U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Implementation of IAEA Safeguards within the United States

David H Hanks

Material Control and Accounting Branch
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission (NRC)

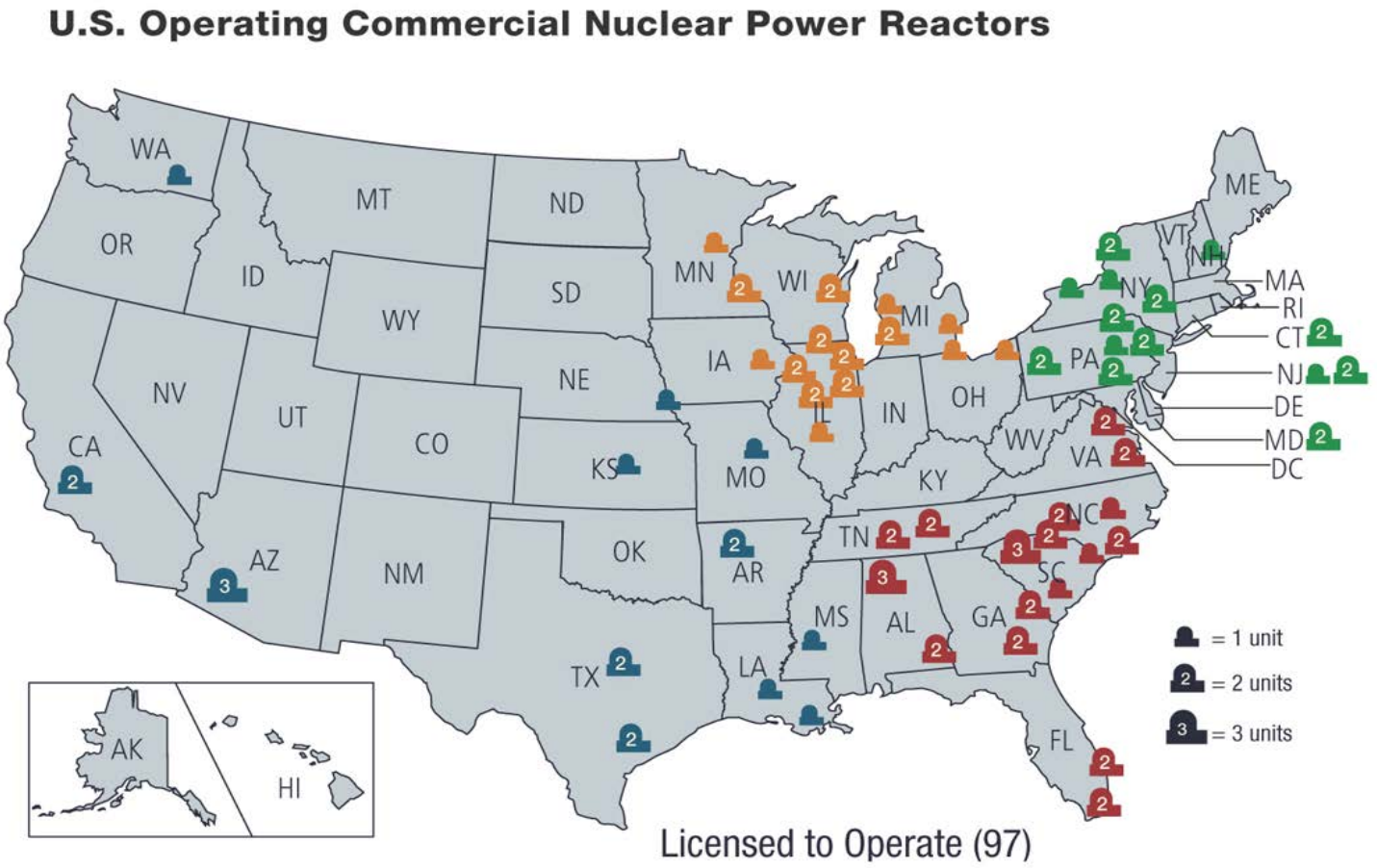
U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

What does the NRC do?

- Issue, amend, suspend or revoke authorizations (licenses)
- Rulemaking: develop regulations (10 CFR) and guidance
- Research
- Oversight: inspect, monitor and assess activities
- Take enforcement measures in the event of non-compliance
- Emergency preparedness
- Incident response

