Installation Management Command Remediation Overview and Challenges

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Our mission is to provide standardized, effective & efficient services, facilities and infrastructure to Soldiers, Families and Civilians for an Army and Nation engaged in persistent conflict.

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TABLE OF CONTENTS

I. Part I

- I. Overview of U.S. Army Garrison Cleanup Program in Europe
- II. Challenges

II. Part II Case Study – Cleanup of Groundwater at U.S. Army Garrison Kaiserslautern, Germany

LEGAL FRAMEWORK

- There is a NATO Status of Forces Agreement (SOFA) in each country where U.S. Forces are stationed

- SOFA states that United States will “respect” Host Nation (HN) law
  - Generally U.S. interprets this to mean we apply substantive but not procedural portions of HN law
  - Germany – Negotiated Supplemental Agreement to NATO SOFA stating that German law shall apply
  - Other countries clean up only in accordance with Department of Defense Instruction (DoDI) 4715.8
  - DoD has designated one service per country as Environmental Executive Agent (EEA). EEA must approve all cleanup projects

DoD INSTRUCTION (DODI) 4715.8

- Cleanup policy for environmental contamination on DoD Installations outside continental United States (OCONUS)
  - Defines EEA responsibilities and coordination procedures
- Three scenarios allow cleanup:
  - Known Imminent and Substantial Endangerment (KISE)
    - Appropriate DoD medical authority and EEA consulted
    - Rarely used
  - International Agreement
    - Applies to Germany: Supplementary Agreement to NATO SOFA Article 53
    - EEA consultation and HQ Legal counsel concurrence
  - Maintain Operations/Protect Human Health and Safety (MOHS)
    - In-theater Commander determines requirement and EEA consulted
    - Army uses for Italy, Belgium, Netherlands where NATO SOFA requires U.S. to respect HN law

Installation Management Command Remediation Overview and Challenges

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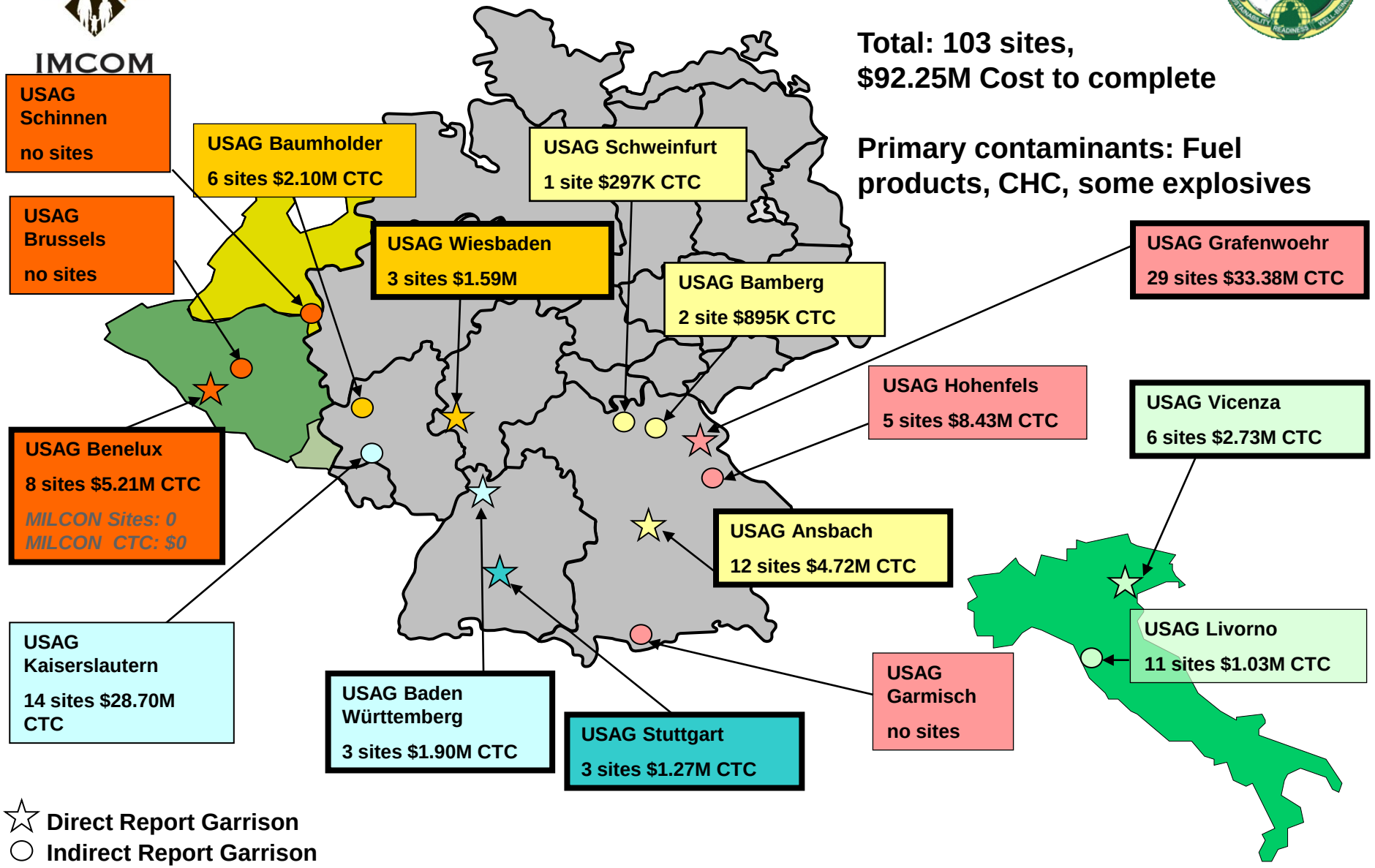
Total: 103 sites,
$92.25M Cost to complete

