



# Willis

## **Cost Cap Insurance and Blended Finite Programs**

Willis Environmental Practice  
Atlanta, GA  
June 26, 2003

***“There are two times in a man’s  
life when he should not speculate:  
When he can’t afford it and when  
he can.”***

**Mark Twain**

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## Cost Caps

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## Cost Cap Insurance

- **Purpose**

- **Protect Against Cost Growth in Remediation and Corrective Action Projects**

- **Uses**

- **Budget Certainty for Project Cost Control**
- **Minimize Impact of Unexpected Cost Growth**
- **Allow Expanded Use of Lump Sum/Fixed Price Contracts**
- **Aid in Cost Negotiations**
- **Provide “Second Set of Eyes”**

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## Potential Applications

- Remediation and Corrective Action Projects
- Operation, Maintenance & Management Activities
- Engineering and Oversight Activities
- Single Sites and Portfolios

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## Form

### Insuring Agreement

The Company agrees to pay on behalf of the INSURED for REMEDIATION EXPENSE, incurred pursuant to and necessary to complete the SCOPE OF WORK stated in the Remediation Stop Loss Schedule, in excess of the Self-Insured Retention Amount stated in the Declarations and subject to any CO-PAYMENT PARTICIPATION stated in the Declarations, that is based on or arises from:

1. discovery, during the POLICY PERIOD, of POLLUTION CONDITIONS not identified within the SCOPE OF WORK; or
2. increased levels or quantities of POLLUTION CONDITIONS identified within the SCOPE OF WORK, to the extent such increased levels are discovered during the POLICY PERIOD; or
3. changes in GOVERNMENT ACTION, as pertaining solely and exclusively to the SCOPE OF WORK, during the course of the POLICY PERIOD

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## Form (Cont'd)

- **Policy Term**
  - Duration of Cleanup and/or O&M Activities
- **Limits**
  - Limits Normally Range from One to Two Times Expected Cost
- **Retention and Buffer**
  - Retention is Expected Cost Plus a Buffer Layer (5% to 25% of Expected Costs)
  - May Require a Co-pay Provision

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## Form (Cont'd)

- **Reporting**
  - Summary of Contractor's Progress Reports
    - Quarterly Reports
    - Until 75% of Project Costs
  - Monthly Reporting until Project is Completed
  - Must Report All Major Changes to Project
- **Premiums Range Between 4%-15% of Estimated Costs**

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## Underwriting Data

- **Scope of Work**
- **Project Schedule and Estimated Cost**
  - Engineer's Estimate/Contractor's Proposal
  - Consent Decree/Administrative Order
  - Remedial Action Plan/Voluntary Clean-up Agreement/  
OM&M Plan
- **Site Background Data**
  - Location
  - Sampling Data
  - Previous Actions
- **Technology to be Employed**

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## Cost Estimates

- **Work Breakdown Element (WBE)**
  - Basic Element of Project Task
  - Sum Costs of All WBEs to Establish Project Cost Estimate
- **Quantity**
  - Volume
  - Mass
  - Length
  - Number
  - Time
- **Price**
  - Unit Price or Lump Sum
  - Contingencies
  - Overhead and Profit

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## Cost Modeling

- Stochastic
- Expected Value or Weighted Average
- Probabilistic

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## Stochastic Cost Model

- Deterministic Values for Quantities and Prices
- Most Common Estimating Method Used by Contractors When Preparing Bids
- Does Not Account for Uncertainty Except through a Contingency Factor
- Not the Best Method for Establishing Engineer's Estimate

$$\text{Estimated Cost} = (\text{Quantity}) * (\text{Price})$$

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## Weighted Average

- Attempts to Account for Uncertainty in Cost Estimates
- Three Scenarios
  - Optimistic Cost Estimate (OCE)
  - Most Likely Cost Estimate (MCE)
  - Pessimistic Cost Estimate (PCE)
- Assign Probability/Weight to Each Scenario (P)
- Combine Three Scenarios to Determine Expected Value Cost (EVC)

