



NSG

Nuclear Suppliers Group

May 6, 2015

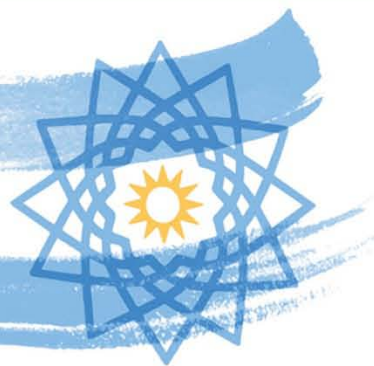
**2015 Review Conference of the Nuclear
Non-Proliferation Treaty**

United Nations, New York

**Ambassador Rafael
Mariano Grossi**
2014-2015 NSG Chair

Richard Goorevich
*NSG Consultative
Group Chair*

NSG Chair





Export Controls and the International Nonproliferation Regime



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- Treaty on the Non-Proliferation of Nuclear Weapons
 - 1970 entry into force
 - Foundation of global non-proliferation regime
 - Calls on States party to implement conditions of supply for sensitive equipment and material transfers
- NPT Article III.2

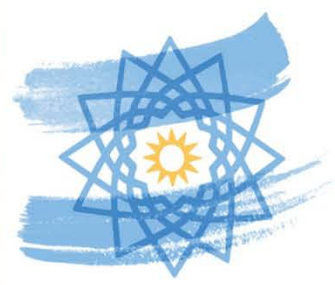
Each State Party to the Treaty undertakes not to provide: (a) source or special fissionable material, or (b) equipment or material especially designed or prepared for the processing, use or production of special fissionable material, to any non-nuclear-weapon State for peaceful purposes, unless the source or special fissionable material shall be subject to the safeguards required by this Article.

116 United Nations Member States have adopted nuclear export controls



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Export Controls and the International Nonproliferation Regime



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Nuclear export controls are just one means of halting the spread of nuclear weapons, along with:

- IAEA safeguards
- physical protection
- material control and accounting measures



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MULTILATERAL NUCLEAR EXPORT CONTROLS



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Prevent the proliferation of nuclear weapons by:

- **creating international standards** for countries to support a principled position on nuclear nonproliferation
- **learning how proliferators exploit weaknesses** to procure materials and capabilities necessary for a nuclear program



Opportunities for Preventing Proliferation Vary



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- Fissile material production involves:
 - specialized equipment and facilities
 - skilled workforce, facilities, equipment, time, and money

Remains principal obstacle & rate-determining step to nuclear weapons

- Nuclear weapon design or testing work includes:
 - theoretical work and non-nuclear testing and diagnostics

Typically involves small number of people and dual-use equipment/facilities that are more difficult to detect



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Opportunities for Preventing Proliferation Vary (cont.)



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Preventing meaningful assistance to fissile material production is the most effective means of slowing nuclear proliferation

- Exports controls:
 - on nuclear items inherently emphasize controls on fissile material production
 - on items for weaponization are important but less effective because they must address the dual use nature of many components
 - are most effective *before* fissile material production facilities are constructed and operational



Multilateral Export Control Regimes



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Zangger Committee

- Established 1971-1974 to interpret NPT Article III.2
- 39 Member Governments
- Determines the meaning and application of “especially designed or prepared”
- Trigger List covers material and equipment transfer

Nuclear Suppliers Group

- Established in 1974 following India’s first nuclear test
- 48 Participating Governments (PGs)
- Conscious effort to balance trade and security interests
- Trigger List and Dual Use List Cover material, equipment, and *technology* transfer



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NSG at a Glance



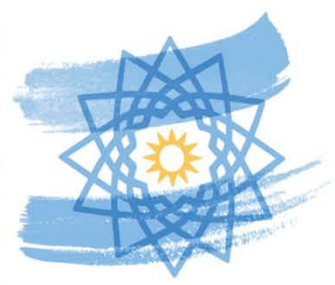
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- Contribute to the nonproliferation of nuclear weapons through the implementation of two sets of Guidelines for nuclear exports and nuclear-related exports
 - Guidelines for the Export of Nuclear Material, Equipment and Technology (INFCIRC/254/Rev.10/Part 1), originally adopted in 1978
 - Guidelines for Transfers of Nuclear Related Dual-Use Equipment, Materials, Software and Related Technology (INFCIRC/254/Rev.7/Part 2), originally adopted in 1992
- NSG Part 1 and Part 2 Guidelines
 - Aim to ensure that nuclear trade for peaceful purposes does not contribute to the proliferation of nuclear weapons or other nuclear explosive devices, and that international trade and cooperation in the nuclear field is not hindered unjustly in the process
 - Any change requires a consensus decision in the NSG
 - Have been revised 21 times, most recently in November 2013, following the three year Fundamental Review of the Trigger List and Dual Use List



