



# Reclamation and Bonding, SRCE Model



June 16, 2025

# Purpose of Reclamation Costs and Financial Sureties/Purpose of the Discussion

- Build an understanding of the SRCE model and how it is used for estimating reclamation costs
- Understand the value and limitations in using SRCE to set closure cost estimates for effective bonding
- Discuss approach for review of the closure cost estimate
- Develop expectations for updating and auditing closure cost estimates

## Meeting Outline:

- Purpose and Scope of Reclamation Costs and Surety Bonds
- Example: Waste Rock Facility Closure
- Overhead and Indirect Costs
- Other Facilities Closure
- Water Treatment Costs
- Surety Updating and Auditing
- Critical Success Factors for SRCE
- Questions and Discussion

Approved  
Mine Plan

Approved  
Reclamation Plan

Required  
Mitigation Measures

Reclamation  
Cost Estimate

Contingency  
Cost Estimate

Selection of Surety  
Instruments

# Surety Bonds Cover

- Buildings and foundations
- Electrical power lines
- Electrical substations and transformers
- Exploration drillholes and trenches
- Exploration roads and pads
- Fences
- Heap leach ore processing facilities
- Laydown yards
- Landfills
- Material borrow areas and quarries
- On-site worker housing
- Open pits
- Operational ponds
- Operational stormwater controls
- Pipelines
- Power generation equipment
- Roads (access and mine haulage)
- Process water inventory management
- Septic systems
- Site mechanical infrastructure
- Tailings storage facilities
- Tanks
- Underground mining openings
- Waste rock disposal facilities
- Water treatment
- Well abandonment
- Construction management
- Contractor mobilization and demobilization
- Haulage of materials
- Site security
- Stormwater and sediment control during closure
- Waste disposal
- Post-closure performance monitoring



# Why Develop a Standard Reclamation Cost Estimator (SRCE)?

- **Pre-2002:**
  - Mine and exploration project proponents prepared reclamation cost estimated independently by their own methods.
  - State and Federal regulatory agencies reviewed and approved reclamation cost estimates independently.
  - Estimates and approvals had different costs for fuel and consumables, material quantities, equipment productivity, and other factors.
  - Reconciliation between similar projects and between agency decisions on the same project was difficult.
- **2002–2006:**
  - Development of a standardized approach for proponent submittals and agency decisions.
- **Post-2006**
  - Each year, agencies set approved unit rates for fuel and consumables, equipment productivities, and labor rates.
  - Proponents use the same approach to identify closure activities and calculate material quantities.
  - The activities and material quantities are converted into costs by applying the agency approved unit rates.
  - Reclamation cost estimates between similar projects and agency decisions can be reconciled.



# Example: Waste Rock Facility Closure

The activities associated with waste rock facility closure are:

1. Equipment mobilization
2. Grading for physical stability
3. Placement of cover material and growth media
4. Revegetation of the cover
5. Reclamation performance monitoring
6. Water quality monitoring
7. Overhead and contingency



# Example: Waste Rock Facility Closure

## 1. Equipment mobilization

Set this aside for the moment, we'll come back to it.





# Example: Waste Rock Facility Closure

## 2. Grading for physical stability

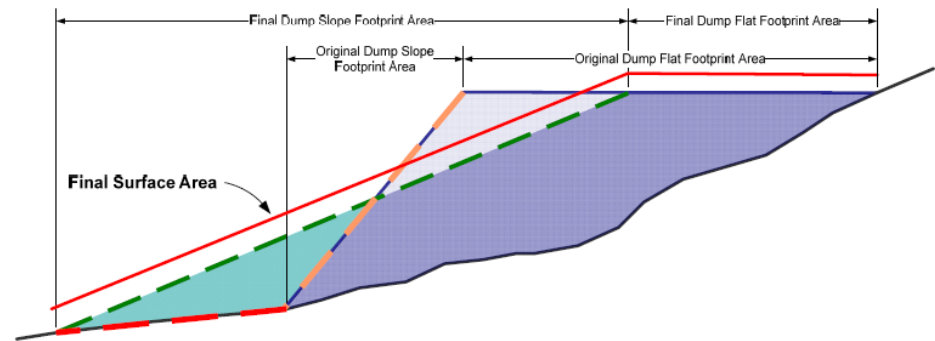
User provides the height and angle of the waste rock facility.