$$EVC = (OCE) * (POCE) + (MCE) * (PMCE) + (PCE) * (PPCE)$$

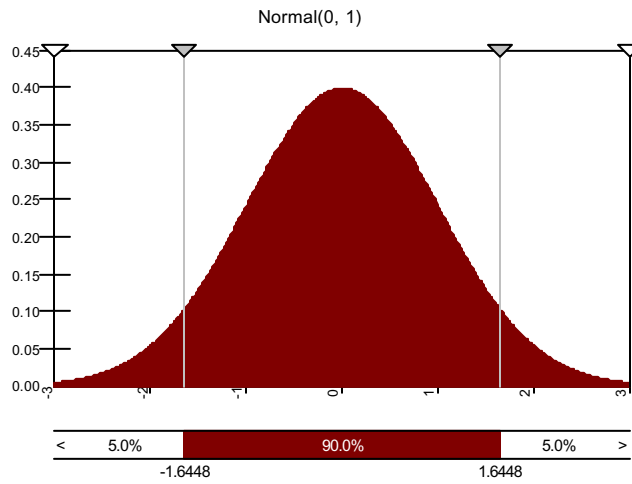
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## Probabilistic Model

- Accounts for Uncertainty through Monte Carlo Simulation
- Probability Distribution Assigned to each Unit Cost and Each Quantity
- Probabilistic Model
  - Run 10,000 Iterations
  - Each Iteration uses a randomly selected value of Unit Costs and Quantities
  - Monte Carlo Software Combines Iterations to Create a Final Cost Distribution
- Estimated Cost is Selected from the Final Distribution – Usually between the 10% and 90 Percentiles

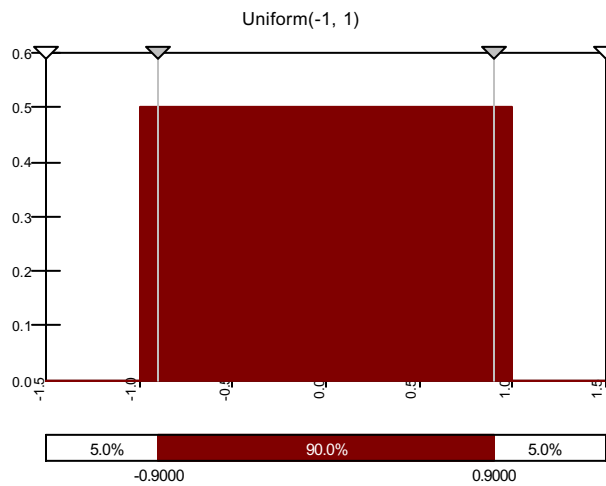
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## Common Distributions - Normal



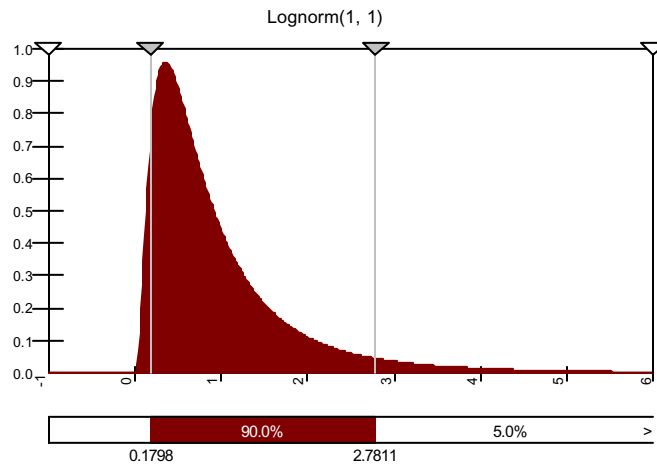
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## Common Distributions - Uniform



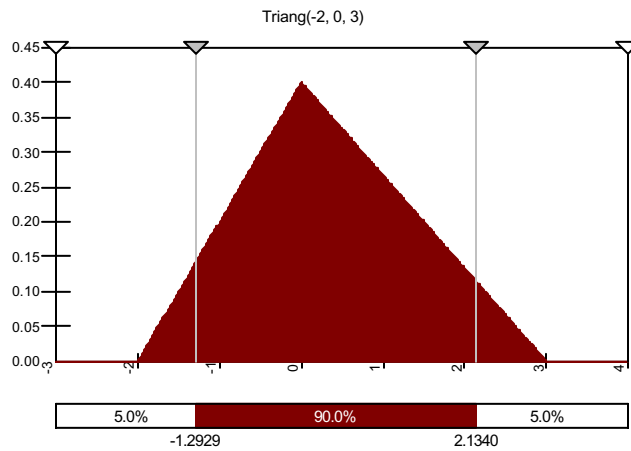
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## Common Distributions – Log Normal



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## Common Distributions – Triangular



