

Implementation of IAEA Safeguards in the United States

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Summary of Common Acronyms

AP	Additional Protocol
CA	Complimentary Access
EFL	Eligible Facilities List
IAEA	International Atomic Energy Agency
INFCIRC	Information Circular
LOF	Location Outside Facility
NNWS	Non Nuclear Weapons State
NWS	Nuclear Weapons State
NPT	Nonproliferation Treaty
SISUS	Subgroup on IAEA Safeguards in the U.S.
SQP	Small Quantities Protocol
VOA	Voluntary Offer Agreement

Overview of U.S.-IAEA Agreements

- U.S. – IAEA Safeguards Agreement (INFCIRC/288)
 - ***“The U.S. Voluntary Offer Agreement”***
 - *EIF 1980*
- *Protocol to the U.S. – IAEA Safeguards Agreement (INFCIRC/288)*
 - ***“The Reporting Protocol”***
 - *EIF 1980*
- *Protocol Additional to the U.S. – IAEA Safeguards Agreement (INFCIRC/288 Add.1)*
 - ***“The Additional Protocol”***
 - *EIF 2009*
- ***U.S.-IAEA Caribbean Territories Safeguards Agreement (INFCIRC/366)***
 - *Includes a Small Quantities Protocol*
 - *EIF 1989*

History

- The Treaty on the Non-Proliferation of Nuclear Weapons (NPT) requires non-nuclear weapon states (NNWS) to accept IAEA safeguards on all source and special nuclear material in all peaceful nuclear activities
 - The United States, as one of five nuclear-weapon states (NWS), or P5, was not obligated to conclude a safeguards agreement with the IAEA
- Since the early 1960's the U.S. has permitted the application of IAEA safeguards on a variety of nuclear facilities



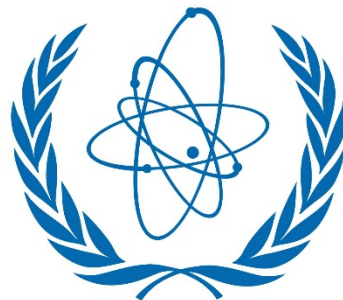
NPT Signing, 1968



NPT RevCon, 2010

Safeguards in the U.S. – Why Do It?

- Objectives of IAEA safeguards in the U.S.:
 - Meet U.S. commitments for placing nuclear materials under IAEA safeguards
 - IAEA gains experience in implementing new safeguards technologies, testing of new safeguards equipment
 - IAEA gains experience in applying safeguards to new facility types



