Seymour Johnson AFB

Environmental Restoration — Installation

Seymour Johnson Air Force Base (SJAFB), a 3,216-acre Air Combat Command (ACC) installation in Goldsboro, North Carolina, had the best managed environmental restoration program in the Air Force in 2007. This status as the clear leader in environmental restoration was attained through creative management, engineering expertise, stakeholder engagement and regulatory partnerships.

Since 1982, the SJAFB Environmental Restoration Program (ERP) has embraced innovation that has ultimately resulted in the use of Performance Based Contracting, Decision Based Partnering and Future First Planning to accelerate and assure success. The restoration team's "thinking outside the box" eliminated fragmented contracts, implemented innovative technologies and closed sites ahead of schedule saving over $10 million and years of treatment systems operation.

By applying "state of the art" remediation techniques, the ERP team made significant progress toward achieving site closures without disrupting the base's critical flying mission. The following major accomplishments illustrate the team's outstanding performance.

SIGNIFICANT ACCOMPLISHMENTS

- Fast-tracked cleanup at the Radar Tower to clear the way for on-time completion of a $19 million Fuel Hydrant System. Saved $3 million in reduced life-cycle costs.
- Capitalized on innovative technologies by installing a hydrogen gas infusion system reducing contamination at a former waste storage site by 90% in six months.
- Used in-situ bioaugmentation with bacterial seeding at an Old Jet Engine Test Cell site to save $200,000 and shave 7 years from the remediation schedule.
- Negotiated with regulators to apply Underground Storage Tank (UST) regulations to spill sites. Saved 8 years and $1.8 million in cleanup costs.
- Used a laser-equipped cone penetrometer to provide real-time data analysis of the plume at the Bulk Fuels Storage Area expediting remedial design, regulatory approval and mobilization. Saved $50,000 and reduced treatment period by 25 years.

The goals of the SJAFB ERP are to cleanup and achieve regulatory closure of contaminated sites, reduce risk to human health and the environment, and restore all sites to maximum mission reuse potential by 2015. Seymour Johnson AFB's departure from traditional processes rewarded the AF with critical cost savings and produced a hedge of protection around the 4th Fighter Wing's mission of defending the Constitution… and the Land it lives on!

INTRODUCTION

Seymour Johnson Air Force Base (SJAFB) is the home of the 4th Fighter Wing (4 FW) and the 916th Air Refueling Wing (916 ARW). The 4 FW flies the multi-role, all-weather F-15E Strike Eagle in support of the Aerospace Expeditionary Force, which is capable of executing worldwide combat missions. The 4 FW also manages a 46,600-acre bombing range in Dare County, NC, the Fort Fisher Recreation Area in Kure Beach, NC and provides logistical support to the 916 ARW, a tenant unit flying the KC-135R Stratotanker in worldwide air refueling and mobility operations.

Considered "family" by Wayne County, NC and Goldsboro, SJAFB and the city share the same southeastern boundary. On the northwest, the base is bounded by Stoney Creek and on the west by the Neuse River, an important drinking water source for the region. The combination of a mild climate and a long growing season contributes to Wayne County's highly productive agricultural sector. In addition, Wayne County's thriving growth and dynamic economy are enhanced by an expanding manufacturing sector.

The Goldsboro-Wayne County Metropolitan Area population is estimated to be over 113,000 with 38,000 people within the city limits. Seymour Johnson AFB provides facilities, services, and housing to support quality of life for the 4,500 active duty and 6,000 family members, nearly 1,000 Reservists, 3,000 retirees, and 500 civilian employees who live on, work for, or visit the base. The total civilian and military payroll is over $282 million per year, contributing to the overall economic impact of the base on the local community of over $460 million per year.

The Wings Over Wayne air show attracted more than 80,000 military and local community members.

BACKGROUND

The goals of the SJAFB Environmental Restoration Program (ERP) are to clean up and achieve regulatory closure of contaminated sites, reduce risk to human health and the environment, and restore all sites to maximum mission reuse potential by 2015. These ERP goals are achieved in accordance with all applicable laws and regulations while protecting the 4 FW flying mission and the Goldsboro/Wayne County community.