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NSG Part 1 Guidelines



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NSG Part 1 Guidelines Trigger List:

- is illustrative of commodities “especially designed or prepared” for the processing, use, or production of special fissionable material.
- prohibits the export of commodities and related technology:
 - to any non-nuclear weapon state that does not have a legally binding commitment for full scope safeguards with the IAEA; or
 - if the exporting country is not satisfied that the export will be used for peaceful purposes



NSG Part 2 Guidelines



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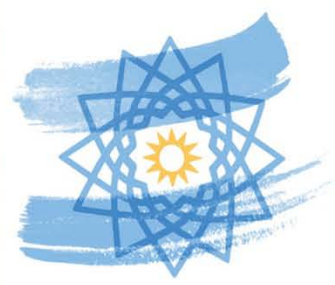
Part 2 of the NSG Guidelines Dual Use List

- includes nuclear related dual-use equipment, materials and technologies.
- prohibits the export of controlled commodities and technologies:
 - to any non-nuclear weapons state for use in nuclear explosive activity, or in an unsafeguarded nuclear fuel-cycle facility;
 - when there is an unacceptable risk of diversion, or if the export would be contrary to nonproliferation objectives; or
 - if there is a risk of diversion to terrorist acts.

There Are no Exceptions to the Prohibitions of Part 2



The NSG as an International Standard



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NSG Guidelines and Control Lists increasingly represent the global standard for nuclear and dual use nuclear related trade:

- NPT 2010 Action Plan

Action 36: “The Conference Encourages States parties to make use of multilaterally negotiated and agreed guidelines and understandings in developing their own national export controls.”

- United Nations Security Council Resolution 1540

“[T]hat all states shall take and enforce effective measures to establish domestic controls to prevent the proliferation of nuclear [...] weapons, including by establishing appropriate controls over related materials.”

- Cited in IAEA Model Additional Protocol

- NSG “Watch Lists” adopted by United Nations Sanctions Committee



Wide Application of the NSG Guidelines



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- NSG PGs Implement the Guidelines and Control Lists in their national regulations
 - EU Control Lists
 - Reflected in PG Nuclear Cooperation Agreements
- Outreach Partners and UN Member States increasingly are implementing the Guidelines and Control Lists
 - 15 NSG Outreach Partners have harmonized to the Guidelines and Control Lists and several more are in the process of harmonization
 - 79 UN Member States implement Nuclear Export Control Lists
 - 67 UN Member States with end-use controls
 - 59 UN Member States with catch-all controls



NSG Enabling Legitimate Nuclear Trade



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- NSG itself does not deny or approve exports
 - PGs have flexibility to implement Guidelines and apply the Trigger and Dual Use Lists
- Goal is to harmonize nuclear cooperation between suppliers/receivers consistent with shared principles
 - Permit the maximum amount of legitimate nuclear and dual use commerce
 - Reduce as practicable licensing burdens on PGs and Industry
 - Apply a common, non-discriminatory standard for transfers



Transparency and Outreach



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- 1995 NPT RevCon called for greater transparency in multilateral export controls
- 1996 Buenos Aires Plenary, PGs agreed to initiate an outreach program
 - NSG Website
 - Outreach seminars
 - Joint activities
 - Implementation assistance
- Outreach Partners include:
 - Brokering and transshipment States
 - Recipient governments
 - Aspiring exporters
 - Regional organizations
 - Industry
 - Multilateral institutions and regimes



NSG and UNSCR Committees



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- NSG Chairs and 1540 Committee Chairs consult on:
 - Requests for assistance on 1540 implementation
 - Crosscutting issues, such as Germany's *Brokering and Transit/Transshipment* good practices paper endorsed by NSG PGs
- Action 18, UNSCR 1977
 - [1540 Committee should encourage organizations such as the NSG to] *enhance cooperation and information sharing with the 1540 Committee on technical assistance and all other issues of relevance for the implementation of resolution 1540.*



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NSG Structure and Decision-making



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- **Plenary:** Decision making body for Part 1 and Part 2 issues
- **Consultative Group (CG):** Working-level deliberative body for Part 1 and Part 2 Guidelines issues
 - The CG will take-up all cross-cutting issues
- **Technical Experts Group (TEG):** Working-level technical body for (Annexes of the INFCIRC/254/Parts 1 and 2)
 - The TEG will take up technical questions related to the control lists
- **Information and Exchange Meeting (IEM) and the Licensing and Enforcement Experts Meeting (LEEM):** These bodies meet once a year during Plenary Week to share information related to identifying and discussing proliferation trends and concerns.



