

Operating Cost for Miners

Understanding and Reducing Mine Costs

Prepared for:

CIM Convention BC2022
May 2, 2022

Prepared by:

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Operating Expenditures

Operating costs are expenses associated with an operating mine on a day to day basis.



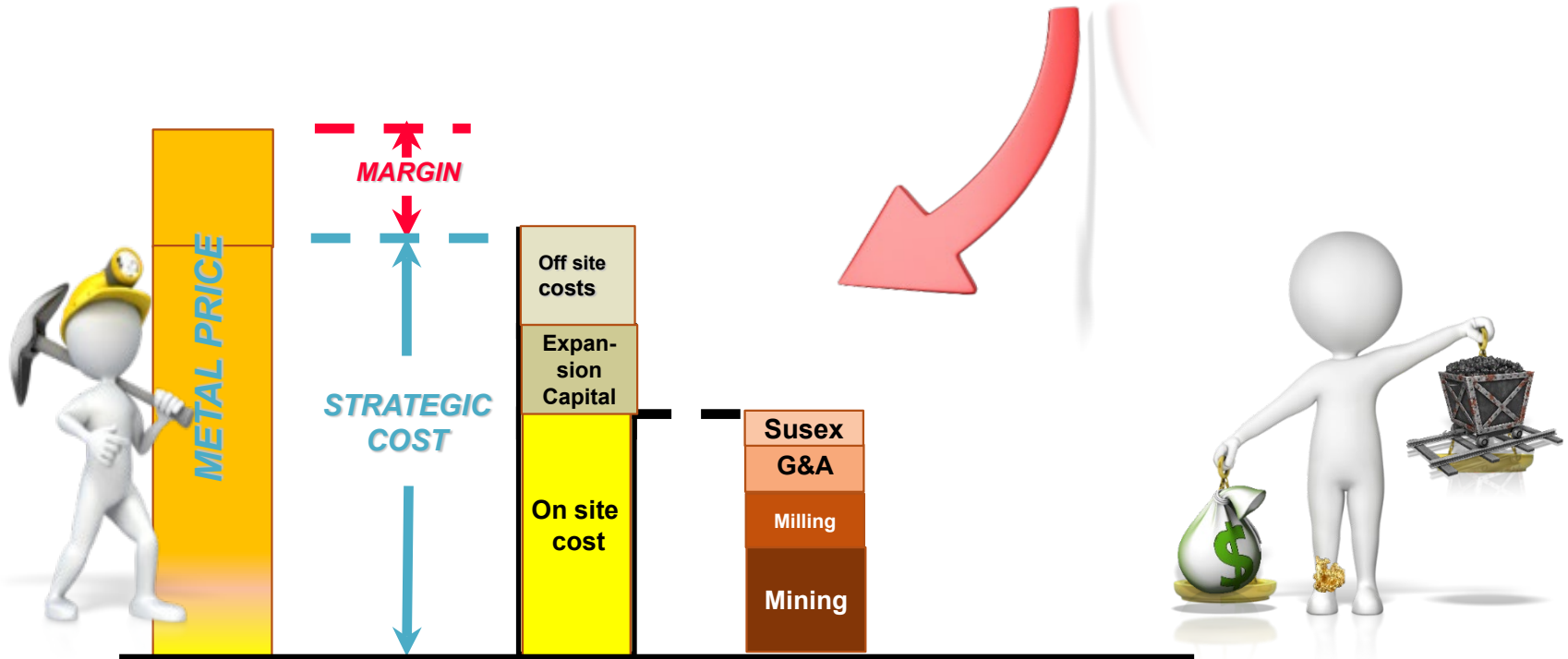
Sustaining Expenditures

Sustaining Capital Cost represents capital expenditures that must be incurred on a periodic basis to maintain production at the current level.

- Capital mine development
- Improvement capital
- Replacement capital

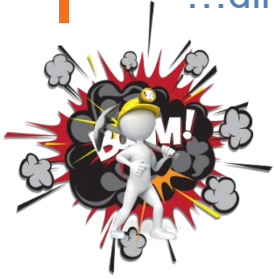


Off and Onsite Expenditures



On Site Cost Categories (AISC)

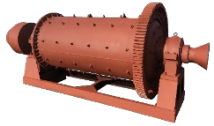
...direct labour, supplies, services and consumables, equipment, energy...



60%

Mining

...to break, excavate, haul material to the mill and all supporting services to complete this category



25%

Milling

...for crushing, grinding, flotation, etc...



15%

General and Administration (G&A)

the necessary costs to maintain and administer the daily operations



15 to
45% of
opex

Sustaining Capital

... for capital mine development, improvement capital and replacement capital

Operating Cost Process Based

- Personnel Cost 40%
 - Labour
 - Salary
 - Benefits
- Materials and Supplies 35%
 - Consumables (Drilling Supplies and Explosives)
 - Utilities
 - Maintenance
- Services 10%
 - Contractors
 - Consultants
 - Rentals
- Energy 15%
 - Fuels, Lube and Power

Mine G&A

Technical
Management
Administration
Supervision

Operating Cost Activity Based

Direct
Mining

Lateral Development
Back Fill
Production Drilling
LHD Mucking
Production Blasting
UG Truck Haulage
UG Rail Haulage

Mine
Services
and
Supplies

Raise boring
Muck Circuit
Hoist and Shaft Services
Training
Roadway Upkeep
Supplies Handling
Services - Utilities
Plant Security

Haulage and
Crushing

UG Truck Haulage
UG Rail Haulage



Operating Cost Process Based “ARE”

— Personnel Cost 40%

- Labour
- Salary
- Benefits

— Materials and Supplies 35%

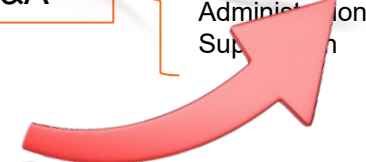
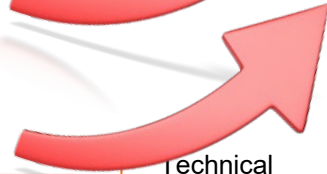
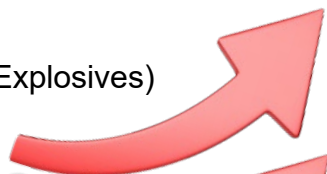
- Consumables (Drilling Supplies and Explosives)
- Utilities
- Maintenance

— Services 10%

- Contractors
- Consultants
- Rentals

— Energy 15%

- Fuels, Lube and Power



Mine G&A

Technical Management Administration Support

Operating Cost Activity Based “Do”

Direct Mining

- Lateral Development
- Back Fill
- Production Drilling
- LHD Mucking
- Production Blasting
- UG Truck Haulage
- UG Rail Haulage

Mine Services and Supplies

- Raise boring
- Muck Circuit
- Hoist and Shaft Services
- Training
- Roadway Upkeep
- Supplies Handling
- Services - Utilities
- Plant Security

Haulage and Crushing

- UG Truck Haulage
- UG Rail Haulage



Operating Activity Based Cost

- Gathers data about their operating costs and activities.
- Costs are assigned to specific activities, i.e. drilling, blasting, haulage.
- Activities are associated with the generated overall average tonnes produced per day.
- Enables the mine to decide which activity may be increasing their profitability, and which are contributing to losses.
- Generates data to create a better budget and gain a greater overall understanding of the expenses that are required to keep the mine running.