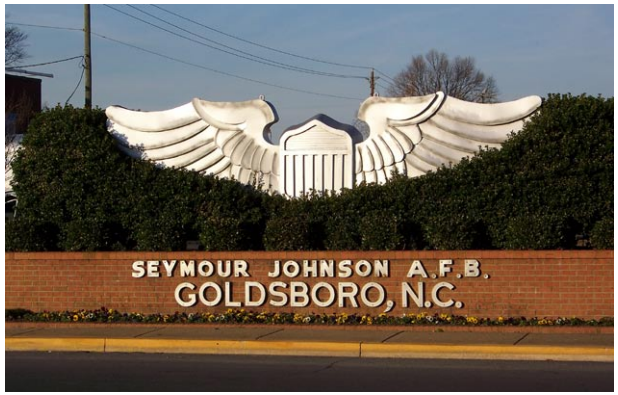
ORGANIZATION, STAFFING AND MANAGEMENT APPROACH

The SJAFB ERP has taken an aggressive approach since 1982. Insight gained from the challenges encountered has ultimately led to new ways of doing business using Performance Based Contracting (PBC) coupled with Decision Based Partnering (DBP) and Future First Planning (F2P).

Performance Based Contracting: The PBC process eliminated the need to award new contracts for each year or project and reduced the potential for cost overruns by doing away with annual, incremental proposal and acquisition costs. By using PBC to provide contractors discrete and measurable targets along the path to site closure, SJAFB avoided redundant administrative, acquisition and procurement costs, and saved over $10 million.

Decision Based Partnering: A refinement of the traditional partnering approach, DBP was developed at SJAFB because of the rapid decision making required with performance based restoration efforts. The primary objectives achieved through DBP were identification, prioritization, and resolution of key decision points along a critical path to site closure. It also allowed timely scheduling of meetings so that all partnering members reached agreement on issues as quickly as possible.

Future First Planning: F2P reduced schedule and mission disruptions and released formerly contaminated land for military construction projects by removing environmental constraints through a fast-track approach. It enabled mission critical land reuse at 4 sites on SJAFB, allowing more than $25 million worth of construction projects to proceed without delay.



The SJAFB ERP Team maximizes stakeholder input!

Community Involvement

Successes with the Restoration Advisory Board (RAB) and community involvement have been the springboard to increased public confidence in SJAFB's ability to protect the environment and the community. An updated Community Involvement Plan and a new ERP Website keep ERP successes in the limelight. The website gives the general public immediate access to current information on restoration activities. Stakeholders can see historic aerial photos, Geographic Information System (GIS) maps, site activity status, closure progress, contractor assignments and contact information by navigating the user-friendly website. The ERP Update Newsletter, published annually, addresses current program initiatives and is provided to interested parties and the local library.

Four public meetings were used to present proposed plans for sites with completed Remedial Investigations/Feasibility Studies and to continue proactive stakeholder outreach. **These meetings were announced in both English and Spanish to reach all segments of the surrounding community.** One public meeting was held near the remote bombing range to foster trust and keep the communities in that area informed. The Information Repository of all ERP-related documents at the Wayne County Library is continually updated with the most current details.

Earth Day presentations illustrated how landfills work and emphasized how to avoid polluting groundwater. Earth Day celebrations coordinated with the City of Goldsboro demonstrated the environment knows no political boundaries. Events were structured to appeal to the entire family including environmentally oriented games and puzzles for the children and "green awareness" door prizes at the conclusion of the days events. . Base Earth Day outreach efforts provided a booth and staff to encourage community interaction and education.

Even a cold day in April did not discourage attendance at the Annual SJAFB Earth Day celebration.

Initiatives

The team developed and maintains an ERP GIS data layer for the base, including sampling points, analytical results, site boundaries, and site history. Global Positioning System (GPS) equipment was used to increase data reliability, reduce survey costs, and input data directly to the installation's GeoBase program ensuring the widest dissemination of ERP spatial information. The detailed GIS layer expedites site investigations and ensures proposed development does not conflict with active remediation.