Primary contaminants: Fuel products, CHC, some explosives



☆ **Direct Report Garrison**
○ **Indirect Report Garrison**

CHALLENGES

- Technical
  - Complicated geology – fractured bedrock, karst
  - Some HN regulators very conservative, not open to innovative cleanup technologies
  - Project team members do not understand DoDI , NATO SOFA and/or HN laws
- Cleanup to support construction
  - Many large construction projects to support Army Transformation
  - Due to limited installation property, must construct on contaminated land
  - Contamination frequently found during construction (lack of proper planning)
- Contamination moving off installation
  - Off installation contamination is handled under the U.S. Army Claims Service
  - If contamination goes off installation the local authority must file a claim within a specified timeframe
  - All off installation work is contracted/executed by the claimant – U.S. pays 75%, local authority pays 25%

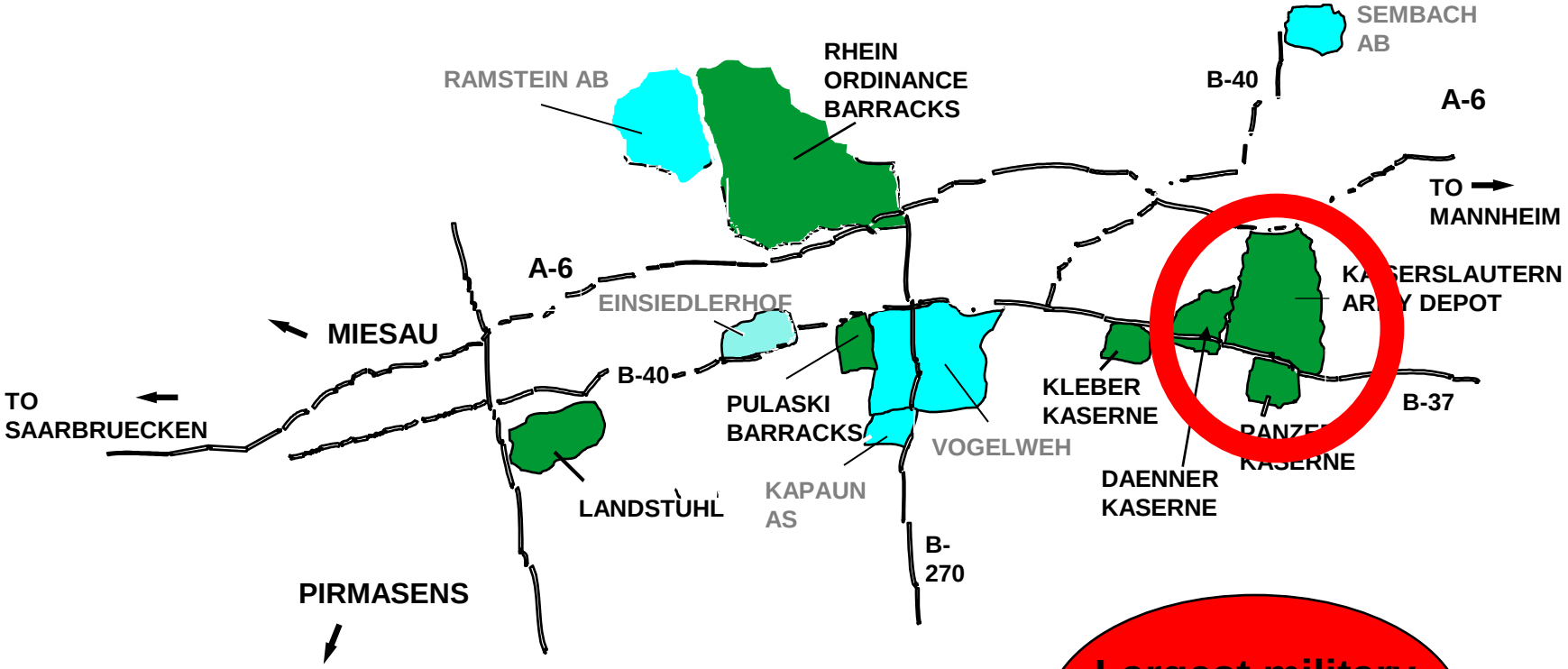
PART II

Case Study

CHC Groundwater Contamination at Kaiserslautern Army Depot

U.S. Army Garrison Kaiserslautern Germany