IAEA

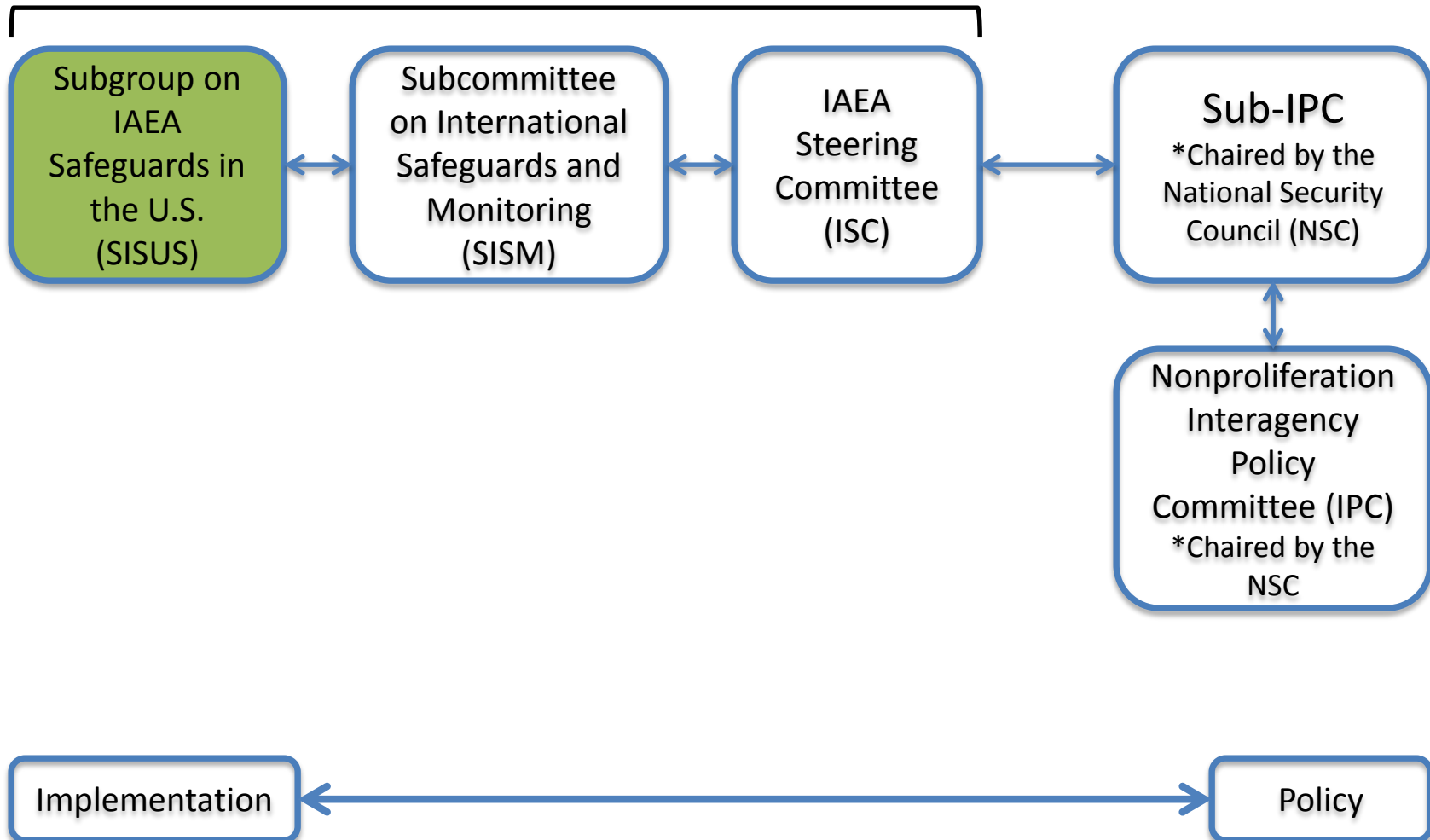
International Atomic Energy Agency

Applicable U.S. Laws and Regulations

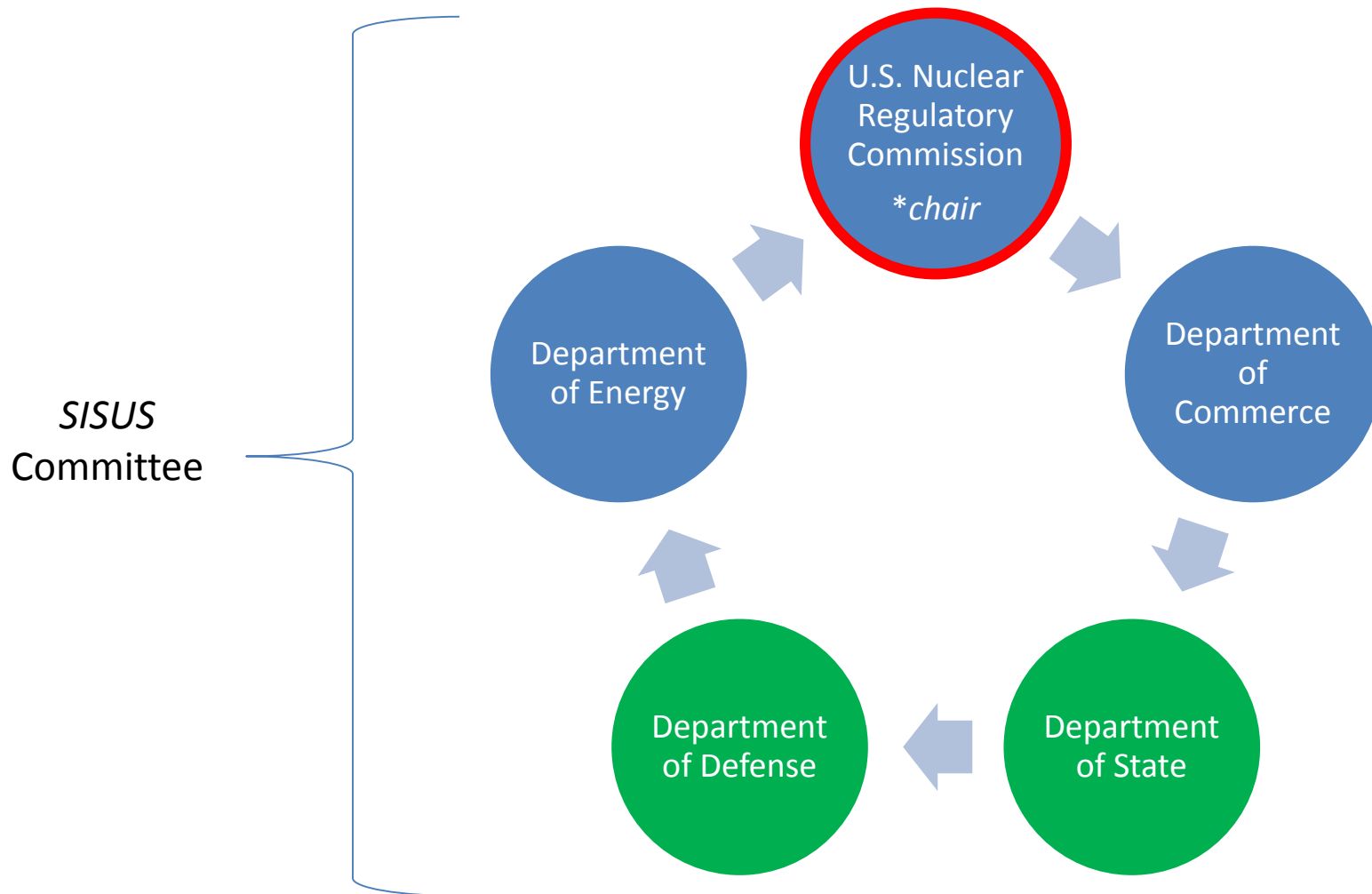
- Atomic Energy Act of 1954, as amended
 - Primary U. S. law on nuclear energy to “. . . promote world peace, improve the general welfare, increase the standard of living and strengthen free competition in private enterprise.”
- Energy Reorganization Act of 1974
 - Established the United States Nuclear Regulatory Commission and Energy Research and Development Administration (eventually the Department of Energy)
- Nuclear Nonproliferation Action of 1978
 - Establish a more effective framework for international cooperation on peaceful nuclear activities
 - Codifies support to the IAEA
- Title 10 of the Code of Federal Regulations Part 75
 - Requires NRC licensees to comply with U. S. obligations to the IAEA

