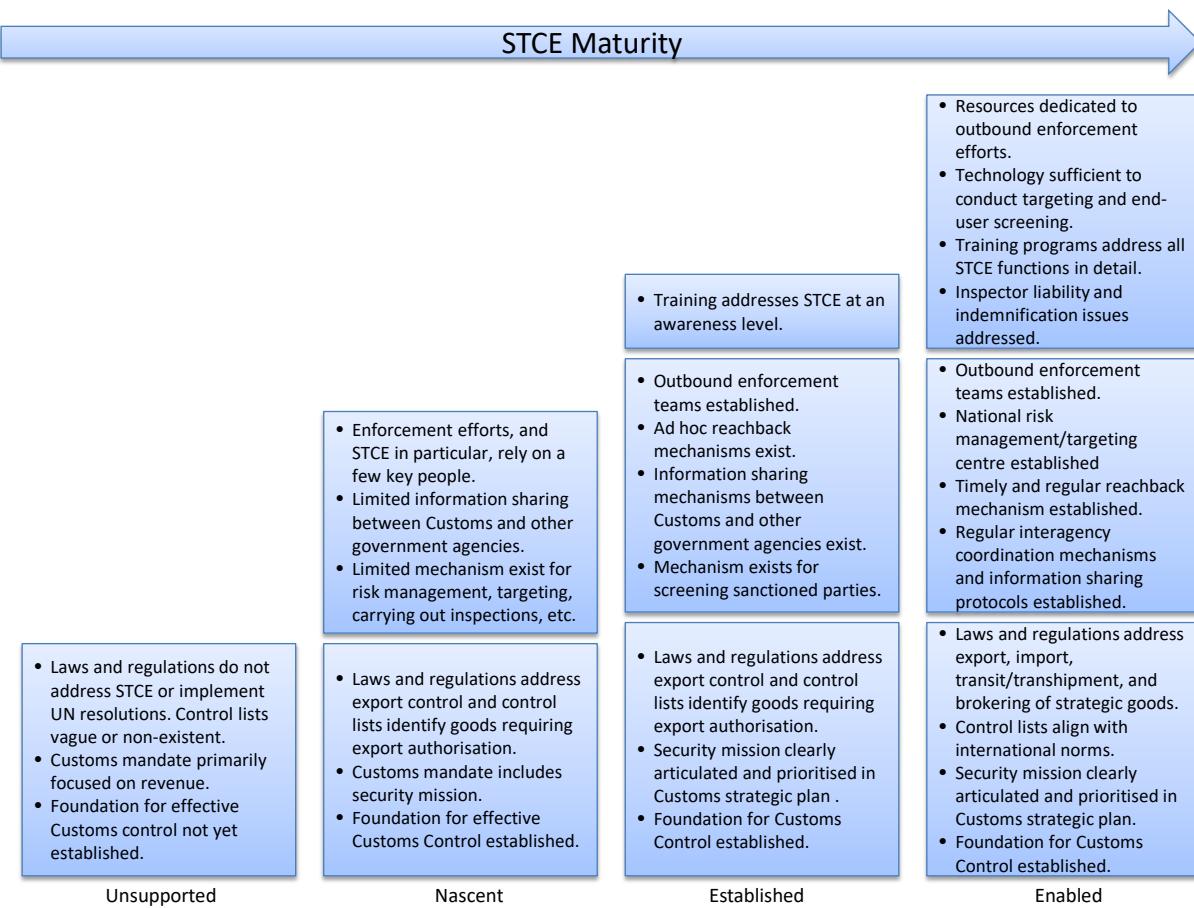
As with risk management, embedding STCE as an organisational culture is not straightforward and requires strong ongoing commitment from managers and staff at all levels. Borrowing a concept from the Risk Management Compendium, a STCE maturity model<sup>31</sup> is suggested (see Figure 1) as a means of self-assessment, allowing Members to review and develop their systems in a structured and systematic way.

<sup>29</sup> Administrative fines are appropriate for lesser offences and administrative non-compliance and have advantages with respect to speed and ease of prosecution. Criminal prosecutions are important for offences with international implications, conspiracy, or criminal intent.

<sup>30</sup> Customs law typically gives Customs Administrations omnibus authority and flexible powers to detain goods, search without warrants, access computerized data, conduct investigations, etc. These are often collectively referred to as “Customs powers”.

<sup>31</sup> A maturity model is a set of structured levels that describe how well behaviours, practices, and processes of an organisation can reliably and sustainably produce required outcomes.

This model suggests four levels of STCE maturity. At the lowest level, the foundations for STCE such as a legal framework and mandate do not exist, and efforts to implement STCE are “unsupported.” Little can be done at the working level under these conditions, and implementation must first focus on high-level commitment. Following that, when a commitment to enforcement exists but the implementation is “nascent” or just starting to take hold, a few key individuals may champion the effort, but they may be isolated and lack standard mechanisms and procedures for carrying out controls. Implementation efforts at this stage should focus on establishing the STC program, including the mechanisms for coordinating the role of Customs in the larger whole-of-government STCE process. Once the program is “established” with all the pieces in place, the challenge is to energize and “enable” that machinery to function effectively. The WCO’s STCE Curriculum will be based on this framework.



**Figure 1 STCE Maturity Model**

#### **Case study: Malaysia Establishes STC**

Malaysia established a national STC system, starting with a Cabinet decision in March 2010. Legislation, known as the Strategic Trade Act, was published in June 2010, followed by establishment of the Strategic Trade Secretariat (led by the Ministry of International Trade and Industry and comprising both licensing and enforcement agencies). Publication of a STA Regulation implementing the Act followed in December 2010, and Malaysia’s STCE went into effect in April 2011.

#### **Case Study: Republic of Serbia Enhances and Enables STC**

In 2013, Serbian parliament passed a new Law on Export and Import of Dual-use Goods and in 2014, a new Law on Export and Import of Arms and Military Equipment. With an eye towards bringing Serbia’s

controls in line with international norms, these laws include controls for export, import, transport, transit, brokering, provision of technical assistance, and catch-all controls. Serbia also established national control lists, one for arms and military equipment and another for dual-use goods, both harmonized with those of the European Union. On this legislative basis, Serbia's "Rulebook on the Duties of the Customs Authorities in Foreign Trade in Arms, Military Equipment and Dual-Use Goods" prescribes the obligations of Customs authorities, and Serbian officials also published a helpful guide on dual-use goods in their "Customs Review", compiling and explaining Customs duties in this regard.

Serbian Customs, together with the licensing authority – the Ministry of Trade, Tourism, and Telecommunications – also established a project entitled "Control of Foreign Trade in Weapons, Military Equipment, and Dual-Use Goods. One benefit of this close cooperation is information sharing, with Customs receiving information on companies registered for foreign trade in weapons and military equipment and information on licenses issued or denied. In exchange, Customs regularly informs the Ministry about the use of issued licenses. Serbian Customs actively participates in the activities of the Interministerial Working Group for Monitoring and Implementation of the National Action Plan for the Implementation of UNSCR 1540, the National Authority for the Implementation of the CWC, and the National Technical Expert Group for the implementation of the Nuclear Suppliers Group.

### **1.3.2 Key Requirements**

To establish and enable an STCE Program within Customs, senior Customs managers must attend to the following considerations:

- Having a legal and regulatory framework that defines the goods considered strategic<sup>32</sup> and establishes necessary authorities and penalties to implement controls and relevant United Nations Security Council Resolutions
- Establishing a foundation for Customs Control (upon which STCE can be built) as described in Chapter 6 of the Revised Kyoto Convention, including the legal and technical capacities to verify shipments and confiscate goods
- Providing high-level policy commitment, reflected in the Customs Administration's strategic plan and metrics
- Creating a training program (see Section 2.3.2) corresponding to the roles of Customs in the [STCE process](#) as outlined in section 2.2
- Establishing mechanisms for Customs-business partnerships and encouraging compliance, especially through an active, structured outreach program
- Establishing and maintaining sufficient internal intelligence capabilities and information exchange mechanisms with other national intelligence authorities to effectively assess both strategic and operational risks
- Establishing a risk management process (often using a centralized risk management/targeting centre)
- Establishing essential coordination and information-sharing mechanisms (often using a centralized clearing house or coordination centre)
- Establishing strong working relationships, information sharing channels, and standard operating procedures with licensing agencies and investigative and law enforcement authorities<sup>33</sup>
- Evaluating, selecting, deploying, and maintaining technical detection technology
- Providing timely technical support services, generally through a centralized clearing house as mentioned above, in some cases supplemented by specially-trained officers for initial screening
- Anticipating and addressing the challenges listed in section 1.3.3 below.

<sup>32</sup> It is considered a good practice to define strategic goods consistently with international norms established by the multilateral export control regime guidelines.

<sup>33</sup> It is considered a good practice to establish protocols for information exchange and cooperation, particularly between Customs and licensing and investigative authorities. Customs must be aware what kind of information will be needed by the investigative authority in order to conduct an effective investigation. The WCO and INTERPOL can provide assistance to Customs and police forces in establishing this working relationship.

Factors found to ultimately contribute to successful STC prosecutions include:

- Comprehensive and clear legislation in place, including liability for different types of activities in the supply chain such as exporting, shipping, trading, brokering, and financing for strategic goods
- Legislation that includes a catch-all clause
- A link from trade control laws to criminal law to enable the possibility to prosecute attempts to violate trade control laws
- Appropriate sanctions or penalties directed at both individuals and at companies
- Prosecutors that are aware of existing trade control laws (including laws that implement international conventions, treaties, and UN resolutions) and trained in how to use them
- Clear division of roles and legal authorities between Customs, police, and other actors
- Effective interagency and intra-agency cooperation, particularly with respect to facilitating the flow of information such as licence denials, for example through joint databases

### **1.3.3 Key Challenges**

The role of Customs in STCE hinges on the capacity to exercise key legal authorities, including audits, inspections, detentions, seizures, penalties, etc. Often these capacities are limited by the challenges identified in this section.

#### **1.3.3.1 Inspector Liability and Indemnification**

The costs of transporting goods for inspection, delaying the movement of goods, and potential damage to goods can be significant, but they are necessary to carrying out Customs controls. If a Customs official delays or damages cargo that is found to be legitimate or without any violation, that official must be personally protected from any potential lawsuit from private sector entities so long as the Customs officer performed his or her official duties in a legal and non-negligent manner. Indemnification must be considered since inspectors bearing personal liability will have strong disincentives to carry out Customs controls. National laws and policies should ensure that any claimant has the burden of proving that a Customs official acted in an illegal or negligent manner, and Customs management should be provided training that ensures that Customs officials are neither punished for delaying nor rewarded for facilitating cargo. When establishing an STCE Program, the mechanism for bearing (and minimizing) the financial costs of potentially delaying or damaging cargo must be explicit.

*Key challenges may limit the ability of Customs to exercise legal authorities.*

Given the complexity of STC, it should be understood and anticipated that targeting strategic trade is an imperfect science, and suspect shipments will frequently prove benign as additional information is uncovered. Training Customs officers to target and interdict illicit shipments of strategic goods, with appropriate risk management approaches, will result in more accurate and selective detentions, but 100% accuracy should not be expected.

#### **1.3.3.2 Property Storage and Disposition**

The governmental act of taking property is a sensitive issue and can be a liability-laden role for Customs. Customs needs to have procedures in place for handling dangerous, illicit, and/or high-value property. These procedures must also protect and preserve the value, including evidentiary value, of goods under seizure.<sup>34</sup> In addition, the costs associated with seized, detained, and abandoned goods must be addressed, as these liabilities can be a powerful disincentive to STCE for Customs.

<sup>34</sup> These considerations are explored at length in the WCO's *Compendium of Customs Operational Practices for Enforcement and Seizures* (COPES). <http://www.wcoomd.org/en/topics/enforcement-and-compliance/instruments-and-tools/compendiums/copes.aspx>

### **1.3.3.3 Competing Priorities for Finite Resources**

Customs has responsibility for implementing a wide range of Government policies, including revenue collection, trade compliance and facilitation, interdiction of prohibited substances, protection of cultural heritage, and enforcement of intellectual property rights. Resource limitations currently prevent many Customs Administrations from focusing on STCE.

Ultimately, STCE is one priority among many, and senior management must decide how to allocate resources. In this regard, it is essential that STCE be consciously incorporated into Customs' strategic plans and metrics be established to create incentives that align with that strategy. Emphasis in those strategic plans on establishment of appropriate legal authorities, interagency coordination mechanisms, and resource allocation can help elevate the importance of STCE. Allocation of resources is essential to enable Customs officials to focus on STCE activities.

### **1.3.3.4 Limitations on Information Sharing**

Due to confidentiality and data protection provisions, often stemming from national legislative instruments, Customs information is notoriously difficult to share, both within national governments and internationally. For effective enforcement, sharing information with and by Customs is often essential, and regulatory or administrative accommodation may be needed to permit it.

### **1.3.3.5 Technological Constraints**

Many countries lack sufficient information technology infrastructure to support timely exchange of information and communication among Customs field offices, between field offices and headquarters, and between Customs and other law enforcement agencies. Creation of centralized databases (of violations and risk assessments, for example) greatly facilitates effective STCE. In addition, the WCO provides several relevant platforms, such as the Cargo Targeting System (CTS) and the Customs Enforcement Network (CEN), as detailed in section 1.4.4.

### **1.3.3.6 Commodity Identification**

Many customs officials lack sufficient awareness of strategic commodities. Several countries that participated in Operation Cosmo 2<sup>35</sup> noted a lack of training on identification of goods and formalized and efficient reachback mechanisms within Customs or between Customs and another agency. Some countries realized they faced long turnaround times for technical reachback or entirely lacked procedures to identify a strategic commodity when an officer detained a shipment. The volume and diversity of goods flowing in the international supply chain makes raising the level of awareness (see training section 2.3.2) quite difficult and necessitates providing mechanisms for expert support (see reachback section 2.3.1).

### **1.3.3.7 Catch-all Controls and Emerging Technologies**

Catch-all is a substantial measure providing a safety net to both licensing and customs agencies to prevent proliferation and scrutinize consignments of strategic commodities not included on export control lists. Customs administrations should, where relevant, cooperate closely with licensing agencies to identify and stop transactions where catch-all controls might be applied.

The 21<sup>st</sup> century brought about new advancements and emerging technologies for industry and trade, such as intelligent robots, additive technology (3D printing), quantum computing, and post-quantum cryptology, presenting new challenges to customs. The multilateral export control arrangements keep a close watch on these developments and adjust their control lists as appropriate. This highlights the

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<sup>35</sup> In April 2018, 114 WCO members participated in the WCO's Operation Cosmo 2, a global operation to target strategic goods during export, transit and transshipment controls through document checks to confirm authenticity, physical examinations, coordination with other national authorities and technical reach-back, targeting of high-risk companies, detention or seizure of shipments, and initiation of criminal investigations. Following the operation, many countries listed challenges they faced, including some identified in this section.

dynamic nature of technology and trade in which customs is required to operate and fulfil its security mission.

### **1.3.3.8 Investigator Inexperience**

During Cosmo 2, countries reported issues following through on detained strategic goods due to lack of experience investigating STC cases. Investigators may be included in STCE trainings or in export control working groups (see training section 2.3.2). The WCO's Customs Operational Practices for Enforcement and Seizures (COPES) Programme has designed training materials that promote best practice in relation to investigation, prosecution, evidence collection, and seizure techniques. The WCO can include STCE-relevant COPES material in its STCE National Training or deliver joint STCE-COPES training events where appropriate.

## **1.4 International Cooperation**

### **1.4.1 Notifying Recipient Countries of High-Risk Shipments**

Export controls are the backbone of STC, but it may not always be feasible to detain suspect shipments before they leave the Customs territory. In these cases, as appropriate and in accordance with national legislation, the WCO's Customs Enforcement Network (CEN) Website and the CEN Communication System (CENComm) can be used to notify the transit, transhipment, or recipient countries of the high-risk shipment so that it can be controlled in transit, during transhipment, or upon import or re-export. This kind of international cooperation is an essential element in combating transnational crime. In the context of STCE, detailed communications between Customs authorities took place during Operations Cosmo 1 and Cosmo 2, where countries used STRATComm a dedicated and secure online communication platform for STCE purposes. Mechanisms for international cooperation are further elaborated later in this section.

### **1.4.2 Mutual Administrative Assistance**

"Mutual administrative assistance" (MAA) means actions of a Customs administration on behalf of or in collaboration with another Customs administration for the proper application of Customs law and for the prevention, investigation, and repression of Customs offences.<sup>36</sup> MAA is often important to STCE given the multinational character of strategic trade and typical separation of related brokering activities from physical shipments. A MAA agreement between two Customs administrations can provide the legal framework for bilateral exchange of enforcement information to prevent or investigate offences. See section 1.4.4.2 for WCO instruments on MAA.

### **1.4.3 Mutual Legal Assistance**

STCE efforts often require international law enforcement cooperation, which may or may not involve Customs depending on their legal authorities. Such cooperation may take the form of "Letters Rogatory" (formal requests from a court in one country for testimony, documentary, or other evidence from another country). Mutual Legal Assistance Treaties (MLAT) can be established between countries to facilitate cooperation on law enforcement matters. Joint investigations can also be conducted (on a formal or informal basis). This is discussed further in section 2.2.6.

### **1.4.4 World Customs Organization (WCO)**

The WCO, in close co-operation with Members, has developed an extensive library of instruments, tools, guidance materials, and operational co-ordination that can significantly facilitate national implementation of STCE. Collectively, these are referred to as the Compliance and Enforcement Package (CEP) Toolkit. This CEP Toolkit includes, in addition to this document:

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<sup>36</sup> Definition from the Revised Kyoto Convention (RKC)

#### **1.4.4.1 WCO Customs Risk Management Compendium**

This compendium outlines a common approach that enables Customs administrations across the globe to speak the same language about the methodology they use to both identify and address potential risks. The WCO Risk Management Compendium<sup>37</sup> is sufficiently flexible in its application to meet the unique operating environment and conditions of individual WCO Members. Volume 1 sets out the organizational framework for risk management and outlines the risk management process. Volume 2 deals with risk assessment, profiling, and targeting tools that inform selection criteria for identifying high-risk consignments, passengers, and conveyances for Customs intervention.

#### **1.4.4.2 Instruments on Mutual Administrative Assistance**

To facilitate and provide a legal basis for the exchange of information among Customs administrations, an instrument for bilateral or multilateral exchange of information is required. Customs administrations also need other types of assistance to ensure the proper application of Customs laws and to prevent, investigate, and combat Customs offences. This range of assistance is normally referred to as “mutual administrative assistance” (MAA), as discussed in section 1.4.2. WCO instruments provide a sound basis for establishing arrangements and agreements for MAA.<sup>38</sup>

#### **1.4.4.3 Guidelines for Post-Clearance Audit**

By application of a post-clearance, risk-based approach, Customs administrations are able to target their resources more effectively and work in partnership with the business community to improve compliance levels and facilitate trade. The Post-Clearance Audit (PCA) process can be defined as the structured examination of a business's relevant commercial systems, sales contracts, financial and non-financial records, physical stock and other assets as a means to measure and improve compliance. Volume 1 is primarily targeted at management-level officials to assist with the development and administration of a PCA programme. Volume 2 focuses on the operational aspects of PCA, with practical guidance and checklists for auditing officials. See section 2.2.1.2 for further discussion of the role of Customs Audit in STCE.<sup>39</sup>

*The WCO Compliance and Enforcement Package (CEP) Toolkit can significantly facilitate national STCE implementation.*

#### **1.4.4.4 Compendium of Customs Operational Practices for Enforcement and Seizures (COPES)<sup>40</sup>**

This Compendium highlights practical examples of working practices as well as stumbling blocks to effective enforcement, in particular procedures related to enforcement and seizure. The practices outlined in this Compendium will encourage Customs administrations to deeply examine their own methods and possibly take steps toward making improvements to their current systems, notably the enhancement of their legal foundation (enabling powers) and the operational options on which their procedures and practices are based.

#### **1.4.4.5 WCO Basic Customs Intelligence Course**

The WCO has developed a comprehensive intelligence analyst training package that is presented in a two-week course. This package will assist members who are endeavouring to modernize their risk

<sup>37</sup> <http://www.wcoomd.org/en/topics/enforcement-and-compliance/instruments-and-tools/compendiums/rmc.aspx>

<sup>38</sup> <http://www.wcoomd.org/en/topics/enforcement-and-compliance/instruments-and-tools/wco-and-international-instruments-on-mutual-administrative-assistance.aspx>

<sup>39</sup> <http://www.wcoomd.org/en/topics/enforcement-and-compliance/instruments-and-tools/guidelines/pca-guidelines.aspx>

<sup>40</sup> <http://clikc.wcoomd.org/course/view.php?id=124>

management practices by building an intelligence capacity and capability within their administrations. Equally, the package will also assist administrations who wish to have a structured intelligence training curriculum as an added resource to their existing national intelligence programs. See section 2.4.2 for further discussion of the role of intelligence in STCE.

#### **1.4.4.6 WCO Commercial Fraud Technical Resources**

The movement of commercial strategic goods without required permits or licences can constitute commercial fraud. The WCO has developed numerous applicable technical materials related to commercial fraud, including the WCO Commercial Fraud Manual for Senior Customs Officials, the WCO Handbook for Commercial Fraud Investigators, and Commercial Fraud Training Courses. With appropriate access, the complete list is available on the WCO's website.<sup>41</sup>

#### **1.4.4.7 The Customs Enforcement Network (CEN)**

To enable its Members to combat transnational organized crime more effectively, the WCO has developed CEN, a global system for gathering data and information for intelligence purposes, and the CEN Communication tool (CENComm). CEN was updated in 2016 to include a category for strategic goods with over 50 relevant commodity sub-headings, and CENComm features the STRATComm application which enables WCO Members to communicate secure information relating to seizures or warnings concerning shipments of strategic goods. This communication tool is integral to the intelligence process for Operation Cosmo activities.

#### **1.4.4.8 The Cargo Targeting System (CTS)**

The WCO has developed a risk management system for cargo targeting. Starting with the container mode of transport, CTS gathers cargo manifest data from the shipping industry and allows users to search and analyse it in order to identify high risk shipments across the full range of Customs threats. CTS provides standardized yet flexible targeting capabilities to any WCO Member that adopts it.

#### **1.4.4.9 Regional Intelligence Liaison Offices (RILOs)**

A RILO is a regional centre for collecting, analyzing, and supplementing data as well as disseminating information on trends, modus operandi, routes, and significant cases of fraud. The WCO has established a global network of RILOs to promote information and intelligence exchange and enhance cooperation between Customs services tasked with combating transnational crime. The RILO network currently comprises eleven Liaison Offices covering the WCO's six regions.<sup>42</sup> During Operations Cosmo 1 and Cosmo 2, officers from the RILO offices were relied upon to help improve communications on STCE cases.

#### **1.4.4.10 Authorized Economic Operator (AEO)**

AEO offers an opportunity for Customs to share its security responsibilities with the private sector, while at the same time rewarding them with a number of facilitation benefits. Implementation Guidance<sup>43</sup> is available to assist Members in developing and implementing AEO programs, and much of that guidance is also applicable to developing and implementing STCE programs.

#### **1.4.4.11 Customs Learning & Knowledge Community (CLiKC!)**

CLiKC! gathers all training-related tools in a single portal, offering the worldwide Customs community a single entry point for WCO training activities and a collaborative portal to share and foster Customs

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<sup>41</sup> Accessible by WCO Members at <http://www.wcoomd.org/en/topics/key-issues/cep/instruments-and-tools.aspx>

<sup>42</sup> [http://www.wcoomd.org/-/media/wco/public/global/pdf/topics/enforcement-and-compliance/tools-and-instruments/rilo/rilo-brochure\\_en.pdf?db=web](http://www.wcoomd.org/-/media/wco/public/global/pdf/topics/enforcement-and-compliance/tools-and-instruments/rilo/rilo-brochure_en.pdf?db=web)

<sup>43</sup> <http://www.wcoomd.org/en/topics/facilitation/instrument-and-tools/tools/~/media/4448CE5B00DB422FA89A29AA447A4F22.ashx>

knowledge.<sup>44</sup> CLiKC! has two STCE Forums, one for all WCO Members<sup>45</sup> and one for STCE Accredited Customs Expert Trainers.<sup>46</sup>

*CLiKC! has two STCE forums*

#### 1.4.4.12 Programme Global Shield

Programme Global Shield (PGS) is an international effort to counter the illicit diversion and trafficking of the most commonly used and most freely available explosive precursor chemicals and other components (especially detonators) that may be used by terrorists and other criminal organizations to manufacture explosive devices.<sup>47</sup>

#### 1.4.4.13 Container Control Programme

The Container Control Programme (CCP) is a joint initiative of the WCO and the United Nations Office on Drugs and Crime (UNODC) to establish dedicated risk profiling teams for cargo at key seaports and airports across the globe. The installation of such “Port Control Units” and “Air Cargo Control Units” is based on a multi-step, 3-year training concept. Communication among these units is facilitated by ContainerComm and AirCargoComm, both specific CENComm applications.<sup>48</sup>

### 1.5 Performance Management

When implementing any major initiative, such as STCE, performance management is crucial to ensuring individuals, teams, and interrelated functions perform as intended to achieve organizational objectives. Developing appropriate performance measures, based on objectives determined by the strategic plan, will help ensure each function has the organizational capacity, resources, and performance culture to deliver intended results.

The following attributes contribute to a high-performance culture:

- Individual and organizational performance objectives are clearly defined and directly related to strategic priorities.
- Performance is regularly measured and assessed.
- Employees are recognized for good performance and appropriately rewarded.
- Regular constructive feedback is provided by all managers and employees to help improve performance.
- Performance issues and underperformance are effectively managed.
- Financial resources are allocated to sustain performance.

The metrics used to assess performance should be carefully designed to create appropriate incentives for operational Customs officers, balancing control and facilitation.

<sup>44</sup> <http://clikc.wcoomd.org/>

<sup>45</sup> <https://clikc.wcoomd.org/course/view.php?id=574>

<sup>46</sup> <https://clikc.wcoomd.org//course/view.php?id=570>

<sup>47</sup> <http://www.wcoomd.org/en/topics/enforcement-and-compliance/activities-and-programmes/security-programme/programme-global-shield.aspx>

<sup>48</sup> <https://www.unodc.org/unodc/en/drug-trafficking/container-control-programme.html>

## 2. STCE for Operational Customs Officers

### 2.1 Introduction

As discussed in Section 1, international trade in strategic commodities is subject to control. Section 2 explores the technical aspects for Customs of implementing such controls. Specifically, implementation guidance is provided for each major functional area of the STCE process described in section 2.2. Section 2.3 then explores several related Customs functions on which the STCE process depends, followed by a discussion in section 2.4 of key functions of other government agencies that depend on Customs.

### 2.2 STCE Process

Customs must ensure that shipments meet all legal and regulatory requirements through standard control mechanisms. Most of these processes are well known to Customs, and this implementation guide does not attempt to convey all related Customs enforcement knowledge. Rather, it focuses on the ways in which Customs' functions in STCE are uniquely challenging and certain interagency and international dependencies inherent to each function. STCE comprises many interrelated functions, as shown in Figure 2.

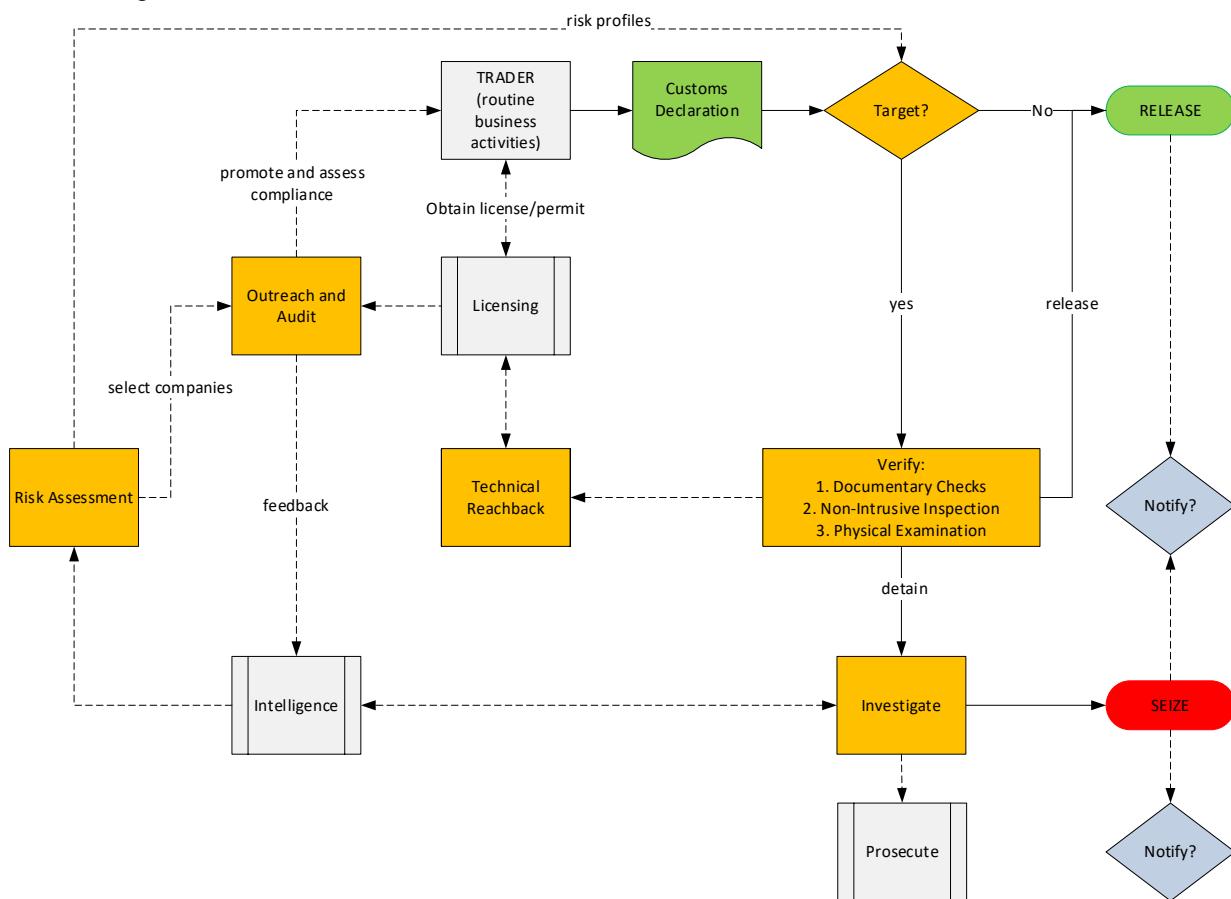


Figure 2 Functional STCE Processes

Trade in strategic goods is common, but such trade is generally subject to an authorization (permitting or licensing) process. Compliance by the trade community with this national strategic trade authorization processes is central to facilitation of legitimate trade, enabling Customs to focus attention on potentially illicit trade.

## **2.2.1 Awareness and Audit**

To facilitate as much trade as possible and thereby focus enforcement efforts where they are needed, compliance by the trade community is essential. Compliance is promoted using awareness raising and audit. Awareness raising refers to ways traders can be educated and assisted, while audit refers to verification of their compliance. The two functions are not necessarily independent or mutually exclusive activities and could be accomplished concurrently. Severe penalties to deter noncompliance, including forfeiture of goods, fines, criminal prosecution, and loss of export privileges, underlie both mechanisms.

### **2.2.1.1 Awareness Raising Outreach**

Both the licensing or permitting agency and the regulatory or enforcement agency may conduct outreach to enterprises and academic organizations to raise awareness of strategic trade control regulations and compliance procedures.<sup>49</sup> This outreach may take the form of visits to those enterprises, provision of briefings and resources through trade groups, or simply clear guidance and systems on the internet. Audited internal compliance programs (ICP) within trade companies may help them qualify for various forms of general licences and facilitated Customs procedures. Ideally, this interaction between Customs and trade leads to active cooperation and improved insight into the products produced or traded and the clients of the company. A strong Customs-trade relationship can lead to freight forwarders, carriers, and others alerting Customs to suspect export shipments early in the process.

Where STC is a collective effort of multiple agencies (including Customs, a licensing or permitting agency, and investigative agencies), joint outreach demonstrates coordination, ensures consistency, and fosters collaboration. It can also promote understanding of the process (and associated delay) that ensues when Customs detains a suspect shipment, serving both to encourage compliance to avoid such delays and to improve the Customs-trade relationship in the event of such delays.

Documented outreach to enterprises can also provide important evidence that the entity in question had knowledge of STC requirements, which could prove important in the event a violation by that entity is prosecuted. Companies requiring outreach may be identified through the targeting process (section 2.2.3), particularly when new exporters of strategic goods are identified. Similarly, the intelligence-driven risk assessment process (section 2.2.2) may identify entities of concern. A major objective of outreach is to promote active compliance, whereby the trader will not only comply with requirements but will also notify authorities of suspicious enquiries, which can then be fed back into the risk assessment process to generate leads for further investigation.

Practical actions toward establishing an effective outreach program to promote awareness can include:

- Assigning a manager for the awareness program.
- Conducting research to determine which industries, companies, and national associations to focus on.
- Surveying other agencies to determine if outreach is already being conducted and coordinating as necessary.
- Enlisting assistance from national and international industry associations.
- Determining outreach strategies, such as direct company visits, participation in trade shows and conferences, literature for industry associations, websites, etc.
- Developing outreach messages, such as suspicious (“red flag”) indicators and reporting procedures, including contact information for reporting suspicious inquiries.
- Determining how leads will be investigated, tracked, and monitored.
- Developing outreach materials such as brochures, pamphlets, web pages, newsletters, call-in numbers, posters, etc.

This topic is explored further in Annex IV – Industry Outreach by Customs.

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<sup>49</sup> INTERPOL’s Chemical Industry Outreach Program and Biosecurity Training Program also focus on raising awareness in the public sector. These efforts could be leveraged by Members to improve dialogue with industry and the scientific community.

### 2.2.1.2 Audit

While the aim of awareness-raising outreach is to promote future compliance, audit serves to verify past compliance or detect past noncompliance. Customs audits typically involve checking the books and records (including e-mails) of international traders and comparing them to Customs declarations and licence applications. Not only can this lead directly to detection of violations, but those violations can also be valuable inputs to the risk assessment process and ultimately to the profiling and targeting processes. For example, if an audit reveals that strategic goods were improperly obtained by a trading entity, the targeting process may be used to identify future shipments to that entity. Audits are a key element of risk-managed targeting, which contributes significantly to Customs efficiency and trade facilitation. Post-clearance audits enable Customs to offer traders facilitated release of goods by applying simplified procedures, shifting away from close examination of every declaration.

Post-clearance audits are a common practice, but often they are focused on the revenue collection mission.<sup>50</sup> STC audits may require specialized knowledge and dedicated audit teams to be effective. These teams will require specialized knowledge of national STC legislation and control lists, licensing procedures, sanctions, proliferation risks, end users of concern, procurement tactics, and evasion methods. STC audits also typically focus on exports rather than imports, and the auditor must check the products and merchandise of the company, quotations, orders, sales, and export clients.

### 2.2.2 Risk Assessment

Due to the high volume of trade, including legitimate trade in strategic goods, intelligence-driven risk analysis is essential to targeting high-risk consignments for further scrutiny.<sup>51</sup> In this way, low-risk consignments can be facilitated, while high-risk consignments can be subjected to progressively greater control, ranging from documentary checks to technical scans and finally to physical checks (as discussed in section 2.2.4).

According to the WCO's Risk Management Compendium, any effort to manage risk must begin by first establishing the context and identity of the risk to be managed. A fundamental challenge associated with strategic trade is the dual-use nature of most strategic goods, meaning that they are used for both strategic and non-strategic (i.e., commercial) purposes. As a result, these strategic goods are routinely shipped legitimately, both with and without permits. The challenge for Customs is not simply to find shipments of strategic goods, but to find the small percentage of those shipments which may be illicit. Thus, profiles need to be based on the nature of the goods and the nature of the transaction.

In addition, intelligence provides key context regarding identify and modus operandi of supply and procurement agents, brokers, and networks.

STC violations may be wilful or inadvertent. Inadvertent violations often occur when traders are not aware of STC requirements, do not realize that their goods require authorisation, or fail to conduct thorough checks of their trading partners. In these cases, the trader is likely to declare their goods correctly but fail to obtain required authorisations. In the case of wilful violations, the trader may undervalue the goods to avoid making a declaration, declare the goods incorrectly as goods that do not require authorisation, or commit licensing fraud (counterfeiting a required licence, altering a legitimate licence, shipping goods other than those for which the licence was received, or obtaining a licence based on false statements).



<sup>50</sup> See WCO Guidelines for Post-Clearance Audit (PCA)

<sup>51</sup> The basics of the risk assessment and targeting process are covered in the WCO course "Risk Assessment, Profiling and Selectivity". This section will elaborate on considerations related to STCE specifically. See also the WCO's Risk Management Compendium.

### **2.2.3 Profiling and Targeting**

Risk analysis leads to the development of risk profiles<sup>52</sup> and selection criteria which Customs can use to identify transactions likely to be non-compliant. Selectivity is a major challenge with respect to targeting strategic trade. To develop effective profiles for potentially illicit strategic trade, Customs must use internal and external information. Internal information includes information arising from previous transactions, seizures, investigations, and audits. External information may include information from the licensing or permitting agency, such as the nature of common strategic goods with which they deal, known traders related to those goods, suspicious parties, and (critically) information related to permits/licences issued and denied. External information could also be provided by international organizations (such as lists of sanctioned entities as discussed in section 1.1.2.2) and other countries, for example through the CENComm system when they identify a high-risk shipment after the shipment has already departed their jurisdiction (as discussed in section 1.4.1).

Some potential risk indicators include late presentation of Customs documentation, documents containing amendments, unusual routing, unusual terms of payment, country of origin not typical for the product, unusual destination country for the kind of goods, agent pressing for release of goods, lack of interest in release of goods, transport or insurance costs inconsistent with the goods, first time importers or exporters, shipments to trading companies, and vague commodity descriptions. Risk profiles can include information related to persons, places, routes, or items. Indicators associated with specific strategic commodities are discussed in [Annex III](#). A major challenge in this area is the availability of information and the limited amount of time available in which to identify consignments of concern and take appropriate action.

One of the most important sources of information for risk profiling and targeting are screening lists of proscribed entities. The United Nations Security Council Sanctions Committees maintain an online compendium of sanctions lists.<sup>53</sup>

Given the high-volume of commerce in some strategic goods, and in keeping with the philosophy of risk-based compliance management, it is also useful to develop “release profiles” for patterns that correspond to low-risk shipments by compliant traders so that those transactions can be facilitated. This benefits trade, and it benefits Customs by enabling efficient allocation of resources. Examples of such profiles might be for Authorized Economic Operators conducting routine transactions with known trading partners, high-volume exporters with good records of compliance, or shipments which have already been authorized by the licensing/permitting agency. As the profiles of routine trade in strategic goods become known, anomalous transactions that deviate from those patterns can be targeted.