Fixed and Variable Costs

- **Fixed Costs** are costs that don't change based on the activity:
 - *Property taxes on site, camp costs, G & A and labour, leasing*
- **Variable Costs** are costs that do change based on the activity:
 - *Drilling, loading, mucking*
- **Combined Costs:** Most mine costs are a combination of the two.
 - *Milling (50/50)*
- *Depending on production tonnes these costs can change a lot! Because of the fixed cost component!*



Increase Production to Reduce Costs



Fixed Cost

\$110,000 per day for labour and leasing, Or \$110/t

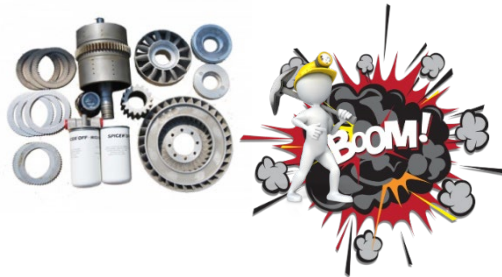


1,000 tonnes per day

\$145 per tonne

Variable Cost

\$35,000 per day on consumables result in \$35/t



Increase Production to Reduce Costs



Fixed Cost

\$110,000 per day for labour and leasing, Or \$55/t

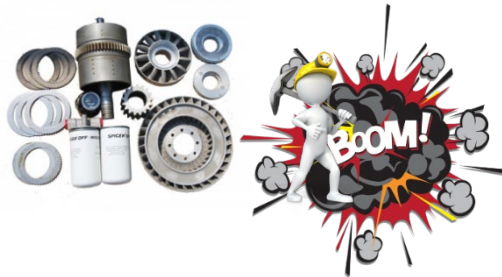


2,000 tonnes per day

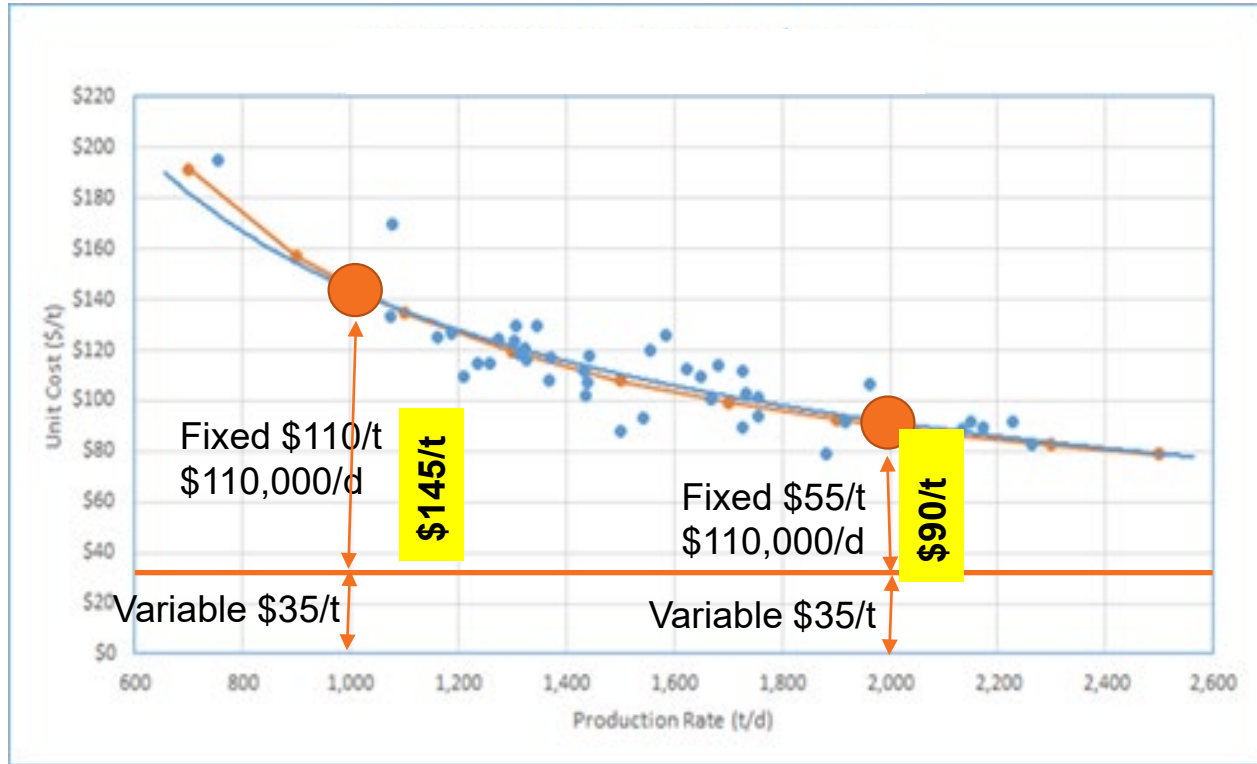
\$90 per tonne

Variable Cost

\$35,000 per day on consumables result in \$35/t



Increase Production to lower costs



Source: BWB Consulting

	Monthly Historic Average
Activity	\$/t
Direct Mining - Services and Supplies	47.05
<i>Lateral Development</i>	14.69
<i>Shotcreting</i>	2.44
<i>Backfill</i>	12.40
<i>Production Drilling</i>	4.97
<i>LHD Mucking</i>	8.34
<i>Production Blasting</i>	4.21
Haulage and Crushing	25.49
<i>Tires (Variable)</i>	2.29
<i>UG Truck Haulage</i>	5.46
<i>Muck Circuit</i>	4.83
<i>Hoist and Shaft Services</i>	4.41
<i>Surface Haulage</i>	8.50
Indirect Mining - Services and Supplies	21.41
<i>Diamond Drilling</i>	2.65
<i>Roadway Upkeep</i>	2.38
<i>Supplies Handling</i>	10.45
<i>Services Utilities</i>	5.93
Fuels and Power	15.83
<i>Natural Gas</i>	4.50
<i>Power</i>	5.00
<i>Diesel Fuel (Mobile Equipment)</i>	5.50
<i>Diesel Lube (Mobile Equipment)</i>	0.83
Mine G & A	22.35
<i>General Expenses</i>	5.00
<i>Training</i>	0.59
<i>Plant Security</i>	0.40
<i>Supervision</i>	12.40
<i>Engineering/Geology</i>	3.96
TOTAL	132.13

