A White Paper Prepared for the US Army Corps of Engineers

Management of PFAS-Impacted Soil in Support of Military Construction Nationwide

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Prepared and Offered By:

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ANC 8(a)
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ACRONYMS AND ABBREVIATIONS

ADEC	Alaska Department of Environmental Conservation
AFB	Air Force Base
AFCEC	Air Force Civil Engineer Center
ANC	Alaska Native Corporation
Brice	Brice Engineering, LLC
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	contaminants of concern
CLs	cleanup levels
DoD	Department of Defense
EAFB	Eielson Air Force Base, Alaska
GIS	geographic information system
J&A	justification and approval
JBER	Joint Base Elmendorf-Richardson, Alaska
JBLM	Joint Base Lewis McChord, Washington
MILCON	military construction
NDAA	National Defense Authorization Act
O&M	operations and maintenance
PA/SI	Preliminary Assessment and Site Inspection
PDT	project development team
PFAS	per- and polyfluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PMO	Project Management Office
POL	petroleum, oils, and lubricants
QA/QC	Quality Assurance and Quality Control
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
SOW	Scope of Work
SRM	sustainment, restoration, and modernization
UFP-QAPP	Uniform Federal Policy for Quality Assurance Project Plan
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force

EXECUTIVE SUMMARY

This white paper, developed by Brice Engineering, LLC (Brice), presents our recommended approach to address the presence of per- and polyfluoroalkyl substances (PFAS) contamination in soil and water encountered during military construction (MILCON) projects. Our approach incorporates key lessons learned from multiple major and minor MILCON and sustainment, restoration, and modernization (SRM) construction programs. The Brice approach includes retaining a single environmental team to manage all contaminated soil and water generated during construction, with a key focus on pre-construction site characterization through on-site treatment and/or transportation and disposal. This approach has multiple benefits to the government, and when fully implemented it:

Streamlines the Process:

Provides a single point of contact for contaminated media issues and minimizes potential impacts to construction program and project schedules

Reduces Risk:

Minimizes the inherent project and program risks through centralized tracking of source and waste data as well as diligently tracking regulatory and work plan requirements

Saves Cost:

- Eliminates duplicate contract administration costs for environmental tasks by allowing consolidation of soil management and stockpiling, on-site soil treatment, beneficial re-use of treated materials during construction, and centralized manifesting and disposal of contaminated media
- Reduces long-term life cycle costs commonly found when soil is placed in long-term stockpiles by preparing an upfront characterization and management plan
- When implemented with upfront treatment such as soil washing, reduces impacted soil volume by 70 - 90%, providing the benefit of both:
  - Reducing the total volume of soil to be managed in stockpiles, which further reduces the amount of real estate needed to set aside for stockpiles and soil management
  - Treated soil may be reclaimed and re-used during project construction. Soil washing can also act to sort soil grain sizes for suitability as structural and other fill types to be used during construction, adding a ***Green and Sustainable*** solution to the MILCON project.
- Utilizes proven water treatment technologies for potential MILCON construction dewatering that can be efficiently coupled with a soil washing plant for additional cost savings and consolidated waste stream management
- Eliminates long-term impacts on agency staff and other resources being burdened with engagement of multi-year and multi contract funding and awards to capture stockpile Characterization, Segregation, operations, and maintenance (O&M), and eventual transport and disposal or other means of treatment technology

To further streamline the process Brice recommends the ***Alpha Contracting*** process, reauthorized under Section 802 of the 2020 National Defense Authorization Act (NDAA), in which the contractor is retained

in the planning phases of the contract, thus acting as a key member of the Department of Defense (DoD) project development team (PDT). The Alpha Contracting process can be achieved readily for projects of this magnitude utilizing Section 823 of the 2020 NDAA increase of the threshold for justification and approval for 8 (a) Program sole-source awards. While the 2010 NDAA required justification and approval for 8 (a) Program sole-source awards valued at or above $20 million (later increased to $22 million), Section 823 of the 2020 NDAA increases this threshold to $100 million. As a member of the PDT, we could base our support out of either the Brice headquarters in Anchorage, Alaska, or the nearest Brice office. With professional and technical support staff located nationwide, Brice would customize our team and services in whatever manner needed to support the urgency and demands of the project.

1.0 INTRODUCTION

Our deep history and experience in the management of contaminated soil, surface water, and groundwater associated with construction projects means Brice is uniquely and expertly qualified to assist the U.S. Army Corps of Engineers (USACE) and other DoD agencies in the execution of their projects.

