CNS | consolidated nuclear security, llc

PANTEX PLANT | Y-12 NATIONAL SECURITY COMPLEX

Global Security & Strategic Partnerships Programs

East Tennessee Economic Council | July 30, 2020

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Serving the Nation - Missions

- **Providing the Nuclear Deterrent** for our Nation and Allies
- **Leading Nuclear Nonproliferation and Counterterrorism / Counterproliferation** efforts to make the world a safer place
- **Supplying Enriched Uranium Material for Reactors** – Naval Propulsion, Army, NASA, Universities, Isotope Production Reactors
- **Providing High Explosives** for the Stockpile and Strategic Partners
- **Delivering Solutions** – Solve emerging national security challenges

Assuring Global Freedom

- Decades of hands-on, production-related experience in nuclear weapons materials and processes are leveraged to identify global areas of concern
- Protect, remove, and assure safety and security of special nuclear material
- Utilize critical assets for training, Weapons of Mass Destruction detection, and exercise enhancement
- Provide applied development and deployment of research to real-world issues

PANTEX Amarillo, TX

- Weapon assembly and disassembly
- Life Extension Programs and surveillance for active weapons
- Safe, secure plutonium pit storage and surveillance
- Weapons Counterterrorism/Counterproliferation expertise
- High explosives design, manufacturing, processing and handling

Y-12 Oak Ridge, TN

- Weapon component assembly, disassembly, refurbishment and surveillance
- Safe, secure uranium processing and storage
- Enriched uranium supply for naval propulsion, isotope production/research reactors, and special purpose reactors for DOD/NASA
- Specialized expertise and training to support nuclear nonproliferation and global security missions
- Special Nuclear Material weaponization detection test-bed

Global Security & Strategic Partnership Customers

NNSA

- Defense Programs
- Defense Nuclear Nonproliferation
- Counterterrorism & Counterproliferation
- Naval Reactors

DOE

- Office of Intelligence/ Counterintelligence
- Office of Science
- Office of Nuclear Energy
- Other National Laboratories and Sites

U.S. Federal Agencies

- Department of Defense
- Department of State
- Department of Justice
- Intelligence Community
- National Aeronautics and Space Administration

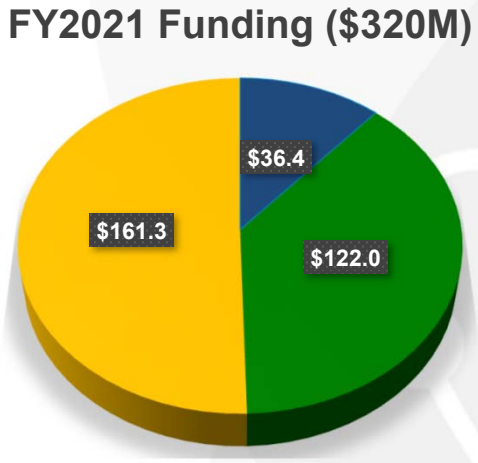
Non-Federal Entities

- Mutual Defense
- Foreign Government Research Reactors
- Academic Institutions
- Commercial Companies

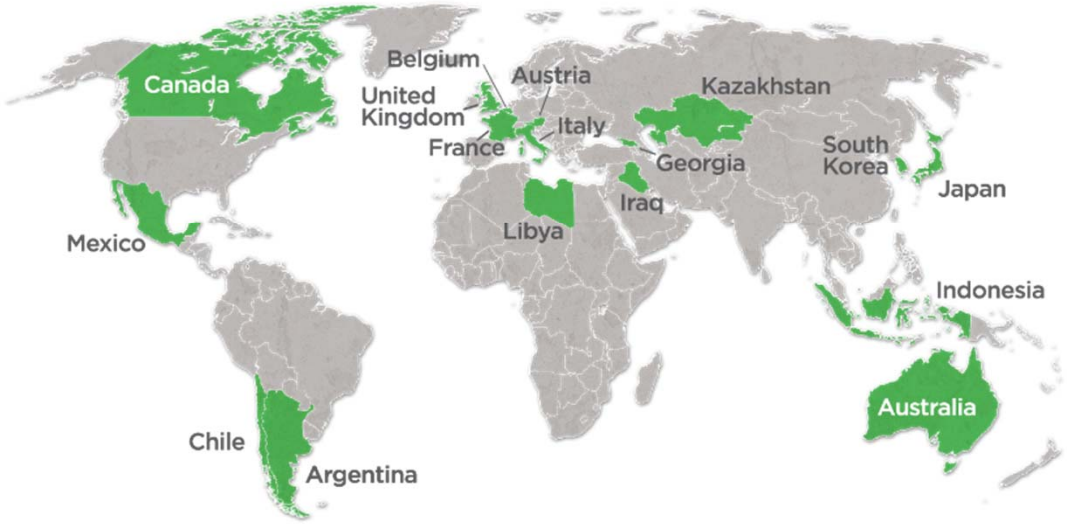
Global Security & Strategic Partnership Programs

