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Title: Overview of NNSA Non-Defense Programs

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Overview of NNSA Non-Defense Programs

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Nuclear Engineering and Nonproliferation (NEN) Division

Los Alamos National Laboratory

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Early Acknowledgement / Warning

- **Much of this presentation is made up of content from many SMEs, line managers and program managers (who also provided helpful discussion)**

- **Collaborative/Interactive Discussion**

Notional NEN application question:
What's in the box?

- **Nuclear Threat Reduction Examples**
  - Safeguards: Has someone diverted material from this box that is subject to international safeguards in a fuel cycle facility?
  - Arms Control: Does this box contain nuclear warhead?
  - Emergency Response: Is this box that I found on the side of the road a threat? How can I better search / characterize these types of boxes?

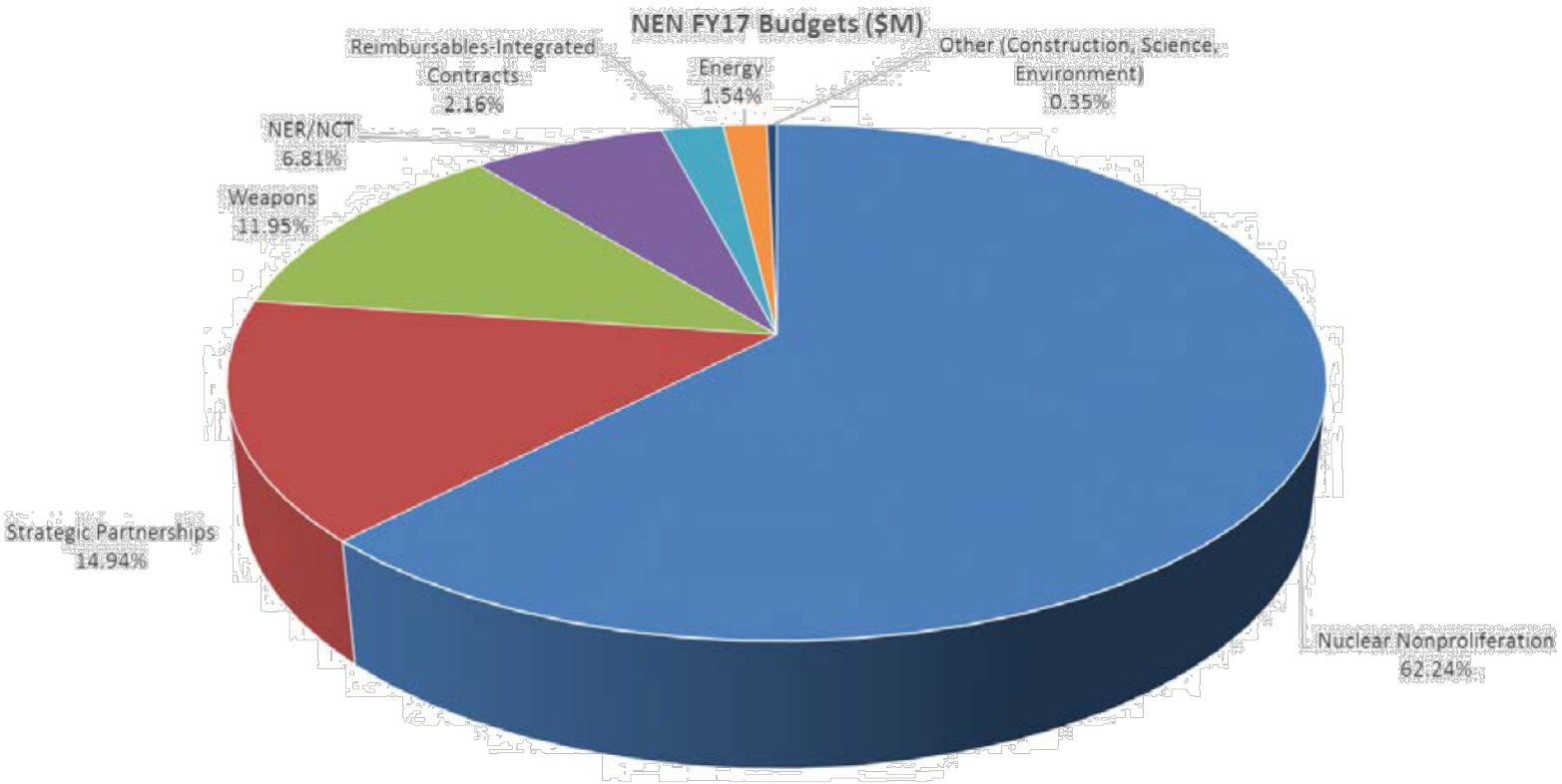
- **Criticality Safety Example**
  - Can I handle this box safely for my day-to-day duties?

- **Nuclear Energy Example**
  - How much electricity can this box produce?

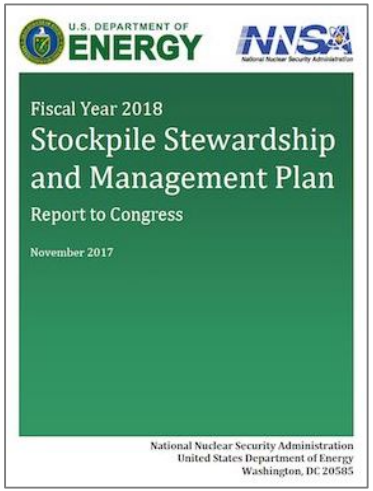
NEN-2 Critical Experiments Team Sponsors

- Nuclear Criticality Safety Program (NCSP)
- National Technical Nuclear Forensics (NTNF)
- Nuclear Weapons Stockpile Stewardship Program
- Nuclear Material Management
- Nuclear Emergency Response
- Nuclear Counter-terrorism
- Nuclear Nonproliferation / Safeguards / Arms Control
- DHS/DNDO, DTRA, NASA, Naval Reactors
- Universities, commercial partners
- DOE-NE: MPACT, NEUP
- Others…

NEN Sponsors



Three Main Missions



★ **Maintaining a Safe, Secure, and Reliable Nuclear Arsenal (NA-10)**

…aka Stockpile Stewardship, Weapons Program, Defense Programs

Three Main Missions

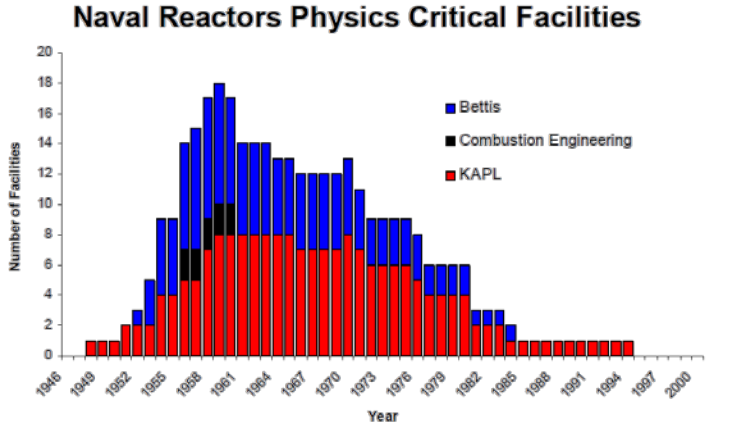
- **Maintaining a Safe, Secure, and Reliable Nuclear Arsenal (NA-10)**
  …aka Stockpile Stewardship, Weapons Program, Defense Programs