PROGRAM SUMMARY

SJAFB led the way for the USAF and US Army Corps of Engineers (USACE) in implementing new, fast-track management approaches as well as several innovative cleanup technologies. This was accomplished in a climate that supported small business and ensured all stakeholders were on the team. An expedited contractor selection process was used to award a Performance Based, Fixed Price Remediation with Insurance (FPRI) Contract to Bay West, Inc., **a small business**. Bay West conducted remediation activities at 16 ERP sites with the goal of regulatory site closeout. The FPRI contract included treatment system operation and maintenance as well as Remedial Process Optimization (RPO) of four groundwater remediation systems. SJAFB also contracted with NewFields, **another small business,** to provide a technical facilitator to resolve conflicts. This kept the decision-making process on track by establishing mutually agreed-upon timelines and resolution points. Typical SJAFB site contaminants include jet fuel, metals, chlorinated solvents, pesticides, and volatile and semi-volatile organic compounds. Cleanup activities are regulated by the State of North Carolina using three separate categories: inactive hazardous sites under CERCLA, landfill sites under RCRA, and spill sites under UST regulations.

To maintain the fast pace essential for Performance Based Remediation, Bay West used site investigation techniques that yielded real-time data and adjusted their work plan as field results dictated. Not only were data gathered to delineate the area and depth of a plume, but also to thoroughly and immediately characterize the chemical nature of the contamination. This approach made it easier to choose/design the most effective remediation technology/strategy for each individual site and it eliminated weeks of lab processing time, short-cutting the path to closure. As a result of these performance-based, decision-based, and future planning initiatives, SJAFB has already achieved "No Further Action" (NFA) - or regulatory site closure - at 5 of the 16 ERP sites in less than 3 years.

ACCOMPLISHMENTS

Fast Track Cleanup
Seymour Johnson AFB maintained a fast pace on restoration activities to make sites available for planned reuse as quickly as possible. PBC provided the flexibility to move from slow, expensive treatment systems to more aggressive options, which expedited progress toward site closure.

Radar Tower Site: SJAFB implemented an F2P investigative approach reducing life-cycle costs by $3 million in the cleanup of a former radar tower site. This effort reduced operations and maintenance requirements, and liability by 15 years, saving $1.8 million and clearing the way for construction of a new, $19 million Type 3 Fuel Hydrant System.

Soil contamination threatened the on-time start of this high priority, military construction project. Bay West used an innovative, surfactant injection system to release and recover 700 gallons of Light Non-Aqueous Phase Liquid (LNAPL) in one week.

Injection of Fenton's reagent oxidant/catalyst reduced groundwater contamination.

In addition, 75,000 gallons of modified Fenton's reagent oxidant/catalyst were injected reducing groundwater contamination concentrations at least 90%.

Hot-spot excavation of 1,400 cubic yards of contaminated soil removed 13,000 gallons of petroleum product. By adding oxidants and treating this soil in a biopile on base, indigenous micro-organisms were able to metabolize 50% of the contamination allowing beneficial reuse of the soil as landfill cover and saving over $46,000 in tipping fees.

Coal Pile Site: An F2P approach was also used to cleanup contaminated surface soil at a former coal pile site. This minimized waste and accelerated restoration of the land to open space per the Integrated Natural Resources Management Plan and Base Comprehensive Plan.

Over 420 tons of coal were removed and transported to a local coal-burning power plant for re-use in power generation. Rock was screened and reclaimed for use at other areas on Base. Compost was added to the surface of the site from SJAFB and Goldsboro sources to biologically degrade soil contaminants and speed up site closure. This resulted in a 75% decrease in total Polynuclear Aromatic Hydrocarbon concentrations within 3 months. The surface was hydroseeded with fescue grass and Loblolly pine seedlings were planted enhancing soil stability and phytoremediation. Benefits of this remedy include diversion of coal and rock/aggregate from the landfill for beneficial reuse, use of locally available waste streams to treat soil, restoration of site to natural conditions, and reduction of exposure risk to potential future residents.

