

International Nonproliferation Export Control Program

SAND2011-4602 C

SAND2011-4602C

MISSION

Strengthen global efforts to prevent proliferation of WMD-related materials, equipment, and technology



AREAS OF ENGAGEMENT

Proliferation Risk Analysis in the Licensing Process

- Ensure the license review process competently assesses proliferation risks associated with end-uses and end-users, and ensure technical specialists are being utilized

Government Outreach and Enterprise Compliance

- Assist governments to establish outreach programs and promote enterprise compliance at key enterprises and technology holders

WMD-related Commodity Identification Training and reach-back for Customs

- Ensure enforcement personnel are sensitized to WMD-related materials and equipment, and have access to technical/analytical resources and support

WMD Commodity Identification Training (CIT)

- **Familiarizes enforcement officers with the materials, components, and equipment sought by WMD procurement programs**
- **Reduces the complexity of the various export control lists, by**
 - Grouping commodities by physical appearance and category rather than by function
 - Focusing primarily on appearance, notable features, key parameters, special markings, typical packaging, sizes, weights, monetary values, etc
- **INECP follows a disciplined indigenization approach, based on our technical partnerships, to establish ongoing, country-led training programs and technical “reach-back” capabilities**

CIT Modules

Electronic Components	Electronic Equipment	Industrial Equipment – Nuc/Missile	Industrial Equipment – Chem/Bio	Structural Materials	Chemicals	Radioactive and SNM	Fabricated Components	Systems and Subsystems
Detonators	LASERS	Machine Tools	Remote Filling Equipment	Aluminum	Platinized Catalysts	Uranium (various forms)	Multi-walled Pipe	Solid Propellant Motors
Firing Sets	Power Supplies	Filament and Tape Winding or Weaving Machines	Heat Exchangers	Titanium	Helium	Plutonium	Tanks	Liquid Propellant Engines
Capacitors	Frequency Changers	Flash X-ray	Agitators	Maraging Steel	Uranium Hexafluoride	Reactor fuel	Valves	Reentry Vehicles
Switching Devices	High-speed Cameras	Flow-forming/Spin forming Machines	Chemical Reaction Vessels	Beryllium	Phosphorus Pentasulfide	Industrial radionuclides	Heat Shields	Unmanned Aerial Vehicles
Gyroscopes	Radiation Hardened Cameras	Robots	Fermenters	Tungsten	Zirconium	Tritium	Missile Components	Missile Systems and Stages
Photomultiplier Tubes	Neutron Generators	Dimensional Inspection Machines	Centrifugal Separators	Graphite	Chlorine Trifluoride	Alpha-emitting radionuclides	Crucibles	Attitude Control Systems
Manganin Pressure Guages / Quartz Pressure Transducers	Neutron Detectors	Remote Manipulators	Cross-Flow Filtration Equipment	Fibrous and filamentary material	Cyanide Compounds	Heavy Water	Radomes	Turbine Engines
Accelerometer	Pulse Generators	Gas guns	Freeze-Drying Equipment		Propellant chemicals		RADAR systems	Protective equipment
Toxic Gas Monitors	Telemetry and Telecontrol	Mixers & Mills	Furnaces		CW Precursor chemicals		Thrust Vector Control Systems	Fogging and Spraying Systems
	RADARs	Isostatic Presses	Electrolytic Cells		Metal Powders		Gas Centrifuge Components	
		Rate Tables/Motion Simulators	Aerosol Inhalation Equipment		Sodium Sulfide		Radiation-shielded Windows	
		Vibration Test Systems	Pumps		Lithium			
		Balancing Machines	Columns & towers					

eCIT

- The Commodity Identification Training (CIT) information and approach has been integrated into an online Strategic Commodity Reference Engine
- eCIT provides secure, online full-text search of the CIT information and all relevant export control lists through a simple user interface.
- The system is designed to be customizable and adoptable by interested countries.

eCIT 3 panels

contents

commodity

thumbnails

http://score.anl.gov/score/page/site/dashboard

Search: Go Advanced Print

About Help Language 

Commodities **Commodity Types** **WMD Uses** **Controls**

auger filler
Balancing Machines
ballistic missile
Beryllium
beryllium powder
bioreactor
Bismuth
bismuth powder
boron powder
Calcium
Cameras - Electronic Streak And Framing
Cameras - Radiation Hardened
Cameras - Rotating Mirror
Capacitors

Carbon Fiber
Centrifugal Separators
Chemical Reaction Vessels
Chemical reactors
Chemical Vapor Deposition Furnace
chemostat
Chlorine fluoride
Chlorine fluoride (ClF3)
Chlorine Trifluoride
Chlorotrifluoride
Chlortrifluorid
ClF3
Cold-cathode tubes
Columns And Towers
compensated ion chambers
Condensers
converters
Coordinate Measuring Machines (CMM)
Cross Flow Filtration Equipment
Crucibles
cruise missiles
Cyanide Compounds
D2O
Dc Power Supplies
Decanter Centrifuge
Detonators
Deuterium oxide
Dideuterium oxide
Dimensional Inspection Machines
dinitrogen tetroxide
Disodium monosulfide
Disodium sulfide
distillation columns
double containment piping

Centrifugal Separators

Description WMD Uses Controls Civilian Uses Appearance Packaging

◆ A centrifuge is laboratory apparatus used to separate heavier from lighter molecules and cellular components and structures by spinning them at high speed. Centrifuges create a sustained centrifugal force, a force due to rotation, that results in the separation of samples into layers according to their density. For example, in the dairy industry skim milk is produced by separating away the cream by centrifugation.