U.S. Government Oversight

Defined in Federal Register 2722

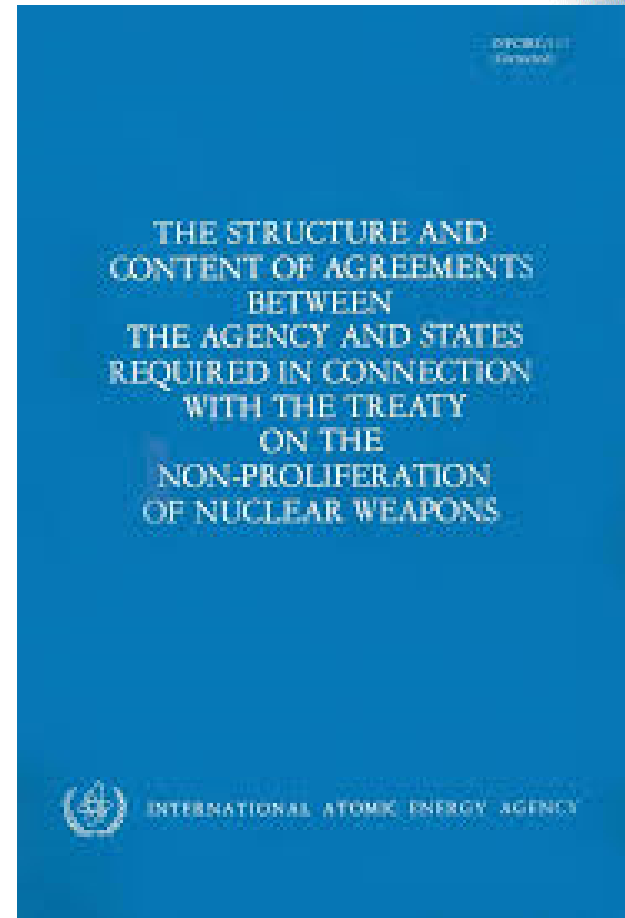


Who Implements in the U.S.? Who are the Players?