From our founding as an Alaskan construction company in the late 1950s, Brice has specialized in planning and executing large-scale construction programs with challenging schedules and complex logistics. With over 40 years of experience working with USACE, we have demonstrated success and excellence in projects ranging from heavy civil site preparation and vertical and horizontal construction to small- and large-scale, complex environmental remediation.

Most relevant to this task, senior Brice personnel were directly involved in planning and trusted to implement the programmatic management of PFAS-contaminated soil and groundwater during the $600M F-35A beddown at Eielson Air Force Base (EAFB), Alaska, and the management of PFAS contaminated-groundwater during the $80M emergency repair of the McChord Field runway at Joint Base Lewis-McChord (JBLM), Washington.

Brice believes that putting our depth of experience, industry-leading knowledge in this field, and our unrivaled internal experts at the disposal of USACE will not only streamline processes, but also reduce overall risk to construction projects where PFAS contamination is known or suspected. Ideally through an ***Alpha Contracting*** process, we could leverage this expertise to expedite an executable and efficient scope and design platform that will address the complex PFAS-contaminated soil and groundwater issues. We understand the importance of timely execution of MILCON projects and want to support this mission by offering collaborative solutions before impacted media is encountered and potentially stalls a project.

Alpha Contracting**,** as reauthorized under Section 802 of the 2020 NDAA, is an innovative acquisition technique that allows the stakeholders and contractor to closely collaborate while developing a Scope of Work (SOW) and negotiate project costs (Secretary of Defense Memorandum *Incentive Strategies for Defense Acquisitions,* 05 January 2001). It also allows for faster contract awards than a traditional sole-source contract. In this scenario contractors work jointly with the government on the technical requirements to be included in the SOW. Advantages include less time to issue and award a contract, a better buyer-seller relationship, and a developed teaming relationship that results in both reduced risk to the government and a jointly negotiated fair and reasonable price (*A Chance to Alpha-Innovate in Program Management*, Defense Acquisition Magazine, May-June 2014). As an Alaska Native-Owned 8(a)

Corporation (ANC), Brice is eligible for sole source contracts. Under Section 823 of the 2020 NDAA, no justification and approval (J&A) is required for DoD-awarded sole-source 8(a) contracts up to $100M, and sole source awards to an ANC 8(a) cannot be protested (Title 13 of the Code of Federal Regulations [CFR] Part 124.517[a]).

Combined, our specialized expertise and experience in managing PFAS impacts during construction, strategic partnerships with firms on the front lines of DoD PFAS issues, and a suite of complementary technologies that span PFAS services from excavation through on-site PFAS destruction ensure we deliver the highest quality results.

2.0 THE BRICE APPROACH

Traditionally for a construction program such as an F-35A beddown, each construction contractor is responsible for environmental services to support their project, which leads to duplication of effort and shifts the responsibility for coordinating environmental activities on individual projects to the government. Brice proposes a different approach for managing PFAS contamination encountered during MILCON projects. Based on our team's successes and lessons learned at EAFB, including feedback from other government and public stakeholders we have worked with during the F-35A beddown at that installation, we recommend having a single environmental contractor responsible for:

- Developing a programmatic management plan for contaminated soil, surface water, and groundwater across all construction projects in consultation with sponsor and regulatory stakeholders
- Providing direct oversight and quality control for construction dewatering and soil excavation and segregation activities
- Treating wastewater generated by construction stormwater across contaminated soil and excavation dewatering at project sites with contaminated groundwater (if required after agency negotiations)
- Taking custody of soil at designated stockpile area(s), including constructing and managing associated stockpiles
- Supplemental characterization of segregated soil (if required)
- Soil treatment and disposal, including:
  - On-site treatment when appropriate (e.g., soil washing of PFAS-contaminated soil)
  - Manifesting and transport to off-site treatment and/or disposal
    - Soil exceeding Resource Conservation and Recovery Act (RCRA) or equivalent state cleanup levels (CLs)
    - Soil exceeding Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or equivalent state CLs
    - Soil exceeding applicable state CLs for contamination from petroleum, oils, and lubricants (POL)

Based on our lessons learned from EAFB, having one environmental contractor managing contaminated media from cradle to grave provides the following benefits to the government:

- Streamlines processes
  - Provides single point of contact for contaminated media issues
  - Minimizes potential impacts to program and project schedules
- Reduces inherent risks