◆ The basic design of a centrifuge consists of a wheel, or rotor, connected to a motor that spins. Centrifuges are also useful in separating particles or cells from a solution. For example, spinning a sample of liquid growth media in a centrifuge will force any bacteria present to the bottom or sides of the container/spinner bowl. The growth media can then be decanted or suctioned away, leaving the concentrated bacterial cells for further processing.

Must be capable of continuous operation with flow rates > 100 liters/hour

Also Known As...

◆ Decanter Centrifuge

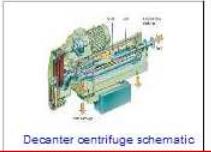
All Filtered


Centrifugal Separator Schematic


Centrifugal Separator


Centrifugal Separator photo and schematic - note inlets and outlets indicating capacity for continuous operation


Decanter centrifuge


Decanter centrifuge schematic

3 panels: **contents**, **commodity**, **thumbnails**

Contents panel: 4 tabs

Commodities	Commodity Types	WMD Uses	Controls
18Ni			
Maraging Steel			
3H			
Tritium			
3T			
absorption columns			
AC power sources			
Frequency Changers			
AC power supplies			
Accelerometers			
adjustable frequency drives			
aerosol filter			
Aerosol Inhalation Chambers			
Agitators			
AHF			
aluminum			
Aluminum			
aluminum powder			
ammonia synthesis converters			
ammonia-hydrogen exchange towers			
ammonium perchlorate			
Angular Rate Sensors			
Anhydrous hydrofluoric acid			
Aramid Fiber			
Arc Remelt Furnace			
auger filter			
Balancing Machines			
ballistic missile			
Beryllium			
beryllium powder			
bioreactor			
Bismuth			
bismuth powder			
boron powder			
Calcium			
Cameras - Electronic Streak And Framing			
Cameras - Radiation Hardened			
Cameras - Rotating Mirror			
Capacitors			
Carbon Fiber			
Centrifugal Separators			
Chemical Reaction Vessels			
Chemical reactors			
Chemical Vapor Deposition Furnace			
chemostat			
Chlorine fluoride			
Chlorine fluoride (ClF3)			
Chlorine Trifluoride			
Chlorotrifluoride			

1. Commodities

- Lists all commodities and aliases (AKAs) in the database in alphabetical order
- **Designed to work like an index**
- Aliases can be expanded to link to their commodity entries
- Clicking on any entry brings up that commodity's information and thumbnails in their respective panels

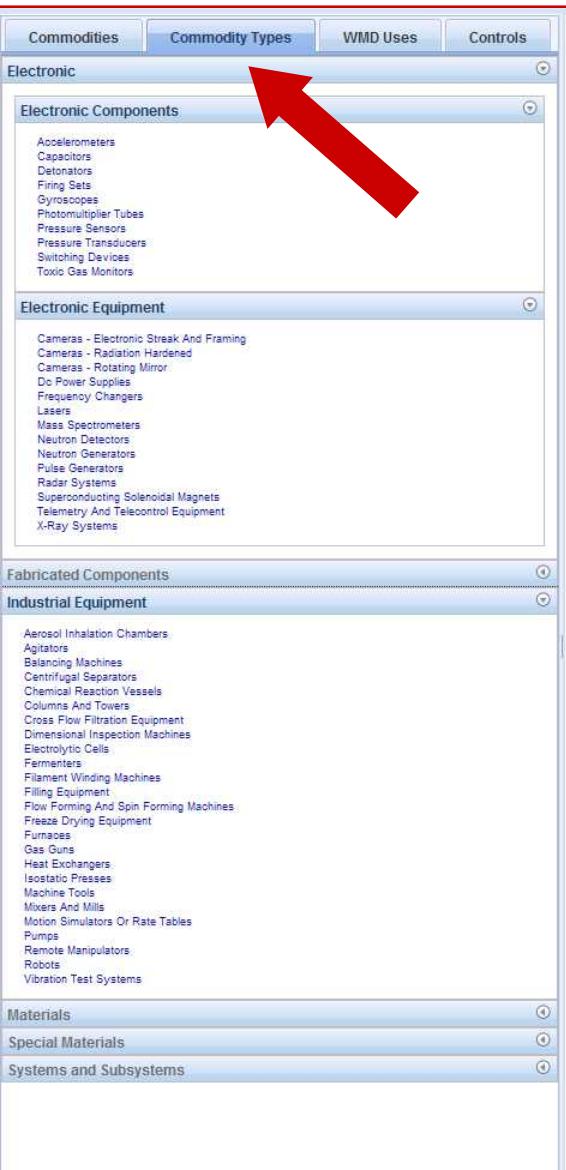
2. Commodity Types

3. WMD Uses

4. Controls

3 panels: **contents**, **commodity**, **thumbnails**

Contents panel: 4 tabs



Commodities Commodity Types WMD Uses Controls

Electronic

Electronic Components

- Accelerometers
- Capacitors
- Detonators
- Firing Sets
- Gyroscopes
- Photomultiplier Tubes
- Pressure Sensors
- Pressure Transducers
- Switching Devices
- Toxic Gas Monitors

