Cost-Effective Strategy for Installation and Operation of a Bioventing System to Remediate Jet Fuel Contamination Beneath the Former Refueling Apron at Griffiss AFB

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Introduction

- Located in Oneida County, New York
- Base covers approximately 3,540 acres
- Former home of USAF strategic air command
- GAFB was designated for realignment under BRAC 93
- Realigned and closed in October 1995
Project Objective

- Design, install, and operate a bioventing system to cost-effectively remediate soil beneath Apron 1, in situ, to facilitate the transfer of the base property for future development as part of the Griffiss Business and Technology Park

- Constructed Project Value: $289,000
Apron 1 History

- Apron 1 covers a 29-acre area
- Fuel was supplied via two independent fueling systems (east and west)
- Fuel was supplied to systems from two pumphouses
- Each system included 9 lateral control points and 9 refueling hydrants
- Systems were decommissioned in 1996 after 50+ years of operation
Current Status of Apron 1

Soil Contamination

- Hydrant locations were excavated and backfilled with clean material during decommissioning
- Decommissioning activities identified a jet fuel spill of unknown volume
- The spill was assigned a NYSDEC spill number which remains open at this time

Beneficial Reuse

- Apron surface is used for ex situ remediation of approximately 80,000 cy of soil from various locations on the base
- Remediation is accomplished using both active and passive applications of biopile technology
Principle of Bioventing

Low-flow air injection to contaminated, vadose zone soils to stimulate indigenous bacteria and breakdown contaminants.
Bioventing Pilot Testing

- Conducted in October 1998 by Peer Consultants
- Pilot testing included soil sampling, soil gas permeability testing, and respiration testing
  - Soil samples were collected and analyzed for BTEX, TPH, TKN, phosphorous, iron, %moisture, and alkalinity.
- Pilot testing results indicated that the site was a candidate site for full-scale bioventing
  - Testing indicated a radius of influence of approximately 100-feet and an oxygen utilization rate of 7.9%
Design Considerations

- **Current use of Apron surface for ex-situ soil treatment**
  - Necessitated placement of all system components in areas isolated from construction activities
  - Restoration of any areas disturbed during system installation to allow for continued use

- **Apron construction – 18-inch thick reinforced concrete**
  - High costs associated with saw-cutting concrete for installation of system piping, and subsequent restoration
Innovative Solutions

- **Reuse of Existing Infrastructure**
  - Re-use of decommissioned fuel supply piping to provide conduit for air delivery to former fuel hydrant areas

- **Aboveground Piping**
  - Installation of air supply header piping above-ground in areas isolated from vehicle traffic and damage related to ex situ operations on the Apron surface

- **O&M Savings**
  - Use rotary-lobe air supply blowers reduce long-term utility costs
Construction Summary

- 22 air injection wells (AIWs) installed at fuel hydrant and lateral control point (LCPs) locations where soil contamination exceeds NYSDEC TAGM 4046 Soil Cleanup Objectives

- 16 vapor monitoring points (VMPs) installed for system monitoring

- Header piping installed above-ground adjacent to apron surface
Construction Summary (cont’d)

- Six-inch fuel supply piping pressure tested and reused to supply air to hydrant locations
- Two rotary-lobe air supply blowers installed
Apron 1 Bioventing System Layout
System Performance

- Apron 1 system has been operating for approximately 6 months
- O2 utilization rates averaging 21% across the site
- Biodegradation rates of 2.8 mg/kg-day
- 100-foot radius of influence
Cost Savings

Significant cost savings were recognized throughout the design and construction of the Apron 1 bioventing system, including:

- Utilization of existing infrastructure - $150,000
- Installation of above-ground piping – $7,000
- Elimination of the need for flush-mount wells and monitoring points - $9,000
- Total savings - $166,000
Conclusions

- Re-use of existing infrastructure in remedial systems can result in substantial cost savings and allows for beneficial reuse of related facilities

- Overall Apron 1 bioventing system construction cost savings = $166,000

- Anticipated O&M cost savings over life of the Apron 1 system = $15,000