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

U.S. Operating Commercial Nuclear Power Reactors

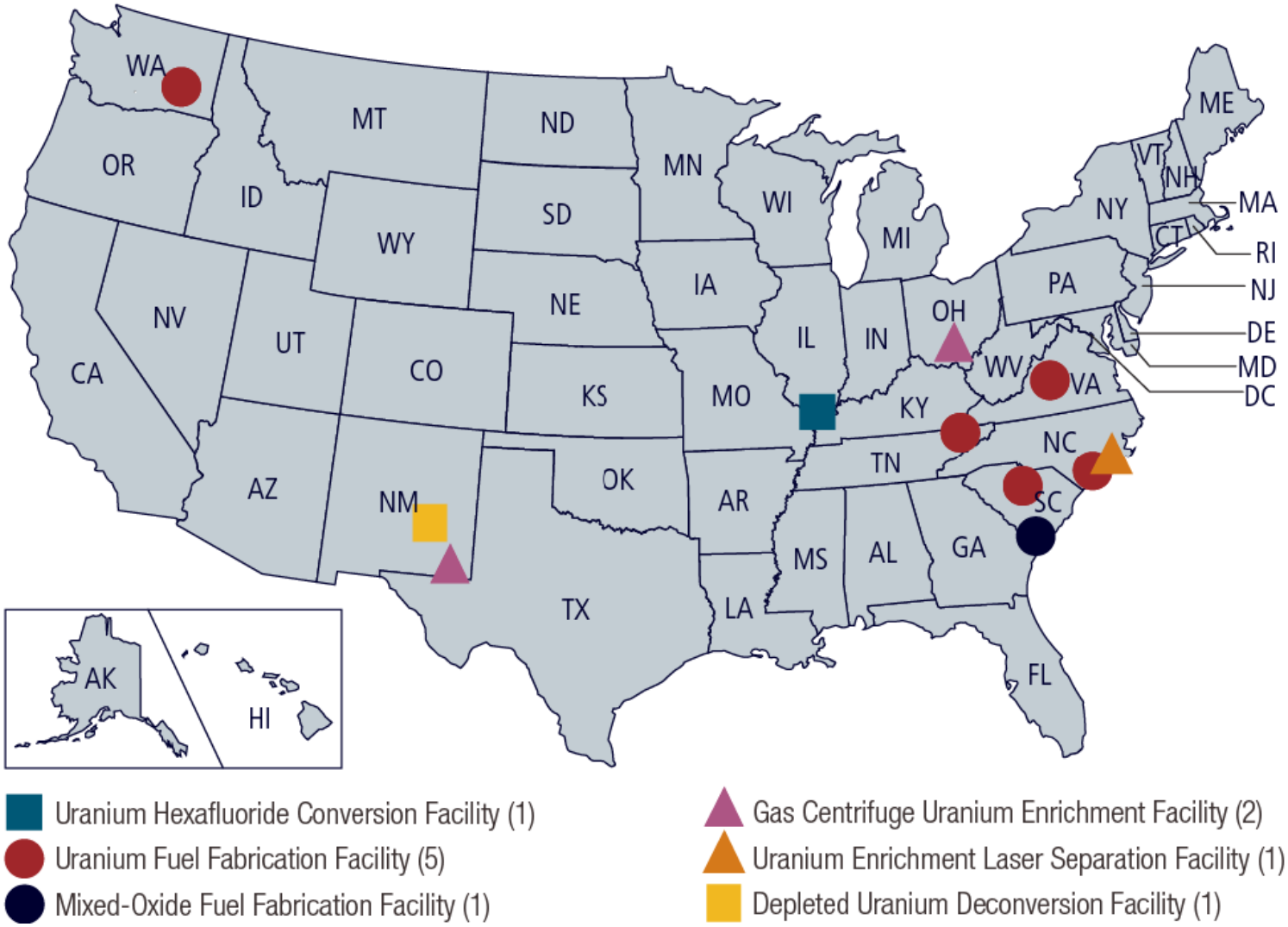


U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

As of August 2019

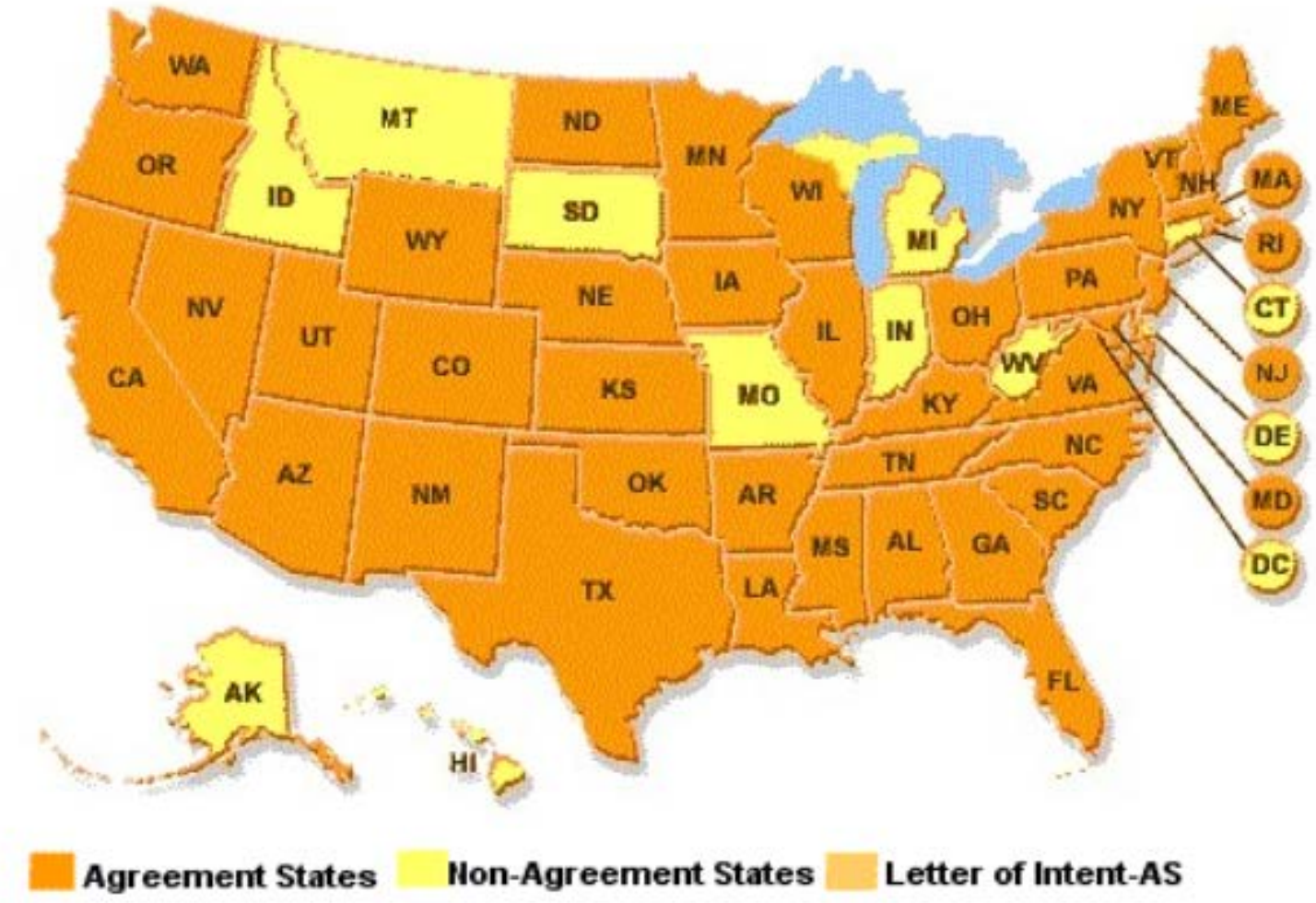
U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

U.S. Nuclear Fuel Cycle Facilities



U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

NRC States and Agreement States



U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Overview of U.S.-IAEA Agreements

- *U.S. – IAEA Safeguards Agreement (INFCIRC/288)*
  - ***"The U.S. Voluntary Offer Agreement"***
  - *Entry Into Force 1980*

- *Protocol to the U.S. – IAEA Safeguards Agreement (INFCIRC/288)*
  - ***"The Reporting Protocol"***
  - *Entry Into Force 1980*

- *Protocol Additional to the U.S. – IAEA Safeguards Agreement (INFCIRC/288 Add.1)*
  - ***"The Additional Protocol"***
  - *Entry Into Force 2009*

- ***U.S.-IAEA Caribbean Territories Safeguards Agreement*** *(INFCIRC/366)*
  - *Includes a Small Quantities Protocol*
  - *Entry Into Force 1989*
  - *Modified Small Quantities Protocol - Entry Into Force 2018*

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

History

- The Treaty on the Non-Proliferation of Nuclear Weapons (NPT) requires non-nuclear weapon states 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, 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

IAEA Director General Rafael Mariano Grossi. (Photo: D. Calma/IAEA)

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Safeguards in the U.S.

- Objectives of IAEA safeguards in the U.S.:
  - U.S. meets its obligations under US-IAEA Agreements for placing nuclear materials under IAEA safeguards
  - IAEA gains experience in implementing new safeguards technologies, testing of new safeguards equipment
  - Minimize commercial and industrial disadvantage in developing nuclear energy for peaceful uses