Electronic Equipment

- Cameras - Electronic Streak And Framing
- Cameras - Radiation Hardened
- Cameras - Rotating Mirror
- Dc Power Supplies
- Frequency Changers
- Lasers
- Mass Spectrometers
- Neutron Detectors
- Neutron Generators
- Pulse Generators
- Radar Systems
- Superconducting Solenoidal Magnets
- Telemetry And Telecontrol Equipment
- X-Ray Systems

Fabricated Components

Industrial Equipment

- Aerosol Inhalation Chambers
- Agitators
- Balancing Machines
- Centrifugal Separators
- Chemical Reaction Vessels
- Columns And Towers
- Cross Flow Filtration Equipment
- Dimensional Inspection Machines
- Electrolytic Cells
- Fermenters
- Filament Winding Machines
- Filling Equipment
- Flow Forming And Spin Forming Machines
- Freeze Drying Equipment
- Furnaces
- Gas Guns
- Heat Exchangers
- Isostatic Presses
- Machine Tools
- Mixers And Mills
- Motion Simulators Or Rate Tables
- Pumps
- Remote Manipulators
- Robots
- Vibration Test Systems

Materials

Special Materials

Systems and Subsystems

1. Commodities

2. Commodity Types

- Lists all commodities in the database in “CIT order”
 - *Commodity Type sections can be expanded and collapsed*
 - **Facilitates browsing by commodity type**
 - Clicking on any entry brings up that commodity's information and thumbnails in their respective panels

3. WMD Uses

4. Controls

3 panels: **contents**, **commodity**, **thumbnails**

Contents panel: 4 tabs

Commodities Commodity Types WMD Uses Controls

Biological

Chemical

Missile

Guidance

Accelerometers
Balancing Machines
Gyroscopes
Motion Simulators Or Rate Tables
Radar Systems
Telemetry And Telecontrol Equipment
Thrust Vector Control Systems
Valves

Launch Support

Payload

Propulsion

Structural

Test

Missiles - Complete Systems And Stages
Uav's

Nuclear

Conversion
Enrichment

Aluminum
Balancing Machines
Chlorine Trifluoride
Columns And Towers
Dc Power Supplies
Dimensional Inspection Machines
Electrolytic Cells
Fibrous And Filamentary Materials
Filament Winding Machines
Flow Forming And Spin Forming Machines
Frequency Changers
Gas Centrifuge Components
Heat Exchangers
Lasers
Maraging Steel
Mass Spectrometers
Metal Powders
Pressure Transducers
Superconducting Solenoidal Magnets
Titanium
Valves

Fuel Fabrication

Heavy Water

Reactors

Reprocessing

Uranium

1. Commodities

2. Commodity Types

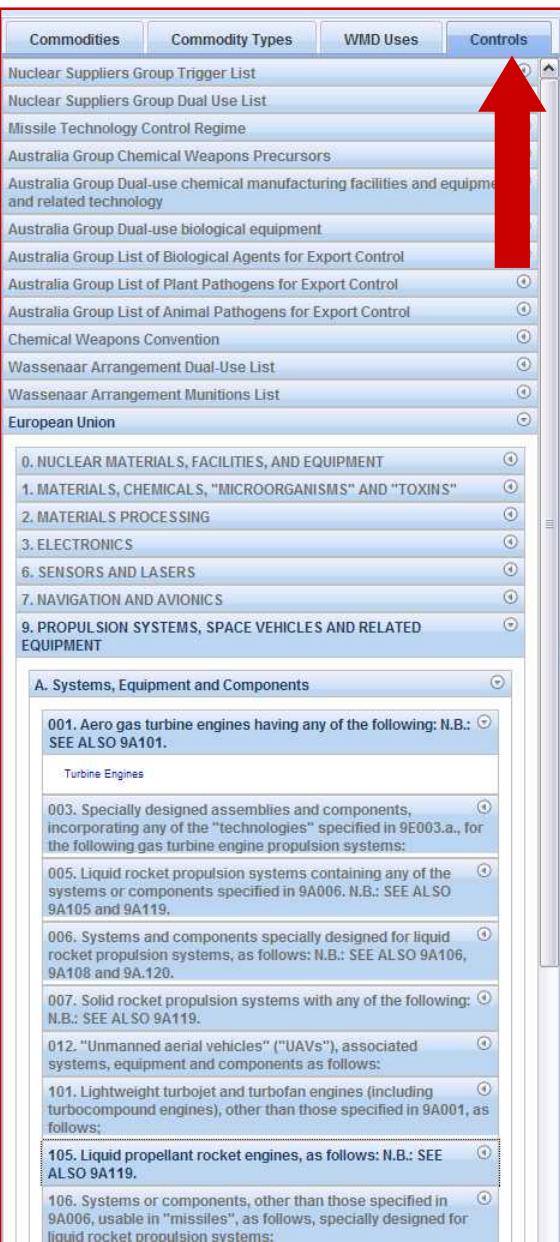
3. WMD Uses

- Lists all commodities in the database by their WMD applications
 - *WMD Use sections can be expanded and collapsed*
 - **Facilitates browsing by WMD Application**
 - Clicking on any entry brings up that commodity's information and thumbnails in their respective panels

4. Controls

3 panels: **contents**, **commodity**, **thumbnails**

Contents panel: 4 tabs



The screenshot shows the 'Contents' panel with four tabs: 'Commodities', 'Commodity Types', 'WMD Uses', and 'Controls'. A red arrow points to the 'Controls' tab, which is currently selected. The panel displays a hierarchical list of control lists, with some sections expanded to show detailed commodity information. For example, the 'A. Systems, Equipment and Components' section is expanded, showing items like '001. Aero gas turbine engines' and '105. Liquid propellant rocket engines'.

