



*Aerial of the Y-12 National Security Complex (Courtesy of the DOE).*

Sigma provides technical expertise in direct support of the national mission of stockpile stewardship:

- Los Alamos National Laboratory
- Sandia National Laboratories
- Pantex Plant
- Y-12 National Security Complex
- NNSA Headquarters Offices (NA-22, NA-122)
- USAF Nuclear Weapons Safety Center
- U.S. Air Force Global Strike Command

### Sigma Contract Vehicles

- **Technical, Engineering and Programmatic Support (TEPS) Services Blanket Purchase Agreement (BPA) III**
  - CTA Member under Contract No. 89233122ANA000017
  - January 2023 to December 2027
- **DOE Office of Nuclear Energy, Nuclear Industry Advisory and Assistance Services Support**
  - Contract No. 89243222DNE000002
  - \$49M Ceiling IDIQ
  - May 2022 to April 2027
- **Honeywell Supply Chain Management Center Strategic (SCMC) Sourcing Agreement**
  - Contract No. WS190223
  - \$225M Ceiling
  - October 2020 to September 2025

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A Nuclear Professional Services Company

# Nuclear Weapons Program Engineering

Leveraging more than 25 years of experience as a trusted provider of nuclear professional services to the federal government and prime contractors, Sigma Science has been providing Nuclear Weapons Program Engineering support support to U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA), and the Department of Defense (DoD) for Weapons and Nonproliferation programs since 1996.

Sigma provides Nuclear Weapons Program Engineering solutions through:

- Providing nuclear weapons technical advisory and assistance services
- Performing discrete tasks, studies, and projects in support of the U.S. nuclear weapons program mission
- Providing technical support services to DoD and NNSA nuclear weapon modernization and stewardship programs

### Capabilities

Founded in 1996, Sigma is a small business with more than 100 resources and access to hundreds of nuclear subject matter experts (SMEs), engineers, scientists, and professional staff.

- **Weapons Engineering**—Sigma's weapon engineers have spent their career working in and supporting the U.S. nuclear weapons modernization and stewardship programs. This includes supporting warhead maintenance and evaluation, production support, R&D, and certification activities. Sigma engineers also work closely with DOE/NNSA's M&Os in their nuclear weapons product realization efforts.
- **Stockpile Sustainment**—Sigma is supported the NNSA Defense Program's execution of the Stockpile Stewardship Program through our technical support services for NA-122.1. In this effort, Sigma engineers performed life-cycle sustainment analyses and assessments, integrated stockpile sustainment business, organizational process, and performance-based management, and stockpile operations and logistics.
- **Nuclear Weapon Surety**—Sigma supports both NNSA and DoD in their weapon surety missions, ensuring the adequate protection of the U.S. nuclear arsenal. Sigma SMEs bring decades of experience working in weapon safety, weapon security, and weapon reliability through sustainment and testing, while protecting the public health, safety, and environment from potential adverse consequences of nuclear weapon operations. From direct hands-on support for weapon sustainment to performing independent design assessments for DoD weapon storage and generation facilities, Sigma engineers are well experienced in the entire nuclear weapon lifecycle activities required to ensure unwavering weapon surety.

## Relevant Experience

### Nuclear Weapons Program Support

Sigma's weapons experts have decades of experience across the DOE/NNSA enterprise, covering the entirety of the nuclear weapons lifecycle. Our SMEs have the critical knowledge and skills necessary to support the design, development, qualification, commissioning, and decommissioning of weapons stockpile systems. Our work history supporting the DOE/NNSA and national laboratories ensure our team is able to support the identification of technical, programmatic, and management gaps and issues – while offering feasible and implementable solutions.