Gather 24 months of historic expenses and sort by activity

and

Escalate historic costs to current dollars



	Monthly Historic Average	Annoolaly Remove
Activity	\$/t	\$/t
Direct Mining - Services and Supplies	47.05	46.50
<i>Lateral Development</i>	14.69	14.50
<i>Shotcreting</i>	2.44	2.55
<i>Backfill</i>	12.40	10.40
<i>Production Drilling</i>	4.97	6.50
<i>LHD Mucking</i>	8.34	8.34
<i>Production Blasting</i>	4.21	4.21
Haulage and Crushing	25.49	25.49
<i>Tires (Variable)</i>	2.29	2.29
<i>UG Truck Haulage</i>	5.46	5.46
<i>Muck Circuit</i>	4.83	4.83
<i>Hoist and Shaft Services</i>	4.41	4.41
<i>Surface Haulage</i>	8.50	8.50
Indirect Mining - Services and Supplies	21.41	21.41
<i>Diamond Drilling</i>	2.65	2.65
<i>Roadway Upkeep</i>	2.38	2.38
<i>Supplies Handling</i>	10.45	10.45
<i>Services Utilities</i>	5.93	5.93
Fuels and Power	15.83	15.83
<i>Natural Gas</i>	4.50	4.50
<i>Power</i>	5.00	5.00
<i>Diesel Fuel (Mobile Equipment)</i>	5.50	5.50
<i>Diesel Lube (Mobile Equipment)</i>	0.83	0.83
Mine G & A	22.35	22.35
<i>General Expenses</i>	5.00	5.00
<i>Training</i>	0.59	0.59
<i>Plant Security</i>	0.40	0.40
<i>Supervision</i>	12.40	12.40
<i>Engineering/Geology</i>	3.96	3.96
TOTAL	132.13	131.58

Remove anomalies



	Monthly Historic Average	Annoolaly Remove	Adjustment Factor
Activity	\$/t	\$/t	\$/t
Direct Mining - Services and Supplies	47.05	46.50	48.58
<i>Lateral Development</i>	14.69	14.50	14.50
<i>Shotcreting</i>	2.44	2.55	2.55
<i>Backfill</i>	12.40	10.40	1.20 12.48
<i>Production Drilling</i>	4.97	6.50	6.50
<i>LHD Mucking</i>	8.34	8.34	8.34
<i>Production Blasting</i>	4.21	4.21	4.21
Haulage and Crushing	25.49	25.49	25.49
<i>Tires (Variable)</i>	2.29	2.29	2.29
<i>UG Truck Haulage</i>	5.46	5.46	5.46
<i>Muck Circuit</i>	4.83	4.83	4.83
<i>Hoist and Shaft Services</i>	4.41	4.41	4.41
<i>Surface Haulage</i>	8.50	8.50	8.50
Indirect Mining - Services and Supplies	21.41	21.41	22.74
<i>Diamond Drilling</i>	2.65	2.65	1.50 3.98
<i>Roadway Upkeep</i>	2.38	2.38	2.38
<i>Supplies Handling</i>	10.45	10.45	10.45
<i>Services Utilities</i>	5.93	5.93	5.93
Fuels and Power	15.83	15.83	15.83
<i>Natural Gas</i>	4.50	4.50	4.50
<i>Power</i>	5.00	5.00	5.00
<i>Diesel Fuel (Mobile Equipment)</i>	5.50	5.50	5.50
<i>Diesel Lube (Mobile Equipment)</i>	0.83	0.83	0.83
Mine G & A	22.35	22.35	22.35
<i>General Expenses</i>	5.00	5.00	5.00
<i>Training</i>	0.59	0.59	0.59
<i>Plant Security</i>	0.40	0.40	0.40
<i>Supervision</i>	12.40	12.40	12.40
<i>Engineering/Geology</i>	3.96	3.96	3.96
TOTAL	132.13	131.58	134.98

Flex unit costs to represent the mine



	Monthly Historic Average	Annoolay Remove	Adjustment Factor	Variable/ Fixed
Activity	\$/t	\$/t	\$/t	\$/t
Direct Mining - Services and Supplies	47.05	46.50	48.58	54.65
<i>Lateral Development</i>	14.69	14.50	14.50	15.50
<i>Shotcreting</i>	2.44	2.55	2.55	2.65
<i>Backfill</i>	12.40	10.40	1.20 12.48	14.98
<i>Production Drilling</i>	4.97	6.50	6.50	7.50
<i>LHD Mucking</i>	8.34	8.34	8.34	9.00
<i>Production Blasting</i>	4.21	4.21	4.21	5.02
Haulage and Crushing	25.49	25.49	25.49	26.40
<i>Tires (Variable)</i>	2.29	2.29	2.29	2.29
<i>UG Truck Haulage</i>	5.46	5.46	5.46	5.85
<i>Muck Circuit</i>	4.83	4.83	4.83	4.90
<i>Hoist and Shaft Services</i>	4.41	4.41	4.41	4.51
<i>Surface Haulage</i>	8.50	8.50	8.50	8.85
Indirect Mining - Services and Supplies	21.41	21.41	22.74	24.05
<i>Diamond Drilling</i>	2.65	2.65	1.50 3.98	4.02
<i>Roadway Upkeep</i>	2.38	2.38	2.38	2.99
<i>Supplies Handling</i>	10.45	10.45	10.45	11.02
<i>Services Utilities</i>	5.93	5.93	5.93	6.02
Fuels and Power	15.83	15.83	15.83	17.88
<i>Natural Gas</i>	4.50	4.50	4.50	6.20
<i>Power</i>	5.00	5.00	5.00	5.35
<i>Diesel Fuel (Mobile Equipment)</i>	5.50	5.50	5.50	5.50
<i>Diesel Lube (Mobile Equipment)</i>	0.83	0.83	0.83	0.83
Mine G & A	22.35	22.35	22.35	25.67
<i>General Expenses</i>	5.00	5.00	5.00	7.00
<i>Training</i>	0.59	0.59	0.59	0.80
<i>Plant Security</i>	0.40	0.40	0.40	0.60
<i>Supervision</i>	12.40	12.40	12.40	13.25
<i>Engineering/Geology</i>	3.96	3.96	3.96	4.02
TOTAL	132.13	131.58	134.98	148.65

**Apply Fixed/
Variable to
Reflect
Production Rate**



	Monthly Historic Average	Annoolay Remove	Adjustment Factor	Variable/ Fixed
Activity	\$/t	\$/t	\$/t	\$/t
Direct Mining - Services and Supplies	47.05	46.50	48.58	54.65
<i>Lateral Development</i>	14.69	14.50	14.50	15.50
<i>Shotcreting</i>	2.44	2.55	2.55	2.65
<i>Backfill</i>	12.40	10.40	1.20 12.48	14.98
<i>Production Drilling</i>	4.97	6.50	6.50	7.50
<i>LHD Mucking</i>	8.34	8.34	8.34	9.00
<i>Production Blasting</i>	4.21	4.21	4.21	5.02
Haulage and Crushing	25.49	25.49	25.49	26.40
<i>Tires (Variable)</i>	2.29	2.29	2.29	2.29
<i>UG Truck Haulage</i>	5.46	5.46	5.46	5.85
<i>Muck Circuit</i>	4.83	4.83	4.83	4.90
<i>Hoist and Shaft Services</i>	4.41	4.41	4.41	4.51
<i>Surface Haulage</i>	8.50	8.50	8.50	8.85
Indirect Mining - Services and Supplies	21.41	21.41	22.74	24.05
<i>Diamond Drilling</i>	2.65	2.65	1.50 3.98	4.02
<i>Roadway Upkeep</i>	2.38	2.38	2.38	2.99
<i>Supplies Handling</i>	10.45	10.45	10.45	11.02
<i>Services Utilities</i>	5.93	5.93	5.93	6.02
Fuels and Power	15.83	15.83	15.83	17.88
<i>Natural Gas</i>	4.50	4.50	4.50	6.20
<i>Power</i>	5.00	5.00	5.00	5.35
<i>Diesel Fuel (Mobile Equipment)</i>	5.50	5.50	5.50	5.50
<i>Diesel Lube (Mobile Equipment)</i>	0.83	0.83	0.83	0.83
Mine G & A	22.35	22.35	22.35	25.67
<i>General Expenses</i>	5.00	5.00	5.00	7.00
<i>Training</i>	0.59	0.59	0.59	0.80
<i>Plant Security</i>	0.40	0.40	0.40	0.60
<i>Supervision</i>	12.40	12.40	12.40	13.25
<i>Engineering/Geology</i>	3.96	3.96	3.96	4.02
TOTAL	132.13	131.58	134.98	148.65