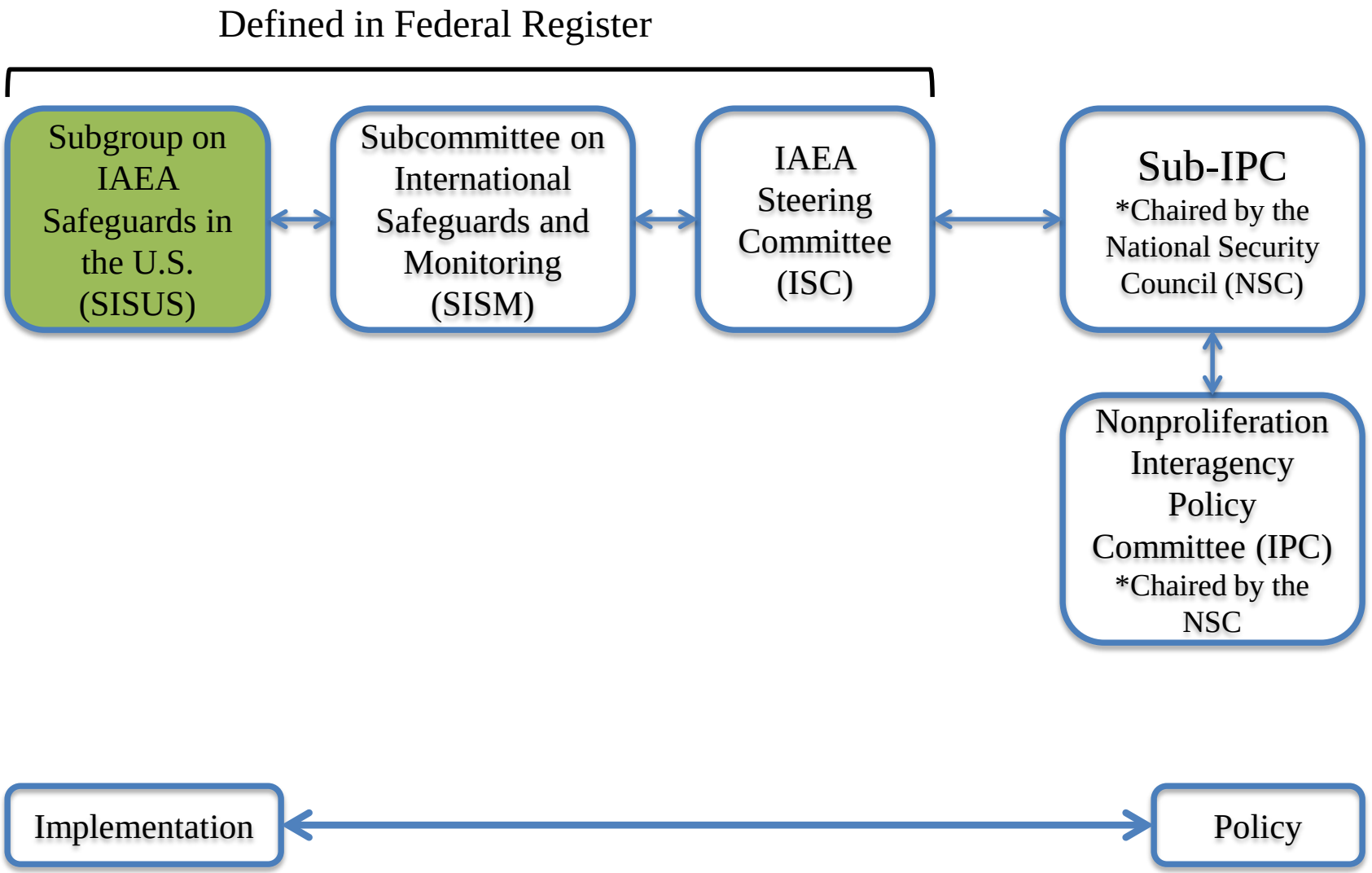
U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

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.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