**USAF Nuclear Weapons Safety Center.** Sigma provides nuclear engineering and nuclear safety services under a \$2.2M, 7-year task order contract (with options), awarded in September 2020. Under the contract, Sigma provides a certified nuclear surety engineer to assist with the U.S. Air Force (USAF) Nuclear Safety Design Certification (NSDC) for nuclear Weapons Generation Facilities (WGFs) across the USAF mission. Currently, four WGFs are in various design and construction stages (i.e., two intercontinental ballistic missile facilities and two bomber facilities for nuclear asset maintenance and storage). Three additional sites are pending design over the next six years. The NSDC's role is to review design submittals and evaluate them against pre determined design requirements, ensuring facilities can perform their intended functions and missions and meet nuclear surety standards.

**NNSA NA-22.** Sigma provides nuclear non-proliferation subject matter experts to NNSA Office of Defense Nuclear nonproliferation (DNN) R&D under this 5-year, \$11.7M contract. Sigma professionals provide access to five onsite FTEs and reach back to 13 SMEs that provide input and guidance to DNN's nuclear non-proliferation research portfolio in the areas of data science, artificial intelligence, remote sensing, nuclear physics, and nuclear engineering supporting the monitoring of global nuclear arm's treaties and global foreign nuclear weapon development activities.

**NNSA NA-122.** Under this 3-year, \$41.M contract supporting the office of Nuclear Weapons Stockpile Sustainment (NA-122) Stockpile Service Division (NA-122.1), Sigma SMEs provided Weapons Life-Cycle Sustainment Analyses and Assessments, Stockpile Life Extension Planning; supported the implementation of planning, programming, budgeting, and execution (PPBE) for the multi-weapon systems and production operations work scope; and supported stockpile operations logistics in delivering limited life components, spares, support equipment, surveillance activities, and managing weapon production data. Sigma provided critical personnel resources who have special skills working with nuclear weapons programs. The NNSA recognized Sigma for having the expertise and ability to provide daily support in multiple areas. We leveraged the unique skill sets of the Sigma team members to provide training and mentoring to senior NNSA members.

**National Technology and Engineering Solutions of Sandia (NTESS), Sandia National Laboratory (SNL).** Sigma provided nuclear safety basis, criticality safety engineering, nuclear facility readiness support, systems engineering, and nuclear facility operations support to NTESS at SNL under a 4-year \$3.6M contract (October 2017 to October 2021). Under this contract, Sigma technical SMEs provided systems engineering, program management, and use control and weapons surety support. In addition, they developed robust source models that were used to predict the absorbed dose to test objects and to evaluate the impact of changes/improvements to the facilities with respect to operations, radiological environment, and operational safety perspectives.

**Ground-Based Strategic Deterrent Engineering and Manufacturing Development Program.** Sigma was awarded a \$650,000 two-year contract in November 2020 supporting Northrop Grumman's (NG) Ground Based Strategic Deterrent (GBSD) Engineering and Manufacturing Development program. The contract scope required the development of a Nuclear Surety Management Plan, an associated Nuclear Surety Technical Requirements Document, and a Nuclear Surety Evaluation Plan. Additional contract requirements include portioning GBSD hardware and software into functional subsystems required to facilitate the evaluation of nuclear safety design certification criteria compliance and other design certification facets (e.g., safety design, compatibility, technical orders, Weapon System Safety Rules). Documentation requirements include a Certification Requirements Plan and a Nuclear Safety Analysis Report for each technical analysis.

**US Air Force Global Strike Command—On-Site General Engineering Management and Advisory Support and On-Demand Engineering Design Firm Services for Design Reviews.** Sigma provided engineering management, advisory support, and on-demand engineering services under a \$900,000 two-year contract, awarded in September 2020. The contract was with the U.S. Air Force Global Strike Command Office of Civil Engineering (AFGSC/A4C) at Barksdale Air Force Base (AFB) in Louisiana. The primary contract scope called for facilitating planning, developing, and integrating nuclear weapon generation facility, infrastructure, and operational engineering requirements to support AFGSC's and the Air Force Nuclear Enterprise's long-term plans and strategies. In providing On-Demand Engineering and Design Firm Services, Sigma assisted in reviewing nuclear essential system designs for nuclear weapon generation facilities to verify engineering analysis and calculations and compliance with regulations.