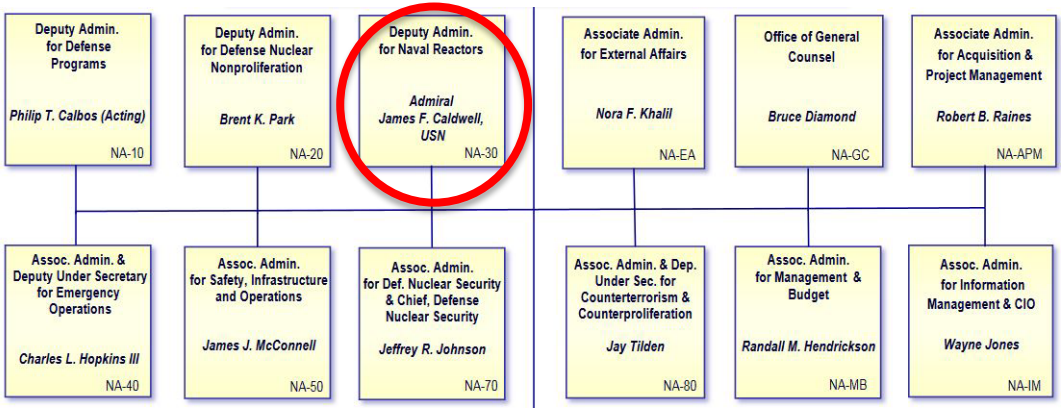
- **Powering the Nuclear Navy (NA-30)**
  NNSA provides militarily effective nuclear propulsion plants and ensures their safe, reliable and long-lived operation.

NA-30: Naval Reactors

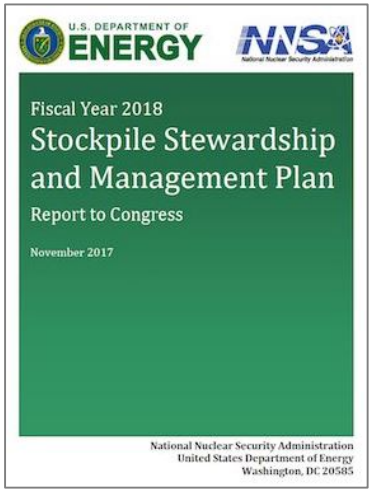
- The Naval Nuclear Propulsion Program provides militarily effective nuclear propulsion plants and ensures their safe, reliable and long-lived operation

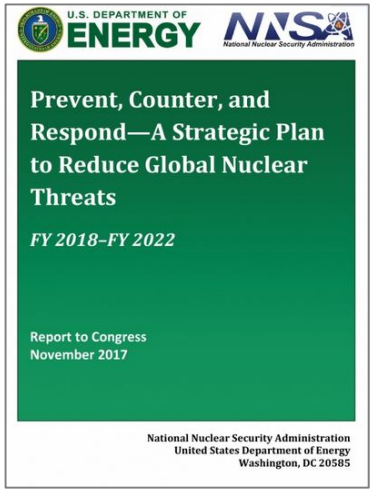
- The Naval Nuclear Laboratory includes the Bettis and Knolls Atomic Power Laboratories, the Kenneth A. Kesselring Site, and the Naval Reactors Facility which have proudly supported the nation since 1946. The Naval Nuclear Laboratory has nearly 7,000 employees working at primary locations in Pennsylvania, New York, South Carolina, and Idaho. The Naval Nuclear Laboratory also has an established presence at numerous shipyards and vendor locations around the globe





