



BIOLOGY R&D



CHEMISTRY R&D



DESIGN & DEVELOPMENT



INTEGRATION & TESTING



PRODUCTION



OPERATIONS & TRAINING

Corporate Core Competencies & Capabilities

Joint Enterprise-Research, Development, Acquisition, and Production/Procurement (JE-RDAP)

signature
science LLC[®]

Submitted to:

Joint Program Executive Office for Chemical and Biological Defense (JPEO-CBD)

December 4, 2017

Company Overview

SUMMARY

Signature Science, LLC (SigSci) will provide the Joint Program Executive Office for Chemical and Biological Defense (JPEO-CBD) with high quality services supported by deep scientific expertise, solid corporate infrastructure, and proven development processes. SigSci has provided these services for over 16 years to the Department of Defense (DoD), Department of Homeland Security (DHS), and the Intelligence Community (IC).

Engineering, Manufacturing, and Laboratory Locations:

- Austin, Texas
- Charlottesville, Virginia

Signature Science (SigSci) is a scientific consulting and services firm that provides government and commercial clients with a wide array of CBRNE-related solutions and technologies. SigSci combines scientific rigor with proven quality assurance (QA) processes to deliver well-executed projects and programs. SigSci's corporate expertise includes full life cycle program management, signature analytics, algorithm development, analytical chemistry, biology, CBRNE threat materials science, biosurveillance, forensics, QA, statistics, and design, engineering, and fabrication of sample collection and detection devices. SigSci's extensive history as a prime contractor and subcontractor on numerous research, development, test, and evaluation (RDT&E) and low-rate production programs positions SigSci to provide the leadership, scientific and engineering expertise, and detailed program management needed to successfully execute the Joint Enterprise-Research, Development, Acquisition, and Production/Procurement (JE-RDAP) program and associated tasks for the JPEO-CBD.

SigSci's matrixed organizational structure and management approach is ideally suited to the process of assembling all the right resources to efficiently and effectively manage and execute tasks under the JE-RDAP IDIQ. SigSci's IDIQ Program Manager (PM), will draw technical resources from across our unique, multidisciplinary team of chemists, biologists, engineers, statisticians, data scientists, QA auditors, and former military operators – all of whom possess highly relevant programmatic or field experience directly applicable to the JE-RDAP IDIQ. Work will be supported by dedicated administrative specialists from contracts, subcontracts, purchasing, accounting, property management, and security. As necessary, the PM will supplement the core SigSci team by drawing on a robust network of consultants and industry teammates from both large and small businesses. This flexible teaming approach will ensure that all facets of the Defense Acquisition Cycle are satisfactorily addressed. This is the same proven business model that SigSci has used to ensure success on hundreds of contracts over the past 15 years.

Our approach on future JE-RDAP orders will include the following:

- **Highly Qualified Personnel** - Assembling and sustaining highly qualified SMEs and management staff with experience on successful CBRNE research, development, and production programs.
- **Partner and Supplier Integration** - Inclusion of known experts from SigSci's network of partners and suppliers offering discriminating technology and complementary expertise.

- **Intelligent Scheduling** - Detailed Work Breakdown Structure (WBS) and Integrated Master Schedule (IMS) including all milestones, deliverables and tasks required for task execution.
- **Milestones and Compliance** - Planning that emphasizes tasks required to achieve acquisition milestones and 100% compliance with requirements.
- **Sophisticated Project Management** - Proven SigSci management practices for effective program execution, including program management and cost control, subcontract management, risk and opportunity management, and configuration management.
- **Modularity and Flexibility** - Spiral development approaches that maximize modularity and flexibility, focusing on achieving key performance parameters to ensure milestone decisions are achieved.
- **Robust Communication** - Clear and robust communications that include all stakeholders, beginning at the requirements gathering stage, and carrying through technology maturation, engineering manufacturing design, production, and deployment.

