Mission Impossible

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Do We Have a Problem?

- Mid 1990's…Are systems being installed?…Nope.
  … Are the installed systems operating?..Nope.
- Why?
  - P&T…(not smart), Mineral fouling, precipitation, carbon backup w/biofouling and mineralization. Pumping clean water and Burning electricity.
  - SVE…ineffective design, occluding water above screen, 100% by-pass air, knockout tanks, water in piping, making noise and burning electricity
  - CATOX….burning gas and electricity
  - AS…most afraid to design, bypass air, didn't inject enough air to overcome hydraulic head. Making noise and burning electricity.
  - Apparent overall lack of knowledge and/or concern from the Vendors…can't get reports turned in, systems turned on, or systems that are turned on to stay turned on

What Can We Do About It?

- 1995…
  - Established firm deadlines for all work conducted under the Trustfund.
  - Failure to meet deadlines would result in disqualification from Trustfund work until the work was completed.
  - When completed, Vendor was considered new Vendor and only able to have one contract until successful completion of that project.

1996: Major Overhaul of Entire Process

Problem: Designs don't work. KDHE doesn't have a method for enough oversight during the design phase.

Solution: Complete overhaul of the entire process

- Focus on source area, in situ systems, mobile, trailer mounted units, only feasible design allowed
- Divide Design Phase into two components
  - KDHE oversight on both with comments from KDHE Technical Services Staff (TSS) and PM

Revised Remediation Format

- Remedial Design Report (RDR)
  - » Borings to define source area
  - » Pilot testing
  - » Conceptual design including remedial well layout
  - » Unit meeting/peer review w/ TSS KDHE
  - » Meeting w/ design engineer
- Remedial Design Plan (RDP)
  - » Formal design based on approved conceptual design
  - » Operational parameters based on pilot testing
- Site Remedial Plan (SRP)
  - » Installation and two years of OM&M including equipment warrantee for two years

“Refined” Pay for Performance

Problem: System must be operational in order to achieve remedial goals

Solution:Design a modified PFP based on system up-time at optimal operational parameters.

- Reward for exemplary performance
- Major disincentive for failure.

- At bid award, additional 10% of overall cost is encumbered, divided into 8 equal payments as quarterly incentives.

Refined PFP (cont.)

- System operational >85% of time during the quarter…100% of incentive payment
- System operational <85% and >50%. Payment is the percent of operational time during that quarter.
- System operational <50%. No payment,
- Two consecutive quarters <50%. Disqualification from Trustfund.
- Site reaches remedial goals before the two year period of OM&M, the remainder of incentive is released.
- Disincentive deductions for items such as late reports, failure to keep site area clean….others

Refined PFP Verification

Problem: How do we verify “up-time”?

Solution: Hour meters, oversight, more oversight

- Hour meters were added in the design for every major component of the system…not “hot wired”
  - Verification at startup (and throughout project)
- Telemetry system at each site.
  - All major functions w/ shut down notification, alarm conditions, remote monitoring,
- Shut down notification sent to KDHE within 24 hours.
- Sign-in sheets at remedial trailer.
  - Date/time, personnel, affiliation, hour meter readings, status

PFP Verification

- Vendor Monthly Report
  - Includes operational parameters: SVE/AS flows, vac and pressure at both manifold and wellhead, DTW, hour meter readings,
  - Must be submitted within 6 days of site visit
- Vendor Quarterly Report:
  - Groundwater elevations, current/historical, graph
  - Analytical results: current/historical, graph conc vs time for each major constituent.
  - Isoconcentration maps for each major constituent.
  - All required operational data

Quarterly Report (cont):

- Attachment K
  - Tracks operational parameters:
    - » SVE: inch of vacuum at manifold and wellhead, flow at each leg, and total stack, Field readings of VOC's at each leg of system and total, % dilution air
    - » AS: psi at each leg of manifold and wellhead, flow, % dilution air, operation time/cycling frequency
  - System down-time summary,
    - » repair history, hour meter readings per monthly and cumulative
  - $/time

Oversight by KDHE

- District personnel monthly site visit
  - Monthly: Remediation System Operation Sheet
    - » Record operational data, hour meter readings, comments
- Quarterly Project Manager site visit
- Mandatory KDHE presence during remedial well drilling, trenching.
- Mandatory PM presence at pilot testing, startup.
- TSS and PM post construction audit
- PM peer review meeting at each phase of the Project. RDR, RDP, SRP, Performance Evaluations
- Annual PM system review

2002 Update to Revised PFP

Problem: Systems were operational at design parameters but few adjustments in the field. Sites not achieving remedial goals as quickly.