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## Example – Stochastic Estimate

| Task  | Cost               |
|---|--------------------|
| Clear and Grub                                | \$61,098           |
| Drum Removal                                  | \$25,662           |
| Off-site Transportation and Landfill Disposal | \$2,277            |
| In Situ Solidification                        | \$910,105          |
| Excavation                                    | \$905,864          |
| Off-site Transportation and Landfill Disposal | \$4,712,230        |
| Groundwater Extraction Wells                  | \$33,860           |
| Carbon Adsorption                             | \$9,854            |
| Monitoring Technology                         | \$100,194          |
| Cleanup and Landscaping Technology            | \$8,672            |
| <b>Total Project</b>                          | <b>\$6,769,816</b> |

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## Example – Weighted Average Estimate

| Task  | Cost               |                    |                     |
|---|--------------------|--------------------|---------------------|
|   | Optimistic         | Most Likely        | Pessimistic         |
| Clear and Grub                                | \$30,549           | \$61,098           | \$109,976           |
| Drum Removal                                  | \$17,963           | \$25,662           | \$48,758            |
| Off-site Transportation and Landfill Disposal | \$1,822            | \$2,277            | \$3,188             |
| In Situ Solidification                        | \$546,063          | \$910,105          | \$1,592,684         |
| Excavation                                    | \$588,812          | \$905,864          | \$1,721,142         |
| Off-site Transportation and Landfill Disposal | \$2,827,338        | \$4,712,230        | \$6,361,511         |
| Groundwater Extraction Wells                  | \$16,930           | \$33,860           | \$60,948            |
| Carbon Adsorption                             | \$6,898            | \$9,854            | \$14,781            |
| Monitoring Technology                         | \$80,155           | \$100,194          | \$186,361           |
| Cleanup and Landscaping Technology            | \$3,469            | \$8,672            | \$11,274            |
| <b>Total Project</b>                          | <b>\$4,119,998</b> | <b>\$6,769,816</b> | <b>\$10,110,621</b> |
| Probability                                   | 15%                | 55%                | 30%                 |
| <b>Weighted Component</b>                     | <b>\$618,000</b>   | <b>\$3,723,399</b> | <b>\$3,033,186</b>  |
| <b>Weighted Average Cost</b>                  |                    |                    | <b>\$7,374,585</b>  |

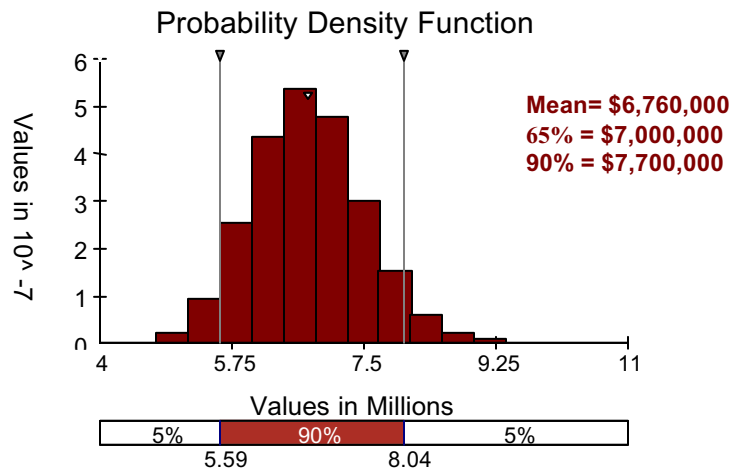
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## Example – Probabilistic Estimate

| Task  | Cost               | Distribution |
|---|--------------------|--------------|
| Clear and Grub                                | \$61,098           | Uniform      |
| Drum Removal                                  | \$25,662           | Uniform      |
| Off-site Transportation and Landfill Disposal | \$2,277            | Triangular   |
| In Situ Solidification                        | \$910,105          | Normal       |
| Excavation                                    | \$905,864          | Log Normal   |
| Off-site Transportation and Landfill Disposal | \$4,712,230        | Log Normal   |
| Groundwater Extraction Wells                  | \$33,860           | Normal       |
| Carbon Adsorption                             | \$9,854            | Triangular   |
| Monitoring Technology                         | \$100,194          | Normal       |
| Cleanup and Landscaping Technology            | \$8,672            | Uniform      |
| <b>Total Project</b>                          | <b>\$6,769,816</b> |              |