KAISERSLAUTERN MILITARY COMMUNITY

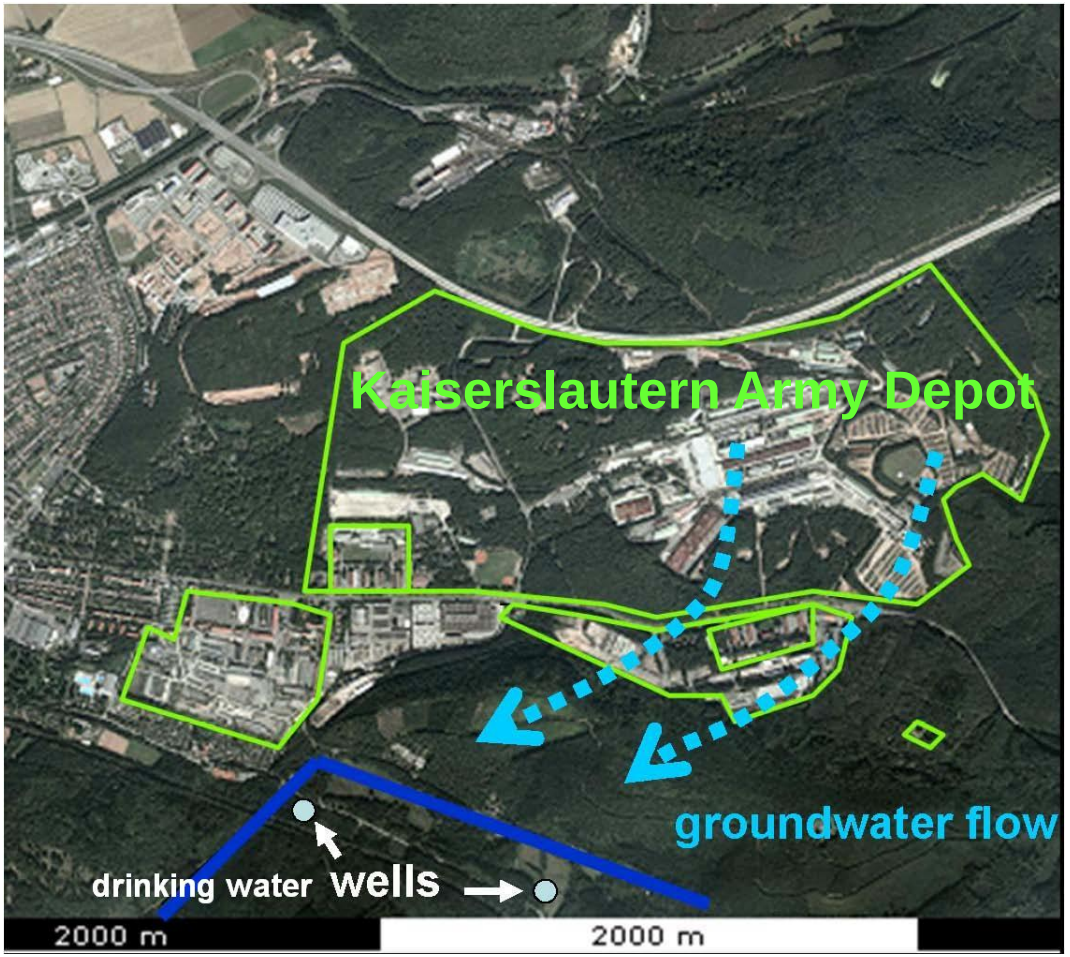


Largest military community outside United States

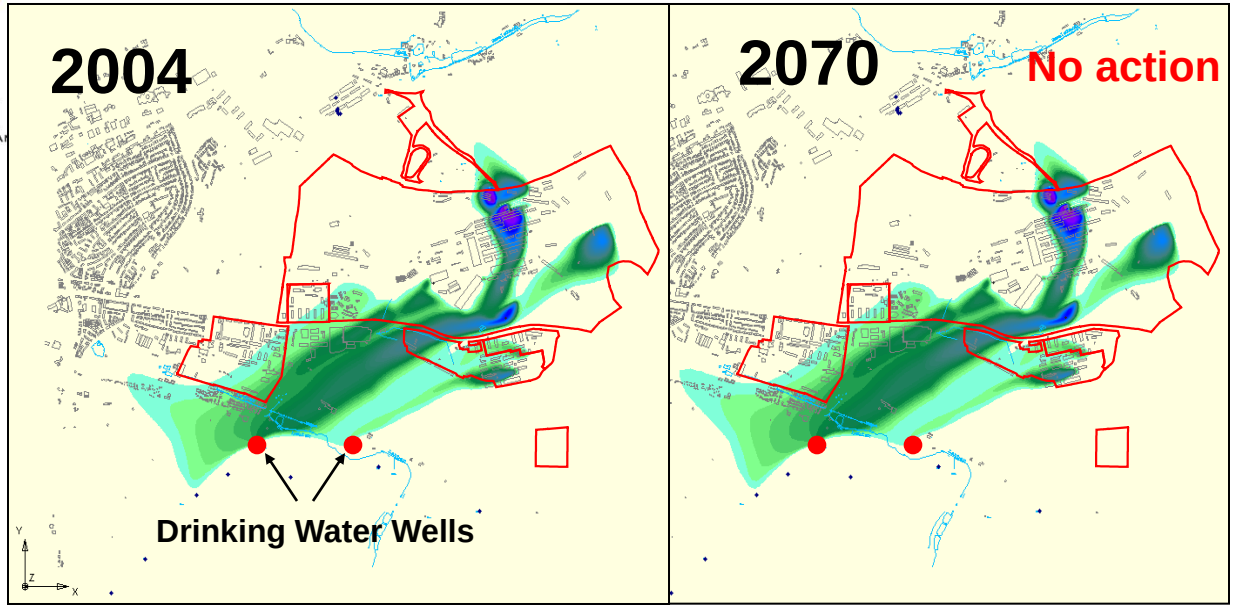
ARMY INSTALLATIONS

AIR FORCE INSTALLATIONS

PROJECT OVERVIEW



- **Groundwater is contaminated with CHCs (primarily TCE)**
- **Contamination caused by improper solvent disposal in the 1960's-70s**
- **Small amounts of CHCs found in drinking water wells**
- **Host Nation (HN) concern reached congressional level and resulted in Defense Appropriation Bill language directing the Army and Air Force to cooperate with HN for cleanup**