Demonstrated Past Performance

SUMMARY

SigSci's past experience in the management and execution of phased product development – consistent with DoD 5000.2 for RDT&E, design, integration, fielding, and support of CBRNE systems – ensures successful transition of products and capabilities to meet JPEO-CBD's needs.

SigSci's core competencies encompass applied RDT&E, design, development, and integration, combining scientific and engineering rigor with proven processes to deliver CBRNE systems and capabilities that will exceed JPEO's expectations. SigSci has the facilities, management structure, accounting, operational and property controls, technical skills, QA measures, and safety compliance to execute all facets of RDT&E through low rate initial production. From there, SigSci has an extensive network of transition partners prepared to meet JPEO's full rate production needs, and we will bring these capabilities to bear on JE-RDAP orders as necessary. Over the past 7 years, SigSci has executed 417 individual contracts totaling \$231M dollars supporting the IC, DoD, DHS, and commercial clients. These diverse contracts span the full defense acquisition life cycle, including technology maturation, risk reduction, engineering, manufacturing development, production, deployment, operations, and support.

Program Name	Client	SigSci's Support of Each Program	AoA	R&D	HW Design	SW Design	Manufacture	Integration	Testing	Training	QA/QC	System Eng.	Risk Mgmt.
NGCD	JPEO	Technical Maturation/Risk Reduction (TMRR) for the Next Generation Chemical Detector Platform/ Site Air monitor (PSAM) to develop a man-portable system for detection, identification, and quantitation of aerosol and vapor hazards. Included the development, design, system engineering, and integration efforts needed to build and test one Breadboard, two Brassboards, and five final Prototype Systems.			✓	✓	✓	✓	✓	✓	✓	✓	✓
CBRNE QA	JPEO/DHS	Provided QA support to the BioWatch Program, the JPEO-CBD, and the National Guard Bureau Civil Support Teams, to ensure complete and accurate detection and identification of CBRNE agents through proficiency testing and the implementation of quality systems.	✓			✓			✓	✓	✓		
GBTI	JPEO	Provided system architecture expertise across six system functional areas (i.e., System Design, Policy, Sample Collection, Assay Development, Sequencing and Bioinformatics, and Network and Data Sharing) to enable the compression of discovery-to-decision through a globally-distributed, fully-integrated and networked state-of-the-art analytical capability for biological threats.	✓					✓	✓		✓	✓	✓
MS-DADT	JPEO	Delivered a mass spectrometer detector architecture study and analysis of alternatives for presumptive field identification. Developed detection algorithm integrating first principles to identify compounds based only on chemical structure, without explicit experimental data. The MS-DADT prototype software demonstrated the identification of >100 compounds, and is programmed to identify >1,000 compounds with the ability to expand several orders of magnitude further.	✓	✓		✓	✓	✓	✓		✓	✓	
API-MS	JPEO	Subcontract to FLIR to design and manufacture prototypes of the ruggedized, field-deployable atmospheric pressure ionization mass spectrometers. Transitioned operational SOPs.			✓			✓	✓	✓		✓	✓
TrueScent	COTS	Developed TruScent K9 Training Aids – a product line of non-explosive scent training aids product line for use in training explosives detection dogs. Over 10k TruScent aids and accessories have been sold to date.		✓	✓		✓		✓	✓	✓		
LESS	COTS	Logistically Enabled Sampling System (LESS) is a software-controlled, active sorbent tube sampler that collects up to 28 discrete samples at 5-1000 ml/min. Over 60 units sold commercially.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Jack Rabbit	DHS	Developed 16 bulk chlorine gas sampler and sensor combination based on commercial off-the-shelf (COTS) spectroscopy analytical methods and JAZ gas sensor.	✓	✓	✓		✓	✓	✓				

Table 1: Examples of SigSci Previous Experience Relevant to JE-RDAP. SigSci's relevant experience will keep JPEO a leader in delivering cutting-edge technologies consistent with Defense Acquisition System processes.