U.S. Voluntary Offer Agreement

- Based on Model Agreement INFCIRC/153
- US-IAEA Agreement INFCIRC/288
- Selection-based approach to safeguards
 - Eligible Facilities List (EFL)
- National Security Exclusion (Article 1.b)
- Includes all typical safeguards activities including inspections, completion of DIQs and DIVs, technical visits, etc...
- **Allows for the application of safeguards in a manner similar to that of NNWS**



U.S. Voluntary Offer Agreement (VOA) – Reporting Protocol

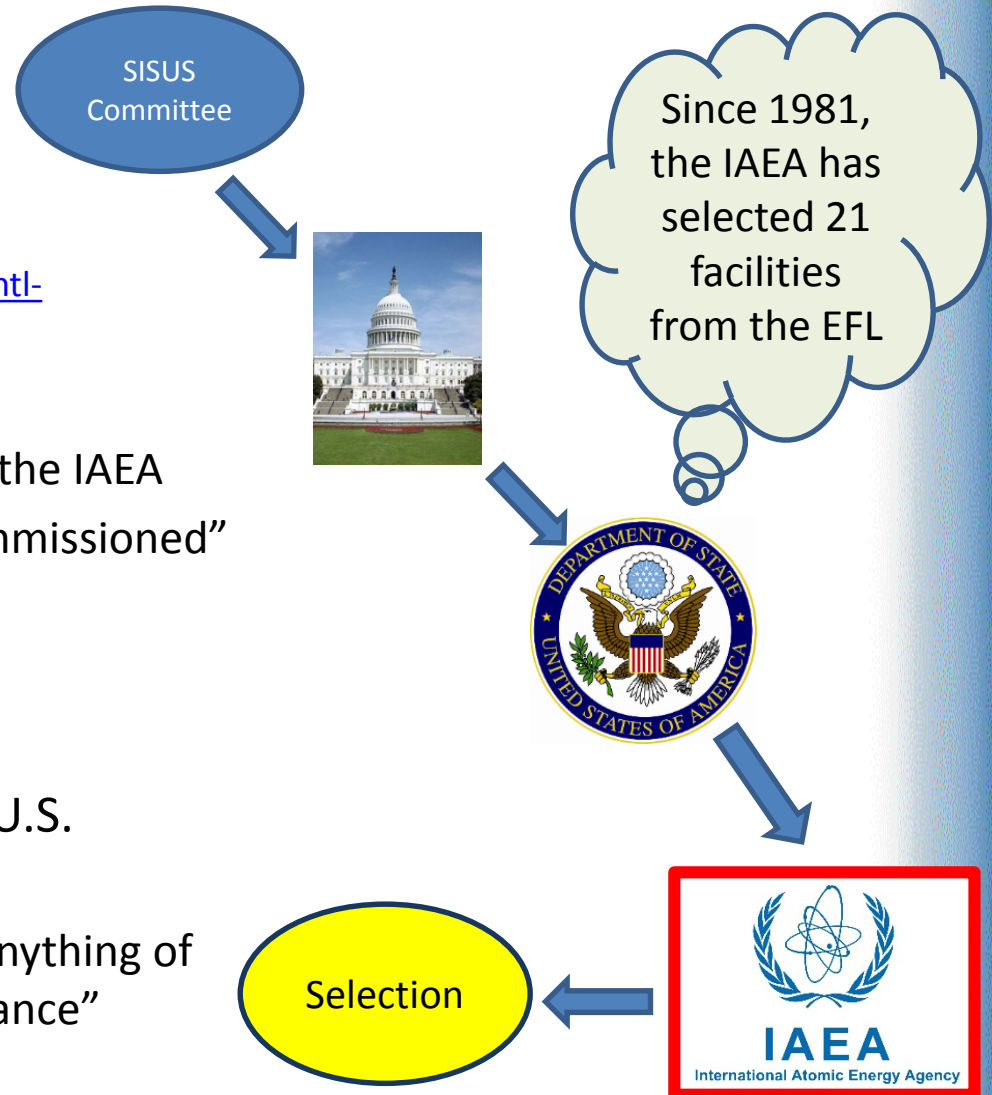
- Allows for limited safeguards activities to be performed at facilities with minimal cost to the IAEA
 - Unique to the United States
- Includes activities such as completion of DIQs and DIVs
- Monthly and annual material accountancy reports (e.g., PILS, ICRs, etc...)
- 4 sites (all NRC licensees) currently selected under this 'Protocol'
- **NO INSPECTIONS**

Eligible Facilities List (EFL)

