

# Surface Miner

## The Assessment Reports



Canada

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MINING INDUSTRY  
HUMAN RESOURCES COUNCIL  
CONSEIL DES RESSOURCES HUMAINES  
DE L'INDUSTRIE MINIERE

# Surface Miner

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WORKPLACE SOLUTIONS

## MiHR

MiHR is the sector council for the Canadian minerals and metals industry. A recognized leader in the development and implementation of national human resources solutions, MiHR contributes to the strength, competitiveness, and sustainability of the Canadian mining sector.

Products and services developed by MiHR are based on sound research into the skills and labour market issues that matter most to the Canadian mining industry. MiHR remains committed to actively engaging and working with all communities of interest—employers, educators, organized labour, and Aboriginal groups, among others—to develop solutions tailored to human resources needs in the mining sector.

## About The Physical Demands Analysis (PDA) Project

The objective of the Physical Demands Analysis Project was to obtain, through full assessment of tasks outlined in the National Occupational Standards developed by MiHR, information to:

- To meet current and projected human resource demands by increasing and making best use of all potential sources of supply
- Address existing and expected skills gaps in the industry, by understanding true physical job requirements that may have put up barriers for certain demographic groups in the past (i.e., women, mature workers, persons with disabilities)
- Determine compatibility between a worker and a specific job (Post Offer Testing)
- Assist employers when returning injured employees to work (Early and Safe Return to Work)
- Assist with recognition of highly physical jobs and ones that have a potential to cause injury (Job Matching)
- Assist employers to accommodate workers with permanent medical restrictions.

# Surface Miner

Area of Competence: Protect Self and Others

## Assessment Report

## Minerals Processing Operator

### *Protect Self and Others — The Assessment Report*

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### Overview

Occupational Domain:	Surface Miner	National Occupational Standard (NOS) Area of Competence:	Protect Self and Others
Hours of Work:	Length of shift may vary from 8-12 hours. (Dependant on mine site)	Breaks:	~1- 1½ hours in total
Shift Work:	Rotating schedule may be required. (Depends on mine site)	National Occupational Classification (NOC) Level of Work:	Light
Dates of Assessment:	February 24-26, 2009	Evaluators:	Tony Dias, H.B.K., C.K., C.R.S.P Liliane Lamarche, B. Sc. (Kin.), C.K.

## Section 1: Detailed Task Description

According to the National Occupation Classification (N.O.C.), this job classification falls within the Light strength category.

The worker is required obtain, inspect, and put on all required personal protective equipment (PPE) at the beginning of each shift. Personal protective equipment may include reflective coveralls, CSA approved safety footwear, head protection, eye protection, hand protection, gloves, and hearing protection. Depending on the assigned job task a worker may also be required to put on a fall restraint system (specifically if performing job tasks which require the worker to work 3 meters above grade). The worker may also need to wear respiratory protection if required to enter a confined space or to protect from dust.

Protecting self and others involves constantly assessing and evaluating hazardous or potentially hazardous conditions. If a hazard is identified, the worker is required to install guarding, signs, rope, barriers etc. according to the mine policies and any applicable government regulation.

All fire extinguishers are inspected according to mine policy. Should a fire occur, the worker is required to identify the class of fire and determine if an extinguisher is an appropriate tool to combat the fire. If a fire cannot be contained, the worker is required to evacuate the area and immediately report to a designated location.

Workers working around stockpiles must ensure that stock piles are stable and have sufficient guarding (berms) to protect other workers. Particularly workers who may be operating mobile and/or service equipment.

Workers must lock and tag out all electrical and mobile equipment prior to performing maintenance tasks.

A worker must be able walk, climb stairs, ladders, and uneven ground. Workers should also have functional range of motion in the neck, trunk, upper and lower extremities. Although, the strength requirements of this job classification are considered Light, a worker should have sufficient strength to be able to climb ladders and or stairs.

Performing work safely in surface mining environment begins at the start of the workday and does not end until the worker leaves the work site.

Section 2: Workflow



## Section 3: Task Objectives and Duties

### Overview

Workers are accountable and responsible for their own safety, as well as the safety of others. Therefore, they must ensure that equipment; materials and production processes do not present safety and health hazards to any employees, contractors, and visitors.

### Essential Tasks

#### 1. Select, Adjust, Wear and Maintain Personal Protective Equipment

- The worker must select, wear and maintain proper head, eye, hearing, respiratory, hand and foot protection.
- The worker must wear appropriate protective clothing.
- The worker must wear fall arrest system when working 3 meters above grade.

#### 2. Inspect Workplace For Hazardous or Potentially Hazardous Conditions

- The worker must follow instructions for safe handling of hazardous materials.
- The worker must report all hazardous or potentially hazardous conditions to appropriate person.
- The worker must guard all identified hazardous locations.
- The worker must clean up spills and/or leaks.

#### 3. Ensure Stockpile Safety

- The worker must ensure that there is safe entry for people and equipment around stockpile. This involves ensuring that an adequate berm is maintained.

#### 4. Follow Company Fire Procedures

- The worker must be able to locate and identify fires.
- The worker must be able to assess severity of fire.
- The worker must be able to activate fire suppression systems and alarms.
- The worker must evacuate area as soon as possible and report to designated area.

#### 5. Lock Out and Tag Equipment and Energy

- Lock and tag out all electrical and mobile equipment.

#### 6. Recognize Warning Lights

- Worker must be able to recognize lights of various equipment and systems.

#### 7. Recognize Audible Alarms

- Worker must be able to recognize alarms and signal alerts in various equipment.

Continued...

**Personal Protective Equipment (PPE)**

- CSA approved safety footwear with a green and orange tag;
- Coveralls, equipped with appropriate reflective markings;
- CSA approved fall arrest systems (required when working 3 meters above the ground);
- Two-way radio;
- Hard hat with or without light clip;
- Safety glasses;
- Hearing protection, which may include ear plugs and/or ear muffs;
- Gloves (Cotton, leather, rubber, welder and hot gloves);
- Dust mask and personal respirator (as required);
- Safety fall arrest; and
- Additional task specific PPE, such as face shield, self-contained breathing apparatus, etc.

**Equipment**

- |                                |                           |  |
|--------------------------------|---------------------------|--|
| • Haulage truck;               | • Forklift;               | • Chain saw;   |
| • Scraper;                     | • Elevated work platform; | • Concrete saw;                                      |
| • Grader;                      | • Light service vehicle;  | • Wrenches (socket, adjustable, pipe, box-end, etc); |
| • Track dozer;                 | • Fuel/Lube truck;        | • Impact gun;  |
| • Rubber-Tired dozer;          | • Water truck;            | • Y connectors;                                      |
| • Cable reeler/Cable truck;    | • Tow truck;              | • Chain wrench;                                      |
| • Front end loader;            | • Low bed/Float;          | • Reducer;   |
| • Hydraulic excavator/Backhoe; | • Mobile crane;           | • Handsaws;  |
| • Electric rope/Cable Shovel;  | • Tool box;               | • Sledge hammers;                                    |
| • Rotary drill;                | • Ladders;                | • Screwdrivers; and/or                               |
| • Skid steer;                  | • Pinch bar;              | • Hose repair equipment.                             |
| • Explosives truck;            | • Clevis;                 |  |

Section 4: Strength and Positional Requirements

STRENGTH REQUIREMENTS		FREQUENCY	LOAD (KG)	FORCE (KG OF FORCE)	COMMENTS*
Lifting/ Lowering	Floor to Waist† (0-104cm)	Constant	4.5-14.5	-	<ul style="list-style-type: none"> <li>CSA approved safety footwear (4.5 kg).</li> <li>Fire extinguishers (~14.5 kg).</li> </ul>
	Waist† to Shoulder† (104-137cm)	Constant	Negligible-14.5	-	<ul style="list-style-type: none"> <li>Hard hat with ear muffs (0.5-1.0 kg).</li> <li>Glasses with side shields (negligible weight).</li> <li>Respiratory protection (&lt; 0.5 kg).</li> <li>Cotton gloves (negligible weight).</li> <li>Fire extinguishers (~14.5 kg).</li> </ul>
	Floor to Shoulder† (0-137cm)	Constant	Negligible-14.5	-	<ul style="list-style-type: none"> <li>Safety harness and lanyard (&lt;1 kg)</li> <li>Reflective coveralls (negligible weight).</li> <li>Fire extinguishers (~14.5 kg).</li> </ul>
	Above Shoulder† (>138cm)	Constant	0.5-1.0	-	<ul style="list-style-type: none"> <li>Hard hat with ear muffs (0.5-1.0 kg).</li> <li>Glasses with side shields (&lt; 0.5 kg).</li> <li>Hearing protection, earplugs, respiratory protection.</li> </ul>
Carrying	Unilateral/ Bilateral	Occasional	<0.5-14.5	-	<ul style="list-style-type: none"> <li>May require carrying absorption pad (&lt; 0.5 kg).</li> <li>Fire extinguishers (~14.5 kg).</li> </ul>
Pushing/ Pulling (kg of Force)	Vertical	Occasional	-	Negligible	<ul style="list-style-type: none"> <li>Putting on reflective coveralls (negligible force required)</li> </ul>
	Unilateral	Occasional	-	14.0	<ul style="list-style-type: none"> <li>Opening/closing doors to mobile equipment, opening electrical controls box panels, opening door to buildings, change/washroom rooms (~14.0 kg of force).</li> <li>Worker has the option of using one or two-hands.</li> </ul>
	Bilateral	Occasional	-	14.0	

The Frequency Definitions are outlined in [Appendix 2](#).