Exclusive to SigSci is our Quality Assurance program which provides services to both fixed and mobile laboratories operated by DoD, DHS Office of Health Affairs (OHA), Weapons of Mass Destruction (WMD) Civil Support Teams (CSTs), and other federal laboratories. SigSci currently develops, implements, and maintains customized QA programs specifically for CBRNE laboratory missions. These programs build upon and complement existing quality procedures and international quality standards such as ISO 17025, ISO Guide 34, and ISO 9001. SigSci began providing QA and quality control (QC) support for the JPEO-CBD in 2003, working hand-in-hand with the Government. The initial program supported the Joint Services Installation Pilot Project laboratories and a single National Capital Region laboratory. Now, the program serves the QA/QC needs of the DHS National Guard Bureau (NGB) WMD CSTs. The JPEO-CBD QA program was recognized as a model in the CBRNE community for its demonstrated technical effectiveness and high degree of inter-agency coordination.

Capabilities and Expertise to Meet Emerging Needs

SUMMARY

SigSci will advance JPEO-CBD mission effectiveness by protecting warfighters, and preventing or mitigating surprise. The modularity built into our approach means our resources can be rapidly reconfigured to meet new and emerging mission needs. The result is effective, practical, and reliable multi-purpose joint solutions.

Technologically, SigSci's long-term support of the IC means we can bring a unique set of skills to JPEO-CBD RDT&E activities, which leverages our real-time experience in the operation of forward deployed laboratories and the training of specialized CBRN collection teams. Our staff is well versed in the past, current, and emerging threat environment, allowing us to anticipate future threats and consider them in the design of SW/HW systems. Today the world is facing an ever-expanding number of emerging threats and intermediates, which will challenge the capabilities of existing collection and detection systems. Our deep expertise allows us to adapt existing technologies to address these threats. We are able to quickly move through the acquisition process and into the field with well-designed, agile warfighter solutions.

SigSci also brings unequalled experience in data analytics, signature analyses, chemometrics, and the integration of disparate data streams that must be leveraged to effectively address JPEO-CBD's most difficult detection challenges. With advancements in cloud-based computing and machine learning, there are now additional opportunities to network sensors together into system-of-systems configurations that will dramatically improve the knowledge that can be gained from the sensors.

New approaches to address warfighter challenges include:

- **Library-less Detection Software** - Applications to algorithmically deduce the most likely analyte(s) for presumptive field-level analysis. The software adaptively learns from available data, determining the most likely spectral

pattern and derives putative spectra for related compounds based on structural similarities. The machine learning logic provides the best detection available, enabling presumptive identification without the need for a prior knowledge of threats or existing library entries.

- **Disruptive New Technologies** - Development of new technologies focused on collection and detection to address emerging threats while decreasing size, weight, power, and logistical support requirements. Examples include a hand-held detector technologies, low-pressure drop high flow rate sampling systems, and unique sorbent structures to create coiled ribbon collection devices which can achieve a 50,000-fold increase in analyte concentration.
- **Data Fusion Strategies for Mitigating Surprise** - Use of machine learning and Bayesian logic to combine orthogonal sensor technologies (such as FT-IR, Raman, and MS) to improve probability of identification and reduce false alarms.
- **CBRNE Threat Detection Gateway** - Use of a distributed platform (i.e., cloud-based computing) to enable scalable integration of any analytical instrument with secure data transfer (e.g., end-to-end encryption) to remotely monitor instruments, execute on-board detection, or a combination thereof.
- **Sequence to Functional Assessment of Threats (S2FAST)** - Integration and optimization of complementary bioinformatics tools and databases needed to perform rapid sequence and protein structure comparisons to more accurately assess the threat potential of known and unknown functional elements in naturally occurring or intentionally modified organisms.

Facilities, Personnel, and Transition Partners

SUMMARY

SigSci has strong internal research, development, design, and manufacturing capabilities that can be augmented through an extensive network of partners, teammates, and contract manufacturers for larger scale production.

