NAVFAC

TechData Sheet

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Assessment and Remediation Technologies for Environmental Cleanup

SMART SITE - Cost Efficiencies in Remedial Action Operations and Long-Term Monitoring

The Naval Facilities Engineering Command, Southern Division (SOUTHDIV), and the Naval Facilities Engineering Service Center (NFESC) conducted an innovative analysis of the remediation program at the Naval Industrial Reserve Ordnance Plant (NIROP), Fridley, Minnesota. This project was completed under the NFESC Broad Agency Announcement (BAA) program.

Science Applications International Corporation (SAIC) was asked to implement the first of four possible phases of their systems engineering program "SMART SITE" to provide an innovative analysis of the Fridley remediation and monitoring program. Since the time the remediation system was originally designed, many new technological advances have occurred and previously unknown operational problems have been better defined, allowing a fresh look at innovative alternatives. Using a systems engineering approach and applying state-of-the-art computer software, evolving engineering principles, alternative technologies, and a proactive regulatory approach, SAIC evaluated the NIROP remediation and monitoring system with respect to performance and cost. The objectives of this evaluation or "Needs Assessment" are listed in Table 1.

Air Stripping System at NIROP Fridley

Table 1. Objectives of the Needs Assessment

1. Evaluate the present remediation technology design, strategy, and Operations and Maintenance (O&M) program with respect to performance and cost.
2. Evaluate possible modifications to the current remedial program activities and evaluate upgrades to current system hardware and software components that may improve performance and/or reduce short-term and long-term costs.
3. Make specific recommendations for improvements to the system and operations.

SMART SITE is being used to evaluate two phases of the groundwater remediation and monitoring program at NIROP. Phase 1 of the program consists of groundwater extraction and discharge of untreated water to the municipal sanitary sewer. Phase 2 of the program involves the addition of a groundwater treatment facility that will discharge treated water into the Mississippi River under a National Pollutant Discharge Elimination System (NPDES) permit. Construction of the Phase 2 system was completed in October 1998 and operations began in December 1998.

The SMART SITE evaluation included several process steps that allowed for a thorough analysis of the Fridley system (Table 2). Each step of this process produced data necessary to optimize the system. Recommendations were then compiled and were further evaluated and ranked by their estimated cost savings, ease of implementation, and their return on investment value.

Table 2. Steps in the SMART SITE Remediation and Monitoring Program Analysis

1. Background information review
2. Site evaluation
3. Remedial program evaluation
   - Remediation treatment technology
   - Treatment system design
   - Treatment system O&M
   - Ongoing sampling and monitoring
   - Treatment system controls
   - System monitoring
   - Data acquisition and reporting
   - Future system requirements
4. Analysis of system modifications and cost reduction alternatives
5. Summary and recommendations

Results of Smart Site Analysis

The remediation treatment technology (a pump and treatment system consisting of six groundwater extraction wells and an air stripping system) and each element of the remedial program were evaluated with respect to performance, costs, and other factors, in consideration of both short-term and long-term program objectives. Where appropriate, potential opportunities for cost savings or performance improvement were identified for further analysis. Eight specific recommendations were presented to optimize the system's performance that, if implemented, could result in an estimated savings of approximately $160,000 per year.

Recommendations include upgrading the current well field, modification of the treatment system component design configuration, streamlining the sampling and monitoring program, and increasing automation of the system operation and reporting functions.

Major savings may be achieved by installing two additional extraction wells and discontinuing pumping at one well. This will increase the mass removal efficiency, reduce fouling and scaling of the wells, and reduce well maintenance costs by an estimated 10 to 30 percent per year.

Results of the SMART SITE analysis show that the easiest and quickest savings may be achieved by reducing the frequency and number of monitoring wells sampled and by changing analytical methods. Each recommendation and its potential savings is listed in Table 3.

Table 3. Recommendations and Potential Savings

Preliminary Recommendations	Estimated Yearly Savings
• Well Field Upgrade	$74,610
• Bypass to Sanitary Sewer	$1,850
• Gravity Discharge of Effluent to Storm Sewer	$16,425
• Influent and Effluent Pump Upgrades	$7,876
• Optimize Operations and Maintenance	$2,830
• Streamline Sampling and Monitoring Program	$26,600
• Wellhead Monitoring Upgrade	$15,400
• Control System Upgrade and Automated Reporting	$16,500
Total Yearly Cost Savings	$162,091

Conclusion

The SMART SITE analysis identified numerous alternatives and modifications that can reduce the cost of the remediation and monitoring program at NIROP. The potential overall cost reduction represents 20 percent of the average yearly O&M costs. The net present value of the savings based on a 20-year system life could reach $1.5 million. The recommendations are being evaluated by SOUTHDIV for potential implementation.

A detailed report on the results of this optimization effort, the costs to implement this type of approach at your site, and project work plans are available. Furthermore, more detailed information on the SMART SITE approach and similar optimization approaches are available through the NFESC BAA program.

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