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

† Anthropometrics are based on the 50th percentile male (waist height, standing 106.3±5.4 cm; shoulder height, standing 143.7±6.2 cm) and the 50th percentile female (waist height, standing 101.7±5.0 cm; shoulder height, standing 132.9±5.5 cm); Eastman Kodak Company (1986). *Ergonomic Design for People at Work: Volume 2*. New York: Van Nostrand Reinhold Company.

MOBILITY AND POSTURAL REQUIREMENTS		FREQUENCY	COMMENTS*
Sitting		Occasional - Constant	<ul style="list-style-type: none"> <li>Sitting frequency will vary based on work assignment. For example: Workers conducting blasting operations, operating lift truck, skid steer, operating service truck, etc. may sit very little, whereas workers operating haulage trucks, electric shovel, etc. may sit for the whole shift.</li> </ul>
Standing		Occasional - Frequent	<ul style="list-style-type: none"> <li>Conducting blasting operations, firing hand pistol for avalanche control, pre-shift meetings, working from the elevated work platform, conducting pre-operational checks on equipment, fuelling equipment, operating mobile crane and forklift, hooking up equipment to tow truck, loading tools and equipment, etc.</li> <li>Putting on personal protective equipment.</li> <li>Standing frequency will vary based on the work assignment.</li> </ul>
Walking		Occasional - Frequent	<ul style="list-style-type: none"> <li>Carrying explosives, blasting agents and detonators from magazine to explosives truck and from explosives truck to the blast hole, conducting blast hole verification, preparing blast hole for detonation, evacuating blast area, checking blast area (post blast).</li> <li>To and from equipment at the beginning and at the end of the shift.</li> <li>Conducting pre-operational checks, fuelling equipment, operating mobile crane, hooking up equipment to tow truck, loading tools and equipment, etc.</li> <li>Walking frequency will vary based on the work assignment.</li> </ul>
Climbing	Stairs	Occasional	<ul style="list-style-type: none"> <li>Mounting and dismounting service and mobile equipment (heights may vary based on type of vehicle).</li> </ul>
	Ladders	Occasional	<ul style="list-style-type: none"> <li>Mounting and dismounting service and mobile equipment (heights may vary based on type of vehicle).</li> <li>Workers may also be required to climb ladders to complete repair/maintenance/ installation tasks.</li> </ul>
	Uneven Ground	Occasional	<ul style="list-style-type: none"> <li>Working outside (rocks, snow and muddy conditions etc).</li> </ul>
Balancing		Occasional	<ul style="list-style-type: none"> <li>Balancing on ladders, stairs and equipment.</li> </ul>
Crawling		Never	
Kneeling		Occasional	<ul style="list-style-type: none"> <li>Conducting pre-operational checks on all equipment at the beginning of the shift.</li> <li>Operator may choose between crouching or kneeling while performing inspection.</li> </ul>
Crouching/Squatting		Occasional	<ul style="list-style-type: none"> <li>Conducting pre-operational checks on all equipment at the beginning of the shift.</li> <li>Operator may choose between crouching or kneeling while performing inspection.</li> <li>Locking and tagging out equipment, cleaning up or containing spills and/or leaks.</li> <li>Lifting hand and power tools.</li> </ul>
Trunk Movements		Occasional	<ul style="list-style-type: none"> <li>Functional range of motion in all directions may be needed to work safely.</li> <li>Awkward postures may be adopted when performing inspection and maintenance tasks.</li> </ul>
Neck Movements		Occasional	

Continued...

MOBILITY AND POSTURAL REQUIREMENTS		FREQUENCY	COMMENTS*
Reaching	Forward/ Backward	Frequent	<ul style="list-style-type: none"> <li>Performing inspection tasks, locking out and tagging equipment, selecting, adjusting, wearing and maintaining personal protective equipment, suppressing minor fires.</li> <li>Reaching for two-way radio.</li> <li>Safely operating mobile and service equipment, hand and power tools.</li> <li>Conducting blasting operations.</li> </ul>
	Upper Level	Occasional	<ul style="list-style-type: none"> <li>Reaching for two-way radio.</li> <li>Selecting, adjusting, wearing and maintaining personal protective equipment.</li> </ul>
	Sideways	Occasional	<ul style="list-style-type: none"> <li>Opening and closing doors to equipment.</li> <li>May be needed when reaching for panel controls (deactivating alarms), accessing two-way radio.</li> <li>Selecting, adjusting, wearing and maintaining personal protective equipment.</li> </ul>
Elbow Posture		Occasional - Frequent	<ul style="list-style-type: none"> <li>Full elbow range of motion is required to work safely. Frequency will vary depending on the task and equipment being operated.</li> </ul>
Wrist Posture		Occasional	<ul style="list-style-type: none"> <li>Full wrist range of motion is required to work safely.</li> </ul>
Gripping		Occasional - Frequent	<ul style="list-style-type: none"> <li>Power grip needed when using hand/power tools, grasping parts and supplies and operating service and mobile equipment, climbing ladders and stairs.</li> <li>Selecting, adjusting, wearing and maintaining personal protective equipment.</li> </ul>
Pinching		Occasional	<ul style="list-style-type: none"> <li>Selecting, adjusting, wearing and maintaining personal protective equipment.</li> <li>Activating control switches.</li> <li>Lock out tag out.</li> <li>Inserting ear plugs.</li> </ul>
Fine Finger Dexterity		Occasional	<ul style="list-style-type: none"> <li>Writing when completing safety reports.</li> </ul>
Striking with Hand		Never	
Foot Action		Occasional	<ul style="list-style-type: none"> <li>Plantarflexion and dorsiflexion required to use the pedal controls while operating service equipment. A force of 6-20 kg is required to depress the pedals, which are located ~30 cm from the vehicle floor.</li> <li>Putting on and adjusting CSA approved safety footwear.</li> </ul>

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Section 5: Sensory/Mental Requirements

SENSORY/MENTAL REQUIREMENTS		ESSENTIAL		COMMENTS*
		Yes	No	
Vision	Near	X		<ul style="list-style-type: none"> <li>Inspecting and operating mobile and service equipment; safely handling explosive and blasting agents; reading and writing in log books; recognizing warning lights, reading instruments, gauges, and emergency signals; as well as selecting, adjusting, and maintaining personal protective equipment.</li> </ul>
	Far	X		<ul style="list-style-type: none"> <li>Peripheral and far vision required in all aspects of surface mining. Including but not limited to the following tasks: inspecting and operating mobile and service equipment, using hand and power tools, conducting blasting operations, recognizing and evaluating environmental conditions and hazards, etc.</li> </ul>
	Colour		X	
Light Quality and Measurements		X		<ul style="list-style-type: none"> <li>All tasks are performed above ground. However, light levels will vary based on weather conditions, time of shift, and other light emitted from surrounding lighting and equipment. Light levels may range from 0 Lux during the night to ~700 Lux during the day.</li> <li>Time of exposure to darkness may vary from 8 - 12 hours (based on seasonal time shifts).</li> </ul>
Hearing	Conversation	X		<ul style="list-style-type: none"> <li>Communicating over two-way radio and in-person.</li> </ul>
	Other Sounds	X		<ul style="list-style-type: none"> <li>Operational noise within equipment.</li> <li>Hearing protection mandatory, ear plugs and/or earmuffs are available. Noise levels may regularly exceed the occupational exposure limits (specifically inside mobile equipment).</li> <li>Level of noise may range from 68 dB-180 dB and may vary based on the task being performed or equipment being operated.</li> </ul>
Talking		X		<ul style="list-style-type: none"> <li>Conversing with the use of hearing protection. Worker may be required to speak loud or shout.</li> </ul>
Reading/Writing		X		<ul style="list-style-type: none"> <li>Reviewing operating manuals, log books, signs, as well as information from onboard systems.</li> <li>Manufacturer and legislative specifications for using explosives.</li> </ul>
Feeling			X	
Judgement/Decision Making		X		<ul style="list-style-type: none"> <li>Communicating safe working conditions.</li> <li>Completing pre-operational checks, assessing level of hazards and, if necessary, taking corrective action.</li> <li>Selecting appropriate explosives for conducting blasting operations (only trained and authorized personal are allowed to handle explosives and blasting agents).</li> <li>Obedying safely regulations while operating service and mobile equipment.</li> <li>Tagging and locking out equipment as required.</li> <li>Assessing severity of fire and activating fire suppression systems and alarms.</li> <li>Identifying hazards and minimizing risks.</li> </ul>
Concentration		X		<ul style="list-style-type: none"> <li>Multi-tasking and communicating while operating mobile and service equipment.</li> <li>Handling explosives, detonators and explosive agents safely.</li> </ul>
Alertness		X		<ul style="list-style-type: none"> <li>Workers must be alert to workplace hazards while operating service and mobile equipment, hand and power tools.</li> <li>Must remain alert while performing repetitive tasks.</li> <li>Workers must also be able to identify relevant alarms and noise from the equipment, which will provide the worker feedback on how the equipment is operating.</li> </ul>