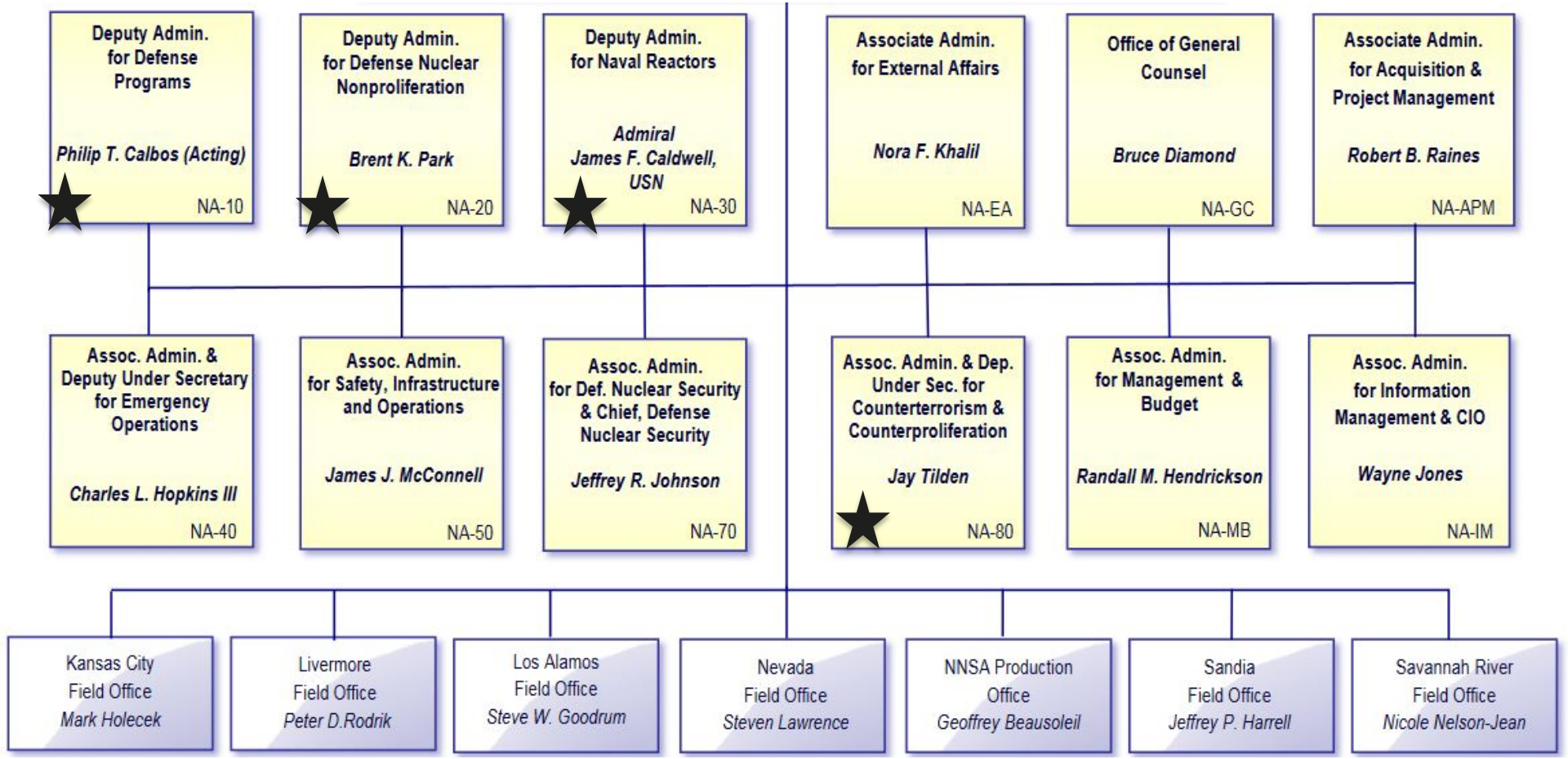
Three Main Missions





- **Maintaining a Safe, Secure, and Reliable Nuclear Arsenal (NA-10)**
  …aka Stockpile Stewardship, Weapons Program, Defense Programs
- **Powering the Nuclear Navy (NA-30)**
  NNSA provides militarily effective nuclear propulsion plants and ensures their safe, reliable and long-lived operation.
- **Global Nuclear Threat Reduction (NA-20/NA-80)**
  Threat: Nuclear Proliferation (state actor) / Nuclear & Radiological Terrorism (non-state actor)
  Reduction: Nonproliferation, Counterproliferation and Counterterrorism Efforts aka Prevent / Detect / Counter / Respond is carried out with other interagency partners including members of US intelligence community, DHS, DoS, DoD, FBI etc…

NNSA Organizational Chart



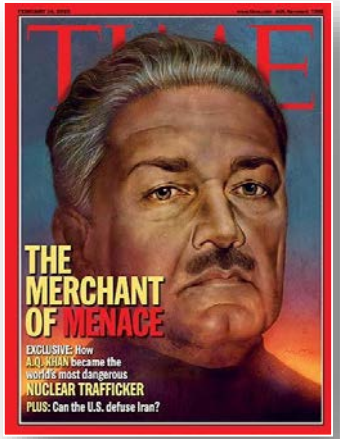
NNSA Language on Approach to Nuclear Threat Reduction

Prevent non-state actors and additional countries from developing nuclear weapons or acquiring weapons-usable nuclear materials, equipment, technology, and expertise; and prevent non-state actors from acquiring radiological materials for a radiological threat device.

Counter the efforts of both proliferant states and non-state actors to steal, acquire, develop, disseminate, transport, or deliver the materials, expertise, or components necessary for a nuclear or radiological threat device or the devices themselves. Counter... threats through innovative science, technology, and policy-driven solutions.

Respond to nuclear or radiological terrorist acts by searching for and rendering safe threat devices, components, and/or radiological and nuclear materials, and by conducting consequence management actions following an event.

e.g. if there is a report of a nuclear or radiological terrorism scenario: Is it a real threat? What is the potential size of the area that may be affected? Where did it come from?



Nuclear Posture Review Language
…because of the interplay

- **Nonproliferation:** Effective nuclear non-proliferation and arms control measures can support U.S., allied, and partner security by controlling the spread of nuclear materials and technology; placing limits on the production, stockpiling and deployment of nuclear weapons; decreasing misperception and miscalculation; and avoiding destabilizing nuclear arms competition. The United States will continue its efforts to: 1) minimize the number of nuclear weapons states, including by maintaining credible U.S. extended nuclear deterrence and assurance; 2) deny terrorist organizations access to nuclear weapons and materials; 3) strictly control weapons-usable material, related technology, and expertise; and 4) seek arms control agreements that enhance security, and are verifiable and enforceable.

- **Counterterrorism:** The U.S. strategy to combat nuclear terrorism encompasses a wide range of activities that comprise a defense-in-depth against current and emerging dangers. Under this multilayered approach, the United States strives to prevent terrorists from obtaining nuclear weapons or weapons-usable materials, technology, and expertise; counter their efforts to acquire, transfer, or employ these assets; and respond to nuclear incidents, by locating and disabling a nuclear device or managing the consequences of a nuclear detonation.

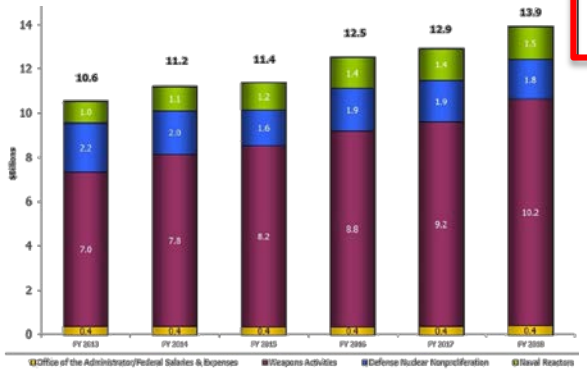
Show me the $

DOE/CF-0136
Volume 1

Department of Energy
FY 2019 Congressional Budget Request

National Nuclear Security Administration

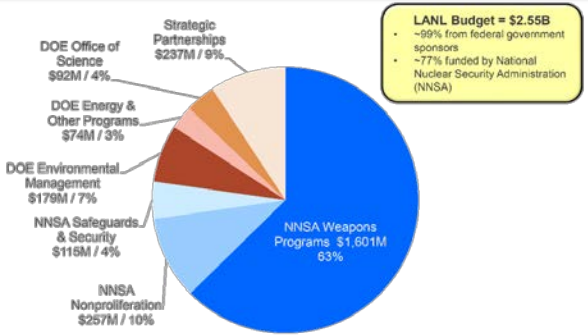
Federal Salaries and Expenses
Weapons Activities
Defense Nuclear Nonproliferation
Naval Reactors



(Dollars in Thousands)