Dare County Bombing Range: SJAFB operates and maintains a 46,600-acre bombing range in Dare County, just west of the Outer Banks. By fast-tracking from Site Investigation to Remedy in Place in 19 months, early closure was obtained on 89 of 93 Areas of Concern, with the remaining 4 sites scheduled for closure in 2008. Site closure was achieved 7 years ahead of the ERP goal and monitoring and sampling costs were reduced by $280,000, a 35% savings in life-cycle costs with **no disruption in operational use of the range**.

Monitoring well sampling at the remote Dare County Bombing Range.

Old Entomology Shop: Remedial action construction was completed at the Old Entomology Shop site nearly 2 years ahead of schedule as a direct result of the combined, fast-tracking effort led by SJAFB. After funding was procured, Bay West mobilized quickly and completed preliminary sampling/analyses and site excavation.

Excavation of pesticide-impacted soil at the Old Entomology Shop site.

Two buildings and 3,300 tons of pesticide-impacted soil were removed, eliminating a potential groundwater contamination source and human health risk. Clean fill was trucked in, a groundwater remediation system was installed, and the site was ready for new construction in just 7 weeks. This achievement allowed the construction of a new Readiness and Emergency Management facility to proceed ahead of schedule. A cost savings of more than $50,000 was realized by accelerating remedial design and remedial action construction.

Slocumb Gate: Soil contamination discovered during construction of new gate security measures threatened to disrupt progress. A dynamic workplan allowing delineation and immediate removal of 80 tons of contaminated soil saved $40,000 over traditional methods and achieved site closure for soil within 6 months of discovery with no construction delays while meeting strict site security standards

INNOVATIVE TECHNOLOGY

The most sophisticated and innovative technologies to expedite cleanup and achieve real results are in full use at SJAFB.

Bulk Fuels Storage Area: Bay West completed 98 borings in 10 days (most through 8"of concrete) using a Laser-Induced Fluorescence/ Cone Penetrometer to delineate the contaminant plume below the Bulk Fuels Storage Area (BFSA). This technique permitted real-time data analysis revealing the true extent of contamination and led to remedial design, regulatory approval and mobilization for remedial action in 6 months.

A Laser-Induced Fluorescence Cone Penetrometer provided real-time data analysis to accelerate delineation of the fuel contaminant plume.

A multi-phase extraction system of 12 horizontal borings, 65 vertical wells, and pumps was installed and operating in 5 weeks. The new system continues to remove 176 gallons/day of jet fuel which is sold for energy recovery. More importantly, there was no disruption to POL operations supporting the flying mission. This intense, fast-track approach allowed effective remediation to begin years ahead of traditional methods, saved $50,000, and reduced the treatment period an estimated 25 years!

Old Jet Engine Test Cell: A fuel and solvent plume at the Old Jet Engine Test Cell is being remediated using In-Situ Bio-augmentation. A 2-foot thick concrete slab and 330 tons of contaminated soil were removed expediting cleanup of fuel and solvents. Soil washing, chemical oxidation, and "tailor-bred" bacteria inoculation were employed to speed Monitored Natural Attenuation. Chemical oxidation by peroxide injection destroyed 90% of the peak dissolved plume in only two applications. This reduced the remediation period an estimated 7 years and realized life-cycle cost savings of $200,000.

Construction of interception trench for in-situ bio-augmentation treatment at the Old Jet Engine Test Cell site.

Former DPDO Waste Storage Area: After injection of a hydrogen-releasing compound reduced the plume by 50%, a hydrogen gas infusion system was installed at the former Defense Property Disposal Office (DPDO) Waste Storage Area to maintain favorable conditions for the anaerobic bacteria. By enhancing reductive dechlorination (keeping the bacteria happy), solvent concentrations at the infusion wells were reduced by 93% within six months of startup! SJAFB is the only military installation using iSOC™ technology to directly inject (infuse) hydrogen gas into groundwater.