1. Commodities

2. Commodity Types

3. WMD Uses

4. Controls tab

- Allows browsing the control lists
 - *Control lists and control list sections can be expanded and collapsed*
 - *Includes all control list entries with linked commodities*
 - *Clicking on any entry brings up that commodity's information and thumbnails in their respective panels*

3 panels: contents, commodity, thumbnails

Commodity panel: 6 tabs

Centrifugal Separators

Description WMD Uses Controls Civilian Uses Appearance Packaging

- A centrifuge is laboratory apparatus used to separate heavier from lighter molecules and cellular components and structures by spinning them at high speed. Centrifuges create a sustained centrifugal force, a force due to rotation, that results in the separation of samples into layers according to their density. For example, in the dairy industry skim milk is produced by separating away the cream by centrifugation.
- The basic design of a centrifuge consists of a wheel, or rotor, connected to a motor that spins. Centrifuges are also useful in separating particles or cells from a solution. For example, spinning a sample of liquid growth media in a centrifuge will force any bacteria present to the bottom or sides of the container/spinner bowl. The growth media can then be decanted or suctioned away, leaving the concentrated bacterial cells for further processing.

Must be capable of continuous operation with flow rates > 100 liters/hour



Also Known As...

- Decanter Centrifuge

Centrifugal Separators

Description WMD Uses Controls Civilian Uses Appearance Packaging

- Centrifugal Separator normally has these main components:
 1. Sealing joints: one or multiple within steam containment area
 2. Spinning bowl of polished stainless steel or titanium
 3. Motor to drive propeller shaft and distributor disc

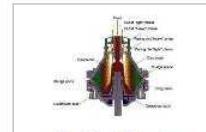
Look for these notable features:

- Total containment during operation - no propagation of aerosols
- Connection for In-situ steam sterilization in a closed state
- Polished stainless steel or titanium spinning bowl
- 3 fluid connections: 1 Inlet for feedstock, 2 Outlets for supernatant and for separated material

DECANTER CENTRIFUGE

- A decanter centrifuge normally has these main components:
 - Horizontal orientation
 - Polished stainless steel bowl

All Filtered



Centrifugal Separator Schematic



Centrifugal Separator



Centrifugal Separator photo and schematic - note inlets and outlets indicating capacity for continuous operation



Decanter centrifuge

1. Description
2. WMD Uses
3. Controls
4. Civilian Uses
5. Appearance
6. Packaging

- Clicking on a thumbnail brings up an enlargement
- The print button provides a single form with all sections combined for field guides and inspector's reports

Example – Kevlar Fibrous and Filamentary Materials

Search: Go Advanced Print [About](#) [Help](#) [Language](#) 

Commodities **Commodity Types** **WMD Uses** **Controls**

HF
High Current Pulse Generators
High Explosives
HMX
HTPB
hydrazine
Hydrofluoric acid
Hydrofluoride
Hydrogen Fluoride
hydrogen-cryogenic distillation columns
hydroxy-terminated polybutadiene
inhibited red fuming nitric acid
inverters
Ion exchange columns
Ion sources
IRFNA
Isostatic Presses
Jet Mills
Kevlar
Fibrous And Filamentary Materials
Laser Amplifiers
Lasers
LI-6
Liquid Propellant Engines
liquid-liquid exchangers
Lithium
M200
M300
M350
M400
Machine Tools
Magnesium
magnesium powder
Manganin pressure gauges
Maraging Steel
Mass Spectrometers
Metal Powders
Missiles - Complete Systems And Stages
mixed oxides of nitrogen
Mixers And Mills
MMH
molybdenum powder

Fibrous And Filamentary Materials

Description **WMD Uses** **Controls** **Civilian Uses** **Appearance** **Packaging**

Controlled materials include fibrous or filamentary materials (fibers), prepregs, and composite structures. Fibers include carbon, aramid, and glass having specifications on specific modulus and specific strength.

Determining composition, strength and modulus requires special equipment and can be difficult. However, most of the carbon fiber produced today meets the control specifications of the NSG.

Also Known As...