- **The concept of “selection-based” safeguards is unique to NWS**
 - IAEA has the right, not an obligation, to apply safeguards in the United States
- “The United States shall,...,provide the [IAEA] with a list of facilities within the United States not associated with activities with direct national security significance to the United States and may,..., add facilities to or remove facilities from that list as it deems appropriate.”
 - Additions to the EFL are submitted for a mandatory 60-day Congressional review before the new list is submitted to the IAEA
- “The [IAEA] shall, from time to time, identify to the United States those facilities, selected from the then current list provided by the United States in accordance with Article 1(b) in which the [IAEA] wishes to apply safeguards, in accordance with the terms of this Agreement.”
 - The United States submits design information to the IAEA only for those facilities that have been selected by the IAEA; the EFL contains all U.S. nuclear facilities eligible for selection by the IAEA

Eligible Facilities List (EFL)

- Two portions of the U.S. EFL
 - DOE facilities (non-public)
 - NRC facilities (public)
 - <http://www.nrc.gov/about-nrc/ip/intl-safeguards.html>
- ~300 facilities on EFL
 - “Facility” is formally defined by the IAEA
 - Facilities removed when “decommissioned” (per IAEA’s definition)
 - LOFs not included on EFL
- Updated annually
- Updates are vetted through the U.S. Government
 - Security evaluation to remove anything of “direct national security significance”



Implementation Contd.



- After the facility has been notified of selection, the following documents are completed:
 - Design Information Questionnaire (DIQ) (with subsequent DIV)
 - Facility Attachment
- U.S. and IAEA negotiate terms of implementation

Snapshot of the EFL

2013 NRC Portion of the EFL Complete List

No	Facility and Organization	NRC Docket & License Nos.	Type	Facility Description	Status	RIS
154.	Rensselaer Polytechnic Institute Dept of Nuclear Engineering & Science Troy, NY 12181	50-225 CX-22	Critical Assembly	0.1 KWth	License issued: 07/03/64	ZSX
155.	Rhode Island Atomic Energy Comm Nuclear Science Center 16 Reactor Road Narragansett, RI 02882	50-193 R-95	GE Pool	2.0 MWth	License issued: 07/23/64	ZTF
156.	University of California – Davis McClellan Nuclear Research Center 5335 Price Ave McClellan, CA 95652	50-607 R-130	TRIGA	2.3 MWth	License issued: 08/13/98	
157.	Texas A&M University Coke Bldg, Second Floor 301 Engineering Research Center College Station, TX 77843	50-59 R-23	AGN-201	5 Wth	License issued: 08/26/57	ZVT
158.	Texas A&M University Texas Engineering Experiment Station Nuclear Science Center Bldg 1095er College Station, TX 77843	50-128 R-83	TRIGA	1 MWth	License issued: 12/07/61	ZVT
159.	U.S. Geological Survey Dept of Interior Denver Federal Center P.O. Box 25046, MS-911 Denver, CO 80225	50-274 R-113	TRIGA I	1 MWth	License issued: 02/24/69	YAT

History of Safeguards in the U.S.

Pre-Voluntary Offer Agreement (1960-1980)

- Focus of U.S. support for IAEA safeguard activities:
 - Train and familiarize IAEA inspectors on different facility types
 - Test “new” safeguards approaches
- 1962: INFCIRC/36
 - U.S. signs its first agreement with the IAEA
 - Three research reactors and one power plant inspected
 - Brookhaven Graphite Research reactor (BNL) – 2 year duration
 - Brookhaven Medical Research reactor (BNL) – 2 year duration
 - Experimental Boiling Water Reactor (ANL) – 1 year duration
 - Piqua Organic Moderated Reactor (Piqua, Ohio) – 2 year duration
- 1964: INFCIRC/57
 - U.S. signs a second agreement with the IAEA
 - Three research reactors and one power plant inspected
 - Brookhaven Graphite Research reactor (BNL)
 - Brookhaven Medical Research reactor (BNL)
 - Piqua Organic Moderated Reactor (Piqua, Ohio)
 - Yankee Rowe Nuclear Power Station (Rowe, Massachusetts)

History of Safeguards in the U.S.