The SRCE model calculates the amount of material to be moved

User specifies the type of equipment to be used (e.g., large dozer)

The SRCE model uses approved equipment productivity to calculate the number of hours needed to grade that amount of material.

The SRCE model uses approved costs to calculate the labor and equipment costs for the length of time needed for grading.



Source: SRCE Users Manual

# Example: Waste Rock Facility Closure

## 3. Cover and Growth Media Placement

User provides the acreage to be covered, the cover thickness, and the growth media thickness.

The SRCE model calculates the amount of material for the cover and growth media to be hauled and placed.

User specifies the distance for cover and growth media haulage, type of equipment used for haulage (e.g., truck size), and the type of equipment used to place the material (e.g., scraper)

The SRCE model uses approved equipment productivity to calculate the number of hours needed to haul and place that amount of material.

The SRCE model uses approved costs to calculate the labor and equipment costs for the length of time needed for hauling material and placing the cover and growth media.



# Example: Waste Rock Facility Closure

## 4. Revegetation

User provides the acreage to be revegetated, selects the agency seed mix, and specifies revegetation approach (i.e., mulch, fertilize, scarification, etc.).

The SRCE model calculates the amount of material required.

User specifies the equipment to be used for preparing the surface for re-seeding (e.g., medium dozer for scarification).

The SRCE model uses approved equipment productivity to calculate the number of hours needed to prepare the surface for re-seeding.

The SRCE model uses approved costs to calculate the labor and equipment costs for re-seeding along with the material costs (e.g., seed, mulch, fertilize).



# Example: Waste Rock Facility Closure

## 1. Equipment mobilization

The equipment needed for grading, cover and growth media placement, and revegetation is compiled.

The user provides a mobilization estimate for that equipment using R.S Means mobilization costs and Davis-Bacon wages for the mileage and travel time from an agency-specified equipment source to the mine location.





# Example: Waste Rock Facility Closure

## 5. Reclamation Performance Monitoring

The user provides an estimate for monitoring hours and travel hours from an agency-specified location for a three-year monitoring period.

The user provides an estimate of the percentage of the reclaimed area that will need additional erosion maintenance and re-seeding based on the monitoring.

The SRCE model uses agency approved labor and material costs to estimate the cost of monitoring and maintenance.



# Example: Waste Rock Facility Closure

## 6. Water Quality Monitoring

The user provides an estimate for monitoring hours and travel hours from an agency-specified location for the agency-specified monitoring period.

The user provides an estimate of the number of water quality samples to be collected and submitted to a certified analytical laboratory for analysis.

The SRCE model uses agency approved labor and analytical costs to estimate the cost of monitoring.



# Example: Waste Rock Facility Closure

## 7. Overhead and Contingency Costs

Agency-specified percentages of total costs for:

- Engineering Design
- Contingency
- Insurance
- Performance Bonds
- Contractor Profit
- Contract Administration
- Agency Overhead

The SRCE model calculates these based on the cost estimate from the preceding steps.



# Example: Waste Rock Facility Closure (SRCE Model Screen Captures)

Waste Rock Dumps - User Input				You must fill in ALL green cells in this section for each dump, lift or dump category							
Facility Description				Physical - MANDATORY							
	Description (required)	ID Code	Type	Underlying Ground Slope % Grade	Ungraded Slope H:V	Final Slope H:V	Final Top Slope % Grade	Lift (dump) Height ft	Mid-Bench Length ft	Average Flat Area Long Dimension (ripping) ft	Final (Regraded) Dump Footprint acres
1	Pipeline WRF w/ 100' lifts	2020	Waste Rock Dump	1.0	1.3	2.5	0.0	100	94,820	300	695.00
2	Pipeline WRF 50' lifts	2020	Waste Rock Dump	0.0	1.3	2.5	0.0	50	42,410	300	122.00
3	Pipeline WRF w/ 100' lifts (including ore stockpile)	2020	Waste Rock Dump	0.0	1.3	2.5	0.0	100	111,900	300	1222.00
4	Pipeline WRF Refractory Stockpile 50' lift	2020	Ore Stockpile	0.0	1.3	2.5	0.0	50	2,010	300	6.00
5	Pipeline WRF- Refractory Stockpile 100' lifts	2020	Ore Stockpile	0.0	1.3	2.5	0.0	100	13,510	300	250.00
6	Pipeline WRF Growth Media Stockpile 50' lift	2020	Waste Rock Dump	0.0	1.3	2.5	0.0	50	1,110	300	3.00
7	Pipeline WRF Growth Media Stockpile 100' lifts	2020	Waste Rock Dump	0.0	1.3	2.5	0.0	100	5,195	300	64.00

