News from BEM SYSTEMS, INC.

Innovators in Environmental Science, Engineering, and Information Management

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Performance-Based Contract, Advanced Bioremediation Technology Sped Environmental Cleanup at Andrews Air Force Base, Maryland

Environmental cleanup came in under budget, decades ahead of schedule

CHATHAM, NJ, March 27, 2006 — Scientists and engineers from environmental consulting firm BEM Systems, Inc. (Chatham, NJ) needed only eleven months of accelerated bioremediation to complete what had been projected as a 28-year cleanup of a highly contaminant-impacted site at a service station on Andrews Air Force Base, Maryland, home base of Air Force One. The in-situ cleanup used a recently introduced remediation technology, ORC Advanced™, to eliminate high concentrations of petroleum hydrocarbons that had resisted earlier cleanup attempts with conventional technologies, at a total cost less than one-third the original estimate of over a million and a half dollars.

The cleanup was the first environmental performance-based contract (PBC) to be completed for the Air Force in Maryland, as part of a government-wide shift toward this kind of contracting vehicle. In performance-based contracts the contracting agency, in this case the Air Force Center for Environmental Excellence (AFCEE), does not specify how a contractor will reach each milestone in a cleanup. Instead, it defines the project's objectives and leaves it to the contractor to find the best way to achieve them.

Following removal of saturated soils from source area, five-acre contaminant plume at Andrews AFB was remediated in-situ by injecting ORC Advanced™ into the subsurface, using conventional, self-contained direct-push equipment.

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Brian Dolan, Chief of Andrews AFB's Environmental Restoration Program, said, "This project convinced me that performance-based contracts are a great tool for Air Force managers. With a PBC contract, minor issues are quickly resolved—there is a great incentive for contractors to make progress. In this instance, BEM and their partner MACTEC worked hand-in-hand with the Maryland Department of Environment to establish a framework to close the site. Together, they aggressively dealt with a large groundwater plume and made this area safe for community usage." Andrews AFB is a two-time winner (2002 and 2004) of the Air Force's prestigious Thomas D. White award for environmental excellence.

John Mieher, BEM's Director of Federal Services, agrees. "The U.S. Air Force is a world leader in environmental restoration and stewardship, and performance-based contracts are one reason for their success," he points out. "This approach does put consultants such as BEM at greater risk, but it also encourages our scientists and engineers to come up with more innovative ways to achieve regulatory closure in the most cost-effective and scientifically sound manner."

In-situ bioremediation has several important advantages over conventional cleanup techniques, says BEM Principal & Program Manager Sharon Stecker, particularly its simplicity and low cost. "There is no above-ground piping or mechanical equipment to install and maintain, and no disposal of hazardous materials," Ms. Stecker said. "In addition, bioremediation can actually eliminate contaminants that have permeated deep into the subsurface, not just dilute them, as with many other treatment approaches."

The five-acre site had several "hot spots" of concentrated contamination where seven large underground gasoline and oil storage tanks had been removed. From there, dissolved contaminants had penetrated deep into the groundwater, forming a plume that covered an area of approximately five acres. Levels of benzene, toluene, ethylbenzene, and xylenes (BTEX) and methyl-tertiary butyl ether (MTBE) in the groundwater tested as high as 60,000 parts per billion. The Air Force had tried several times to clean the site using well-known technologies such as Fenton's Reagent, soil vapor extraction and vacuum-enhanced groundwater recovery, but residual product near the former tanks prevented success.

By November 2003, when AFCEE retained BEM Systems, the most feasible option included costly excavation and groundwater extraction/treatment, followed by 16 years of long-term monitoring and maintenance — until 2031 — before the land would be available for all uses. The projected cost to complete was upwards of $1.5 million.

However BEM's project managers, having gained experience with accelerated bioremediation, opted for a much more aggressive, yet cost-effective accelerated approach, using a proprietary oxygen-releasing compound, ORC Advanced®, a non-toxic, environmentally benign formula developed by Regenesis Bioremediation Products (San Clemente, CA).

In December 2003, 2180 tons of soil at the contamination source area were excavated and disposed of appropriately off-site. The backfill was treated with 500 pounds of ORC Advanced in powder form to stimulate bioremediation in the soil.

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BEM and its project partner MACTEC Engineering (Atlanta, GA) then injected nearly 12 tons of ORC Advanced slurry in a grid pattern into and across the surrounding plume area. According to Regenesis, this was one of the largest applications of ORC Advanced, a recently developed product with an increased oxygen content of 17 percent by weight. (Regenesis' original-formula ORC®, introduced in 1994, has been used on over 11,000 sites worldwide.) As the compound steadily released additional oxygen into soil and groundwater over the following months, it sped the growth of particular aerobic microbes which converted the soil contaminants, including BTEX and MTBE, into harmless end-products such as ethane, carbon dioxide, and water.

The remedial action was completed in February 2004. By November, dissolved concentrations of BTEX in monitoring wells had decreased by over 60-70% on average, with some areas achieving reductions of 100%. MTBE levels were reduced by as much as 51% in the wells with the historically highest MTBE concentrations.

In January 2005, BEM submitted its final report to the Maryland Oil Control Program, an agency of the Maryland Department of the Environment (MDE), that included a regression analysis and risk-based calculation which showed that risk from the site had been reduced to acceptable level. MDE then performed a Compliance Inspection and a final gauging of the monitoring wells and documented that the environmental concerns at the site had been satisfactorily addressed.

The cleanup was completed substantially under budget at approximately $500,000, including $166,425 for the ORC Advanced material, with an 11-month project duration, versus the original $1,600,000 total cost and the estimated 28 years it would have taken to restore the site with traditional technologies.

BEM Systems, Inc. is an independent, employee-owned, multidisciplinary environmental consulting firm. Headquartered in Chatham, N.J., with offices in Florida, Virginia, Arizona, Missouri, and Alaska, BEM's environmental scientists and engineers provide a full range of environmental compliance, cleanup, prevention, computer modeling, environmental restoration, and risk management services for public- and private-sector clients nationwide. For further information, see the company website at www.bemsys.com, or contact Principapal Sharon Stecker (tel. 908-598-2600, ext. 118; email sstecker@bemsys.com).

For further information about ORC Advanced™ or Regenesis's other advanced bioremediation technologies, visit Regenesis online (www.regenesis.com) or contact Bryan W. Vigue, Marketing Director, at 949-366-8000.

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Editor, please note: high-resolution digital photos of this project are available upon request.