Risk profiles used for targeting should be regularly tested. The application of systematic rules has two distinct weaknesses. First, as the rules become known, noncompliant traders can systematically evade them. Second, they are only effective at screening for known risks, creating blind spots for new tactics. For these reasons, risk testing should be conducted through the continued use of random checks.



<sup>52</sup> A risk profile is a set of characteristics which tend to correspond to shipments of interest, often representing a picture of a smuggling pattern, a commodity of interest, an entity of concern, or a combination of these. Profile-based targeting is an enforcement method by which shipments are selected for examination when they match one or more of these profiles.

<sup>53</sup> <https://www.un.org/securitycouncil/content/un-sc-consolidated-list>

Targeting is generally considered as a mechanism for selecting shipments for verification, but that is not the only option. Targeting can also feed back into the Risk Assessment process, which in turn can direct outreach and audit activities. For example, when a new trader of potentially strategic goods is identified, targeting that trader for outreach may promote compliance and lead to a better understanding of that trader's products and trading partners. In turn, this may actually reduce the need for inspection.

## 2.2.4 Verification and Commodity Identification

When a shipment is targeted for Customs verification, based on risk-assessment as discussed, several options may be considered. These should be applied in a progressive manner, beginning with least invasive and disruptive and progressing as necessary. Three kinds of inspection/control are considered here:

- **Documentary** examination (often conducted electronically)
  - Documentary examinations are often conducted progressively, as well, starting with the documents most readily available, such as manifests, bills of lading, air waybills, or export declarations. If suspicions are supported, or not resolved, additional documentation, such as commercial invoices and packing lists, can be requested and obtained.
  - Regarding potentially strategic goods, the invoice is particularly useful as it generally identifies the product very specifically and identifies the purchaser, which is useful for end-user screening.
  - The Risk Management Compendium provides extensive discussion of source elements in documentation and how to use them as risk indicators.
- **Non-intrusive inspection (NII)** (often with portal monitors, container x-ray scans, or other detection systems)
  - While the non-intrusive and non-destructive nature of NII is appealing, and can be instrumental for some commodities, such as for detecting radioactive materials (see discussion under 28.44 Radioactive materials), they are often not effective when it comes to strategic goods. Dual-use commercial goods are not typically concealed like contraband, and they do not produce emanations that can be detected.
- **Physical** examination (putting eyes, hands, and/or instruments on the goods)
  - As with the other examination methods, physical exams are progressive, usually starting with visual inspection of packing lists, shipping documents, and outer packaging. If the package is opened, the goods can be examined, as well as labels, nameplates, and documentation such as manuals and certifications that may accompany the goods. These are particularly useful for identifying strategic goods. Pictures of the goods, labels, and nameplates may be taken and referred for reachback support. If further examination is required, field test kits for identifying chemicals or instruments for [identifying alloys](#) can be used, or samples can be sent to a laboratory for analysis.



Training is critical to enabling verification and commodity identification, as the front-line inspector must have some familiarity with strategic goods to decide whether detention of a shipment for further examination is warranted. Only once the detention is made can technical, analytical, or regulatory support (see section 2.3.1) be called upon. Training can serve both to promote enforcement of STC requirements and to avoid unnecessary interference with non-strategic shipments. It is very difficult to identify dual-use goods, so training programs must take a realistic approach toward the level of awareness and familiarity sought. Often the initial identification step involves negative identification (determining what the goods are not) rather than positive identification (determining what the goods actually are). Negative identification may be as simple as determining that the goods do not match the declaration. However, in many cases commercial goods will be declared correctly, but with a claim that

they do not require a licence or permit. The front-line officer will generally not be able to definitively identify dual-use items or assess their status with respect to national control lists. Nevertheless, they must be aware of the types of goods on those lists that may be targeted and know how to find relevant information to provide to reachback responders once a shipment is detained. Select strategic commodities are discussed in [Annex III](#), together with guidelines for their identification.

The issue of inspector liability and indemnification is very important at this stage. See section 1.3.3.1.

## **2.2.5 Detention and Seizure**

Detention is a formal hold on an item without transfer of ownership and may or may not lead to a seizure. When a potentially illicit shipment of a strategic commodity (i.e., a shipment potentially requiring authorization that has not been authorized) is discovered through the targeting and inspection processes, it may be necessary to detain the shipment to definitively identify the item, classify it with respect to national control lists, and determine the licensing/permitting status of the shipment. These activities will generally require technical reachback and/or referral to the licensing/permitting agency. See section 2.3.1. If a violation is discovered, seizure of the goods (the first stage in a formal process that could result in forfeiture, or the transfer of property ownership, to the government) is possible, and in any case an investigation may be launched. Seized property may have evidentiary value in addition to its intrinsic value as property, and special handling considerations may apply.<sup>54</sup>

## **2.2.6 Investigation**

The investigative process is critical to STCE efforts to identify, disrupt, and dismantle criminal, terrorist, or state-sponsored actors seeking to smuggle or acquire strategic goods through illicit means.

Interdiction alone is incomplete as an enforcement tool because it does not prevent future efforts of an illicit procurement group.

While most Customs administrations do not have investigative authority, STCE investigations depend strongly on Customs functions, processes, and authorities, and Customs will almost certainly carryout some of the steps listed in section 2.2.6.1 before turning an investigation over to another agency. An investigation may be launched, whether or not a seizure is made, based on a shipment of concern, other information arising from intelligence, the risk assessment process, other investigations, tip information, or other source-based methods. In turn, the investigation can develop information identifying broader involvement, gaps in security, source funding and other important information to further enhance enforcement efforts by improving risk assessment and profiling.

While all investigations have similar elements, strategic goods cases are frequently complicated by the fact that the act of purchasing these items is generally legal. The illegality arises from not obtaining proper licences, providing false information to obtain licences, disguising the destination and end use, or falsely declaring an item at time of export or import. Evading or attempting to evade prohibitions or restrictions applicable to commercial goods, such as import, export, or transit licence requirements, is a form of commercial fraud.<sup>55</sup> Careful and thorough documentation is often necessary to prove or disprove an offence.

### **2.2.6.1 Investigative Steps**

Typical investigative steps following discovery of a shipment of concern include:

- Checking the existence and validity of licences or permits.
- Examining the goods and communicating with appropriate authorizing agencies to determine if the shipment/commodity requires a licence or permit for legal import/export.
- Checking consistency of Customs documents (declarations, invoices, packing lists, manifests, air waybills, bills of lading) with each other and with the actual consignment. This can be used to

<sup>54</sup> Detention and seizure considerations are covered in detail in the WCO's *Compendium of Customs Operational Practices for Enforcement and Seizures* (COPES).

<sup>55</sup> Commercial fraud investigation is defined as an inquiry of a suspected violation of laws or regulations that Customs is responsible for enforcing.

answer fundamental questions and to prove fraud, false statements, and knowledge of illicit trafficking. Key information includes:

- Seller, buyer, and consignee names and contact information
- Sales terms, payment terms, currency of sale
- Quantities and descriptions of merchandise, including harmonised system (HS) code
- Package weights
- Routing information
- References to licences or permits, or to claims that they are not required.
- Identifying previous imports/exports by the importer/exporter
- Interviewing suspects or witnesses
- Obtaining business records of the suspect companies and communication documents between importers, exporters and shippers.
- Requesting information from other Customs Administrations through mutual administrative agreements.

Beyond proving whether an offence occurred, investigation may reveal other criminal activities and may lead to opportunities to broaden the investigation and take further enforcement actions to dismantle and disrupt illicit procurement networks.

Investigations which are not initiated by a seizure may involve different investigative techniques, including private sector outreach, development of information sources, communications exploitation, undercover operations, and surveillance.

#### 2.2.6.2 Investigative Techniques<sup>56</sup>

During the course of an investigation, opportunities may arise to broaden the overall scope of the investigation and increase the amount of case-related intelligence. These alternatives to immediately making a seizure are generally well known techniques by law enforcement agencies. However, because STCE cases often involve cross-border movement and are international in nature, these techniques require careful planning and advance coordination with the relevant authorities in the affected countries, and some of these techniques may not be available in all countries due to differing national laws.

Examples include:

- **Controlled Delivery.** A controlled delivery is an investigative technique involving the transportation of contraband to a suspect violator while it is under the control or surveillance of law enforcement. This technique can serve to identify violators, disrupt and dismantle the smuggling organization, broaden the scope of an investigation, identify higher-level violators, obtain evidence, etc. Types of controlled deliveries include:
  - Non-cooperating violators. Contraband discovered during a border inspection is allowed to pass through and proceed to its intended destination while under surveillance of law enforcement. The non-cooperating violator is unaware that the contraband has been discovered. Risks include loss of the contraband and possible counter-surveillance by the criminals.
  - Cooperating violators. When contraband is discovered and the violator arrested, the violator may agree to cooperate with law enforcement. The cooperating violator is under arrest and in the custody of law enforcement, so efforts must be made to protect their safety and ensure they don't harm others or escape.
  - Undercover (covert) officer or informant. The violator is arrested and replaced with an undercover officer or informant.
- **Flash Operation.** Flash operations are used in conjunction with undercover agent/s (UCA). This technique involves using actual or sham versions of the commodity in question and providing targets of investigation the opportunity to visually and physically inspect the commodity.
- **Communications Exploitation.** Sources of information may be the most important and effective tool in developing criminal cases. Mobile phone and e-mail accounts are key components to

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<sup>56</sup> Many of these techniques are not be legally available in all WCO Member States and in any case may not be conducted by Customs.

many investigations, and Customs investigators are in a unique position to gain access to a large amount of target telephone and e-mail data through their border search authority. Call and e-mail data can make connections between defendants and other investigations. A good practice is to maintain a consolidated database of phone numbers and e-mail addresses for such cross-references.

### 2.2.6.3 Case Management

Key to any investigative process, case management unifies information, processes, and people to optimize case outcomes. Case management avoids loss of documents or evidence, helps guide the decision process for next steps in an investigation, provides one location for all related activity and information, and facilitates file review for prosecution. It also allows others to know that an individual is a target of investigation, enables coordination, and controls access to case information. Finally, it can be useful for compiling case statistics, identifying trends in criminal activity, and tracking workload data.

A case management system could be paper-based or electronic. Paper has low cost, ease of organization and use by the case agent, but does not easily support access by others or management oversight. Electronic case management systems cost more to set up but can be more easily accessed and managed. Regardless of format, important components of a case management system include:

- A case chronology, recording each action on a case by date and time
- Investigative reports
- Court documents (warrants, subpoenas, indictments, court orders, pleadings, etc.) – as allowed by law.
- Customs documents (including documents submitted to Customs and documents created by Customs)
- Immigration documents, fugitive reports, custody receipts, inventory sheets, monetary count sheets
- Police reports
- Photographs, fingerprint cards, investigative notes

Adherence to the rules of evidence, in particular chain-of-custody,<sup>57</sup> is important to case management, particularly when investigating crimes that involve strategic goods, where procedures used by the investigative teams could impact forensics related to backtracking (pathways analysis) and attribution of the material's origins. Proper evidence collection and preservation techniques can help meet strict evidentiary standards, defeat commonly used courtroom defences, and result in investigations that withstand local and foreign trial and appellate court challenges. Evidence must be properly identified (where it was found and who found it), and continuity of the chain of custody must be demonstrated (documenting everyone who handled the evidence and when and where it was transported). This can be especially challenging when samples are sent for analysis, and care should be taken to prevent loss or damage, limit links in the chain of custody, provide tracking capability, and document receipts.

### 2.2.6.4 Joint Investigations

The increasing sophistication of transnational criminal organizations, state-sponsored actors and terrorist groups often means that current law enforcement methodology, unilaterally applied, may be insufficient to effectively combat illicit procurement activity. Investigations with a cross-border connection benefit significantly from the participation of law enforcement agencies in all countries in which there is a nexus to the criminal activity in question. Several models can be used to conduct joint investigations.

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<sup>57</sup> Chain of Custody refers to the procedures and documents that account for the integrity of physical evidence by tracking its handling and storage from its point of collection to its final disposition, especially by logging every time the evidence changes hands. Other types of rules of evidence include "chain of evidence", "chain of physical custody", and "chain of possession."

### **Case Study: European Union (EU)**

The EU's European Union's Joint Investigative Team (JIT) is a model being used with increasing success. The JIT model is based on the Convention on Mutual Assistance in Criminal Matters (MLA Convention of 2000) and was ratified by all EU member states (except Italy) in 2005. It is comprised of an investigative team set up on the basis of a formal agreement between two or more member states and/or other parties for a specific purpose and limited duration. Participation in a JIT is not strictly limited to EU members and can easily accommodate inclusion of other invited WCO members.

Advantages of joint investigations include:

- Ability to share information directly without the need for formal requests
- Ability to request investigative measures between team members directly, dispensing with the need for Letters Rogatory and Mutual Legal Assistance Treaty requests
- Ability for members to be present at searches, interviews, etc. in all jurisdictions covered, helping to overcome language barriers in interviews, etc.
- Ability to co-ordinate efforts on the spot, and for informal exchange of specialized knowledge
- Ability to build and promote mutual trust between investigators and prosecutors from different jurisdictions and work environments.
- A platform to determine the optimal investigation and prosecution strategies

Joint investigation agreements do not override participants' domestic law obligations. Considerable coordination and guidance need to be provided to participants regarding differences in law enforcement authority, particularly in the case of coercive methods, i.e. search warrants, court orders, rules of evidence, and agreement on the intended venue for prosecution. Roles, duties, lines of authority, responsibilities, and management structure need to be clearly described in the agreement. These agreements should also address possible liability issues that participants may encounter. Joint investigations may not always be the most appropriate tool in every cross-border investigation, but law enforcement agencies should be aware of their considerable benefits and be in a position to make informed decisions about their use.

### ***2.2.7 Prosecution***

For purposes of prevention, it is important to punish attempts to smuggle strategic items. Prosecution is generally not the purview of Customs, but Customs may play an important part, especially with respect to providing evidence related to the violation. As a result, it is important for Customs to understand procedures for identifying, recording, and preserving evidence and establishing a chain of custody. This is discussed in detail in section 2.2.6.3.

## ***2.3 Related Customs Functions***

The STCE process discussed in section 2.2 depends on several related functions. Those that fall to Customs are discussed here, and those that fall to other government agencies (e.g., licensing and intelligence) are discussed in section 2.4.

### ***2.3.1 Technical "Reachback" and Analytical Support***

As Figure 2 shows, effective STCE depends on the availability of technical reachback<sup>58</sup> services due to the highly technical nature of strategic goods. Reachback support often involves the assessment of data provided by the front-line officer. This could be a spectrum from a radiation detector or information such as a manufacturer name and model number from a nameplate on a commercial product. Analytical support might also require technical analysis of items, such as samples of a chemical or alloy.

Technical reachback with respect to strategic goods most commonly involves the process of "item rating" (also known as "commodity classification") – determining the identity and capabilities of a commodity

<sup>58</sup> Reachback is defined as the process of obtaining support from organizations that are not on the front line.

and determining if it meets the specifications found on the national control list. This is not done at the front line as a matter of not only technical capacity but also authority, as STC determinations are typically the purview of the licensing or permitting authority.

A critical issue for Customs relates to the timeliness of reachback support in light of time pressures on detained shipments. It can be useful to consider providing two different levels of reachback services in two different timeframes: 1) a very rapid determination during initial detention of goods whether further delay/investigation is warranted or if the shipment has already been authorized and 2) a subsequent full item rating that will take longer. The former may be accomplished by specialists within Customs (such as a Customs laboratory, mobile inspection units, or specially trained advisory experts in each major port) or another agency, while the latter generally must be provided by the licensing/permitting authority, especially if the determination will be used in subsequent enforcement and prosecution procedures. Reachback requests may be coordinated by a centralized clearing house or communication hub, giving field officers a single point of contact within Customs that ideally is available 24/7/365. This is discussed further in section 2.4.1.

#### Case Study – Netherlands

In Dutch Customs, the “vraagbaken” (“question beacons”) are specialists within Customs in particular subjects, including waste, hazardous materials, medicines, veterinary science, intellectual property, cultural heritage, weapons, ammunition, strategic goods, and sanctions. These vraagbaken receive special training, and every Customs region has teams of them. Customs officers can contact them directly or they can contact a central phone number anytime (24 hours per day, 7 days per week) to be connected to an appropriate vraagbaken. When a Customs officer asks for help related to strategic goods, the vraagbaken can bring the case to the licensing office or to the investigative team.

#### Case Study – United States

In the U.S., the Exodus Command Center (ECC) serves as the single point of contact for coordinating operational support to Customs export enforcement and investigations from various national export authorities to obtain license determinations, license histories, and other related requests. In 2013, the ECC managed over 3100 referrals from the field. Based on the outcome of queries to the ECC, Customs may seize, release and/or initiate a concurrent criminal investigation.

### **2.3.2 Training and Capacity Building**

A training program is essential for transferring information and knowledge to Customs personnel and equipping them to translate that information and knowledge into practice. In the case of STCE, the training approach should mirror the STCE processes (section 2.2) and related functions (section 2.3) so that Customs can effectively implement the process. The WCO’s STCE Curriculum will provide such training modules tailored to each level of the STCE Maturity Model discussed in section 1.3.1.

Two primary occasions for training are when new employees join an organization or job function and when existing employees are given refresher training to update and maintain their knowledge, skills, and abilities. The latter is especially important when there are changes in procedures or technology. Training is generally imparted in two ways: on the job (e.g., through mentorship, apprenticeship, coaching, or job rotation) and off the job (e.g., through workshops, seminars, or courses). Hybrid approaches are also possible (e.g., through field operations or exercises).

To implement a STCE Training Program, several good practices have been identified and correlated with success:

- **Conducting and participating in bilateral and regional training initiatives and exercises.** Because the enforcement of STC often involves both sides of a border, bilateral and regional training workshops and operations promote sharing of good practices, strengthening working relationships, exercising existing procedures, highlighting gaps in enforcement coverage, and identifying areas for improvement.
- **Developing a training plan.** The training plan establishes the national approach and strategy

for providing STCE training. It identifies the trainees and their needs; the instructors; and the timeline, scope, and resource requirements for the desired training approach. It is common to identify multiple training strategies, with one aimed at raising the general level of awareness and another aimed at developing expertise for STCE specialists.

- **Establishing a working group responsible for developing and implementing the training plan.** In addition to Customs training personnel, this working group should comprise representation from all major stakeholders and actors in the STCE Process, including targeters, risk analysts, inspectors, investigators, technical reachback personnel, and other relevant government agencies, such as licensing/permitting officials and investigators.
- **Integrating STCE training into an established training regimen.** Ultimately, for STCE training to be sustained, it must become a normal part of the Customs training program. Joint training with other governmental authorities who also have responsibilities in the STCE process can be an effective strategy.

This Guide can be used as a starting point to facilitate national implementation of STCE training, and it will become a part of the Compliance and Enforcement Package (CEP) Toolkit included in the WCO's capacity building and e-Learning offerings.<sup>59</sup>

### **2.3.3 Inspector Health and Safety**

Customs officers often face dangerous situations,<sup>60</sup> so their safety and security is a critical concern. In addition to the usual hazards, some strategic goods present unique risks. In the event the hazards discussed below are encountered at the border, communication and coordination with the counterpart Customs administration is important. It is a good practice to establish separate containment/storage facilities at Customs control points for hazardous materials.

#### **2.3.3.1 Toxic chemicals**

Toxic chemicals pose significant hazards to Customs personnel in the field. For each chemical, the associated Safety Data Sheet (SDS) will provide specific information regarding safe handling and storage. In general, it is good practice to ensure proper ventilation and store materials away from sun, heat sources, sparks, flames, and static electricity. Ensure all packages are labelled and check the integrity of containers.

In the event of a chemical leak or spill, secure and evacuate the area but do not attempt to control the leak or spill, which should only be done by properly trained and equipped personnel. Even attempting to rescue personnel in the spill area is extremely dangerous. Call hazardous material emergency responders and gather information on the chemical from placards, documents, and/or the driver. Try to stay upwind and uphill of the leak or spill.

#### **2.3.3.2 Infectious materials**

If a package containing a suspected biohazard is not intact (crushed or torn package, spillage of solids, leakage of liquids), the package should be isolated and not touched. Only trained persons with appropriate personal protective equipment (PPE) should handle or remove the package. Secure the area, leave the zone of direct danger, move upwind if outdoors, and initiate your biohazard response plan. Call upon specialists with PPE and appropriate training.

#### **2.3.3.3 Explosive Materials**

Explosive materials pose significant hazards to Customs officers. For each material, the associated SDS will provide specific information regarding safe handling and storage. In general, it is good practice to ensure good ventilation and store away from sun and heat sources, sparks, flames, and static electricity. Ensure all packages are labelled. Check the integrity of containers. Once these immediate safety and storage concerns are addressed, reach back to your hazardous material response personnel.

<sup>59</sup> <http://www.wcoomd.org/en/topics/key-issues/cep/instruments-and-tools.aspx>

<sup>60</sup> See COPES Section 9 (Security and Safety of Customs Personnel).

### 2.3.3.4 Radioactive Materials

The basic actions of first responders to radiological emergencies should not differ, in general, from those taken in response to emergencies involving other hazardous materials. According to the IAEA<sup>61</sup>, if the dose rate is above 0.1 millisieverts per hour at 1 metre, or neutron or surface contamination<sup>62</sup> is present, the suspected radioactive materials should be isolated and the scene cordoned off until specially-trained personnel arrive on the scene.

Radioactive materials present two hazards: external and internal. There are three primary methods to reduce external exposure to radiation: increase the distance from the source of the radiation, minimize the time of exposure, and shield the radiation source. In addition, internal exposure risk can be reduced by using respiratory protection (like a filter mask); not smoking, eating, or drinking where there are radioactive substances; and not handling radioactive materials with undressed wounds.

Even without radiation detection equipment, response personnel and the public can protect themselves by adhering to the following basic principles:

- Avoid touching suspected radioactive items;
- Perform only life-saving and other critical tasks near a potentially dangerous radioactive source;
- Avoid smoke or use available respiratory protection equipment (for response personnel) within 100 meters of a fire or explosion involving a potentially dangerous radioactive source;
- Keep hands away from the mouth and do not smoke, eat, or drink until your hands and face are washed; and
- Change clothes and shower as soon as possible.

The possible presence of radioactive material should not prevent emergency services personnel from immediately performing life-saving and other critical actions.

### 2.3.4 Transportation, Storage, and Disposition of Seized Goods<sup>63</sup>

The range of disposition options open to Customs officials when dealing with strategic goods should be very wide. Unlike inherently illicit goods such as narcotics or counterfeit materials, strategic goods often have completely legitimate commercial industrial purposes, meaning that destruction may not be the best choice for these items. Common disposition options which WCO Members should consider include:

- **Return to a party with a legal interest in the property.** The private sector entity from which the material was seized might not be the only entity which has a valid claim on the good. If another innocent party has a valid claim on the goods, and is found to not be complicit with any attempt to illicitly transfer the materials, Customs could return the materials to that party.
- **The sale of goods with proceeds deposited into fund for government use.** Given the strategic nature of these goods, the government should ensure that the purchasing party is a trustworthy user with a valid commercial purpose for the materials. It is a good practice to notify the purchaser of any restrictions on their ability to resell or export the goods.
- **Retention of property for official government use.** Storage of goods can be costly, and in the case of hazardous goods, compatibility and segregation issues must be considered.
- **International asset sharing.** Through existing arrangements and agreements such as Mutual Legal Assistance Treaties, the transfer of seized property or the proceeds of sale of such property could occur. In this option, a government could share such goods or proceeds with a foreign government for purposes including the use of those goods at a trial or to offset an international partner's costs related to conducting a seizure.

<sup>61</sup> IAEA Nuclear Security Series No.6, Combating Illicit Trafficking in Nuclear and other Radioactive Material.

<sup>62</sup> Contamination refers to radioactive materials deposited at undesirable locations such as the ground, skin, or clothing. It can come from an unsealed or breached source.

<sup>63</sup> The issues summarized in this section are considered in detail in COPES, sections 3.2 and 3.3.

### **2.3.5      *International Notification***

As shown in Figure 2, notification may follow release or seizure of goods. Notification following release may be appropriate if a shipment of concern is identified through targeting too late to complete Customs controls prior to release. If the goods are already in transit and a violation is suspected, it may be possible to notify Customs in a downstream transit, transhipment, or destination country to request their assistance. Similarly, if goods are seized due to concerns about an entity in a destination country, it may be appropriate to notify the Customs administrations in that country to inform their risk analysis process.

In some cases, United Nations Security Council Resolutions (UNSCRs) have specific reporting requirements. For example, UNSCR 1929 (2010) paragraph 17 “requires any State, when it undertakes an inspection pursuant to paragraphs 14 or 15 [of the Resolution] to submit to the Committee within five working days an initial written report containing, in particular, explanation of the grounds for the inspections, the results of such inspections and whether or not cooperation was provided, and, if items prohibited for transfer are found, further requires such States to submit to the Committee, at a later stage, a subsequent written report containing relevant details on the inspection, seizure and disposal, and relevant details of the transfer, including a description of the items, their origin and intended destination, if this information is not in the initial report.” Such requirements are discussed further in section 1.1.2.2.

## **2.4      *Other Government Agency (OGA) Functions***

### **2.4.1      *STC Licensing/Permitting***

Typically, a licensing or permitting agency, rather than Customs, has jurisdiction to determine what goods require authorization and whether or not such authorization will be given. As a result, STC laws and regulations are typically enforced by Customs on behalf of that other agency, creating information dependencies between them. Communications from Customs to the licensing/permitting agency may include requests for determination whether goods in trade require licences or permits, information about the actual use of licences by authorized traders, and identification of traders who deal with strategic goods (who may be candidates for outreach or more aggressive targeting). Communications from the licensing/permitting agency to Customs may include licence/permit authorizations, denials, invoked catch-all, identification of consignees of concern, and information about commodities of strategic interest, all of which may inform risk assessment and targeting efforts, as well as audit. Ideally, Customs should have access to the licensing/permitting data system to access licensing history for a trader, item ratings advice provided to the trader, etc. These communications are greatly facilitated when Customs is a part of the interministerial licensing process.

### **2.4.2      *Intelligence***

The WCO’s Risk Management Compendium defines intelligence as “a product, derived from the collection and processing of relevant information, which acts as a basis for user decision-making.” At the operational level, a modern risk-based compliance management approach is increasingly enabled by intelligence support, bringing together information and knowledge learned by Customs with a systematic approach for identifying and targeting risks of greatest consequence. Customs intelligence can lead to better risk assessment, better allocation of human resources and technical capabilities, and the identification and dismantling of transnational criminal organizations that impact economies worldwide through illicit trade, smuggling, and trafficking of all types. However, criminal activity is adaptive, so diligence is necessary to identify new trends and patterns as they evolve over time.

Officers tasked with evaluating and processing information remain the critical point of success or failure in the pursuit of credible and reliable intelligence to inform front-line interdiction activities. There are three levels of intelligence development to pursue:

- **Strategic-level** products ensure that senior management is aware of developments that may affect policy determinations and the allocation of financial, physical or human resource. Strategic intelligence relates to long-term threats and trends.
- **Operational-level** products should focus on identified individuals or organizations, emphasizing

modus operandi, capabilities, vulnerabilities, and trafficking routes. This information may directly contribute to development of risk profiles for targeting.

- **Tactical-level** intelligence products provide more immediate support to field staff regarding immediate threats that require a prompt response. Tactical intelligence is aimed at detecting and apprehending individuals or groups with the specific aim of curtailing illegal activities. Tactical intelligence may result in detaining a particular shipment, executing a search warrant, or arresting an offender.

The WCO's Basic Customs Intelligence Course<sup>64</sup> provides members with training in analytical best practices for processing real-time information or predictive assessments. In addition, Volume 2 of the Risk Management Compendium elaborates the WCO Global Information and Intelligence Strategy, explores how intelligence products are produced and used to strengthen the central role of Customs services in the enforcement of legislation involving the cross-frontier movements of goods.

### **2.4.3      Investigation**

Although Customs agencies typically would not handle investigations themselves, investigation is a core STCE process and so it was discussed in section 2.2.6. Nevertheless, establishing protocols and mechanisms for information sharing between Customs and the investigative agency is critical to sharing "Customs information" and case documents.

#### **Case Study – United States**

The Enforcement Coordination Center (E2C2) was established to coordinate and enhance criminal, administrative, and related export enforcement activities. The E2C2 is a multi-agency center with representation from eight U.S. government departments and fifteen federal agencies. It promotes a more robust whole-of-government approach to enforcement that ensures inter-agency coordination, promotes multi-agency collaboration, maximizes information sharing, minimizes duplication of efforts and strengthens the link between law enforcement, the intelligence community, and export licensing entities.

## **Summary**

This implementation guide describes a framework for enforcing STC to assist WCO Members in the development and review of their STCE processes and procedures. The first section is intended to assist senior managers and policy officials to establish STCE procedures and processes and create conditions for their success. The second section is intended to assist operational Customs officers to carry out those activities. The following Annexes provide additional information as referenced in the text.

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<sup>64</sup> The WCO has developed a comprehensive two-week intelligence analyst training package for members. This package will assist members who are endeavouring to modernize their risk management practices by building an intelligence capacity and capability within their administration. Equally, the package will also assist administrations who wish to have a structured intelligence training curriculum as an added resource to their existing national intelligence programs.

## Annex I – Non-proliferation Commitments by WCO Members

The following table summarizes the status, as of March 2019, of WCO Members with respect to the non-proliferation and trade control commitments discussed in Section 1.1.2.

WCO MEMBER	UN	NPT	CWC	BWC	HCOC	ATT	NSG	AG	MTCR	WA	PSI
Afghanistan (Islamic Republic of)	Yes	Yes	Yes	Yes	Yes						Yes
Albania	Yes	Yes	Yes	Yes	Yes	Yes					Yes
Algeria	Yes	Yes	Yes	Yes							
Andorra	Yes	Yes	Yes	Yes	Yes						Yes
Angola	Yes	Yes	Yes	Yes							Yes
Antigua and Barbuda	Yes	Yes	Yes	Yes	Yes	Yes					Yes
Argentina	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	OEG
Armenia	Yes	Yes	Yes	Yes	Yes						Yes
Australia	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	OEG
Austria	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Azerbaijan	Yes	Yes	Yes	Yes	Yes						Yes
Bahamas	Yes	Yes	Yes	Yes		Yes					Yes
Bahrain	Yes	Yes	Yes	Yes							Yes
Bangladesh	Yes	Yes	Yes	Yes							
Barbados	Yes	Yes	Yes	Yes		Yes					
Belarus	Yes	Yes	Yes	Yes	Yes		Yes				Yes
Belgium	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Belize	Yes	Yes	Yes	Yes		Yes					Yes
Benin	Yes	Yes	Yes	Yes	Yes	Yes					
Bermuda	E	E	E	E							
Bhutan	Yes	Yes	Yes	Yes							
Bolivia	Yes	Yes	Yes	Yes							
Bosnia and Herzegovina	Yes	Yes	Yes	Yes	Yes	Yes					Yes
Botswana	Yes	Yes	Yes	Yes							
Brazil	Yes	Yes	Yes	Yes		Yes	Yes		Yes		
Brunei Darussalam	Yes	Yes	Yes	Yes							Yes
Bulgaria	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Burkina Faso	Yes	Yes	Yes	Yes	Yes	Yes					
Burundi	Yes	Yes	Yes	Yes	Yes	S					
Cambodia	Yes	Yes	Yes	Yes	Yes	S					Yes
Cameroon	Yes	Yes	Yes	Yes	Yes	Yes					
Canada	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	OEG
Cape Verde	Yes	Yes	Yes	Yes	Yes	Yes					
Central African Republic	Yes	Yes	Yes	Yes	Yes	Yes					

WCO MEMBER	UN	NPT	CWC	BWC	HCOC	ATT	NSG	AG	MTCR	WA	PSI
<b>Chad</b>	Yes	Yes	Yes		Yes	Yes					
<b>Chile</b>	Yes	Yes	Yes	Yes	Yes	Yes					Yes
<b>China</b>	Yes	Yes	Yes	Yes			Yes				
<b>Colombia</b>	Yes	Yes	Yes	Yes	Yes	S					Yes
<b>Comoros</b>	Yes	Yes	Yes		Yes	S					
<b>Congo (Republic of the)</b>	Yes	Yes	Yes	Yes	Yes	S					
<b>Costa Rica</b>	Yes	Yes	Yes	Yes	Yes	Yes					
<b>Côte d'Ivoire</b>	Yes	Yes	Yes	Yes		Yes					
<b>Croatia</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes
<b>Cuba</b>	Yes	Yes	Yes	Yes							
<b>Curaçao</b>	E	E	E	E							
<b>Cyprus</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes
<b>Czech Republic</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>Democratic Republic of the Congo</b>	Yes	Yes	Yes	Yes							
<b>Denmark</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	OEG
<b>Djibouti</b>	Yes	Yes	Yes			S					Yes
<b>Dominican Republic</b>	Yes	Yes	Yes	Yes	Yes	Yes					Yes
<b>Ecuador</b>	Yes	Yes	Yes	Yes	Yes						
<b>Egypt</b>	Yes	Yes		S							
<b>El Salvador</b>	Yes	Yes	Yes	Yes	Yes	Yes					Yes
<b>Eritrea</b>	Yes	Yes	Yes		Yes						
<b>Estonia</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes
<b>Eswatini</b>	Yes	Yes	Yes	Yes							
<b>Ethiopia</b>	Yes	Yes	Yes	Yes	Yes						
<b>European Union*</b>							Yes				
<b>Fiji</b>	Yes	Yes	Yes	Yes	Yes						Yes
<b>Finland</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>France</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	OEG
<b>Gabon</b>	Yes	Yes	Yes	Yes	Yes	S					
<b>Gambia</b>	Yes	Yes	Yes	Yes	Yes						
<b>Georgia</b>	Yes	Yes	Yes	Yes	Yes	Yes					Yes
<b>Germany</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	OEG
<b>Ghana</b>	Yes	Yes	Yes	Yes	Yes	Yes					
<b>Greece</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	OEG
<b>Guatemala</b>	Yes	Yes	Yes	Yes	Yes	Yes					
<b>Guinea</b>	Yes	Yes	Yes	Yes	Yes	Yes					
<b>Guinea-Bissau</b>	Yes	Yes	Yes	Yes	Yes	Yes					
<b>Guyana</b>	Yes	Yes	Yes	Yes	Yes	Yes					

WCO MEMBER	UN	NPT	CWC	BWC	HCOC	ATT	NSG	AG	MTCR	WA	PSI
Haiti	Yes	Yes	Yes	S	Yes	S					
Honduras	Yes	Yes	Yes	Yes	Yes	Yes					Yes
Hong Kong, China	E	IF	IF	IF							
Hungary	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Iceland	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes
India	Yes		Yes	Yes			Yes	Yes		Yes	
Indonesia	Yes	Yes	Yes	Yes							
Iran (Islamic Republic of)	Yes	Yes	Yes	Yes							
Iraq	Yes	Yes	Yes	Yes	Yes						Yes
Ireland	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Israel	Yes		S			S					Yes
Italy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	OEG
Jamaica	Yes	Yes	Yes	Yes		Yes					
Japan	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	OEG
Jordan	Yes	Yes	Yes	Yes	Yes						Yes
Kazakhstan	Yes	Yes	Yes	Yes	Yes	Yes	Yes				Yes
Kenya	Yes	Yes	Yes	Yes	Yes						
Korea (Republic of)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	OEG
Kosovo											
Kuwait	Yes	Yes	Yes	Yes							Yes
Kyrgyzstan	Yes	Yes	Yes	Yes							Yes
Lao People's Democratic Republic	Yes	Yes	Yes	Yes							
Latvia	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes
Lebanon	Yes	Yes	Yes	Yes		S					
Lesotho	Yes	Yes	Yes	Yes	Yes	Yes					
Liberia	Yes	Yes	Yes	Yes	Yes	Yes					Yes
Libya	Yes	Yes	Yes	Yes	Yes	S					Yes
Lithuania	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes
Luxembourg	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macau, China	E	IF	IF	IF							
Madagascar	Yes	Yes	Yes	Yes	Yes	Yes					
Malawi	Yes	Yes	Yes	Yes	Yes	S					
Malaysia	Yes	Yes	Yes	Yes		S					Yes
Maldives	Yes	Yes	Yes	Yes	Yes						
Mali	Yes	Yes	Yes	Yes	Yes	Yes					
Malta	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes
Mauritania	Yes	Yes	Yes	Yes	Yes	Yes					
Mauritius	Yes	Yes	Yes	Yes		Yes					

WCO MEMBER	UN	NPT	CWC	BWC	HCOC	ATT	NSG	AG	MTCR	WA	PSI
<b>Mexico</b>	Yes	Yes	Yes	Yes		Yes	Yes	Yes		Yes	
<b>Moldova</b>	Yes	Yes	Yes	Yes	Yes	Yes					Yes
<b>Mongolia</b>	Yes	Yes	Yes	Yes	Yes	S					Yes
<b>Montenegro</b>	Yes	Yes	Yes	Yes	Yes	Yes					Yes
<b>Morocco</b>	Yes	Yes	Yes	Yes	Yes						Yes
<b>Mozambique</b>	Yes	Yes	Yes	Yes	Yes	Yes					
<b>Namibia</b>	Yes	Yes	Yes			S					
<b>Nepal</b>	Yes	Yes	Yes	Yes							
<b>Netherlands</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	OEG
<b>New Zealand</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	OEG
<b>Nicaragua</b>	Yes	Yes	Yes	Yes	Yes						
<b>Niger</b>	Yes	Yes	Yes	Yes	Yes	Yes					
<b>Nigeria</b>	Yes	Yes	Yes	Yes	Yes	Yes					
<b>North Macedonia</b>	Yes	Yes	Yes	Yes	Yes	Yes					Yes
<b>Norway</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	OEG
<b>Oman</b>	Yes	Yes	Yes	Yes							Yes
<b>Pakistan</b>	Yes		Yes	Yes							
<b>Palestine</b>		Yes	Yes	Yes		Yes					
<b>Panama</b>	Yes	Yes	Yes	Yes	Yes	Yes					Yes
<b>Papua New Guinea</b>	Yes	Yes	Yes	Yes	Yes						Yes
<b>Paraguay</b>	Yes	Yes	Yes	Yes	Yes	Yes					Yes
<b>Peru</b>	Yes	Yes	Yes	Yes	Yes	Yes					
<b>Philippines</b>	Yes	Yes	Yes	Yes	Yes	S					Yes
<b>Poland</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	OEG
<b>Portugal</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	OEG
<b>Qatar</b>	Yes	Yes	Yes	Yes							Yes
<b>Romania</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes
<b>Russian Federation</b>	Yes	Yes	Yes	Yes	Yes		Yes		Yes	Yes	OEG
<b>Rwanda</b>	Yes	Yes	Yes	Yes	Yes	S					
<b>Saint Lucia</b>	Yes	Yes	Yes	Yes		Yes					Yes
<b>Samoa</b>	Yes	Yes	Yes		Yes	Yes					Yes
<b>Sao Tome and Principe</b>	Yes	Yes	Yes	Yes		S					
<b>Saudi Arabia</b>	Yes	Yes	Yes	Yes							Yes
<b>Senegal</b>	Yes	Yes	Yes	Yes	Yes	Yes					
<b>Serbia</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes				Yes
<b>Seychelles</b>	Yes	Yes	Yes	Yes	Yes	Yes					
<b>Sierra Leone</b>	Yes	Yes	Yes	Yes	Yes	Yes					
<b>Singapore</b>	Yes	Yes	Yes	Yes	Yes	S					OEG
<b>Slovakia</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

WCO MEMBER	UN	NPT	CWC	BWC	HCOC	ATT	NSG	AG	MTCR	WA	PSI
Slovenia	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes
Somalia	Yes	Yes	Yes	S							
South Africa	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
South Sudan	Yes										
Spain	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	OEG
Sri Lanka	Yes	Yes	Yes	Yes							Yes
Sudan	Yes	Yes	Yes	Yes	Yes						
Sweden	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Switzerland	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Syrian Arab Republic	Yes	Yes	Yes	S							
Tajikistan	Yes	Yes	Yes	Yes	Yes						Yes
Tanzania	Yes	Yes	Yes	S	Yes	S					
Thailand	Yes	Yes	Yes	Yes		S					Yes
Timor-Leste	Yes	Yes	Yes	Yes	Yes						
Togo	Yes	Yes	Yes	Yes		Yes					
Tonga	Yes	Yes	Yes	Yes	Yes						
Trinidad and Tobago	Yes	Yes	Yes	Yes		Yes					Yes
Tunisia	Yes	Yes	Yes	Yes	Yes						Yes
Turkey	Yes	Yes	Yes	Yes	Yes	S	Yes	Yes	Yes	Yes	OEG
Turkmenistan	Yes	Yes	Yes	Yes	Yes						Yes
Uganda	Yes	Yes	Yes	Yes	Yes						
Ukraine	Yes	Yes	Yes	Yes	Yes	S	Yes	Yes	Yes	Yes	Yes
Union of Myanmar (Republic of the)	Yes	Yes	Yes	Yes							
United Arab Emirates	Yes	Yes	Yes	Yes		S					Yes
United Kingdom	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	OEG
United States	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	OEG
Uruguay	Yes	Yes	Yes	Yes	Yes	Yes					
Uzbekistan	Yes	Yes	Yes	Yes	Yes						Yes
Vanuatu	Yes	Yes	Yes	Yes	Yes	S					Yes
Venezuela	Yes	Yes	Yes	Yes	Yes						
Vietnam	Yes	Yes	Yes	Yes							Yes
Yemen	Yes	Yes	Yes	Yes							Yes
Zambia	Yes	Yes	Yes	Yes	Yes	Yes					
Zimbabwe	Yes	Yes	Yes	Yes		S					

\* Status akin to WCO membership

AG = Australia Group

ATT = Arms Trade Treaty

BWC = Biological Weapons Convention

CWC = Chemical Weapons Convention  
E = Ratification Extended  
HCOC = Hague Code of Conduct against Ballistic Missile Proliferation  
IF = In Force through China's agreements  
MTCR = Missile Technology Control Regime  
NPT = Nuclear Non-Proliferation Treaty  
NSG = Nuclear Suppliers Group  
OEG = PSI Operational Experts Group  
PSI = Proliferation Security Initiative  
R = Ratified  
RKC = Revised Kyoto Convention  
S = Signed  
UN = United Nations  
WA = Wassenaar Arrangement

## Annex II – Importance of Strategic Goods to the Development of Weapons of Mass Destruction (WMD)

This Annex provides short overviews of the development processes for various WMD and indicates the related strategic goods used in those processes. The goods are then detailed in [Annex III](#), which is organized according to the Harmonized System.

