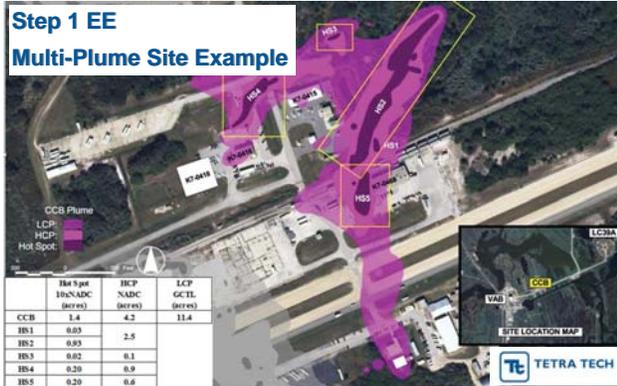
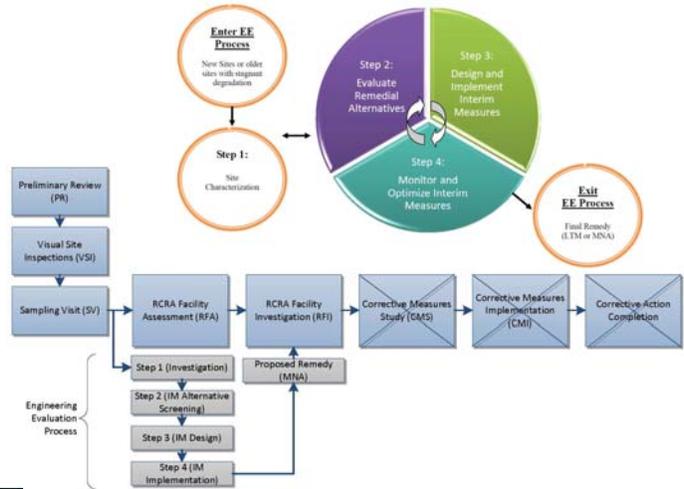


KSC Engineering Evaluation (EE) Process

- Preliminary Assessment/Possible Release Locations
 - Step 1 EE – Characterization
 - Step 2 EE – Remedial/Alternative Screening
 - Step 3 EE – Remedial Design
 - Step 4 EE – Remedial Implementation
- Multi-step process developed to:
 - Ensure adequate site characterization
 - Integrate stakeholder participation in evaluation of remedial technologies
 - Review preliminary designs
 - Evaluate the efficacy of interim measures (IMs)
- CMS Work Plan Process integrated into EE Process
- Remedy conducted through IMs
- Each Step is presented to the KSC Remediation Team (KSCRT)
- In an Advanced Data Package (ADP)
 - KSCRT includes NASA contractors, NASA Remediation Project Managers, and FDEP
 - Package provided prior to presentation for team review
 - Team consensus reached for each Step of the process



Step 1 EE—Characterization

- Perform direct-push technology sampling with analysis by mobile laboratory
- Sample spacing dependent on plume concentration
 - 100' spacing in low-concentration plume (>GCTL, <NADC)
 - 50' spacing in high-concentration plume (>NADC, <10X NADC)
 - 25' spacing in hot spot (>10X NADC)
 - 10' in parent source zone (1% solubility)
- Collect engineering data to support preliminary remedial technology selection
- Establish a monitoring well network/sampling program
- Use Environmental Visualization Software to present data
- Screen and select technologies to be evaluated in Step 2 EE

Step 2 EE Remedial Alternatives Summary Example

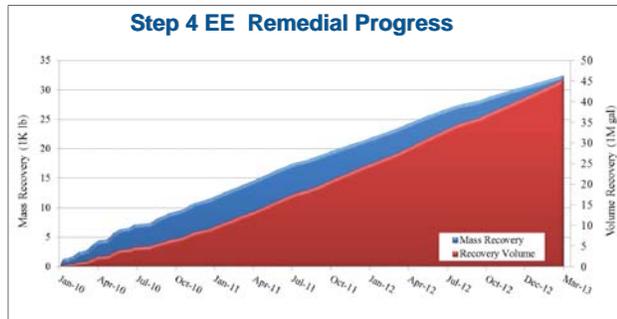
No.	Alternative	General Components
G-1	Air Sparging	AS wells (6 shallow, 18 shallow-intermediate, and 40 intermediate), AS system (rotary claw compressed air pump, heat exchanger, and instrumentation), and conveyance trenching and piping.
G-2	Anaerobic Bioremediation with Recirculation	Injection and extraction wells for application of substrate through recirculation (30 injection wells and 8 extraction wells). Extraction pumps, substrate mixing, and conveyance piping/tubing.
G-3	Anaerobic Bioremediation with Recirculation and EZVI Injection in HS1 SZ	Injection and extraction wells for application of ethyl lactate through recirculation (30 injection wells and 8 extraction wells). Extraction pumps, substrate mixing, and conveyance piping/tubing. Injection of EZVI at 2 locations at HS1.
G-4	Anaerobic Bioremediation with Recirculation and Selective Treatment	Injection and extraction wells for application of ethyl lactate through recirculation (30 injection wells and 8 extraction wells). Extraction pumps, infiltration gallery, air stripper, substrate mixing, and conveyance piping/tubing.
G-5	Anaerobic Bioremediation with Recirculation, Selective Treatment, and EZVI Injection in HS1 SZ	Injection and extraction wells for application of ethyl lactate through recirculation (30 injection wells and 8 extraction wells). Extraction pumps, infiltration gallery, air stripper, substrate mixing, and conveyance piping/tubing. Injection of EZVI at 2 locations at HS1.

Step 2 EE—Remedial Alternative Evaluation

- Compile technologies into remedial alternatives ADP
 - Conceptual designs (layouts, design criteria, cost estimates)
 - Comparative analysis of alternatives
 - Supplemental attachment of all calculations
- Select remedy for Step 3 EE Remedial Design

Step 3 EE—Remedial Design

- Present final remedial design to KSCRT
- Present full design process calculations and drawings
- Present performance specification, monitoring, and exit strategy
- Provide detailed cost and duration modeling



Step 4—Remedial Implementation

- Summarize performance of selected remedy
- Present an ADP with an overview of implementation and lessons learned
- Continue optimization
 - Prepare additional presentations for KSCRT for consensus as needed
 - Update and refine exit strategy

Overview of Process

- Significantly streamline and enhance documentation and design process
 - Multi-disciplinary team of stake-holders vested in a common goal of project success
 - Investigation to remedy timeframe reduced
 - Adaptive and progressive investigation and design methods
 - Cost savings from reduced reporting and enhanced designs applied to Performance of investigations and IMs
 - ADP presentation contains an overview of implementation and lessons learned
- Allows for continued optimization



5/24/2012
Background: Space Shuttle Atlantis—Heading Down the Barge Canal
Foreground: Sparging Curtain - Area South of 516S