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Section 6: Work Environment

WORK ENVIRONMENT	ESSENTIAL		COMMENTS*
	Yes	No	
Slippery Floors or Ground	X		<ul style="list-style-type: none"> <li>Wet/muddy and slippery surfaces. Surface conditions may vary depending on seasonal and weather conditions.</li> </ul>
Sloping or Uneven Terrain	X		<ul style="list-style-type: none"> <li>Ascending/descending grades, ramps and loose rocks.</li> </ul>
Inside Work	X		<ul style="list-style-type: none"> <li>Workers generally work inside environmentally controlled cabs while operating mobile and service equipment.</li> </ul>
Outside Work	X		<ul style="list-style-type: none"> <li>Workers are required to work outside while operating service equipment, conducting blasting operations, using hand and power tools, walking to and from buildings/equipment.</li> <li>Workers may be exposed to different weather conditions such as snow and rain.</li> </ul>
Extreme Heat/Extreme Cold	X		<ul style="list-style-type: none"> <li>Seasonal weather conditions.</li> </ul>
Dry/Humid	X		<ul style="list-style-type: none"> <li>May vary, depending on season and weather conditions.</li> </ul>
Dust (PPE required)	X		<ul style="list-style-type: none"> <li>May be exposed to dust. Respirators are available and may be worn when required.</li> <li>Water is sprayed to reduce dust as much as possible in the fall, spring, and summer.</li> </ul>
Vapours/Fumes (PPE required)		X	
Chemical Irritants (PPE required)		X	
Noise (PPE required)	X		<ul style="list-style-type: none"> <li>Operational noise within equipment.</li> <li>Hearing protection mandatory, ear plugs and/or earmuffs are available. Noise levels regularly exceed the occupational exposure limits.</li> <li>Level of noise ranges from 68 dB-180 dB (noise levels may vary based on the task and equipment being operated).</li> </ul>
Moving Objects/Vehicles	X		<ul style="list-style-type: none"> <li>Mobile and service equipment.</li> </ul>
Electrical Hazards	X		<ul style="list-style-type: none"> <li>May work around power lines and with power tools. Must be aware of potential hazards especially when working around water and/or rain.</li> </ul>
Sharp Tools	X		<ul style="list-style-type: none"> <li>Cutters for wet hole sleeves (pink plastic).</li> <li>Axes, box cutters, power tools and saws.</li> </ul>
Congested/Confined Work Site	X		<ul style="list-style-type: none"> <li>Entering and working in tanks, bins and confined spaces.</li> </ul>
Working at Heights	X		<ul style="list-style-type: none"> <li>Workers may be required to perform work on scissors lifts, climb ladders, stairs and climb onto equipment to operate and perform pre-operational checks.</li> </ul>

Continued...

WORK ENVIRONMENT	ESSENTIAL		COMMENTS*
	Yes	No	
Vibration (Whole Body)	X		<ul style="list-style-type: none"> <li>Operating mobile and service equipment. The degree of whole body vibration will vary according to the type of equipment; task performed, and mine location.</li> <li>Vibration ranges from 6-19 Hz.</li> </ul>
Vibration (Segmental)	X		<ul style="list-style-type: none"> <li>Using power tools, operating service and mobile equipment. The degree and duration of exposure will vary according to the type of equipment; task performed, and mine location.</li> <li>Hand-arm vibration ranges from 12 to 33 Hz.</li> </ul>
Vehicle Operation	X		<ul style="list-style-type: none"> <li>Must be able to operate mobile and service equipment safely.</li> </ul>
Overtime	X		<ul style="list-style-type: none"> <li>Voluntary overtime hours may be needed, depending on production requirements.</li> </ul>
Shift Work	X		<ul style="list-style-type: none"> <li>12- Hour rotating shifts required (may depend on mine site).</li> </ul>
Working Alone	X		<ul style="list-style-type: none"> <li>Works independent within a group of individuals. Check-in policy mandatory.</li> </ul>
Working with Others	X		

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

Section 7: Behavioural/Cognitive Demands

BEHAVIOURAL/COGNITIVE DEMANDS	CDA <sup>2</sup> RANKING SCALE				COMMENTS*
	1	2	3	4	
Degree of Self-Supervision Required				X	<ul style="list-style-type: none"> <li>Workers have to take self responsibility to work safely. Work environment does not allow for close supervision.</li> </ul>
Degree of Supervision Exercised			X		<ul style="list-style-type: none"> <li>Worker is responsible for safety of self and other and may communicate safety issues to others.</li> </ul>
Deadline Pressures (Time Pressure)			X		<ul style="list-style-type: none"> <li>Daily pressures are minimal. However, a worker must respond quickly to an emergency to protect self and others.</li> <li>Worker is expected to work in an efficient manner. All processes are coordinated; therefore work must be performed at a consistent pace to ensure efficiency while working safely.</li> </ul>
Attention to Detail			X		<ul style="list-style-type: none"> <li>Worker must react immediately to alarms.</li> <li>Worker must be aware of surroundings and communicate specific safety details to others as required.</li> </ul>
Performance of Multiple Tasks Required				X	<ul style="list-style-type: none"> <li>Operators have to listen to two-way radio and watch out for other equipment while operating their own equipment.</li> </ul>
Exposure to Distracting Stimuli				X	<ul style="list-style-type: none"> <li>Recognizing warning lights and audible alarms, while monitoring ongoing information conveyed over two-way radio in a noisy environment.</li> </ul>
Need to Work Co-operatively With Others			X		<ul style="list-style-type: none"> <li>Work task are performed individually. However, individual work tasks are part of a larger process.</li> </ul>
Exposure to Emotional Situations	X				
Exposure to Confrontational Situations		X			<ul style="list-style-type: none"> <li>Difference of opinion may occur.</li> </ul>
Responsibility and Accountability Required				X	<ul style="list-style-type: none"> <li>Workers always have to be aware of personal safety and safety of others.</li> </ul>
Reading Literacy		X			<ul style="list-style-type: none"> <li>Required to follow written instructions.</li> <li>Workplace Hazardous Materials Information System (WHMIS).</li> </ul>
Written Literacy		X			<ul style="list-style-type: none"> <li>Filling in log books.</li> </ul>
Numerical Skills			X		<ul style="list-style-type: none"> <li>Basic numerical skills required for equipment operators. More complex math skills required for conducting blasts.</li> <li>Must be able to calculate grade, ratios, dimensions, limits and loads calculations.</li> </ul>
Verbal Communication			X		<ul style="list-style-type: none"> <li>Must be able to communicate over two-way radio or in person.</li> </ul>
Memory			X		<ul style="list-style-type: none"> <li>Must remember multiple requests conveyed over two way radio and drawings.</li> </ul>
Computer Literacy			X		<ul style="list-style-type: none"> <li>Basic computer skills may be required to operate onboard systems.</li> </ul>
Shift Work Demands				X	<ul style="list-style-type: none"> <li>Rotating shift schedule may be required, depending on company policies. Typical shift durations are 8-12 hours but may vary by site.</li> </ul>

<sup>2</sup> The Cognitive Demands Assessment (CDA) definitions and scale are outlined in [Appendix 3](#).