### 2.5 Chemical Weapons Development and Related Strategic Goods

#### 2.5.1 Introduction

Chemical weapons (CW) are designed to inflict injury such as choking, blistering, or nervous system malfunction through chemical reactions. CW agents are the toxic chemical substances dispersed by CW delivery systems. Choking agents (such as chlorine and phosgene) irritate the lungs, causing them to fill with liquid. Blood agents (such as cyanide and arsenic compounds) prevent oxygen from being transferred from the blood to body tissues. Blister agents (such as “mustard gas”) cause painful blisters on the skin, eyes, and other moist tissues like the lungs. Nerve agents (such as Sarin, Soman, Tabun, or VX), the most sophisticated and toxic CW agents, disrupt the nervous system to cause seizures, paralysis, and death.

Figure 3 illustrates the development process for CW, starting with chemical raw materials (precursors) and ending with filled delivery systems and, eventually, waste destruction. The following sections describe the processes involved and the type of strategic materials and equipment used in those processes. Most of the chemicals and equipment used in these processes are dual-use with legitimate commercial uses.

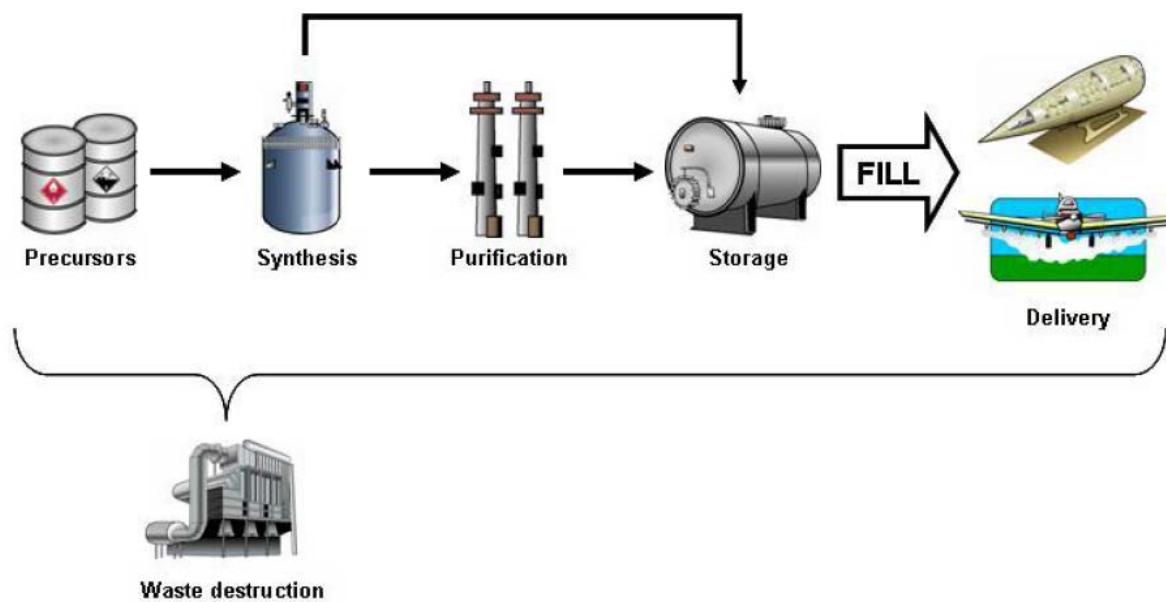


Figure 3 – CW Development Process

#### 2.5.2 Precursors

Chemical weapons precursors are the chemical starting materials, or “ingredients” from which CW agents are prepared. Nearly all CW precursors are dual-use chemicals, although the extent of their commercial use varies. CW programs often seek to purchase these precursor chemicals from international commercial suppliers.

Many of these chemicals are corrosive to common materials like stainless steel and also highly toxic. These characteristics make especially corrosion-resistant chemical equipment with various safety features suitable for CW production, so such equipment is considered strategic.

### **2.5.3      *Synthesis***

Chemical synthesis involves mixing chemicals under controlled conditions to facilitate a chemical reaction to produce other chemicals. This is the step in which a CW agent is actually produced by reacting precursor chemicals together, often through a multi-step process. In addition to synthesizing the desired chemicals, the mixture will often contain unreacted precursors and unwanted chemical byproducts. Chemical equipment used in synthesis must contain the reacting chemicals and provide for control of reaction parameters such as temperature, pressure, and mixing. Key pieces of chemical equipment relevant to the synthesis stage of CW development include reaction vessels (reactors), agitators, and heat exchangers, all of which should have corrosion-resistant wetted surfaces.

### **2.5.4      *Purification***

When the synthesis step is finished, purification removes unreacted precursors and undesired byproduct chemicals and concentrates the CW agent. Among the most common methods for accomplishing this are distillation, extraction, chromatography, and absorption. Other methods used in the chemical industry to purify or isolate chemical compounds include crystallization, filtration, evaporation, and drying. Key pieces of strategic equipment include distillation and absorption columns.

### **2.5.5      *Transfer and Storage***

When handling CW agents or any dangerous substances, transfer and storage operations must take into account the hazardous nature of the chemicals involved. Therefore, while the general types of equipment that are needed to transfer and store chemicals are ubiquitous throughout the chemical industry, equipment subject to trade controls has special features related to the hazards posed by CW precursors and agents – namely toxicity and corrosiveness. These design features include corrosion-resistant chemical contact surfaces and provisions for remote operation or leak containment. Equipment such as pumps, valves, storage tanks, and multi-walled piping are used throughout CW development and production to facilitate the movement and storage of chemicals. Furthermore, remotely-operated filling equipment could be used to fill delivery systems with CW agents as well as safely filling other types of containers.

### **2.5.6      *Waste Destruction***

With respect to CW, waste destruction can refer to the destruction of chemicals (precursors or agents) as well as munitions. The most widely-used method of waste destruction is high-temperature incineration.

## **2.6      *Biological Weapons Development and Related Strategic Goods***

### **2.6.1      *Introduction***

Biological weapons (BW) are designed to employ microorganisms or toxins to deliberately cause disease in humans, livestock, or crops. BW agents are living microorganisms such as bacteria, viruses, or fungi that are pathogenic to humans, plants, or animals. Toxins are highly poisonous chemicals produced by living organisms. Pathogenic bacteria include Anthrax, Plague, and Brucellosis. Viruses include Small Pox, Ebola, and “Foot and Mouth” disease (FMD). Fungi (such as Wheat Stem Rust, Rice Blast, and Rice Brown Spot) are multi-celled organisms that often cause disease in plant crops. Toxins include Ricin, Botulinum Toxin, and T-2 Toxin. While most microorganisms in the environment are not harmful, some are especially dangerous, causing lethal or severely debilitating diseases to humans, animals, or plants. Some of these diseases can be treated, but for others there are no preventative or treatment measures available.

Figure 4 illustrates the BW development process, beginning with an inoculum (starter culture) of a specific agent and ending with product deliverable to a target population. The following sections describe

the processes involved and the type of strategic materials and equipment used in those processes.

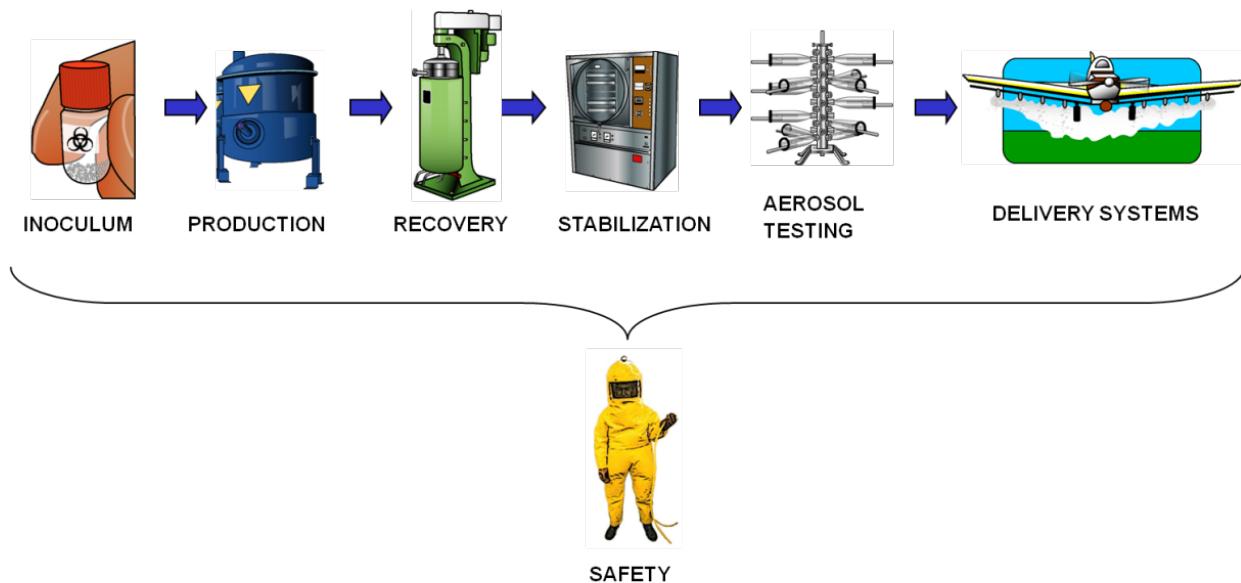


Figure 4 – BW Development Process

### 2.6.2 *The Inoculum*

The inoculum is a relatively small sample of a specific agent that is used to produce a larger quantity of that agent or the toxin produced by it. [Agents and toxins](#) can be obtained from a variety of sources and are dual-use materials. The same agents used by state programs or terrorists to produce a biological weapon may also be employed by the pharmaceutical industry to create vaccines or to study the effectiveness of experimental drugs. Culture collections maintained by academic and for-profit research institutes frequently possess organisms of weapons concern and provide them to other academic and for-profit organizations. Some organisms can also be found in contaminated soil or water, or they could be isolated from sick patients in a hospital or from sick animals.

The process begins by placing the inoculum into a small quantity of nutritional media and allowing the microorganism to grow to a predetermined concentration. Those microorganisms are then used to inoculate a larger quantity of media in the production phase.

### 2.6.3 *Production*

The production of any agent involves the growth of the microorganism under carefully controlled conditions. Bacteria and fungi are typically grown in fermenters or bioreactors. Viruses can be produced in cell culture bioreactors which have properties optimal for the culture of host cells necessary for viral reproduction. Viruses can also be produced in large quantities using embryonated eggs, each of which must be inoculated with virus.

### 2.6.4 *Product Recovery*

When agents grow to substantial quantities, the agent or the toxin it produces must be separated and concentrated from the growth media for further processing. These processes use equipment such as centrifugal separators and decanters (which differentiate materials by density) or specialized filters (which discriminate particles by size).

### 2.6.5 *Stabilization*

When exposed to environmental stresses and prolonged storage, biological agents and toxins can gradually degrade and lose their potency. Several methods are available to stabilize agents against environmental degradation during storage or dissemination. These include freeze-drying, spray drying,

deep freezing, or other types of processing.

### **2.6.6      *Aerosol Testing***

Following production, purification, and stabilization of a biological agent or toxin, testing may be used to assess its effectiveness as a weapon. Microorganisms and toxins in the form of dry powders or wet mists can be tested by exposing animals to the aerosolized material. In the laboratory, aerosol inhalation chambers deliver biological agents to research animals under controlled conditions.

### **2.6.7      *Delivery Systems***

Dissemination of biological weapons could occur in multiple ways using commonly available equipment. For example, agricultural sprayers used to spread pesticides on crops in the form of a dense mist of very small droplets could be used to spread biological agents. Personal portable agricultural sprayers can be very effective in dispersing high concentrations of biological agents in small spaces, while pesticide sprayers mounted on airplanes, helicopters, or unmanned aerial vehicles (UAVs) could disperse biological agents over a large area. Droplets with diameters of 10 microns or less are considered an ideal size for intake into human lungs.

## **2.7      *Radiological Weapons Development and Related Strategic Goods***

### **2.7.1      *Introduction***

A radiological weapon (RW) is a device designed or intended to endanger human life or elicit mass effect through the release of radiation or radioactivity. A radiological exposure device (RED) emits radiation, while a radiological dispersal device (RDD) disperses radioactive materials over an area to contaminate land, buildings, and people. REDs and RDDs do not produce nuclear detonations, but radiation and radioactive materials can have a significant psychological impact on exposed population and can deny use of facilities and areas at high economic cost and hamper emergency response. The key ingredient for a radiological weapon is a radioactive material.

### **2.7.2      *Sources of Radioactive Materials***

Radiation sources are used throughout the world for a wide variety of peaceful purposes in industry, medicine, research, and education. Many of these are in the form of sealed sources with radioactive materials contained within a capsule or housing. Although dozens of radionuclides are used, only a small number are in concentrated amounts or sufficiently available to be potentially used in RW.

The International Atomic Energy Agency (IAEA) has developed a technical document categorizing radioactive sources based on their potential to cause harm to human health.<sup>65</sup> In particular, common practices using radioactive sources are assigned to one of five categories, with Category 1 using sources that pose the greatest potential to cause harm to human health and Category 5 posing the least risk, summarized as shown in Table 2. This gives a good indication, particularly categories one to three, of the potential sources of radioactive materials that could be used in a RW. Isotopes of particular interest for use in RW are listed in [Annex III](#) under [HS Heading 28.44](#).

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<sup>65</sup> IAEA TecDoc 1344, <http://hps.org/documents/IAEATecDoc1344.pdf>

**Table 2**

<b>Category</b>	<b>Common Practices</b>
1	Radioisotope thermoelectric generators (RTGs) Irradiators Teletherapy
2	Industrial gamma radiography High/medium dose rate brachytherapy
3	Industrial gauges Well logging gauges
4	Low dose rate brachytherapy (except eye plaques and permanent implant sources) Thickness/fill-level gauges Portable gauges (e.g. moisture/density gauges) Bone densitometers Static eliminators
5	Low dose rate brachytherapy eye plaques and permanent implant sources X ray fluorescence devices Electron capture devices Mossbauer spectrometry Positron Emission Tomography (PET)

### **2.7.3      *Delivery Mechanisms***

Explosive RDDs (or dirty bombs) use the explosive force of detonation to disperse radioactive material. Radioactive material could also be dispersed in powder or aerosolized forms, potentially by aircraft sprayers or even manually.

A RED could simply be placed in a densely populated area, exposing people who come near to it to radiation.

## **2.8      *Nuclear Weapons Development and Related Strategic Goods***

### **2.8.1      *Introduction***

Nuclear weapons (NW) are designed to cause mass destruction through the explosive release of nuclear energy. Nuclear weapons, even advanced thermonuclear weapons, depend on nuclear fission, which in turn depends on fissile materials such as uranium (U) 235 or plutonium (Pu) 239. A nuclear weapons program comprises the production of fissile material and subsequent creation of a nuclear weapon using that material (weaponization). In addition, extensive testing is needed for sophisticated weapons.

Figure 5 illustrates the nuclear weapon development process, starting with uranium mining and finishing with a deliverable nuclear weapon. Two fundamental pathways are shown, one for the production of highly-enriched uranium (HEU) and one for production of plutonium.

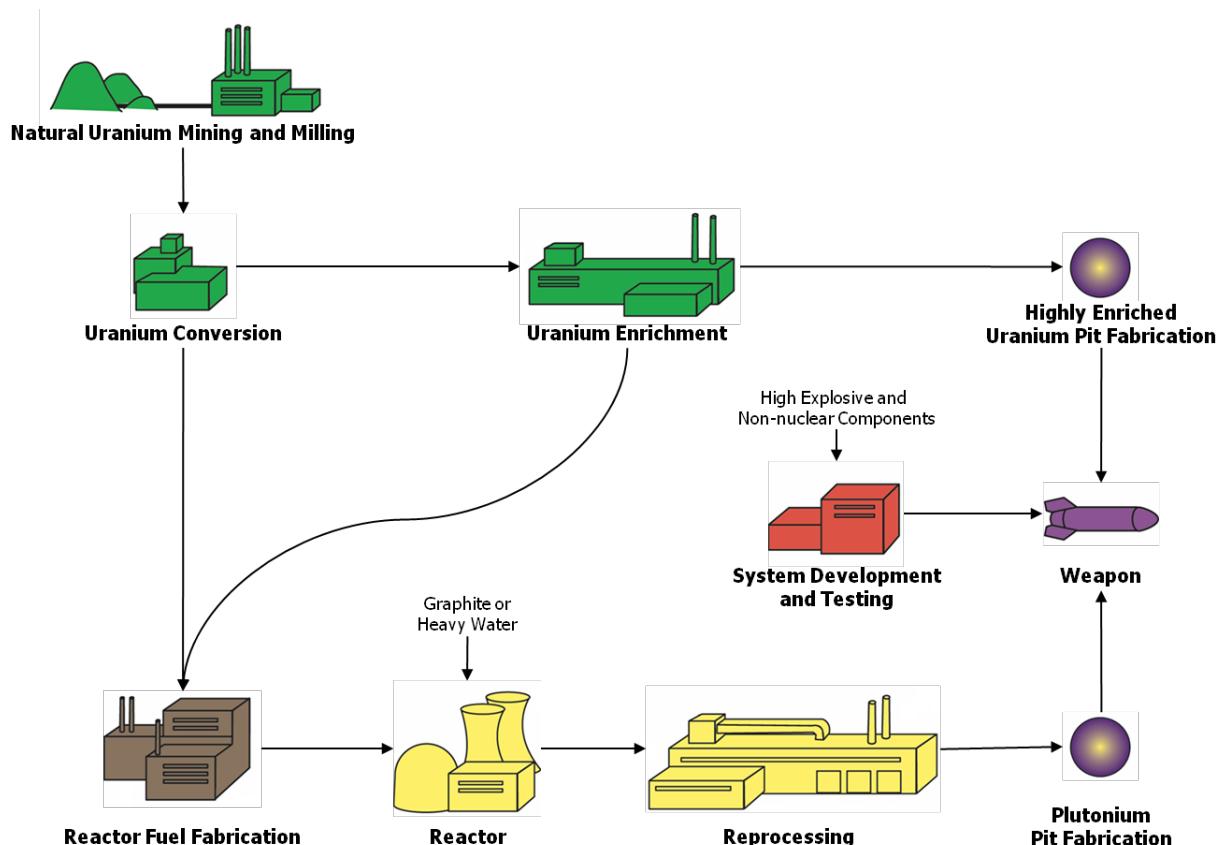


Figure 5 – NW Development Process

### 2.8.2 Uranium Production

Production of HEU<sup>66</sup> begins with mining of [uranium ore](#). This natural uranium comprises primarily U238, together with a small percentage (~0.7%) of the fissile isotope U235. The ore is then milled, typically at or close to the uranium mine to reduce the volume. The product of the uranium mill is called uranium ore concentrate (UOC) or “yellowcake”.

UOC from the mill is then sent to a conversion facility where it is chemically converted into a chemical form of uranium that can be enriched. Typically this form is uranium hexafluoride ( $\text{UF}_6$ ), but other forms are possible depending on the enrichment process that will be used.

The product of the uranium conversion plant is then sent to an enrichment facility where the concentration of U235 is increased. Uranium enrichment is one of the most challenging steps in the nuclear fuel cycle and relies on many strategic goods. For example, the gas centrifuge uranium enrichment process, which is the most widely used process today, relies on a high-speed spinning rotor tube to produce the high centrifugal forces needed to separate U235 and U238. These tubes require special materials that are light-weight, strong, and corrosion resistant (such as [aluminium alloys](#), [maraging steel](#), or [carbon fibre](#)) and special manufacturing equipment (such as filament winding machines and flow forming machines) and highly-accurate balancing equipment. Operating a gas centrifuge facility consisting of thousands of the gas centrifuge machines requires special power supplies (known as frequency changers), as well as vacuum equipment and process control systems compatible with highly-corrosive  $\text{UF}_6$  (such as pressure transducers and mass spectrometers).

<sup>66</sup> This section described the production of uranium enriched in U235, but the production of U233 is also possible, starting with thorium in a process very similar to the process for producing Pu239 in nuclear reactors.

For use in a NW program, uranium would typically be enriched to around 90% U235. In addition, another conversion process would likely be used to convert the enriched UF<sub>6</sub> to a metallic form.

### **2.8.3 Plutonium Production**

While many commercial nuclear reactors in the world use uranium that is slightly enriched (typically between 2% and 5% U235), NW programs would likely use natural uranium (unenriched) in special [heavy water](#) or [graphite](#) reactors. As a result, UOC from the uranium mill would not need to be enriched. Instead, it would be converted and fabricated directly into a metallic or oxide form for insertion into a nuclear reactor as fuel or as a target material. While in the reactor, nuclear reactions transform U238 into Pu239, which can be used in nuclear weapons.

The irradiated fuel is then removed from the reactor and taken to a reprocessing plant, where the fissile material can be separated from nuclear waste and other unwanted materials. Because the nuclear waste is so highly radioactive, reprocessing facilities employ extensive radiation shielding and equipment designed for working in “hot cells”, such as remote manipulators, radiation-shielding windows, and radiation-hardened cameras.

As with uranium, the fissile product would typically be converted to metallic form for a NW program.

### **2.8.4 Weaponization and testing**

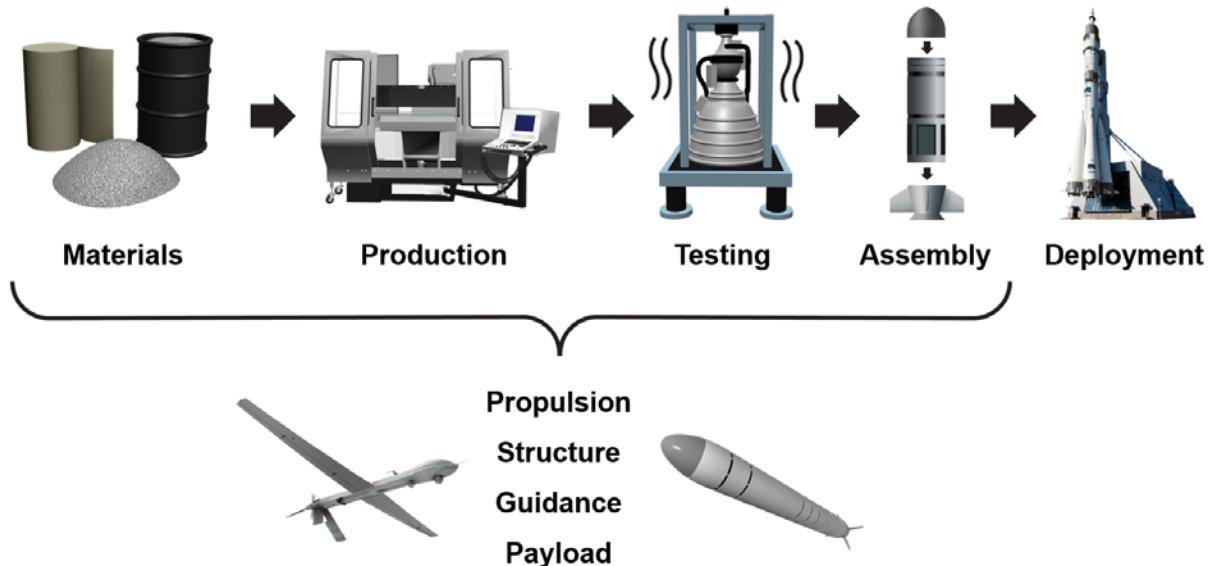
Producing a nuclear weapon from weapons-useable nuclear materials (e.g., U235, Pu239, or U233) requires a great deal of additional strategic materials, equipment, and technology. The weaponization process consists of fabricating nuclear weapons components (using equipment like vacuum induction furnaces, highly-accurate machine tools, and isostatic presses, as well as special materials like beryllium and tungsten) and developing the detonation system (using special electronic components like pulse-discharge capacitors, high-speed switches, and detonators, as well as specially-formulated high-explosive materials). Testing employs additional strategic items, such as high-speed cameras, flash x-ray machines, and other specialized instrumentation.

## **2.9 Delivery System Development and Related Strategic Goods**

### **2.9.1 Introduction**

Missiles are very effective means to deliver chemical, biological, nuclear, radiological, or other weapons to a target. Complete missiles are obviously strategic, but so also are the missile subsystems, components, materials, and equipment needed for their development, production, and testing. Missiles are broadly defined as airborne, unmanned, self-propelled vehicles for delivering a payload. This definition covers not only ballistic missiles, but also cruise missiles and unmanned aerial vehicles (UAV). UAVs have significantly proliferated in recent years, progressing from military origins to law enforcement applications and increasingly also to commercial applications.

Figure 6 illustrates a delivery system development program, which is a process of integrating development and testing of several key subsystems.



**Figure 6 – Delivery System Development**

### 2.9.2 *Propulsion*

To propel a missile, fuel and oxidizer chemicals are mixed and combusted together and the hot gases produced by this reaction are directed so as to produce thrust. Propulsion systems for missiles fall into two general categories depending on whether they use solid or liquid propellants. Liquid propellants are relatively simple, albeit highly flammable and corrosive, but solid propellants are very complex to formulate and manufacture, requiring many propellant chemicals (not just fuel and oxidizer, but also binders, plasticizers, stabilizers, and other additives) and special mixers and extruders.

Cruise missiles and UAVs employ propulsion systems like turbofan and turbojet engines, that resemble those used in manned aircraft.

### 2.9.3 *Structure*

Structural components hold the missile system together. Three major structural components of a missile are the airframe (fuselage), the nose cone, and the exhaust nozzle. These components typically require materials with high strength, low weight, and stable thermal properties. Many of these materials are also used in the commercial aerospace industry. Motor cases and nozzles must withstand high temperatures, high pressures, thermal shock, and erosive exhaust gases. Re-entry vehicles, which protect the missile's payload during atmospheric re-entry, experience very high temperatures and typically require insulation materials and heat shields, which may be ablative, meaning they are designed to burn or vaporize during re-entry.

Key materials include carbon fibre-reinforced composites, fine grain graphites, tungsten, and maraging steel. Important production equipment includes filament winding machines (for fabricating composite structures), and isostatic presses (for powder metallurgy and for reducing the porosity of metals and increasing the density of many ceramics).

### 2.9.4 *Guidance*

Guidance, navigation, and control (GNC) comprise the systems that control the movement of the missile to keep it on course to its target. This requires determining the desired path of travel (the trajectory), the vehicle's actual location and velocity, and the necessary course corrections. It also includes the systems that provide and control the steering mechanisms needed for a missile to achieve stable flight and execute manoeuvres. GNC requires some combination of sensors like accelerometers and gyroscopes, terrain or stellar correlating hardware and software, satellite navigation system receivers, flight

computers, inertial navigation systems, and attitude control systems like thrust vector control systems and actuators for flight control surfaces.

### **2.9.5 Testing**

Testing is needed at every stage of missile development and production. Tests are conducted at the component level before assembly and at the subsystem level before flight testing. Key equipment used in navigation component and subsystem testing include rate tables, centrifuges, vibration test tables, and environmental chambers. Engine test stands and x-ray systems are used for propulsion system testing. Launch and flight testing use telemetry and telecontrol systems, radar systems, theodolites, and many other specialized instruments.

### **2.9.6 Deployment**

Launching a missile is a very complex activity and requires special equipment. Specialized vehicles are used to transport and erect the missile, and also to fuel liquid-fuelled missiles. Radars are commonly used to track the flight of the missile, and special instrumentation, like gravity meters, is used to prepare the launch.

## Annex III – Examples of Select Strategic Commodities

A key outcome identified at the WCO's first Conference on Strategic Trade Controls Enforcement in November 2012 involved awareness raising and training: "A wide range of dual use material, parts and equipment exists; these goods are technically complex therefore recognition of these goods by law enforcement agencies remains a challenge. Participants invited the WCO to explore the possibility of establishing a specialized programme to provide Customs and Border agencies with increased and sustainable capacity to prevent, detect and deal with cross-border trafficking of CBRN and strategic dual use goods."<sup>67</sup> Among the outcomes identified in the Chairperson's Summary was the following statement regarding the Harmonized System:

**Strategic use/functionality of the WCO Harmonized System (HS):** Many presenters recognized the functionality and potential of the HS as being critically important. While the HS has a strong focus on revenue assurance, its international significance as the recognized global descriptor of trade in over 200 countries was highlighted. To maintain the HS in an emerging world of new threats, it will need to be refined to enable it to deliver better strategic outcomes in areas such as safety and security, by either changes to the HS itself, or the development of new tools that could be complementary to the HS to enable these outcomes. Many presenters made the point that while the HS provides descriptors of items at an entity level; these are often too generic to enable frontline personnel, business partners and government organizations to use it to effectively identify strategic commodities. A range of presenters from agency and policy groups with a specific expertise in this discipline stated their willingness to support the WCO in this work.

Customs services worldwide naturally rely upon the HS not only for classifying traded commodities, but also for identifying them, including items subject to strategic trade controls. Targeting systems devised for selecting shipments for scrutiny, inspection, and potentially for enforcement actions, depend upon the HS for identifying strategic commodities in trade. However, since the HS is based on the state of processing or value added while strategic goods are identified by their use and technical specifications, efforts to correlate the HS with strategic goods control lists have not been completely successful. Nevertheless, many administrations have developed "correlation tables" relating the HS to national control lists. Strategies for improving the usefulness of the HS for purposes of STC are under continuing active investigation as part of the WCO's ongoing process of updating the HS every five years,

Select<sup>68</sup> strategic commodities within relevant chapters of the Harmonized System<sup>69</sup> (HS) are described in this Annex. Each entry provides an overview of commodities of strategic interest, information about typical shipments of those commodities, distinguishing characteristics of the commodity relative to their HS category useful for identifying shipments of interest, and notes (when relevant) regarding seizure and disposition of the commodity. It does not attempt to capture the technical complexity of the multilateral or EU export control lists; in all cases Customs is referred to their licensing or permitting agency for control determinations based on national laws and regulations.

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<sup>67</sup> "A Summary Report of Strategic Trade Controls Enforcement Conference", Annex II to Doc.EC0320E1

<sup>68</sup> This Annex attempts to identify HS chapters potentially covering strategic commodities. It is not a complete, exhaustive, or authoritative list of strategic goods. It should be viewed as an indicative guide and as a living document responsive to the needs of WCO Members. WCO Members concerned with strategic commodities not profiled herein are encouraged to contact the Secretariat so that those items may be added.

<sup>69</sup> References to chapters, headings, and subheadings of the HS Nomenclature are for indicative purposes and do not represent official classification decisions by the HS Committee or the WCO Secretariat's advice on how the particular commodities are to be classified. The intent is to identify strategic goods falling under various HS codes, not to identify every possible HS code for those goods.

## 2.10 HS Chapter 26 (Ore)

### 26.12 Uranium or thorium ores and concentrates



Figure 7 Uranium Ore Concentrate (UOC)

Introduction:

- Uranium and thorium ores contain materials from which special fissionable material (see [28.44](#)) can be derived.
- Ores do not meet the IAEA or NSG definitions of "nuclear material" or "source material" because the definitions require source material to be in the form of metal, alloy, chemical compound, or concentrate. However, uranium ore concentrate<sup>70</sup> (UOC) does meet these definitions.

Shipments:

- It is uncommon for uranium or thorium ores to be shipped across international borders or over significant distances. It is much more common for them to be milled and concentrated at or near the mine and then shipped as ore concentrates.
- UOC is typically transported in 200 litre steel drums, weighing approximately 400 kilograms.

Identification (distinguishing characteristics within HS category):

- The principal uranium ores are autunite, brannerite, carnotite, coffinite, davidite, parsonsite, pitchblende, torbernite (or chalcolite), tyuyamunite, uraninite, uranophane, and uranothorianite.
- The principle thorium ores are monazite and thorite.
- Uranium Ore Concentrate (UOC) is also known as yellowcake.

Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

## 2.11 HS Chapters 28-36 (Special materials)

<sup>70</sup> When obtained by processes not normal to the metallurgical industry, UOC is classified under heading 28.44.

## **28-29 Strategic Chemicals**



**Figure 8 Various chemicals as packaged for shipment**

### **Introduction:**

- Many chemicals are considered strategic. Major classes of strategic chemicals include:
  - Precursor chemicals - chemical ingredients from which other chemicals of strategic value can be synthesized, such as chemical weapons (CW) agents, explosives, and narcotics. Collectively, the term “precursor chemicals” covers hundreds of specific chemicals.
    - CW precursors are identified on the control lists of the Australia Group and the Schedules of the Chemical Weapons Convention (CWC).
    - Explosive compounds and precursors. See also HS 36.02 Explosives.
    - Narcotic precursors are identified by UN Convention Against the Illicit Traffic in Narcotic Drugs and Psychotropic Substance.
  - CW Agents are identified on the Schedules of the CWC and the WA Munitions List.
  - Propellant chemicals for missiles include fuels, oxidizers, and additives (like binders, plasticizers, stabilizers, and burn-rate modifiers). These are identified by the Missile Technology Control Regime (MTCR). Note that propellant powders are classified under [HS Chapter 36](#).
- The vast majority of these chemicals have industrial applications. Some are widely traded in large volumes, while others are specialty or research chemicals shipped in small quantities with niche markets.

### **Shipments:**

- Many chemicals are dangerous, and are packaged accordingly. The Recommendations of the UN Committee of Experts as published in the UN's Recommendations on the Transport of Dangerous Goods, Model Regulations, also known as “The Orange Book”,<sup>71</sup> provides the basis for all national and international regulations for the safe transport of dangerous goods.
- Typical chemical packaging includes drums, barrels, jerricans, boxes, bags, bulk containers, and large carriers.

<sup>71</sup> <http://www.unece.org/trans/danger/danger.html>

**Identification (distinguishing characteristics within HS category):**

- In general, chemicals cannot be identified by appearance, as most are white powders, colourless liquids, or gases. Container markings and labels are essential to identifying chemical shipments.
- Chemicals listed by the Chemical Weapons Convention and the Australia Group are listed by HS number in [Annex VI](#).
- Labels<sup>72</sup>:
  - Chemical names are sometimes very complex. Moreover, chemicals can have many synonymous chemical names.
  - UN Numbers are 4-digit numbers used for hazardous chemicals.
    - They are not always unique to a particular chemical, but they can be helpful for identification.
    - UN numbers are typically found on outer packaging and should be listed on Dangerous Goods Shipping Declarations, along with a diamond label (hazard placard) and proper shipping name.
    - UN Numbers associated with strategic goods are listed for easy reference in [Annex VII](#).
  - CAS numbers are registry numbers of the Chemical Abstracts Service. They provide a unique numeric identifier for each registered chemical, and many millions of chemicals have been registered.
    - CAS numbers take the form (NNNNN)NN-NN-N, where N is a digit from 0-9. The CAS number is grouped into three parts, with the first part comprising 2 or more digits, the second part comprising two digits, and the last part being a single-digit checksum, used to ensure the CAS number is legitimate.
    - CAS numbers are typically found on inner packaging and labels and on accompanying paperwork like Safety Data Sheets (SDS)
  - Too many specific chemicals are considered strategic to list them all here. Many strategic chemicals are listed by CAS number in [Annex V](#).
- Sampling
  - Definitive identification of chemicals may require use of a field test kit or sending a sample to a laboratory. Chemicals can be extremely dangerous. See Inspector Health and Safety (Section 2.3.3)

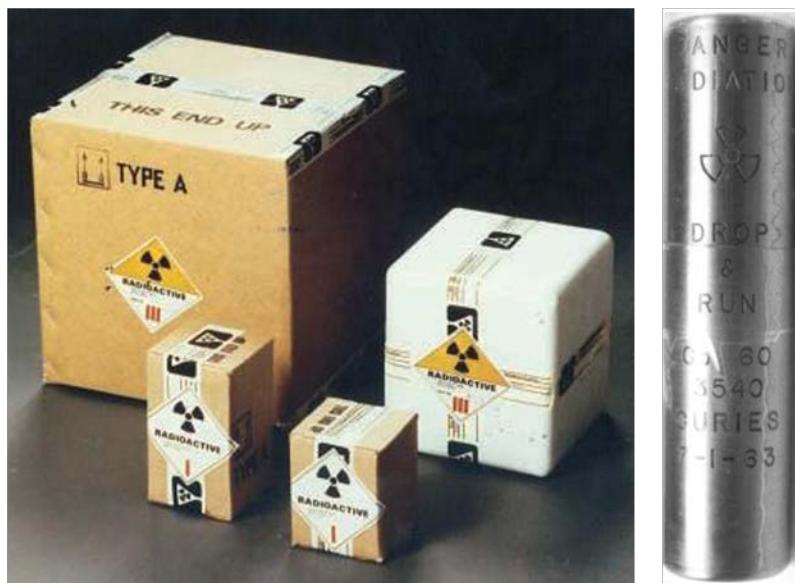
**Seizure and Disposition:**

- Given the vast range of strategic chemicals, reachback will be required for a determination. Ideally, be prepared to provide a CAS number and the SDS to the reachback personnel.
- Many strategic chemicals pose significant dangers due to toxicity, corrosiveness, flammability, etc. See Inspector Health and Safety (Section 2.3.3).