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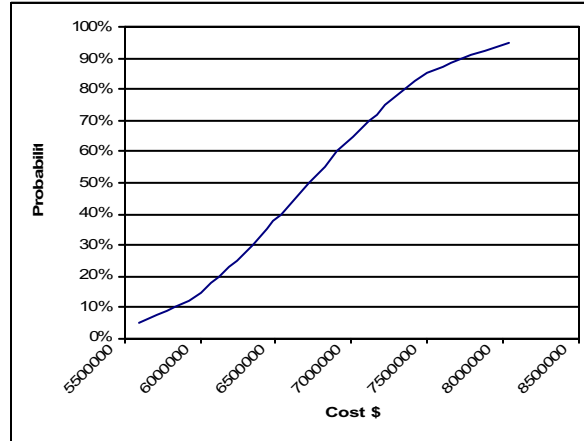
## Example – Probabilistic Estimate



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## Example – Probabilistic Estimate

### Cumulative Distribution Function



Mean = \$6,760,000  
65% = \$7,000,000  
90% = \$7,700,000

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## Blended Finite Programs

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## Blended Finite Programs

- **Purpose**
  - **To Provide a Blend of Funded and Unfunded Risk Financing Mechanisms to Manage Risks not Amenable to Traditional Risk Transfer Programs**
- **Uses**
  - **Balance Sheet Cleansing**
  - **Tax Implications**
    - **Immediate Realization of Environmental Expenses**
    - **Beneficial Receipt**
  - **“Walk Away” Program**

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## Potential Applications

- **Remedial and Corrective Actions**
- **Operation & Maintenance Activities**
- **Liability Buyouts**
- **Long-term Liabilities**

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## Form

### Insuring Agreement

We will pay loss that the insured becomes legally obligated to pay as a result of a claim for **BODILY INJURY, PROPERTY DAMAGE or REMEDIATION COSTS**, resulting from a **POLLUTION INCIDENT** that commenced prior to the **DELINEATION DATE**, and is on, under or migrating beyond the boundaries from the insured site, provided such claim is first made against the insured and reported to us in writing during the **POLICY PERIOD**. We will also pay **REMEDIATION COSTS** resulting from **discovery** of a **POLLUTION INCIDENT** that commenced prior to the **DELINEATION DATE**, and is on or under the insured site, provided that such **POLLUTION INCIDENT** is reported to us in writing as soon as possible after discovery and in any event during the **POLICY PERIOD**

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## Program Components

- **Components**

- **Funded Layer**
- **Cost Cap**
- **Third Party (EIL) Coverage**

- **Term**

- **Normally Length of Project Including O&M Period**
- **Can Range from 5 to 30+ Years**

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## Program Components (Cont'd)

- **Limits**

- **Normally One to Two Times Expected Costs**
- **Shared Among all Coverages**

- **Retentions**

- **Clean-up and O&M Activities – First Dollar**
- **EIL - \$25,000 to \$250,000**

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## Program Components (Cont'd)

- **Pricing**

- **Funded Layer**
  - **Net Present Value of Inflated Future Costs**
  - **Buffer**
- **Cost Cap (4% to 15% of Funded Layer)**
- **EIL (Based on Risk)**
- **Carrier Charges (2% to 8% of Funded Layer)**

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## Underwriting Data

- **Scope of Work**
- **Project Schedule and Estimated Cost**
  - **Engineer's Estimate/Contractor's Proposal**
  - **Consent Decree/Administrative Order**
  - **Remedial Action Plan/Voluntary Clean-up Agreement/ OM&M Plan**
- **Site Background Data**
  - **Location**
  - **Sampling Data**
  - **Previous Actions**
- **Technology to be Employed**

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## Example – Blended Finite Program

- **Project Details**
  - **1 Year of Source Control: Drum Removal, Soil Excavation and Stabilization**
    - **\$6,700,000 in 2003 Dollars**
  - **30 years OM&M**
    - **Year 1 = \$83,000 in 2003 Dollars**
    - **Years 2-30 = \$50,000/year in 2003 Dollars**
- **Inflation Rate = 3%**
- **Discount Rate = 5%**

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## Example – Blended Finite Program

- **Program Terms**

- **30 Year Program**
- **Cost Cap Limit = \$10,000,000**
- **EIL Limit = \$5,000,000; SIR \$100,000 per Occurrence**
- **Total Inflated Costs = \$9,153,000**

- **Pricing**

- **Net Present Value = \$7,484,000**
- **Cost Cap = \$524,000**
- **EIL = \$400,000**
- **Frictional Costs = \$150,000**
- **Program Total = \$8,558,000**

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