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

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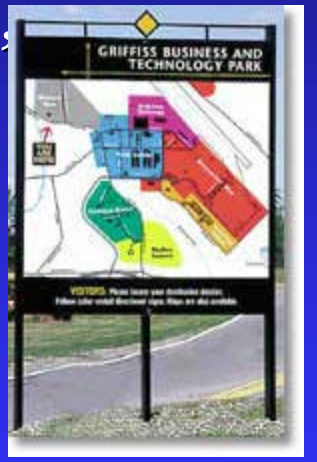
Introduction

- *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*

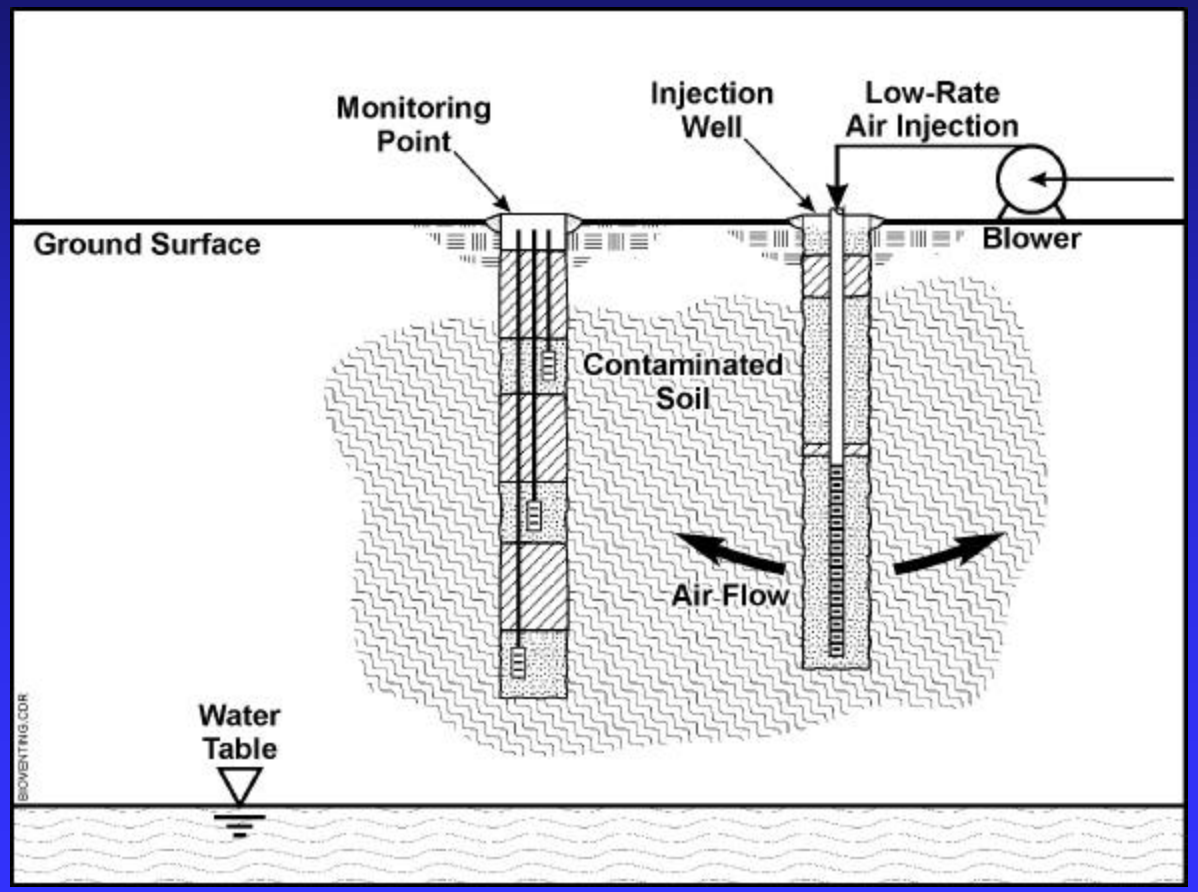
Current Status of Apron 1

- *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 80,0000 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*

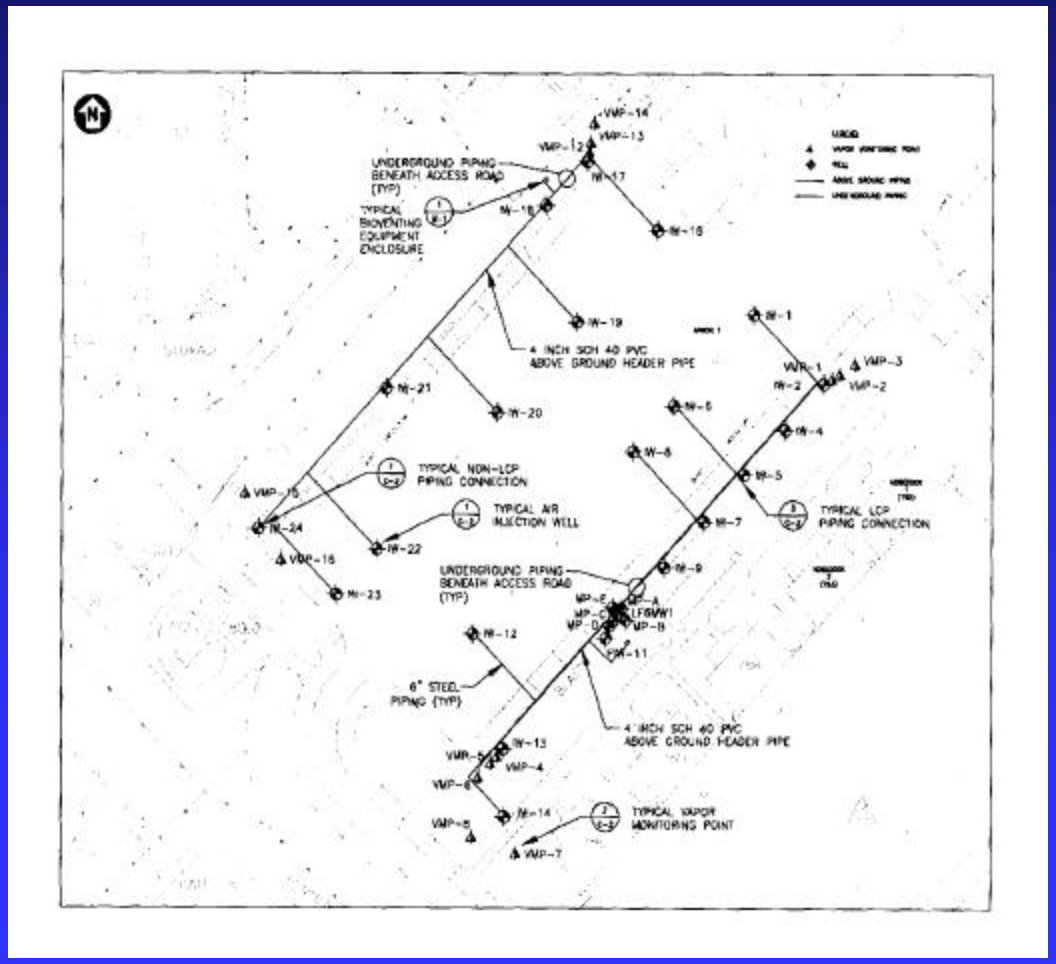
Construction Summary

- *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 is 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*