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<sup>72</sup> In 2003, the United Nations adopted the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

## **28.44 Radioactive materials**



**Figure 9 Radioactive materials. "Type A" packages (left) and a sealed source (right)**

### **Introduction:**

- Not all radioactive materials are considered strategic goods, and there are millions of legal shipments of radioactive materials every year.
- Radioactive materials are commonly grouped into four categories:
  - **Naturally occurring radioactive material** (e.g., ceramics, tile, fertilizer, and building materials such as granite and marble)
  - **Industrial isotopes** (high-activity sources typically used in well-logging, radiography, sterilization, food irradiation, and heat sources)
  - **Medical isotopes** (typically used in cancer treatment (injection or teletherapy))
  - **Special nuclear material** (taking many distinct forms throughout the nuclear fuel cycle, including UF<sub>6</sub>, nuclear reactor fuel assemblies, spent fuel from nuclear reactors, and high-level waste)
- Certain radioactive materials are identified as nuclear proliferation, health, and safety concerns.
  - The illicit trafficking of nuclear materials threatens global security.
    - Smuggling scams are prevalent on the nuclear black market; smugglers claiming to possess weapons-usable uranium or plutonium are often inaccurate.
  - Some high-activity industrial and medical isotopes could be used in radiological weapons.
  - Industrial and medical radioactive materials out of regulatory control can pose serious health and safety consequences for the public. For example, scrap metal shipments can contain improperly discarded radioactive materials. The majority of radiation alarms are caused by contaminated scrap metal, which poses serious public health and safety concerns but is not "strategic" in the sense of STCE.

### **Shipments:**

- IAEA Safety Standard SSR-6, *Regulations for the Safe Transport of Radioactive Material* (2018 edition), is the international standard for the safe transport of radioactive materials.<sup>73</sup>
- Approximately 20 million packages of all shapes and sizes containing radioactive materials are routinely transported worldwide annually.
- "Type A" radioactive shipment packages are used for moderate quantities
  - Designed to withstand normal conditions of transportation

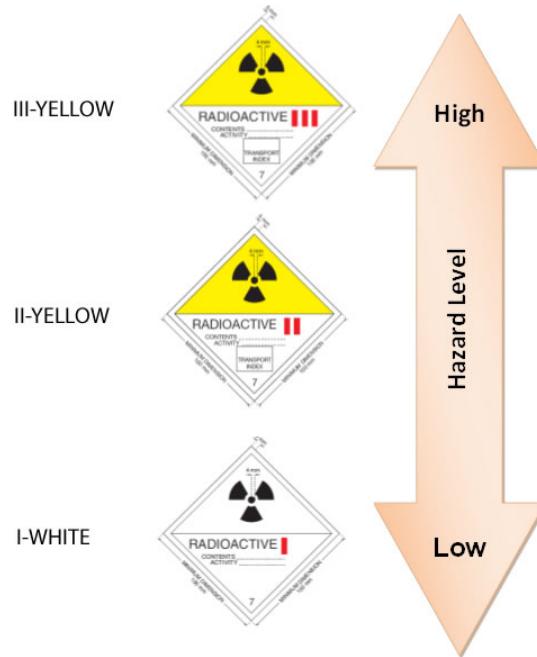
<sup>73</sup> <https://www.iaea.org/publications/12288/regulations-for-the-safe-transport-of-radioactive-material>

- Should be accompanied by a dangerous goods transport document.
- “Type B” radioactive shipment packages are used for transportation of large quantities
  - Designed to withstand accident conditions of transportation.
  - Could range from a metal drum to a massive shielded transport container.
  - Should be accompanied by a dangerous goods transport document.
- “Excepted Packages”
  - For very small quantities of radioactive materials, no special packaging beyond a strong, tight container designed to survive routine handling is required. They may not be obviously marked with the words “radioactive material”.
- Labels
  - Type A packages should be labelled with UN 2915 and Hazard Class number 7
  - “Radioactive” warning labels are used on Type A and Type B packages. They are required on two opposite sides.
  - Contents (proper shipping name) and activity (in becquerels, Bq) of the package must be marked in the spaces provided.
  - The Transportation Index is the dose rate at one meter from the package surface.
  - Three different labels (Figure 10) denote different dose rates
    - I (white) for Transportation Index 0
    - II (yellow) for Transportation Index 0.1 to 1
    - III (yellow) for Transportation Index >1 to 10
- Illicit shipments of radioactive materials may not adhere to standard labelling and packing requirements. Identification of such unmarked radioactive material shipments may depend on technical means of detection and identification.

Identification (distinguishing characteristics within HS category):

- Radioactive materials of strategic concern include:
  - Fissionable materials which could be used in nuclear weapons
    - Neptunium (Np) 237
    - Plutonium (Pu) 239
    - Uranium (U) 233
    - Uranium (U) 235
  - Materials of concern for use in radiological weapons
    - Americium (Am) 241
    - Californium (Cf) 252
    - Cesium (Cs) 137
    - Cobalt (Co) 60
    - Iodine (I) 131
    - Iridium (Ir) 192
    - Plutonium (Pu) 238
    - Polonium (Po) 210
    - Radium (Ra) 226
    - Strontium (Sr) 90
  - Alpha-emitting radionuclides which could be used in nuclear weapon initiators:

**Figure 10 Labels for radioactive materials**



- Actinium (Ac) 225 or 227
  - Californium (Cf) 253
  - Curium (Cm) 240, 241, 242, 243, or 244
  - Einsteinium (Es) 253 or 254
  - Gadolinium (Gd) 148
  - Plutonium (Pu) 236 or 238
  - Polonium (Po) 208, 209, or 210
  - Radium (Ra) 223 or 226
  - Thorium (Th) 227 or 228
  - Uranium (U) 230 or 232
- Tritium, a radioactive isotope of hydrogen, which can be used as a fuel for thermonuclear fusion reactions
- HS 2844.20 is unique to uranium enriched in U235 and plutonium, which are always considered strategic.
- UN 2977 is unique for UF6 enriched in U235, which is always considered strategic.
- Radiation detection and identification instruments come in a variety of form factors to meet different operational needs.
  - Fixed Radiation Detection Equipment
    - Radiation portal monitors (RPM) are most commonly deployed at border checkpoints, airports and seaports to provide gamma- and neutron-detection capability in a manner that minimizes disruptions to site operations. Typically, the RPM is installed in a permanent fashion, incorporated in the site infrastructure, and is networked to communicate to a central location to facilitate front-line officer support requirements.
    - The RPM is based on passive radiation detection technologies that can operate unattended and alert the front-line officer when elevated radiation is measured in the stream of cargo and passengers. A small fraction of the RPM's deployed globally incorporate both detection and identification capabilities. Such RPM's have been found most practical when used only for secondary inspection in response to a primary alarm.
  - Mobile Radiation Detection Equipment
    - Vehicle mounted systems have been developed for a range of nuclear security applications. Law enforcement uses vans equipped with detection capability for operations at both the interior and green borders of a country. Vehicle systems designed with both radiation detection and isotope identification capabilities are used for search and survey operations, including the security associated with major public events. Finally, there are vans equipped with laboratory quality radiation measurement capabilities used by technical experts in response to primary radiation detection alarms at remote locations, such as land border crossings.
    - Specialty platforms have been developed to address the challenge of scanning transhipped containers at major seaports. A straddle carrier with integrated detection and identification technologies allows for scanning rows of stacked containers. In a similar fashion, another mobile platform is driven throughout a port and strategically positioned to maximize scanning. This allows for scanning as containers are discharged from a vessel.
  - Portable Detectors
    - Hand-held radiation detectors can be grouped into three types: the personal radiation detector (PRD), the hand-held survey meter and the radioactive isotope identification device (RIID). Each is designed with differing sensitivities and isotope discrimination capabilities for specific inspection functions.
    - The PRD is designed primarily as a health and safety tool for the front-line officer. It can also be effective in detecting the presence of radiation sources in vehicles and crowds of people and in establishing a safety perimeter around gamma-emitting radiation sources. The PRD is not a viable tool for scanning of cargo containers.

- The Survey Meter is best suited for inspecting vehicles and shipping containers. It can be used as a stand-alone tool and is best used in the response to fixed radiation portal alarms for locating gamma- and neutron-emitting radiation sources.
  - The RIID provides discrimination of gamma-emitting radiation sources. It is designed to identify special nuclear material and common industrial and medical isotopes. RIID technology is available in both PRD and Survey Meter form factors. The RIID identification performance is acutely dependent on the detector material type and size.
  - Typical man-portable (backpack) radiation detection equipment provides functionality similar to the hand-held with greater sensitivity and extended operability attuned to law enforcement and other interior application requirements.
- Instrument alarms can be of three main types:
  - **Real Alarm** is due to elevated radiation from a source item or material that is out of regulatory control.
  - **Innocent Alarm** is due to elevated radiation from material that is NOT out of regulatory control. The vast majority of instrument alarms at borders and ports are innocent alarms due to naturally occurring radioactive materials (NORM).
  - **False Alarm** is due to equipment fault rather than an actual elevation in radiation level.
- The use of radiation detection equipment requires specialized training, maintenance, and management.

#### Seizures and Disposition:

- In the event of an incident involving illicit trafficking in nuclear or radioactive materials, rules of evidence should be followed. Any deployed specialists should have training in crime scene management and forensic rules of evidence.
- The IAEA maintains a database<sup>74</sup> of incidents of illicit trafficking and other unauthorised activities and events involving nuclear and other radioactive material outside of regulatory control.
- The IAEA's Nuclear Security Recommendations on Nuclear and Other Radioactive Material out of Regulatory Control (NSS-15) provides guidance to states regarding strategies to deter, detect, and respond to criminal or unauthorized acts. It includes recommendations for preventative measures, detection and assessment of alarms and alerts, and for graded response. The recommended actions cover the confirmation of a credible threat, assessment and interdiction, and response to a nuclear security event. In addition, the IAEA provides an Implementation Guide<sup>75</sup> (NSS-21) to provide guidance to Member States for the development or improvement of nuclear security systems and measures for the detection of criminal or unauthorized acts with nuclear security implications involving nuclear and other radioactive material out of regulatory control.
- See also Inspector Health and Safety (Section 2.3.3).

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<sup>74</sup> IAEA Incident and Trafficking Database (ITDB)

<sup>75</sup> "Nuclear Security Systems and Measures for the Detection of Nuclear and Other Radioactive Material out of Regulatory Control: Implementation Guide", IAEA Nuclear Security Series No. 21 (NSS-21), 2013.

## 2845.10 Heavy Water



**Figure 11 Heavy water in stainless steel drums**

Introduction:

- Heavy water is water with a higher proportion than normal of the hydrogen isotope deuterium. Heavy water is used in certain types of nuclear reactors that are well suited to producing plutonium. Heavy water is particularly significant to nuclear proliferation as it can enable a [reactor](#) to operate on natural (rather than enriched) uranium. For these reasons, heavy water is considered a strategic commodity and is listed on the NSG's Trigger List.
- Also known as deuterium oxide, D<sub>2</sub>O

Shipments:

- Typically packaged in stainless steel drums with volume between 150 and 200 litres.
  - Approximate weight of 200 litre drum would be ~230 kg
- Drums would usually be on wooden pallets so that they can be manoeuvred by fork lift.
- Labels
  - CAS 7789-20-0
  - EC 232-148-9
  - UN: none (not hazardous)

Identification (distinguishing characteristics within HS category):

- Quantity is an important factor. Non-industrial quantities of heavy water (i.e., in the gram to kg range) are routinely provided by specialty chemical dealers. Tens of tons are needed for nuclear reactor application. Generally, quantities below hundreds of kilograms are not considered strategic.

Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

## 2845.90 Other [stable] isotopes

Introduction:

- Note 6 to HS Chapter 28 indicates that the term "isotopes" includes elements of which the natural isotopic composition has been artificially modified, that is, elements enriched in a particular isotope. Some examples of such enriched materials that are considered strategic include:
  - Boron enriched in Boron-10 (because it is used in controlling the reaction rate in nuclear facilities)
  - Lithium enriched in Lithium-6 (because it can be used to produce tritium)
- Note 6 to HS Chapter 28 also indicates that the term "isotopes" includes other individual nuclides. Some individual nuclides that are considered strategic include:

- Helium-3 (because it can be used to produce tritium)
- Note that none of the isotopes under this heading are radioactive.

Shipments:

- Lithium:
  - Lithium metal is usually shipped in a fused solid ingot in dry air to minimize risk of fire. Other metal forms may be coated with heavy mineral oil or grease. It is then usually contained in an airtight, sealed metal container, not larger than 23 litres, and these containers will then be placed in drums with cushioning for shock absorption.
  - Many lithium compounds require special hazard labels
    - “Dangerous When Wet”
    - “Corrosive”
    - “Oxidizer”
    - Lithium hydroxide requires a shipping label of “Corrosive”
  - International Civil Aviation Organization (ICAO) forbids shipment of lithium metal or lithium hydride on passenger aircraft. Maximum of 15 kg may be carried on a cargo aircraft. For lithium hydroxide, a maximum of 15 kg is allowed on passenger aircraft, 50 kg on cargo aircraft.
- Boron:
  - Borate chemicals are shipped in paper sacks, plastic bags in metal cans, plastic containers, or larger drums.
- Helium-3
  - Helium-3 is shipped as a compressed gas (unlike natural helium, which is often shipped as a cryogenic liquid) in forged steel or aluminium alloy cylinders at high pressure.
  - Labels:
    - “Non-flammable Gas”
    - Hazard Class 2.2

Identification (distinguishing characteristics within HS category):

- Within 2845.90, shipments of elemental boron (CAS 7440-42-8), lithium (UN 1415, CAS 7439-93-2), or helium may be strategic.
- Unenriched boron and lithium (which are not strategic) or natural helium would not be expected to ship under this HS code.

Seizures and Disposition:

- Lithium in contact with water releases flammable gases which may ignite spontaneously. It also causes severe skin burns and eye damage.
- See Inspector Health and Safety (Section 2.3.3).

## 30.02 Micro-organisms and toxins

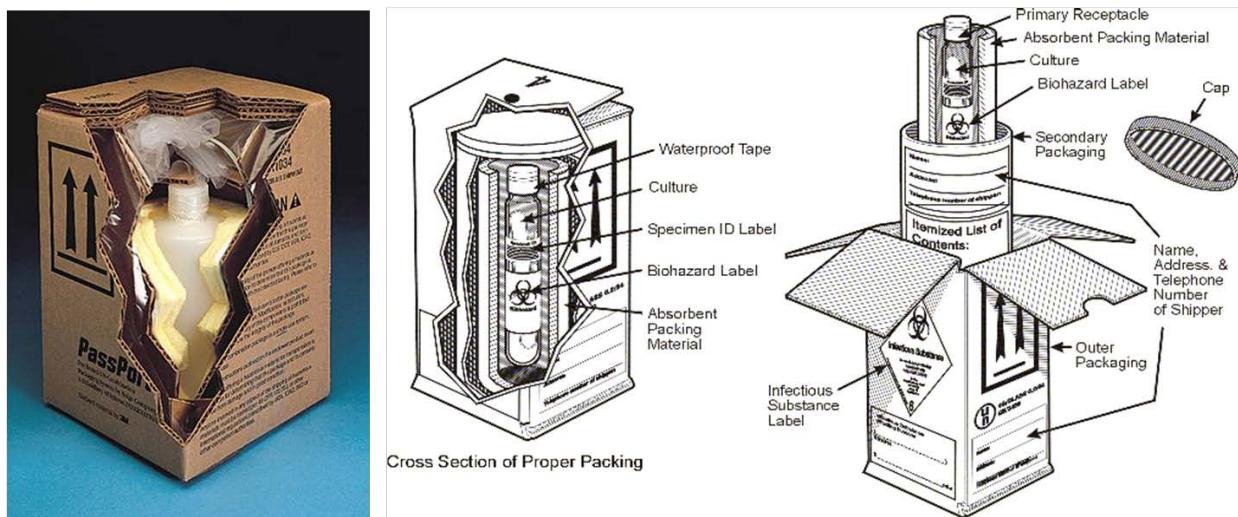


Figure 12 Packaging for UN Category A Infection Substances

### Introduction:

- Biological agents are strategic living micro-organisms that are pathogenic to humans, animals, or plants; have few or no known medical countermeasures; and can be produced and used as [biological weapons](#).
- Biological agents are divided into three classes:
  - Viruses
  - Bacteria
  - Fungi
- Toxins are harmful chemicals produced by living organisms.

### Shipments:

- Biological agents may be shipped as solids, powders, or liquids.
- Legitimate shipping of disease-causing agents requires special documentation, labelling, and packaging.
  - Typically triple-packaged, with an inner container of Teflon, plastic, glass, or steel; a secondary container surrounded by adsorbing material; and a shock and breakage resistant shell.
  - Category A Infectious Substances, affecting humans (UN 2814) or affecting animals (UN 2900), Hazard Class 6
    - Maximum quantity of Category A infectious substances allowed in one air package is 4 litres or 4 kg. The maximum allowable quantity on passenger aircraft is 50 ml or 50 g.
    - Outer container must display infectious substance label (Figure 13), proper shipping name, UN number, and quantity.
  - Category B Biological Substances, UN 3373
    - Outer container must display the words "Biological Substance, Category B" with the UN number.
  - If packaged with dry ice, may also display UN 1845 and hazard class 9 label.
  - UN 3462 indicates "toxins extracted from living sources" and should have hazard class 6.1.



**Figure 13 Infectious substance label**

Identification (distinguishing characteristics within HS category):

- Strategic micro-organisms and toxins are identified on the control lists of the Australia Group.
- Some noteworthy examples include:
  - Bacteria
    - Bacillus anthracis - Anthrax
    - Yersinia pestis - Plague
    - Brucella - Brucellosis
    - Coxiella burnetii - Q-Fever
  - Viruses
    - Variola virus - Small Pox
    - Ebola virus - Ebola
    - Foot and Mouth Disease (FMD) virus
    - Avian influenza virus (High Pathogenicity)
  - Fungi
    - Wheat Stem Rust
    - Rice Blast
    - Rice Brown Spot
  - Toxins
    - Saxitoxin (CAS 35523-89-8)
    - Ricin (CAS 9009-86-3)
    - Botulinum Toxin (CAS 93384-43-1)
    - T-2-Toxin (CAS 21259-20-1)

Seizures and Disposition:

- Micro-organisms may be hazardous and perishable. See Inspector Health and Safety (Section 2.3.3)

### **31.02 Fertilizers, nitrogenous**



**Figure 14 Nitrogen fertilizers as shipped**

Introduction:

- Some nitrogenous fertilizers are important explosive precursors.

Shipments:

- These substances are typically shipped in plastic bags.

Identification (distinguishing characteristics within HS category):

- Three nitrogenous fertilizers are recognized by the WCO's Programme Global Shield as explosive precursors:
  - Ammonium Nitrate (HS 3102.30, CAS 6484-52-2, UN 1942, 2067, 2017)
  - Ammonium Calcium Nitrate Double Salt (HS 3102.60, CAS 15245-12-2)
  - Calcium-Ammonium-Nitrate (CAN Fertilizer), which is a mixture of ammonium nitrate and dolomite powder) (HS 3102.90)

Seizures and Disposition:

- See Inspector Health and Safety (Section 2.3.3).

### **32.12 Aluminium Paste**



**Figure 15 – Aluminium paste**

**Introduction:**

- Aluminium paste generally consists of microscopic aluminium particles finely dispersed in an organic-solvent or aqueous-based carrier. It is widely used in paints, coatings, and inks. It is listed by as a Project Global Shield explosive precursor material.

**Shipments:**

- Packaged in drums or canisters.

**Identification (distinguishing characteristics within HS category):**

- UN 1325
- HS 3212.90
- Pictograms: flammable solid, irritant
- As a mixture, aluminium paste lacks its own CAS registry number, but will present as a mixture containing aluminium (CAS 7429-90-5).

**Seizures and Disposition:**

- Caution: flammable and combustible  
See Inspector Health and Safety (Section 2.3.3).

### **36.01 Propellant powders**



**Figure 16 Propellant powders as packaged**

**Introduction:**

- Combustion of these powder mixtures produces a large volume of hot gases which can propel missiles.

**Shipments:**

- Propellant powders will be shipped like other [strategic chemicals](#).

**Identification (distinguishing characteristics within HS category):**

- Identification techniques for propellant powders will be the same as for other [strategic chemicals](#).
- CAS numbers for many of the strategic propellant powders are included in [Annex V](#).

**Seizures and Disposition:**

- Propellant powders are likely to be flammable and explosive hazards. See Inspector Health and Safety (Section 2.3.3).

## **36.02 Explosives**



**Figure 17 Explosive materials as packaged**

### **Introduction:**

- Explosive materials produce a sudden expansion of the material usually accompanied by the production of heat and large changes in pressure upon initiation. Low explosives burn rapidly (or deflagrate), while high explosives detonate.

### **Shipments:**

- Explosives are hazard class 1. They should be shipped with a hazard placard.
- They will have UN numbers starting with 0 (i.e., of the form 0NNN).
- Typically, special packaging regulations apply to shipments of explosives. They will typically have nested inner packaging and outer packaging, and some may also have intermediate packaging.
- Inner packaging layers may include plastic or rubberized cloth bags which may include a wetting solution. Outer packaging can be steel drums, plastic drums, steel boxes, aluminium boxes, or wood boxes.

### **Identification (distinguishing characteristics within HS category):**

- Explosive materials come in many forms, including powders, granules, mouldable solids, or rigid masses resembling dense plastic.
- HS 36.02 covers explosives consisting of mixtures of chemical substances. Explosives based on the following chemical substances are of strategic importance due to their potential use in nuclear explosive devices, according to NSG Guidelines:
  - HMX – CAS 2691-41-0
  - RDX – CAS 121-82-4
  - TATB – CAS 3058-38-6
  - HNS – CAS 20062-22-0
  - ADNBF – CAS 97096-78-1
  - DADE or FOX7 – CAS 145250-81-3
  - DNI – CAS 5213-49-0
  - DAAOF or DAAF – CAS 78644-89-0
  - DATB – CAS 1630-08-6
  - DNGU or DINGU – CAS 55510-04-8
  - PYX – CAS 38082-89-2
  - DIPAM – CAS 17215-44-0

- DAAzF – CAS 78644-90-3
  - TNP – CAS 229176-04-9
  - These explosive chemicals are included in Annex V – Strategic Chemicals.
- These and many more explosive and energetic materials also have conventional military applications.
- Explosives may be detectable using trace detection technologies (e.g., detection of vapours or particles using ion mobility spectroscopy such as Ionscan®)
- Sampling and analysis may be required for definitive identification.

**Seizures and Disposition:**

- Explosives are dangerous good. See Inspector Health and Safety (Section 2.3.3).

### **36.03 Detonators**



**Figure 18 EBW detonator**

**Introduction:**

- Detonators initiate an explosive charge using a safety fuse, electrical current, or shock. Some detonators can be used to initiate the high-explosive charge of a nuclear weapon.
- Also known as initiators or igniters.

**Shipments:**

- Detonators will be shipped in high-explosive qualified containers and should be marked accordingly.
- Typically detonators are loaded into cardboard or pasteboard tubes or grooved Styrofoam trays, which are then inserted into boxes.
- Labels:
  - Hazard class 1 (explosive) placard.

**Identification (distinguishing characteristics within HS category):**

- Detonators of strategic concern include electrically-driven “exploding bridge” (EB), “exploding bridge wire” (EBW), “exploding foil” initiators (EFI), and “slapper” detonators.
- Detonating cord and more common detonators (also known as ignitors) falling under this heading, such as blasting caps, percussion activated detonators, and fuses, are not considered strategic, but may be employed in improvised explosive devices (IED).

**Seizures and Disposition:**

- Detonators are dangerous good. See Inspector Health and Safety (Section 2.3.3).

## ***2.12 HS Chapter 38 (Miscellaneous chemical products)***

### **38.01 Artificial Graphite**



**Figure 19 Graphite electrodes**

#### **Introduction:**

- Graphite is a form of carbon and an important material used in nuclear and missile systems. Its chemical, nuclear, and material properties are unique; these include significant resistance to corrosion, low neutron absorption, high strength at high temperature, good resistance to ablation, and ease of machining.
  - Nuclear use of concern is as a moderator for nuclear reactors.
  - Missile use of concern is for structural components such as re-entry vehicle nose tips, rocket nozzle throats, and thrust tabs.
- Most commercial graphite meets the specifications to be considered nuclear grade, but is only considered strategic for nuclear purposes when exported “for use in a nuclear reactor” according to NSG guidelines.

#### **Shipments:**

- Most graphite is shipped in the form of large cylindrical electrodes used in aluminium and steel production. These should be classified under HS heading 8545.
- Graphite may also be supplied in the form of precision-machined blocks, tubes, or cylinders.

#### **Identification (distinguishing characteristics within HS category):**

- Graphite has a distinctive matte black appearance. It is soft enough to mark with a fingernail and tends to blacken surfaces that come into contact with it.
- Distinguishing characteristics that make graphite strategic are density (greater than 1.5 grams per cubic centimetre for nuclear use, or 1.72 grams per cubic centimetre for missile use), purity (less than 5 parts per million boron equivalent for nuclear use), and grain size (less than or equal to 100 micrometres for missile use).
- Pyrolytic or fibrous reinforced graphites usable for rocket nozzles are also considered strategic.

#### **Seizures and Disposition:**

- No special seizure and disposition issues are identified for this commodity.

### **38.15 Reaction initiators, accelerators, and catalysts**



**Figure 20 Platinised catalysts in the form of Raschig rings**

Introduction:

- Platinised catalysts are catalytic materials (e.g., aluminium oxide) impregnated with platinum. They are considered strategic because they are used in [heavy water](#) production plants and in tritium separation facilities.

Shipments:

- These materials will usually be packaged in sealed drums.

Identification (distinguishing characteristics within HS category):

- HS 3815.12 includes catalytic materials with precious metal or precious metal compounds as the active substance. The use of platinum as the active substance distinguishes the catalysts of interest within this category.
- Because these are quite common, only platinised catalysts that are specially designed or prepared for promoting hydrogen isotope exchange are considered strategic. So, for example, automotive catalytic converters should not be treated as strategic commodities.
- Catalysts of interest may be fabricated in small tubular forms called Raschig rings.

Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

### ***2.13 HS Chapter 55 (Synthetic filaments and fibres)***

#### **55 Synthetic filaments and fibres**



**Figure 21 Aramid fibre on a spool**

**Introduction:**

- Aramid fibres are long-chain synthetic polyamides. They have extremely high tensile strength and heat resistance, which is why they are commonly used in armour and ballistic protection applications and advanced composite products which require high-strength and light-weight properties. They are identified as strategic commodities on the dual-use lists of the NSG and the WA.
- Products made with aramid fibres include bulletproof vests, spacecraft components, and fire-resistant fabric.

**Shipments:**

- Aramid fibres are typically wound onto spools, which are wrapped in plastic and packed in sturdy boxes with spacers or end supports to prevent movement of the spools.
- Fibre may be shipped impregnated in resin ("prepreg"), in which case it must be kept cold. Prepreg will be shipped in refrigerated containers or packed on dry ice.
- Labels:
  - The spools are typically labelled on the inside with details identifying the specific type of fibre.
  - Prepreg shipped on dry ice will have labelling consistent with shipments of non-hazardous goods on dry ice, which itself is a 'miscellaneous' hazard, class 9. It should have UN number 1845.

**Identification (distinguishing characteristics within HS category):**

- HS headings 55.01 and 55.02 apply to tows. HS 5503.11 applies to synthetic staple fibres of aramids.
- Aramid fibres naturally have a distinctive yellow colour, but coloured fibres and yarns are also available.
- Trade names include Kevlar™ and Nomex™ (Trademarks of DuPont), Twaron™ (Trademark of Teijin).

**Seizures and Disposition:**

- No special seizure and disposition issues are identified for this commodity.

## *2.14 HS Chapter 62 (Articles of apparel)*

### **62.10 Protective Suits**



**Figure 22 Positive pressure protective suits**

**Introduction:**

- A strategic commodity found within HS 62.10 (articles of apparel) is the bio-safety protective suit. Note, however, that protective apparel of vulcanised rubber falls under HS 40.15.

**Shipments:**

- Typically packaged in a plastic wrap.
- May contain warnings to protect from heat.

**Identification (distinguishing characteristics within HS category):**

- The most strategic protective suits operate under positive pressure, so they have tethered air supply lines. They will usually be made of one piece with overlapping, sealed seams, protective hoods, gloves, and boots.
  - Suits that are not airtight or that use self-contained breathing apparatus are not generally subject to control.

**Seizures and Disposition:**

- No special seizure and disposition issues are identified for this commodity.

## *2.15 HS Chapter 68 (Articles of stone or of other mineral substances)*

### 68.15 Carbon Fibre



**Figure 23 Carbon fibre on spools and as packaged**

**Introduction:**

- HS heading 6815 includes carbon fibre, also known as graphite fibre, which has high tensile strength, low weight, high chemical resistance, high temperature tolerance and low thermal expansion. It is used to reinforce composite materials, especially in the aircraft & aerospace industries, wind energy, the automotive industry, and in sporting goods.
- Carbon fibres are thin strands of carbon atoms. The strands can be twisted together like yarn and woven like cloth.
- It is considered a strategic material because it can be used to make rotors for uranium enrichment gas centrifuge machines, structural components for missiles, and other strategic products.

**Shipments:**

- Carbon fibre is typically wound onto spools, which are wrapped in plastic and packed in sturdy

boxes with spacers or end supports to prevent movement of the spools.

- Fibre may be shipped impregnated in resin ("prepreg"), in which case it must be kept cold. Prepreg will be shipped in refrigerated containers or packed on dry ice.
- Labels:
  - The spools are typically labelled on the inside with details identifying the specific type of fibre.
  - Prepreg shipped on dry ice will have labelling consistent with shipments of non-hazardous goods on dry ice, which itself is a 'miscellaneous' hazard, class 9. It should have UN number 1845.

Identification (distinguishing characteristics within HS category):

- Carbon fibres have a distinctive black colour.
- Trade names include HexTow® (Hexcel), SIGAFIL® (SGL Group), TORAYCA® (Toray), PANEX® and PRYON® (Zoltek), and Pyrofil® (Mitsubishi/Grafil)

Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

## 2.16 HS Chapter 69 (Ceramic products)

### 69.03 Crucibles



Figure 24 Refractory ceramic crucibles

Introduction:

- Crucibles are vessels used to melt and process materials at high temperatures. Crucibles made with or lined with materials that can withstand molten actinide metals (such as uranium and plutonium) are considered strategic because they are needed to melt and cast nuclear materials in the production of nuclear weapon components.
- Note that certain metallic crucibles are also suitable. (See 8103.90 – Tantalum (articles of)).

Shipments:

- Ceramic crucibles are typically packaged like glassware. Individual crucibles may be placed into individual compartments of cardboard boxes, surrounded by protective material, and marked as fragile.
- Larger crucibles may be wrapped in bubble-wrap and boxed individually.

Identification (distinguishing characteristics within HS category):

- Due to nuclear criticality constraints, large crucibles, as may be typically used in steel production, for example, are not suitable for processing nuclear materials.

- Crucibles of strategic value will be small (8 litres or less) and made of or lined with one of the following ceramic materials:
  - Calcium fluoride ( $\text{CaF}_2$ );
  - Calcium zirconate (metazirconate) ( $\text{CaZrO}_3$ );
  - Cerium sulfide ( $\text{Ce}_2\text{S}_3$ );
  - Erbium oxide (erbia) ( $\text{Er}_2\text{O}_3$ );
  - Hafnium oxide (hafnia) ( $\text{HfO}_2$ );
  - Magnesium oxide ( $\text{MgO}$ );
  - Tantalum carbide ( $\text{TaC}$ ), nitride ( $\text{TaN}$ ), or boride ( $\text{TaB}_2$ ), or any combination thereof;
  - Yttrium oxide (yttria) ( $\text{Y}_2\text{O}_3$ ); or
  - Zirconium oxide (zirconia) ( $\text{ZrO}_2$ );
- Crucibles made of these exotic materials will be more expensive than typical laboratory crucibles, with unit prices of hundreds of USD.
- Very small crucibles (less than 50 ml) would also not be strategically valuable.
- HS 69.03 refers to refractory crucibles specifically. However, crucibles of interest are also frequently classified under HS 69.09 as “ceramic ware for laboratory, chemical, or other technical uses...”

Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

## 2.17 HS Chapter 70 (Glass)

### 70.17 Laboratory glassware

Introduction

- The types of crucibles described in section 2.16 could be classified under HS 7017.90 (as laboratory glassware) if they are made of glass-ceramic materials.
- Other laboratory glassware is not considered strategic.

### 70.19 Glass Fibre



Figure 25 Spool of glass fibre

Introduction:

- Like carbon fibre, glass fibres can be used to produce strong, fibre-reinforced composite structures.
- Unlike carbon fibre, most glass fibre is not strong enough to be considered strategically important. Of particular interest are special high-strength glass fibres such as S-glass.

Shipments:

- Shipping practices for glass fibre are essentially the same as for [carbon fibre](#).

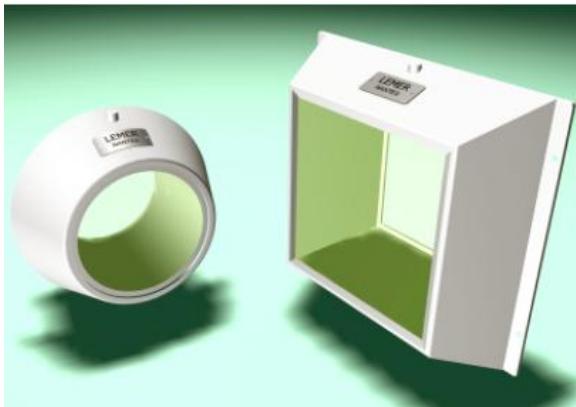
Identification (distinguishing characteristics within HS category):

- Glass fibre has a shiny white satin appearance when viewed on the spool.
- Of interest are special high-strength glass fibres such as S-glass.
- E-type glass, commonly termed “fiberglass”, was originally developed as an electrical insulator. It is very common but not particularly strong, and hence not of strategic interest.

Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

## **70.20 Other articles of glass**



**Figure 26 Radiation shielding windows**

Introduction:

- A strategic commodity that could be classified under HS Heading 70.20 (other articles of glass), is the radiation-shielding window. Windows made of high density (lead) glass are used to block radiation while observing operations in “hot cells” – laboratory areas for handling radioactive materials – where the radiation levels are high, such as those used for reprocessing of nuclear fuels.

Shipments:

- Radiation-shielding windows are very heavy. Large windows are packaged for shipping with wooden sheets over the glass surfaces for protection and the assembly is tied down on a pallet or inside a wooden crate.

Identification (distinguishing characteristics within HS category):

- Radiation-shielding windows will be heavier and thicker than normal windows.
- Radiation-shielding glass typically has a yellow-green tint, and the windows are typically tapered (with one side smaller than the other).
- Generally, radiation-shielded glass less than 10 cm thick is not considered strategic.

Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

## ***2.18 HS Chapters 72-83 (Metals and articles of metal)***

This section profiles many metals that are considered strategic. In some cases, the metal itself is strategic, regardless of form, but in most cases the metal must be in a particular form or have particular properties or purity levels to be strategically significant. In some cases, the metal itself is not important as a raw material, but certain articles may be strategically significant only when made of particular metals.

Identification of metals in the field is very challenging. At a documentary level, shipments of specialty metals are normally accompanied by certificates providing exact composition as well as labels and markings on the metal itself. These details can be very helpful for consistency checks with declarations and invoices and when seeking reachback support to identify a metal and determine if it meets control specifications. At a technical level, verifying that a metal has been declared correctly may require special training and detection technology, such as alloy analysers that use non-destructive x-ray fluorescence (XRF) technology or destructive techniques such as drilling. While positive identification may be difficult, negative identification (determining that the metal is not what has been declared) is sometimes easier, based on weight or density mismatches, for example.

## **72 and 73 – Iron and steel**



**Figure 27 Maraging steel**

### **Introduction:**

- Some specialty alloy steels are considered strategic due to their high strength and other physical properties.
  - Note that HS Chapters 72 and 73 do not distinguish steels based on physical properties, but on chemical composition and form.
- They can be used for production of rotating components of uranium enrichment gas centrifuges or structural components for missiles, especially rocket motor cases and propellant tanks.

### **Shipments:**

- Specialty steels are generally bundled and shipped much like stainless steels.
- Sheets, ingots, or bars are often stacked and secured to a pallet. Tubes are usually bundled and secured to a pallet. They may be covered with plastic and/or crated.
- Shipments of specialty metals are normally accompanied by certificates providing exact composition as well as labels and markings on the metal itself.

### **Identification (distinguishing characteristics within HS category):**

- Specialty steels of interest include:
  - Maraging steel
    - Alloys M300, M350, and M400 are of strategic interest.
    - Trade names include Vascomax®, NiMark®
    - The fact that maraging steel is magnetic can be used to distinguish it from stainless steel.
  - Titanium-stabilized duplex stainless steel (Ti-DSS)
    - Note that Ti-DSS is not a titanium alloy. It is a duplex stainless steel that contains small amounts of titanium.

- These specialty steels will be much more expensive than typical steels.
- They would likely be classified under the following HS headings which apply to “other alloy steels”:
  - 72.24
  - 72.25
  - 72.26
  - 72.28
  - 7304.51
  - 7304.59

**Seizures and Disposition:**

- No special seizure and disposition issues are identified for this commodity.

**75.04 – Nickel powder**



**Figure 28 Nickel powder**

**Introduction:**

- Very pure nickel powder is considered strategic because it can be used to make porous materials that act as filters for separating uranium isotopes in the gaseous diffusion uranium enrichment process.
- Also known as carbonyl nickel powder, nickel carbonyl powder, and Type 123.