Activity Based Costs based on historic or benchmark



	Monthly Historic Average	Annoolaly Remove	Adjustment Factor	Variable/ Fixed	First Principal
Activity	\$/t	\$/t	\$/t	\$/t	\$/t
Direct Mining - Services and Supplies	47.05	46.50	48.58	54.65	
<i>Lateral Development</i>	14.69	14.50	14.50	15.50	
<i>Shotcreting</i>	2.44	2.55	2.55	2.65	
<i>Backfill</i>	12.40	10.40	1.20 12.48	14.98	
<i>Production Drilling</i>	4.97	6.50	6.50	7.50	
<i>LHD Mucking</i>	8.34	8.34	8.34	9.00	
<i>Production Blasting</i>	4.21	4.21	4.21	5.02	
Haulage and Crushing	25.49	25.49	25.49	26.40	
<i>Tires (Variable)</i>	2.29	2.29	2.29	2.29	
<i>UG Truck Haulage</i>	5.46	5.46	5.46	5.85	
<i>Muck Circuit</i>	4.83	4.83	4.83	4.90	
<i>Hoist and Shaft Services</i>	4.41	4.41	4.41	4.51	
<i>Surface Haulage</i>	8.50	8.50	8.50	8.85	
Indirect Mining - Services and Supplies	21.41	21.41	22.74	24.05	
<i>Diamond Drilling</i>	2.65	2.65	1.50 3.98	4.02	
<i>Roadway Upkeep</i>	2.38	2.38	2.38	2.99	
<i>Supplies Handling</i>	10.45	10.45	10.45	11.02	
<i>Services Utilities</i>	5.93	5.93	5.93	6.02	
Fuels and Power	15.83	15.83	15.83	17.88	
<i>Natural Gas</i>	4.50	4.50	4.50	6.20	
<i>Power</i>	5.00	5.00	5.00	5.35	
<i>Diesel Fuel (Mobile Equipment)</i>	5.50	5.50	5.50	5.50	
<i>Diesel Lube (Mobile Equipment)</i>	0.83	0.83	0.83	0.83	
Mine G & A	22.35	22.35	22.35	25.67	
<i>General Expenses</i>	5.00	5.00	5.00	7.00	
<i>Training</i>	0.59	0.59	0.59	0.80	
<i>Plant Security</i>	0.40	0.40	0.40	0.60	
<i>Supervision</i>	12.40	12.40	12.40	13.25	
<i>Engineering/Geology</i>	3.96	3.96	3.96	4.02	
TOTAL	132.13	131.58	134.98	148.65	

..but we need to compare to..
First Principles



...to understand what it should cost

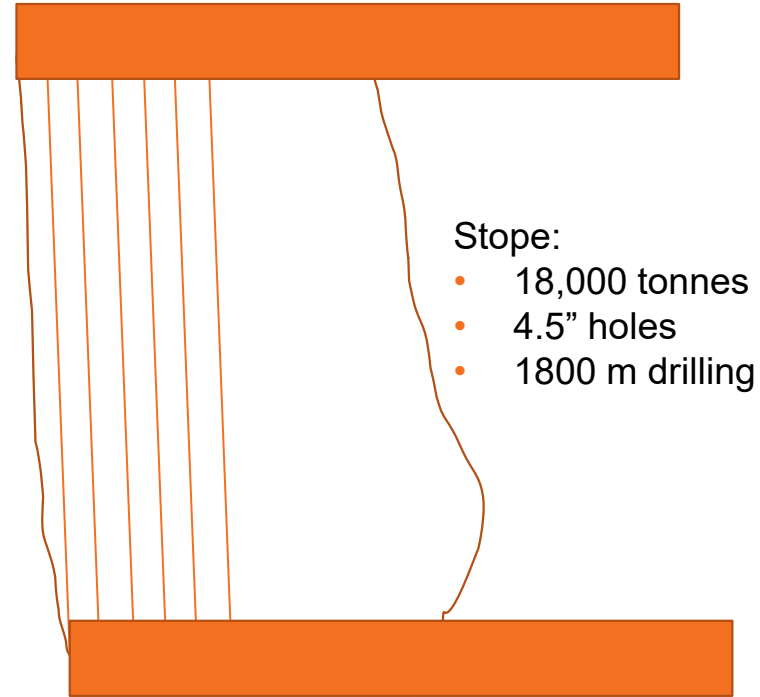
First Principles Estimation

- Regarded as “**best practice**” and can be used to price all types of activities.
- Based on typical mining criteria for rock densities, swell factors, drill penetration rates, etc.
- Industry-standard estimating methods are used for equipment selection, personnel allocation, and cost estimation.

- Pros:
 - Understand the “true” cost of an activity
 - Establishes “ground zero” costs

- Cons:
 - Expenses such as allowances and waste overlooked
 - Generally underestimated