Key Mission Areas

- Nuclear Threat Reduction
- Uranium and Other Material Supply
- Special Manufacturing and Fabrication Operations



Vulnerable Nuclear Material Removal / Minimization



Countries Where Y-12 Has Removed Material

Removing Vulnerable Nuclear Material from Europe

Down-blending HEU to LEU for Commercial Power

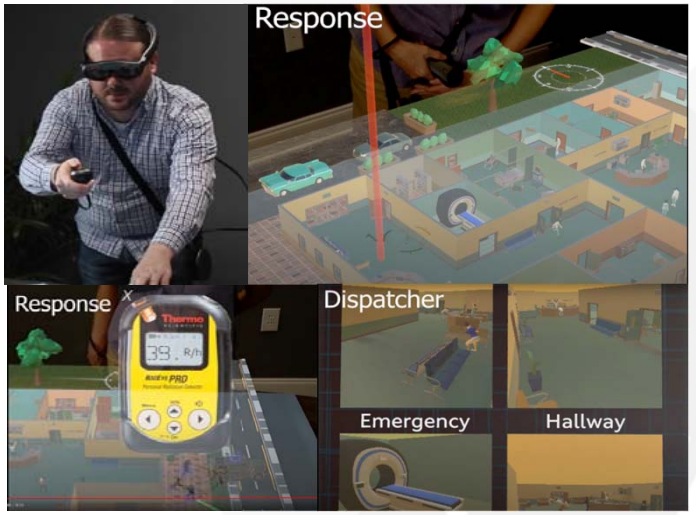
Cutthroat Trout (Nevada)

Artic Char (Alaska)

Covina Loco (Florida)

Nuclear and Radiological Material Security

- Live and Virtual Training Capabilities
- Security Response Training
- Domestic Radiological Protection
- International Nuclear Security
- Nuclear Smuggling Detection and Deterrence
- Radiological / Nuclear Detection and Response Training for Other Agencies



Augmented/Virtual Reality Training Tools

Training First Responders, Military, and Foreign Security Forces

Security Performance Workshops

Security Response Training

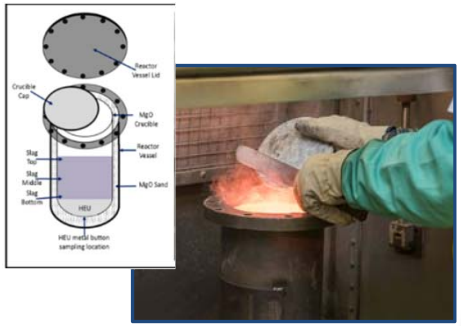
Nuclear Nonproliferation and Arms Control R&D

Leveraging current and historic Pantex/Y-12 activities, infrastructure, materials, and core competencies, which exist for our primary Nuclear Deterrent mission, to support broader nuclear security science and technology development missions within NNSA, Department of Homeland Security, and Department of Defense.

- Advancing U.S. capabilities to detect and characterize nuclear weapon development activities globally
- Supporting the development and testing of policy options and technical capabilities for international nuclear safeguards, arms control / treaty verification, nuclear export controls, and nonproliferation initiatives
- Engaging internationally to promote nonproliferation and arms control norms and best practices through bilateral and multilateral work

Pantex Monitoring Project

Seismo-Acoustic Sensing Array



Signatures from Bomb Reduction

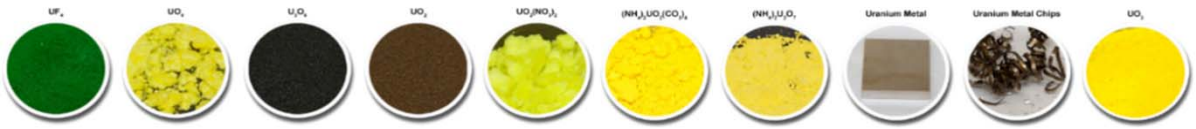
QUAD
Nuclear Verification Partnership

Nuclear Detection and Analysis

Multiple Locations Provide a Range of Capabilities which Leverage ongoing NNSA and Other Government Agency activities