Testing an iSOC infusion device for hydrogen delivery.

Multi-phase extraction system treating fuel contamination at a hydrant spill site.

PARTNERSHIPS

SJAFB actively involves state regulators, two Army Corps of Engineer districts, ACC and RAB members to address aspects of facility remediation across all regulatory boundaries. The base has displayed superlative technical and contracting acumen in addressing a full spectrum of environmental and regulatory issues in an innovative and service-oriented fashion to focus the team and support the mission.

The ERP team negotiated a reclassification of hydrant system spill sites to UST sites by working with regulators to determine the best approach to site closure. By capitalizing on this partnership, a transition to less stringent regulations was achieved. This brilliant strategy saved $1.8 million and reduced the operations, maintenance and long-term monitoring requirements by more than 8 years.

Work on one of the new treatment systems, which consists of 21 vertical extraction wells, was sequenced to avoid conflicts with the annual SJAFB air show. A new system was installed, replacing an ineffective one, jump-starting fuel recovery from 0 to 16,000 gal/year. This major improvement reduced the projected operating period by 16 years, and saved $6 million. Installation of 4 horizontal wells under a taxiway ensured no impact on the mission and kept a $301- million, 18,000 sorties/year flying program on track!

Additional Remedial Process Optimization was achieved by obtaining permits to discharge to the Goldsboro sanitary sewer allowing Bay West to quadruple the treatment flow rate! Skilled negotiations led to reduced sampling and reporting requirements and lowered costs by $500,000. A refined sampling network eliminated 1,000 field hours.

RESTORATION ADVISORY BOARD, PASSING ON LESSONS LEARNED

The broad support of RAB members was a crucial element that allowed SJAFB to implement and prove the effectiveness of new methodologies. Community members, government officials, regulators, technical experts, and military leaders remained thoroughly engaged throughout remediation activities. Their leadership and concurrence were catalysts for rapid progress and innovation.

In addition to sharing lessons learned with RAB members, Bay West also gave presentations to the ERP teams at Scott AFB and McConnell AFB so they could benefit from SJAFB's experience and success. MacDill AFB followed the SJAFB lead by adopting DBP and a facilitator to establish schedules of resolution to expedite their restoration program. SJAFB's Restoration Program became the "model" for all USAF bases.

REDUCING RISK TO HUMAN HEALTH AND THE ENVIRONMENT

While the cost savings realized by aggressive restoration efforts are significant, the real impacts are increased mission flexibility and enhanced quality of life for the Wayne County, Goldsboro and SJAFB communities.

Closure of Former Landfills: Extensive site improvements were completed at two former landfill sites totaling 19 acres. Trees, shrubs and exposed debris were removed and soil was added to achieve desired contours. Three swales were graded to direct water drainage toward Stoney Creek and compost was added to support new vegetation. Monitoring wells were installed to meet state requirements. The heavily wooded and vegetated former landfills now have properly graded surfaces and, with added compost and reseeding, look more like parks than landfills.

Before

After

Heavily wooded sections of landfills were cleared, ground into wood chips and traded for compost. The cleared and graded landfill looks more like a park than a landfill.

By trading 2,000 cubic yards of wood chips from site clearing activities for 880 cubic yards of compost from the base recycling facility, a savings of $57,000 in transportation and compost costs was realized. No waste was hauled off-site, saving county landfill space. The construction of 925 feet of channel and several check dams controlled runoff and erosion and ensured surface waters were protected during the operation. All landfills have been submitted for regulatory site closeout and are now in the long-term monitoring phase.

CONCLUSION

With a ground breaking approach, Seymour Johnson AFB is the clear leader in environmental restoration. The ERP team pioneered innovative strategies; attacked technical challenges and regulatory concerns; and captured success through technical expertise, effective management, and teamwork. Departure from traditional processes has rewarded the Air Force with $10 million in savings and has produced a hedge of protection around the 4th Fighter Wing's mission.

"Defending the Constitution… and the Land it lives on!"

Environmental Restoration — Installation

Seymour Johnson Air Force Base

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