- Eliminates miscommunication associated with transfer of analytical or source data between contractors
- Centralizes tracking of regulatory and/or work plan requirements
- Single transfer of custody for soil between construction contractor and Brice

- Reduces costs
  - Eliminates duplicate contract administration costs for environmental tasks
  - Reduces duplication of efforts through multiple contractors
  - Eliminates the potential of inserting vague SOW into a MILCON Design Build project, which we have observed to lead to Prime Contractors putting a minimal effort to support the environmental unknowns of the project. This commonly leads to project delays and disputes that may be avoided.
  - Consolidates soil stockpiling, treatment, and disposal requirements
    - Otherwise spread out among multiple construction contractors
    - Less opportunity to negotiate bulk unit rates
    - Services generally performed under subcontract, increasing mark-up
  - Volume reduction of contaminated soil
    - Direct transfer of soil from excavation to on-site treatment
      - Reduces pre-treatment stockpile footprints and double handling
    - On-site soil washing substantially reduces volume of contaminated soil
      - Clean aggregate can be re-used on construction projects
      - Smaller stockpile footprints and volumes for transport to secondary treatment or disposal

We envision the effort would be approached in three different phases, as discussed in the following pages.

2.1 Phase I – Program Planning

Phase I involves pre-construction planning, environmental data gap review, supplemental site investigations (if required), and assistance to USACE in developing associated requirements for inclusion in the construction (both MILCON and SRM) contracts. Phase I activities would ideally be conducted concurrent with the MILCON design phase in order to eliminate the potential for schedule impacts. The information gathered would both inform design and contract requirements and be used to scope the requirements and negotiate pricing associated with Phase II (construction) activities.

> **"Effective upfront project planning allowed for a timely, high-quality project that was within budget. The contractor [Brice] performed and managed work effectively in order to increase productivity and allow more work to be completed in the short Alaskan field season."**
>
> **-Robert A. Glascott, COR**
> **USACE AK**

- Evaluate the need to conduct Supplemental Site Investigations to address data gaps
  - Review environmental data from existing environmental investigations (e.g., Preliminary Assessment and Site Inspection [PA/SIs] and Remedial Investigations [RIs]) for project sites to determine potential need for additional investigation

  - Review environmental data from soil cores and water collected during geotechnical investigations at each project site during project design
  - Based on results, potentially collect supplemental sampling data during project design to refine or close data gaps and define soil segregation areas within the construction footprint of each project
- Use site data to establish and mark in situ soil segregation boundaries based upon contaminants present and waste characterization hierarchy (RCRA, CERCLA, PFAS, POL, Clean)
  - Boundaries incorporated into soil management work plan and Uniform Federal Policy for Quality Assurance Project Plan (UFP-QAPP)
  - Provide 3-D boundary and excavation footprints in geographic information system (GIS) and AutoCAD formats for design and construction contractor use. This data would allow the contractor to efficiently excavate materials without the delays typical of an environmental-driven excavation that requires a scientist to screen and direct soil removal. The impacted media would be incorporated into the construction plans for separate deposition and/or treatment, similar to how overburden spoils would be managed by the contractor.
  - Calculate volume estimates by project site and contaminants of concern (COCs) to be used both for MILCON design and contract requirements and for programming/funding Phase II
- Assist with negotiating construction dewatering approach with regulatory agencies. Recommend presenting 3-option approach below:
  - Normal operations if no groundwater contamination occurs at project site
  - Discharge groundwater to an area of equal or higher contaminant concentration, if possible
  - Treat wastewater from construction dewatering to applicable regulatory CLs prior to discharge, if required
- ***Develop programmatic dewatering plan*** based on agreement with regulatory agencies, with clearly identified requirements and templates for construction contractors to use
- ***Develop programmatic work plan*** and UFP-QAPP for management of soil resulting from construction projects
- Work with USACE to customize contract specification and develop contractor compliance tools
- Scope and negotiate Phase II activities with USACE based on final soil segregation quantities, dewatering approach and estimates, and approved programmatic work plans

2.2 Phase II – Project Planning and Construction

Once construction contracts begin to be awarded, Brice would begin interfacing with project-specific DoD and construction contractor representatives for the execution of the individual construction contracts. Phase II activities would include the following post-award activities:

- Pre-Construction
  - Participate in planning charrettes (if design-build) and/or other pre-construction meetings