- **Army/Air Force has formed a working group with the HN**



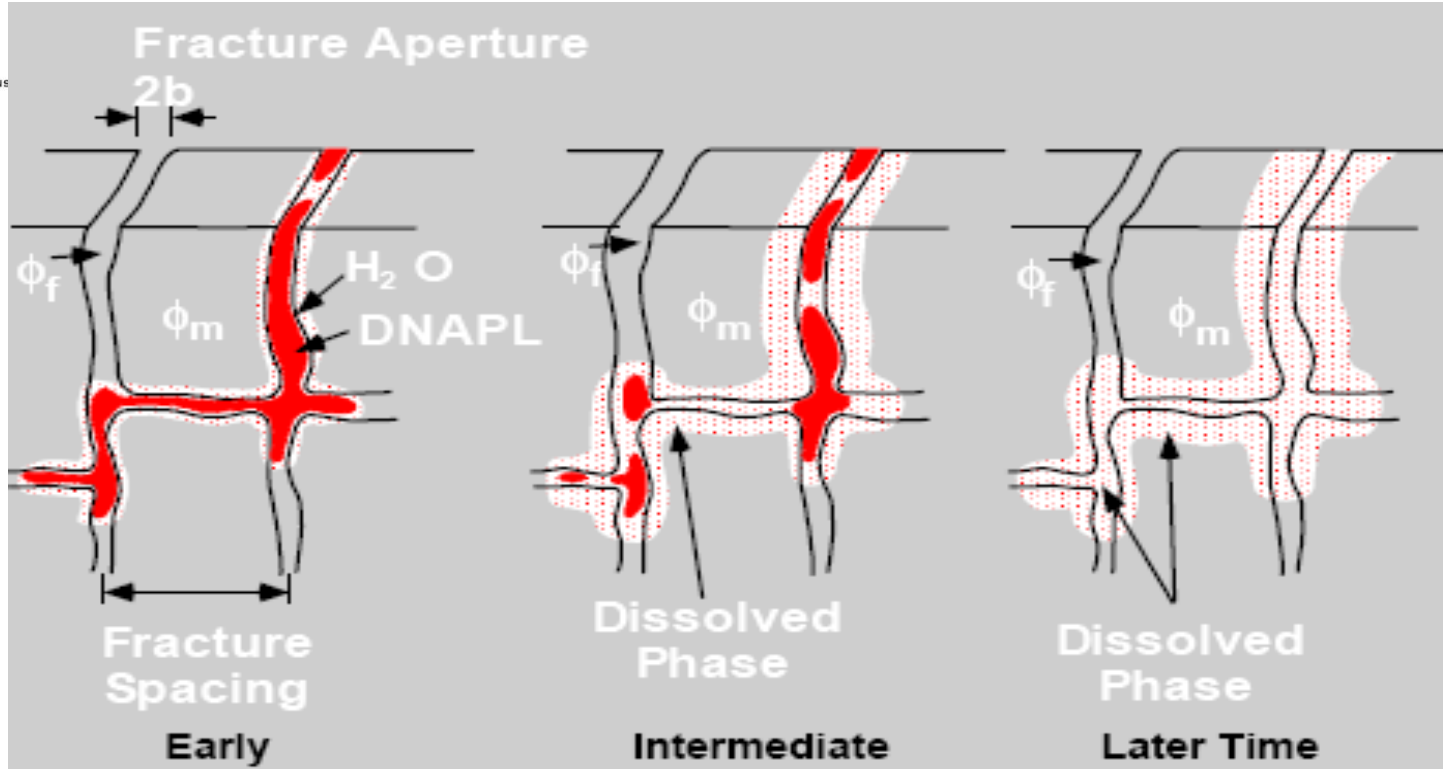
- Groundwater sampling showed at least ten plumes on site
- Groundwater modeling showed that the drinking water (DW) wells are unlikely to ever exceed current drinking water standards
- Sampling results at the site and at the DW have confirmed this hypothesis
- Cleanup goals are usually designed to protect the most sensitive receptors
- No impact to drinking water wells expected, therefore no obvious cleanup goal