Drill Cost by First Principles



Drill Cost \$6.52/t by First Principles

Supplies (Variable) \$3.20/t

(bits, steel, hammer, etc.) and parts

\$32/m

Services (Fixed) \$1.11/t

ITH Drill Rental

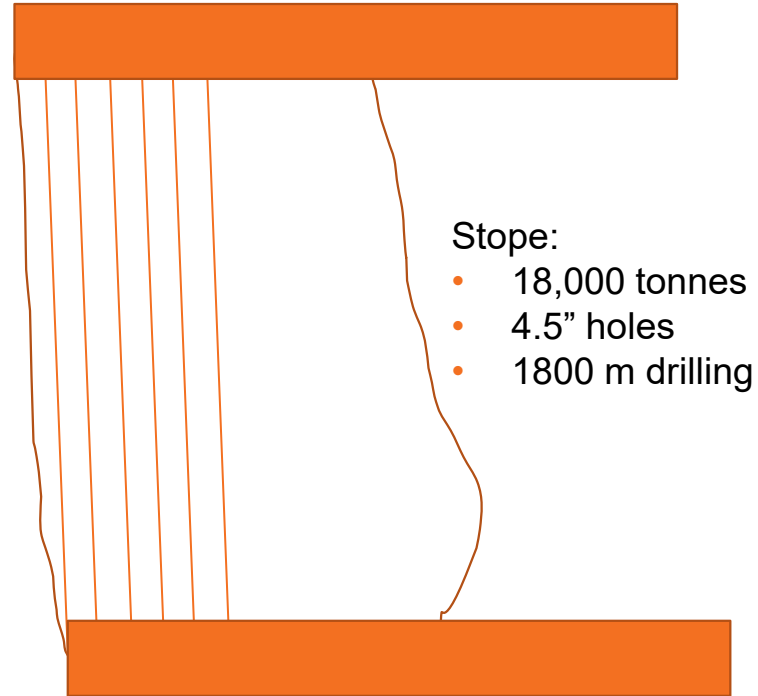
\$20,000/month

Labour (Fixed) \$1.11/t

\$20,000 per stope

Allowance

15 to 20%



	Monthly Historic Average	Annoolaly Remove	Adjustment Factor	Variable/ Fixed	First Principal	Drivers
Activity	\$/t	\$/t	\$/t	\$/t	\$/t	Comments
Direct Mining - Services and Supplies	47.05	46.50	48.58	54.65	53.18	
<i>Lateral Development</i>	14.69	14.50	14.50	15.50	15.50	
<i>Shotcreting</i>	2.44	2.55	2.55	2.65	2.65	<i>excessive shotcrete</i>
<i>Backfill</i>	12.40	10.40	1.20 12.48	14.98	14.98	
<i>Production Drilling</i>	4.97	6.50	6.50	7.50	7.50	
<i>LHD Mucking</i>	8.34	8.34	8.34	9.00	9.00	
<i>Production Blasting</i>	4.21	4.21	4.21	5.02	3.55	<i>blasting powder waste</i>

Production Drilling
\$7.50/t
Historic Projection
vs
\$6.52/t
with First Principles
Causes: ?

<i>Diesel Lube (Mobile Equipment)</i>	0.83	0.83	0.83	0.83	0.83	
Mine G & A	22.35	22.35	22.35	25.67	25.67	
<i>General Expenses</i>	5.00	5.00	5.00	7.00	7.00	
<i>Training</i>	0.59	0.59	0.59	0.80	0.80	
<i>Plant Security</i>	0.40	0.40	0.40	0.60	0.60	
<i>Supervision</i>	12.40	12.40	12.40	13.25	13.25	
<i>Engineering/Geology</i>	3.96	3.96	3.96	4.02	4.02	
TOTAL	132.13	131.58	134.98	148.65	145.18	

Drill Cost \$6.52/t by First Principles

Supplies (Variable) \$3.20/t
(bits, steel, hammer, etc.) and parts
\$32/m

Services (Fixed) \$1.11/t
ITH Drill Rental
\$20,000/month

Labour (Fixed) \$1.11/t
\$20,000 per stope

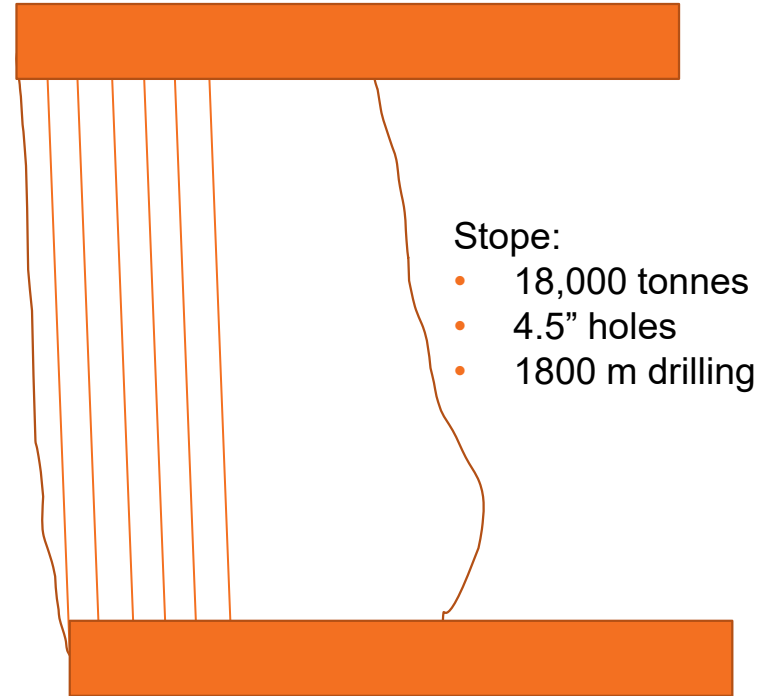
Allowance
15 to 20%

**Wasting bits,
hammer, parts?**

**Better use of drill
for more stopes.**

**Full use of
Labour, efficient,
travel times.**

**Control
Miscellaneous
spending.**

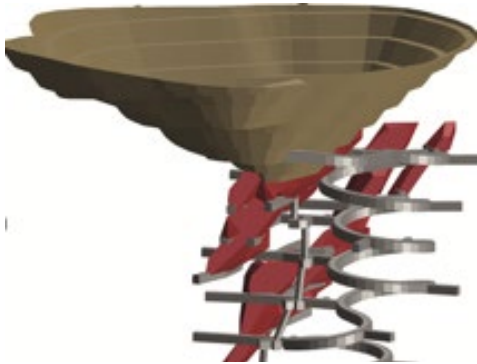


	Monthly Historic Average	Annoloaly Remove	Adjustment Factor		Variable/ Fixed	First Principal	Drivers
Activity	\$/t	\$/t	\$/t		\$/t	\$/t	Comments
Direct Mining - Services and Supplies	47.05	46.50	48.58		54.65	53.18	
<i>Lateral Development</i>	14.69	14.50	14.50		15.50	15.50	
<i>Shotcreting</i>	2.44	2.55	2.55		2.65	2.65	
<i>Backfill</i>	12.40	10.40	1.20	12.48	14.98	14.98	
<i>Production Drilling</i>	4.97	6.50	6.50		7.50	7.50	
<i>LHD Mucking</i>	8.34	8.34	8.34		9.00	9.00	
<i>Production Blasting</i>	4.21	4.21	4.21		5.02	3.55	
Haulage and Crushing	25.49	25.49	25.49		26.40	26.40	
<i>Tires (Variable)</i>	2.29	2.29	2.29		2.29	2.29	
<i>UG Truck Haulage</i>	5.46	5.46	5.46		5.85	5.85	
<i>Muck Circuit</i>	4.83	4.83	4.83		4.90	4.90	
<i>Hoist and Shaft Services</i>	4.41	4.41	4.41		4.51	4.51	
<i>Surface Haulage</i>	8.50	8.50	8.50		8.85	8.85	
Indirect Mining - Services and Supplies	21.41	21.41	22.74		24.05	24.05	
<i>Diamond Drilling</i>	2.65	2.65	1.50	3.98	4.02	4.02	
<i>Roadway Upkeep</i>	2.38	2.38	2.38		2.99	2.99	
<i>Supplies Handling</i>	10.45	10.45	10.45		11.02	11.02	
<i>Services Utilities</i>	5.93	5.93	5.93		6.02	6.02	
Fuels and Power	15.83	15.83	15.83		17.88	15.88	
<i>Natural Gas</i>	4.50	4.50	4.50		6.20	6.20	
<i>Power</i>	5.00	5.00	5.00		5.35	5.35	
<i>Diesel Fuel (Mobile Equipment)</i>	5.50	5.50	5.50		5.50	3.50	
<i>Diesel Lube (Mobile Equipment)</i>	0.83	0.83	0.83		0.83	0.83	
Mine G & A	22.35	22.35	22.35		25.67	25.67	
<i>General Expenses</i>	5.00	5.00	5.00		7.00	7.00	
<i>Training</i>	0.59	0.59	0.59		0.80	0.80	
<i>Plant Security</i>	0.40	0.40	0.40		0.60	0.60	
<i>Supervision</i>	12.40	12.40	12.40		13.25	13.25	
<i>Engineering/Geology</i>	3.96	3.96	3.96		4.02	4.02	
TOTAL	132.13	131.58	134.98		148.65	145.18	