Waste Rock Dumps - User Input (cont.)				You must fill in ALL green cells and relevant blue cells in this section for each dump, lift or dump category											
				Grading			Cover		Growth Media		Revegetation				
	Description (required)	Regrading Material Condition (select)	Regrading Material Type (select)	Regrading Equipment Fleet (select)	Slot/Side-by-Side (select)	Cover Material Type (select)	Cover Placement Equipment Fleet (select)	Growth Media Material Type (select)	Growth Media Equipment Fleet (select)	Seed Mix Slopes (select)	Seed Mix Flat Areas (select)	Mulch Slopes (select)	Mulch Flat Areas (select)	Fertilizer Slopes (select)	Fertilizer Flat Areas (select)
1	Pipeline WRF w/ 100' lifts	1	Alluvium	Large	Yes	Alluvium	Tandem Scra	Alluvium	Tandem Scrape	Mix 2	Mix 2	None	None	None	None
2	Pipeline WRF 50' lifts	1	Alluvium	Large	Yes	Alluvium	Tandem Scra	Alluvium	Tandem Scrape	Mix 2	Mix 2	None	None	None	None
3	Pipeline WRF w/ 100' lifts (including ore stockpile)	1	Alluvium	Large	Yes	Alluvium	Tandem Scra	Alluvium	Tandem Scrape	Mix 2	Mix 2	None	None	None	None
4	Pipeline WRF Refractory Stockpile 50' lift	1	Alluvium	Large	Yes	Alluvium	Tandem Scra	Alluvium	Tandem Scrape	Mix 2	Mix 2	None	None	None	None
5	Pipeline WRF- Refractory Stockpile 100' lifts	1	Alluvium	Large	Yes	Alluvium	Tandem Scra	Alluvium	Tandem Scrape	Mix 2	Mix 2	None	None	None	None
6	Pipeline WRF Growth Media Stockpile 50' lift	1	Alluvium	Large	Yes	Alluvium	Tandem Scra	Alluvium	Tandem Scrape	Mix 2	Mix 2	None	None	None	None
7	Pipeline WRF Growth Media Stockpile 100' lifts	1	Alluvium	Large	Yes	Alluvium	Tandem Scra	Alluvium	Tandem Scrape	Mix 2	Mix 2	None	None	None	None
8	Pipeline Ore Stockpile (PLOR)	1	Alluvium	Large	Yes	Alluvium	Tandem Scra	Alluvium	Tandem Scrape	Mix 2	Mix 2	None	None	None	None