Pre-Voluntary Offer Agreement (1960-1980)

1967

- First IAEA inspections at a reprocessing plant
 - West Valley, NY; verify spent fuel from Yankee Rowe NPP

1967

- President Johnson commits to accept the application of safeguards on U.S. facilities
 - Except those of direct national security significance

1970

- NPT enters into force

1972

- BOG approves INFCIRC/153

1976

- BOG approves U.S. Voluntary Offer Agreement (INFCIRC/288)
 - With National Security Exclusion (NSE)

1980

- **U.S. Voluntary Offer Agreement enters into force**



THE STRUCTURE AND
CONTENT OF AGREEMENTS
BETWEEN
THE AGENCY AND STATES
REQUIRED IN CONNECTION
WITH THE TREATY
ON THE
NON-PROLIFERATION
OF NUCLEAR WEAPONS

 INTERNATIONAL ATOMIC ENERGY AGENCY

First Phase of the VOA (1980-1993)

- Approximately 200 IAEA inspections at multiple facilities
 - 6 nuclear power plants
 - Trojan, Rancho Seco, Arkansas Nuclear One, San Onofre, Turkey Point, Salem
 - 6 fuel fabrication plants
 - Siemens (Richland, WA), CE (Windsor, CT), Westinghouse (Columbia, SC), GE (Wilmington, NC), Framatome Cogema Fuels (Lynchburg, VA), CE (Hematite, MO)
 - 1 spent fuel storage location (ANL)
 - 1 gas centrifuge enrichment plant (Portsmouth in Piketon, OH)
- Facilities were selected on a staggered basis and for differing lengths of time



2nd Phase of the VOA (1993-2009)

- In 1993 the Clinton administration issued a fact sheet outlining elements of its nuclear nonproliferation policy
 - One aspect was eliminating fissile material excess to defense needs
- Approximately 374 MT of fissile material were removed from defense stockpiles; some of this was placed under IAEA safeguards
- **Approximately 600 IAEA inspections** at the following facilities:
 - Downblending of HEU at BWXT (Lynchburg, VA)
 - HEU from Kazakhstan
 - HEU from defense stockpiles
 - Y-12 storage vault (Oak Ridge, TN)
 - Hanford storage vault (Hanford, WA)
 - Rocky Flats storage vault (Golden, CO)
 - K-Area Material Storage (Savannah River Site)
 - Portsmouth GDP (Piketon, OH)
 - Down-blending of HEU UF₆ to LEU UF₆
- U.S. funded these IAEA safeguards efforts



2009-Present

- K-Area Material Storage (KAMS) at Savannah River Site (SRS)
 - Only facility currently under routine inspections by the IAEA
 - Incorporates remote monitoring
 - Allow for installation of IAEA equipment
 - Reporting
- Westinghouse Fuel Fab. Facility (Columbia, SC)
- AREVA Inc. Fuel Fab. Facility (Richland, WA)
- Global Nuclear Fuel – Americas Fuel Fab. Facility (Wilmington, NC)
- URENCO USA Gas Centrifuge Enrichment Plant (Eunice, NM)