- Carbon Fiber
- Graphite Fiber
- Glass Fiber
- Aramid Fiber
- Kevlar



Various fibrous and filamentary materials

All **Filtered**



Carbon Fiber Spools



Aramid Fiber Spool



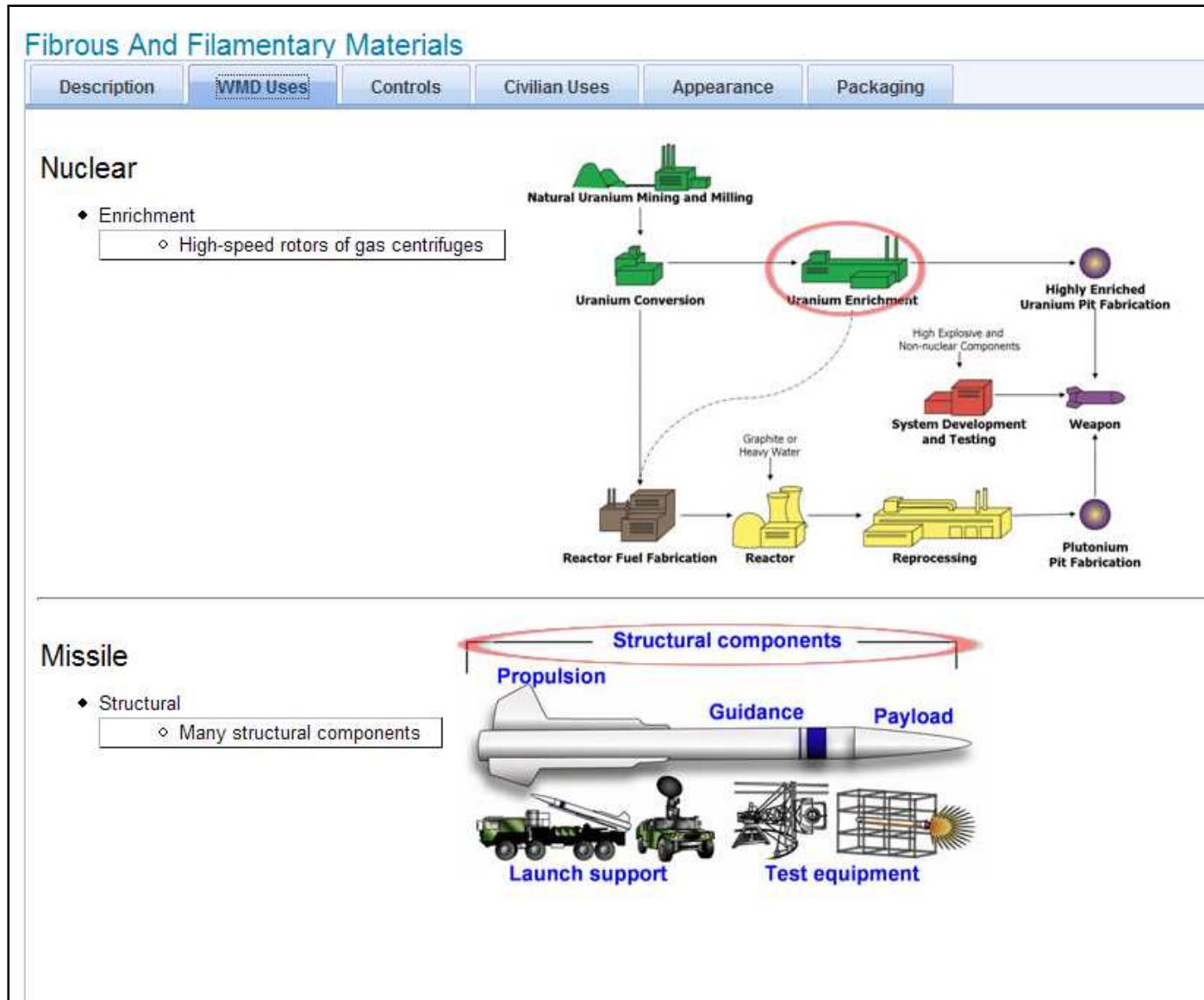
Glass Fiber Spool



Various fibrous and filamentary materials

SCORE v0.5.0

Example – Kevlar Fibrous and Filamentary Materials



Example – Kevlar Fibrous and Filamentary Materials

- Controls tab allows easy drill-down access to all relevant control language
- Control list parsing and hierarchical linking very sophisticated “behind-the scene”

Fibrous And Filamentary Materials

Description WMD Uses Controls Civilian Uses Appearance Packaging

All Filtered

European Union

1C010

1C210

1. MATERIALS, CHEMICALS, "MICROORGANISMS" AND "TOXINS"
C. Materials

Technical Note: Metals and alloys: Unless provision to the contrary is made, the words 'metals' and 'alloys' in 1C001 to 1C012 cover crude and semi-fabricated forms, as follows: Crude forms: Anodes, balls, bars (including notched bars and wire bars), billets, blocks, blooms, briquettes, cakes, cathodes, crystals, cubes, dice, grains, granules, ingots, lumps, pellets, pigs, powder, rondelles, shot, slabs, slugs, sponge, sticks; Semi-fabricated forms (whether or not coated, plated, drilled or punched):

- a. Wrought or worked materials fabricated by rolling, drawing, extruding, forging, impact extruding, pressing, graining, atomising, and grinding, i.e.: angles, channels, circles, discs, dust, flakes, foils and leaf, forging, plate, powder, pressings and stampings, ribbons, rings, rods (including bare welding rods, wire rods, and rolled wire), sections, shapes, sheets, strip, pipe and tubes (including tube rounds, squares, and hollows), drawn or extruded wire;
- b. Cast material produced by casting in sand, die, metal, plaster or other types of moulds, including high pressure castings, sintered forms, and forms made by powder metallurgy.

The object of the control should not be defeated by the export of non-listed forms alleged to be finished products but representing in reality crude forms or semi-fabricated forms.