Waste Rock Dumps - Regrading Costs															
Productivity = Dozer Productivity x Grade Correction x Density Correction x Operator (0.75) x Material x Visibility x Job Efficiency (0.83) x (Slot/Side-by-Side) x (Altitude Deration)															
	Description (required)	Regrading Volume cy	Dozing Distance (see above) ft	Regrading Fleet	Uncorrected Dozer Productivity cy/hr	Grade Correction	Dozing Material	Density Correction	Side-by-Side or Slot Dozing	Total Hourly Productivity cy/hr	Total Dozer Hours hr	Total Labor Cost \$	Total Equipment Cost \$	Total Regrading Cost \$	
1	Pipeline WRF w/ 100' lifts	5,299,384	144	D10R	1,194	1.6	1.0	0.79	1.2	1,127	4,702	\$335,582	\$1,816,195	\$2,151,777	
2	Pipeline WRF 50' lifts	589,028	72	D10R	2,152	1.6	1.0	0.79	1.2	2,032	290	\$20,697	\$112,015	\$132,712	
3	Pipeline WRF w/ 100' lifts (including ore stockpile)	6,216,667	143	D10R	1,201	1.6	1.0	0.79	1.2	1,134	5,482	\$391,250	\$2,117,477	\$2,508,727	
4	Pipeline WRF Refractory Stockpile 50' lift	27,917	72	D10R	2,152	1.6	1.0	0.79	1.2	2,032	14	\$999	\$5,408	\$6,407	
5	Pipeline WRF- Refractory Stockpile 100' lifts	750,556	143	D10R	1,201	1.6	1.0	0.79	1.2	1,134	662	\$47,247	\$255,704	\$302,951	
6	Pipeline WRF Growth Media Stockpile 50' lift	15,417	72	D10R	2,152	1.6	1.0	0.79	1.2	2,032	8	\$571	\$3,090	\$3,661	
7	Pipeline WRF Growth Media Stockpile 100' lifts	288,611	143	D10R	1,201	1.6	1.0	0.79	1.2	1,134	255	\$18,199	\$98,496	\$116,695	
8	Pipeline Ore Stockpile (PLOR)	611,111	143	D10R	1,201	1.6	1.0	0.79	1.2	1,134	539	\$38,468	\$208,194	\$246,662	





# Overhead and Indirect Costs

Contingency rates are between 2% and 50% depending on jurisdiction and total direct costs.

Example of factors applied (Idaho):

- Engineering, Design, and Construction Planning (3% to 7%)
- Contingency (12% to 22%)
- Insurance (approximately 1.5%)
- Performance Bonding (2.5% - 3.5%)
- Contractor Profit (6% to 10%)
- Contract Administration (5% to 9%)
- Agency Overhead (4% to 8%)

# Reclamation of Other Site Facilities

Reclamation for the other site facilities follow similar steps and the same basis logic:

- Estimate material quantities
- Develop a time estimate for completion based on equipment productivity
- Calculate labor and equipment costs
- Calculate material costs
- Add mobilization and monitoring costs
- Add overhead and indirect costs



# Water Treatment Costs

- Interim water management (e.g., continued circulation of process waters while preparing for water treatment and/or disposal),
- Impacted groundwater and/or surface water capture and active water treatment,
- Closure period water management (e.g., evaporation, active water treatment plant discharge),
- Post-closure water (e.g., conversion to long-term monitored passive water treatment upon success of closure period water management), and
- Water quality performance monitoring.

Cost estimate based on estimated volume of water to manage and time for facilities (e.g., tailings storage facility) draindown along with agency-approved labor and electrical power rates.



# Surety Updating and Auditing

## Update

1. When there is a change to the mine plan
2. When there is a change to the reclamation plan
3. Per an agency-set schedule to account for changes in unit rates

## Audit

- Review acceptability of existing surety instruments or instrument changes
- Review terms of Reclamation Plan approval
- Check fulfillment of Monitoring Plan requirements
- Review as-built maps for the facilities for comparison to bonded acreages and activities
- Conduct field inspections
- Confirm bonding is current and consistent with any Plan Modifications approved



# Critical Success Factors for SRCE

1. Collaboration between agencies requiring/holding reclamation sureties
2. Annual agency adoption of approved costs and equipment productivities:  
Fuel, Electrical power, Consumables, Labor rates, Equipment productivities from equipment manufacturer data, Location(s) for mobilization of personnel and equipment
3. Agency adoption of targets/ranges for overheads and contingency
4. Encourage permittees to utilize SRCE
5. Establish a schedule for updates and audits
6. Develop a procedure/methodology for SRCE review:
  - Check facilities/equipment in the Consolidated Permit are in the SRCE model
  - Request current facility as-built information
  - Check for permit modifications since the last SRCE review
  - Check authorized facility acreage with SRCE model inputs
  - Check required cover and growth media thicknesses and stockpile locations
  - Check cover and growth media availability versus closure requirements
  - Check feasibility of equipment selections
  - Check for updates to seed mixes



# Questions and Discussion

