An Evaluation of a Spectrum of Performance-Based Remediation Approaches and their Impact on Achieving Site Closure

S. Shawn Turner, P.G., BCES, CDM Smith
Kent S. Sorenson, Jr., Ph.D., P.E, CDM Smith
Introduction

• Defining Performance Based Contracting
• Risk vs. Certainty
• Selecting an approach
• Case Studies
Defining Performance Based Contracting

Definition

Performance Based Contracting is a results-oriented contracting method that focuses on the outputs, quality, or outcomes that may tie at least a portion of a contractor’s payment, contract extensions, or contract renewals to the achievement of specific, measurable performance standards and requirements. These contracts may include both monetary and non-monetary incentives and disincentives.

- Principles and Practices of Public Procurement
Defining Performance Based Contracting

The term “performance-based” can be confusing because it is used to mean many different things. In reality, it can refer to a whole spectrum of project delivery models.

- MORE CERTAINTY
  Remediation technology selected and designed in general...but allows contractor flexibility to optimize design

- MORE RISK
  No remediation technology selected or minimal design...
  Performance based on concentrations reductions
Certainty vs. Risk

• More design = more certainty, more owner “risk”
• Less design = less certainty, less owner “risk”
• Risk transference debatable
  • Contractual risk
  • Project risk
  • Relevant contract mechanisms:
    • DB vs. DBB
    • Cost-reimbursement vs. firm fixed price
Certainty/Risk Spectrum in Remediation

Feasibility Study
- Nature/Extent
- Recommended Technology
- Cleanup Objectives

Remedial Design
- PDI
- Technology
- Reagent

Remedial Action
- Implementation per Specification
- Technology
- Reagent
Selecting a contracting approach

• What is the appropriate approach along the performance-based spectrum for given *remediation technologies, environmental settings, or contaminants*? What is the project *complexity*?

• What is the desired end state for “*closure*” and beneficial reuse, and how does that impact the approach?

• How is *risk management* factored into the contracting mechanism?
  • Answering this question should consider risk sharing mechanisms, such as; *bonding, insurance, off-ramps, and indemnification*.
  • What are the site specific risk factors, such as; off-site migration, future land use, etc.
Selecting a contracting approach (continued)

• Who are the relevant stakeholders, and what is their desired participation?
  • Owner, property owners, adjacent properties, regulatory agencies, etc.

• How much of a driver is cost?

• What schedule considerations need to be met?
  • Property redevelopment, consent order/permit requirements, etc.
Project Overview

• Site developed in 1960s as a landfill for industrial waste
• Primary contaminants were chlorinated solvents
• Treatment by In-Situ Chemical Oxidation
  • Injected >1,000,000 gallons of 1% permanganate solution
• Property was being remediated for sale for industrial reuse
Former Industrial Landfill, Florida Performance Based Cleanup

Contract Details

- Performance milestones based on percent complete of design, construction, and remedy effectiveness
  - 100% payment achieved with unconditional NFA
  - 90% payment achieved with conditional NFA
- Project executed as an interim corrective measure
- Client provided unlimited access to site

Project Drivers

- Schedule
- Cost
- Risk Mitigation
- Closure
- Participation
- Complexity
Conclusions

• Performance metrics and decision framework established in advance
• Technically based innovative remediation strategy led to project success
  • >90% Reduction in TVOC concentration in first 6 months
  • Site closed as conditional NFA
• Site closure changed to conditional closure due to reframed schedule demands due to expedited property transaction
Chlorinated benzenes and ethenes were released as dense non aqueous phase liquid (DNAPL).

- Soil/DNAPL Treatment Technology: Thermal Conduction Heating (TCH)
  - Thermally-Enhanced Extraction of DNAPL
- Groundwater Treatment Technology: Hydraulic Fracturing/EHC®
  - Polish remaining VOCs post –TCH to meet very stringent cleanup criteria (generally less than 5 ppb)
Hunter’s Point Naval Shipyard, California
Firm Fixed Price

Contract Details

• Firm Fixed Price, milestones at:
  • Removal of all NAPL
  • Destruction of contaminants to achieve a 90% reduction in chlorinated VOCs in soil
  • Destruction of contaminants to achieve an 80% reduction of chlorinated VOCs in groundwater.
• Achieve Objectives in Stringent 18 month Timeframe
• $3 million project budget constraint
Conclusions

- Adaptive management strategy
- Close coordination with regulators and other stakeholders
- Performance metrics and decision framework established in advance
- Rigorous, evolving conceptual site model
- Highly engaged technical and PM team, experienced with state-of-the-art technologies and optimization
Confidential Industrial Client, Texas
T&M Changed to Firm Fixed Price

Project Overview

• Legacy Site – Liability from Acquisition
• Petroleum constituents and metals in soil
• Treatment by Ex-Situ Soil Stabilization
  • Pug mill with addition of cement
• Property being remediated for sale for industrial reuse
Confidential Industrial Client, Texas
T&M Changed to Firm Fixed Price

Contract Details

- Started as T&M cleanup contract
- Rebid as a firm fixed price contract due to escalating remediation costs
- Project has separate remediation contractor and owners rep/construction oversight
Confidential Industrial Client, Texas
T&M Changed to Firm Fixed Price

Conclusions

• Production increased from ~400 tons/day to ~2,000 tons/day
• Final time to closure and total project costs significantly reduced

• Contract change resulted in significant increase in change order frequency
  • Increased risk for owner
Former Manufacturing Site, Florida
Fixed Fee/T&M Build Out

Project Overview

• Legacy Site – Liability from Acquisition
• High concentration chlorinated solvent in groundwater (DNAPL)
  • Contaminants in 3 distinct aquifer units
• Treatment by Enhanced Anaerobic Bioremediation
  • Strong Assessment, Treatability Study, Modeling
• Client did not own the property
  • Property owner wanted to eventually redevelop into hotel
Former Manufacturing Site, Florida
Fixed Fee/T&M Build Out

Contract Details

• Fixed Fee Price provided at beginning of project
• Annual budgets were approved as T&M, but tracked against overall fixed fee price and remediation progress
• Contract structure allowed maximum participation between contractor, owner, property owner and regulatory agency
Conclusions

• Effective remediation strategy developed collaboratively
  • >90% TVOC reduction in first 6 months; >99% overall reduction
  • Closed with a conditional NFA
  • Project won multiple National Awards
• Upfront cost clarity ensured project completed on budget
• More traditional approach was a slower model to closure – schedule not a project driver
Conclusions

• Performance based contracting can exist in many forms along a spectrum of contracting mechanisms

• Successful contracting selection considers many of the same factors as remedial strategy selection, and should be just as carefully and thoughtfully considered

• The best contracting mechanism is the one that is tailored for a specific site, and that benefits all stakeholders