  - Construct centralized soil stockpile facilities in designated area(s) at the affected facility
- At Construction Site
  - Monitor dewatering, excavation, and soil segregation activities
  - Treat wastewater from dewatering activities (if required)
- At Centralized Soil Stockpile Area(s)
  - Accept soil direct from site excavation (transfer of custody)
  - Segregate, construct, and maintain pre-treatment contaminated soil stockpiles
  - Process, coordinate manifests, and ship RCRA- and CERCLA-contaminated soil for treatment and disposal
  - Process, coordinate manifests, and ship POL-contaminated soil for treatment and disposal
  - Conduct soil washing operations of PFAS or comingled PFAS/POL soil on site to reduce volume of PFAS soil requiring secondary treatment or disposal
    - Treated soil meeting applicable CLs provided to construction projects for beneficial re-use
    - Treat soil still exceeding applicable CLs at an on-site secondary treatment platform approved by stakeholders
    - Addition of stabilization agent to fines if required to meet applicable leachability standards
- Process, coordinate manifests, and ship any PFAS-contaminated soil still exceeding applicable CLs for treatment and disposal based on guidance in place at the time of the project

2.3 Phase III – Restoration and Reporting

Following the treatment and/or shipment of all soil, Brice would return the centralized soil stockpile/processing area(s) to their pre-project condition or other condition identified under the Alpha Contract. This may include activities such as post-project sampling, grading, seeding, or paving.

> **"The Brice team was responsive, extremely flexible, and easy to work with. They get the job done efficiently and effectively in spite of rapidly changing requirements and site conditions."**
>
> **Michael Boese, AFCEC/CZOP, Restoration Project Manager, EAFB**

Brice would prepare monthly reports that include quantities of water treated and quantities of soil stockpiled, treated, and disposed of, and that include copies of all manifests and certificates of treatment or disposal received during that time period. If required by the regulatory agencies and/or desired by the USACE, Brice would prepare a comprehensive report at the end of the soil management activities that includes all applicable weight tickets, manifests, and certificates.

3.0 WHY BRICE?

Brice provides USACE with a powerful combination of elements that create success. Combined, our key personnel with specialized expertise managing PFAS impacts during construction, our strategic partnerships with firms on the front lines of DoD PFAS issues, over 30 years of soil washing experience that includes treatment of PFAS, and a suite of complementary technologies that span PFAS services from excavation through on-site PFAS destruction ensure we deliver the highest quality results.

3.1 Key Personnel

Since 2015, the Brice PFAS Team has worked closely together to address PFAS issues for USACE and the U.S. Air Force (USAF), including active involvement in the $600M EAFB F-35A Beddown Program, which included a combination of MILCON, minor MILCON, and SRM projects. These team members include:

Steve Becker, CEP, Program Manager

- Over 30 years of public and private-sector experience in environmental remediation and construction
- Former Air Force Civil Engineer Center (AFCEC) Restoration Team Lead for EAFB
- Environmental Representative to the F-35A Project Management Office (PMO)
- Directly led PFAS response strategy for the F-35A beddown at EAFB

Gary Fink, REM, Senior Technical Advisor

- Over 24 years' experience as a civilian environmental professional for the USAF
- Former Chief of Environmental Restoration at Joint Base Elmendorf-Richardson (JBER) and EAFB

Leah Waller, Senior Project Manager

- Over 24 years of experience in investigation, risk assessment, and remediation, including 5 years managing PFAS-specific projects for 66 sites
- Led USAF PA/SI efforts for 4 geographically separate airfield facilities in Alaska, including EAFB

Marcus Hobbs, Program Construction Manager

- Over 22 years construction management experience for both the public and private sectors, completing all projects to date with zero recordable or reportable safety incidents
- Manages Brice's design-build construction programs at Eareckson Air Station ($106M to date) and Wake Island Airfield ($64M to date), both of which include projects with PFAS-impacted soil and/or groundwater

James Perlow, PE, PG, Program Engineer

- Over 18 years of experience in the design and construction of water and wastewater treatment systems, including over 5 years with PFAS treatment systems
- Field Engineer/Site Supervisor for eight PFAS groundwater treatment systems for Defence Australia; a groundwater treatment system at Cannon Air Force Base (AFB), New Mexico; and the PFAS soil washing pilot study at Peterson AFB, Colorado

Corey Schwabenlander, PG, Program Geologist

- Hydrogeologist with more than 20 years of professional experience, including 6 years of managing investigations of PFAS-impacted sites, including EAFB
- Deputy PM and Quality Assurance and Quality Control (QA/QC) Manager of the RI for SS035, Garrison Slough Pond, at EAFB, which included PFAS as COCs