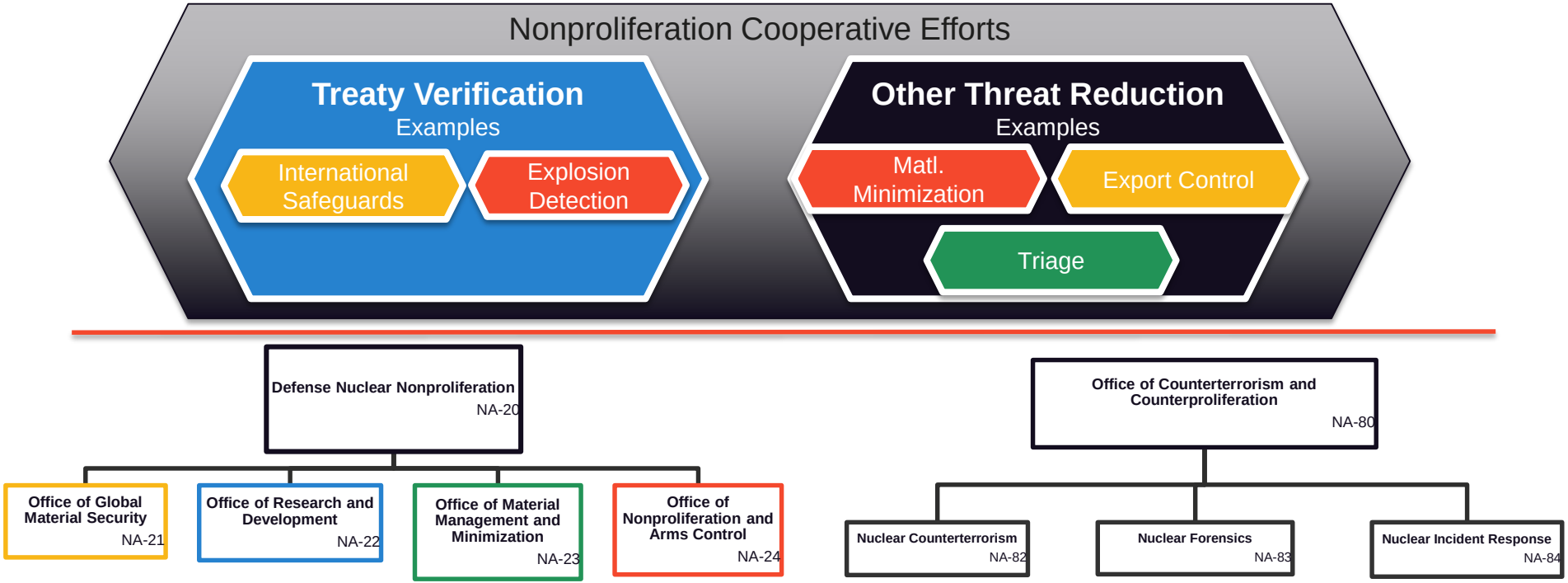
	FY 2017 Enacted	FY 2018 Annualized CR*	FY 2019 Request	FY 2019 Request vs FY 2017 Enacted $	FY 2019 Request vs FY 2017 Enacted %
National Nuclear Security Administration					
Federal Salaries and Expenses	387,366	384,736	422,529	+35,163	9.1%
Weapons Activities	9,240,739	9,241,675	11,017,078	+1,776,339	19.2%
Defense Nuclear Nonproliferation	1,879,738	1,885,970	1,862,825	-16,913	-0.9%
Naval Reactors[a]	1,419,792	1,410,455	1,788,618	+368,826	26.0%
Total, National Nuclear Security Administration	**12,927,635**	**12,922,836**	**15,091,050**	**+2,163,415**	**16.7%**

Defense Nuclear Nonproliferation			
Defense Nuclear Nonproliferation Programs			
Global Material Security	367,108	364,615	337,108
Material Management and Minimization	288,350	286,391	332,094
Nonproliferation and Arms Control	124,703	123,856	129,703
Defense Nuclear Nonproliferation R&D	469,750	466,560	456,095
Nonproliferation Construction	335,000	332,725	279,000
Subtotal, Defense Nuclear Nonproliferation Programs	**1,584,911**	**1,574,147**	**1,534,000**
Nuclear Counterterrorism and Incident Response	271,881	270,035	319,185
Legacy Contractor Pensions	83,208	82,643	28,640
Subtotal, Defense Nuclear Nonproliferation	**1,940,000**	**1,926,825**	**1,881,825**