LEGAL FRAMEWORK FOR CLEANUP

- Since drinking water is unlikely to be affected the question is…..Why cleanup?
  - Under German law groundwater is considered public domain that must be protected
  - All groundwater is considered a possible future public water supply
  - Groundwater must be cleaned-up unless it can be shown that cleanup is not:
    - Necessary
    - Technically feasible
    - Reasonable

- What is TECHNICALLY FEASIBLE?

- Army unsuccessfully used Pump and Treat in 2000
- Army unsuccessfully used Biodegradation with nutrient addition in 2006
- Army conducted feasibility study to review past remediation attempts and choose a new technology



- In-Situ Chemical Oxidation (ISCO) was chosen
  - ISCO entails adding potassium permanganate to groundwater
  - Na/K permanganate reacts with CHC forming CO_2 and water
- ISCO Pilot Test is currently underway

- TECHNICALLY FEASIBLE?
- Political challenges to implementing ISCO:
  - HN law does not allow addition of chemicals to groundwater
  - Because of trusted working relationship, HN allowed Army to try ISCO when other techniques failed
  - HN mandated Army must demonstrate hydraulic control of the test area. Army added two rings of control wells to ensure proper monitoring or containment if necessary
- Technical challenges to implement ISCO:
  - Achieving and maintaining contact between oxidant and contaminant
  - Complicated geology (fractured, porous sandstone)
  - Maintaining hydraulic control

- TECHNICALLY FEASIBLE?

- "What is Success?" Created matrix of project specific success indicators
  - Reduction of CHC mass
    - Carbon isotope analysis – Qualitative
    - Concentration trends – semi Quantitative
    - Pumping tests – Quantitative
  - MnO_4 delivery to matrix and fractures
    - Redox potential, Manganese, and Potassium concentrations
    - Rock coring
  - Hydraulic control
    - Tracer Tests
    - Pumping tests

- WHAT IS REASONABLE?
- Current cleanup cost estimate is $27M
- After pilot test is complete groundwater model will be rerun for multiple cleanup scenarios
- Cost estimates will be compiled for each scenario
  - If oxidation/destruction rates are low, the technology may be feasible, but not reasonable
  - Cleanup may reach a point of diminishing returns: Spending more money may not lead to more cleanup
- Create a benefit cost ratio (BCR) for the “Monitor Only” scenario
  - Conduct socio-economic reviews to show there is a cost to “doing nothing”, both economic and political
  - Use BCR as a basis to compare to active remediation scenarios

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- **HOST NATION WANTS:**
- Protection of drinking water wells
- Cleanup of groundwater (What level of cleanup will they accept?)
- No expenditure of HN funds (Claims program)

- **U.S. (ARMY) WANTS:**
- Maintain mission capability
- Good relationship with Host Nation
- Prudent use of cleanup funds

THE FINAL SOLUTION WILL BE SOMEWHERE IN THE MIDDLE

SUMMARY AND WAY AHEAD

- Complete ISCO pilot test
- Complete Benefit Cost Ratio (BCR) for “Monitoring Only” scenario
- Maintain dialog with HN throughout project
- Use technical metrics to define success of pilot test
- Model possible cleanup scenarios, compile cost estimates for all scenarios
- Coordinate with HN to agree on final cleanup scenario

END OF BRIEF

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