Solution: More engineering oversight.

- Identified several areas with continual problems
  - Piping/trenching
  - Engineering oversight/optimize system performance
  - Additional source areas

2002 revisions (cont)

- Trenching:
  - Water entrainment in lines. Broken lines.
  - Significant revisions to minimum trenching requirements in design
    - » Trenching/Compaction test,
    - » Slope verification map with survey points
    - » Piping tightness test verification
    - » PG and PE sign and stamp As-Builts

Apparently We Aren't Paying Them to Think

Problem: Most field work conducted by techs.

- No knowledge of actual system operation
- No adjustments to the system throughout lifetime of project
- No Engineers anytime anywhere

Solution: More Engineer involvement

- Base-line testing at startup
- Performance Evaluation
- Certificate of Completion

Base-line Testing

- Project Engineer required to conduct Base-line Testing at system start-up
  - Data collected for each major component
    - » SVE: each leg isolated to collect flow rates at system and manifold, wellhead data, estimated ROI.
    - » AS: each leg isolated and collect flow, system, manifold, wellhead, and manifold and well head pressure while in operation w/ SVE, DO, est ROI
  - Comprehensive SVE/AS map of actual system operation with RIO
  - Summary of adjustments made and why
- Engineer must complete, stamp and sign a **Certification of Completion** certifying all equipment and all work was conducted according to the approved design

Performance Evaluation

- Base-line Report serves as a foundation for the Performance Evaluation
- Testing is repeated twice during first two years of OM&M
- Engineer required to conduct test.
  - Must check all equipment
  - Re-test all base-line parameters from original base-line at all wells
  - Identify and assess additional potential source areas
  - Review historical remedial data
  - Generate a comprehensive review of system operation, make recommendation to improve/enhance the system …if necessary

2005 Introducing the "New and Improved Quarterly Report"

Problem: Review and interpretation of data to determine operational status takes significant PM time. Increased effort = decreased time available to do the rest of our job.

Solution: Create a spreadsheet to do our/their thinking and have the Vendors fill it out.

Electronic Monthly/Quarterly Report

- Both Monthly and Quarterly reports use a coded Quattro Pro spreadsheet.
- User friendly, focuses on actual data collected in the field and can be input directly.
- Cell input description sheet to clarify requested input data.
- When data is entered, spreadsheet evaluates performance of the remedial wells with respect to base-line data entered at startup or from system evaluation report, and current groundwater elevations

Electronic Monthly/Quarterly Report

- Flags operational problems.
  - Data indicative of short circuiting, broken lines, lines full of water, occluded screens, insufficient sparge pressures, and equipment that could need servicing.
- Data can be entered in the field for instantaneous evaluation
  - Appropriate measures can be taken during the site visit
  - Saves time and money
- Monthly reports are combined with analytical data and to generate the Quarterly Report.

Electronic Quarterly Report

- Quarterly Report focuses on what is important for successful operation and ease of interpretation.
  - Graphs Vac, flows and pressure vs time for SVE/AS
  - Calculates and archives operational time and percent of optimal system capacity
  - Graphs quarterly analytical data per well, per contaminate, vs time and highest overall contamination levels.
  - Graphs groundwater elevations per well and vs time
  - Estimates and archives pounds of hydrocarbons removed.
- Supplemented by analytical data input quarterly and contaminant isoconcentration maps and historical time series isocon maps.

Is This Successful?

- Very Effective
  - We have tripled our remedial production, even with the additional oversight.
    - » Currently have over 200 sites in active, in-situ remediation
  - Vendors have a taken a very proactive approach to their systems.
    - » Not all receive 100% incentive but since 1996 no Vendors have been disqualified for failure to maintain system operation…before, all would have been.
    - » Pride in success.
  - Last years remedial data indicated that when excluding sites with free product and less than two sampling events, the Geometric Mean of the extent of treatment (C/C_{o}) at all sites for BTEX is 0.14, MtBE is 0.057

What's Next????

- Training for staff and Vendor's field personnel….never ending
- Currently working on an SVE/AS pilot project for and expedited design/build that targets sites with similar lithology and DTW using a pre-designed trailer mounted remediation system designed to fit the geologic profile. Electronic reporting.

THE END

ROCK CHALK JAYHAWK!!