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# Surface Miner

Area of Competence: Work Safely in Surface Mining Environment

## Assessment Report

## Minerals Processing Operator

### Work Safely in Surface Mining Environment — The Assessment Report

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#### Overview

Occupational Domain:	Surface Miner	National Occupational Standard (NOS) Area of Competence:	Work Safely in Surface Mining Environment
Hours of Work:	Length of shift may vary from 8-12 hours. (Dependant on mine site)	Breaks:	~1- 1½ hours in total
Shift Work:	Rotating schedule may be required. (Depends on mine site)	National Occupational Classification (NOC) Level of Work:	Heavy
Dates of Assessment:	February 24-26, 2009	Evaluators:	Tony Dias, H.B.K., C.K., C.R.S.P. Liliane Lamarche, B. Sc. (Kin.), C.K.

## Section 1: Detailed Task Description

According to the National Occupation Classification (N.O.C.), these job tasks fall within the Heavy strength category.

Workers are required to follow all applicable regulations, policies and procedures, to ensure safety of themselves, their coworkers, and the environment.

To work safely, the workers are required to lift and carry items weighing up to 70 kilograms, on an occasional basis and exert pushing and pulling forces up to 58 kilograms, on an occasional basis, as well as walk, climb stairs, ladders and uneven ground. The amount of weight a worker may lift or carry individually will vary based on provincial legislation or company policy.

Workers should also have functional range of motion in the neck, trunk, upper and lower extremities.

The work safely tasks in the surface mining environment begin at the start of the workday and do not end until the worker leaves the work site.

Each worker is responsible for identifying, assessing and reporting hazards, and taking corrective action to guard against existing and/or potential hazards.

Workers must always ensure that they are wearing assigned personal protective equipment, including but not limited to: reflective coveralls, safety shoes/boots, hard hat, gloves, respirator (when required), hearing protection, fall restraint systems (when working 3 meters above grade), etc.

It is also the worker's responsibility to perform work tasks using good body mechanics, in order to minimize the effects of loads on the body and not engage in behaviours that can cause injury.

Section 2: Workflow



## Section 3: Task Objectives and Duties

### Overview

General safety activities require a worker to continually assess and recognize hazards or potential hazards, involving mobile and service equipment, hand and power tools, handling explosives and environmental conditions (i.e.: weather, fog or avalanche conditions).

### Essential Tasks

- 1. Deal With Hazardous or Potentially Hazardous Conditions**
  - Workers must wear and maintain personal protective equipment.
  - Workers must guard or remove all identified hazards.
  - Workers must clean up spills or leaks.
  - Workers must control dust.
  - Worker must perform all job tasks in safe manner.
- 2. Understand and Apply Acts and Regulations Applying to Surface Miners**
  - Workers must understand and comply with all acts and regulations that apply to surface mining.
- 3. Recognize and Apply Rules For Traffic Patterns and Rights-of-way**
  - Worker must obey traffic patterns (emergency vehicles have the right-of-way over all others).
- 4. Practise and Apply Emergency Procedures**
  - Worker must wear proper personal protective equipment.
  - Worker must report all emergencies and other incidents to appropriate personnel.
  - Worker must be able to locate and use emergency flush showers, eyewash and first aid stations.
  - Worker must seek medical attention when required.
- 5. Work Around Operating and Mobile Equipment**
  - Worker must wear proper personal protective equipment.
  - Worker must obey safety signs, warning signals, lights and controls.
  - Worker must use designated travel ways around equipment and must not cross guards or barricades.
  - Worker must exercise caution around moving parts of equipment.
- 6. Identify Explosives and Blasting Agents**
  - Worker must be able handle explosives and blasting safely.
  - Worker must understand and identify various types, forms, strength and amounts of explosives along with related hazards.
  - Worker must report all hazards to appropriate authority.
- 7. Work Around Energy Sources**
  - Workers must be able to recognize energy sources.
  - Worker must wear proper personal protective equipment.
  - Worker must observe warning signs, signals, alarms or lights.
  - Worker must communicate with others to report all hazardous or potentially hazardous conditions.
- 8. Enter Tanks, Bins, and Confined Spaces**
  - Worker must wear personal protective equipment (including fall arrest system when required).
  - Worker must conduct pre-entry checks and lockouts before entering tanks, bins and confined spaces.
  - Worker must tag and lock out equipment before entering tanks, bins and confined spaces.

Continued...

- Worker must ensure that there is adequate lighting and ventilation in tanks, bins and confined spaces.
- Worker must post warning signs as required when entering tanks, bins and confined spaces.
- Worker must ensure that all warning devices are working properly.
- Worker must enter and exit tanks, bins and confined spaces safely.
- Worker must ensure to post a spotter or post rescue personnel out side of tanks, bins and confined spaces.

**9. Manually Lift and Carry Materials and Supplies**

- Worker must practice good manual lifting and carrying technique.
- Worker must ensure good footing.

**10. Work Safely Around Hazardous Materials**

- Worker must understand, identify, assess and report severity of potentially hazardous conditions.
- Worker must follow WHMIS.
- Worker must wear personal protective equipment.
- Worker must be able to locate and use emergency flush showers, eyewash and first aid stations.
- Worker must communicate with others using verbal, radio contact, hand and audible signals.
- Worker must obey safety signs, warning signals, lights and controls.

**11. Work Safely Around Water Hazards**

- Worker must operate equipment safely in and around water hazards.
- Worker must ensure the safety of personnel working around water hazards.

**Personal Protective Equipment (PPE)**

- CSA approved safety footwear with a green and orange tag;
- Coveralls equipped with appropriate reflective markings;
- CSA approved fall arrest systems, which is required when working 3 meters above grade;
- Hard hat;
- Safety glasses;
- Hearing protection, which may include ear plugs and/or ear muffs;
- Gloves (cotton, leather, rubber, welder and hot gloves);
- Lockout procedure;
- Dust mask and personal respirators; and
- Additional task specific PPE, such as face shield, self-contained breathing apparatus, etc.

**Equipment**

- |                                |                           |   |
|--------------------------------|---------------------------|---|
| • Haulage truck;               | • Forklift;               | • Chain saw;  |
| • Scraper;                     | • Elevated work platform; | • Concrete saw;                                       |
| • Grader;                      | • Light service vehicle;  | • Wrenches (socket, adjustable, pipe, box-end, etc.); |
| • Track dozer;                 | • Fuel/lube truck;        | • Impact gun;   |
| • Rubber-tired dozer;          | • Water truck;            | • Y connectors;                                       |
| • Cable reeler/cable truck;    | • Tow truck;              | • Chain wrench;                                       |
| • Front end loader;            | • Low bed/float;          | • Reducer;  |
| • Hydraulic excavator/backhoe; | • Mobile crane;           | • Handsaws;   |
| • Electric rope/cable shovel;  | • Tool box;               | • Sledge hammers;                                     |
| • Rotary drill;                | • Ladders;                | • Screwdrivers; and/or                                |
| • Skid steer;                  | • Pinch bar;              | • Hose repair equipment.                              |
| • Explosives truck;            | • Clevis;                 |   |

Section 4: Strength and Positional Requirements

STRENGTH REQUIREMENTS		FREQUENCY <sup>‡</sup>	LOAD (KG)	FORCE (KG OF FORCE)	COMMENTS*
Lifting/Lowering	Floor to Waist <sup>†</sup> (0-104cm)	Occasional	2-70	-	<ul style="list-style-type: none"> <li>CSA approved safety footwear (2.0-4.5 kg).</li> <li>Warning signs (~5 kg).</li> <li>Fire extinguisher (10.0 kg).</li> <li>Workers are required to use proper body mechanics when lifting loads. Loads requiring lifting vary from 2 to 70 kg. **</li> </ul>
	Waist <sup>†</sup> to Shoulder <sup>†</sup> (104-137cm)	Occasional	2-43	-	<ul style="list-style-type: none"> <li>Fire extinguisher (10.0 kg).</li> <li>Workers are required to use proper body mechanics when lifting loads. Loads requiring lifting vary from 2 to 43 kg. **</li> </ul>
	Floor to Shoulder <sup>†</sup> (0-137cm)	Never	-	-	
	Above Shoulder <sup>†</sup> (>138cm)	Occasional	2-43	-	<ul style="list-style-type: none"> <li>Workers are required to use proper body mechanics when lifting loads. Loads requiring lifting vary from 2 to 43 kg.</li> <li>Tools (2-43 kg) may be stored from floor to above shoulder level, as high as 197 cm. This may vary by mine site.</li> <li>Boxes of explosives (8-19 kg) are stored anywhere from floor level to as high as 170 cm. This may vary by mine site.</li> <li>Hard hat with ear muffs (0.5-1.0 kg). **</li> </ul>
Carrying	Unilateral/ Bilateral	Occasional	2-43	-	<ul style="list-style-type: none"> <li>Workers are required to use proper body mechanics when carrying loads. Loads requiring carrying vary from 2 to 43 kg. **</li> </ul>
Pushing/Pulling (kg of Force)	Vertical	Occasional	-	58	<ul style="list-style-type: none"> <li>Workers are required to use proper body mechanics when pushing and pulling.</li> <li>Releasing pin on fire extinguisher (9.0 kg of force).</li> </ul>
	Unilateral	Occasional	-	3-58	
	Bilateral	Occasional	-	3-58	

\*\* The amount of weight a worker may lift individually will vary based on provincial legislation or company policy.