Actuals
vs.
What it
should be

Identify
Differences

Capital Sustaining Cost Estimation



Avoid Benchmarking, it varies high primarily on development

— Capital mine development 70%

- Use unit cost (i.e. \$5500/m) x capital development within a unit area or zone / tonnes to be mined within that zone

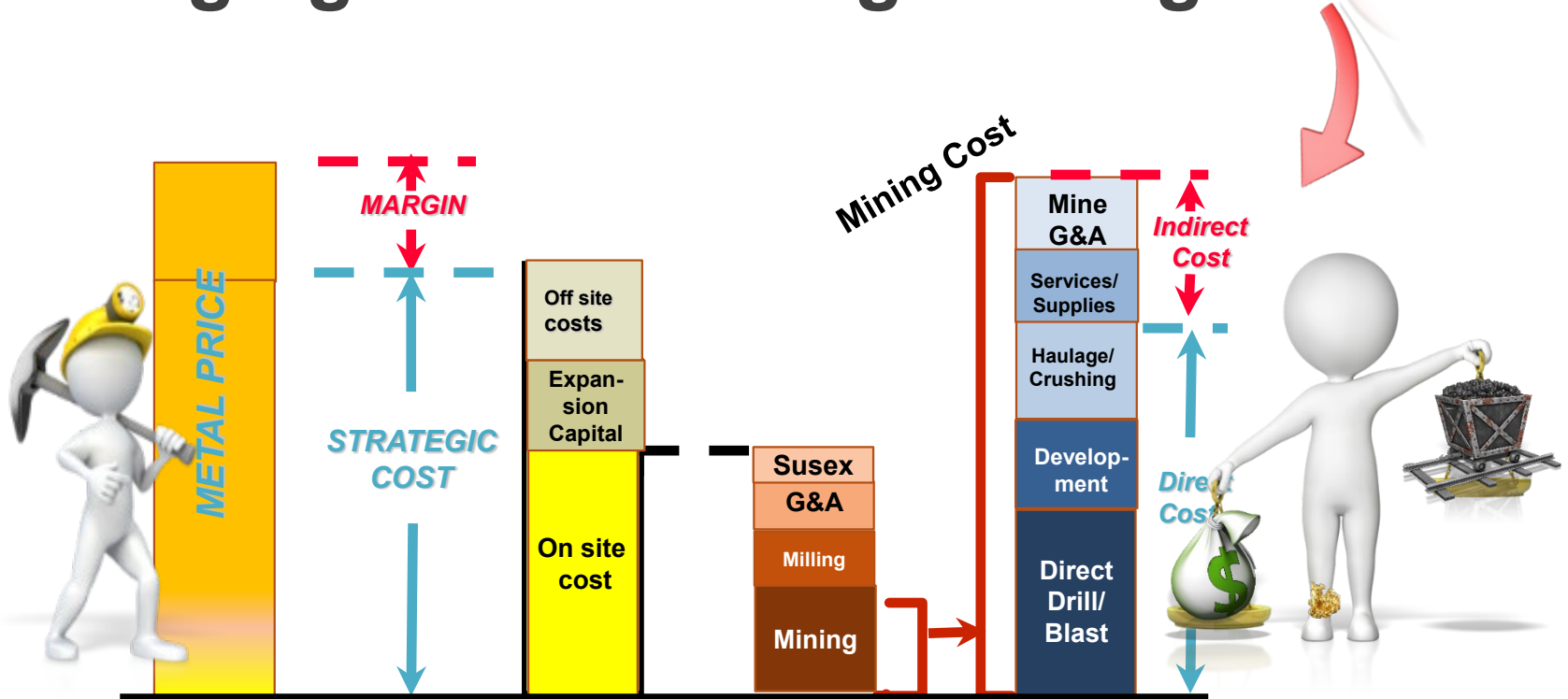
— Improvement capital 20%

- Apply 5 to 10% annually on capital items

— Replacement capital 10%

- 60% percent of mobile equipment after 4 to 6 years

Managing and Reducing Mining Costs



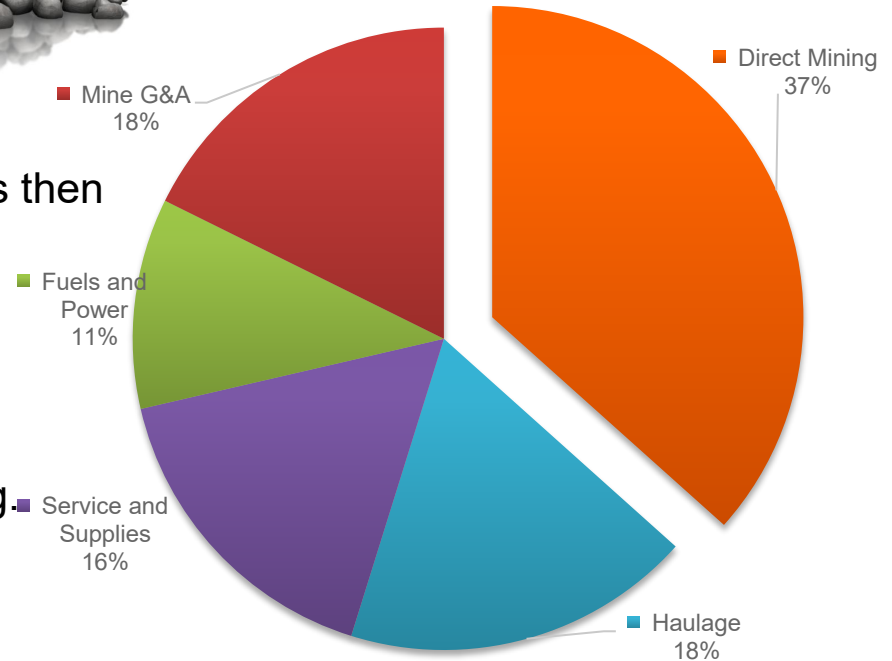
What we do – Break Material – why we are here