- Nuclear Detection and Source Testing Center (NDSTC) Site 1:
  - Y-12 Category 2 Nuclear Facility within High Security Area
  - Access to Category I (≥5 kg HEU) and II (between 1 and 5 kg HEU) quantities of HEU
  - Active or passive measurements on 'Library of Test Objects'
- NDSTC Site 2:
  - Y-12 Development Laboratories with less restrictive areas for measuring Category IV quantities of HEU (<500 g)
  - Multiple testing and demonstration venues (e.g., laboratories, production facilities, roads, etc.)
- NDSTC Pantex:
  - Weapons Cell, High Explosives Range
  - Access to weapons and weapons components
  - Large acreage for standoff activities and leverages High Explosives Center of Excellence
- National Uranium Forensics Archive at Y-12
  - Unique uranium samples and standards for forensics
- New Brunswick Laboratory Center certified reference materials

Uranium Source Materials of Interest



B53 NELA Measurements During the Warhead Measurement Campaign

Radiological Signature Training Devices

High Explosives Range

Enrichment/Mass Standards

Nuclear Counterterrorism and Emergency Response

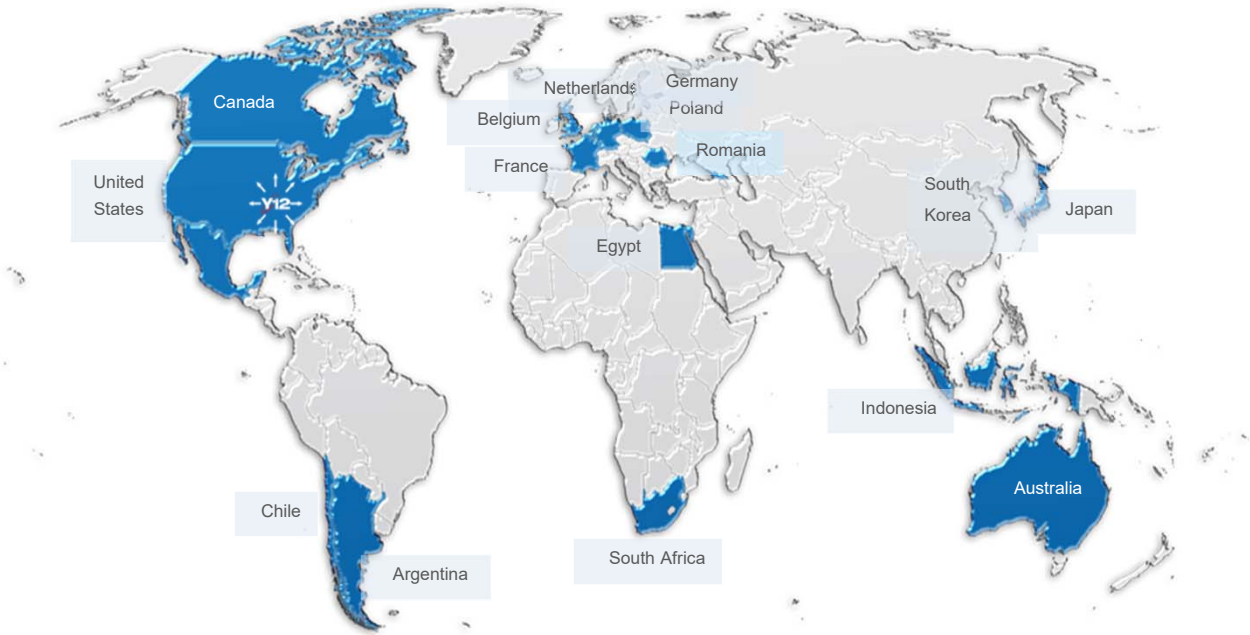
- **Support for Radiological Assistance Program, Joint Technical Operations Team, Disposition, and Accident Response Group**
- **Human capital with hands-on expertise**
  - US Weapon Assembly / Disassembly
  - Engineers & Technicians
  - Tooling Design Engineers
  - High Explosives Scientists and Engineers
- **Capabilities**
  - Hands-on Weapon Expertise
  - Hands-on Training Courses
  - Drill / Exercise Support
  - Packaging and Transportation
  - Health Physics
  - Radiological Source Support