‡ The frequencies documented will vary depending on the subtask completed. Lifting up to 70 kg may be routinely required. Only trained and authorized personal are able to handle explosives and blasting agents.

The Frequency Definitions are outlined in [Appendix 2](#).

† Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

‡ Anthropometrics are based on the 50th percentile male (waist height, standing 106.3±5.4 cm; shoulder height, standing 143.7±6.2 cm) and the 50th percentile female (waist height, standing 101.7±5.0 cm; shoulder height, standing 132.9±5.5 cm); Eastman Kodak Company (1986). *Ergonomic Design for People at Work: Volume 2*. New York: Van Nostrand Reinhold Company.

MOBILITY AND POSTURAL REQUIREMENTS		FREQUENCY	COMMENTS*
Sitting		Occasional - Constant	<ul style="list-style-type: none"> <li>In-classroom training; operating equipment.</li> <li>Frequency will vary depending on the facility and the work assignment.</li> </ul>
Standing		Occasional - Frequent	<ul style="list-style-type: none"> <li>Waiting for holes to be filled, preparing blast hole for detonation and installing detonators (down lines), firing hand pistol for avalanche control, pumping water from holes, and/or conducting blast hole verification, pre-shift meetings, working from the elevated work platform, conducting pre-operational checks on equipment, fuelling equipment, operating mobile crane and forklift, hooking up equipment to tow truck, loading tools and equipment, etc.</li> <li>Exposure to uneven, wet and/or slippery surfaces is possible.</li> <li>Frequency will vary depending on the facility and the work assignment.</li> </ul>
Walking		Occasional - Frequent	<ul style="list-style-type: none"> <li>Carrying explosives, blasting agents and detonators from magazine to explosives truck, and from explosives truck to the blast hole; conducting blast hole verification; preparing blast hole for detonation; evacuating blast area; checking blast area (post blast).</li> <li>Exposure to uneven, wet and/or slippery surfaces is possible.</li> <li>To and from equipment at the beginning and at the end of the shift.</li> <li>Conducting pre-operational checks, fuelling equipment, operating mobile crane, hooking up equipment to tow truck, loading tools and equipment, etc.</li> <li>Frequency will vary depending on the facility and the work assignment.</li> </ul>
Climbing	Stairs	Occasional	<ul style="list-style-type: none"> <li>Mounting and dismounting service and mobile equipment (heights may vary based on type of vehicle).</li> </ul>
	Ladders	Occasional	<ul style="list-style-type: none"> <li>Mounting and dismounting service and mobile equipment (heights may vary based on type of vehicle). Workers may also be required to climb ladders to complete repair/maintenance/installation tasks.</li> </ul>
	Uneven Ground	Occasional	<ul style="list-style-type: none"> <li>Working outside (rocks, snow, etc).</li> </ul>
Balancing		Occasional	<ul style="list-style-type: none"> <li>Balancing on ladders, stairs and equipment.</li> </ul>
Crawling		Never	
Kneeling		Occasional	<ul style="list-style-type: none"> <li>Performing inspection/maintenance tasks.</li> </ul>
Crouching/Squatting		Occasional	<ul style="list-style-type: none"> <li>Performing inspection/maintenance tasks.</li> </ul>
Trunk Movements		Occasional	<ul style="list-style-type: none"> <li>Functional range of motion in all directions may be needed to work safely.</li> <li>Awkward postures are adopted when performing some inspection and maintenance tasks, attention to safety when performing awkward tasks is required.</li> <li>Examples include, but are not limited to: Operating mobile, service equipment and completing inspection tasks.</li> </ul>
Neck Movements		Occasional	
Reaching	Forward/Backward	Frequent	<ul style="list-style-type: none"> <li>Full range of motion is required for some tasks.</li> <li>Examples include, but are not limited to operating equipment, using hand and power tools, completing inspection and repairing of equipment, putting on reflective coveralls, hard hat, safety glasses, lanyard and harness, etc.</li> </ul>
	Upper Level	Occasional	
	Sideways	Occasional	

Continued...

MOBILITY AND POSTURAL REQUIREMENTS	FREQUENCY	COMMENTS*
<b>Elbow Posture</b>	Occasional - Frequent	<ul style="list-style-type: none"> <li>Full elbow range of motion is required to work safely. Frequency will vary depending on the task and equipment being operated.</li> </ul>
<b>Wrist Posture</b>	Occasional	<ul style="list-style-type: none"> <li>Full wrist range of motion is required to work safely.</li> </ul>
<b>Gripping</b>	Frequent - Constant	<ul style="list-style-type: none"> <li>Power grip needed when using hand/power tools, grasping parts and supplies and operating service and mobile equipment.</li> </ul>
<b>Pinching</b>	Occasional	<ul style="list-style-type: none"> <li>Tip and key pinch grip required when operating switches and performing pre-operational checks, recording in log books, etc.</li> </ul>
<b>Fine Finger Dexterity</b>	Never	
<b>Striking with Hand</b>	Never	
<b>Foot Action</b>	Occasional-Constant	<ul style="list-style-type: none"> <li>Plantarflexion and dorsiflexion required to use the pedal controls while operating service equipment. A force of 6-20 kg is required to depress the pedals, which are located ~30 cm from the vehicle floor.</li> </ul>

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

Section 5: Sensory/Mental Requirements

SENSORY/MENTAL REQUIREMENTS		ESSENTIAL		COMMENTS*
		Yes	No	
Vision	Near	X		<ul style="list-style-type: none"> <li>Inspecting and operating mobile and service equipment.</li> <li>Inspecting and putting on personal protection equipment.</li> <li>Safely handling explosive and blasting agents.</li> <li>Reading and writing in log books.</li> </ul>
	Far	X		<ul style="list-style-type: none"> <li>Peripheral and far vision required in all aspects of surface mining. Including but not limited to the following tasks: inspecting and operating mobile and service equipment, using hand and power tools, conducting blasting operations, recognizing and evaluating environmental conditions and hazards, etc.</li> </ul>
	Colour		X	
Light Quality and Measurements		X		<ul style="list-style-type: none"> <li>All tasks are performed above ground. However, light levels will vary based on weather conditions, time of shift, and other light emitted from surrounding lighting and equipment. Light levels will vary from 0 Lux during the night to ~700 Lux during the day.</li> <li>Time of exposure to darkness may vary from 8 - 12 hours (based on seasonal time shifts).</li> </ul>
Hearing	Conversation	X		<ul style="list-style-type: none"> <li>Communicating over two-way radio and in-person.</li> </ul>
	Other Sounds	X		<ul style="list-style-type: none"> <li>Operational noise within equipment.</li> <li>Hearing protection mandatory, ear plugs and/or earmuffs are available. Noise levels may regularly exceed the occupational exposure limits (specifically inside mobile equipment).</li> <li>Level of noise ranges from 68 dB-180 dB.</li> </ul>
Talking		X		<ul style="list-style-type: none"> <li>Conversing with the use of hearing protection. Worker may be required to speak loud or shout.</li> </ul>
Reading/Writing		X		<ul style="list-style-type: none"> <li>Reviewing log books, signs, as well as information from onboard systems.</li> <li>Manufacturer and legislative specifications for using explosives.</li> </ul>
Feeling			X	
Judgement/Decision Making		X		<ul style="list-style-type: none"> <li>Communicate safe working conditions.</li> <li>Complete pre-operational checks, assess level of hazards and, if necessary, take corrective action.</li> <li>Use appropriate type and amount of explosives for conducting blasting operations (only trained and authorized personal are allowed to handle explosives and blasting agents).</li> <li>Obey safety regulations while operating service and mobile equipment.</li> <li>Identifying hazards and minimizing risks.</li> </ul>
Concentration		X		<ul style="list-style-type: none"> <li>Multi-tasking and communicating while operating mobile and service equipment.</li> </ul>
Alertness		X		<ul style="list-style-type: none"> <li>Workers must be alert to workplace hazards while operating service and mobile equipment, hand and power tools.</li> <li>Must be able to remain alert while performing repetitive tasks.</li> </ul>