**Shipments:**

- Nickel powder is typically packaged in metal drums lined with polyethylene or with internal plastic bags.

**Identification (distinguishing characteristics within HS category):**

- CAS 7440-02-0
- Purity is the principle distinguishing characteristic. Nickel with purity below 99% is not considered strategic.
  - If purity is 99% or more, then it should also have a mean particle size of less than 10  $\mu\text{m}$ .

**Seizures and Disposition:**

- No special seizure and disposition issues are identified for this commodity.

**75.06 – Nickel plates, sheets, strip and foil**

**Introduction:**

- Porous nickel metal such as sheets produced from the nickel powder described above is also

considered strategic.

Shipments:

- Porous nickel metal may be shipped in the form of sheets,

Identification (distinguishing characteristics within HS category):

- Porous nickel will be relatively more expensive than typical nickel shipments under this HS code.

Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

## 76 – Aluminium alloys



Figure 29 Aluminium alloy tubes (top), billets (bottom left), and tube preforms (bottom right)

Introduction:

- High-strength aluminium alloys, particularly in the form of tubes or cylinders, are considered strategic because they can be used to manufacture rotating components for [uranium enrichment](#) gas centrifuge machines.
- Note that unalloyed aluminium is not of strategic concern.

Shipments:

- Shipments of specialty metals are normally accompanied by certificates providing exact composition as well as labels and markings on the metal itself.

Identification (distinguishing characteristics within HS category):

- Shipments of alloys in the 2000 series or the 7000 series (ANSI) are typically capable of the high tensile strengths of concern.
- Tubes and cylinders of these materials with an outside diameter greater than 75 mm are of greatest concern.
- The following HS codes are of particular interest:
  - 7604.21 for hollow profiles of aluminium alloys
  - 7608.20 for tubes and pipes of aluminium alloys

Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

### **76.03 – Aluminium powder**

Introduction:

- Spherical aluminium powder is used as a propellant chemical for missiles.
- Note that aluminium powder is also listed as an explosive precursor chemical by WCO Programme Global Shield.

Shipments:

- Aluminium powder is generally packaged and shipped in steel drums with a capacity of 120 litres or less, weighing ~180 kg or less.
- Packages should be marked as Hazard Class 4.3

Identification (distinguishing characteristics within HS category):

- CAS 7429-90-5
  - Of particular interest for missile propulsion is “spherical aluminium powder” with particles of uniform diameter of less than 200 µm with an aluminium content of 97% by weight or more and other technical requirements.
  - Such specifications are not important for use in an IED.
- UN 1396

Seizures and Disposition:

- Aluminium powder is hazardous. Keep away from sources of ignition. Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from water. Flammables-area. Keep containers tightly closed. Keep away from acidic, alkaline, combustible and oxidizing materials. Separate from halogenated compounds.
- See Inspector Health and Safety (Section 2.3.3).

### **81.01 – Tungsten**

Introduction:

- Tungsten is the strongest metal at temperatures in excess of 1650°C and is used in special applications where metal components must retain strength and operate at extremely high temperatures.
- It is considered strategic because it can be used to fabricate certain nuclear weapon components and various high-temperature missile parts.
- Also known as wolfram.

Shipments:

- Because tungsten is extremely dense, packaging will be unusually strong and secure.

Identification (distinguishing characteristics within HS category):

- Tungsten in forms with hollow cylindrical symmetry is particularly important for nuclear reasons.
- Tungsten and alloys in solid and particulate forms with tungsten content of 97% by weight or more are considered strategic for missile-related reasons.
  - Particulates should also have particle size of 50 µm or less.
- CAS 1207-12-1

Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

### 8103.90 – Tantalum (articles of)



Figure 30 Tantalum crucibles

#### Introduction:

- While tantalum itself is not considered strategic, certain articles of tantalum, such as many of the items used for processing corrosive chemicals, can be.
- Crucibles made of (or lined with) tantalum are considered strategic.

#### Shipments:

- Tantalum crucibles are typically individually boxed and labelled.

#### Identification (distinguishing characteristics within HS category):

- Extremely pure (99.9% or greater) tantalum crucibles are considered strategic by the NSG when they have a volume between 50 ml and 2 l.
- Such tantalum crucibles are much more expensive than more common crucibles, with unit prices of several hundred USD typical.
- Because only articles of tantalum are potentially strategic (and not the material itself), the HS number of interest is 8103.90. However, it should be noted that 8103.90 covers many other (non-strategic) articles of tantalum not provided for more specifically under other headings.

#### Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

### 81.04 – Magnesium



Figure 31 Magnesium

#### Introduction:

- Magnesium is a silvery-white metal like aluminium, but it is even lighter. High-purity magnesium is strategic because it can be used in the production of plutonium and uranium metal. It can also be used as a fuel substance in missile propellants.

Shipments:

- Magnesium powders or granules are very flammable, so they are usually shipped in sealed containers.
- Large forms (ingots, castings, forgings, sheets, plates, etc.) may be shipped without containers.

Identification (distinguishing characteristics within HS category):

- CAS 7439-95-4
- UN 1418 or 1869
- Labels:
  - “Dangerous When Wet”
  - “Flammable Solid”
- Because only very high purity magnesium is considered strategic for nuclear use, HS 8104.11 (magnesium containing at least 99.8% magnesium by weight) is of particular interest.

Seizures and Disposition:

- Caution: magnesium wire, strip, foil and powder burn fiercely with a dazzling light and must be handled with care. There is a risk of explosion in fine magnesium powder when mixed with air.

### 81.06 – Bismuth



Figure 32 Bismuth

Introduction:

- Bismuth is a brittle metal with a white, silver-pink hue.
- It is considered strategic because it is used to produce polonium (Po) 210.

Shipments:

- Can be shipped as a powder or as metal needles, ingots or pellets.
- As a powder, will be packaged in glass, plastic bags, or plastic jars.
- Small quantities of pellets packaged in plastic bottles.
- Large quantities of ingots usually packaged in wooded crates.
- Large quantities of needles can be shipped in large drums lined with sealed plastic bags.

Identification (distinguishing characteristics within HS category):

- CAS 7440-69-9
- Important parameters are extremely high purity (greater than 99.99%) and low silver content (less than 10 parts per million). These parameters will result in strategic shipments having higher unit values than typical shipments under this HS code.

**Seizures and Disposition:**

- Ingestion and inhalation of dusts and fumes should be avoided.

**81.08 – Titanium alloys**

**Introduction:**

- Titanium alloys have high strength, low weight, and retain properties well at high temperature.
- They are principally used in the aircraft industry, in shipbuilding, for making equipment for the chemical industry (e.g., vats, agitators, heat exchangers, valves and pumps), for the desalination of sea-water and for the construction of nuclear power stations.
- They are considered strategic because they can be used to fabricate parts for uranium enrichment gas centrifuge machines and structural components for missiles.

**Shipments:**

- Shipments of specialty metals are normally accompanied by certificates providing exact composition as well as labels and markings on the metal itself.

**Identification (distinguishing characteristics within HS category):**

- Only certain alloys capable of very high ultimate tensile strength are considered strategic.
- Tubes and cylinders made of these materials with an outside diameter greater than 75 mm are of greatest concern.

**Seizures and Disposition:**

- No special seizure and disposition issues are identified for this commodity.

**81.09 – Zirconium**

**Introduction:**

- Zirconium is a lustrous, grey-white metal that resembles titanium.
- It is considered a strategic material for use in nuclear reactors and for production of nuclear fuels.
- Also, like titanium, it is used for making equipment for the chemical industry.
- It can also be used as a propellant chemical for missiles.
- Also known as Zircaloy
- Brand names include Zirlo®

**Shipments:**

- Solid ingots and unfinished products may be shipped unprotected on pallets.
- Low hafnium zirconium in the form of tubes and other structural shapes is expensive, so would be protected from contamination and damage.
- Zirconium metal structural shapes, ingots, and most compounds are not classified as hazardous and require no special markings.
- Zirconium metal powder would normally be shipped in metal drums and requires shipping labels:
  - “Flammable Solid”
  - “Spontaneously Combustible”

**Identification (distinguishing characteristics within HS category):**

- For nuclear purposes, all but traces of hafnium must be removed, so “low-hafnium” (less than 1 part hafnium to 500 parts zirconium by weight) zirconium is considered strategic.
  - Tubes especially designed or prepared to serve as cladding for nuclear fuel is particularly important.
- CAS 7440-67-7 (applies to all zirconium, not just low-hafnium zirconium)

**Seizures and Disposition:**

- Zirconium powders are hazardous materials.

## **81.12 – Beryllium**



**Figure 33 Beryllium**

### **Introduction:**

- Beryllium metal is extremely light and stiff, highly transparent to x-rays, and an excellent neutron reflector
- Beryllium is a strategic metal because it is used to fabricate nuclear reactor and nuclear weapon components. It is also used as a metal fuel material in missile propellants.

### **Shipments:**

- Beryllium metal is expensive, so would be well protected from contamination and damage.
- Beryllium metal powder would normally be shipped in metal drums and requires shipping labels: "Poison" and "Flammable Solid" and is in Packing Group II
- Shipments of specialty metals are normally accompanied by certificates providing exact composition as well as labels and markings on the metal itself.

### **Identification (distinguishing characteristics with HS category):**

- CAS 7440-41-7
- HS 8112.1x
- Beryllium alloys are considered strategic if they have more than 50% beryllium. Alloys with less than 50% beryllium would not be classified under this HS Heading.
  - Beryllium-copper is common, but as it only contains ~2% beryllium, it is technically a copper alloy and not a beryllium alloy.
  - Beryllium-Aluminium Grades 120, 130, 140, and 150 all contain 50% or more beryllium.
  - Beryllium-Aluminium Grades 160, 162, and 562 have less than 50% beryllium.

### **Seizures and Disposition:**

- Beryllium powders and compounds can be hazardous materials.

## **81.12 – Hafnium**

### **Introduction:**

- Hafnium is a specialty nonferrous lustrous, silvery gray metal.
- Hafnium is an important material in the nuclear industry (for nuclear reactor control rods) and the aerospace industry (for superalloys).

### **Shipments:**

- There are two main producers of hafnium in the world, the United States and France.
- Hafnium metal powder, thin sheets, and coiled wire are flame hazards and require international shipping labels of "Flammable Solid" or "Spontaneously Combustible"

- Hafnium powder or chips normally are shipped in tightly closed metal drums, wooden barrels or boxes.
- Solids sometimes are shipped on pallets much like steel.
- Hafnium ingots, rods, and bars sometimes are packed in strong wooden crates or metal cans surrounded by cushioning material.

Identification (distinguishing characteristics with HS category):

- CAS 7440-58-6
- HS 8112.9x

Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

## *2.19 HS Chapter 84 (Machinery)*

Machinery belonging to HS Chapter 84 includes an extremely wide array of strategic goods. Often key to identifying this heavy industrial equipment are manufacturers' nameplates that give the manufacturer name and model number of the equipment. Even when equipment of a type that is considered strategic is identified, determining whether it meets the specifications found on national control lists often requires technical reachback.

### **Note regarding materials of construction**

For many of the items in this chapter, materials of construction (especially of wetted parts that contact fluids) can be significant in determining if an item may be strategic. Presence of these materials does not guarantee an item is strategic or that it will meet all the technical specifications to make them export controlled. They do, however, indicate that the item is corrosion-resistant and may be an indicator of strategic usability. National laws and regulations will specify the actual composition required for different types of strategic items.

The following materials are often associated with these determinations: high-nickel (usually > 40% nickel but sometimes > 60% nickel) alloys, nickel-chromium alloys, fluoropolymers, glass (including vitrified or enamelled coatings), graphite, tantalum, tantalum alloys, titanium, titanium alloys, zirconium, zirconium alloys, ceramics<sup>76</sup>, ferrosilicon, niobium (columbium), and niobium alloys.

Commonly, product specifications make reference to trade names rather than alloy compositions. For example, Hastelloy®, Inconel®, Incoloy®, and Monel® are common trade names for high-nickel alloys. Zircaloy® and Zircadyne® are zirconium alloys, and Duriron® is a trade name for a ferrosilicon. Similarly, fluoropolymers are often indicated by acronyms containing the letter F, such as PTFE, PFA, and PVDF, or by trade names such as Halar®, Tefzel®, Fluon®, Teflon®, Kynar®, Dyneon®, Solef®, Hylar®, and Algoflon®.

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<sup>76</sup> Ceramic parts would be classified under HS Chapter 69.

#### **8401.10 Nuclear reactors**



**Figure 34 Delivery of a 40-ton stainless-steel reactor vessel**

##### **Introduction:**

- [Nuclear reactors](#) are extraordinarily complex systems. The term ‘nuclear reactor’ generally includes the items within or attached directly to the reactor vessels, including control rods, mechanical structures, the reactor vessel and internal components, piping systems, and shields.

##### **Shipments:**

- Nuclear reactors are generally not shipped as single items but rather will comprise hundreds or thousands of shipments of individual components to be assembled onsite. These may be classified under HS 8401.40 as “parts of nuclear reactors”.
- Typically, nuclear reactors are only supplied according to the NSG’s Guidelines for Nuclear Transfers.

##### **Identification (distinguishing characteristics within HS category):**

- This HS code is typically used in error, but since nuclear reactors represent such important strategic systems, use of this code should be investigated.

##### **Seizures and Disposition:**

- No special seizure and disposition issues are identified for this commodity.

#### **8401.20 Machinery and apparatus for isotopic separation**

##### **Introduction:**

- This HS code covers some of the most strategic equipment because it can be used for [uranium enrichment](#) and for heavy water production.

##### **Shipments:**

- Typically, isotope separation requires very complex and extensive facilities that are not shipped as single items. Often these facilities will be assembled from materials and equipment falling under other HS codes.

##### **Identification (distinguishing characteristics within HS category):**

- This HS code is typically used in error, but since isotope separation equipment and facilities represent such important strategic systems, use of this code should be investigated.

## Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

### 8401.30 [Nuclear] Fuel elements

#### Introduction:

- Nuclear fuel elements typically contain special nuclear materials in a protective cladding made of a base metal or alloy such as zirconium or aluminium.
- Nuclear fuel is always considered strategic.

#### Shipments:

- Nuclear fuel elements are transported in specially designed steel packages.
  - Fuel elements for a typical light-water reactor (LWR) are ~4 m long.
  - Fuel elements for a typical heavy-water reactor (HWR) are much shorter (often slightly less than 1 m long)
- UN 3327
- Radioactive Material, "Type A" Package (see 28.44 Radioactive materials for labelling information)
  - This HS code only applies to non-irradiated fuel elements, which have a low radioactivity level; no shielding is necessary. Irradiated fuel elements would be classified under HS heading 28.44.
- Nuclear fuel elements are designed for a specific nuclear reactor, so shipments should be for a specific nuclear power plant.



Figure 35 LWR (left) and HWR (right) fuel element shipments.

Identification (distinguishing characteristics within HS category):

- This HS code is frequently used in error for other (i.e., non-nuclear) types of fuel. Because nuclear fuel is of such strategic importance, use of this code should be investigated.
- Typically, fuel elements are fitted with supports which also serve to keep them spaced apart and fixed in place.

Seizures and Disposition:

- Nuclear fuel elements contain radioactive materials and have extremely high economic value.

#### **8401.40 Parts of nuclear reactors**

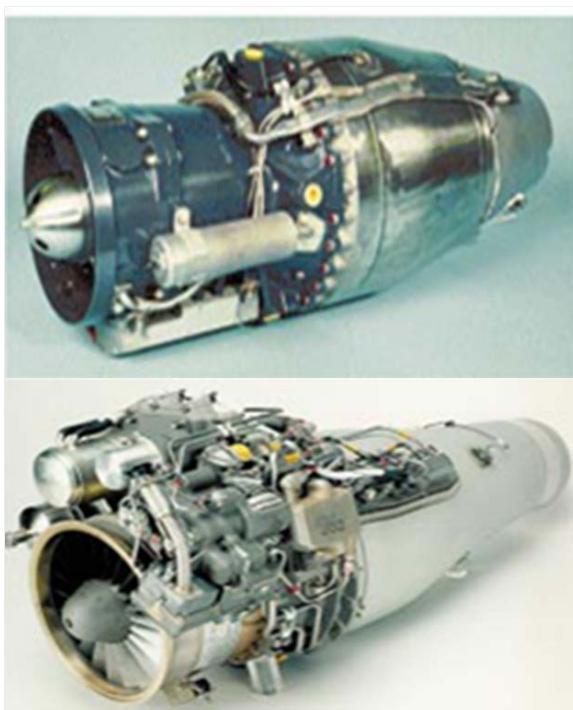
Introduction:

- Parts of nuclear reactors include strategic items such as control rods, control rod drive mechanisms, reactor vessels, and vessel internals. These are all included on the Trigger List of the NSG and subject to the principles of the Nuclear Non-Proliferation Treaty regarding equipment "especially designed or prepared" for the processing, use, or production of special fissionable material.

Identification (distinguishing characteristics within HS category):

- Items declared to be parts of nuclear reactors should be considered strategic and use of this code should be investigated.

#### **84.11 Turbojet and turbofan engines**



**Figure 36 Small Cruise Missile Turbojet (top) and Turbofan (bottom) Engines**

Introduction:

- The turbojet and turbofan engines of concern are jet engines that can power Unmanned Aerial Vehicles (UAV's) or cruise missiles. They are similar in design and operation to those engines that power civilian aircraft, just smaller in size and power. These engines make long range cruise missiles and UAV's practical.
- Several sub-components are also of concern, such as the compressor, combustion chamber, turbine, possibly a fan section, and other miscellaneous parts including bearings and valves. If presented separately, these would be classified according to their appropriate HS headings.

Shipments:

- Typically the engine inlet and outlet are covered, the engine is wrapped in protective paper or plastic, and the entire engine is packed within a crate.
- Because they often contain self-starting features, the package markings may indicate the presence of explosives.

Identification (distinguishing characteristics within HS category):

- Watch for turbine engines that are lightweight, fuel efficient, or specifically designed or modified for missile use.

Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

**8412.10 Reaction engines**



Figure 37 Ramjet (top left), Pulsejet (middle left), Solid Propellant Engine (bottom left), and Liquid Propellant Engine (right)

Introduction:

- Strategic goods falling under this HS code include rocket engines (solid and liquid) and ramjet/scramjet/pulsejet combined cycle engines.
  - Ramjets are mechanically simple engines with no turbo-compressor. The feed air is forced in by the speed of motion alone and compressed in the combustion chamber under the effect of a duct. The motive force is provided by the reaction of the exhaust gases expanding through a nozzle. Pulsejets are similar but emit a pulsating flow of gas instead of a continuous jet.
  - In rocket engines, combustion is independent of an external air supply, with propellant chemicals supplying both fuel and oxidizer.
    - Liquid propellant engines consist of a combustion chamber plus tanks for the storage of propellants, interconnected by a system of tubes and pumps, and a jet-pipe.
    - Solid propellant engines (also known as solid propellant motors) consist of a cylindrical pressure chamber containing solid propellant and a jet-pipe.

Shipments:

- Solid propellant engines are usually shipped in steel or aluminium containers or wooden crates. Containers may be hermetically sealed and pressurized.
- Liquid propellant engines are typically shipped in large wooden crates or metal containers.
- Ramjets and pulsejets are packaged like turbojet engines (see [84.11](#))

Identification (distinguishing characteristics within HS category):

- Ramjets** are usually pipe-shaped, with a conical plug at the front and a flared conical nozzle at the rear.
- Pulsejets** are characterized by their long cylindrical resonator cavity connected to a bulbous control mechanism towards the front.
- Solid propellant engines** consist of a large composite or metal tube (typically 0.5 to 2 m in diameter and 1 to 10 m long) containing solid propellant. The solid propellant is distinctive, with a star-shaped pattern of exposed interior surface. They may have a dome-shaped cap on one end and a bell-shaped rocket nozzle on the other.
- Liquid propellant engines** are complex systems of tanks, metal piping, pumps, and valves connected to a combustion chamber and nozzle, which is usually larger than the rest of the engine.

Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

[\*\*84.13 Pumps for liquids\*\*](#)



Figure 38 Magnetically coupled, corrosion-resistant centrifugal pump (left), diaphragm pump (centre),

### missile turbopump (right)

#### Introduction:

- Although many different kinds of pumps are considered strategic, the vast majority of pumps in everyday trade are not. To be considered strategic they must be of certain special types, made with certain materials of construction, or have other distinctive capabilities.
- Some of the strategic uses of pumps for liquids include missile propulsion, nuclear reactor coolant pumps, and processing corrosive chemicals during CW agent production.

#### Shipments:

- Typically inlets and outlets are covered and the pump is crated or boxed.
- In some cases, pumps are incorporated in pre-configured systems which are skid mounted.

#### Identification (distinguishing characteristics within HS category):

- HS codes of greatest interest are 8413.50 (reciprocating positive-displacement pumps), 8413.60 (rotary positive-displacement pumps), 8413.70 (centrifugal pumps).
- Pumps may be strategic if they have multiple-seals or are seal-less and if they are made with certain corrosion-resistant materials (see [introductory note](#) to chapter 84). Generally, these pumps should also have a capacity of at least 0.6 cubic meters per hour (i.e., 2.2 gallons per minute, 10 litres per minute, or 0.35 cubic feet per minute).
  - For centrifugal pumps, which are very common, magnetically-driven pumps and canned motor drive pumps (CMP) are typical seal-less designs.
  - Bellows pumps and diaphragm pumps are inherently seal-less.
  - Corrosion-resistant materials lining the wetted surfaces of the pump may be visually distinctive.
- Pumps would also be considered strategic if they were especially designed or prepared for nuclear use. One possible indicator of such preparation would be a so-called "N-stamp"
  - The N-stamp is a nuclear accreditation from the American Society of Mechanical Engineers denoting that a vendor produces commercial nuclear-grade components.
- Pumps for missile engines are typically turbopumps (meaning they are driven by a turbine rather than a motor). They resemble turbochargers for automobiles or trucks, but can be much larger (up to several hundred kilograms). They often have two housings (one for the turbine and one for the pump) and may have ribbed bodies (for a better strength-to-weight ratio).
- Determining if a suspect pump meets requirements to be considered strategic will generally require [technical reachback](#).

#### Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

### 8414.10 Vacuum pumps



Figure 39 Turbomolecular pump (left), seized Diffusion pump (centre), and a two-stage vacuum system (right)

#### Introduction:

- Vacuum pumps are used to remove air and other gases to create a vacuum. As with other pumps, vacuum pumps are quite common, but they can be important to many uranium enrichment and CW agent production processes.

#### Shipments:

- Vacuum pumps are shipped like other pumps (see 84.13 Pumps for liquids).
- Vacuum pumps are often combined into two-stage pumping systems and shipped as one unit.

#### Identification (distinguishing characteristics within HS category):

- There are many types of vacuum pumps (e.g., Roots pumps, rotary vane pumps, rotary lobe pumps, diffusion pumps, turbomolecular pumps, cryogenic pumps, ion pumps, scroll pumps, rotary screw pumps), but the type does not determine whether or not the pump is strategic. That depends on materials of construction (see [note](#) on corrosion-resistant materials at the beginning of Chapter 84) and capacity of the pump. Generally the capacity must be greater than 5 cubic metres per hour (i.e., 18.3 gallons per minute, 83.3 litres per minute, or 2.9 cubic feet per minute) to be considered strategic.

#### Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

### 8414.60 Hoods



Figure 40 Class I, II, and III Biosafety Cabinets.

#### Introduction:

- This HS code, which applies to ventilating or recycling hoods incorporating fans, includes a strategic commodity, namely the biological safety cabinet or biosafety cabinet (BSC).
- A BSC is an enclosed space that controls ventilation and the environment for work with infectious agents or toxins. BSCs reduce the risk of airborne infection by physically containing the work space used. They accomplish this goal through the use of directional airflow, HEPA filtration of supply and exhaust air, and a completely sealed workspace which operates under negative pressure.

#### Shipments:

- BSCs are typically wrapped in plastic and shipped in crates or on wooden pallets. Gloves, HEPA filters, and leg supports may be detached for shipping.

#### Identification (distinguishing characteristics within HS category):

- There are three classes (I, II, and III) of BSC. Class I and II BSCs are open in front, so only Class III BSCs are considered strategic. They have completely closed fronts (1), a pass-through box (2) to transfer items in and out, and attached gloves (3) for manipulating materials inside the cabinet.
- Hoods having a horizontal side larger than 120 cm would be classified under 8418.80 (Other), but this code includes many other types of machines and appliances as well.

Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

#### **84.17 Industrial or laboratory furnaces**

Introduction:

- Several types of electrical furnaces are considered strategic, but they are not covered by this HS heading, which only applies to non-electrical furnaces and ovens. Rather they fall under heading 85.14.
- Certain incinerators (8417.80) falling under this heading are strategic, specifically incinerators designed to destroy CW munitions, agents, or precursors. However, these would most likely be constructed onsite and are not likely candidates for Customs control.

#### **84.19 Machinery, plant or laboratory equipment....**

HS Heading 84.19 encompasses a significant number of strategic goods, including freeze dryers, spray dryers, fermenters, chemical reaction vessels, heat exchangers, distillation columns, chambers for aerosol challenge testing, and micro-encapsulation equipment. A few examples are profiled.

##### **8419.39 Freeze dryers**



**Figure 41 Compact laboratory freeze dryer (left) and industrial-scale freeze dryer (right)**

Introduction:

- Freeze dryers (also known as lyophilizers) preserve organic material by freezing and drying in a vacuum. The preservation process allows long term storage at room temperatures.
- They are strategic because they can be used to preserve and stabilize BW agents and toxins and to enhance their effectiveness.

Shipments:

- Freeze dryers would be boxed (small units) or crated (larger units) and shipped with associated vacuum pumps and manifolds.

Identification (distinguishing characteristics within HS category):

- HS 8419.39 applies, but they are frequently declared using 8419.89.
- To be considered strategic, must be steam-sterilizable and of moderate capacity (capable of producing between 10 and 1000 kg of ice in 24 hours).
  - Examination of included documentation and manuals usually reveals this information.

Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

### 8419.39 Spray dryers



Figure 42 Production-scale spray dryer

Introduction:

- Spray dryers produce powder from liquid by spraying the liquid into tiny droplets and immediately contacting the droplets with hot drying gas.
- They are strategic because they can be used to stabilize BW agents or toxins and potentially produce powders small enough to be inhaled.

Shipments:

- Laboratory-scale spray dryers may be shipped intact, while production-scale spray dryers may be shipped in multiple pieces.
  - Those pieces, when presented separately, could be classified under other HS headings depending on their constituent materials and technical features.

Identification (distinguishing characteristics within HS category):

- Spray dryers can be recognized by their cylindrical drying chambers which are tapered at the bottom. Spray dryers of concern can produce particles smaller than 10 µm.
- Generally smaller-scale spray dryers are of concern (systems that would fit inside a room) while very large systems are of less concern.

Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

## **8419.50 Heat Exchangers**



**Figure 43 Shell and tube, plate and frame, and block heat exchangers**

### **Introduction:**

- Heat exchangers are used to control the temperature of chemical reaction mixtures, chemical feeds, or products. To avoid contamination from mixing process chemicals from the fluid used for temperature control, the fluids are physically separated by thermally conductive tubes, plates, or blocks.

### **Shipments:**

- Depending on their size and durability, heat exchangers may be strapped to pallets or secured in crates for shipping. Ports should be capped for shipping to prevent contaminants from entering the heat exchanger. Large heat exchangers might be strapped to flatbed trucks with special cradles.

### **Identification (distinguishing characteristics within HS category):**

- HS 8419.50 is specific to heat exchangers, but not to strategic versions.
- Manufacturer's nameplates are helpful for identifying commodities and their specifications. To be considered strategic, according to Australia Group guidelines, a heat exchanger should have a heat transfer area greater than 0.15 square meters but less than 20 square meters and all wetted surfaces should be made from corrosion resistant materials such as high-nickel alloys, glass, or fluoropolymers (see [Note regarding materials of construction](#)).
- Heat exchangers and condensers come in a wide variety of designs, but all share some common physical features. First, they have pairs of fluid connections for the chemical stream and the temperature-controlling fluid. Second, they are composed of a series of thermally conductive barriers to keep the process chemicals and temperature-controlling fluid physically separated.
- Three common types of heat exchangers are shell and tube, plate and frame, and block designs.

### **Seizures and Disposition:**

- No special seizure and disposition issues are identified for this commodity.

## **8419.89 Chemical Reaction Vessels**



**Figure 44 Chemical reaction vessels**

### **Introduction:**

- Chemical reaction vessels are used to combine different chemicals to make ([synthesize](#)) new chemical compounds. They fall under HS 8419.89 if they incorporate means of heating or cooling, as they usually do.

### **Shipments:**

- Smaller lab-scale units are shipped in cardboard boxes or wooden crates.
- Industrial-size units are skid mounted, with ports capped.
- The agitator may be attached, shipped separately, or absent.

### **Identification (distinguishing characteristics within HS category):**

- HS 8419.89 is not specific to chemical reaction vessels. Chemical reaction vessels are generally cylindrical, with ports and flanges on the top, including a mount for an agitator.
- Manufacturer's nameplates are helpful for identifying commodities and their specifications. To be considered strategic, a chemical reaction vessel should have a volume greater than 100 litres but less than 20,000 litres and all wetted surfaces should be made from corrosion resistant materials such as high-nickel alloys, glass, or fluoropolymers (see [Note regarding materials of construction](#)).

### **Seizures and Disposition:**

- No special seizure and disposition issues are identified for this commodity.

## 8419.89 Fermenters



**Figure 45 Laboratory-scale fermenter**

### Introduction:

- A fermenter is a specialized vessel used to grow micro-organisms. They are used extensively in the food industry and for the production of medications and vaccines, but they are also used to produce BW agents.
- They usually consist of a glass or polished stainless steel vessel with a drive motor for stirring and a control system. They may also take the form of disposable systems.
- Also known as bioreactors or chemostats.

### Shipments:

- The vessel will generally be separated from the drive motor and wrapped in plastic with ports covered. The whole vessel will then be boxed or crated. Electronic control units usually will be packaged separately.

### Identification (distinguishing characteristics within HS category):

- HS 8419.89 is not specific to fermenters. Fermenters used in production of wine and beer are classified under 8435.10 or 8438.40.
- Fermenters are also frequently classified under 8479.82 (as mixing or stirring machines).
- To be strategic, a fermenter should be at least 20 litres or greater in volume and capable of cultivation of pathogenic micro-organisms, viruses or for toxin production, without the propagation of aerosols.

### Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

## 84.21 Centrifuges and Filtering or Purifying Machinery

HS Heading 84.21 encompasses several strategic items, including centrifuges, spray dryers, centrifugal separators, and filtration equipment. Note that gas centrifuges for separation of uranium isotopes fall under HS 8401.20.

### 8421.19 Centrifuges



Figure 46 Centrifuge for calibrating accelerometers (left) and (non-strategic) laboratory centrifuge (right)

#### Introduction:

- A centrifuge is a machine that rapidly rotates a container to apply centrifugal force to its contents. They are used to test and calibrate accelerometers used in missile guidance systems.

#### Shipments:

- Packaging will be robust but not distinctive.

#### Identification (distinguishing characteristics within HS category):

- Typical laboratory centrifuges for spinning liquid samples are not of concern.
- Centrifuges capable of imparting accelerations above 100 g may be strategic.

#### Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

### 8421.19 Centrifugal separators

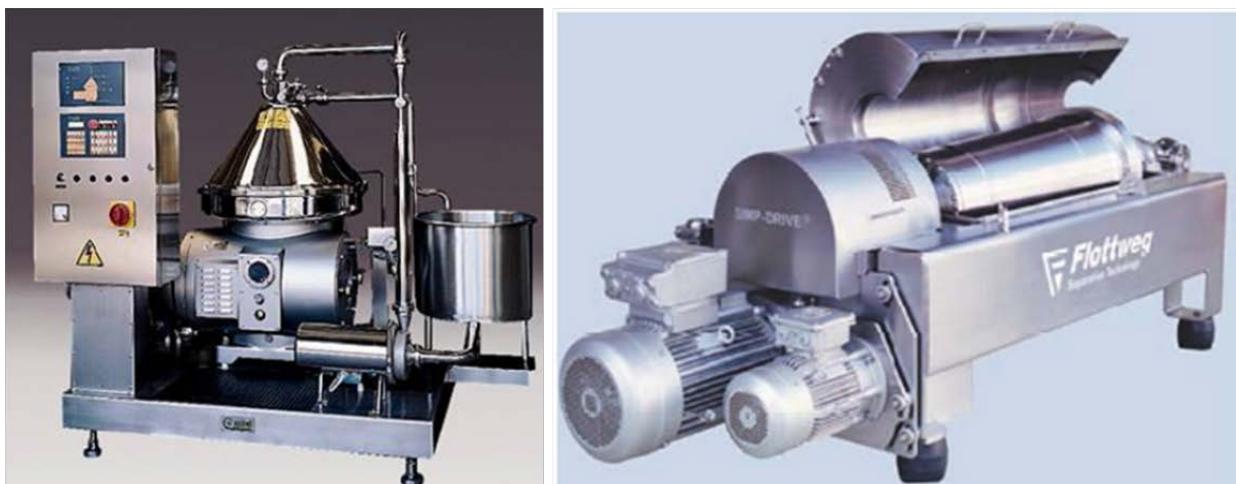


Figure 47 Centrifugal separator (left) and decanter centrifuge (right)

#### Introduction:

- A centrifugal separator spins a mixture of solids and liquids (or liquids and liquids) to separate heavier materials from lighter materials. They are commonly used in water purification and the pharmaceutical and food industries.
- They are of strategic concern because they are used to [recover](#) BW agents or toxins from their growth media.
- May be referred to as “decanter centrifuges” or “disk stack centrifuges”.

#### Shipments:

- Controlled centrifuges are heavy items and likely packaged in crates or on pallets. Decanters may ship with the spin bowl separated from its metal housing. Rotating assemblies may be raised on transportation brackets to protect their bearings during shipping.

#### Identification (distinguishing characteristics within HS category):

- Centrifugal separators are easily recognized by their distinctive polished, conical bowl.
- Decanter centrifuges have a horizontal orientation.
- Strategic centrifugal separators should be capable of continuous operation (at least 100 litres per hour) and have titanium or polished stainless steel components. They should also be capable of being steam sterilized while closed.
  - Continuous operation implies that these machines should have at least three connections (one inlet and two outlets) plus at least one more connection for steam sterilization.

#### Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

### 8421.29 Cross-flow filtration equipment



Figure 48 Cross-flow filtration system

#### Introduction:

- In cross-flow filtration equipment, a solution is filtered as it flows parallel to a membrane, in contrast to traditional direct flow filters in which the liquid flows perpendicular to the surface of the filter.
- Cross flow filtration is used in microbiological processing to separate microorganisms or their products from solution. It is also used in food processing for liquid clarification and in the dairy industry to reduce bacterial content of dairy products. They are strategic because they can be

used to [recover](#) BW agents or toxins from fermentation broth.

- Also known as tangential-flow filtration.

Shipments:

- Packaging will be robust but not distinctive.

Identification (distinguishing characteristics within HS category):

- Strategic cross-flow filtration systems should have a total filtration area of at least 1 square metre.
- Systems are often made of polished stainless steel or titanium and they often comprise an array of parallel cylinders (combining the filtration area of several modular filters).

Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

#### **8421.29 or 8421.99 Filtering Elements**



**Figure 49 Cross-flow filter cassettes**

Introduction:

- Filter cassettes and membranes for [cross-flow filtration systems](#) are also strategic items.

Shipments:

- Filter cassettes are usually packed in cardboard boxes.

Identification (distinguishing characteristics within HS category):

- These HS codes apply to parts of filtering or purifying machinery, including many ordinary filtration systems that are not strategic. The key distinguishing characteristic will be if the filter module is designed for tangential flow. The most common types are flat plate cassettes or cylinders. They are usually polymeric (plastic) but can be ceramic or stainless steel.
  - Note that many filtering elements will be classified according to their constituent material.
- Filter cassettes for cross-flow filtration equipment are considered strategic if they have a filtration area of at least 0.2 square metres.

Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

### **8422.30 Filling equipment**



**Figure 50 Filling equipment**

Introduction:

- HS 8422.30 (machinery for filling containers) applies to strategic equipment that can be remotely operated to fill CW munitions with toxic, corrosive CW agents or to otherwise transfer such toxic and corrosive chemicals into containers.

Shipments:

- Packaging will be robust but not distinctive.

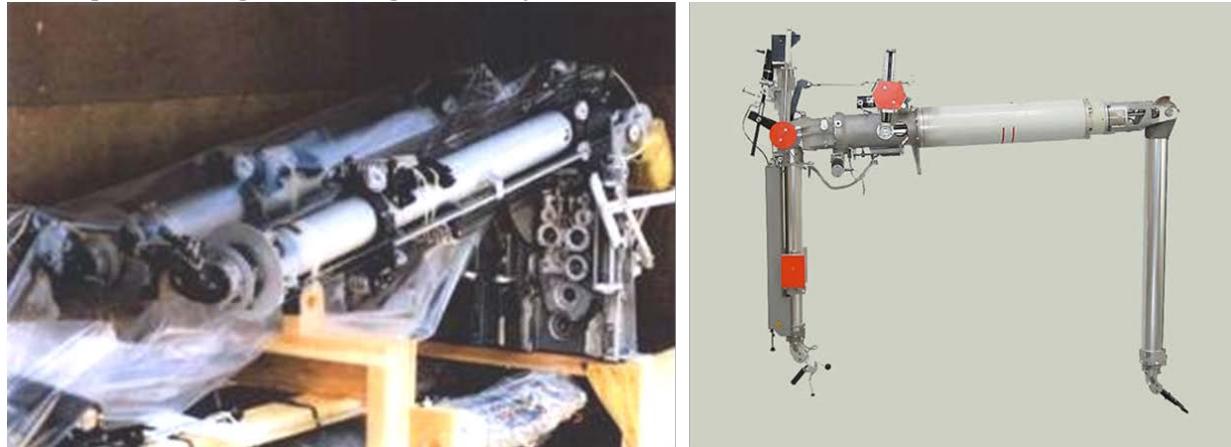
Identification (distinguishing characteristics within HS category):

- To distinguish filling equipment of strategic concern from common filling equipment used, for example, in the beverage industry, key features are remote operability and use of corrosion-resistant [materials](#) such as nickel, nickel alloys, or nickel-chromium alloys.

Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

### **84.28 Special Lifting or Handling Machinery**



**Figure 51 Remote manipulators**

Introduction:

- Remote manipulators allow a hand-like mechanism to be controlled by a human operator, usually to safely move or manipulate hazardous materials. They may be of mechanical or operated by joystick or keypad.
- Remote manipulators are strategic because they enable handling of highly radioactive materials in a hot cell shielded facility.
- Also known as “telemanipulators” and “master-slave manipulators”

Shipments:

- Mechanical master-slave manipulators are generally shipped as a single unit, packaged on support blocks to prevent motion and wrapped in plastic.

Identification (distinguishing characteristics within HS category):

- HS 8428.90 applies to many special lifting or handling machinery items besides remote control manipulators.
- Remote manipulators suitable for use in a nuclear hot cell facility and quite unique, sophisticated, and expensive machines. To be considered strategic, they should be large enough to work through or over at least a 30 cm thick shield wall.

Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

#### 84.45 Winding machines...

Introduction:

- HS heading 8445 applies to machines for the preparation of textile fibres, but because it uses the term “winding machines”, the trade community may use this code for filament winding machines used for the production of such structural composites.
- Filament winding machines are discussed under 84.77 Machinery for producing articles of fibre-reinforced plastics.

Identification (distinguishing characteristics within HS category):

- Shipments of items falling under this HS code would commonly involve the textile industry, but filament winding machines for the production of structural composites would not be used for production of textiles.

#### 84.46 Weaving machines...

Introduction:

- HS heading 8446 applies to weaving machines (looms) for production of fabrics, but because it uses the term “weaving machines”, the trade community may use this code for multi-directional, multi-dimensional weaving machines used for the production of composite structures.
- Weaving machines for the production of composite structures are discussed under 84.77 Machinery for producing articles of fibre-reinforced plastics.

#### **84.56 Electrical discharge machines**



**Figure 52 Plunge-type EDM**

##### **Introduction:**

- HS 8456.30 applies to machine-tools for removing metal by the electro-discharge process (i.e., by sudden electrical discharges). These are sometimes known as electric-spark cutting machines or EDMs.
- They are strategic because they can be used for cutting critical components for nuclear weapons and certain uranium enrichment equipment components.

##### **Shipments:**

- EDMs are likely to be shipped as a unit in a large crate, but the control unit might be in a separate box. The console containing the electronics and electrical power supplies for the machine tool may also be packaged separately.

##### **Identification (distinguishing characteristics within HS category):**

- There are two basic types of EDMs, a ram- or plunge-type that uses a fixed electrode and a wire-type that uses a continuously moving wire.
  - The plunge type is considered strategic if it meets certain technical capabilities (especially having two or more rotary axes that can be coordinated simultaneously
    - These are often referred to as “Sink EDM” or “Plunge EDM”
    - While these machines generally look similar to milling machines, they do not have a rotating spindle for a cutting tool.
  - The wire-type is not considered strategic.
- Used machines can pose a significant risk, as compliance with licensing or permitting requirements is often less common in the secondary market.

##### **Seizures and Disposition:**

- No special seizure and disposition issues are identified for this commodity.

#### **84.57 Machining centres (vs. 84.59)**

##### **Introduction:**

- Machining centres carry out several machining operations on metal using automatic tool change. Machines discussed under headings 8459 to 8461 may be classified under 8457 if they have such capabilities.

#### **84.58 Turning machines (lathes)**



**Figure 53 Turning machine**

##### **Introduction:**

- Turning machines rotate a metal part being machined and remove material using a cutting tool that does not spin. (Note that spinning lathes, which deform rather than cut the material, are classified under HS heading [84.63](#).)
- Turning centres may also have milling function (so-called mill-turn machines).
- They are strategic because they can be used for producing certain components for nuclear weapons and machines for uranium enrichment.

##### **Shipments:**

- Turning machines are likely to be shipped as a unit in a large crate, but the control unit might be in a separate box. The console containing the electronics and electrical power supplies for the machine tool may also be packaged separately.

##### **Identification (distinguishing characteristics within HS category):**

- Only numerically controlled turning machines are considered strategic. These are classified under HS 8458.11.
- Turning machines have a spindle for holding the part to be machined.
- They are considered strategic if they have very good positioning accuracy (typically better than 6 µm) and two or more axes which can be coordinated simultaneously.
- Used machines can pose a significant risk, as compliance with licensing or permitting requirements is often less common in the secondary market.

##### **Seizures and Disposition:**

- Caution: determining if a machine tool meets the accuracy specifications of national legislation is technically challenging. [Technical reachback](#) to the national authority is advised.

#### **84.59 Milling machines**



**Figure 54 CNC milling machines and a rotary table**

#### **Introduction:**

- Milling machines work a metal surface by means of rotating tools combined with a traversing movement of the article fixed on the machine table.
- They are strategic because they can be used for cutting critical components for nuclear weapons and certain uranium enrichment equipment components.

#### **Shipments:**

- Milling machines are often wrapped in plastic and shipped as a unit in a large crate, but the control unit might be in a separate box. The console containing the electronics and electrical power supplies for the machine tool may also be packaged separately.
- For very large machines, major components such as the bed, column, spindle assembly, and

drive motors are likely to be shipped in separate crates.

Identification (distinguishing characteristics within HS category):

- HS codes 8459.21, 8459.31, 8459.51, and 8459.61 correspond to numerically-controlled machines, which are the ones of strategic interest.
- In particular, machines having five or more axes, two or more rotary contouring axes, or positioning accuracies better than 6 µm are strategically significant.
  - Presence of a rotary table (see Figure 54) is a good indication that the machine has rotary axes, but this can also be accomplished with a swivelling cutting tool.
- Used machines can pose a significant risk, as compliance with licensing or permitting requirements is often less common in the secondary market.

Seizures and Disposition:

- Caution: determining if a machine tool meets the accuracy specifications of national legislation is technically challenging. [Technical reachback](#) to the national authority is advised.

#### **84.60 Grinding machines**



**Figure 55 Numerically-controlled precision grinding machine**

Introduction:

- HS heading 84.60 covers certain surface-finishing machines for metals, including grinding machines of various types (e.g., internal surface grinders, centreless surface grinders, surface grinding machines, thread grinding machines, etc) whose function is to perfect, to the desired degree of precision, the work of other machines. (Note that grinding machines designed to work on micro-organisms, viruses, and toxins are classified under HS 8479.82.)

Shipments:

- Grinding machines are likely to be shipped as a unit in a large crate, but the control unit might be in a separate box. The console containing the electronics and electrical power supplies for the machine tool may also be packaged separately.

Identification (distinguishing characteristics within HS category):

- HS codes 8460.11 and 8460.21 correspond to accurate, numerically-controlled machines, which are the ones of strategic interest.
- In particular, machines having five or more axes or positioning accuracies better than 4 µm are

strategically significant.

- While these machines generally look similar to milling machines, they use abrasive disks, wheels, or drums as their cutting tools.
- Used machines can pose a significant risk, as compliance with licensing or permitting requirements is often less common in the secondary market.

#### Seizures and Disposition:

- Caution: determining if a machine tool meets the accuracy specifications of national legislation is technically challenging. [Technical reachback](#) to the national authority is advised.

### 84.62 Presses

#### Introduction:

- HS heading 84.62 applies to presses for working metal or metal carbides, including (according to explanatory notes) "presses for moulding metallic powders by sintering". As a result, the trade community often uses this code for isostatic presses. However, as these can be used for sintering of materials other than metals or metal carbides, they should not be classified under heading 84.62.
- There are two principal types of strategic isostatic presses. Cold isostatic presses (CIPs) are described under [84.79](#) below, while hot isostatic presses are described under [85.14](#).

### 84.63 Other machine tools...

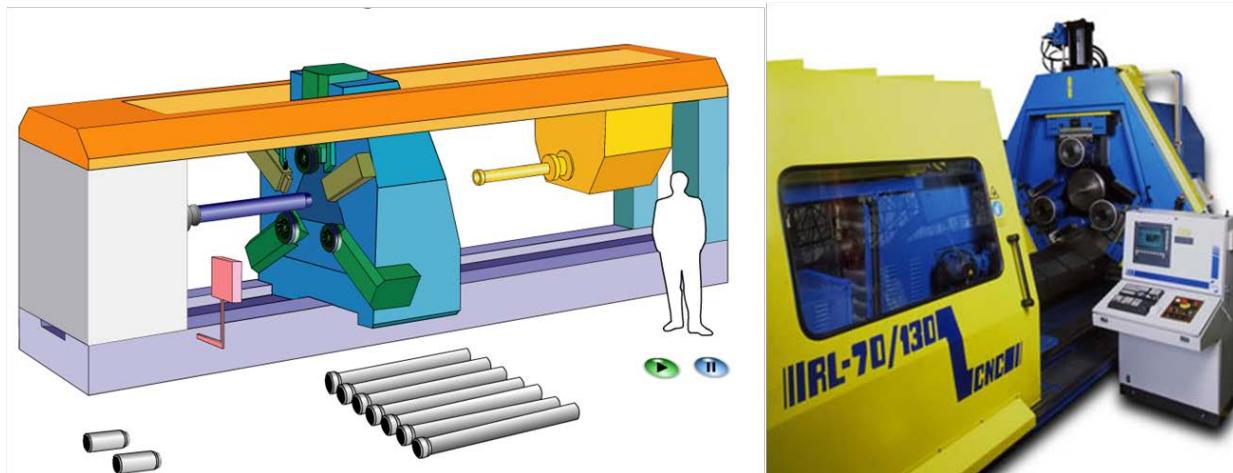


Figure 56 Flow forming machine

#### Introduction:

- HS Heading 8463 includes "spinning lathes" which differ from ordinary [lathes](#) by the fact that they operate by deforming (rather than cutting or removing) the metal. They look like lathes except that they use rollers rather than cutting tools.
- Flow-forming machines (and spin-forming machines with flow-forming functions) are used to manufacture hollow, symmetrical, relatively thin-walled shapes from conical, disk-, or ring-shaped preforms. The preform is spun and pressed against a mandrel with rollers to give it the desired shape. Flow forming applies extremely high forces to reduce the thickness of the material.
- Note that traders may classify flow forming machines under HS heading 84.55 as "rolling mills."

#### Shipments:

- Spinning lathes are heavy industrial items, generally shipped in large crates.
- Large vertical machines are usually shipped with these components boxed separately.
  - Roller arms
  - Vertical columns

- Mandrels
  - Control unit
  - Hydraulic supply and power unit
- Smaller vertical machines as well as horizontal machines may be shipped in a large container. The roller arms will be shipped in the assembled configuration.
- As with the larger vertical machines, the control unit and hydraulic power supply will usually be boxed separately.

Identification (distinguishing characteristics within HS category):

- Under this heading, flow-forming machines are considered strategic if they meet certain technical requirements because they can be used to form rotors for uranium enrichment gas centrifuge machines or missile propulsion components.
- A key consideration is the number of rollers or number of axes that can be coordinated simultaneously. Machines with three or more rollers or two or more axes are of particular interest.
- Manufacturer's name plates, manufacturer names, and model numbers are particularly valuable for identifying these commodities.
- Used machines can pose a significant risk, as compliance with licensing or permitting requirements is often less common in the secondary market.

Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

#### 84.77 Machinery for producing articles of fibre-reinforced plastics



Figure 57 Filament winding machines

Introduction:

- Filament winding machines produce fibre-reinforced plastics (FRP) by winding continuous resin-impregnated fibres onto a rotating mandrel in a precise geometric pattern to produce strong, durable and lightweight composite materials that are often stronger and lighter than steel. They are used in the production of aerospace composite components, sporting goods, storage tanks and pipes. They are strategic because they are also used to produce composite rotors for uranium enrichment gas centrifuge machines and manufacturing structural components for missiles.

Shipments:

- Machines are generally shipped in crates or in plastic film cocoon wraps. Control panels will usually be wrapped in plastic.
- Smaller machines (tabletop or freestanding) are usually shipped in one piece. Larger machines may be shipped as separate components, and long carriage bed structures may be disassembled into sections for shipment

Identification (distinguishing characteristics within HS category):

- Filament winding machines have numerical control panels, a steel frame or structure for holding the ends of the mandrel(s), drive spindles for turning the mandrel(s), and a feedeye rail and carriage with spools for fibre. They will also have flanged feet for bolting them to the floor.
- See also [84.45](#) and [84.46](#) above.

Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity

#### **84.79 Machines and mechanical appliances having individual functions not specified or included elsewhere**

HS heading 84.79 applies to machines not covered more specifically elsewhere, and HS code 8479.89 applies to "Other machines and mechanical appliances" not listed elsewhere under heading 84.79. Several strategic items classify under this heading.

#### **8479.50 Robots**



**Figure 58 Robots**

Introduction:

- Robots are programmable mechanisms that are capable of positioning or moving in 3 dimensions, much like a human arm. They can move material, parts, or operate tools. They are routinely used for manufacturing painting, welding, foam spraying, and water-jet cutting.
- Some industrial robots are considered strategic, including those designed for handling explosives and those designed for handling radioactive materials.

Shipments:

- Robot will usually be intact when shipped except for any end-effectors (tools) and the associated control unit and power supply, which would be in separate crates.

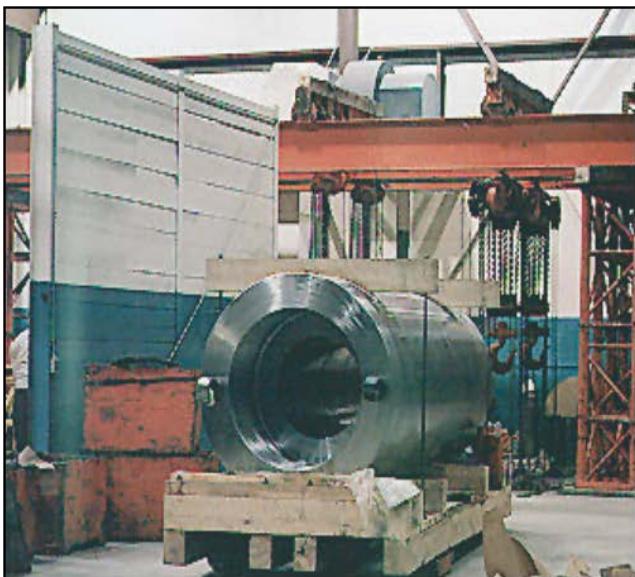
Identification (distinguishing characteristics within HS category):

- This HS code applies to industrial robots capable of performing a variety of functions by using different tools. Robots specifically designed to perform a specific function (such as painting, spraying, cutting, or welding) would be classified under headings covering their function.
- To distinguish strategic robots from more common industrial robots, indications on associated paperwork of radiation-hardening or "explosion-proof" designs would be good indicators.

Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

## **8479.89 Cold isostatic presses**



**Figure 59 Isostatic press**

### **Introduction:**

- See also [84.62](#) (presses, where the trade community often classifies isostatic presses) and [85.14](#) (hot isostatic presses).
- Cold isostatic presses use a fluid to apply pressure to a mould in a pressure chamber to compact powders to form solid parts with uniform density.
- They are strategic because they can be used to produce nuclear explosive device parts.

### **Shipments:**

- Large pressure chambers are very heavy (thousands of kilograms) due to their thick walls. Use of wood pallets and steel banding is common. They are typically shipped individually.

### **Identification (distinguishing characteristics within HS category):**

- The most notable feature of a typical isostatic press is the thick-walled pressure chamber closed on one end and having a threaded closure plug on the other end. These machines typically cost hundreds of thousands of USD.

### **Seizures and Disposition:**

- No special seizure and disposition issues are identified for this commodity.

## 84.81 Valves



Figure 60 Bellows-sealed vacuum valve (left), flouropolymer-lined valve (centre), servo-vale (right)

### Introduction:

- Valves are used to control and regulate the flow of gases and liquids. They are true dual-use items since they are so widely used for non-WMD purposes. Only certain specialized valves are considered strategic, for example because they can be used to process uranium hexafluoride gas in a uranium enrichment facility or toxic and corrosive chemicals in a CW facility. Also, certain servo valves used in missiles are considered strategic.

### Shipments:

- Small valves are usually shipped in cardboard boxes. Each box may contain one or multiple valves depending on size.
- Large valves are shipped in crates or on pallets.

### Identification (distinguishing characteristics with HS category):

- Strategic valves are likely to be much more expensive than typical valves, meaning that strategic valve shipments will likely have abnormally high unit costs and cost-to-weight ratios for HS heading 8481.
- Valves may be strategic if they are made with certain corrosion-resistant materials (see [introductory note](#) to chapter 84).
  - Bellows-sealed valves are of particular interest.
  - Corrosion-resistant materials lining the wetted surfaces of the valve may be visually distinctive.
- Valves would also be considered strategic if they were especially designed or prepared for nuclear use. One possible indicator of such preparation would be a so-called “N-stamp”
- Valves for missiles are typically servo valves (electrically operated). Two kinds are identified as strategic:
  - Servo valves used in flight control systems (designed or modified to operate in a vibration environment. They will have hydraulic and electrical connections on the side of the device. They may be constructed from stainless steel and have mounting swivels at either end.)
  - Servo valves for use in liquid propellant systems, with flow rates greater than 24 litres per minute, at pressures of 7 megapascals or more, with actuator response time less than 100 milliseconds.

### Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

## *2.20 HS Chapter 85 (Electronics)*

Electronics belonging to HS Chapter 85 cover a wide array of strategic goods, including stand-alone electronic equipment as well as certain electronic components. Often key to identifying electronic equipment are manufacturers' nameplates that give the manufacturer name and model number of the equipment. Even when equipment of a type that is considered strategic is identified, determining whether it meets the specifications found on national control lists often requires technical reachback.

#### **8504.40 Direct Current (DC) Power Supplies**



**Figure 61 High-voltage power supply (HVPS)**

##### **Introduction:**

- HS 8504.40 applies to rectifiers, which convert alternating current (AC) to direct current (DC). Some DC power supplies are strategic because they are used to create a steady magnetic field in the electromagnetic isotope separation process (EMIS).

##### **Shipments:**

- High-power or high-voltage DC power supplies are typically packaged for shipping in reinforced, heavy weight plywood crates. They weigh from 1000s of kg up to 10,000s of kg and they may be from 1 to 3 meters on a side.
- The power supply may use transformers designed to be filled with oil, but they will typically be shipped dry. They will have nameplates indicating both dry and wet weights.

##### **Identification (distinguishing characteristics within HS category):**

- Current or voltage stability better than 0.1% is an important characteristic of strategic power supplies.
- High-power DC power supplies should provide 100 volts at 500 amperes or greater, i.e., 50 kVA).
- High-current DC power supplies should provide 20 kilovolts at 1 ampere or greater, i.e., 20 kVA).

##### **Seizures and Disposition:**

- No special seizure and disposition issues are identified for this commodity.

## **8504 .40 Inverters**



**Figure 62 Variable-frequency motor controllers**

### **Introduction:**

- HS 8504.40 also applies to "alternating current converters and cycle converters"<sup>77</sup> by which alternating current (single or polyphase) is converted to a different frequency.
- A very important strategic commodity that falls within this classification is the frequency changer, which provides the high-frequency power needed to spin uranium enrichment gas centrifuge machines at high speed.
- Also known as inverters, converters, variable frequency drives, AC power supplies, and speed-driven motor controllers.

### **Shipments:**

- Frequency changers are typically wrapped in plastic and packaged in sturdy cardboard boxes with material to absorb shock and vibration.

### **Identification (distinguishing characteristics within HS category):**

- The key parameter to distinguish strategic frequency changers from other "static converters" is the ability to produce a multi-phase output at a frequency of 600 Hz or more. If that requirement is met, then technical reachback may be appropriate to check if other requirements are also met.
  - Most commercial frequency changers are limited to 400 Hz or less.

### **Seizures and Disposition:**

- No special seizure and disposition issues are identified for this commodity.

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<sup>77</sup> HS Explanatory Notes

## **85.06 Primary batteries**



**Figure 63 Thermal batteries**

### **Introduction:**

- A very special type of battery that is considered strategic is the thermal battery. These single-use batteries contain a solid electrolyte and a pyrolytic material that when ignited melts the electrolyte and activates the battery. They are considered strategic only if designed or modified for use in missile systems.

### **Shipments:**

- Thermal Batteries are shipped in metal or plastic crates or in padded cardboard boxes.

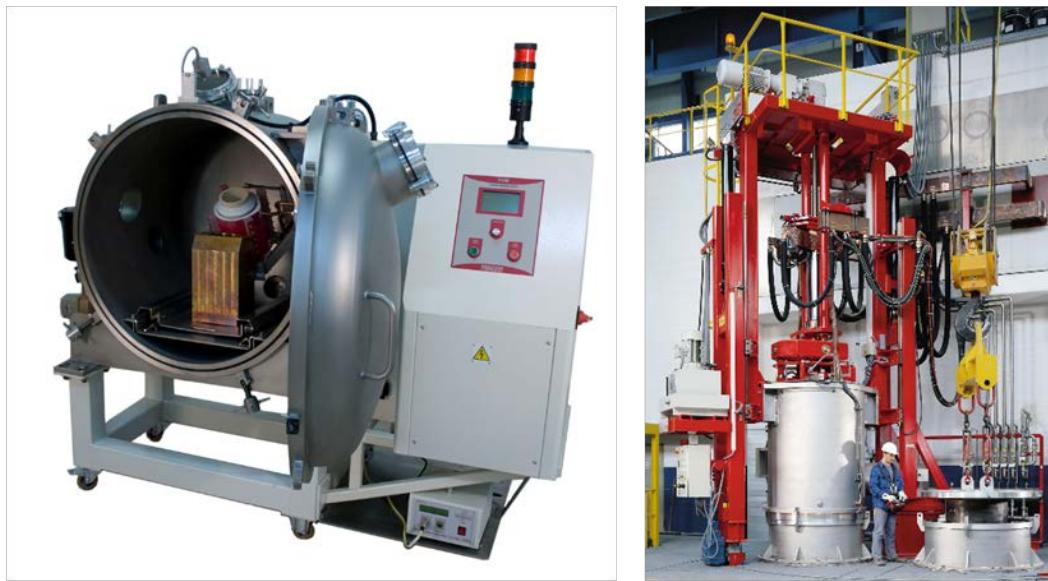
### **Identification (distinguishing characteristics within HS category):**

- Thermal batteries are manufactured in vacuum-sealed steel housings.
  - Electrical connections may have distinctive glass-to-metal hermetic seals.
  - May have threaded mating cable connector and mounting flanges.
- Thermal batteries are much more expensive on a per unit basis than other primary batteries, which should make them stand out within the HS heading.

### **Seizures and Disposition:**

- No special seizure and disposition issues are identified for this commodity.

## **85.14 Furnaces**



**Figure 64 Vacuum Induction furnace (left) and arc remelt furnace (right)**

### **Introduction:**

- HS heading 85.14 applies to a number of industrial or laboratory type electric furnaces. Furnaces which may be strategic (because they can be used in the production of nuclear-explosive components) include vacuum (or controlled atmosphere) induction furnaces (8514.20) and plasma, electron-beam, or arc furnaces (8514.30).
- HS heading 85.14 can also apply to hot isostatic presses, also known as HIPs. These resemble [cold isostatic presses](#), but they compress and sinter parts simultaneously by applying a pressurized and heated gas to material in a pressure chamber. They are strategic because they can be used to produce structural components for missiles such as rocket nozzle inserts and re-entry vehicle nose tips.

### **Shipments:**

- Cylindrical furnaces and components are usually shipped in wooden crates held by banding iron.
- Ports on furnace housings are labelled and covered during shipping to prevent foreign matter from entering the furnace system.
- Crucibles, induction heating coils, plasma torches, and e-beam guns may be installed or packaged separately. Support equipment such as vacuum pumps, power supplies, hydraulic pumps, and control consoles are usually shipped in separate wooden crates

### **Identification (distinguishing characteristics within HS category):**

- HS 8514.10 can apply to hot isostatic presses if fitted with a resistance heated furnace. Distinguishing characteristics are discussed under the [cold isostatic press](#) entry.
- HS 8514.20 is specific to induction furnaces.
  - Within this heading the key distinguishing characteristics are a closed chamber (to control the atmosphere), an induction coil 60 cm or smaller in diameter, capability to operate above 850 °C, and power of 5 kW or more.
- HS 8514.30 is very general, applying to all “other furnaces and ovens”.
  - Arc remelt furnaces can be identified by a tall cylindrical housing and hydraulic ram used to lower and raise the electrode.
  - Electron-beam and plasma furnaces should have power of 50 kW or more and be capable of operating above 1200 °C.

### **Seizures and Disposition:**

- No special seizure and disposition issues are identified for this commodity.

## 85.25 Digital Cameras

Introduction:

- Some cameras are considered strategic, regardless of whether they record images digitally (HS heading 8525) or chemically (HS heading [90.06](#)). Strategic cameras which may fall under this heading include:
  - Radiation-hardened cameras
  - High-speed cameras
  - Night-vision cameras



Figure 65 Radiation-hardened camera (left), high-speed camera (centre), and night-vision camera (right)

### 8525.80 Radiation-hardened cameras

Introduction

- Radiation-hardened cameras are designed or shielded to enable it to operate in a high-radiation environment. They are strategic because they enable processing of highly-radioactive materials, especially the separation of plutonium in reprocessing facilities.

Shipments:

- Radiation-hardened cameras are generally shipped in commercial-grade plastic containers with cushioning.
- Labels and nameplates should give manufacturer name, model number, and a serial number.

Identification (distinguishing characteristics with HS category):

- Radiation-hardened cameras are typically cylindrical with stainless steel or aluminium housings. They can be recognized as cameras by their lens at one end and electrical connection at the other.
- Often they can be distinguished from other cameras by their high unit value (tens of thousands of USD), shielded housings and thick, lead-glass lens covers.

Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

### 8525.80 High-speed cameras

Introduction

- High-speed cameras are strategic because they can be used in developing and testing nuclear explosive devices.
- Two types of high-speed cameras are identified on the NSG dual-use list:
  - Mechanical (rotating-mirror) streak and framing cameras. These use a rapidly-rotating mirror to achieve high frame rates or streak writing speeds.
  - Electronic streak and framing cameras use highly specialized optical and electronic components to generate images, and are less distinctive than rotating-mirror cameras.

Shipments:

- These cameras tend to be large, heavy, and extremely expensive. They will be very well packaged as expensive delicate instruments. They are generally shipped individually.

Identification (distinguishing characteristics with HS category):

- As mentioned under shipments, these cameras tend to be large (approximately 1 m on a side), heavy (hundreds of kg), and extremely expensive (more than USD 100,000), and those characteristics can help distinguish these cameras from other digital cameras shipped under this HS code.
- Rotating-mirror cameras often have metallic housings, an input for high-pressure gas (to drive the rotating mirror), a large high-quality lens, and (for older film-based rotating-mirror cameras) a distinctive circular or semi-circular shape.
  - To be considered strategic, they should have recording rates faster than 225,000 frames per second or streak writing speeds faster than 0.5 mm/ $\mu$ s.
- Electronic streak and framing cameras resemble ordinary large video camera, with a large high-quality lens and box-shaped electronic cabinet.
  - To be considered strategic, they should be capable of 50 ns or less time resolution or exposure time.

Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

### 8525.80 Night-vision cameras

Introduction

- Image intensifiers amplify very dim light to provide a usable image to the user. These have military applications for weapon aiming and optical surveillance.

Shipments:

- Night-vision cameras are generally shipped in sturdy cardboard boxes with cushioning.

Identification (distinguishing characteristics with HS category):

- Night-vision cameras may closely resemble binoculars or surveillance cameras. Some are dual-use, but others are primarily built for military use (MILSPEC).
- May be called “image intensifying cameras” or “electron bombardment CCD cameras”

Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

### 85.26 Radar Systems



Figure 66 Radar units – airborne (left), tracking (centre), and laser-tracking (right).

Introduction:

- Radars emit a pulse of electromagnetic energy and detect the energy reflected to them and calculate the distance to the sensed object. Radars designed for missile systems can be used

for guiding cruise missiles of UAVs (e.g., by terrain imaging) or fusing payloads (e.g., with radar altimeters). They can also be used from the ground for tracking launch vehicles.

- Radars also have extensive conventional military and commercial uses.

#### Shipments:

- Radars will typically be sealed in plastic bag and packaged carefully. The antenna structure and drive systems are especially sensitive. The systems are sealed in an air - tight enclosure and shipped in cushioned containers. A wide range of outer containers may be used including metal drums, wooden boxes, and composite or metal cases.

#### Identification (distinguishing characteristics within HS category):

- Radars are recognizable by their dish or array antennae attached to a gimbal mechanism for movement. Radar systems for missiles and UAVs are normally designed as a single assembly consisting of an antenna subassembly located at one end and the other components in one or more housings located nearby.

#### Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

### 85.32 Capacitors



Figure 67 Capacitors

#### Introduction:

- Ordinary capacitors are very common, and the vast majority of capacitors in trade are not considered strategic.
- The NSG and WA control lists identify special pulse discharge capacitors and high-energy storage capacitors.
- Pulse discharge capacitors are considered strategic because they are key components of nuclear weapon firing sets.
- Capacitors are also known as condensers.

#### Shipments:

- Common capacitors are often shipped on tape reels (each holding thousands of capacitors), but strategic capacitors are more commonly shipped in sturdy boxes in smaller quantities.

#### Identification (distinguishing characteristics within HS category):

- Strategic capacitors differ significantly from the small, inexpensive capacitors commonly used in consumer electronics.
  - Common capacitors used in consumer electronics are typically shipped in quantities of tens of thousands. They have very low unit values (~USD 0.01 per unit), are small (on the scale of millimetres), and have low mass (grams).
  - Pulse discharge capacitors have a very different profile, usually shipped in quantities between 10 and 100, with unit values of hundreds of dollars each, and they are considerably bigger (on the scale of several centimetres and weighing hundreds of grams each).
- If a shipment of capacitors is suspected of being strategic, technical specifications would need to be checked. They should have a voltage rating of at least 750 volts to warrant further investigation.

**Seizures and Disposition:**

- Caution is needed when handling capacitors, as they can store electrical energy and present a shock hazard. A shorting wire should be present between the terminals of a capacitor.
- Also, some capacitors may contain hazardous oils.

**8535.30 Switches for voltages exceeding 1,000 volts**



**Figure 68 Triggered spark gaps (left and centre) and krytron (right)**

**Introduction:**

- HS heading 85.35 typically covers electrical apparatus used in power distribution systems, but it also covers the types of switches described for heading 85.36 for voltage ratings exceeding 1,000 volts, including “electronic switches which operate by contactless means”. Strategic switching equipment fitting this description includes triggered spark gaps and cold cathode tubes (such as krytrons and sprytrons).
  - Note that traders might classify the cold cathode tubes under HS 8540.89.
- These switches are considered strategic because they are one of the primary components in nuclear weapons firing sets.

**Shipments:**

- No unusual or distinctive packaging is identified for this commodity. These switches are small electronic components, typically just a few centimetres on a side.

**Identification (distinguishing characteristics within HS category):**

- Triggered spark gaps are typically ceramic cylinders with three external metal connectors (two flat plats and one central trigger).
  - They would be considered strategic if rated for a peak current of 500 amperes or more

have an anode delay time of 15 microseconds or less.

- Sprytrons are small glass cylindrical bulbs, approximately 1 centimetre in length and diameter, with three external connectors. Krytrons look like sprytrons but have four external connectors. They also typically carry a warning label indicating that they contain radioactive materials.
  - Sprytrons and krytrons would be considered strategic if they have a peak current rating of 100 amperes or more, an anode delay time of 10 microseconds or less, and a voltage rating of 2.5 kilovolts or more.

#### Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

### **8540.81 or 8540.89 Photomultiplier Tubes (PMT)**

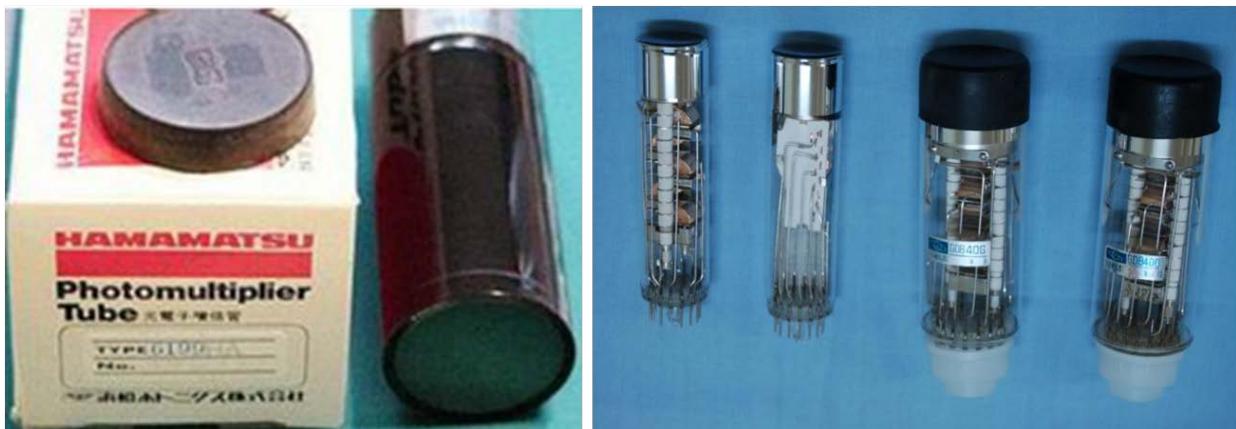


Figure 69 Photomultiplier tubes

#### Introduction:

- HS code 8540.81 refers to "receiver or amplifier valves and tubes". A strategic commodity classified under this code is the photomultiplier tube (PMT), which is a photosensitive vacuum tube comprising a photoemissive cathode and an electron multiplier. They are extremely sensitive light detectors that multiply the current produced by incident light, enabling individual photons to be detected. They are considered strategic because they can be used in nuclear testing.

#### Shipments:

- PMTs are usually shipped in individual cardboard boxes with shock absorbing material. Windows may be covered with an opaque layer for protection. A protective cap may be slipped over exposed leads.
- Label should give manufacturer and model number, and there should include a specification sheet indicating photocathode dimensions and pulse rise time.

#### Identification (distinguishing characteristics within HS category):

- HS 8540.81 is not specific to PMTs. They can be recognized by their glass vacuum tubes, reflective mirror-like surface near the window, and large number of electrical leads (11 or more).
- Strategic PMTs will have fast rise times (less than 1 nanosecond) and large photocathode area (greater than 20 square centimetres)

#### Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

### **8543.10 Particle Accelerators**



**Figure 70 Neutron generator (left) and well logging assemblies (right)**

#### **Introduction:**

- Under this subheading, neutron generators are of strategic interest. Neutron generators accelerate deuterium or tritium ions onto a deuterium or tritium target causing fusion reactions producing neutrons. They are strategic because the resulting neutrons could be used to initiate a nuclear explosive device.
- Common non-nuclear uses include oil well logging and neutron radiography.

#### **Shipments:**

- Complete well logging neutron generator assemblies will typically be packaged in long plastic pipes, wooden or plywood crates reinforced by steel bands, or metal boxes.
- Individual neutron tubes may be packaged in smaller wooden crates with metal bands.

#### **Identification (distinguishing characteristics within HS category):**

- HS 8543.10 applies to particle accelerators, so it is not specific to neutron generators.
- Labels may indicate that the package contains radioactive materials, specifically tritium in a sealed source.
- Neutron tubes may be acrylic, glass, ceramic, or steel.
- To be considered strategic, the neutron generator should be designed to operate without an external vacuum system.

#### **Seizures and Disposition:**

- Neutron generators may contain tritium and should be handled accordingly.

## 8543.20 Signal Generators



Figure 71 Pulse generators

### Introduction:

- HS 8543.20 applies to signal generators (apparatus for the production of electrical signals of known wave-form and magnitude, frequency, etc.).
- Under this heading, pulse generators are of strategic interest because they can be used to characterize the performance of high-speed recording equipment used in [nuclear testing](#).
- Note that frequency changers (see [8504.40](#)) are sometimes declared with this HS code, but signal generators do not produce appreciable output power and would not serve as gas centrifuge power supplies.

### Shipments:

- Pulse generators are typically packed into cardboard boxes with form-fitting polystyrene plastic surrounding the unit to absorb the shock and vibration incurred during transportation.

### Identification (distinguishing characteristics within HS category):

- HS 8543.20 is not specific to pulse generators.
- Basic pulse generators allow users to control the frequency or pulse repetition rate, the pulse width, pulse high-voltage and pulse low-voltage levels, and a delay for an internal or external trigger. More complex products allow control over the rise time and fall time of the pulses. To be considered strategic, a pulse generator should have a pulse transition time of less than 500 picoseconds (0.5 nanoseconds).
- Pulse generators typically have electronic cabinets, approximately 10 cm x 20 cm x 30 cm, weighing ~3 kg. They usually have connectors for coaxial cables (often labelled "trigger" and "out" or "ext").

## **8543.70 Other electrical machines and apparatus**



**Figure 72 Firing sets**

### **Introduction**

- Systems to fire electronic detonators, also known as firing sets, are usually classified under this HS code. Some firing sets are strategic because they can be used to trigger nuclear weapon detonators with precise timing.

### **Shipments:**

- Firing sets are typically packed into cardboard boxes with form-fitting polystyrene plastic surrounding the unit to absorb the shock and vibration incurred during transportation.

### **Identification**

- Firing sets will typically have markings indicating connection to detonators. To be considered strategic, they should be designed to fire multiple strategic detonators. This is often indicated by the term "parallel firing capability".
- Firing sets usually have compact, rugged electronic boxes with connectors for attaching detonators. Manual units will also have arming switches (often with a key lock for safety) and a firing button.
- Firing sets may be called "capacitive discharge units" or "capacitive discharge initiators" or simply "blasting machines"
- Note that traders could classify these under HS 8543.20.

### **Seizures and Disposition:**

- Firing sets contain pulse discharge [capacitors](#) that can store electrical energy and present a shock hazard (see 85.32 Capacitors).

## ***2.21 HS Chapter 87 (Vehicles)***

## **87.10 Tanks and other armoured fighting vehicles**



**Figure 73 Shipments of Armoured Fighting Vehicles**

### **Introduction:**

- This heading covers tanks and other armoured fighting vehicles and parts of such vehicles.
- Tanks are armoured fighting vehicles mounted on tracks, usually with a weapons turret.
- Other armoured vehicles are typically wheeled, lighter, and may only be partly armoured.

### **Shipments:**

- Armoured vehicles will typically be shipped intact, although weapon systems may not be fitted.
- They may be containerized, but are more typically shipped using roll-on/roll-off transport.

### **Identification (distinguishing characteristics within HS category):**

- Armoured vehicles can be readily recognized by their armour, heavy construction, and military colour schemes.
- As vehicles specially designed or modified for military use, goods falling under this HS heading are always considered strategic.

### **Seizures and Disposition:**

- No special seizure and disposition issues are identified for this commodity.

## ***2.22 HS Chapter 88 (Aircraft, spacecraft, and parts thereof)***

## **88.02 Aircraft and spacecraft**



**Figure 74 Unmanned Aerial Vehicles – long-endurance fixed wing (left) and rotary wing with chemical tanks and spraybars (right)**

Introduction:

- HS 8802.11 and 8802.12 apply to helicopters. HS 8802.20, 8802.30, and 8802.40 apply to aeroplanes and other aircraft.
  - An important strategic commodity classified here is the Unmanned Aerial Vehicle (UAV). UAVs (which are often called drones) are becoming increasingly common for applications like agricultural spraying, photography, surveillance, search and rescue, research, mapping, and surveying. However, they also represent growing strategic threats, as even very small UAVs can deliver chemical or biological payloads to precise locations.
- HS 8802.60 applies to spacecraft and launch vehicles.



**Figure 75 Crated UAVs**

Shipments:

- UAVs are often dismantled for shipment. Often one or more custom container will hold the fuselage, wings, tail, landing gear, and propulsion system separately.
- Ground-based flight controls may also be packaged separately.