Direct Mining

- ✓ Increase Volume
- ✓ Focus on better equipment efficiency
- ✓ Integrate Operations – People-Process then technology
- ✓ Work safely
- ✓ Treat work force well, engage them in decisions giving choice, content and collaboration*
- ✓ Be flexible with labour in their tasks e.g. Development
- ✓ Have 1 crew doing multiple tasks



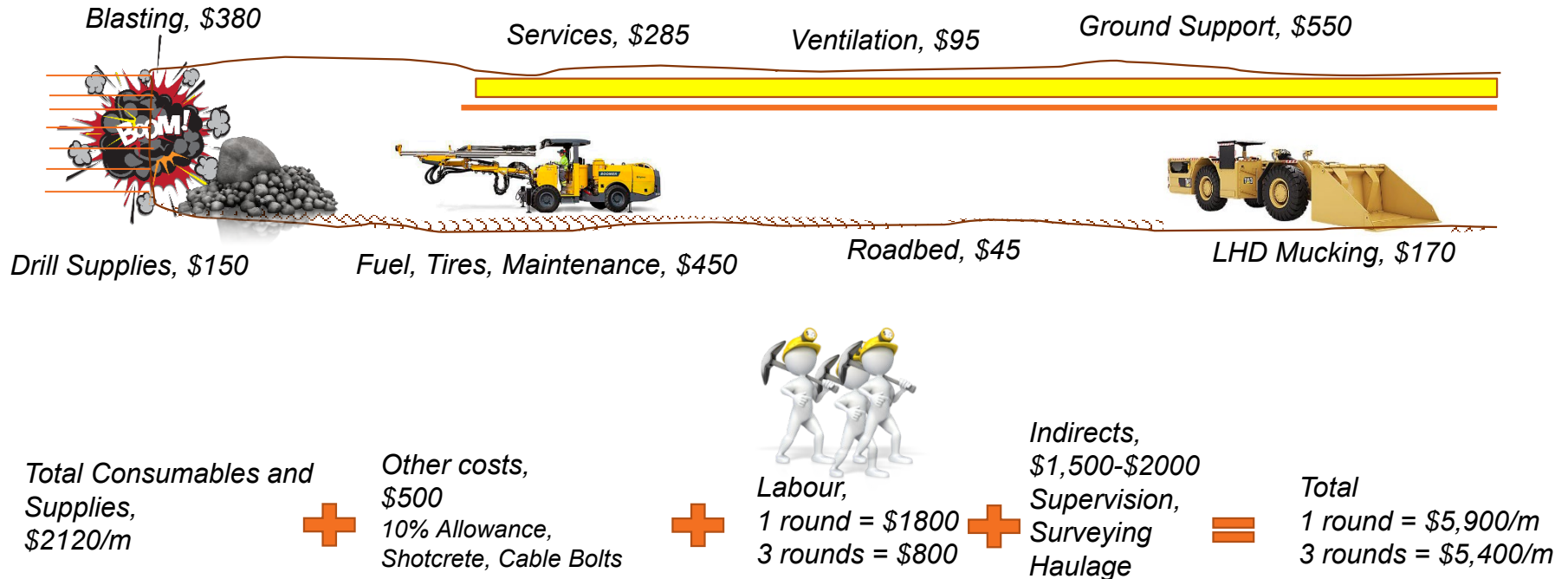
Mine Opex



* One mine in Sudbury increased production by 40% by simply asking crews, “what do you think?”

Development Cost per metre

Lower Cost by use of Headings



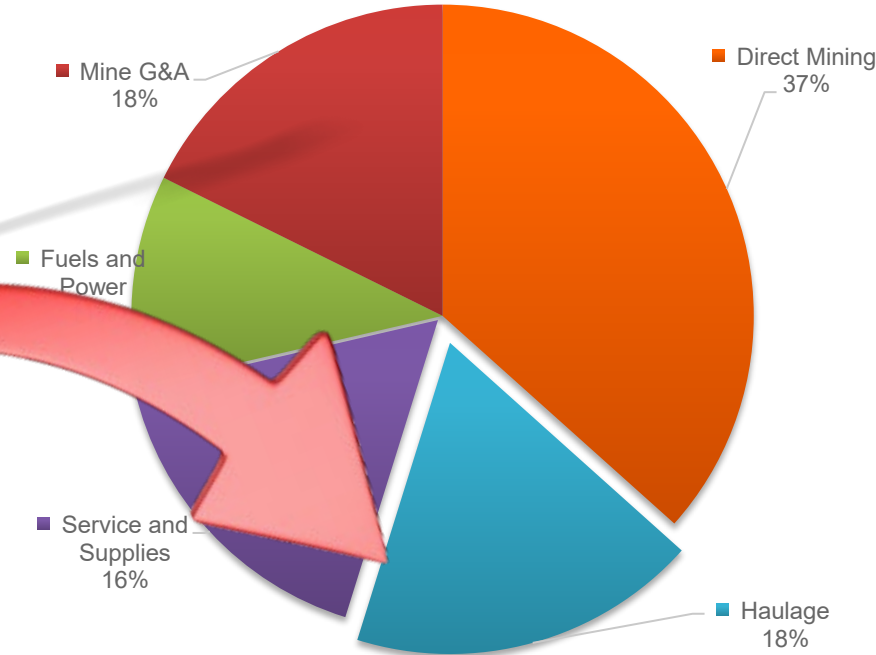
What we move – Mining is a material movement exercise – what we do

Haulage

- ✓ Streamline process (Discrete simulation)
- ✓ \$3/t to \$5/t every time we move material
- ✓ Consider alternative energy
- ✓ Increase seat time by hot seating
- ✓ Consider pre-concentration to reduce haulage



Mine Opex



Supply and Services – the stuff to break and move material



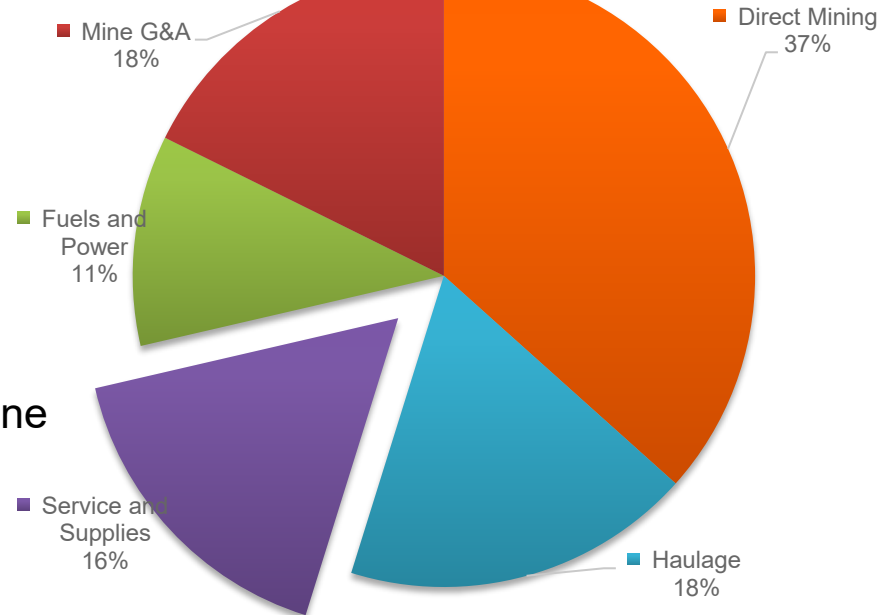
Supplies

- ✓ Reduce wastage, typically 100 to 200% waste
- ✓ in powder, bits, pumps, and supplies
- ✓ Monitor inventory FILO