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

Section 6: Work Environment

WORK ENVIRONMENT	ESSENTIAL		COMMENTS*
	Yes	No	
Slippery Floors or Ground	X		<ul style="list-style-type: none"> <li>Wet/muddy and slippery surface surfaces. Ground surface may vary according to seasonal and weather conditions.</li> </ul>
Sloping or Uneven Terrain	X		<ul style="list-style-type: none"> <li>Loose rocks and uneven terrain.</li> </ul>
Inside Work	X		<ul style="list-style-type: none"> <li>Workers are required to work inside while operating equipment or when working in the maintenance shop. Inside work is generally performed in temperature controlled environment.</li> </ul>
Outside Work	X		<ul style="list-style-type: none"> <li>Worker may be exposed to different environmental conditions when walking to various buildings, performing pre-operational checks of equipment, conducting blasting operations, working with hand and power tools, etc.</li> </ul>
Extreme Heat/Extreme Cold	X		<ul style="list-style-type: none"> <li>Exposure to hot or cold temperatures are possible when working outdoors.</li> </ul>
Dry/Humid	X		<ul style="list-style-type: none"> <li>Conditions may vary depending on task performed and mine site.</li> </ul>
Dust (PPE required)	X		<ul style="list-style-type: none"> <li>May be exposed to dust. Respirators are available and may be worn when required.</li> <li>Water is sprayed to reduce dust as much as possible in the fall, spring, and summer.</li> </ul>
Vapours/Fumes (PPE required)		X	
Chemical Irritants (PPE required)		X	
Noise (PPE required)	X		<ul style="list-style-type: none"> <li>Operational noise within equipment.</li> <li>Hearing protection mandatory, ear plugs and/or earmuffs are available. Noise levels regularly exceed the occupational exposure limits.</li> <li>Level of noise ranges from 68 dB-180 dB (noise levels may vary based on the task and equipment being operated).</li> </ul>
Moving Objects/Vehicles	X		<ul style="list-style-type: none"> <li>Mobile and service equipment.</li> </ul>
Electrical Hazards	X		<ul style="list-style-type: none"> <li>Overhead electric lines.</li> </ul>
Sharp Tools	X		<ul style="list-style-type: none"> <li>Cutters for wet hole sleeves (pink plastic).</li> </ul>
Congested/Confined Work Site		X	

Continued...

WORK ENVIRONMENT		ESSENTIAL		COMMENTS*
		Yes	No	
Working at Heights		X		<ul style="list-style-type: none"> <li>Workers may be required to perform work on elevated work platform, climb ladders and stairs to access equipment, climbing on equipment to perform pre-operational checks. Workers are required to wear fall arrest systems, when working 3 meters above the ground.</li> </ul>
Vibration	Whole Body	X		<ul style="list-style-type: none"> <li>Communicating while operating mobile and service equipment. The degree of vibration and duration of exposure will vary according to the type of equipment used; task performed, and mine location.</li> <li>Vibration ranges from 6-19 Hz when operating the various types of service and/or mobile equipment.</li> </ul>
	Segmental	X		<ul style="list-style-type: none"> <li>Communicating operating mobile and service equipment. May be exposed to vibration when operating controls and holding onto steering wheel while driving/travelling.</li> <li>Hand-Arm vibration ranges from 3-12 Hz. The degree of vibration and duration of exposure will vary according to the type of equipment used; task performed, and mine location.</li> </ul>
Vehicle Operation		X		<ul style="list-style-type: none"> <li>Must be able to operate mobile and service equipment safely.</li> </ul>
Overtime		X		<ul style="list-style-type: none"> <li>Voluntary overtime hours may be needed, depending on production requirements.</li> </ul>
Shift Work		X		<ul style="list-style-type: none"> <li>12- Hour rotating shifts required (May depend on mine site).</li> </ul>
Working Alone		X		<ul style="list-style-type: none"> <li>Works independent within a group of individuals. Check-in policy mandatory.</li> </ul>
Working with Others		X		

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

Section 7: Behavioural/Cognitive Demands

BEHAVIOURAL/COGNITIVE DEMANDS	CDA <sup>2</sup> RANKING SCALE				COMMENTS*
	1	2	3	4	
Degree of Self-Supervision Required			X		<ul style="list-style-type: none"> <li>Workers to be aware of personal safety and safety of others.</li> <li>Work environment does not permit for close supervision.</li> </ul>
Degree of Supervision Exercised			X		<ul style="list-style-type: none"> <li>Watch out for self and others.</li> <li>Communicate with other workers to warn them of potential hazards (workers may not always be able to see safety hazards around them and may rely on other workers to notify them).</li> </ul>
Deadline Pressures (Time Pressure)		X			<ul style="list-style-type: none"> <li>Daily pressures are minimal.</li> </ul>
Attention to Detail				X	<ul style="list-style-type: none"> <li>Inspection of safety systems (fire extinguishers, safety procedures, heavy and mobile equipment, and power tools) require a significant attention to detail. Mistakes will have serious consequences.</li> </ul>
Performance of Multiple Tasks Required			X		<ul style="list-style-type: none"> <li>Communicating while operating mobile and service equipment. Must be able to filter relevant information conveyed over two-way radio.</li> </ul>
Exposure to Distracting Stimuli			X		<ul style="list-style-type: none"> <li>Alarms, lights, other equipment, two-way radio and environmental stimuli.</li> </ul>
Need to Work Co-operatively with Others			X		<ul style="list-style-type: none"> <li>All mining processes are integrated.</li> </ul>
Exposure to Emotional Situations				X	<ul style="list-style-type: none"> <li>Workplace accidents</li> </ul>
Exposure to Confrontational Situations		X			<ul style="list-style-type: none"> <li>There may be clashes of personality.</li> </ul>
Responsibility and Accountability Required				X	<ul style="list-style-type: none"> <li>Must maintain a safe work environment. Responsible for the safety of self and others.</li> </ul>
Reading Literacy			X		<ul style="list-style-type: none"> <li>Required to follow written instructions.</li> <li>Workplace Hazardous Materials Information System (WHMIS).</li> </ul>
Written Literacy		X			<ul style="list-style-type: none"> <li>Completing log books and document and equipment defects.</li> </ul>
Numerical Skills	X				
Verbal Communication			X		<ul style="list-style-type: none"> <li>Person to person, two-way radio.</li> </ul>
Memory			X		<ul style="list-style-type: none"> <li>Signals, signs, and colour coding.</li> <li>Remember the location of the emergency flush showers, eyewash, first aid station and wash station.</li> <li>Must be able to prioritize.</li> </ul>
Computer Literacy			X		<ul style="list-style-type: none"> <li>Must be able to understand GPS and on-board systems.</li> </ul>
Shift Work Demands				X	<ul style="list-style-type: none"> <li>Rotating shift schedule may be required, depending on company policies. Typical shift durations are 8-12 hours but may vary by site.</li> </ul>

<sup>2</sup> The Cognitive Demands Assessment (CDA) definitions and scale are outlined in [Appendix 3](#).

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

# Surface Miner

Area of Competence: Use Hand and Power Tools

## Assessment Report

## Minerals Processing Operator

### Use Hand and Power Tools — The Assessment Report

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#### Overview

Occupational Domain:	Surface Miner	National Occupational Standard (NOS) Area of Competence:	Use Hand and Power Tools
Hours of Work:	Length of shift may vary from 8-12 hours. (Dependant on mine site)	Breaks:	~1- 1½ hours in total
Shift Work:	Rotating schedule may be required. (Depends on mine site)	National Occupational Classification (NOC) Level of Work:	Heavy
Dates of Assessment:	February 24-26, 2009	Evaluators:	Tony Dias, H.B.K., C.K., C.R.S.P. Liliane Lamarche, B. Sc. (Kin.), C.K.