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- Governing and decision-making body for the NSG covering:
 - policy issues
 - all Part 1 and Part 2 Guidelines issues
 - membership and participation
- May establish technical working groups on issues including, but not limited to:
 - review of the NSG Guidelines
 - the Technical Annexes (Control Lists)
 - procedural arrangements
 - information sharing
 - transparency activities
- Can mandate the NSG Chair to conduct outreach activities to specific countries to promote adherence to the NSG Guidelines.
- Decisions in the Plenary are made by consensus.



Recent Plenary Outcomes



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- **2010 Christchurch, New Zealand**
 - Established Fundamental Review under the Dedicated Meeting of Technical Experts (DMTE) to review Part 1 and Part 2 Control Lists
- **2011 Noordwijk, Netherlands**
 - Amendment to Part 1 Guidelines paragraphs 6&7 to clarify conditions of supply for enrichment and reprocessing equipment, material and technologies
- **2012 Seattle, United States**
 - Amendment to Part 1 Guidelines to encourage reliance on the global nuclear fuel market
 - Mexico and Serbia join NSG
- **2013 Prague Czech Republic**
 - Amendment to reference IAEA recommendations for Physical Protection in Part 1 Guidelines (Paragraph 3.a and Annex C)
 - Fundamental Review concluded: 54 Amendments adopted to the Part 1 and Part 2 Control Lists
 - Creation of the TEG
- **2014 Buenos Aires, Argentina**
 - Good Practices for Brokering & Transit/ Transshipment



Argentina Nuclear Cooperation and the NSG



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- Argentina has carved out a place for itself in the nuclear export market, through cooperation and compliance with internationally recognized standards for export controls
 - Exporters must work through institutions like the NSG to maintain a joint effort and a levelled playing field.
 - Promoting a safe and secure nuclear energy market requires cooperation, especially in the area of nuclear export controls,
 - Argentina views the NSG as an enabler of nuclear trade, permitting countries to engage in the maximum amount of legitimate trade without undermining nuclear nonproliferation
- Argentina has benefitted from responsible nuclear cooperation in line with NSG principles. Argentina has:
 - a well-developed nuclear sector with three nuclear power plants in operation
 - a strong industry base for nuclear research
 - an impeccable safety record, and a nuclear legacy of more than half a century
 - A growing nuclear export sector
- As 2014 and 2015 NSG Chair, ensuring that the NSG and its Guidelines remain technically sound and current with trends in the nuclear industry, will serve to maintain the level playing field for Argentina and other nuclear exporters alike.



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Next Steps for the NSG



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The following issues are currently under discussion in the CG:

- Improving NSG Outreach and Benefits for Adherent Governments and Outreach Partners
- Streamlining the Process of Government to Government Assurances
- Keeping the Guidelines and Control Lists Relevant
- Keeping pace with emerging and evolving technologies
- Expand to reflect the growing and globalizing supply chain



NSG Consultative Group (CG)



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- Standing working body for the NSG.
- Reports to the Plenary on:
 - deliberations of NSG Guidelines on nuclear supply and the technical annexes, and;
 - recommendations on these and other issues, as requested by the Plenary.
- May request to:
 - serve as the decision-making authority on a specific issue, and;
 - establish or dissolve working groups
- Helps set the agenda of the Plenary on Part 1 and Part 2 issues
- Meets at least twice a year
 - First immediately before the Plenary during Plenary Week
 - Second approximately six months after the Plenary
- All decisions are made by consensus
- The Permanent Mission of Japan in Vienna acts as a Point of Contact and provides assistance to the CG and the larger NSG
- The NSG Plenary appoints a CG Chair for a one year period



NSG Technical Experts Group (TEG)



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- Established by the 2013 Prague Plenary
- Works to ensure the control lists are complete and up-to-date, the CG may consider requesting the TEG to address key questions/issues, such as:
 - Are there control entries that should be added or deleted?
 - Are there control entries for which technical parameters have become obsolete or outdated and need to be changed/updated?
 - Have new and emerging technologies and recent developments applicable to nuclear activities been duly accounted for as appropriate and needed?
- Meets at least once each year