210. 'Fibrous or filamentary materials' or prepgs, other than those specified in 1C010.a., b. or e., as follows:

a. Carbon or aramid 'fibrous or filamentary materials' having either of the following characteristics:

b. Glass 'fibrous or filamentary materials' having both of the following characteristics:

WCO Harmonized System

Missile Technology Control Regime

Nuclear Suppliers Group Dual Use List

Wassenaar Arrangement Dual-Use List

All Filtered

Carbon Fiber Spools

Aramid Fiber Spool

Glass Fiber Spool

Various fibrous and filamentary materials

SCOR

Example – Kevlar Fibrous and Filamentary Materials

Fibrous And Filamentary Materials

Description	WMD Uses	Controls	Civilian Uses	Appearance	Packaging
European Union					
WCO Harmonized System					
5402.10					
5402.41					
5404.10					
5404.90					
6815.10					
7019.12					
7019.19					
7019.40					
7019.51					
7019.52					
7019.59					
7019.90					
Missile Technology Control Regime					
Nuclear Suppliers Group Dual Use List					
Wassenaar Arrangement Dual-Use List					

Fibrous And Filamentary Materials

Description	WMD Uses	Controls	Civilian Uses	Appearance	Packaging
European Union					
WCO Harmonized System					
Missile Technology Control Regime					
Nuclear Suppliers Group Dual Use List					

2.C.7

2. MATERIALS

C. MATERIALS

7. "Fibrous or filamentary materials", and prepgs, as follows:

a. Carbon or aramid

1. A 'specific modulus' of 12.7×10^6 m or greater; or
2. A 'specific tensile strength' of 23.5×10^4 m or greater;

b. Glass

1. A 'specific modulus' of 3.18×10^6 m or greater; and

c. Thermoset resin impregnated continuous "yarns", "rovings", "tows" or "tapes" with a width of 15 mm or less (prepgs), made from carbon or glass "fibrous or filamentary materials" specified in Item 2.C.7.a. or Item 2.C.7.b.

• Carbon and aramid fiber: must meet a specific modulus or a specific tensile strength
• Glass fiber: must meet a specific modulus and a specific tensile strength

Wassenaar Arrangement Dual-Use List

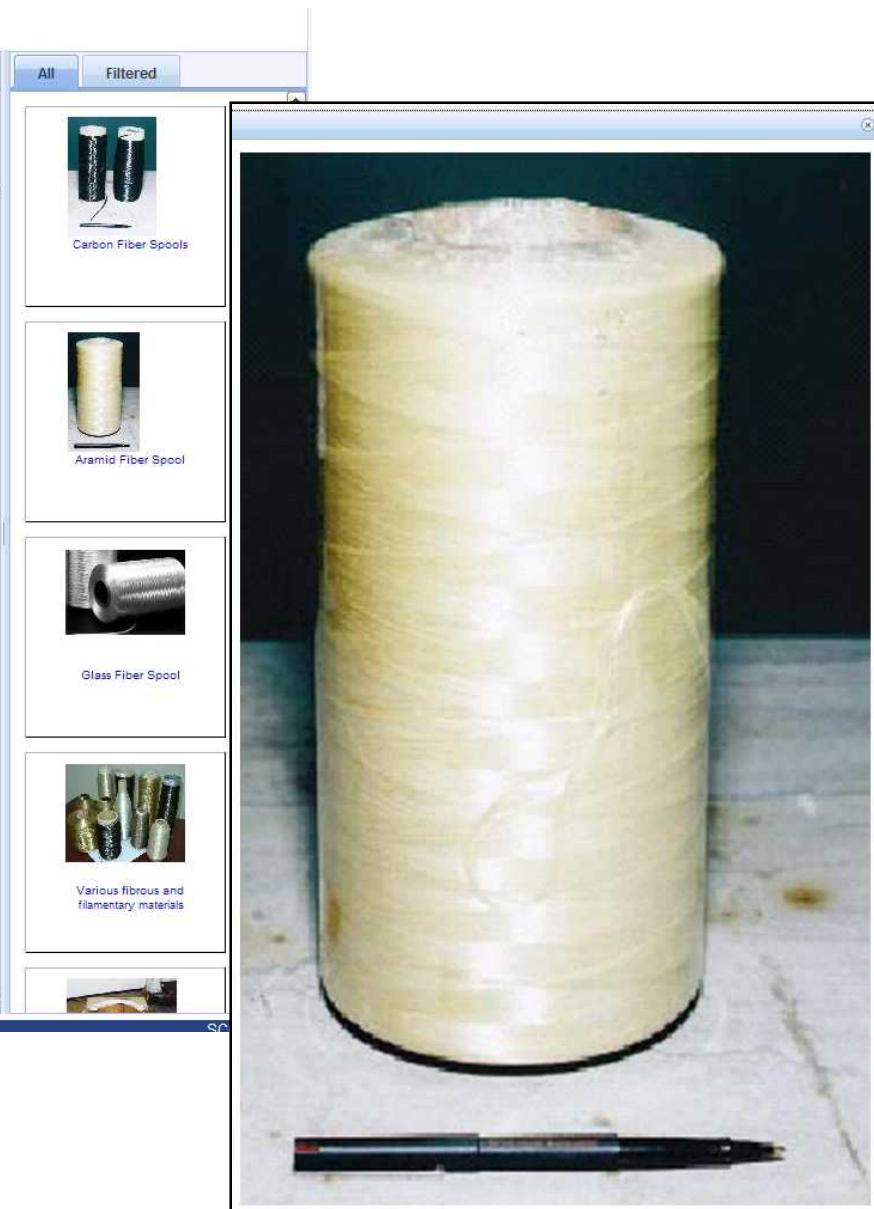
- Actual control language and CIT tips and summaries are juxtaposed to guide understanding