Intelligence Community (IC) Support

The Nuclear Production Field Intelligence Element (FIE) provides intelligence support to the IC through:

- Expertise in nuclear production, security and transportation, high explosives, and weaponization of the nuclear fuel cycle.
- Subject Matter Expert Reach Back Support: Hundreds of SCI cleared SMEs with hands-on nuclear weapon production experience
- Training for the IC in nuclear weapon production, nuclear security, nuclear materials production and identification
- Provide live environment test beds for sensor testing, research & development, and training

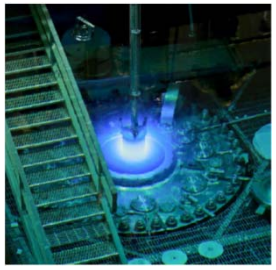
Enriched Uranium Fuel Supply



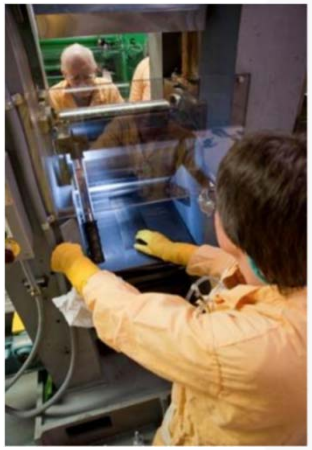
Recent and Current Fuel Projects

- HALEU Inventory Assessment
- NNSA Conversions (UMo High Density Fuel)
- Slowpoke and MNSR Conversions
- NASA KiloPower / KRUSTy Program
- Army Fast Burst Reactor Fuel Upgrade
- DoD Reactor Fuel

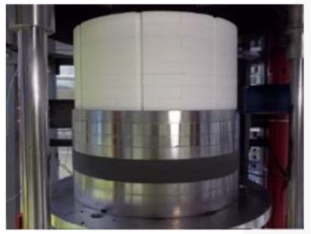
WSMR FBRU



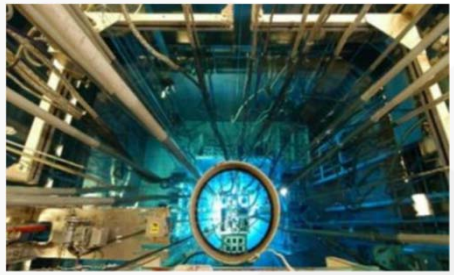
ORNL HFIR



High Density Fuel for Reactor Conversions

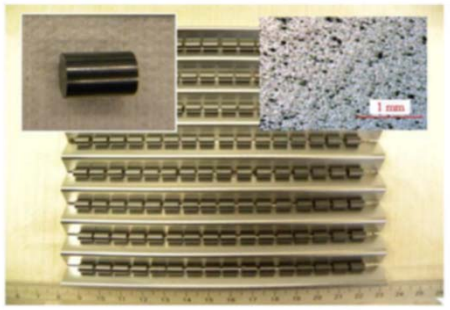


NASA KRUSTy



LEU for Isotope Production & Research Reactors

HEU for the U.S. Navy



Slowpoke UO_2 Pellets

Development, Manufacturing and Testing of High Explosives

- Over 70 Years of HE manufacturing experience
- Production of stockpile components
  - Chemical synthesis and formulation
  - Pressing and machining
  - Chemical and mechanical testing
  - Test fire and disposition
- Training and Mock materials
- Blast effects engineering and analysis
- Forensics and technical support
- Characterization and qualification
- Custom formulations, components, and shaped charges

HE Synthesis Facility

Manufacturing & Fabrication Operations for Strategic Partners

- Machine all forms of uranium and alloy components and produce classified tooling, enclosures, and graphite casting molds
- Large-scale for various government agencies
- Pantex and Y-12 maintain over 30 additive manufacturing machines for metals, polymer, and resins

Large Scale Manufacturing Capabilities

Thermoplastic AM Machines

Fabricated Metal Wire Feedstock

E-Beam Additive Manufacturing Machines

Metal AM Machines

UV Curable Resin AM Machines

Highlight Area

Oak Ridge Enhanced Technology and Training Center (ORETTC)

What is the Oak Ridge Enhanced Technology & Training Center Project?