Identification (distinguishing characteristics within HS category):

- UAVs resemble manned aircraft, but they are usually smaller and lack cockpits. Fixed wing designs are typically propeller-driven. Small systems may be powered by electric motors while larger systems may have internal combustion or turbine engines.
- Indicators that a UAV may be strategic include:
  - capable of carrying payloads of 500 kg
  - range of 300 km or more
  - capable of spraying 20 litres or more of a liquid
  - operated autonomously or beyond direct visual range.
- Disassembled UAVs would be unusually small and light relative to typical shipments using HS heading 88.02.

Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

## 2.23 HS Chapter 89 (Ships)

### 8906.10 Warships

Introduction:

- Warships are vessels specially designed or modified for combat. As such, they are armed and designed to withstand damage.

Shipments:

- Warships may be shipped using heavy lift ships, but may also provide their own transportation.

Identification (distinguishing characteristics within HS category):

- As vessels specially designed or modified for military use, goods falling under this HS heading are always considered strategic.

Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

## 2.24 HS Chapter 90 (Optical, photographic, measuring equipment)

### 90.06 [Film] Cameras

Introduction

- Most strategic cameras are now digital and are discussed under [85.25](#). It is possible that older (potentially used) film-based rotating-mirror cameras could be shipped under this HS code.

## 9013.20 Lasers



Figure 76 Industrial laser and typical markings

### Introduction:

- Lasers produce or amplify coherent electro-magnetic radiation in the wavelength range between 1 nm and 1 mm (ultra-violet, visible, and infra-red regions of the spectrum).
- Many powerful lasers are considered strategic because they can be used in laser-based uranium enrichment or in military applications.

### Shipments:

- Controlled lasers tend to be large and expensive. They will be packed in shock-instrumented wooden crates or specially-designed cases.

Identification (distinguishing characteristics with HS category):

- HS 9013.20 is unique to lasers. Identifying lasers is relatively simple (especially recognizing the international laser hazard symbol), but determining if they meet complex control criteria can be very challenging.
- The following general guidelines may help in rapidly determining if a laser merits further investigation:
  - Class IV lasers may produce enough power to make them strategically significant.
  - In general, lasers producing less than 1 W of power won't meet control requirements.

**Seizures and Disposition:**

- Caution: determining if a laser meets the control specifications of national legislation is technically challenging. [Technical reachback](#) to the national authority is advised.

### 9014.20 Aeronautical and space navigation instruments and appliances



Figure 77 Accelerometers (left and centre) and gyroscope (right)

**Introduction:**

- Examples of strategic commodities falling under HS 9014.20 are inertial sensors like accelerometers and gyroscopes. Accelerometers measure linear forces (acceleration) and gyroscopes measure rotational forces. They are strategic because they are used in missile guidance, navigation, control, and testing.
  - Note that accelerometers and gyros not used for navigation would be classified under HS 90.31.
- Gyroscopes may be called "rate sensors"

**Shipments:**

- Modern inertial sensors are quite small and lightweight. They are typically packaged one per box with their own cables. They are typically packed in special black or pink plastic bags for electrostatic protection. They tend to be shipped in small quantities (ones to tens) and are expensive (thousands of USD each).

**Identification (distinguishing characteristics with HS category):**

- HS 9014.20 is not unique to accelerometers and gyroscopes. Accelerometers and gyros typically have precisely machined metallic cases, a few cm on a side. Accelerometers usually have straight orientation arrows and gyroscopes have curved arrows. They will usually have mounting holes for attaching them to a larger system and electrical connectors or pins.

**Seizures and Disposition:**

- No special seizure and disposition issues are identified for this commodity.

### 90.15 Surveying instruments and appliances

Strategic items falling under HS 90.15 include gravity meters and well-logging instruments using neutron generators

## **9015.80 Gravity meters**



**Figure 78 Relative gravity meters (left and centre) and absolute gravity meter (right)**

### **Introduction:**

- Gravity meters are strategic because they are used to improve the accuracy of missiles. They may also be called gravimeters, gravimeters, or gradiometers.

### **Shipments:**

- Gravity meters are usually packed in custom cases as sensitive and expensive electronic equipment.

### **Identification (distinguishing characteristics with HS category):**

- HS 9015.80 is not unique to gravity meters.
- Gravity meters may be absolute or relative. Absolute gravity meters have a cylindrical vacuum chamber and are quite heavy (~100 kilograms). Relative gravity meters have level indicators (may be bubble-type), levelling screws, and are similar to car batteries in size and shape. Accuracy is important – not all gravity meters are considered strategic (but all gradiometers are).

### **Seizures and Disposition:**

- Caution: determining if a gravity meter meets the control specifications of national legislation is technically challenging. [Technical reachback](#) to the national authority is advised.

## 9022.19 X-ray systems



Figure 79 X-ray systems. LINAC (left) and flash x-ray (right)

### Introduction:

- HS 9022.19 applies to apparatus using x-rays for non-medical, non-dental purposes. X-ray systems can be strategic because they are used to test solid rocket-motors and nuclear weapon systems.

### Shipments:

- Small machines are typically packaged in wooden crates.
- Larger systems may be attached directly to a pallet or skid-mounted.

### Identification (distinguishing characteristics with HS category):

- X-ray systems of strategic interest include LINACs and flash x-ray systems.
  - LINACs should have energy levels of 2 MeV or greater, while flash x-ray systems should have energy level of 500 keV or greater.
  - LINACs are typically integrated systems in a single rectangular unit, usually ~1-2 meters on a side.
  - Flash x-ray systems usually have three major components: a cylindrical x-ray head, a pulsed x-ray generator (accelerator), and a control unit. X-ray heads will be approximately 1-2 meters in length and tens of cm in diameter.
- Manufacturer name plates should provide important information needed for identification, such as manufacturer name and model number.

### Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

## **9026.20 Instruments for measuring pressure**



**Figure 80 Pressure transducer**

### **Introduction:**

- A strategically significant instrument for measuring pressure is the pressure transducer, also known as the capacitance diaphragm gauge (CDG) or “electrical pressure gauges”, because they can be used for process control in uranium enrichment facilities. Pressure transducers measure liquid or gas pressure in a system and convert the measurement to an electronic signal that can be transmitted to recording equipment.

### **Shipments:**

- Pressure transducers are typically sealed in plastic and well packed individually in sturdy cardboard boxes. When more than one is shipped, these individual boxes are placed in a larger box for a single shipment.

### **Identification (distinguishing characteristics with HS category):**

- HS 9026.20 is not unique to pressure transducers, but pressure transducers are fairly unique compared to typical pressure-measuring instruments. Pressure transducers of strategic importance must be very accurate and corrosion-resistant, so they tend to be expensive. A typical strategic pressure transducer weighs ~ 1 kg and costs thousands of USD. They are typically cylindrical, with diameter of ~ 10 cm and length 10-20 cm. For pressure measuring instruments matching that profile, look for corrosion resistance and measurement of absolute pressure (rather than differential).
  - Absolute pressure-measurement instruments will have a single fluid connection, while differential pressure transducers will have two (usually marked low and high).
  - Pressure transducers will also have an electronic connection.

### **Seizures and Disposition:**

- No special seizure and disposition issues are identified for this commodity.

## **90.27 Other instruments and apparatus for physical or chemical analysis...**

### **Introduction**

- HS heading 9027 covers instruments and apparatus for physical or chemical analysis, and HS 9027.80 “other instruments and apparatus” covers several strategic items as well as a wide variety of non-strategic items. Two items identified here as strategic are:
  - Mass spectrometers
  - Toxic gas monitors

## 9027.80 Mass spectrometers



**Figure 81 Mass spectrometer**

### Introduction:

- Mass spectrometers are analytical tools used to determine the isotopic content of chemical samples. They are strategic because they can be used to monitor the performance of uranium enrichment processes.
- These are called “mass spectrographs” in the HS explanatory notes.

### Shipments:

- Complete mass spectrometers consist of several subsystems (mass analyser, vacuum system, computer, power supply, etc.), each of which would be packaged separately, usually in wooden crates marked as fragile.

### Identification (distinguishing characteristics with HS category):

- HS 9027.80 is not unique to mass spectrometers; it covers a broad range of “other instruments and apparatus”. Strategic mass spectrometers tend to be large (1-2 meters on a side) and very expensive (hundreds of thousands to millions of USD).

### Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

## 9027.80 Toxic gas monitors



Figure 82 Toxic gas monitors – fixed (left) and field portable (right)

### Introduction:

- Toxic gas monitors are detectors used primarily for workplace health and safety, environmental monitoring, and military and emergency response. They are strategic because they can be used to monitor CW and toxic chemical production.
- These are called "gas analysis apparatus" in the HS explanatory notes.

### Shipments:

- Systems are relatively small so the package will be probably under a cubic meter
- Typically shipped in plastic bags surrounded by foam padding for shock resistance and packaged in cardboard boxes or crates. Crates may be shock-instrumented.
- The package may be accompanied by a small cylinder of compressed gas for calibration of the device

### Identification (distinguishing characteristics with HS category):

- HS 9027.80 is not unique to toxic gas monitors; it covers a broad range of "other instruments and apparatus". Toxic gas monitors are generally small (10s of cm on a side) and housed in a metal or plastic enclosure. Strategic toxic gas monitors should be designed for continuous operation, and meet certain detection requirements.

### Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

### **9031.10 Machines for balancing mechanical parts**



**Figure 83 Belt-driven dynamic balancing machines**

#### **Introduction:**

- HS 9031.10 covers machines for balancing mechanical parts. The explanatory notes identify two types: dynamic (where the parts are rotated) and static (where the parts are balanced but not rotated). Some dynamic balancing machines are strategic because they can be used for balancing uranium enrichment gas centrifuge rotors and/or spinning masses for certain [gyroscopes](#).

#### **Shipments:**

- Large balancing machines are shipped on pallets due to weight and ruggedness.
- Smaller balancing machines are shipped in desk-size crates.

#### **Identification (distinguishing characteristics with HS category):**

- HS 9031.10 is unique to balancing machines. Strategic balancing machines fall into two groups:
  - Missile-related balancing machines tend to be small and fast (speed greater than 12,500 rpm) and vertically-oriented.
  - Nuclear-related balancing machines can be horizontal or vertical and may be belt-driven. They should be designed for balancing hollow cylindrical rotors with diameter greater than 75 mm and should have mass capability in the range 0.9 to 23 kg.

#### **Seizures and Disposition:**

- No special seizure and disposition issues are identified for this commodity.

### **9031.80 Other measuring or checking instruments and appliances**



**Figure 84 Vibration test systems (left and bottom right) and test fixture (top right)**

#### **Introduction:**

- HS 9031.80 covers a very wide variety of measuring and checking instruments. One strategic item identified with this HS code is the vibration test system. Vibration test systems are heavy-duty pieces of equipment used to simulate forces of vibration and mechanical shock. They are sometimes called "shaker tables".
- Vibration test systems are strategic test instruments that can simulate conditions of atmospheric re-entry for nuclear weapons and missile subsystem testing.

#### **Shipments:**

- Vibration test systems are so large and heavy (typically several tons) that they must be packaged in custom-built crates of extremely robust construction.
- The vibration table may be secured with a temporary brace for shipment to prevent its movement.

#### **Identification (distinguishing characteristics with HS category):**

- HS 9031.80 is not unique to vibration test systems.
- Vibration test systems are quite unique in appearance and easily recognized. Notable features are a massive cylindrical exciter supported on bushings in a steel frame. On one end of the exciter will be a test table with threaded holes used to mount the test object.

#### **Seizures and Disposition:**

- No special seizure and disposition issues are identified for this commodity.

## ***2.25 HS Chapter 93 (Arms and ammunition)***

### **93.01 Military Weapons**

#### **Introduction:**

- This heading includes artillery, rocket launchers, military firearms, and other specialised military weapons such as those designed to form part of the armament of vessels or vehicles.

Shipments:

- Military weapons are commonly shipped in crates.

Identification (distinguishing characteristics within HS category):

- As items specially designed or modified for military use, goods falling under this HS heading are always considered strategic.

Seizures and Disposition:

- No special seizure and disposition issues are identified for this commodity.

### **9305.91 Parts and accessories**

Introduction:

- This HS code includes parts and accessories of military weapons of heading 93.01.

Identification (distinguishing characteristics within HS category):

- As items specially designed or modified for military use, goods falling under this HS heading are always considered strategic.

### **93.06 Munitions of war and parts thereof**

Introduction:

- This heading includes ammunition, missiles, mines, depth charges, grenades, bombs, etc.

Shipments:

- Munitions are commonly shipped in crates.

Identification (distinguishing characteristics within HS category):

- As items specially designed or modified for military use, goods falling under this HS code are always considered strategic.
- Of the codes in this section HS 9306.90 is identified here as particularly strategic because it includes ballistic missiles, cruise missiles, and parts thereof.

Seizures and Disposition:

- Munitions should be considered dangerous and handled with care.

## Annex IV – Industry Outreach by Customs

UNSCR 1540 calls upon states to “develop appropriate ways to work with and inform industry and the public regarding their obligations under such laws”. In this context, outreach to industry is a general expectation and a requirement to be exercised by government agencies, including Customs. This Annex contains definitions, good practices, and case studies regarding ways to conduct various elements of industry outreach, with a focus on the role of Customs specifically, to ensure that businesses conducting international trade are aware of their strategic trade control responsibilities and compliant with applicable legal requirements. Ideally the goal is not merely to seek compliance, but to also promote partnership between Customs and the trade community.

### **Introduction: A definition of industry outreach**

While diffusion of new cutting-edge technologies and related knowledge lies at the heart of the advancement of societies, trade control measures related to sensitive items are essential to curb the proliferation. Compliance measures which facilitate legal trade while blocking illicit or dubious transactions can potentially resolve this conflict. Effective compliance with trade controls can be greatly enhanced when government agencies prioritize outreach with all entities involved in international trade supply chain.

Industry outreach can be defined as activities by appropriate government agencies directed toward the trade community to promote their future compliance by raising awareness of strategic trade control regulations and compliance procedures they are to follow.

*Industry Outreach:  
Activities directed toward  
the trade community to  
promote future compliance.*

Supporting active and effective compliance by the business community can result in faster facilitation of legitimate trade, reduced duration of Customs controls, and mitigation of the risks of illicit trade in strategic goods.

Strategic trade controls should not be regarded as a hindrance to trade, but rather a safeguarding function. This additional security can help businesses avoid suffering losses, both financially and in terms of reputation. Consequently, responsible exporters increasingly strive to embed the compliance process throughout their business

operations. Customs can provide these exporters with tools and information that can increase their awareness and adherence to trade controls through outreach.

This outreach is crucial, since all entities involved in international trade, especially those who produce or trade in strategic items and technologies are the first line of defence in countering proliferation. Consequently, a well-functioning outreach effort by Customs can help nations promote their image as a safe place to conduct trade, thereby attracting both foreign and home investments in sensitive products and technology.

There are many approaches to exercise outreach by Customs. This Annex defines fundamental concepts and provides general suggestions, bearing in mind the diversity of structure, operational capacities, priorities, and inherent restrictions different Customs agencies face.

Furthermore, a step-by-step approach to developing a robust and sustainable cooperation with the businesses, including some good practices on how Customs can work more closely with the private sector more broadly, can be found in the WCO Customs-Business Partnership Guidance.<sup>78</sup>

### **Examples of practical actions by customs**

Practical actions toward establishing an effective customs outreach programme to promote awareness

<sup>78</sup> <http://www.wcoomd.org/en/media/newsroom/2015/july/release-of-the-wco-Customs-business-partnership-guidance.aspx>

of businesses will inevitably vary from country to country, depending on the scope of custom's mandate. However, the following list of general actions should be considered.

- **Assigning a manager for the awareness programme**

A dedicated manager to oversee the implementation of an industry outreach program ensures that all the activities of that programme are coordinated and that there is oversight of all activities.

- **Determining outreach strategies and communications protocols**

As Customs will have limited resources for industry outreach activities, it is important to develop strategies that maximise the available resources. This can be done by coordinating and pooling resources with licensing authorities and industry associations, but also by identifying which outreach activities will assist Customs to best target the areas of highest identified risk.

- **Conducting research to determine on which industries, companies, and national associations to focus**

Most countries establish a list of controlled commodities as part of their export control regulations (see Section 1.1.1). This control list should be a starting point for assessing which industries and companies to approach as part of industry outreach. In addition, Customs export data and open source materials such as the Strategic Trade Atlas can be used as a source to identify strategic commodities commonly traded by a country and the companies involved in such trade. This can then guide the Customs administration towards the national associations and trade bodies that they need to engage.

- **Coordinating with other agencies**

There is a risk that Customs replicate similar outreach activities being carried out by other agencies. It is important for Customs to liaise with licensing authorities and other agencies responsible for control of sensitive industries to ensure a coordinated cross-governmental approach. If there are existing outreach programmes conducted by other agencies, Customs should consider how to support and supplement these. Options included joint outreach activities by Customs and Licensing authorities, or an agreement to focus on different economic entities with the licensing authority focusing on exporters and Customs on the shippers.

- **Enlisting assistance from national and international industry associations**

National and international industry association often host conferences, seminars, and training events for their members, and these events can be used to engage with industry representatives through the delivery of awareness presentations and through the distribution of outreach materials such as brochures, pamphlets, and call-in numbers. Industry associations are also a good contact point through which to pass targeted messages to industry as they likely have current contact information for their members.

- **Developing suspicious indicator (“red flag”) lists**

As an agency responsible for implementing export control, Customs experts should develop a series of risk indicators to highlight aspects of a shipment that call for greater compliance checks or verification. In an export control environment, red flags are indicators that a transaction might involve attempts to illegally export or divert controlled items to a sanctioned or blacklisted party in violation of export control regulations. They signal the effort to conceal the ultimate end-user or end-use of sensitive goods, typically at an early stage of a transaction (inquiries, quotation requests). Nonetheless, red flags may also emerge at a later stage of a given transaction, just prior to or during the shipment operation (i.e. last-minute change in shipping route, removal of labels from boxes/creates, etc.), a scenario Customs should especially be aware of. It is common practice now that national licensing authorities publish a list of red flag indicators and share these with Customs.

- **Providing a voluntary disclosure mechanism**

The voluntary disclosure of a possible export control violation attempt is a good way to establish and maintain a positive relationship and transparency between the exporter/shipper and Customs. For authorities responsible for export controls, encouraging voluntary disclosure provides a means to reach increased compliance with less effort, for example, reducing the need to initiate audits. Customs is expected to inform the company how to submit the disclosure report. As a rule, voluntary disclosure should be submitted in a written format. It is expected to include both the

relevant circumstances of the infraction and steps the company has taken to remedy the situation (i.e. evidence of investigation into the issue, culpability, rectification, etc.).

- **Developing outreach materials such as brochures, pamphlets, web pages, newsletters, call-in numbers, posters, etc.**

A simple and cost-effective means of industry outreach is through the dissemination of outreach materials. As well as brochures, pamphlets and posters which can be handed or sent out, articles and information can be included on Customs websites and in Customs publication produced for industry audiences.

#### Case Study – Coordinated outreach at seminars and trade shows

Customs outreach to industry can often be maximised by pooling resources and knowledge with other departments involved in Strategic Trade Control. For example, Her Majesty's Revenue and Customs (HMRC) in the United Kingdom identified a trend in breaches involving chemicals and prosecuted several exporters. Sector-specific awareness events were conducted together with the licencing authority (the Department for Business, Energy, and Industrial Strategy), and commercial trade bodies.

The Licencing and Business/Trade Authorities also have a strong presence at trade shows. UK Customs works closely with these departments to understand where their active involvement can potentially enhance an event. This provides Customs with direct access to relevant audiences, opening and exercising direct channels of communication with minimal resource commitment.

#### Case Study – Project Shield America<sup>79</sup>

As part of the U.S. Immigration and Customs Enforcement (ICE), Homeland Security Investigations' (HSI) Project Shield America (PSI) is part of its industry and academic outreach efforts with an aim to prevent the proliferation of export-controlled technology and components.

The cooperation and diligence of the exporting and academic community assist law enforcement in preventing the proliferation of WMD and conventional weapons. Companies and academic institutions are encouraged to report suspicious export inquiries, hence securing the reputation of industry and protecting national security.

The PSI online leaflet outlines the overarching goals of this shared effort and highlights some of the typical red flag indicators related to potential illegal export attempts.

#### Responsibilities of business operators

Exporters and shippers (also known as agents or freight forwarders) are two key parties to export transactions. Though these two parties are certainly compliance partners with shared responsibilities, the roles they play in an export transaction are different. The exporter is responsible for an export transaction, and the shipper coordinates logistics so that the shipment can be transported from one location to another.

Exporters and shippers enter into a contractual agreement for individual shipping operations, setting forth responsibilities, such as Incoterms, routing, and representation for Customs. Exporters should have information related to the goods to be shipped, the buyer, and the terms of sale. The shipper is heavily reliant on information provided by the exporter, especially if the commodities are export controlled. to complete the transaction in a legal manner. This information is to include, inter alia, goods classification, export licensing requirement, export licenses or permits the exporter may have obtained, the end use, and the end user. The shipper, on the other hand, has information relating to the methods of transportation and routing (including transshipment ports/hubs and destination). All this information is important to ensuring that shipments are compliant with national export control laws and regulations.

<sup>79</sup> <https://www.ice.gov/doclib/project-shield/pdf/shield-america-brochure.pdf>

- **Responsibilities of the exporter**

To secure legitimate strategic trade, exporters need to be educated on the requirements of the export regulations established in their country. The exporter needs to understand how to identify which of their commodities may require an export license. Most countries establish a list of controlled commodities as part of their export control regulations. This list usually includes technical parameters of the controlled commodities that determine when their export will require authorization through a license or permit. Exporters will need to have sufficient technical knowledge of the items they plan to export and understanding of the export control list to determine if an export license is required. They will also need to know the end use of the commodity and the ultimate end user.

Most exporters are likely to possess all the information needed to appropriately classify the goods according to HS standards. Appropriate HS classification is the first step in determining if that commodity is strategically controlled and possibly needing a license to be exported, but it is only the first step. Most national export controls only apply to a small percentage of items categorized under a single HS code, and the exporter must use more detailed technical information to further determine if the specific item to be exported is controlled and needs an export license.

When conducting outreach, customs officials need to draw the attention of industry specialists to the application of the right tariff code (typically harmonized with the HS to the first 6 digits but nationally specific beyond that) along with the application of the appropriate control list number, keeping in mind that control lists vary from country to country. The proper combination of these two will ensure that the commodity in question is properly classified and declared, minimizing the chances of misdeclaration. This act also fits in with the obligation of transactional due diligence discussed later in this Annex.

As previously mentioned, knowing the end use and end user is also a crucial factor. If the end user is a sanctioned entity or the end use is related to a WMD programme, the export could require a license according to national catch-all requirements, regardless of the product. It is important, therefore, that exporters “know their customers.” Customs is well positioned to inform exporters of the requirements of national export control laws and help exporters understand the need to know the specifications of the commodity they are exporting, where it is going, and how will it be used.

- **Responsibilities of the shipper**

In the past, the business of most shipping companies primarily focused on the logistics of exporting, but now shipping companies need to exercise similar levels of caution as the (sometimes unaware) exporters. A good example of the need for caution in international export operations occurs when the ex-works-rule is applied. This contractual term is sometimes used by sellers attempting to pass on risks or disguise their involvement. It is a convenient way for the seller to avoid appearing as the official exporter of record. This situation can force the local shipping company to deal with either foreign shipping companies or buyers they do not know. If the shipping company becomes the exporter of record, they may also find themselves burdened with additional export compliance risks and responsibilities. Most importantly, shipping companies must ensure that they do not complete shipping transactions to sanctioned entities.<sup>80</sup>

### **Role of Customs in Promoting Compliance**

Businesses participating in the global economy, particularly those exporting sensitive technologies, must manage risks related to compliance and enforcement. Such a business should develop an adequate and customized Internal Compliance Programme (ICP) to address risks identified by the company and related to their trade transactions, including, inter alia, identifying and classifying their controlled goods, risky trading partners, shipments to transshipment hubs known for diversion attempts, incoming orders from new clients, screening list changes. For every risk identified, appropriate measures need to be in place to mitigate or eliminate these risks.

Export control and compliance often lacks a natural home within an organization because it involves

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<sup>80</sup> Exporters and shipping companies both can be required to check the sanction list. It usually depends upon the contract between the exporter and the shipper.

many departments and functions, from sales and shipping to service and engineering, making it a cross-cutting issue for the compliance manager to cover. An export compliance manager needs to create an ICP that includes cooperation from many departments. The ICP is a framework of coordinated corporate processes set up to support the export compliance function. Though there might be similarities between ICPs, and model frameworks of standards have been developed, they need to be customized by each company to deliver maximum efficiency.

Having an ICP in place is a reflection of the company's good faith efforts to conduct business in line with export restrictions. When Customs officials proactively seek to work channels of communication with businesses it is therefore advisable to impart and discuss the following basic ICP elements to encourage future compliance.

- **Company and management commitment**

When a company strives to establish its ICP, it should do so in the wider context of the core company culture, making the ICP an integral part of values, behaviors, and beliefs by which the business is run. To align the ICP into the company culture, cross-functional support from different business units working together is needed. Leadership support throughout all departments involved is indispensable to get everyone to view export compliance as a set of measures enabling the company to stay in business.

- **Communication**

Communication must exist at different levels and stages of the corporate compliance process. Within the company, the information flow must ensure appropriate resources are at the disposal of employees. A communication plan must also be in place to formally disseminate information on compliance procedures and guidelines, regulatory updates, escalation processes, contact information, as well as to set out standards of external communication with national authorities, such as Customs. A good way to ensure that the ICP (and its updates) reaches all employees is its publication on intranet of the business.

It is important that internal communication should be part of a communication culture where suspicious cases that could potentially result in non-compliance are escalated to the proper hierarchical level in the company where the company can disclose this information with Customs or the licensing authority.

- **Record keeping**

Record keeping is a fundamental element of any business activity. Proper record keeping expedites Customs audit checks and demonstrates best practices by the company. For export shipments, records include, *inter alia*: purchase orders, end-user statements, quote requests, quotations, sales contracts (including Incoterms), pro-forma and/or commercial invoices, payment receipts, export license applications, export licenses, export declarations, packing lists, bills of lading, airway bills, technical data sheets, safety data sheets, and certificates of origin.

For ease of retrieval and search, as well as to achieve low cost storage, records may be kept electronically. When keeping records electronically, files should be labelled with appropriate reference numbers and names to facilitate retrieval when needed.

- **Goods classification**

Businesses involved in foreign trade, in general, self-classify goods, services, or technology they intend to export. This assumes a close in-house coordination between compliance and technical (and ideally, sales) departments to observe all restrictive classification scenarios. For follow-up and traceability purposes, it is advisable to document each decision made relating to classification, which is, at the same time, an important cornerstone of Customs audits.

To decide whether the goods in question meet strategic trade control requirements, one needs to go beyond the HS and assess exact technical parameters of the item in question. To do this, compliance officers must rely on the expertise of technical staff and/or engineers of the company. When in doubt, it is advisable to seek a licensing determination from the competent (licensing) agency. This will take more time than making the determination on site, may facilitate future transactions involving the product.

- **Transactional due diligence**

Following proper goods classification another vital priority is assessing transaction-related risks. Checks should be carried out on trade-related embargoed, sanctioned, or sensitive destinations and entities. Just as importantly, stated end-use and parties involved should be screened. Compliance measures need to include the screening of potential risks of diversion (i.e. transshipment hubs with previous records of diversion, shipping/forwarding companies marked as consignees, etc.). Transactions should be screened against red flag indicators (discussed below), which could warrant a license application according to catch-all controls even if the commodity to be exported is not on export control list. Finally, when an export license is granted, both the exporter and the shipper need to ensure that the shipping operation takes place in accordance with the provisions of the license.

- **Red flags**

As an agency responsible for implementing export control, Customs expects exporters to exercise due diligence and to be aware of red flag indicators. Ignoring red flag indicators popping up in a business transaction may result in severe penalties as well as criminal charges, causing harm to a businesses' reputation.

It is common practice now that national licensing authorities publish a list of red flag indicators. To ensure due diligence is exercised, businesses should screen transactions against red flag indicators at every major stage of a given transaction (quotation request, purchase order, shipment). The process of screening should ideally be documented to support decisions taken. This can take the form of a yes-no checklist against the list of red flag indicators.

Awareness trainings focusing on red flags should reflect past and present global security concerns as well as risks relevant to the company. Consequently, the list of red flags should be updated from time to time, preferably supported by actual examples/case studies coming from real-world scenarios of export control violations (or violation attempts).

- **Training**

Companies involved in international transactions are expected to exercise due diligence. To address this issue, there should be an internal awareness-raising training in place focused on developing and enhancing the abilities of employees to identify red flag indicators at various stages of an export transaction.

Customs can offer to participate as speakers at in-house trainings to support the activities of the compliance teams. This helps establish a relationship of trust between Customs and the compliance team, whereby information and experiences can be shared.

- **Disclosure**

The voluntary disclosure of a possible export control violation attempt can help an exporter or shipper to establish and maintain a positive relationship and transparency with Customs. For authorities responsible for export controls, voluntary disclosure is a chance to reach increased compliance with less effort, for example, by having to initiate fewer audits.

Voluntary disclosure by a company should be proactive, timely, and made in good faith. Furnishing sufficient and detailed documentary evidence in the disclosure package assists in establishing facts, as well as timely and accurate actions to be taken by authorities. The level of leniency awarded to the disclosing entity might highly depend on two key factors: the timeliness and the accuracy of the information provided.

Customs should inform the company how to submit the disclosure report. As a rule, voluntary disclosure should be submitted in a written format and should include both the relevant circumstances of the infraction and steps the company has taken to remedy the situation. Disclosure reports will shed light on causes and weak points in the company's ICP that resulted in the violation reported. Hence, it is wise to expressly report weak links detected as well as mitigating circumstances and corrective measures that have been or will be introduced. It is to be emphasized here that failure to follow up on the corrective measures increases the likelihood of repeat future violations, may cause credibility loss, heighten the likelihood of penalties, and may affect the company's ability to acquire export licenses going forward.

## **Closing words**

Some companies might become involved in proliferation merely by accident, either because they are unaware that their merchandise is controlled or because they do not know what due diligence should have been conducted. For these actors, awareness raising, education, and networking by means of outreach by Customs is essential. Ideally, outreach is a two-way street: it should focus on imparting information on export control legislation and proper implementation practices, and, at the same time, it should require reporting suspicious enquiries and procurement attempts. It is not sufficient for industry to be merely aware of their legal obligations; strong partnership between government and industry is also required. Exercising an effective outreach mechanism is a good way to forge this partnership.

To deliver outreach, licensing and Customs agencies are best placed in the machinery of governments. With the right communication channels exercised and appropriate strategies in place to make businesses allies in the fight against proliferation, outreach activities will deliver desired result, which will, in turn (and in the long run) boost the performance of national economies. The approaches outlined in this Annex are part of a “toolkit” of measures all of some of which can be used by Customs agencies for industry outreach, depending on the national priorities within each country.

From the business’ perspective, fulfilling the trade compliance mission fits in with rendering corporate social responsibilities visible, a vital goal every company is striving to accomplish. Looking at the bigger picture, building and exercising appropriate internal mechanisms will protect the company and its employees by detecting and preventing inappropriate conduct and promoting adherence to the company’s legal and ethical obligations.

From the Customs’ point of view, effective industry outreach may result in regular exchange of information or disclosures that may indicate attempts to evade controls. In addition, gaining an understanding of the regular trade of a company will make it easier to identify irregular or unusual shipments.

## Annex V – Strategic Chemicals by CAS Registration Number

The list includes a great number of chemicals listed by the CWC, AG, NSG, MTCR, WA, and PGS. The most commonly traded CWC scheduled chemicals, as identified by the OPCW<sup>81</sup>, are shown in **bold red text**.

CAS numbers cannot be used as unique identifiers in ALL situations because some forms of listed chemicals have different CAS numbers, and mixtures containing a listed chemical may also have different CAS numbers.

CAS	Chemical
51-75-2	HN2
57-13-6	Urea
57-14-7	Unsymmetrical dimethylhydrazine
57-39-6	MAPO
60-34-4	Monomethylhydrazine
67-64-1	Acetone
<b>74-90-8</b>	<b>Hydrogen cyanide</b>
<b>75-44-5</b>	<b>Phosgene</b>
<b>75-52-5</b>	<b>Nitromethane</b>
75-55-8	Propyleneimine
75-97-8	Pinacolone
<b>76-06-2</b>	<b>Chloropicrin</b>
76-89-1	Methyl benzilate
<b>76-93-7</b>	<b>Benzilic acid</b>
77-81-6	Tabun
<b>78-38-6</b>	<b>Diethyl ethylphosphonate</b>
78-53-5	Amiton
96-64-0	Soman
96-79-7	N,N-Diisopropyl-(beta)-aminoethyl chloride
<b>96-80-0</b>	<b>N,N-Diisopropyl-(beta)-amino-ethanol</b>
100-15-2	N-Methyl-p-nitroaniline
100-35-6	N,N-Diethylaminoethyl-2-chloride
100-37-8	Diethylaminoethanol
<b>100-38-9</b>	<b>2-(N,N-Diethylamino)ethanethiol</b>
<b>102-71-6</b>	<b>Triethanolamine</b>
<b>105-59-9</b>	<b>Methyldiethanolamine</b>
107-07-3	2-Chloroethanol
107-44-8	Sarin
<b>108-02-1</b>	<b>2-(N,N-Dimethylamino)ethanethiol</b>
108-18-9	Diisopropylamine
108-70-3	1,3,5-Trichlorobenzene
111-22-8	Triethylene glycol dinitrate
<b>111-48-8</b>	<b>Thiodiglycol</b>
116-17-6	Triisopropyl phosphite
119-75-5	2-Nitrodiphenylamine
<b>121-45-9</b>	<b>Trimethyl phosphite</b>
121-82-4	RDX
<b>122-52-1</b>	<b>Triethyl phosphite</b>
124-40-3	Dimethylamine
<b>139-87-7</b>	<b>Ethyldiethanolamine</b>
143-33-9	Sodium cyanide
151-50-8	Potassium cyanide
257-07-8	Dibenz-(b,f)-1,4-oxazephine
298-06-6	O,O-Diethyl phosphorodithioate
302-01-2	Hydrazine
376-90-9	FPF-1
382-21-8	PFIB

CAS	Chemical
430-78-4	Ethylphosphinyl difluoride
<b>464-07-3</b>	<b>Pinacolyl alcohol</b>
479-45-8	Tetryl
505-60-2	Bis (2-chloroethyl) sulphide
505-71-5	EDNA (Ethylenedinitrime)
506-59-2	Dimethylamine hydrochloride
<b>506-77-4</b>	<b>Cyanogen chloride</b>
506-93-4	Guanidine nitrate
532-27-4	2-Chloro-1-phenylethanone
538-07-8	HN1
540-73-8	Symmetrical dimethyl hydrazine
541-25-3	2-Chlorovinyldichloroarsine
555-77-1	HN3
556-88-7	Nitroguanidine
578-94-9	10-Chloro-5,10-dihydrophenarsazine
603-33-8	TPB
637-12-7	Octal
637-39-8	Triethanolamine hydrochloride
676-83-5	Methylphosphinyl dichloride
<b>676-97-1</b>	<b>Methylphosphonyl dichloride</b>
676-98-2	Methylphosphonothioic dichloride
676-99-3	DF
677-43-0	N,N-Dimethylaminophosphoryl dichloride
683-08-9	Diethyl methylphosphonate
693-21-0	Diethylene glycol dinitrate
753-59-3	Methylphosphinyl difluoride
753-98-0	Ethylphosphonyl difluoride
<b>756-79-6</b>	<b>Dimethyl methylphosphonate</b>
<b>762-04-9</b>	<b>Diethyl phosphite</b>
849-29-6	O-(3-chloropropyl) O-[4-nitro-3-(trifluoromethyl)phenyl] methylphosphonothionate
<b>868-85-9</b>	<b>Dimethyl phosphite</b>
<b>869-24-9</b>	<b>N,N-Diethylaminoethyl-2-chloride hydrochloride</b>
932-64-9	NTO
<b>993-13-5</b>	<b>Methylphosphonic acid</b>
993-43-1	Ethylphosphonothioic dichloride
1066-50-8	Ethylphosphonyl dichloride
1271-42-7	Ferrocene carboxylic acid
1271-55-2	Acetyl ferrocene
1273-89-8	Ethyl ferrocene
1273-94-5	1,1-Diacetyl ferrocene
1273-97-8	Diethyl ferrocene
1274-00-6	Pentyl ferrocene
1274-08-4	Dibutyl ferrocene
1293-87-4	Ferrocenedicarboxylic acid
1304-56-9	Beryllium oxide
1313-82-2	Sodium sulphide
1314-20-1	Thorium oxide
1314-23-4	Zirconium oxide
1314-80-3	Phosphorus pentasulphide
1317-60-8	Superfine iron oxide (Fe2O3)
1333-83-1	Sodium bifluoride
1341-49-7	Ammonium bifluoride
1344-57-6	Uranium dioxide
1344-58-7	Uranium trioxide
1344-59-8	Triuranium octoxide
1445-76-7	Chlorosarin
1498-40-4	Ethylphosphinyl dichloride
1614-08-0	ADHTDN
<b>1619-34-7</b>	<b>3-Quinuclidinol</b>
1630-08-6	DATB

<sup>81</sup> <https://www.opcw.org/resources/declarations/most-traded-scheduled-chemicals-2017>