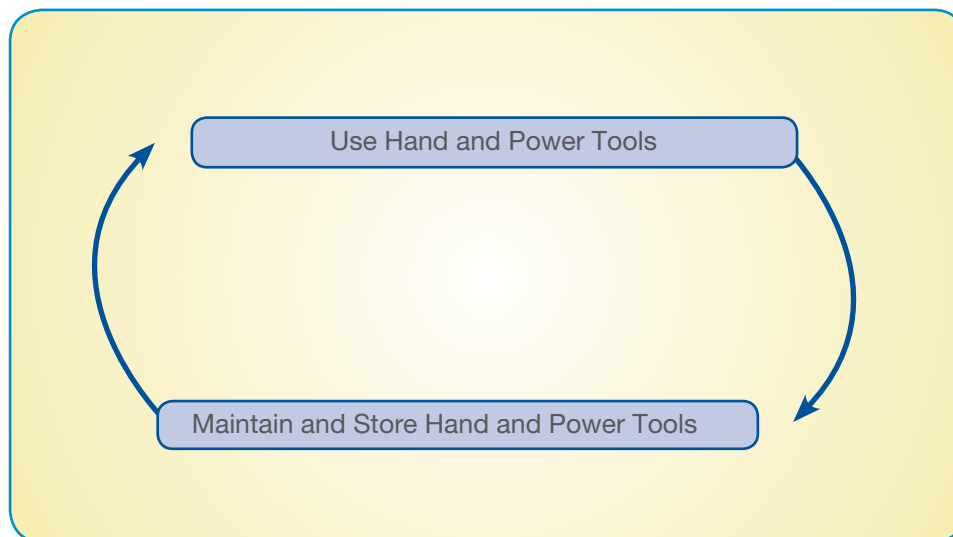
## Section 1: Detailed Task Description

As a Surface Miner, workers are required to use a variety of hand and power tools, in order to repair and maintain equipment. Hand and power tools may include: sledge hammers, pinch bars, arch rope rolls, Y connectors, clevis, reducers, chain wrench, tool box, chain saw, concrete saw, impact guns, ladders, etc. A worker using these tools must be able to lift and carry items weighing 5-43 kg (the weight will vary depending on the tool selected). The amount of weight a worker may lift individually will vary based on provincial legislation or company policy. A worker may also need to push and pull hoses and slings, loosen and tighten nuts and bolts. This may require a worker to exert between 36-57 kg of force.

As job tasks vary from day to day, a worker should have good positional tolerance in order to tolerate prolonged periods of standing, walking, kneeling, crouching, and stooping. Good neck, trunk, upper and lower extremity range of motion is also an asset. A worker is also expected to use ladders as needed. Overall, these job tasks fall within the Heavy strength category, as defined by the National Occupation Classification (N.O.C.).

Workers should be trained in the proper use of all tools and should be able to recognize the hazards associated with the different types of tools and the safety precautions necessary.

## Section 2: Workflow



## Section 3: Task Objectives and Duties

### Overview

Using hand and power tools involves inspecting, selecting, using and storing hand and power tools. Hand and power tool selection will vary according to which task is performed.

### Essential Tasks

#### 1. Use Hand and Power Tools

- The worker must be trained in the proper use and application of hand and power tools.
- Before using hand and power tools, the worker must always inspect tools for defects, and put on appropriate personal protective equipment and clothing.
- The worker must choose tools specific to the job and respect the limitations of the tools.
- The worker must ensure that there is adequate ventilation and lighting.
- The worker must follow tag and lock out procedures.
- The worker must follow operating procedures for starting-up, operating, shutting down, disconnecting, using/ replacing attachments.

#### 2. Maintain and Store Hand and Power Tools

- The worker must be familiar with the function and purpose of each hand and power tool.
- The worker must inspect, clean, and maintain tools.
- The worker must return tools to storage.

### Personal Protective Equipment (PPE)

- CSA approved safety footwear with a green and orange tag;
- Coveralls equipped with appropriate reflective markings;
- CSA approved fall arrest systems, which is required when working 3 meters above grade;
- Hard hat;
- Safety glasses;
- Hearing protection, which may include ear plugs and/or ear muffs;
- Gloves (Cotton, leather, rubber, welder and hot gloves);
- Lockout procedure;
- Dust mask and Personal respirators; and
- Additional task specific PPE, such as face shield, self-contained breathing apparatus, etc.

### Equipment

- |   |                          |
|---|--------------------------|
| • Chain saw;  | • Screwdrivers;          |
| • Concrete saw;                                       | • Hose repair equipment; |
| • Wrenches (socket, adjustable, pipe, box-end, etc.); | • Pinch bar;             |
| • Impact gun;   | • Clevis;                |
| • Y connectors;                                       | • Tool box; and/or       |
| • Chain wrench;                                       | • Ladders;               |
| • Reducer;  | • Handsaws               |
| • Sledge hammers;                                     |                          |

Section 4: Strength and Positional Requirements

STRENGTH REQUIREMENTS		FREQUENCY	LOAD (KG)	FORCE (KG OF FORCE)	COMMENTS*
Lifting/Lowering	Floor to Waist† (0-104cm)	Occasional -Frequent	5-43	-	<ul style="list-style-type: none"> <li>Sledge hammers (small - 6.8 kg, big - 9.2 kg), pinch bar (6.0 kg), Y connectors (small - 10.8 kg, big - 21.2 kg), clevis (12.9-20.0 kg), reducer (42.7 kg), chain wrench (21.1 kg), tool box (4.0-11.0 kg), chain saw (5.0 kg), concrete saw (13.4 kg), impact gun (5.0 kg), 20 foot ladder (16.0 kg), tift for fusing machine (33 kg), etc.</li> <li>Tools are stored in storage shed on shelves. Height of shelf ranges from 0 to 197 cm. **</li> </ul>
	Waist† to Shoulder† (104-137cm)	Occasional -Frequent	5-43	-	<ul style="list-style-type: none"> <li>Sledge hammers (small - 6.8 kg, big - 9.2 kg), pinch bar (6.0 kg), Y connectors (small - 10.8 kg, big - 21.2 kg), clevis (12.9-20.0 kg), reducer (42.7 kg), chain wrench (21.1 kg), tool box (4.0-11.0 kg), chain saw (5.0 kg), concrete saw (13.4 kg), impact gun (5.0 kg), 20 foot ladder (16.0 kg).</li> <li>Tools are stored in storage shed on shelves. Height of shelf ranges from 0 to 197 cm. **</li> </ul>
	Floor to Shoulder† (0-137cm)	Never	-	-	
	Above Shoulder† (>138cm)	Occasional -Frequent	5-43	-	<ul style="list-style-type: none"> <li>Sledge hammers (small - 6.8 kg, big - 9.2 kg), pinch bar (6.0 kg), Y connectors (small - 10.8 kg, big - 21.2 kg), clevis (12.9-20.0 kg), reducer (42.7 kg), chain wrench (21.1 kg), tool box (4.0-11.0 kg), chain saw (5.0 kg), concrete saw (13.4 kg), impact gun (5.0 kg), 20 foot ladder (16.0 kg).</li> <li>Tools are stored in storage shed on shelves. Height of shelf ranges from 0 to 197 cm. **</li> </ul>

Continued...

STRENGTH REQUIREMENTS		FREQUENCY	LOAD (KG)	FORCE (KG OF FORCE)	COMMENTS*
Carrying	Unilateral/ Bilateral	Occasional -Frequent	5-43		<ul style="list-style-type: none"> <li>May carry sledge hammers (small - 6.8 kg, big - 9.2 kg), pinch bar (6.0 kg), Y connectors (small - 10.8 kg, big - 21.2 kg), clevis (12.9-20.0 kg), reducer (42.7 kg), chain wrench (21.1 kg), tool box (4.0-11.0 kg), chain saw (5.0 kg), concrete saw (13.4 kg), impact gun (5.0 kg), 20 foot ladder (16.0 kg), etc. **</li> <li>Carrying distance will vary based on the work area and mine site.</li> </ul>
Pushing/Pulling (kg of Force)	Vertical	Occasional		36	<ul style="list-style-type: none"> <li>Workers generally have the option of using one or two- hands; however, bilateral use is required for some maintenance or inspection tasks, such as tightening bolts of bucket on heavy equipment (36.0 kg of force-force applied up or down).</li> <li>Pulling hose (52.0 to 57.0 kg of force), pulling slings (36 kg of force).</li> </ul>
	Unilateral	Occasional		36-57	
	Bilateral	Occasional		36-57	

\*Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

\*\* The amount of weight a worker may lift individually will vary based on provincial legislation or company policy.

The Frequency Definitions are outlined in [Appendix 2](#).

† Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

‡ Anthropometrics are based on the 50th percentile male (waist height, standing 106.3±5.4 cm; shoulder height, standing 143.7±6.2 cm) and the 50th percentile female (waist height, standing 101.7±5.0 cm; shoulder height, standing 132.9±5.5 cm); Eastman Kodak Company (1986). *Ergonomic Design for People at Work: Volume 2*. New York: Van Nostrand Reinhold Company.