To support JPEO-CBD activities and needs, SigSci maintains over 15,000 sq. ft. of laboratory and engineering space for forensic, biological, and chemical research and development at its Austin, TX headquarters with an additional 22,500 sq. ft of space in Charlottesville, VA. All lab areas have restricted access and includes workshops for engineering and laboratory research requiring additional security precautions up to the SECRET level. Chemistry support is performed in dedicated synthetic and analytical chemistry laboratories with over 2,500 sq. ft. of space making syntheses possible on scales from a few milligrams to kilograms. The SigSci analytical chemistry laboratories are equipped with state-of-the-art instrumentation, including ICP-MS, GC-MS single and triple quadrupoles, UHPLC High-Res MS spectrofluorimeters, FTIR and UV-Vis spectrophotometers. The SigSci Manufacturing and Testing Center in Charlottesville, VA has space for delivery, storage, administration, and training. The Center has 8,000 square feet of manufacturing space to support assembly and design activities.



SigSci has extensive testing and evaluation capabilities with the ability to test sensors and provide training courses using many materials that cannot be readily utilized at other facilities. SigSci has an ATFE license/permit at both its Austin, TX and Charlottesville, VA facilities (5-TX-453-20-5L-01392 and 1-VA-003-20-5L-00846) to manufacture, handle, and store explosives. SigSci also has an analytical license to purchase, store, analyze, and conduct small-scale synthesis of Drug Enforcement Agency (DEA) Schedule 1-4 controlled substances. Mature Standard Operating Procedures (SOPs) for the manufacture of each explosive and controlled substances have been validated in our laboratories and vetted over more than nine years of research and development activities and training courses.

SigSci has chemists and engineers with expertise in custom test fixture design, custom instrumentation design and construction, ranging from sensors and samplers to novel mass spectrometers. SigSci has developed engineering practices for the design, development, modification, and/or construction of any laboratory equipment and instrumentation. These practices includes draft manufacturing process flow plans, bills of materials, engineering design such as CAD drawings and electrical schematics, and assembly and operating instructions. SigSci's design and fabrication laboratory is equipped with a FDM 3D printer for rapid prototyping and electronic assembly/soldering stations. SigSci has licenses to LabView, Solidworks, SAS, and MATLAB and extensive experience developing custom instrumentation control interfaces and data acquisition modules.

SigSci's historical activities have primarily focused on early acquisition phases including R&D, TMRR, and Engineering, Manufacturing, and Development (EMD) activities, and performing low quantity manufacturing internally with our LESS and TruScent products. When programs reach production levels that exceed the internal capabilities of SigSci's manufacturing, we actively seek out partners to transition solutions and products to support production. SigSci has an extensive and dynamic network of partners and teammates spanning all CBRNE-related disciplines. SigSci will leverage this network to align the best, most suited partner for the transition of larger volume products.

Conclusion

SigSci is well positioned to provide JPEO-CBD with high quality research, development, production, and fielding of CBRNE defense systems by applying expertise, infrastructure, quality processes, and mission insight gained over 15 years of fielding experience. This experience uniquely positions SigSci to advance the warfighter's mission effectiveness by providing practical and reliable multi-purpose products with agile modularity that can be tailored to meet new and emerging mission needs.

Signature Science LLC

HEADQUARTERS
8329 North Mopac Expressway
Austin, TX 78759

WASHINGTON DC OFFICE
2111 Wilson Blvd., Suite 340
Arlington, VA 22201

Danielle N. Dickinson-McNeill

JE-RDAP Program Manager
512-583-2441
703-220-7608 (M)
ddickinson@signaturescience.com

Eve Compton

JE-RDAP Contracts Specialist
512-583-2366
ecompton@signaturescience.com

Brian Schimmoller

Vice President, Business Development
512-533-2019
512-771-3513 (M)
bschimmoller@signaturescience.com