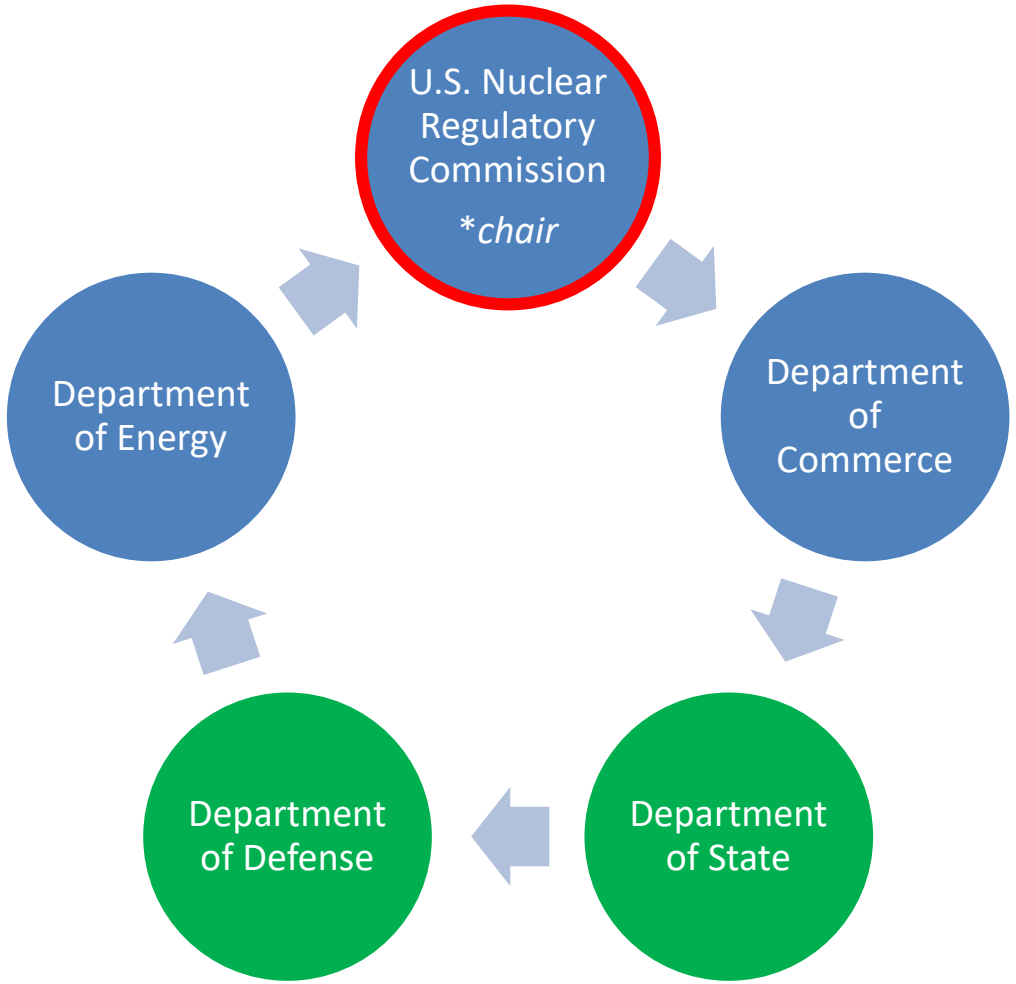
U.S. Government Oversight



U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

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

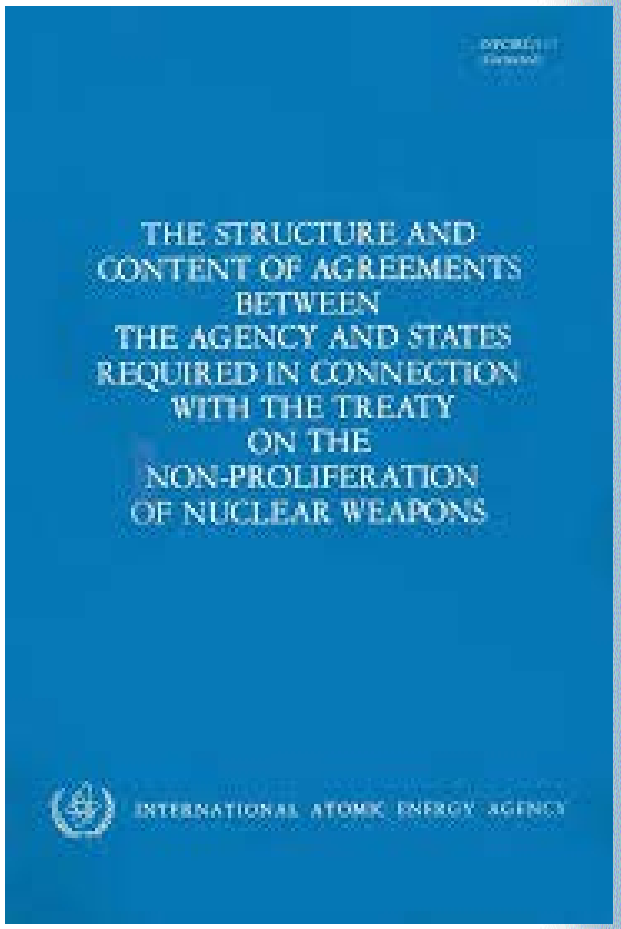
SISUS Committee



U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

U.S. Voluntary Offer Agreement

- Based on INFCIRC/153
- Selection-based approach to safeguards
  - Eligible Facilities List (EFL)
- National Security Exclusion
- Includes all typical safeguards activities including inspections, completion of Design Information Questionnaire (DIQ) and Design Information Verification (DIV), sampling, technical visits, etc…
- Allows for the application of safeguards in a manner similar to that of non-nuclear weapon states (NNWS)