The DMTE and Fundamental Review



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2010 Plenary

- NSG agreed to form the Dedicated Meeting of Technical Experts (DMTE) group to conduct a 3-year fundamental review of the two control lists and update them to keep pace with advances in technology, market trends, and security challenges
- Ultimately, 54 proposals from the DMTE to change the Part 1 and Part 2 control lists were accepted by the Plenary
- Tables showing the changes were published at the end of INFCIRC/254/Rev.12/Part 1 and /Rev.9/Part 2

2013 Plenary

- Following the successful conclusion of the DMTE, the NSG formed the Technical Experts Group (TEG) as a standing body to carry on the work on the DMTE and respond to tasking by the Consultative Group



Information Exchange Meeting (IEM) and Licensing and Enforcement Experts Meeting (LEEM)



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- In the IEM, PGs to share information about developments in nuclear proliferation and issues in supplying goods and technology to countries for which safeguards compliance concerns exist.
 - share proliferation perspectives
 - present varied policy approaches
 - present detailed information on emerging technologies and further technical information supporting discussions in TEG.
 - Examples include: lasers, accelerator-driven sub-critical reactors, additive manufacturing, and machine tool accuracy
- In the LEEM, PGs share national experiences in export controls with the objective of maintaining a “level playing field.”
 - comparing interpretations and applications of NSG Guidelines.
 - comparing licensing practices and determinations
 - prosecutions and law enforcement actions for export control violations
 - Examples include: components, government-to-government assurances, and second-hand equipment.
- Additionally the LEEM has prepared best practices guides and maintains contact lists for licensing and law enforcement authorities



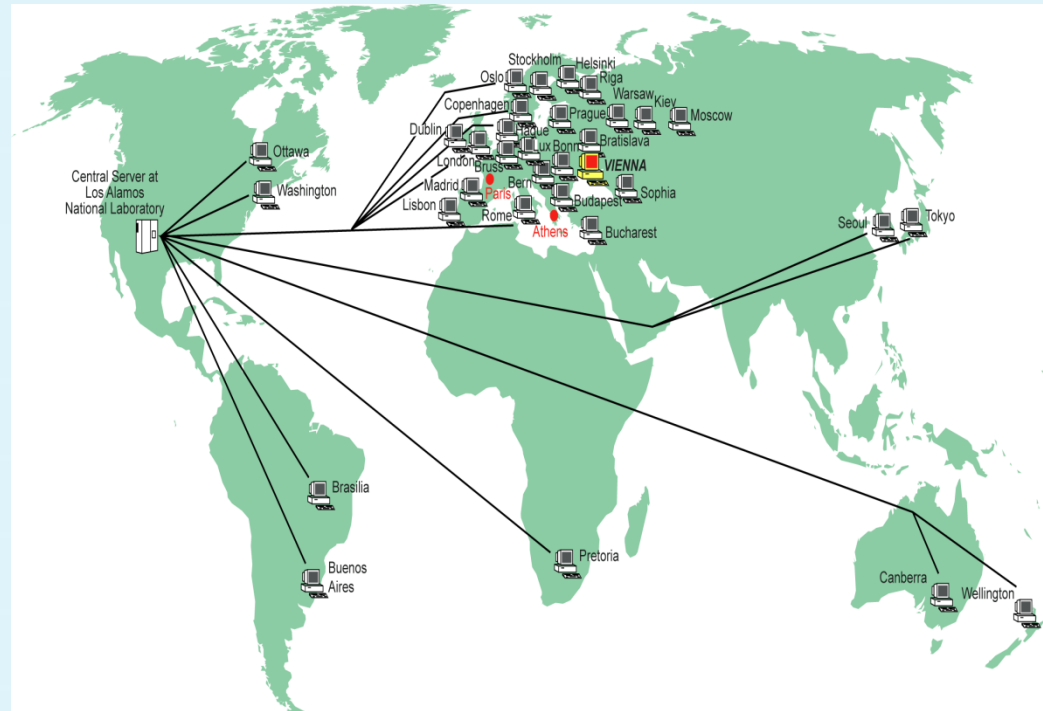
NSG Information Sharing



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- **No-Undercut Rule for Dual-Use Denials**
- **Information Exchange Meetings to discuss issues of concern**
- **Licensing and Enforcement Experts Exchange Meetings**

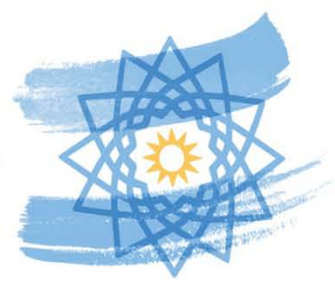


NSG Information Sharing System – secure communications for sharing denial and related information real-time