- A Federal - State Funded Partnership of two highly specialized technology demonstration and training facilities with national-level nuclear nonproliferation, emergency, and security response experts that differentiate this campus from anywhere else.
- State-of-the-art Defense Nuclear Non-proliferation asset to demonstrate technologies and train experts in nuclear non-proliferation, nuclear security, nuclear operations, safeguards, and emergency response.
- Multi-facility project consisting of commercial grade installations, advanced digital training platforms (augmented/virtual reality), and associated field training venues.
- Initially three facilities:
  - State funded **Emergency Response Training Facility** (ERTF) ~40,000 sqft
  - Federal funded **Simulated Nuclear & Radiological Activities Facility** (SNRAF) ~35,000 sqft
  - State funded **Science and Energy Education Meeting Center** (City of Oak Ridge managed)

ORETTC Users

- ORETTC provides opportunity to strengthen our local, state, federal and international and interagency partners in security operations, nuclear nonproliferation, and emergency response
- Enhanced integrated facilities for training, testing, and new technology engagement
- Supports NNSA programs: Defense Programs, Defense Nuclear Non-proliferation, Emergency Response, Defense Nuclear Security, Counterproliferation / Counterterrorism, etc.
- Supports Strategic Partnership Programs: Department of Homeland Security, Department of Defense, Department of State, Department of Justice, and regional, state, and local emergency responders.
- Enhances engagement with academia to improve processes and facilitate innovation-based solutions and sharing of new knowledge.

ORETTC Economic Impacts

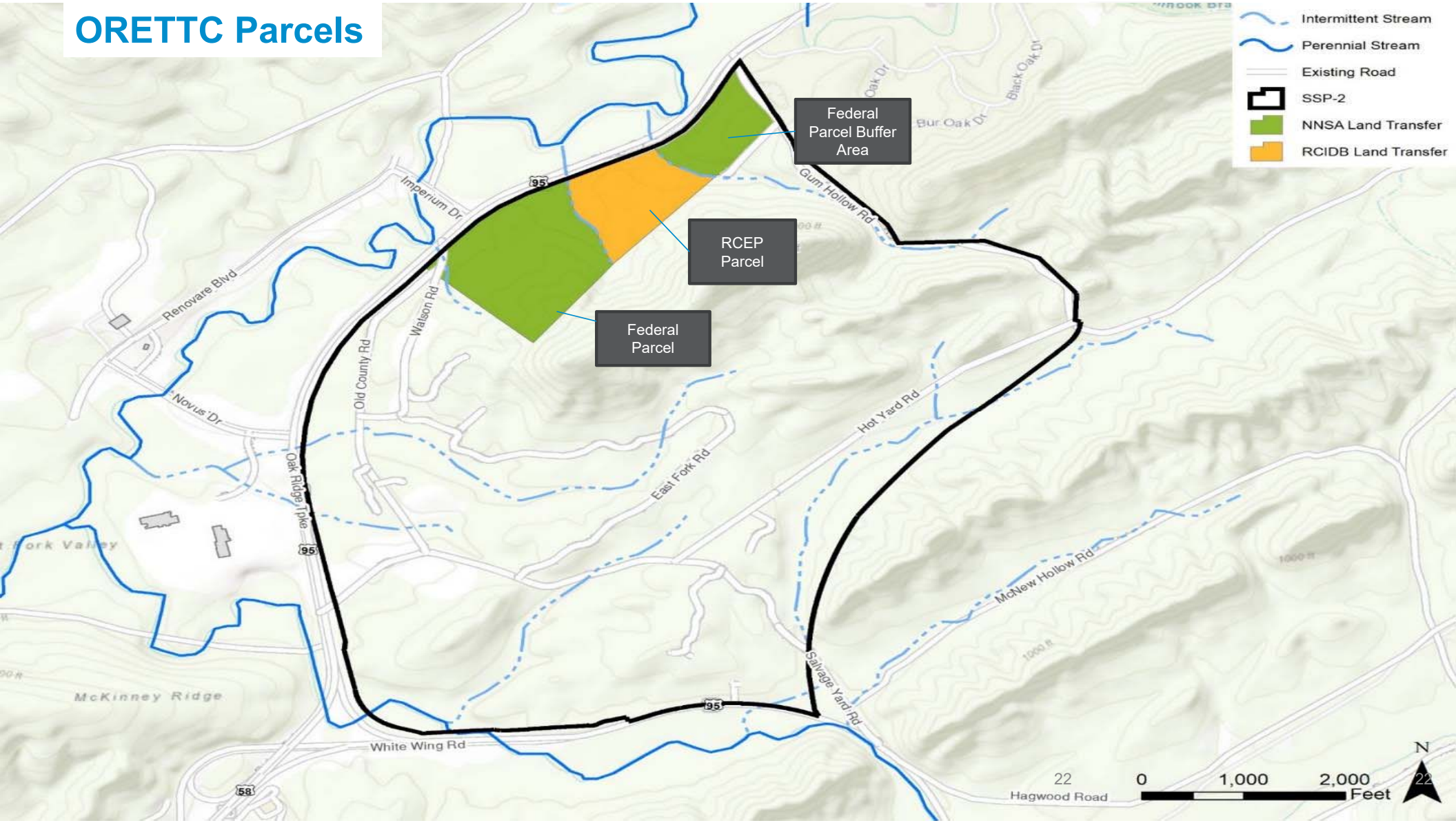
Economic benefits to the region are significant as estimated by the University of Tennessee[1]

