Federal Remediation Technologies Roundtable General Meeting

Perchlorate Remediation at JPL Pasadena, CA

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JPL Background

- Perchlorate from Cleaning Rocket Motors in 1940s and 1950s
- NPL Listing in 1992
- Three Operable Units
- NASA/NAVFAC MOA in 1999
- Superfund Program Transferred in May 2000

Presentation Summary

- Regulatory Overview
- Ion Exchange Pilot Test
- Fluidized Bed Bioreactor Pilot Test
- Packed Bed Reactor Pilot Test
- In-situ Pilot Test
- Conclusions

Regulatory Issues

- California DHS Interim Action Level
- Future MCLs???
- Background Perchlorate in Basin
- Water Purveyors/Adjudicated Groundwater

Ion Exchange Pilot Test

- Calgon “ISEP+” system
- September 1998 - March 1999
- Ion Exchange w/Catalytic Destruction
- Objectives
  - Minimize regenerant consumption (spent brine flow rate)
  - Treat perchlorate to non-detectable levels

Ion Exchange Pilot Test

- Results
  - – ClO_4^- to non-detectable levels
  - – Brine waste reduced to 0.16 %
  - – Reuse of 91% “purified” brine
- Further Investigation
  - – Brine treatment technology
  - – Energy cost

Fluidized Bed Bioreactor Pilot Test

- US Filter-Envirogen “FBR” system
- September 2000 - December 2000
- Objectives
  - Treat perchlorate to non-detectable levels
  - Optimize nutrient additions
  - Develop full-scale design
  - Test robustness and reliability of system

Fluidized Bed Bioreactor Pilot Test

- Results
  - Perchlorate treated to non-detectable levels in *three project phases*
  - Ethanol feed rate optimized
- Further Investigation
  - Use of native “JPL bacteria”
  - Treatment of low-concentration perchlorate influent stream

Packed Bed Reactor Pilot Test

- Foster Wheeler/Arcadis
- March 2001 - present
- Three Packed Bed Bioreactors
- Objectives
  - Treat perchlorate to non-detectable levels
  - Find optimal organism/food combination
  - Optimize bed packing material
  - Treat low-concentrations of perchlorate

Packed Bed Reactor Pilot Test

- Results (as of May 24, 2001)
  - Perchlorate treated to non-detectable levels
  - Choice of bacteria not essential to optimization
- Further Investigation
  - Different packing materials
  - Low-concentration influent
  - New reactor designs

In-Situ Pilot Test

- Envirogen Microcosm Study (SERDP)
- Arcadis Molasses Injection
- Regulatory Issues

In-Situ Pilot Test

- Planned Project
  - Determine proper electron donor
  - Well type/recirculation
  - Regulatory Issues
- Startup - September 2001

Conclusions

- Technology - Many Choices
- Main Drivers at JPL:
  - Disposition of Treated Water
  - Cost - Electricity/Waste Streams
  - Community Acceptance
  - Site Geology
- Treatment Standard