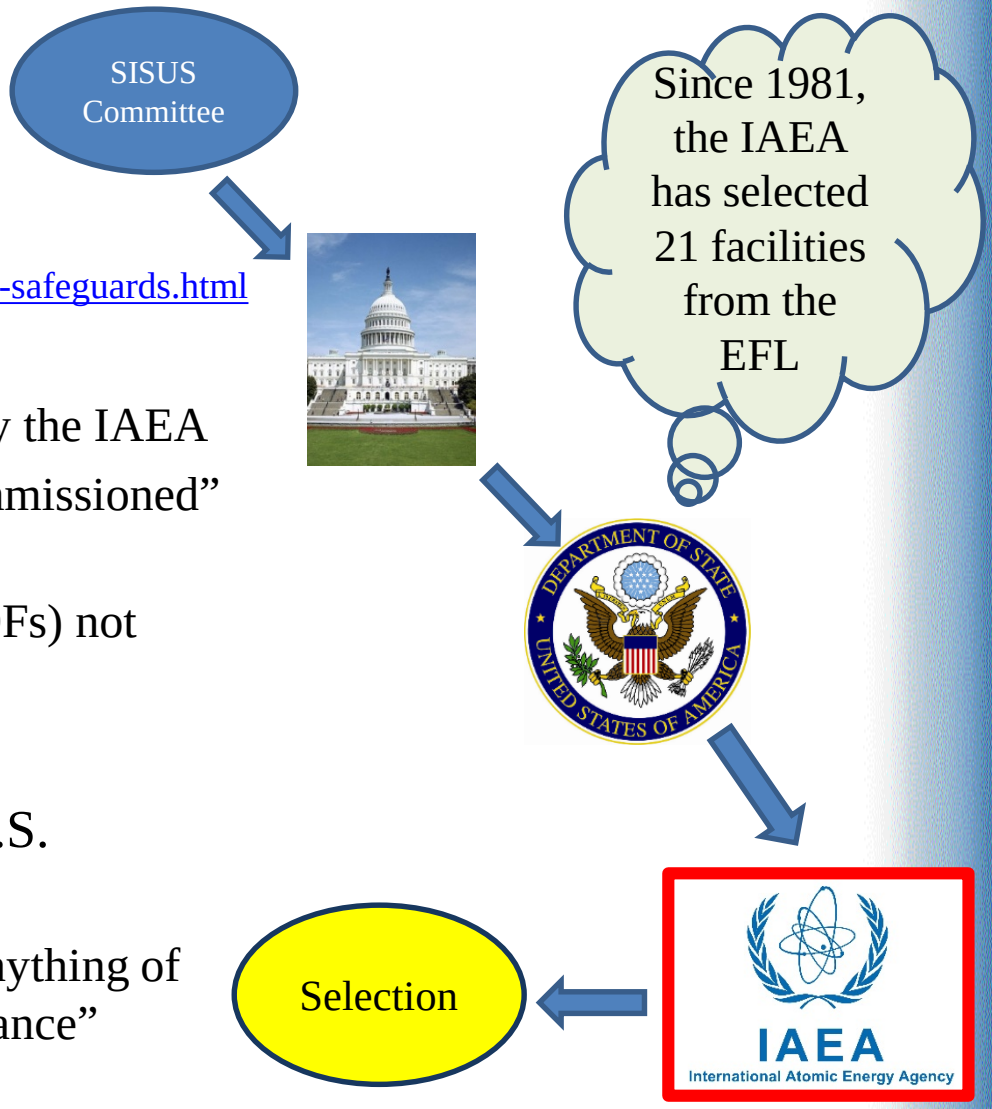
U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

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., Physical Inventory Listing (PIL), Inventory Change Report (ICR), etc…)
- 4 sites (all NRC licensees) currently selected under this 'Protocol'
- **NO INSPECTIONS**

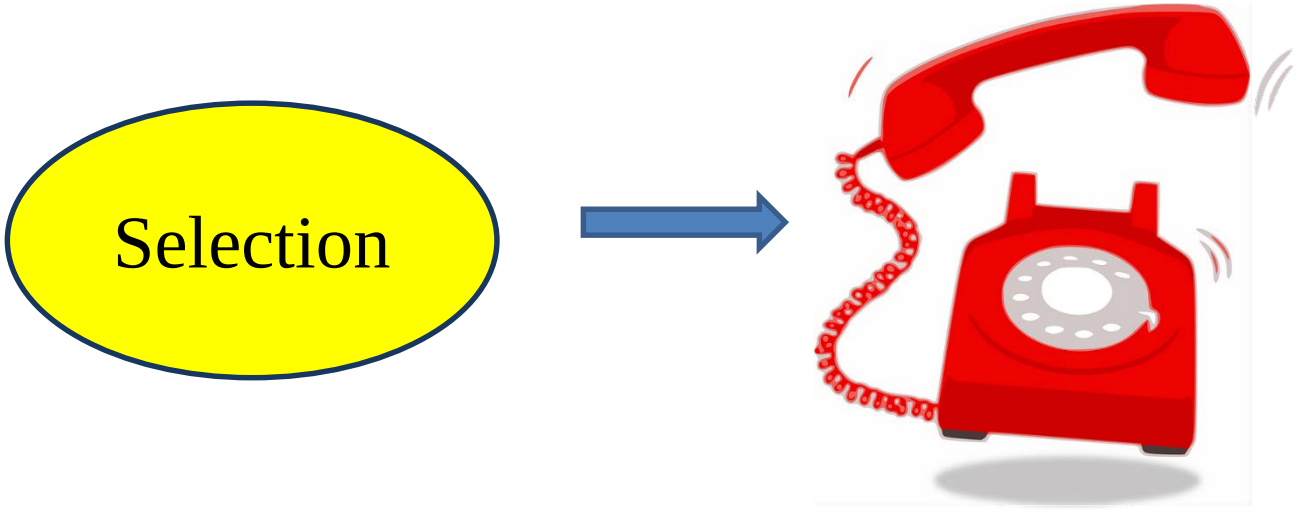
Eligible Facilities List (EFL)

- 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)
  - Locations Outside Facilities (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"



U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Implementation Contd.



