Plans for Risk Analysis and Contingency

NLC Costing Workshop
April 24-27, 2000
Review of Approach Used for Lehman Review
Part 1 - Risk Scoring

• Risk Evaluation and Scoring Process
  – Performed at Component/Task Level
  – Design Risk, Design Maturity, Supplier Risk, Cost Estimate Maturity, Schedule Risk Each Scored From 1 to 10
    • Modified U.S. Atlas Scoring Methodology
  – Entered Into ACCESS Database and Available for Management Review

• Contingency Not Calculated by Risk Scorer
  – Advantages
    • Retain Scoring Detail Lost When Contingency Calculated
    • Allow Scoring to be Minimally Influenced by the “Right” Contingency Number

• Coverage
  – ~150 High Cost Items Scored for Risk
Review of Approach Used for Lehman Review
Part 2 - Contingency Calculation

• Contingency Generation Process
  – Performed at Project Manager Level
  – Algorithm Runs Inside ACCESS
    • High Scores are Emphasized; Low Scores De-Emphasized
      – Baseline Algorithm is Cubic
    • Scoring is Weighted: Technical and Manufacturing High (100); Schedule Low (20); Others at 40-50

• Results
  – Contingency Generated at 30% Level with Little Normalizing Required
Appraisal of Approach Used for Lehman

- **Advantages**
  - Common Approach for DOE Projects
    - Familiar and Comfortable to Reviewers
    - Fairly Straightforward to Generate Risk Scores

- **Disadvantages**
  - No Proof or Evidence That This Approach Generates the Appropriate Contingency
  - Considerable Experience That This Approach Does Not Always Work
  - Dynamic Range Always Less Than Reality Provides For

- **Premise**
  - We Must Adopt an Approach That is Bullet-Proof
Contingency Generation Alternatives

• Few Choices Available - (Modified) Lehman Approach or Probabilistic Approach

• Basis for Evaluating Alternatives
  – Relative Merits of Different Approaches

• Most Bullet-Proof Approach Appears to be Adopting Probabilistic Costs
  – Single Point Estimates (One Number) For Each NLC Activity/Item are Replaced by a Range of Possible Costs
  – This Range Has Defined Probabilities of Occurrence
  – The Range of Possible Total Project Costs is Generated by a Monte Carlo Simulation of All the Project Activities/Items
  – The Contingency is Automatically Generated Along With a Probability of Occurrence
Factors Affecting Risk/Contingency Choice

• Problems with Point Estimates
  – Unacceptable per OMB Rules
    • Will Fail to Pass an Independent Project Review
  – Not Recommended for Major Projects by Project Management/Risk Literature
  – Does Not Directly Deal with Cost Implications of Risk and Uncertainty
  – Allows Risk Information to Remain Buried Within Point Estimates
  – Cause Every Other DOE Project Difficulty

• Problems with Probabilistic Approach
  – Not Established DOE Practice
  – Obtaining Probability Distributions Requires Much More Work
  – More Complex, Different, and Sometimes Arbitrary Approach

• Benefits of Probabilistic Approach
  – Contingency Becomes Automatic and Meaningful
  – Uncertainty and Risk Explicitly Quantified, Reviewed, and Included
Tentative Plan for Risk/Contingency

- Wait Until Cost Estimates Settle Down - (May 18?)
- Decide if Risk Scoring Maintained/Modified/Dropped
- Decide if Probabilistic Costing is Attempted
  - Scope
  - Complexity
- Write Up Process to be Utilized; Work with Estimators
- Perform a First Cut
- Evaluate the Results
Monte Carlo Example
($2.9 B of Lehman Costs)

NLC Monte Carlo Histogram Results
500 Draws; $200M Buckets; No Cross-Correlation

CD-1 = $2.9 B
Mean = $3.2 B
Monte Carlo Example
($2.9 B of Lehman Costs)

NLC Monte Carlo Histogram Results
All Hardware and All Conventional Facilities Completely Correlated Within Themselves

CD-1 = $2.9 B
Mean = $3.1 B