CAS	Chemical
1741-01-1	Trimethylhydrazine
2404-03-7	Diethyl N,N-dimethylphosphoramidate
2465-65-8	O,O-Diethyl phosphorothioate
2625-76-5	2-Chloroethylchloromethylsulphide
2691-41-0	HMX
2698-41-1	[(2-Chlorophenyl) methylene] propanedinitrile
<b>3001-98-7</b>	<b>3,9-Dimethyl-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane 3,9-dioxide</b>
3032-55-1	TMETN Trimethylolethane trinitrate
3058-38-6	TATB
3068-00-6	1,2,4-Trihydroxybutane
3457-37-2	Diimido oxalic acid dihydrazine
3554-74-3	3-Hydroxy-1-methylpiperidine
3563-36-8	1,2-Bis (2-chloroethylthio)ethane
3731-38-2	3-Quinuclidone
3811-04-9	Potassium Chlorate
4000-16-2	TAGN
<b>4261-68-1</b>	<b>N,N-Diisopropyl-2-aminoethyl chloride hydrochloride</b>
<b>4584-46-7</b>	<b>2-(N,N-Dimethylamino)ethylchloride hydrochloride</b>
<b>4708-04-7</b>	<b>Propylphosphonic dichloride</b>
5108-69-0	BDNPA
5213-49-0	DNI
5299-64-9	N-Nonanoylmorpholine
5409-42-7	1,4,5,8-Tetraazadecaline
5798-79-8	$\alpha$ -Bromobenzeneacetonitrile
5842-07-9	N,N-Diisopropyl-(beta)-aminoethane thiol
5917-61-3	BDNP
6163-75-3	Dimethyl ethylphosphonate
6172-80-1	Butyl methylphosphinate
6415-12-9	Tetramethylhydrazine
6484-52-2	Ammonium Nitrate
6581-06-2	3-Quinuclidinyl benzilate
6659-60-5	BTTN
7040-57-5	Chlorosoman
7046-61-9	3-Nitraza-1,5-pentane diisocyanate
7217-25-6	Acetone
7422-78-8	Allylhydrazine
7429-90-5	Spherical aluminum powder
7439-89-6	Iron powder
7439-95-4	Magnesium powder
7439-95-4	Magnesium
7439-98-7	Molybdenum powder
7440-02-0	Nickel powder
7440-33-7	Tungsten powder
7440-41-7	Beryllium powder
7440-41-7	Beryllium
7440-42-8	Boron powder
7440-67-7	Zirconium powder
7440-69-9	Bismuth
7440-70-2	Calcium
<b>7526-26-3</b>	<b>Diphenyl methylphosphonate</b>
7631-99-4	Sodium Nitrate
7652-64-4	1,1'-Isophthaloyl-bis(2-methylaziridine)
7664-39-3	Hydrogen fluoride
7681-49-4	Sodium fluoride
7697-31-2	Nitric acid
<b>7719-09-7</b>	<b>Thionyl chloride</b>
<b>7719-12-2</b>	<b>Phosphorus trichloride</b>
7722-73-8	1,1',1"-Trimesoyl-tris(2-ethylaziridine)
7722-84-1	Hydrogen Peroxide
7757-79-1	Potassium Nitrate
7775-09-9	Sodium Chlorate
7778-74-7	Potassium Perchlorate
7782-39-0	Deuterium

CAS	Chemical
7783-81-5	Uranium hexafluoride
7784-21-6	Alane
7784-34-1	Arsenic trichloride
7789-20-0	Heavy water
7789-23-3	Potassium fluoride
7789-29-9	Potassium bifluoride
7790-91-2	Chlorine trifluoride
7790-98-9	AP
8007-58-7	Inhibited red fuming nitric acid
9009-86-3	Ricin
<b>10025-67-9</b>	<b>Sulphur monochloride</b>
<b>10025-87-3</b>	<b>Phosphorus oxychloride</b>
<b>10026-13-8</b>	<b>Phosphorus pentachloride</b>
10028-17-8	Tritium
10102-03-1	Dinitrogen pentoxide
10102-44-0	Nitrogen dioxide
10544-72-6	Dinitrogen tetroxide
10544-73-7	Dinitrogen trioxide
<b>10545-99-0</b>	<b>Sulphur dichloride</b>
12036-31-6	Lead stannate
12055-23-1	Hafnium oxide
12059-95-9	Plutonium dioxide
12069-32-8	Boron carbide powder
13242-44-9	N,N-Dimethylaminoethane-2-thiol hydrochloride
13465-08-2	HAN
13587-52-5	Nitric acid-d solution
13812-39-0	Hydrazinium diperchlorate
13982-63-3	Radium-226
14258-72-1	Lithium-6
14450-60-3	Lead citrate
14546-44-2	Hydrazinium azide
14762-55-1	Helium-3
14798-12-0	Boron-10
15245-12-2	Ammonium Calcium Nitrate Double Salt
15588-62-2	HAP
15715-41-0	Diethyl methylphosphonite
15748-73-9	Lead salicylate
16893-85-9	Sodium hexafluorosilicate
17003-79-1	FEFO
17096-47-8	Methyl-NENA
17215-44-0	DIPAM
17409-41-5	BHEGA
17607-20-4	BAMO
17702-41-9	Decaborane
18433-84-6	Pentaborane(11)
<b>18755-43-6</b>	<b>Dimethyl propylphosphonate</b>
18924-91-9	2,4,6-tris(2-Ethyl-1-aziridinyl)-1,3,5-triazine
19136-34-6	Lead maleate
19624-22-7	Pentaborane(9)
19899-80-0	DNAM
20062-22-0	HNS
20773-28-8	HNF
20936-32-7	Lead beta-resorcylate
25243-36-1	TACOT
<b>25333-42-0</b>	<b>R-(<i>–</i>)-3-Quinuclidinol</b>
27814-48-8	PGN
27978-54-7	Hydrazinium perchlorate
30003-46-4	DBT
31904-29-7	n-Butyl ferrocene
35523-89-8	Saxitoxin
37206-42-1	Catocene
37836-27-4	Hydrazine nitrate
38082-89-2	PYX
39277-47-9	Agent Orange
40334-69-8	Bis (2-chlorovinyl) chloroarsine
40334-70-1	Tris (2-chlorovinyl) arsine

CAS	Chemical
<b>41203-81-0</b>	"(5-Eethyl-2-methyl-2-oxido-1,3,2-dioxaphosphinan-5-yl)methyl methyl methylphosphonate"
41378-98-7	TAT
41480-75-5	N,N-Diisopropylaminoethane-2-thiol hydrochloride
<b>42595-45-9</b>	"bis[(5-Eethyl-2-methyl-2-oxido-1,3,2-dioxaphosphinan-5-yl)methyl] methylphosphonate"
<b>43625-06-5</b>	Nitric-15N acid solution
50782-69-9	VX
53159-39-0	TVOPA
55510-03-7	TNGU
55510-04-8	DNGU
57856-11-8	QL
62320-94-9	Basic copper salicylate
<b>63747-58-0</b>	<b>Poly(1,3-phenylene methyl phosphonate)</b>
63869-13-6	Bis (2-chloroethylthio) methane
63905-10-2	1,3-Bis (2-chloroethylthio)-n-propane
63918-89-8	Bis (2-chloroethylthioethyl) ether
63918-90-1	Bis (2-chloroethylthiomethyl) ether
68411-07-4	Lead-copper chelates of beta-resorcylate or salicylates
68412-45-3	Tepan
68412-46-4	Tepanol
<b>68957-94-8</b>	<b>2,4,6-Tripropyl-1,3,5,2,4,6-trioxatriphosphinane 2,4,6-trioxide</b>
69102-90-5	HTPB
70247-32-4	CP
<b>70715-06-9</b>	<b>"Phosphorus oxide, polymer with dimethyl methylphosphonate and oxirane"</b>
70890-46-9	DNBT
70983-44-7	Copper beta-resorcylate
71463-62-2	1,1'-Trimethyladipoylbis(2-ethylaziridine)
75393-84-9	NTDNA
78246-06-7	DNAD
78644-90-3	DAAzF
82486-82-6	Butyl-NENA
82486-83-7	Propyl-NENA
84051-81-0	Poly-NIMMO
<b>84402-58-4</b>	<b>Methylphosphonic acid compound with (aminoiminomethyl)urea (1:1)</b>

CAS	Chemical
<b>84962-98-1</b>	<b>Sodium 3-(trihydroxysilyl)propyl methylphosphonate</b>
85068-72-0	Methyl BAPO
85068-73-1	Ethyl-NENA
90683-29-7	AMMO
93894-59-8	Dihexyl ferrocene
97096-78-1	ADNB
97645-24-4	TNAZ
<b>99580-93-5</b>	<b>Product from the reaction of Methylphosphonic acid and 1,2-Ethanediamine</b>
103850-22-2	LICA 12
110438-25-0	Titanium IV, 2,2[bis 2-propenolato-methyl, butanolato, tris (dioctyl) phosphato]
115029-35-1	Keto-RDX
117412-28-9	BNCP
117907-74-1	CL-14
124782-15-6	HBIW
125735-38-8	Dinitroazetidine-t-butyl salt
125856-62-4	Butacene
<b>129788-86-9</b>	<b>Product from the reaction of Methylphosphonic acid and 1,3,5-Triazine-2,4,6-triamine</b>
130256-72-3	K-55
130400-13-4	NNHT
135285-90-4	CL-20
135877-16-6	TNAD
140456-78-6	ADN
142173-26-0	BCMO
142868-93-7	1,4-Bis (2-chloroethylthio)-n-butane
142868-94-8	1,5-Bis (2-chloroethylthio)-n-pentane
143178-24-9	GAP
143850-71-9	HNAD
145250-81-3	DADE
<b>170836-68-7</b>	<b>Mixture of CAS RN 41203-81-0 and CAS RN 42595-45-9</b>
182763-60-6	TAIW
194486-77-6	DDPO
229176-04-9	TNP
<b>294675-51-7</b>	<b>Methylphosphonic acid, polyglycol ester</b>
<b>363626-50-0</b>	<b>Bis(polyoxyethylene) methylphosphonate</b>
<b>663176-00-9</b>	<b>Phosphonic acid, methyl-, polyglycol ester (Exolit OP 560)</b>

## Annex VI – Harmonized System Codes Related to Chemical Weapons Agents and Precursors

HS	HS text	Strategic chemical(s)	CWC	AG
28.11	Other inorganic acids and other inorganic oxygen compounds of non-metals.			
2811.11	- Other inorganic acids: -- Hydrogen fluoride (hydrofluoric acid)	Hydrogen fluoride [7664-39-3]		
2811.12	- Other inorganic acids: -- Hydrogen cyanide (hydrocyanic acid)	Hydrogen cyanide [74-90-8]		
28.12	Halides and halide oxides of non-metals.			
2812.11	- Chlorides and chloride oxides: -- Carbonyl dichloride (phosgene)	Carbonyl dichloride (phosgene) [75-44-5]		
2812.12	- Chlorides and chloride oxides: -- Phosphorus oxychloride	Phosphorus oxychloride [10025-87-3]		
2812.13	- Chlorides and chloride oxides: -- Phosphorus trichloride	Phosphorus trichloride [7719-12-2]		
2812.14	- Chlorides and chloride oxides: -- Phosphorus pentachloride	Phosphorus pentachloride [10026-13-8]		
2812.15	- Chlorides and chloride oxides: -- Sulphur monochloride	Sulphur monochloride [10025-67-9]		
2812.16	- Chlorides and chloride oxides: -- Sulphur dichloride	Sulphur dichloride [10545-99-0]		
2812.17	- Chlorides and chloride oxides: -- Thionyl chloride	Thionyl chloride [7719-09-7]		
2812.19	- Chlorides and chloride oxides: -- Other	Arsenic trichloride [7784-34-1]		
28.13	Sulphides of non-metals; commercial phosphorus trisulphide.			
2813.90	- Other	Phosphorus pentasulphide [1314-80-3]		
28.26	Fluorides; fluorosilicates, fluoroaluminates and other complex fluorine salts.			
2826.19	- Fluorides: -- Other	Ammonium bifluoride [1341-49-7] Potassium bifluoride [7789-29-9] Potassium fluoride [7789-23-3] Sodium bifluoride [1333-83-1] Sodium fluoride [7681-49-4]		
2826.90	- Other	Sodium hexafluorosilicate [16893-85-9]		
28.30	Sulphides; polysulphides, whether or not chemically defined.			
2830.10	- Sodium sulphides	Sodium sulphide [1313-82-2]		
28.37	Cyanides, cyanide oxides and complex cyanides.			
2837.11	- Cyanides and cyanide oxides: -- Of sodium	Sodium cyanide [143-33-9]		
2837.19	- Cyanides and cyanide oxides: -- Other	Potassium cyanide [151-50-8]		
28.53	Phosphides, whether or not chemically defined, excluding ferrophosphorus; other inorganic compounds (including distilled or conductivity water and water of similar purity); liquid air (whether or not rare gases have been removed); compressed air; amalgams, other than amalgams of precious metals.			
2853.10	- Cyanogen chloride (chlorcyan)	Cyanogen chloride [506-77-4]		
29.03	Halogenated derivatives of hydrocarbons.			
2903.39	- Fluorinated, brominated or iodinated derivatives of acyclic hydrocarbons: -- Other	PFIB [382-21-8]		

<b>HS</b>	<b>HS text</b>	<b>Strategic chemical(s)</b>	<b>CWC</b>	<b>AG</b>
29.04	Sulfonated, nitrated or nitrosated derivatives of hydrocarbons, whether or not halogenated.			
2904.91	- Other -- Trichloronitromethane (chloropicrin)	Trichloronitromethane (chloropicrin) [76-06-2]		
29.05	Acyclic alcohols and their halogenated, sulphonated, nitrated or nitrosated derivatives.			
2905.19	- Saturated monohydric alcohols: -- Other	Pinacolyl alcohol [464-07-3]		
2905.59	- Halogenated, sulphonated, nitrated or nitrosated derivatives of acyclic alcohols: -- Other	2-Chloroethanol (ethylene chlorohydrin) [107-07-3]		
29.14	Ketones and quinones, whether or not with other oxygen function, and their halogenated, sulphonated, nitrated or nitrosated derivatives.			
2914.19	- Acyclic ketones without other oxygen function: -- Other	Pinacolone [75-97-8]		
29.18	Carboxylic acids with additional oxygen function and their anhydrides, halides, peroxides and peroxyacids; their halogenated, sulphonated, nitrated or nitrosated derivatives.			
2918.17	- Carboxylic acids with alcohol function but without other oxygen function, their anhydrides, halides, peroxides, peroxyacids and their derivatives: -- 2,2'-Diphenyl-2-hydroxyacetic acid (benzilic acid)	Benzilic acid [76-89-1]		
2918.19	- Carboxylic acids with alcohol function but without other oxygen function, their anhydrides, halides, peroxides, peroxyacids and their derivatives: -- Other	Methyl benzilate [76-93-7]		
29.20	Esters of other inorganic acids of non-metals (excluding esters of hydrogen halides) and their salts; their halogenated, sulphonated, nitrated or nitrosated derivatives.			
2920.19	- Thiophosphoric esters (phosphorothioates) and their salts; their halogenated, sulphonated, nitrated or nitrosated derivatives: -- Other	O,O-Diethyl phosphorodithioate [298-06-6] O,O-Diethyl phosphorothioate [2465-65-8]		
2920.21	- Phosphite esters and their salts; their halogenated, sulphonated, nitrated or nitrosated derivatives: -- Dimethyl phosphite	Dimethyl phosphite [868-85-9]		
2920.22	- Phosphite esters and their salts; their halogenated, sulphonated, nitrated or nitrosated derivatives: -- Diethyl phosphite	Diethyl phosphite [762-04-9]		
2920.23	- Phosphite esters and their salts; their halogenated, sulphonated, nitrated or nitrosated derivatives: -- Trimethyl phosphite	Trimethyl phosphite [121-45-9]		
2920.24	- Phosphite esters and their salts; their halogenated, sulphonated, nitrated or nitrosated derivatives: -- Triethyl phosphite	Triethyl phosphite [122-52-1]		

HS	HS text	Strategic chemical(s)	CWC	AG
2920.29	- Phosphite esters and their salts; their halogenated, sulphonated, nitrated or nitrosated derivatives: -- Other	Triisopropyl phosphite [116-17-6]		
29.21	Amine-function compounds.			
2921.11	- Acyclic monoamines and their derivatives; salts thereof: -- Methylamine, di- or trimethylamine and their salts	Dimethylamine [124-40-3] Dimethylamine hydrochloride [506-59-2]		
2921.12	- Acyclic monoamines and their derivatives; salts thereof: -- 2-(N,N-Dimethylamino)ethylchloride hydrochloride	2-(N,N-Dimethylamino)ethylchloride hydrochloride [4584-46-7]		
2921.13	- Acyclic monoamines and their derivatives; salts thereof: -- 2-(N,N-Diethylamino)ethylchloride hydrochloride	N,N-Diethylaminoethyl-2-chloride hydrochloride [869-24-9]		
2921.14	- Acyclic monoamines and their derivatives; salts thereof: -- 2-(N,N-Diisopropylamino)ethylchloride hydrochloride	N,N-Diisopropyl-2-aminoethyl chloride hydrochloride [4261-68-1]		
2921.19	- Acyclic monoamines and their derivatives; salts thereof: -- Other	Diethylamine Diisopropylamine [108-18-9] HN1 [538-07-8] HN2 [51-75-2] HN3 [555-77-1] N,N-Diethylaminoethyl-2-chloride [100-35-6] N,N-Diisopropyl-(beta)-aminoethyl chloride [96-79-7]		
29.22	Oxygen-function amino-compounds.			
2922.15	- Amino-alcohols, other than those containing more than one kind of oxygen function, their ethers and esters; salts thereof: -- Triethanolamine	Triethanolamine [102-71-6]		
2922.17	- Amino-alcohols, other than those containing more than one kind of oxygen function, their ethers and esters; salts thereof: -- Methyltriethanolamine and ethyldiethanolamine	Ethyldiethanolamine [139-87-7] Methyltriethanolamine [105-59-9]		
2922.18	- Amino-alcohols, other than those containing more than one kind of oxygen function, their ethers and esters; salts thereof: -- 2-(N,N-Diisopropylamino)ethanol	N,N-Diisopropyl-(beta)-aminoethanol [96-80-0]		
2922.19	- Amino-alcohols, other than those containing more than one kind of oxygen function, their ethers and esters; salts thereof: -- Other	Diethylaminoethanol [100-37-8] Triethanolamine hydrochloride [637-39-8]		

<b>HS</b>	<b>HS text</b>	<b>Strategic chemical(s)</b>	<b>CWC</b>	<b>AG</b>
29.29	Compounds with other nitrogen function.			
2929.90	- Other	Diethyl N,N-dimethylphosphoramide [2404-03-7]		
		N,N-Dimethylaminophosphoryl dichloride [677-43-0]		
29.30	Organic-sulphur compounds.			
2930.60	- 2-(N,N-Diethylamino)ethanethiol	2-(N,N-Diethylamino)ethanethiol [100-38-9]		
2930.70	- Bis(2-hydroxyethyl)sulfide (thiodiglycol (INN))	Thiodiglycol [111-48-8]		
2930.90	- Other	1,2-Bis (2-chloroethylthio)ethane [3563-36-8]		
		1,3-Bis (2-chloroethylthio)-n-propane [63905-10-2]		
		1,4-Bis (2-chloroethylthio)-n-butane [142868-93-7]		
		1,5-Bis (2-chloroethylthio)-n-pentane [142868-94-8]		
		2-Chloroethylchloromethylsulphide [2625-76-5]		
		Amiton [78-53-5]		
		Bis (2-chloroethyl) sulphide [505-60-2]		
		Bis (2-chloroethylthio) methane [63869-13-6]		
		Bis (2-chloroethylthioethyl) ether [63918-89-8]		
		Bis (2-chloroethylthiomethyl) ether [63918-90-1]		
		N,N-Diisopropyl-(beta)-aminoethane thiol [5842-07-9]		
		N,N-Diisopropylaminoethane-2-thiol hydrochloride [41480-75-5]		
		N,N-Dimethylaminoethane-2-thiol [108-02-1]		
		N,N-Dimethylaminoethane-2-thiol hydrochloride [13242-44-9]		
2930.90	- Other	VX [50782-69-9]		
29.31	Other organo-inorganic compounds.			
2931.31	- Other organo-phosphorous derivatives: -- Dimethyl methylphosphonate	Dimethyl methylphosphonate [756-79-6]		
2931.32	- Other organo-phosphorous derivatives: -- Dimethyl propylphosphonate	Dimethyl propylphosphonate [18755-43-6]		
2931.33	- Other organo-phosphorous derivatives: -- Diethyl ethylphosphonate	Diethyl ethylphosphonate [78-38-6]		
2931.34	- Other organo-phosphorous derivatives: -- Sodium 3-(trihydroxysilyl)propyl methylphosphonate	Sodium 3-(trihydroxysilyl)propyl methylphosphonate [84962-98-1]		

<b>HS</b>	<b>HS text</b>	<b>Strategic chemical(s)</b>	<b>CWC</b>	<b>AG</b>
2931.35	- Other organo-phosphorous derivatives: -- 2,4,6-Tripropyl-1,3,5,2,4,6-trioxatrichosphinane 2,4,6-trioxide	2,4,6-Tripropyl-1,3,5,2,4,6-trioxatrichosphinane 2,4,6-trioxide [68957-94-8]		
2931.36	- Other organo-phosphorous derivatives: -- (5-Ethyl-2-methyl-2-oxido-1,3,2-dioxaphosphinan-5-yl)methyl methyl methylphosphonate	(5-Ethyl-2-methyl-2-oxido-1,3,2-dioxaphosphinan-5-yl)methyl methyl methylphosphonate [41203-81-0]		
2931.37	- Other organo-phosphorous derivatives: -- Bis[(5-Ethyl-2-methyl-2-oxido-1,3,2-dioxaphosphinan-5-yl)methyl] methylphosphonate	bis[(5-Ethyl-2-methyl-2-oxido-1,3,2-dioxaphosphinan-5-yl)methyl] methylphosphonate [42595-45-9]		
2931.38	- Other organo-phosphorous derivatives: -- Salt of methylphosphonic acid and (aminoiminomethyl)urea (1:1)	Methylphosphonic acid compound with (aminoiminomethyl)urea (1:1) [84402-58-4]		
2931.39	- Other organo-phosphorous derivatives: -- Other	3,9-Dimethyl-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecane 3,9-dioxide [3001-98-7]		
		Butyl methylphosphinate [6172-80-1]		
		Chlorosarin [1445-76-7]		
		Chlorosoman [7040-57-5]		
		Diethyl methylphosphonate [683-08-9]		
		Diethyl methylphosphonite [15715-41-0]		
		Dimethyl ethylphosphonate [6163-75-3]		
		Diphenyl methylphosphonite [7526-26-3]		
		Ethylphosphinyl dichloride [1498-40-4]		
		Ethylphosphinyl difluoride [430-78-4]		
		Ethylphosphonothioic dichloride [993-43-1]		
		Ethylphosphonyl dichloride [1066-50-8]		
		Ethylphosphonyl difluoride [753-98-0]		
		Methylphosphinyl dichloride [676-83-5]		
		Methylphosphinyl difluoride [753-59-3]		
		Methylphosphonic acid [993-13-5]		
		Methylphosphonothioic dichloride [676-98-2]		
		Methylphosphonyl dichloride [676-97-1]		
		Methylphosphonyl difluoride [676-99-3]		

HS	HS text	Strategic chemical(s)	CWC	AG
		O-(3-chloropropyl) O-[4-nitro-3-(trifluoromethyl)phenyl] methylphosphonothionate [849-29-6]		
		Product from the reaction of Methylphosphonic acid and 1,2-Ethanediamine [99580-93-5]		
		Product from the reaction of Methylphosphonic acid and 1,3,5-Triazine-2,4,6-triamine [129788-86-9]		
		Propylphosphonyl dichloride [4708-04-7]		
		QL [57856-11-8]		
		Sarin [107-44-8]		
		Soman [96-64-0]		
		Tabun [77-81-6]		
2931.90	- Other	2-Chlorovinyldichloroarsine [541-25-3]		
		Bis (2-chlorovinyl) chloroarsine [40334-69-8]		
		Tris (2-chlorovinyl) arsine [40334-70-1]		
29.33	Heterocyclic compounds with nitrogen hetero-atom(s) only.			
2933.39	- Compounds containing an unfused pyridine ring (whether or not hydrogenated) in the structure: -- Other	3-Hydroxy-1-methylpiperidine [3554-74-3]		
		3-Quinuclidinol [1619-34-7]		
		3-Quinuclidinyl benzilate [6581-06-2]		
		3-Quinuclidone [3731-38-2]		
30.02	Human blood; animal blood prepared for therapeutic, prophylactic or diagnostic uses; antisera, other blood fractions and immunological products, whether or not modified or obtained by means of biotechnological processes; vaccines, toxins, cultures of micro-organisms (excluding yeasts) and similar products.			
3002.90	- Other	Ricin [9009-86-3]		
		Saxitoxin [35523-89-8]		
38.24	Prepared binders for foundry moulds or cores; chemical products and preparations of the chemical or allied industries (including those consisting of mixtures of natural products), not elsewhere specified or included.			
3824.91	- Other: -- Mixtures and preparations consisting mainly of(5-ethyl-2-methyl-2-oxido-1,3,2-dioxaphosphinan-5-yl)methyl methyl methylphosphonate and bis[(5-ethyl-2-methyl-2-oxido-1,3,2-dioxaphosphinan-5-yl)methyl] methylphosphonate	Mixture of CAS RN 41203-81-0 and CAS RN 42595-45-9 [170836-68-7]		
3824.99	- Other: -- Other	Phosphonic acid, methyl-, polyglycol ester (Exolit OP 560 TP) [294675-51-7]		
		Phosphonic acid, methyl-, polyglycol ester (Exolit OP 560) [663176-00-9]		

<b>HS</b>	<b>HS text</b>	<b>Strategic chemical(s)</b>	<b>CWC</b>	<b>AG</b>
		Phosphorus oxide, polymer with dimethyl methylphosphonate and oxirane [70715-06-9]		
		Phosphorus oxide, polymer with dimethyl methylphosphonate and oxirane [70715-06-9]		

## Annex VII – UN Numbers Associated with Strategic Goods

UN	*	UN	*								
0072	E	1385	C	1790	C	2421	M	2982	R		
0075	M	1396	M	1806	C	2427	EP	2984	EP		
0208	E	1401	N	1809	C	2428	EP	3172	B		
0226	E	1415	N	1810	C	2439	C	3294	C		
0282	E	1418	M	1811	C	2463	M	3321	R		
0392	E	1442	M	1812	C	2674	C	3322	R		
0402	E	1467	M	1828	C	2686	C	3323	R		
0483	E	1485	EP	1836	C	2814	B	3324	N		
0484	E	1486	EP	1849	C	2817	C	3325	N		
0489	E	1489	EP	1868	M	2900	B	3326	N		
0490	E	1495	EP	1869	N	2908	R	3327	N		
1032	C	1498	EP	1921	M	2909	R	3328	N		
1046	N	1560	C	1942	EP			3329	N		
1051	C	1567	M	1957	N	2910	R	3330	N		
1052	C	1580	C	1975	M	2911	R	3331	N		
1067	M	1581	C	2008	M	2912	R	3332	R		
1076	C	1582	C	2014	EP	2913	R	3333	N		
1090	E	1583	C	2015	EP			3373	B		
1135	C	1589	C	2029	M	2915	R	3413	C		
1158	C	1614	C	2030	M	2916	R	3414	C		
1160	C	1680	C	2032	M	2917	R	3415	C		
1163	M	1689	C	2067	EP	2918	N	3416	C		
1244	M	1690	C	2071	EP			3421	C		
1261	EP	1694	C	2321	M	2919	R	3422	C		
1336	E	1697	C	2323	C	2977	N	3462	B		
1358	M	1727	C	2329	C	2978	N	3507	N		
1380	M	1749	N	2382	M						

\* Concerns:

B-Biological, C-Chemical, E-Explosive, EP-Explosive Precursor, M-Military, N-Nuclear, R-Radiological

UN	Description	Concern*
0072	CYCLOTRIMETHYLENETRINITRAMINE (CYCLONITE; HEXOGEN; <b>RDX</b> ) WETTED with not less than 15 per cent water, by mass	E
0075	DIETHYLENEGLYCOL DINITRATE, DESENSITIZED with not less than 25% nonvolatile, water-insoluble phlegmatizer, by mass	M
0208	TRINITROPHENYLMETHYLNITRAMINE ( <b>TETRYL</b> )	E
0226	CYCLOTETRAMETHYLENETETRANITRAMINE ( <b>HMX</b> ; OCTOGEN) WETTED with not less than 15 per cent water, by mass	E
0282	<b>NITROGUANIDINE</b> (PICRITE), dry or wetted with less than 20% water, by mass	E
0392	HEXANITROSTILBENE ( <b>HNS</b> )	E
0402	AMMONIUM PERCHLORATE	E
0483	CYCLOTRIMETHYLENETRINITRAMINE (CYCLONITE; HEXOGEN; <b>RDX</b> ), DESENSITIZED	E
0484	CYCLOTETRAMETHYLENETETRANITRAMINE ( <b>HMX</b> ; OCTOGEN), DESENSITIZED	E
0489	DINITROGLYCOLURIL ( <b>DINGU</b> )	E
0490	NITROTRIAZOLONE (NTO)	E
1032	DIMETHYLAMINE, ANHYDROUS	C
1046	HELIUM, COMPRESSED	N
1051	HYDROGEN CYANIDE, STABILIZED, containing less than 3% water	C
1052	HYDROGEN FLUORIDE, ANHYDROUS	C
1067	DINITROGEN TETROXIDE (NITROGEN DIOXIDE)	M
1076	PHOSGENE	C
1090	ACETONE	E
1135	ETHYLENE CHLOROHYDRIN	C
1158	DIISOPROPYLAMINE	C
1160	DIMETHYLAMINE, AQUEOUS SOLUTION	C
1163	DIMETHYLHYDRAZINE, UNSYMMETRICAL	M
1244	METHYLHYDRAZINE	M
1336	NITROGUANIDINE (PICRITE), WETTED with not less than 20% water, by mass	E
1358	ZIRCONIUM POWDER, WETTED with not less than 25 per cent water (a visible excess of water must be present) (a) mechanically produced, particle size less than 53 microns; (b) chemically produced, particle size less than 840 microns	M
1380	PENTABORANE	M
1385	SODIUM SULFIDE, ANHYDROUS or SODIUM SULFIDE with less than 30 per cent water of Crystallization	C
1396	ALUMINIUM POWDER, UNCOATED	M
1401	CALCIUM	N

UN	Description	Concern*
1415	LITHIUM	N
1418	MAGNESIUM POWDER or MAGNESIUM ALLOYS POWDER	M
1442	AMMONIUM PERCHLORATE	M
1467	GUANIDINE NITRATE	M
1560	ARSENIC TRICHLORIDE	C
1567	BERYLLIUM POWDER	M
1580	CHLOROPICRIN	C
1581	CHLOROPICRIN AND METHYL BROMIDE MIXTURE with more than 2% chloropicrin	C
1582	CHLOROPICRIN AND METHYL CHLORIDE MIXTURE	C
1583	CHLOROPICRIN MIXTURE, N.O.S.	C
1589	CYANOGEN CHLORIDE, STABILIZED	C
1614	HYDROGEN CYANIDE, STABILIZED, containing less than 3% water and absorbed in a porous inert material	C
1680	POTASSIUM CYANIDE, SOLID	C
1689	SODIUM CYANIDE, SOLID	C
1690	SODIUM FLUORIDE, SOLID	C
1694	BROMOBENZYL CYANIDES, LIQUID	C
1697	CHLOROACETOPHENONE, SOLID	C
1727	AMMONIUM HYDROGENFLUORIDE, SOLID	C
1749	CHLORINE TRIFLUORIDE	N
1796	Nitrating acid mixtures	EP
1790	HYDROFLUORIC ACID	C
1806	PHOSPHORUS PENTACHLORIDE	C
1809	PHOSPHORUS TRICHLORIDE	C
1810	PHOSPHORUS OXYCHLORIDE	C
1811	POTASSIUM HYDROGENDIFLUORIDE, SOLID	C
1812	POTASSIUM FLUORIDE, SOLID	C
1826	Nitrating acid mixtures	EP
1828	SULPHUR CHLORIDES	C
1836	THIONYL CHLORIDE	C
1849	SODIUM SULPHIDE, HYDRATED with not less than 30 per cent water	C
1868	DECABORANE	M
1869	MAGNESIUM OR MAGNESIUM ALLOYS with more than 50% magnesium in pellets, turning or ribbons	N

UN	Description	Concern*
1921	PROPYLENEIMINE, STABILIZED	M
1942	AMMONIUM NITRATE	E
1957	DEUTERIUM, COMPRESSED	N
1975	NITRIC OXIDE AND DINITROGEN TETROXIDE MIXTURE; or NITRIC OXIDE AND NITROGEN DIOXIDE MIXTURE	M
2008	ZIRCONIUM POWDER, DRY	M
2014	Hydrogen Peroxide	EP
2015	Hydrogen Peroxide	EP
2029	HYDRAZINE, ANHYDROUS	M
2030	HYDRAZINE AQUEOUS SOLUTION with more than 37% hydrazine, by mass	M
2031	Nitric acid other than red fuming	EP
2032	NITRIC ACID, RED FUMING (note: inhibited RFNA may have different number)	M
2067	AMMONIUM NITRATE FERTILIZERS	EP
2321	TRICHLOROBENZENES, LIQUID	M
2323	TRIETHYL PHOSPHITE	C
2329	TRIMETHYL PHOSPHITE	C
2382	DIMETHYLHYDRAZINE, SYMMETRICAL	M
2421	NITROGEN TRIOXIDE	M
2439	SODIUM HYDROGENDIFLUORIDE	C
2463	ALUMINIUM HYDRIDE	M
2674	SODIUM FLUOROSILICATE	C
2686	2-DIETHYLAMINO-ETHANOL	C
2814	<b>INFECTIOUS</b> SUBSTANCES AFFECTING HUMANS	B
2817	AMMONIUM HYDROGENFLUORIDE SOLUTION	C
2900	<b>INFECTIOUS</b> SUBSTANCES AFFECTING ANIMALS	B
2908	Radioactive material, excepted package -- empty packaging	R
2909	Radioactive material, excepted package-articles manufactured from natural or depleted uranium or natural thorium	R
2910	Radioactive material, excepted package-limited quantity of material	R
2911	Radioactive material, excepted package-instruments or articles	R
2912	Radioactive material, low specific activity (LSA-I) [non fissile or fissile-excepted]	R
2913	Radioactive material, surface contaminated objects (SCO-I or SCO-II) [non fissile or fissile-excepted]	R

UN	Description	Concern*
2915	Radioactive material, Type A package [non-special form, non fissile or fissile-excepted]	R
2916	Radioactive material, Type B(U) package [non fissile or fissile-excepted]	R
2917	Radioactive material, Type B(M) package [non fissile or fissile-excepted]	R
2918	Radioactive material, <b>fissile</b> , n.o.s.	N
2919	Radioactive material, transported under special arrangement, [non fissile or fissile excepted]	R
2977	Uranium hexafluoride, <b>fissile</b>	N
2978	Uranium hexafluoride, non-fissile or fissile excepted	N
2982	Radioactive material, n.o.s	R
2984	Hydrogen Peroxide	EP
3172	<b>TOXINS</b> , EXTRACTED FROM LIVING SOURCES, LIQUID, N.O.S	B
3294	HYDROGEN CYANIDE SOLUTION IN ALCOHOL with not more than 45% hydrogen cyanide	C
3321	Radioactive material, low specific activity (LSA-II), non-fissile or fissile excepted	R
3322	Radioactive material, low specific activity (LSA-III), non-fissile or fissile excepted	R
3323	Radioactive material, Type C package, non-fissile or fissile excepted	R
3324	Radioactive material, low specific activity (LSA-II), <b>fissile</b>	N
3325	Radioactive material, low specific activity (LSA-III), <b>fissile</b>	N
3326	Radioactive material, surface contaminated objects (SCO-I or SCO-II), <b>fissile</b>	N
3327	Radioactive material, Type A package, <b>fissile</b> , non-special form	N
3328	Radioactive material, Type B (U) package, <b>fissile</b>	N
3329	Radioactive material, Type B (M) package, <b>fissile</b>	N
3330	Radioactive material, Type C package, <b>fissile</b>	N
3331	Radioactive material, transported under special arrangements, <b>fissile</b>	N
3332	Radioactive material, Type A package, special form, non-fissile or fissile excepted	R
3333	Radioactive material, Type A package, special form, <b>fissile</b>	N
3373	BIOLOGICAL SUBSTANCE, CATEGORY B	B
3413	POTASSIUM CYANIDE, SOLUTION	C
3414	SODIUM CYANIDE, SOLUTION	C
3415	SODIUM FLUORIDE, SOLUTION	C
3416	CHLOROACETOPHENONE, LIQUID	C
3421	POTASSIUM HYDROGENDIFLUORIDE SOLUTION	C

UN	Description	Concern*
3422	POTASSIUM FLUORIDE, SOLUTION	C
3462	<b>TOXINS</b> EXTRACTED FROM LIVING SOURCES, SOLID, N.O.S.	B
3507	Uranium Hexafluoride, Radioactive Material, Excepted Package less than 0.1 kg per package, non-fissile or fissile-excepted	N

## Annex VIII – Glossary

The following terms are defined for purposes of this implementation guide.

<b>AG</b>	<i>Australia Group. See section 1.1.2.3.</i>
<b>ATT</b>	<i>Arms Trade Treaty. See section 1.1.2.1.</i>
<b>Becquerel</b>	<i>A unit of radioactivity corresponding to one disintegration per second. See section 28.44 Radioactive materials.</i>
<b>Catch-all</b>	<i>Catch-all controls subject goods to trade controls even if they are not included in national control lists if there is information indicating that they will be used for a proscribed activity or by a proscribed end user. See sections 1.2.1 and 1.3.3.7.</i>
<b>CAS Number</b>	<i>CAS numbers are registry numbers of the Chemical Abstracts Service. They provide a unique numeric identifier for each registered chemical. See section 28-29 Strategic Chemicals.</i>
<b>Control list</b>	<i>Export control lists specify materials, equipment, software, and technology subject to trade control. Listed goods generally require licences or permits for various international transactions, especially for export.</i>
<b>MTCR</b>	<i>Missile Technology Control Regime. See section 1.1.2.3.</i>
<b>NPT</b>	<i>Nuclear Non-Proliferation Treaty. See section 1.1.2.1.</i>
<b>NSG</b>	<i>Nuclear Suppliers Group. See section 1.1.2.3.</i>
<b>Outreach</b>	<i>Activities by appropriate government agencies directed toward the trade community to promote their future compliance by raising awareness of strategic trade control regulations and compliance procedures they are to follow. See Annex IV – Industry Outreach by Customs.</i>
<b>PGS</b>	<i>WCO Programme Global Shield. See section 1.4.4.12.</i>
<b>PSI</b>	<i>Proliferation Security Initiative. See section 1.1.2.4.</i>
<b>Reachback</b>	<i>The process of obtaining support from organizations that are not on the front line.</i>
<b>RKC</b>	<i>Revised Kyoto Convention</i>
<b>Sievert (Sv)</b>	<i>A measure of absorbed radiation dose in the International System of Units. It is a measure of the health effect of low levels of ionising radiation on the human body. Since one sievert is a large quantity, radiation doses normally encountered are expressed in millisievert (mSv) or microsievert (<math>\mu</math>Sv) which are one-thousandth or one millionth of a sievert. For example, one chest X-ray will give about 0.2 mSv of radiation dose.</i>
<b>Strategic goods</b>	<i>Weapons of mass destruction (WMD), conventional weapons, and related items involved in the development, production, or use of such weapons and their delivery systems</i>
<b>STC</b>	<i>Strategic Trade Control</i>
<b>STCE</b>	<i>Strategic Trade Control Enforcement</i>
<b>UNSCR 1540</b>	<i>United Nations Security Council Resolution 1540. See section 1.1.2.5.</i>
<b>WA</b>	<i>Wassenaar Arrangement. See section 1.1.2.3.</i>
<b>WMD</b>	<i>Weapons of Mass Destruction. WMD include nuclear weapons (designed to cause mass destruction through the explosive release of nuclear energy), chemical weapons (designed to inflict injury such as choking, blistering, or nervous system malfunction through chemical reactions), biological weapons (designed to employ microorganisms to cause illness in humans, livestock, or crops), and radiological weapons (designed to cause illness and mass disruption through the spread of radioactivity).</i>

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