Reporting AND
inspections

Reporting ONLY,
NO INSPECTIONS

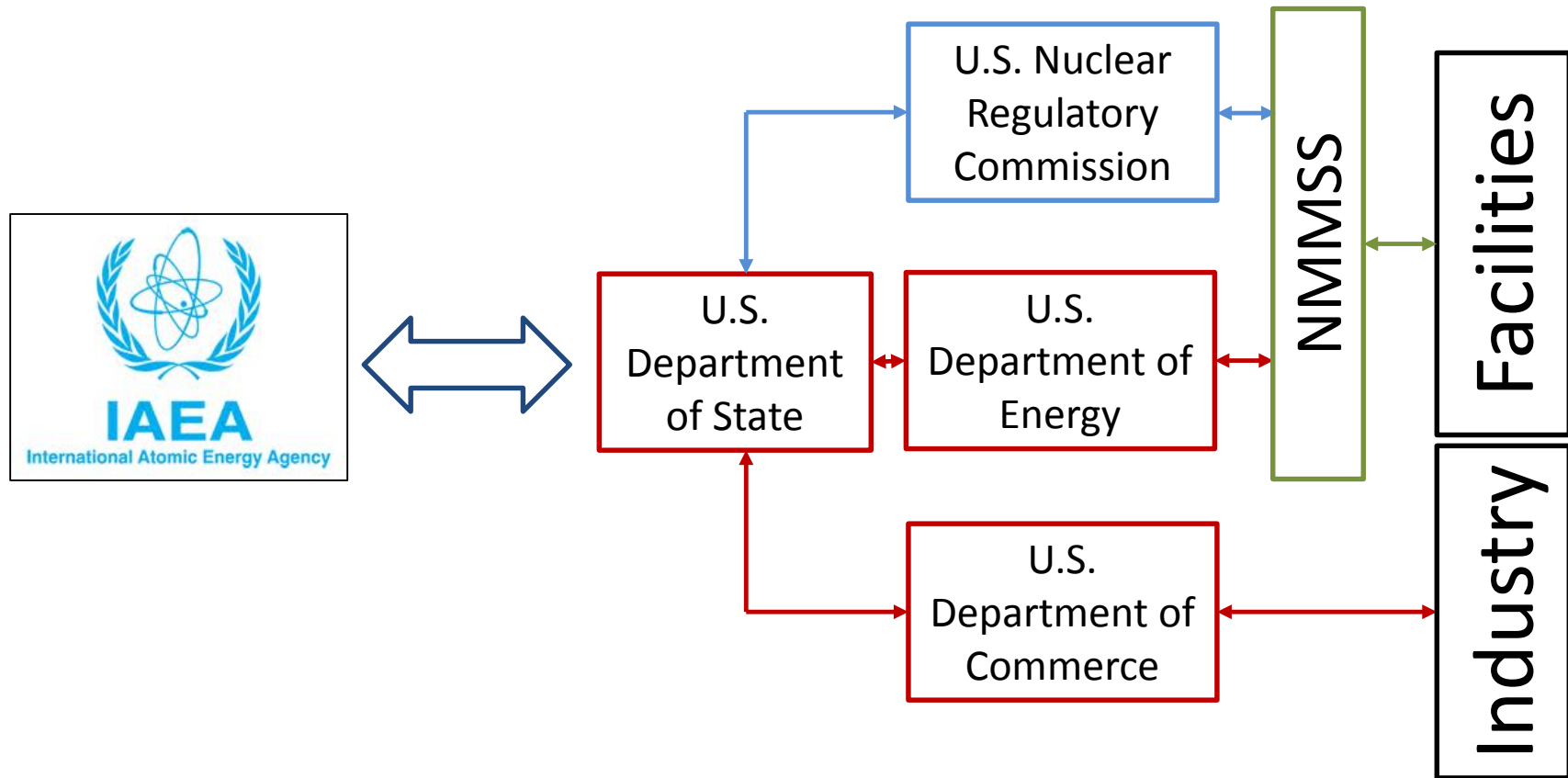
U.S. Reports to the IAEA

- ICRs, MBRs, and PILs for selected facilities
- Annual and quarterly AP reports
- Annual estimates of separated plutonium and plutonium in spent nuclear fuel
- Annual report on quantity of Americium and Neptunium exported, and
- Monthly reports on export/import license applications received, issued, pending or denied.

Lessons Learned from Implementing IAEA SGs in the U.S.

- Facilities need a strategy for accommodating IAEA access
- Good measurement capabilities can save money and time
- Several safeguards challenges arise during decontamination and decommissioning of facilities
- Staff training in IAEA safeguards, inspections and regulations is critical; recruitment of new staff may be necessary
- Initial inventory taking requires extensive preparation
- Inspections demand substantial site preparation:
 - Don't assume
 - Put everything in writing
 - Maintain open dialogue
 - Allow extra time

Flow of Information through NMMSS



Example of IAEA Technology



U.S. Additional Protocol (AP) 2009 - Present

- Signed in 1998, entry into force 2009
- Provides the IAEA with additional information and access rights on nuclear fuel cycle related activities
- Closely identical to the model INFCIRC/540
 - Contains a national security exclusion
- “Locations” and “Sites” must submit:
 - Annual updates
 - Quarterly export reports
- The U.S. AP applies to everyone within the U.S.
 - Excluding anything of national security significance
 - No “selection” is required

Reports under the U.S. AP

- Annual reporting requirements
 - (2.a.i) Nuclear fuel cycle research and development
 - Not involving nuclear materials
 - With USG involvement
 - Approximately 75% of the total number of U.S. declarations are 2.a.i. declarations
 - (2.a.iii) Site declaration including description of activities
 - For facilities that have ever submitted a DIQ to the IAEA and were on the EFL as of January 2009
 - (2.a.iv) Nuclear fuel cycle related manufacturing and assembly
 - (2.a.v) Uranium and thorium mines, mills, and concentration plants
 - (2.a.vi) Possession of large quantities of impure source material
 - E.g., Yellowcake
 - (2.a.x) Ten year plan
 - No legal obligations or rights; provides a “heads up” to the IAEA regarding a State’s future plans
 - (2.b.i) Nuclear fuel cycle research and development
 - Not involving nuclear materials
 - Without USG involvement
- Quarterly reporting requirements
 - (2.a.ix) Exports of equipment and components (Annex II items)

Snapshot of Licensees Who Report Under the U.S. AP...and many more!