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

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)

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

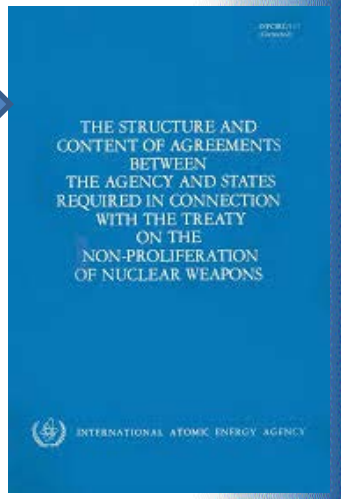
History of Safeguards in the U.S. Pre-Voluntary Offer Agreement (1960-1980)

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**

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

First Phase of the VOA (1980-1993)

- Approximately 200 IAEA inspections at multiple facilities
  - 6 nuclear power plants
  - 6 fuel fabrication plants
  - 1 spent fuel storage location
  - 1 gas centrifuge enrichment plant
- Facilities were selected on a staggered basis and for differing lengths of time

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

2nd Phase of the VOA (1993-2009)

- The Clinton administration ordered elimination of excess fissile material (from defense stockpiles)
- A portion of this material was placed under IAEA safeguards
- **Approximately <u>600 IAEA inspections</u> at the following facilities:**
  - 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)
- U.S. funded these IAEA safeguards efforts

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

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)
- Framatome 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

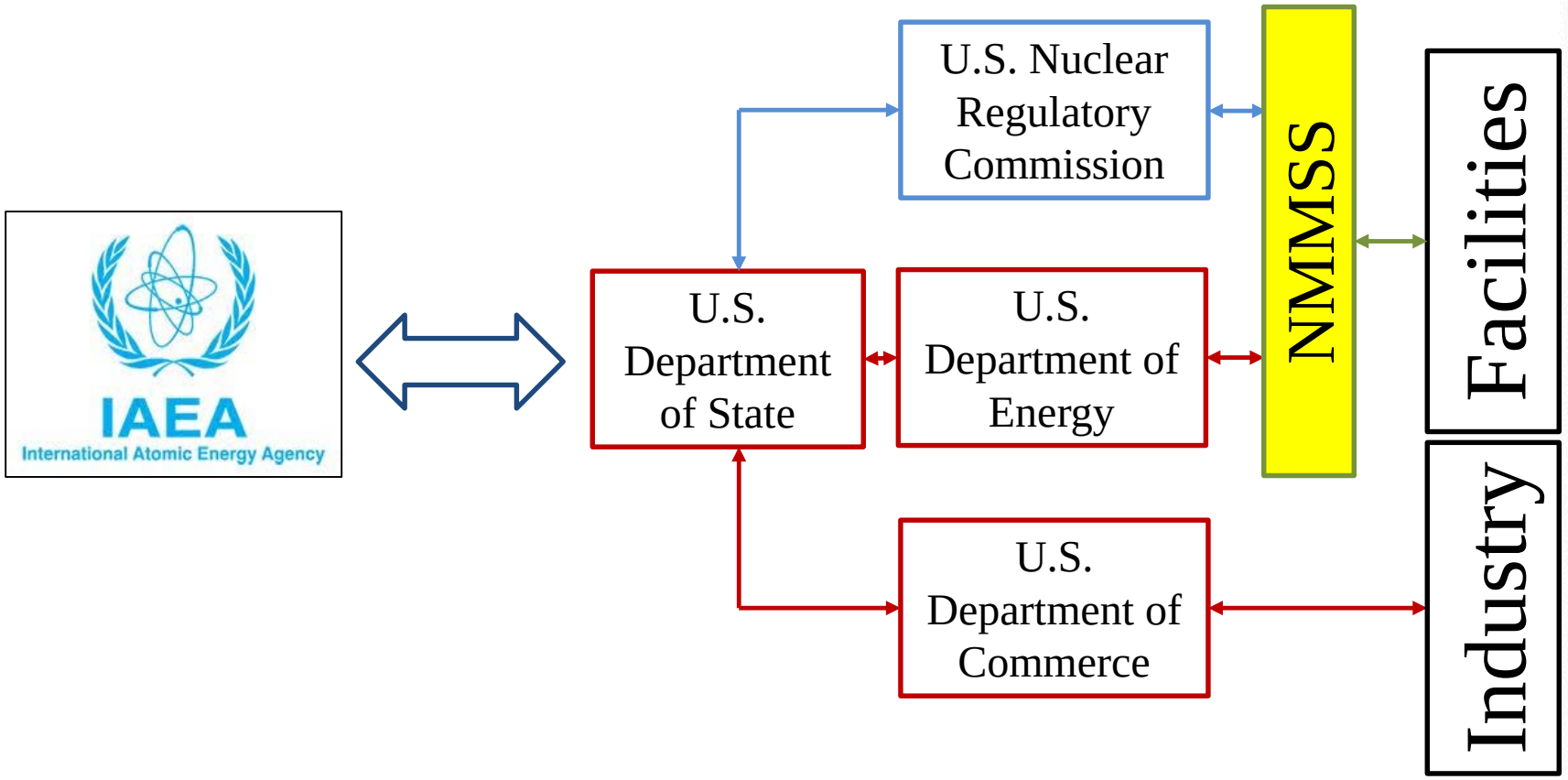
Reporting ONLY, NO INSPECTIONS

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

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
- Monthly import/export reports (INFCIRC/207)