Services

- ✓ Are there to increase efficiency, streamline processes and help break material
- ✓ Streamline movement of personal and materials

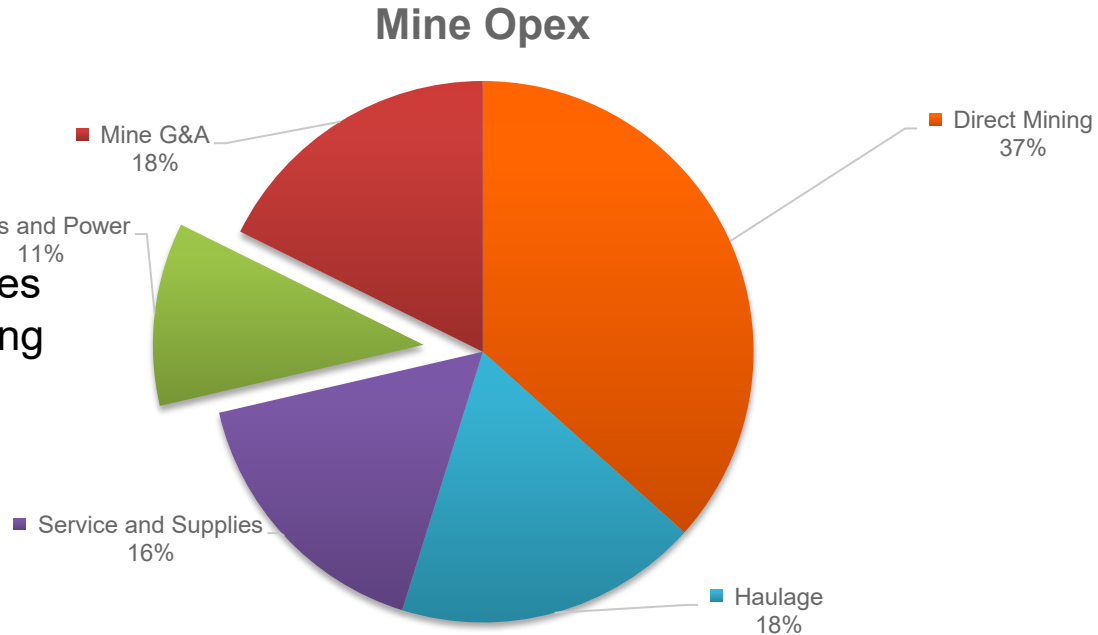
Mine Opex



Fuels and Power– the stuff that makes things move

Fuels and Power

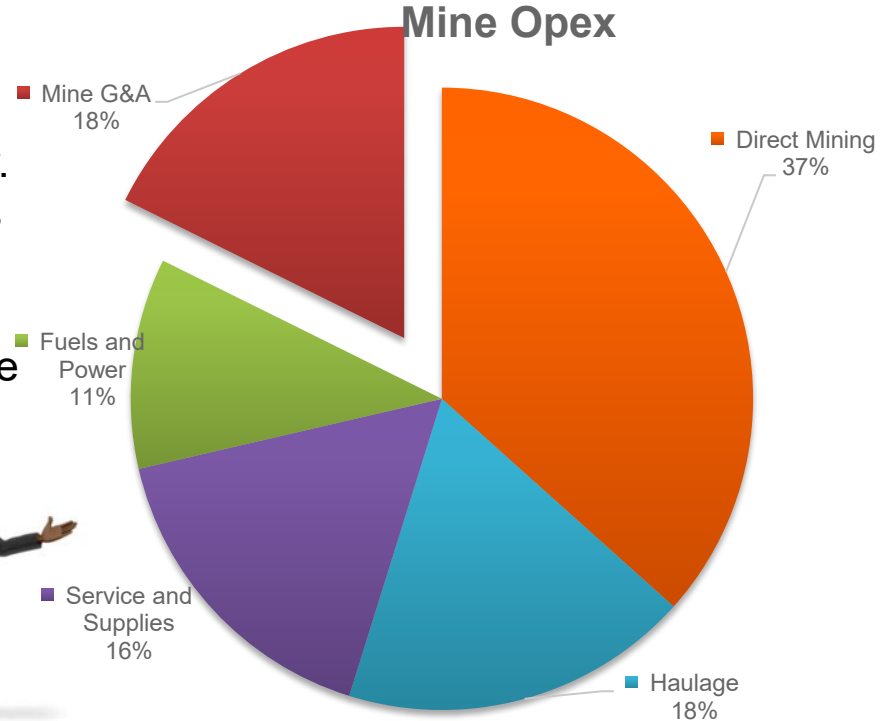
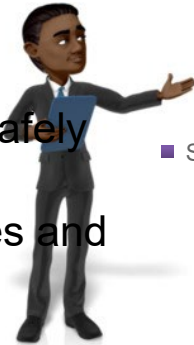
- ✓ Streamline supply chain delivery
- ✓ Consider alternative sources of energy
- ✓ Consider Electrification Vehicles
- ✓ Better use of ventilation monitoring systems
- ✓ Reduce air losses



Mine G & A– support the process

Mine G & A

- ✓ Avoid slow growth and being top heavy.
- ✓ Treat people well, they will make things go well.
- ✓ Their role is to provide continuous improvement and proactive before there is a delay.
- ✓ Encourage and develop a safe environment.
- ✓ They are there to move tonnes safely and go home well.
- ✓ KPI of defined daily quality tonnes and priority development



Summary

Focus:

- Minimize waste
- Increase volume – (adjust mining methods, better fill, increasing stope cycle time (careful of implications of increasing mining fronts and sequencing))
- Quality Tonnes (follow your CoG strategy)
- People: Attract and retain experienced mine planners
- Everyone communicating the same message



Summary

Operation Analysis:

- Understand and be clear on your unit costs (ABC) of your operation.
- Access all costs items to uncover your actual cost base and identify outliers.
- Compare current costs with “ground-zero” costs and benchmark data.
- Set realistic targets of KPIs.
- Meet with operations and discuss targets and mine plan. Look for ideas.
- Share metrics with everyone in your group and have everyone track them. Post it.
- Monitor that the priority headings are being realized (development drives production).
- Streamline material and ore/waste handling in your mine (mining is a material movement exercise).
- Be safe and have fun.



Presenter



Gary has more than 30 years in underground mine design and economics, due diligence, and operational improvement.

He has worked with a wide range of commodities at near surface and ultra-deep producing mines around the world with a focus on base metals such as copper and precious metals.

He currently resides in Sudbury, Canada with his wife and three teenage children.

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AREAS OF EXPERTISE

▼ **Mine Engineering**

Underground Mine
Design, Planning, and
Engineering

Mining Operation
Assistance

▼ **Mining Project Evaluation**

Due Diligence and
Project Reviews