Complementary Access (CA)

- Complementary access is an essential aspect of the IAEA's expanded authorities
- Complementary access allows the IAEA to:
 - Verify the absence of undeclared nuclear materials and activities
 - Resolve a question or inconsistency
- Access for IAEA with 24 hours advance notice
 - 2 hours if IAEA is already onsite
- C.A.'s rare in the U.S.
- Only 2 CA's have been conducted in the U.S. (2010)
 - AREVA Inc., Fuel Fabrication Facility (Lynchburg, VA)
 - Global Advanced Metals (Boyertown, PA)



INFCIRC/366 – The U.S.-IAEA Caribbean Territories Safeguards Agreement and the Small Quantities Protocol



What is a
small
quantities
protocol?

Why a Modified SQP?

2005: Limitations of SQPs were recognized. The SQP was modified to strengthen the safeguards system. The IAEA Board of Governors (BOG) has requested that all States modify existing SQPs and will only accept modified SQPs to future agreements.



As of March 2016,
57% of SQP states
have modified
their SQP



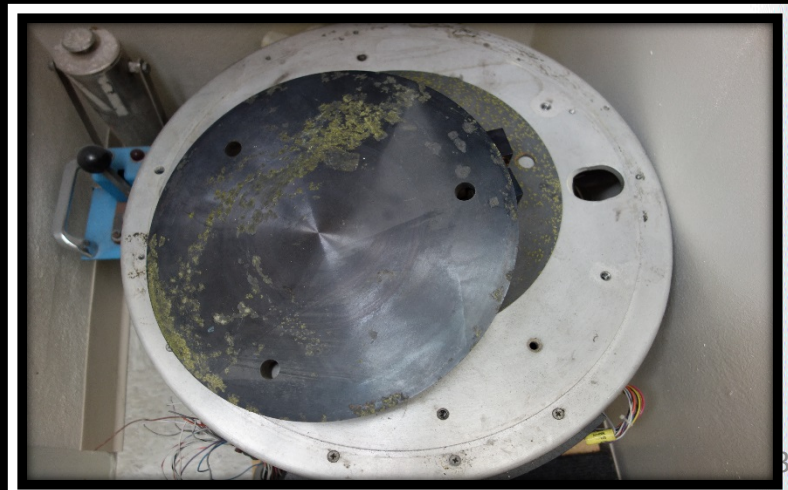
- The USG will adopt the IAEA's ***model text*** of the modified SQP
- The USG is a primary driver for strengthening IAEA safeguards

The U.S. Caribbean Territories



U.S. "Protocol I" Territories:

- **Puerto Rico**
- **U.S. Virgin Islands**
 - St. Croix
 - St. Thomas
 - St. John
- **Navassa Island**
- **Serranilla Bank**
- **Baja Nuevo (Petal Island)**
- **Guantanamo Bay Naval Base**



Cardinal Health



What are the new requirements?

Original SQP Requirements	Modified SQP Requirements
Annual reports on imports and exports (and advance notification on those imports and exports > 1 ekg)	CONTINUES DOE/NRC Form 741, DOE/NRC Form 740M
Establish and maintain a State System of Accounting and Control (SSAC)	CONTINUES
Conclude Subsidiary Arrangements	CONTINUES
	Must submit initial inventory report DOE/NRC Form 742C
	Provide up-to-date information on nuclear material outside facilities DOE/NRC Form 740M
Provide design information at least 180 days before nuclear material is introduced into the facility (*SQP becomes non-operational if/when a facility is <u>built</u>)	Provide early notification to the IAEA when a decision to construct a facility is made (or when nuclear material quantities are expected to exceed SQP limits, as defined) (*SQP becomes non-operational if/when a facility is <u>approved</u> or when SQP limits are exceeded)
	Facilitate ad hoc and special inspections (when notified by the IAEA)

Where are IAEA safeguards requirements located?

NRC Regulations

- Title 10 Code of Federal Regulations (CFR) Part 75



Questions?