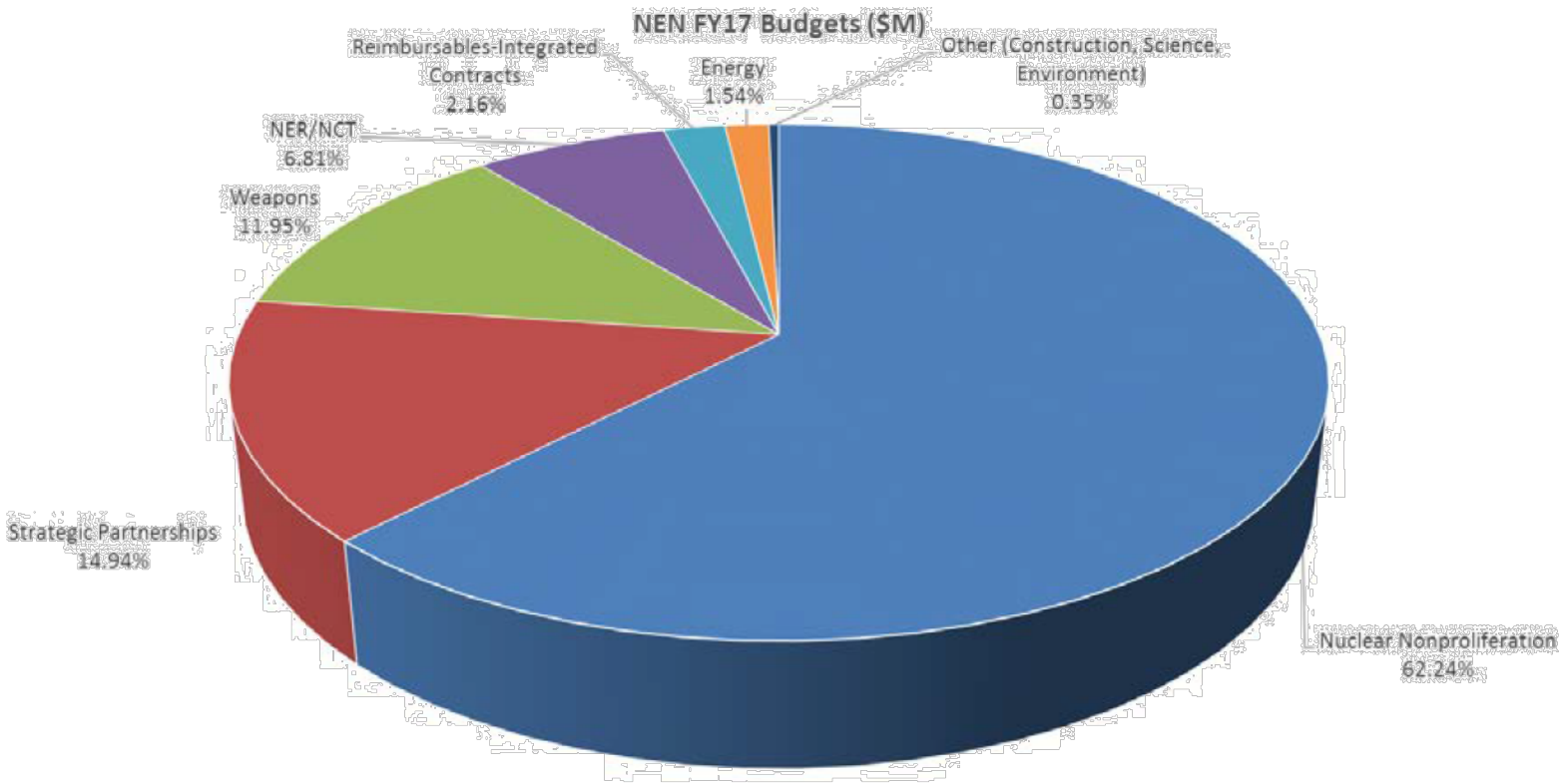


Efforts are hard to categorize, dissect…

So we will just follow NNSA structure (imperfect e.g. Forensics)



NEN Sponsors – FY17



National Security & Defense

Sponsors

- OSD (AT&L)
- DTRA
- MDA
- Joint Staff
- USD(I)
- Combatant Commands
- Service Components

- S&T
- OHA
- DNDO
- US CBP
- FEMA
- US SS
- TSA

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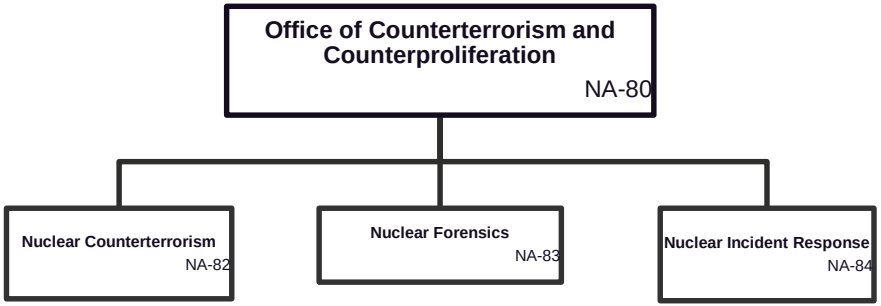
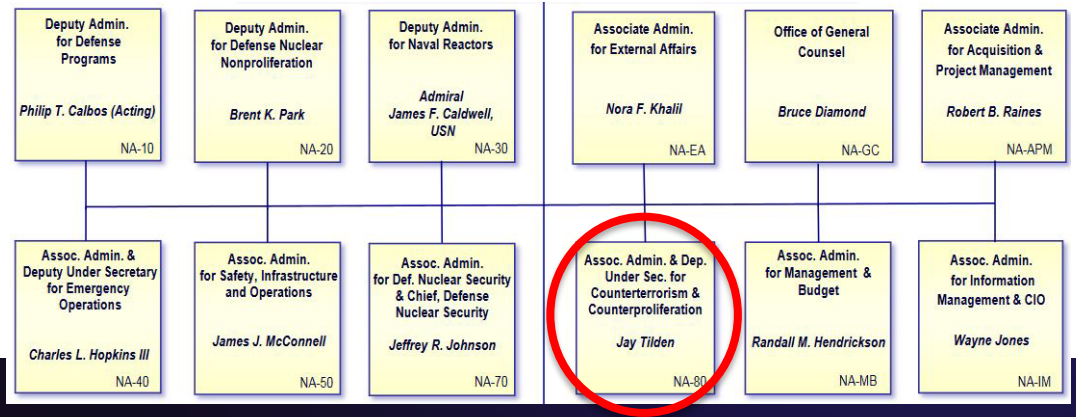
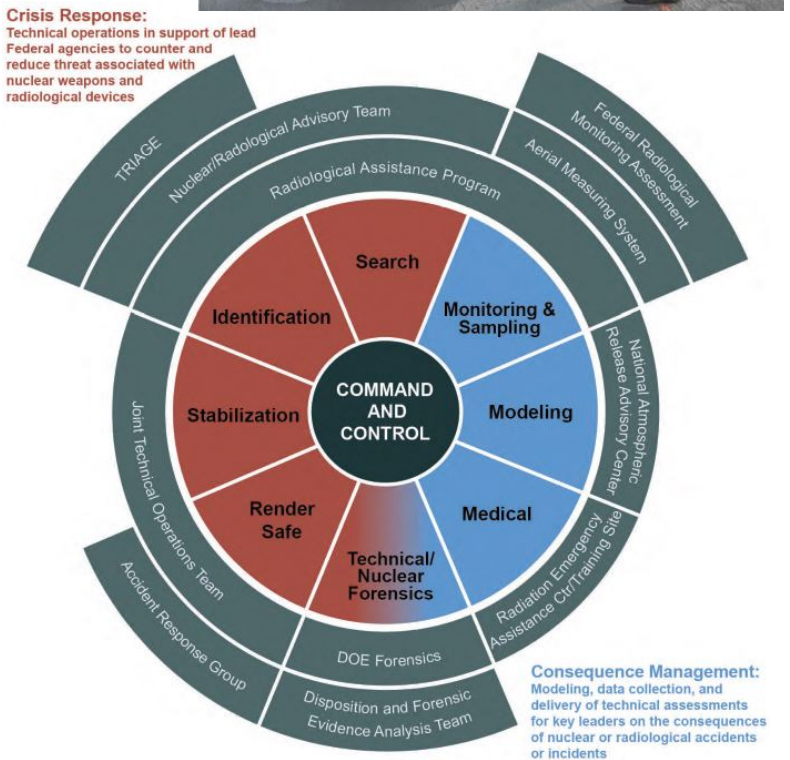
NA-80: Counterterrorism & Counterproliferation

- **Mission:** ***"counter... threats through innovative science, technology, and policy-driven solutions."***