- Construction:
  - 443 one-time construction jobs
  - $23.4M in income
  - $1.4M in state and local sales tax revenue
- Operations of the ERTF and SNRAF when activities have matured:
  - 560 ongoing jobs
  - $39.3M in annual income
  - $2.0M in sales tax revenue per year
- Visitors to the ERTF and SNRAF:
  - 36 jobs per year
  - $976K in annual income
  - $191K in sales tax revenue

[1] Extrapolated data using fewer facilities from report: *The Economic Impact of the Proposed CNS Global Security Technical Assistance Facility on the State of Tennessee;* The Howard H. Baker Jr. Center for Public Policy, The University of Tennessee, Knoxville; Dr. Matthew N. Murray, Rebecca Davis; December 11, 2017

ORETTC Facility Locations

ORETTC Parcels



Two Facilities – Integrated Campus

Simulated Nuclear and Radiological Activities Facility (SNRAF)

Northeast view of the SNRAF entrance


Northwest view of the SNRAF


Southwest view of the SNRAF

Emergency Response Training Facility (ERTF)


A view of the ERTF entrance


Courtyard view of the ERTF on the south side of the facility

Oak Ridge Enhanced Technology and Training Center

Emergency Response Training Facility

Entry View

Emergency Response Training Facility

Courtyard View

Emergency Response Training Facility

High Bay View

Simulated Nuclear and Radiological Facility

Northeast Entrance View

Simulated Nuclear and Radiological Facility

Northwest View

Simulated Nuclear and Radiological Facility
Southeast View

ORETTC Site Rough Grading Progress

Oak Ridge Enhanced Technology & Training Center
ERTF Status Update (7/15/21)

Emergency Response Training Facility

- Full State funding of $18M received of which **$15.1M** is for ERTF ($2.9M for city of Oak Ridge for meeting center)
- Design completed **March 2021**
- NNSA land transfer to Roane County ETC Project completed in **July 2021**
- Construction anticipated to start **Summer 2021**
- Beneficial Occupancy projected for **October 2022**

Schedule and cost impacts due to timing of land transfer and impacts of material and resource costs as a result of the pandemic

Oak Ridge Enhanced Technology & Training Center
SNRAF Status Update (7/15/21)

Simulated Nuclear & Radiological Activities Facility

- NNSA Defense Nuclear Nonproliferation Global Material Security funding - **$20M** ($12M in 2019, $8M in 2020)
- Environmental Assessment and a Finding of No Significant Impact published **November 2020**
- Aquatic Resource Alteration Permit/Notice of Intent/Stormwater Pollution Prevention Plan permit package approved **February 2021**
- Construction Manager At Risk contract awarded **February 2021**.
- Rough Grading underway and will complete by **July 2021.**
- 100% Design submission (re-scoped design) by **September 2021**
- Construction to begin in **Late Fall / Early Winter 2021**
- Beneficial Occupancy planned for **Fall 2022**

Schedule and cost impacts due impacts of material and resource costs as a result of the pandemic

Summary

- Long, proud history of expertise in uranium, lithium, high explosives, assembly / disassembly, and nuclear security and a vital part of today's nuclear security enterprise
- Integral role in sustaining U.S. nuclear deterrent and reducing global nuclear threats with unique security and nonproliferation research capabilities
- GSSP missions bring fresh ideas, keep our technology on the cutting edge, and challenge our workforce
- These missions bring new facilities and infrastructure and bolster the reputation of Oak Ridge, Amarillo and the surrounding regions

Any Questions?