Victoria Pennick, Program Chemist

- Over 30 years of experience as an environmental chemist, including experience in the field, the laboratory, as a project chemist, and conducting data validation and QA/QC
- Directs Brice's Chemistry Division and serves as Senior Chemist for all Brice PFAS work

Monte Garroutte, PFAS Regulatory Specialist

- Over eight years of experience as a regulatory program specialist with the Alaska Department of Environmental Conservation (ADEC) Contaminated Sites Program
- Former ADEC Restoration Program Manager for EAFB and member of the Alaska Statewide PFAS Task Force

3.2 Strategic Partners

In addition to our extensive internal capabilities, Brice can also draw on our established network of strategic partners. These partners have proven track records supporting DoD agencies with professional services that include:

- PFAS investigation, site delineation, and forensics
- PFAS hydrogeology, contaminant fate and transport, and risk assessment
- Public and stakeholder facilitation addressing PFAS issues
- Design, installation, and operation of PFAS treatment systems for both surface water and groundwater
- Construction management and site support

Together with these partners, Brice would assemble a customized team with the expertise and experience needed for developing site-specific solutions that address complex technical and logistical challenges.

3.3 Soil Washing

Brice pioneered the application of soil washing with a patented technology in the early 1990's. Brice performed multiple projects at over 10 different DoD installations, including projects selected for the Secretary of the Army Environmental Award in 2007 and 2009. In 2018, Brice began investigating the suitability of our soil washing technology for treating PFAS-impacted soil. Bench-scale studies performed on soil from one of the EAFB F-35A beddown projects demonstrated the potential to successfully reduce PFAS levels in soil to below ADEC CLs.

In 2019, Brice was awarded a contract by the USACE Omaha District to deploy their field treatment process for PFAS impacted soil at Peterson AFB, Colorado. This project demonstrated that Brice's soil washing process could remove more than 99% of perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) from coarse soil fractions (> #200 mesh) and between 83% (PFOS) and 93% (PFOA) of contamination from fine soil fractions (< #200 mesh) in a single treatment. Brice's field treatment plant can be used to treat PFAS-impacted soil during construction, returning treated soil meeting CLs back to construction sites for beneficial use. Depending on source soil and project needs, treated soil can also be used to blend construction aggregate to contract specifications on site.

3.4 Complementary Technologies

In addition to the above, Brice has worked extensively with other companies to evaluate PFAS treatment and destructive technologies that may be included with Brice's patented soil washing system as part of a treatment train approach for on-site removal of PFAS in soil. This has included bench-scale testing on technologies both to further reduce PFAS in the post-treatment fines fraction (e.g., smoldering, low-temp thermal desorption) and/or to stabilize the PFAS remaining in the fines depending on site and soil conditions. Additionally, Brice has worked with other vendors to evaluate the incorporation of PFAS destructive technologies (e.g., supercritical water oxidation, hydrothermal alkaline treatment, electrochemical oxidation, and plasma technologies) for on-site treatment of the PFAS-containing byproducts from the regeneration of filtration media used in both soil washing and construction dewatering treatment systems. Each of these technologies has shown the potential for incorporation into a treatment train tailored to the needs of a specific site.

4.0 CONTRACTING MECHANISM AND APPROACH

Given the complexity and urgency of keeping construction projects proceeding on schedule in the face of PFAS challenges, Brice recommends utilizing an Alpha Contracting approach to help get the work procured and under execution quickly. Alpha contracting is a collaborative effort utilized in a sole-source environment between government and industry to streamline an acquisition from beginning to end.

> "We awarded many millions in work for construction and logistics and the Brice team appears to be handling the monumental effort with ease. I can already see why they came with such a strong recommendation."
>
> Bruce L. Steely, Deputy Director, 611 CES/CD, JBER AK

Brice can quickly mobilize to begin work on these time-critical projects. With offices throughout the continental United States, Alaska, and Hawaii, Brice can rapidly have our team in place to initiate and meet with USACE to keep military construction projects moving forward.

5.0 PROGRAM POINT OF CONTACT

For inquiries regarding the information presented in this document, please feel free to contact

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Brice PFAS Program Manager
Cell: 760.798.6772
Email: SBecker@BriceEng.com

Brice is available to schedule an on-site or videoconference presentation to present on our experience, services, and capabilities, as well as to discuss how we can tailor this management approach to your specific program or project needs.