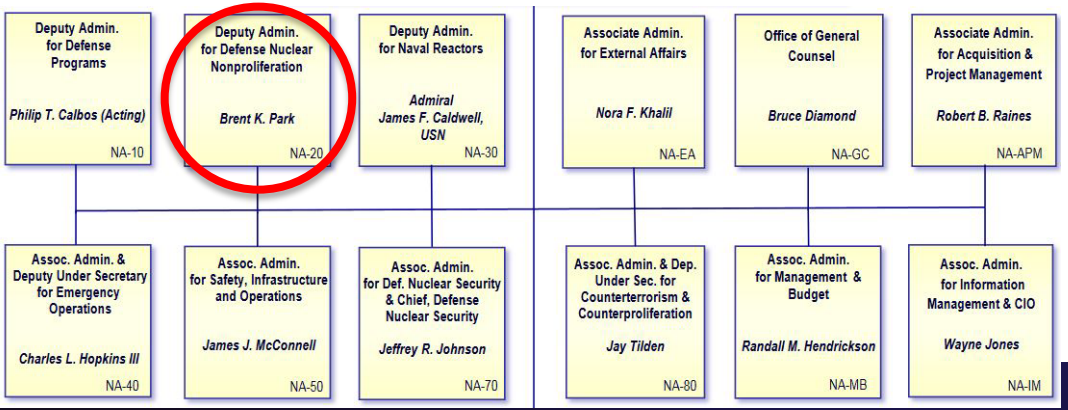




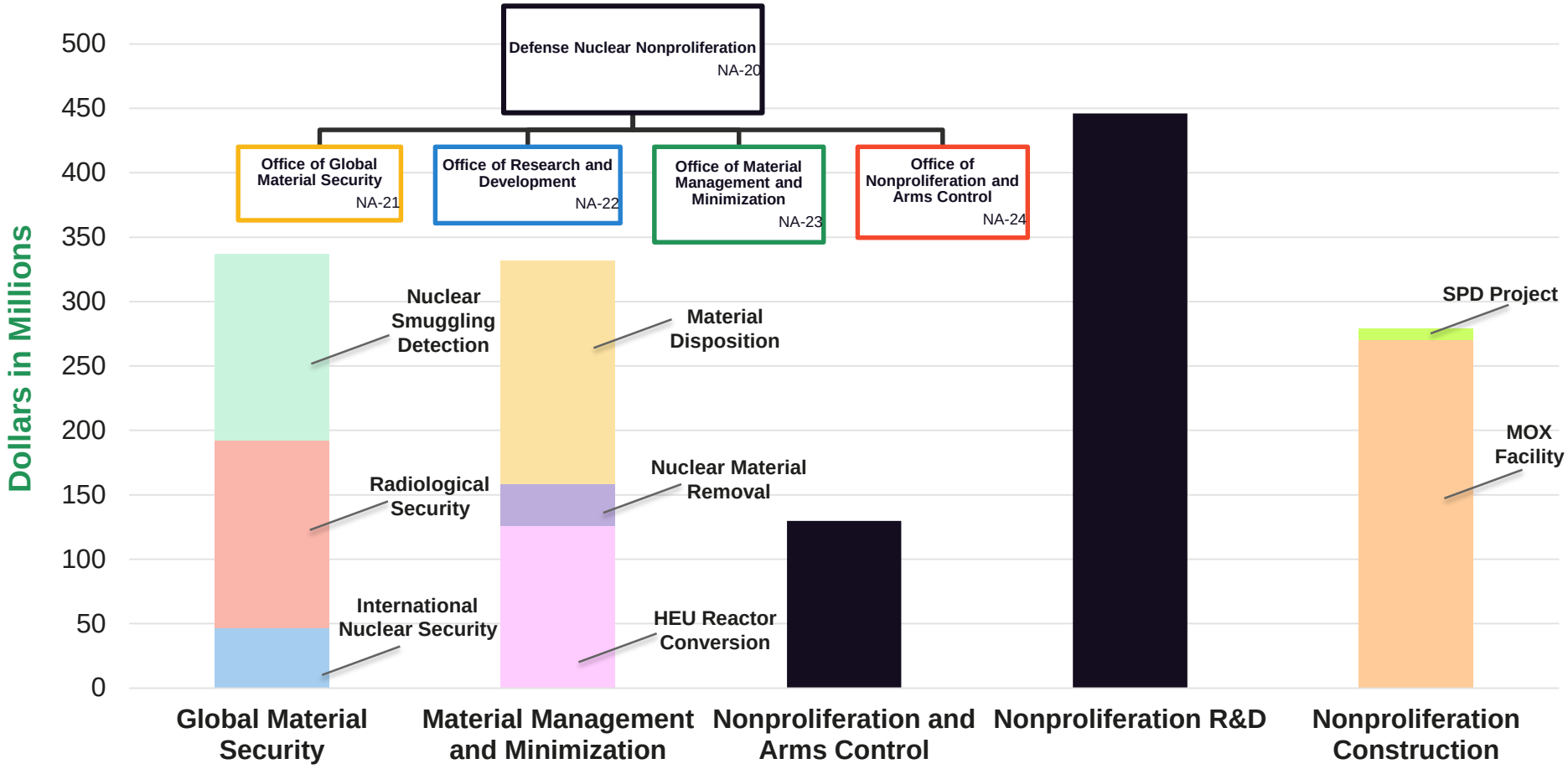
NA-20: Defense Nuclear Nonproliferation

Defense Nuclear Nonproliferation
NA-20

- **Office of Global Material Security** NA-21
- **Office of Research and Development** NA-22
- **Office of Material Management and Minimization** NA-23
- **Office of Nonproliferation and Arms Control** NA-24



Defense Nuclear Nonproliferation Budget Breakdown



NA-21: Global Material Security

International Nuclear Security

- **The International Nuclear Security program collaborates with partners world-wide to improve the security of proliferation-sensitive materials, particularly weapons-usable nuclear material in both civilian and non-civilian use in key countries. INS works with partner countries to:**
  - Upgrade and sustain physical security and material control and accounting systems
  - Develop national-level nuclear security infrastructure in areas such as regulations, inspections, and transportation
  - Implement nuclear security training, in areas such as IAEA INFCIRC 225, transportation security, design basis threat, mitigation of insider threat, process monitoring, knowledge security
  - Jointly conduct technical best practices exchanges
  - Enhance nuclear security culture

FY17 Highlight: Supported joint development and execution of nuclear security best practices exchanges and training courses with COEs in Argentina, China, India, Japan, and South Korea.

Off-Site Source Recovery Program

FY17 Highlight: Recovered 2,119 unwanted radioactive sealed sources from sites located throughout the US.