Example – Kevlar Fibrous and Filamentary Materials

Fibrous And Filamentary Materials

Description WMD Uses Controls Civilian Uses **Appearance** Packaging

- Typically are made up of several thousand individual continuous filaments in a single fiber.
 - The filaments are bundled together to form strands or rovings of parallel filaments and also yarns that are bundles of twisted fibers.
 - Also available in tape form where fibers may be interlaced or arranged in a parallel array and bonded together with a resin.
- The bundles of fibers may be impregnated with an adhesive resin that binds the filaments together or they may be unimpregnated so that the individual fibers can be separated from the bundle.
- Three types of interest
 - Carbon fiber
 - Aramid fiber
 - Glass fiber
- Carbon Fiber
 - black matte appearance and the texture of more common synthetic fibers such as nylon or polyester
 - Sometimes called "graphite fiber"
- Aramid Fibers
 - Yellow
 - Also known as Kevlar
- Glass Fiber
 - Shiny white satin appearance when viewed on the spool



Aramid Fiber Spool

Example – Kevlar Fibrous and Filamentary Materials

Fibrous And Filamentary Materials

Description	WMD Uses	Controls	Civilian Uses	Appearance	Packaging
<ul style="list-style-type: none">• Normally covered in shrink wrap, placed in cardboard boxes with spacers or end supports prevent movement of the spools within the box• There is a major difference for packaging and handling of fibrous materials that have been impregnated with resin before shipping<ul style="list-style-type: none">◦ prepreg must be refrigerated◦ normally packed in special containers with provisions for <u>dry ice</u> cooling or it is shipped in refrigerated cargo containers					



Glass fiber spool in shipping box

All Filtered



Prepreg Refrigerated Shipping Box



Prepreg Refrigerated Shipping Box



Carbon fiber on spools in shipping box



Glass fiber spool in shipping box

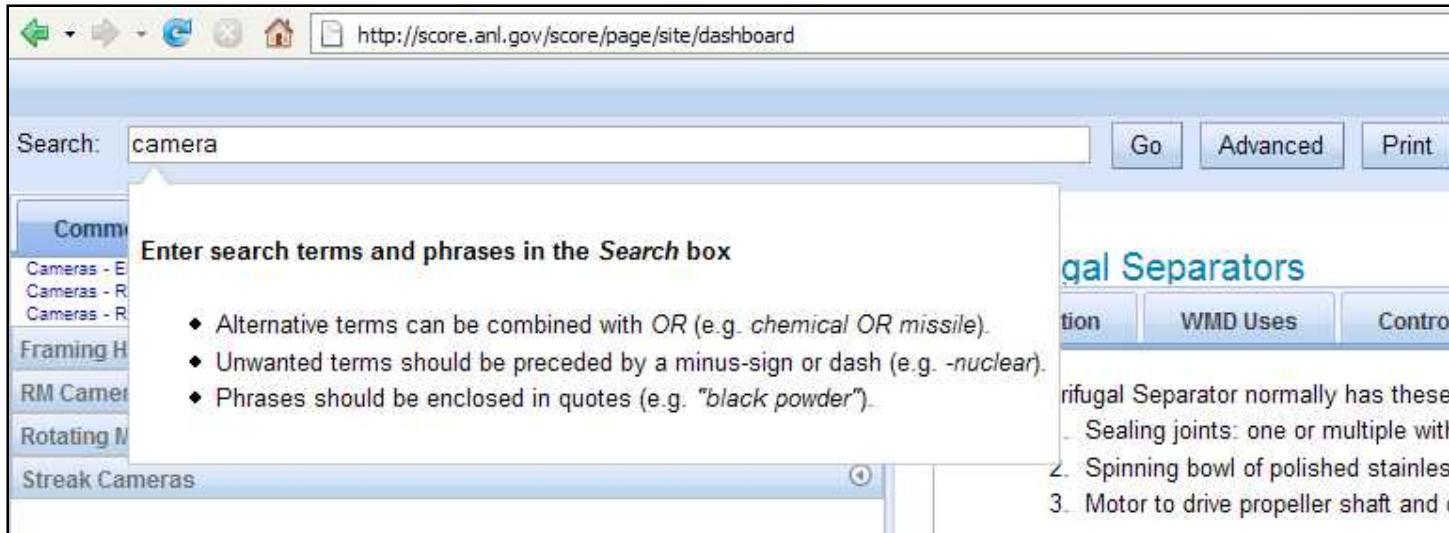
Searching (*filtering*) the database

- The interface works the same with a search in effect – each tab limited to entries matching search term(s)



Searching the database

- Search tips pop up when entering search terms



- Alternatively, an advanced search form can be used
- Can search against full text, including AKA's, HS codes, UN Hazard numbers, company names, etc.