Flow of Information through NMMSS
(Nuclear Materials Management & Safeguards System)



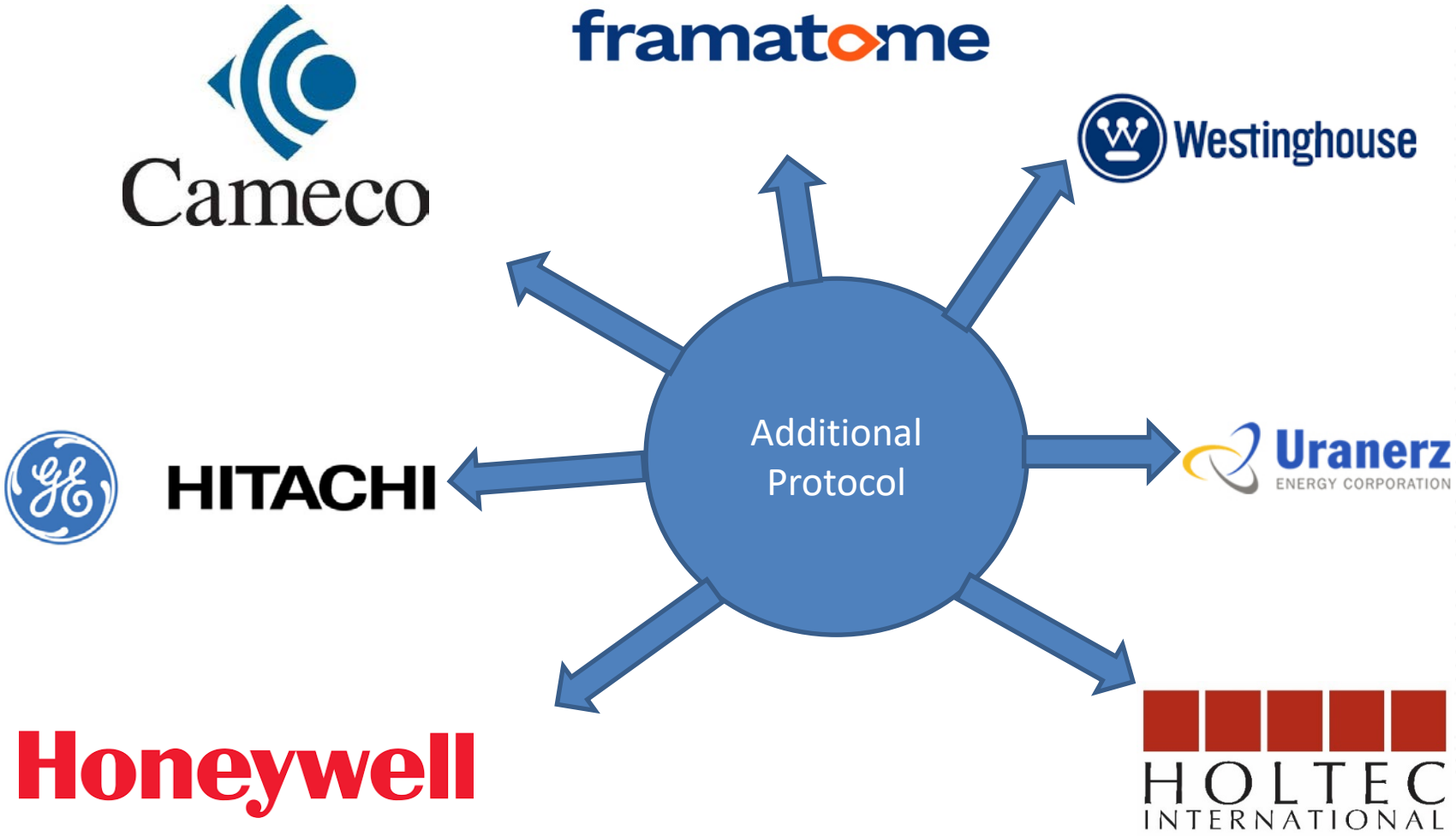
U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

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
- Similar to the INFCIRC/540 model
  - 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

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

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



U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

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
- CA'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)

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

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

What is a small quantities protocol?

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

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 (Petral Island)**
- **Guantanamo Bay Naval Base**

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Material Balance Area (MBA) Structure

Possessors of nuclear material outside a facility (NMOF) are considered one location outside facility material balance area (MBA)

1 MBA

- Recinto Universitario Mayagüez
- Recinto de Rio Piedras
- Alonso & Carus Iron Works
- Cardinal Health
- UPR Medical Campus
- WR Non Destructive Testing

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Where are IAEA safeguards requirements located?

NRC Regulations

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

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

NRC Points of Contact

- Eduardo Sastre at eduardo.sastre@nrc.gov
- Santiago Aguilar at santiago.Aguilar@nrc.gov
- David Hanks at david.hanks@nrc.gov
- James Rubenstone at James.Rubenstone@nrc.gov

Questions?