- **Eliminate excess, unwanted, abandoned, or orphan radioactive sealed sources that pose a potential risk to health, safety, and national security.**
- **Started in 1999 at Los Alamos as part of DOE Office of Environmental Management**
- **Now part of the NNSA Office of Global Material Security, managed at LANL**
- **Recovered 37,460 sources—nearly 44,400 TBq (1.2 million Ci)—as of March 2017**
- **Identify and track disused sealed sources potentially requiring recovery**
  - Maintains a public website that encourages registration of unwanted sources
  - Internal database to allow prioritization of removal activities based on risk and plan removals to maximize efficiency

OSRP by the Numbers

Since 1997

37,000
Radioactive sealed sources have been removed

containing more than
1 million
curies

from over
1,300
industrial, educational, healthcare, and governmental facilities worldwide

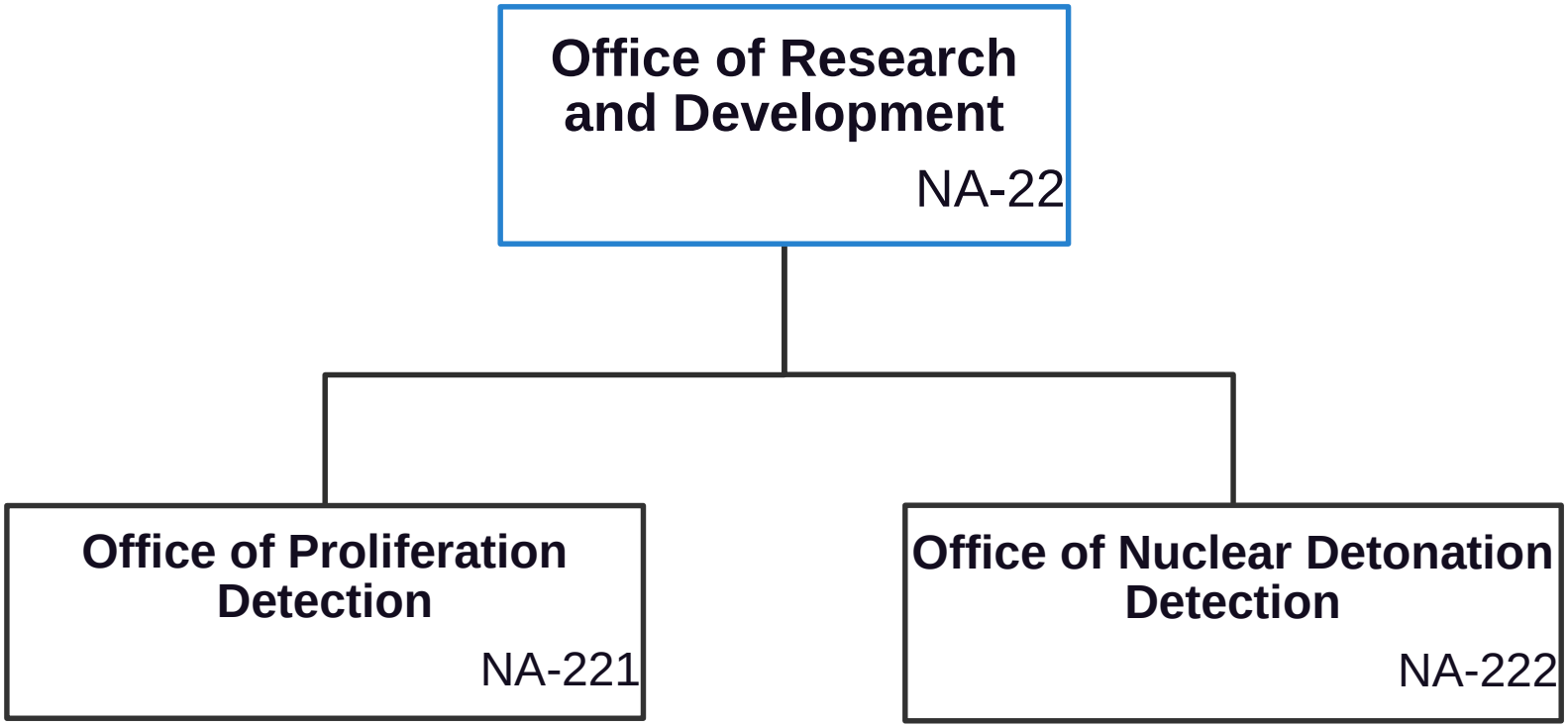
OSRP BY THE NUMBERS

Nuclear Smuggling Detection and Deterrence (NSDD)

FY17 Highlight: Deployed 26 mobile radiation detection systems; transitioned 92 systems to partner country responsibility.

- **"Deter, detect, and interdict illicit trafficking of Special Nuclear Material and other radiological material at foreign seaports, airports, and border crossings"**
- **Test and evaluate new detection technologies**
- **Partnerships with other nations**
- **A DOE National Nuclear Security Administration program**
- **Customs and Border Patrol**
  - Interdiction at U.S. borders, seaports, and airports
  - Under the Department of Homeland Security
    - Container Security Initiative
    - Secure Freight Initiative

NA-22: Research and Development



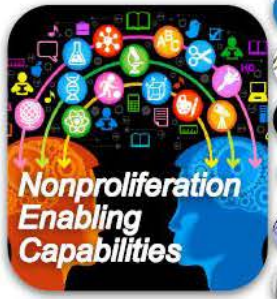
Office of Proliferation Detection

Mission:

Advance U.S. capabilities for global detection of nuclear weapons development activities, including material production, movement, weaponization, and the characterization of nuclear explosions.

- *Uranium Production Detection*
- *Plutonium Production Detection*
- *International Safeguards*
- *Other Nuclear Processes*

- *Weapons Development Detection*
- *Emergency Response*
- *Nuclear Test Detection*



- *Innovation*
- *Near-field Detection*
- *Remote Detection*
- *Data Science*
- *Signature Physics*
- *Radiological Source Replacement*

Office of Nuclear Detonation Detection (NDD)

FY17 Highlight: Delivered two sensor payloads—the GBD III-6 and III-7—to the USAF

Space-based Nuclear Detonation Detection

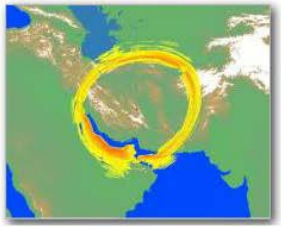
- Near real-time identification via signals at long range
- Sensors build capability of U.S. Nuclear Detonation (NuDet) Detection System (USNDS)