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Technical Foundation for NSG List Development and Maintenance



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- Expert knowledge and analysis of technical aspects of nuclear proliferation
 - Fuel cycle technologies & fissile material production
 - Weaponization technologies
 - “Dual-Use” technologies capable of contributing to the above
- Analysis of new or emerging technologies that could affect proliferation or lower the technological “barrier” to proliferation



Multilateral Export Control List Development and Maintenance



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- Monitor technological advancements to identify the technologies and commodities which could contribute to fissile material production and to the development of nuclear weapons.
- TEG created as a dedicated group to review and make recommendations on technical questions related to the control lists
- Select technologies/commodities for proposed control

For Trigger List Controls

- ? Do the technologies/ commodities meet the “especially designed or prepared” criteria for the processing, use, or production of special fissionable material?

For Dual-Use Controls

- ? Do the technologies/ commodities meet the criteria of “significance” and “controllability”?
- ? Is it useful to control these?
- ? Have proliferants actually sought these?
- ? Must alternative technical paths also be controlled?
- ? Will controls have a significant effect?
- ? Is it feasible to control these?
- ? How many suppliers, magnitude of non nuclear usage, quantities needed?



Comparison of Trigger List and the Dual-Use List



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Trigger List

- Covers fuel cycle technologies/items only
- Listing of EDP items
- Illustrative List
- Technical descriptions of controlled items can be sufficiently broad to cover all usable items of that type
- De minimis quantities for certain materials/items

Dual-Use List

- Covers both fuel cycle and weaponization
- Listing of dual-use items that are both significant and controllable
- Definitive List
- Technical descriptions precisely and narrowly worded to cover only those items that are significant and controllable. Not all usable items are necessarily controlled
- In general, no de minimis quantities for materials
- Can supply items even to countries without full-scope safeguards provided supplier is satisfied item is to be used in non-nuclear activity or safeguarded nuclear activity



Especially Designed or Prepared (EDP) - A Key Concept



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Trigger list covers EDP equipment, components, materials, subsystems and facilities for Processing use and production of special fissionable material

- No formal, universally-accepted definition of EDP
 - Nuclear export control policy officials and technologists must make a reasoned finding on EDP
 - The EDP criteria is met if an item is especially designed, especially prepared, or both
- Gradations of EDP include:
 - **EDP-1:** Clearly unique, no other application but for nuclear processes (eg. reactor, reactor fuel rod, complete gas centrifuge)
 - **EDP-2:** Manufactured to end-use or customer-supplied specifications, intended nuclear end-use could be identified by most fabricators/suppliers (eg. centrifugal compressors for pumping UF_6 gas, distillation column with trays for heavy water separation)
 - **EDP-3:** Manufactured to customer-supplied specifications, only a technology holder or well-informed supplier could identify nuclear end-use (eg. end-cap preform, gas centrifuge baffle plate, gas centrifuge housing, gaseous diffuser housing)



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Some Technical Criteria for Determining EDP



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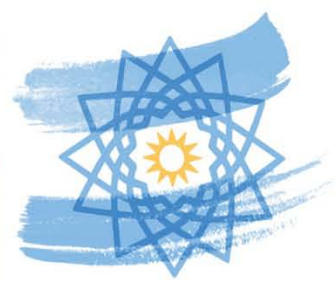
In determining whether or not a particular item is EDP, factors to consider include:

- Physical dimensions
- Dimensional tolerances
- Material(s) of construction
- Performance specifications/characteristics
- Installation-specific features
- Manufactured to customer-supplied specifications?
- Quantity
- Procurement in matched sets?
- End-user and stated end-use

All relevant factors should be considered together in context (no single factor may be sufficiently unique for an unambiguous EDP determination)



Example EDP Determination: Gas Centrifuge Ring Magnets



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- **Magnet dimensions** (inside diameter, outside diameter, thickness)
- **Dimensional tolerances** (balance and assembly requirements for gas centrifuge ring magnets suggest need for finer finish tolerances than most other applications)
- **Magnet material** (e.g., samarium-cobalt)
- **Magnetic performance properties** (e.g., initial permeability, remanence, deviation of magnetic and geometric axes)
- **Installation-specific features** (e.g., possible presence of threaded holes or holes for set screws)
- **Procurement in matched sets** (ring magnets designed to function in pairs)
- **Quantity** (hundreds to thousands required)
- **Manufactured to customer-supplied specifications?**
- **End-user and stated end-use**



Criteria for Placing Items on the Dual-Use List



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Significance

- ? Important function in nuclear fuel cycle facility/activity or in nuclear weapon design, manufacturing, or testing?
- ? Have proliferants actually sought the item?
- ? Will control have an impact?
- ? Must alternative technical paths also be controlled?