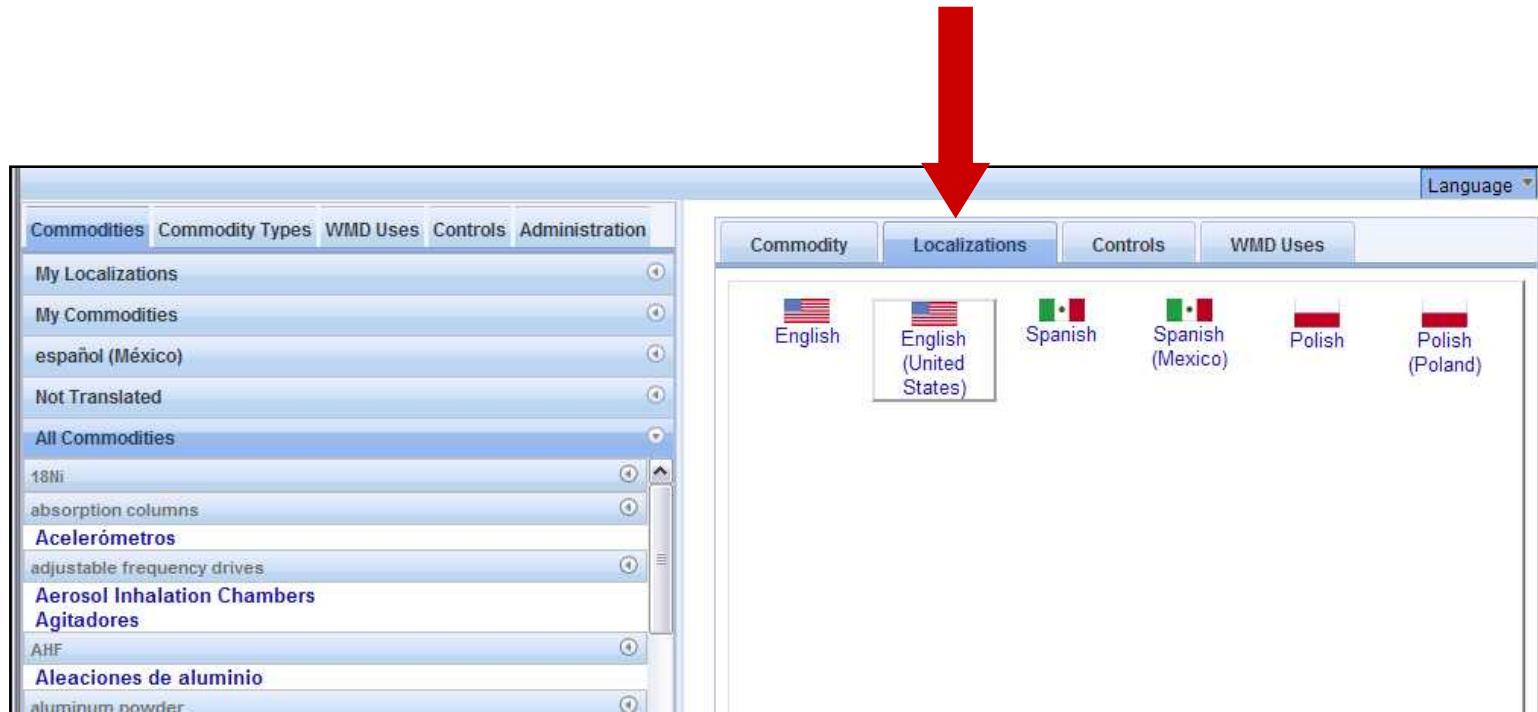


eCIT deployment

- The system is designed to be easily customizable and adoptable by interested countries.
 - Built with open source software development tools and server software
 - Multi-lingual support
 - Includes Content Manager application to facilitate the importation and maintenance of translated and national control lists and commodity data.
- Deployment modes include
 - User
 - *Partners can access our system online*
 - Hosted
 - *Partners can use our platform to host their own version, in their own language*
 - *Requires content management, but no software/database development or system administration*
 - Installed
 - *Partners can install the system on their own servers and modify/adapt as desired*

eCIT Content Manager

- Allows users with appropriate authority to
 - Translate the user interface
 - Create localizations (separate, translated instances) of commodity data
 - Input and maintain translated multilateral control lists
 - Input local control lists



eCIT Content Manager

The screenshot displays the eCIT Content Manager interface, specifically the Localization and Control Lists modules.

Localization Module (Top Left): Shows a list of localizations for the commodity 'Acelerómetros'. The selected localization is 'Spanish Mexico'. Buttons for 'Edit', 'Remove', 'Reject', and 'Approve' are visible. A red box with the text 'Allows for multi-step data quality assurance process for each commodity localization' points to this area.

Control Lists Module (Bottom Left): Shows a list of commodities not yet translated. A red box with the text 'Lists commodities in the database not yet translated to the current language' points to this area.

Control Lists Module (Bottom Right): Shows a side-by-side editor for 'Local Control Lists'. The left pane shows the source language (English) and the right pane shows the destination language (Spanish). Buttons for 'Paste List', 'Edit', and 'Translate' are present. A red box with the text 'Translate button brings up side-by-side editor with source language on left and destination language on right' points to this area.

Language Selection: A red box with the text 'Allows selection among all supported languages' points to the 'Language' dropdown in the top right corner of the Control Lists module.

Input Fields: A red box with the text 'Allows input of local control lists' points to the input field for 'Local Control Lists' in the Control Lists module.