Nuclear Forensics Program

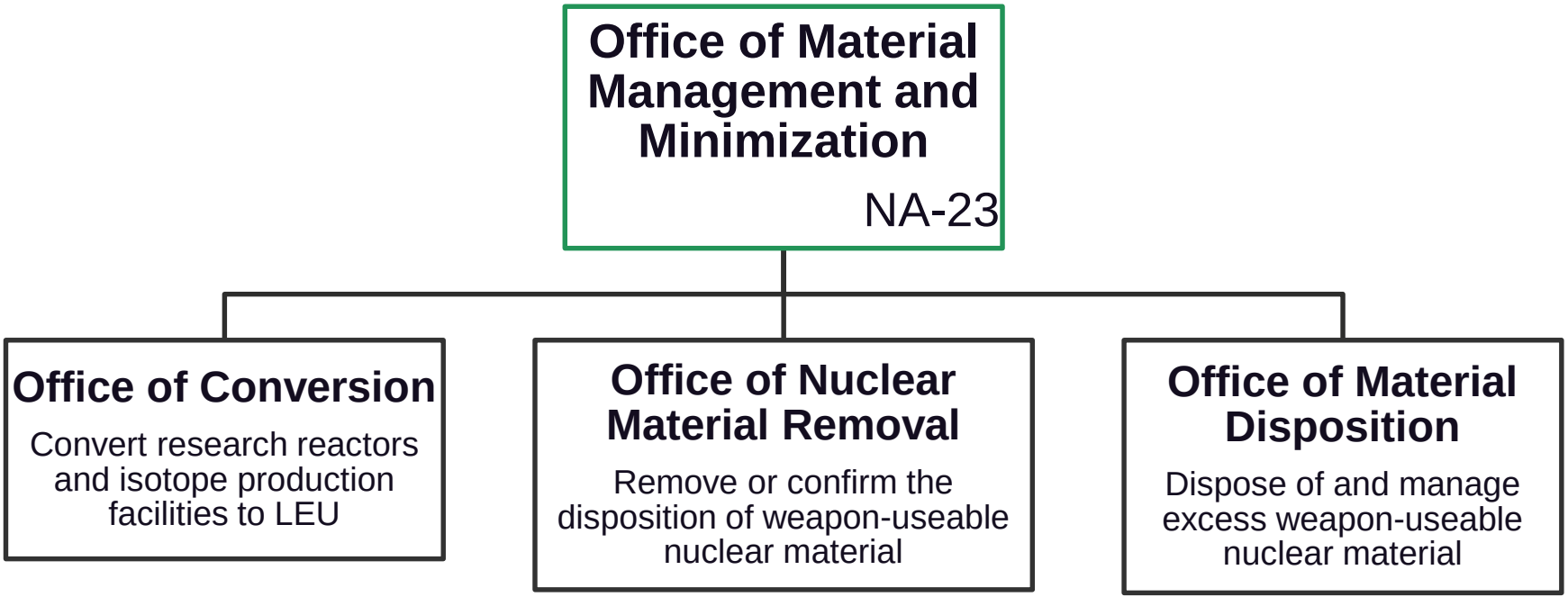
- Characterize Events to Answer Questions re Origin & Provenance
- Scenarios include near-surface low-yield urban detonations
- Local access to signals/samples

Ground-Based Nuclear Detonation Detection

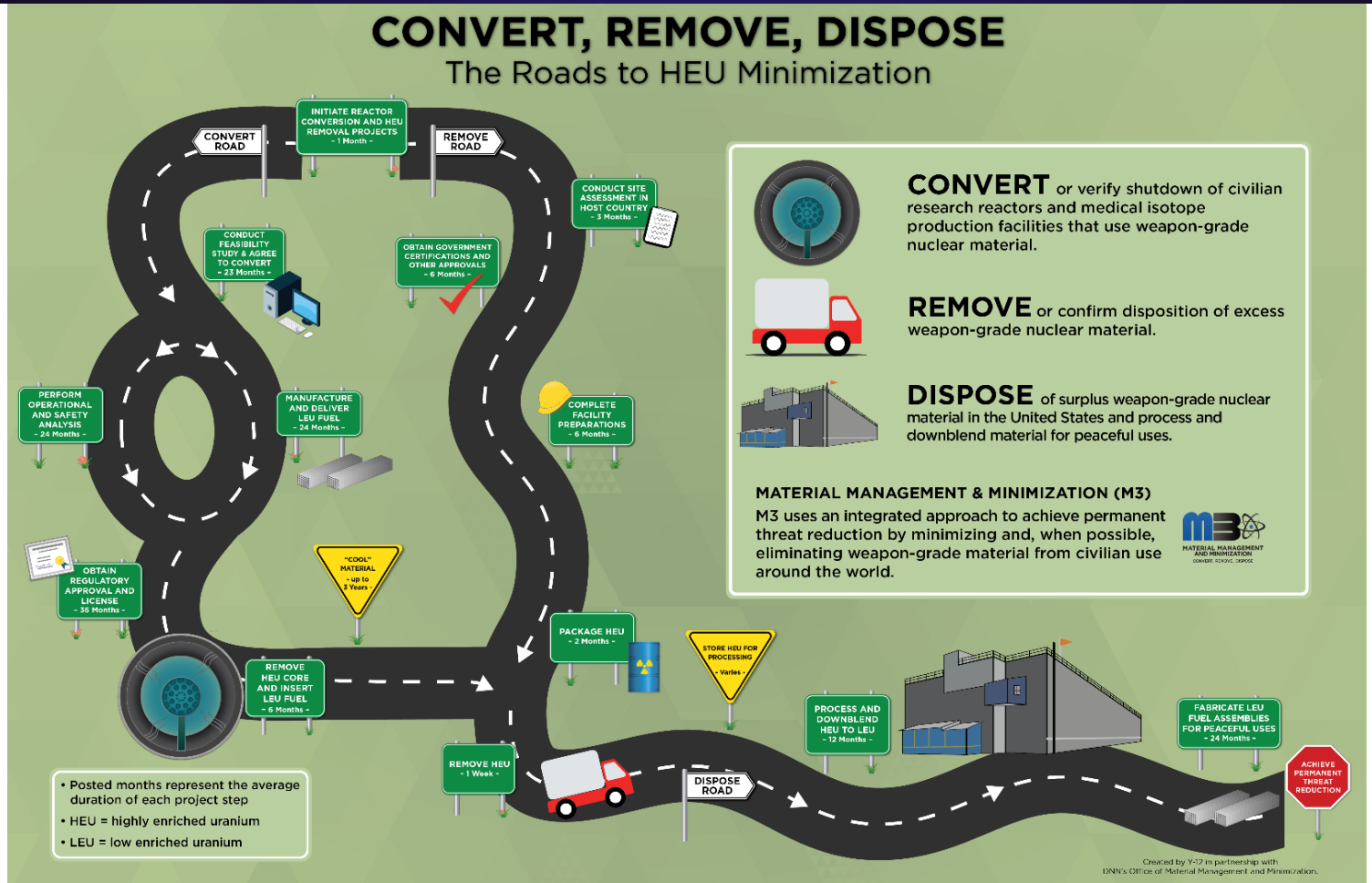
- Detect signals at global, regional, and local distances
- Geophysical and radionuclide technologies relevant to U.S. Nuclear Data Center & US Atomic Energy Detection System (USAEDS)



NA-23: Material Management and Minimization (M3)



M3 Program Overview



Los Alamos works to reduce global HEU and Pu inventories

Conversion of research reactors from HEU to LEU

Removal of last HEU from Poland, September 2016

Joint Japan-U.S. experiments at NCERC *(National Criticality Experiments Research Center in Nevada)* **in support of return of fuel from Japanese Fast Critical Assembly**

Mo-99 production without HEU

NA-24: Nonproliferation and Arms Control