Controllability

- ? Extent of non-nuclear commercial use?
- ? Impact on trade/economics?
- ? Number of suppliers?
- ? Supply sources outside regime?
- ? Substitution cost?



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Items Covered by the Dual-Use List



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- Items with both nuclear and non-nuclear industrial/commercial applications
- Items not otherwise “suitable” for placing on the Trigger List (e.g., lithium isotope separation facilities, tritium production facilities, gas centrifuge rotor tube assembly jigs)



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Categories of Items Controlled on the Dual-Use List



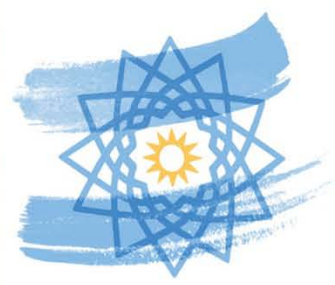
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- Industrial Equipment
- Materials
- Uranium Isotope Separation Equipment
- Heavy-Water Production Equipment
- Test and Measurement Equipment for the Development of Nuclear Explosive Devices
- Components for Nuclear Explosive Devices

Also controlled: specified software, and technology for the development, production and use of all controlled items



Steps To Create (or Amend) Dual-Use List



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- **Develop** preliminary list of facilities, equipment, and materials (based on technical significance for nuclear proliferation)
- **Establish** priorities for items on the list (based on technical significance, actual experience of what proliferants have sought, controllability / impact on trade)
- **Develop** control specifications, being as precise as possible
- **Consult** with Participating Governments
- **Refine** proposed list

**Review, negotiation, refinement, and adoption by full committee
(requires consensus of all members)**



Summary Technical Clarification Exercises



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Trigger List

- 1978 Publication of original NSG Trigger List (INFCIRC/254)
- 1984 Gas Centrifuge (completed in Zangger, adopted by NSG 1992)
- 1985 Reprocessing (completed in Zangger, adopted by NSG 1992)
- 1990 Gaseous Diffusion (completed in Zangger, adopted by NSG 1992)
- 1992 Heavy Water (completed in Zangger, adopted by NSG 1992)
- 1992 Comprehensive harmonization exercise between NSG and Zangger
- 1994 Comprehensive enrichment technology upgrade – added aerodynamic, chemical and ion exchange, laser-based, plasma, and electromagnetic processes (completed in NSG, also adopted by Zangger 1994)
- 1994 Uranium conversion (completed in NSG)
- 1996 Reactors, fuel fabrication, heavy water upgrade systems (completed in Zangger, adopted by NSG 1996)
- 1999 Uranium and plutonium conversion update

Dual Use List

- 1991 Multilateral negotiation of original list
- 1992 Adoption and publication of original list
- 1996 Completion of major “upgrade” exercise; many entries reworded for clarity, technical accuracy, or improved controls; added lithium isotope separation facilities, turboexpanders, and nickel powder
- 1997 Controls on high-speed oscilloscopes dropped
- 1998 Completion of “reformatting” and “restructuring” exercise



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Conclusion



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- The need for a strong export control regime will continue to become increasingly important.
- The NSG plays an important role in helping ensure that nuclear transfers are made for peaceful purposes.
- The NSG recognizes the importance of its role and is currently working to improve its effectiveness through a number of new initiatives in the CG.



Nuclear Suppliers Group: Resources on the Website



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The NSG dedication to transparency has led to the overhauling of its website and the creation of several reference documents on the policy of the NSG and best practice documents for implementing the NSG Guidelines:

www.nuclearsuppliersgroup.org

Official Documents

- Part 1 Guidelines (INFCIRC/254, Part 1)
- Part 2 Guidelines (INFCIRC/254, Part 2)
- The Nuclear Suppliers Group: Its Origins, Role and Activities (INFCIRC 539)
- Statement on Civil Nuclear Cooperation with India (INFCIRC/734)

National Papers and Guidance

- Good Practices for the Implementation of Brokering and Transit/Transshipment Controls
- Good Practices for Corporate Standards to Support the Efforts of the International Community in the Non-Proliferation of Weapons of Mass Destruction