MOBILITY AND POSTURAL REQUIREMENTS		FREQUENCY	COMMENTS*
Sitting		Occasional	<ul style="list-style-type: none"> <li>Transporting hand and power tools.</li> </ul>
Standing		Frequent	<ul style="list-style-type: none"> <li>Using and accessing hand and power tools.</li> </ul>
Walking		Occasional - Frequent	<ul style="list-style-type: none"> <li>Carrying and transporting tools.</li> </ul>
Climbing	Stairs	Never	
	Ladders	Occasional	<ul style="list-style-type: none"> <li>May be required to climb a 20 foot ladder.</li> </ul>
	Uneven Ground	Occasional	<ul style="list-style-type: none"> <li>May be required to climb on uneven ground (loose rock and or snow).</li> </ul>
Balancing		Occasional	<ul style="list-style-type: none"> <li>Required when climbing ladders.</li> </ul>
Crawling		Never	
Kneeling		Occasional	<ul style="list-style-type: none"> <li>Worker may kneel while operating the chain or concrete saw.</li> <li>Worker may also choose to crouch/squat or stoop depending on the job site and job task.</li> </ul>
Crouching/Squatting		Occasional	<ul style="list-style-type: none"> <li>Worker may crouch/squat while operating the chain or concrete saw.</li> <li>Worker may also choose to kneel or stoop depending on the job site and job task.</li> </ul>
Trunk Movements		Occasional - Frequent	<ul style="list-style-type: none"> <li>Full range of motion in all directions may be needed, such as bending forward, to the side, twisting, and stooping to use hand and power tools. Postural requirements will vary based on the task, task location, and mine site.</li> </ul>
Neck Movements		Occasional - Frequent	<ul style="list-style-type: none"> <li>Functional neck range of motion in all directions is required. Neck movement will vary based on the task, task location and mine site (i.e.: the worker may have to bend the neck forward when using the concrete and chain saw).</li> <li>Full bilateral rotation needed when observing surrounding, operating service vehicle, gathering parts.</li> <li>Extension required when performing tasks above shoulder level such as retrieving and storing equipment on shelves up to 197 cm.</li> </ul>
Reaching	Forward/ Backward	Frequent	<ul style="list-style-type: none"> <li>Forward reach required when using and starting equipment and using hand tools.</li> <li>The worker must be able to reach backward in order to pull the start cord for the chain saw, concrete saw and hose repair machine.</li> </ul>
	Upper Level	Occasional	<ul style="list-style-type: none"> <li>Accessing hand and power tools in storage shed. Hand and power tools may be stored anywhere from the floor level to as high as 197 cm from the floor.</li> </ul>
	Sideways	Occasional	<ul style="list-style-type: none"> <li>Worker may be required to reach to the side. This will depend on the on the task, work location, and mine site.</li> </ul>
Elbow Posture		Occasional - Frequent	<ul style="list-style-type: none"> <li>Most tasks requiring the use of hand and power tools are performed with the elbow in a pronated position.</li> <li>Full range of motion in the elbow is required.</li> </ul>
Wrist Posture		Occasional	<ul style="list-style-type: none"> <li>Extension and flexion needed when using wrenches, chain and concrete saw and hand tools.</li> <li>Ulnar/radial deviation required when hammering.</li> </ul>

Continued...

MOBILITY AND POSTURAL REQUIREMENTS	FREQUENCY <sup>§</sup>	COMMENTS*
<b>Gripping</b>	Frequent to Constant	<ul style="list-style-type: none"> <li>• Power grip needed when holding, starting and manipulating power tools, such as chain saw, concrete saw, wrenches, impact tools, electric tools, hammers, screwdrivers, hose repair equipment, etc.</li> <li>• Power grip needed when using hand tools.</li> </ul>
<b>Pinching</b>	Never	
<b>Fine Finger Dexterity</b>	Occasional	<ul style="list-style-type: none"> <li>• Pinching</li> </ul>
<b>Striking with Hand</b>	Never	
<b>Foot Action</b>	Occasional	<ul style="list-style-type: none"> <li>• Operating service vehicle to transport tools.</li> <li>• ~7 kg of force applied downward, at a height of 30 cm from the floor, required to depress pedals on service vehicle.</li> </ul>

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

Section 5: Sensory/Mental Requirements

SENSORY/MENTAL REQUIREMENTS		ESSENTIAL		COMMENTS*
		Yes	No	
Vision	Near	X		<ul style="list-style-type: none"> <li>Selecting and using hand and power tools; inspecting tools for defects; cleaning and maintaining tools.</li> </ul>
	Far	X		<ul style="list-style-type: none"> <li>Operating service vehicle to transport hand and power tools.</li> </ul>
	Colour		X	
Light Quality and Measurements		X		<ul style="list-style-type: none"> <li>Light levels range from 50 Lux (night shift) up to 700 Lux (day shift). Light levels may also vary based on whether the work is being performed indoors or outdoors.</li> </ul>
Hearing	Conversation	X		<ul style="list-style-type: none"> <li>Communicating over two-way radio and in-person.</li> </ul>
	Other Sounds	X		<ul style="list-style-type: none"> <li>Hearing protection is mandatory. Noise levels regularly exceed occupational exposure limits.</li> <li>Noise from power tools. Noise levels range from 50 dB to 99 dB (noise levels may increase when working around other equipment).</li> </ul>
Talking		X		<ul style="list-style-type: none"> <li>Conversing with the use of hearing protection. Worker may be required to speak loud or shout over the noise emitted from power tools and surrounding equipment.</li> </ul>
Reading/Writing		X		<ul style="list-style-type: none"> <li>Operating manuals.</li> </ul>
Feeling			X	
Judgement/Decision Making		X		<ul style="list-style-type: none"> <li>Use hand and power tools safely.</li> <li>Identifying hazards and minimizing risks.</li> </ul>
Concentration		X		<ul style="list-style-type: none"> <li>Using hand and power tools safely. Many tasks completed using hand tools require attention to detail.</li> </ul>
Alertness		X		<ul style="list-style-type: none"> <li>Workers must be aware of workplace hazards. Including ground conditions, mobile equipment, and hand and power tools.</li> </ul>

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Section 6: Work Environment

WORK ENVIRONMENT	ESSENTIAL		COMMENTS*
	Yes	No	
Slippery Floors or Ground	X		<ul style="list-style-type: none"> <li>Wet/muddy and slippery surface surfaces. Ground surface may vary according to seasonal and weather conditions.</li> </ul>
Sloping or Uneven Terrain	X		<ul style="list-style-type: none"> <li>Loose rock and or snow.</li> </ul>
Inside Work	X		<ul style="list-style-type: none"> <li>Performing work in the storage and maintenance building.</li> </ul>
Outside Work	X		<ul style="list-style-type: none"> <li>May be required to outdoors. Therefore, may be exposed to environmental conditions.</li> </ul>
Extreme Heat/Extreme Cold	X		<ul style="list-style-type: none"> <li>Exposed to environmental conditions when working outside, which will vary depending on the season.</li> </ul>
Dry/Humid	X		<ul style="list-style-type: none"> <li>May vary, depending on season and weather conditions.</li> </ul>
Dust (PPE required)	X		<ul style="list-style-type: none"> <li>May be exposed to dust. Respirators are available and may be worn when required.</li> <li>Water is sprayed to reduce dust as much as possible in the fall, spring, and summer.</li> </ul>
Vapours/Fumes (PPE required)		X	
Chemical Irritants (PPE required)		X	
Noise (PPE required)	X		<ul style="list-style-type: none"> <li>Hearing protect mandatory, depending on the task performed and area within the mine. Noise levels regularly exceed the occupational exposure limits.</li> <li>Noise levels range from 50 dB to 99 dB. Noise levels may increase when working around other equipment.</li> </ul>
Moving Objects/Vehicles	X		<ul style="list-style-type: none"> <li>Mobile and service equipment.</li> </ul>
Electrical Hazards	X		<ul style="list-style-type: none"> <li>Power cords and power tools may be potential hazards especially when exposed to water or rain.</li> </ul>
Sharp Tools	X		<ul style="list-style-type: none"> <li>Grinders, concrete and chain saw, etc.</li> </ul>
Congested/Confined Work Site		X	
Working at Heights	X		<ul style="list-style-type: none"> <li>Workers may be required to perform work on elevated work platforms or ladders. Workers are required to wear fall restraint equipment when working 3 m above the ground.</li> </ul>

Continued...

WORK ENVIRONMENT		ESSENTIAL		COMMENTS*
		Yes	No	
Vibration	Whole Body	X		<ul style="list-style-type: none"> <li>Exposed to low grade vibration while driving service vehicle (vibration ranges from 6-8 Hz). The degree of vibration and the duration of exposure will vary according to the work area and mine site.</li> </ul>
	Segmental	X		<ul style="list-style-type: none"> <li>Operating concrete and chain saw. The degree of exposure will vary according to the type of equipment and task performed.</li> <li>Hand-arm vibration ranges from 12 to 33 Hz.</li> </ul>
Vehicle Operation		X		<ul style="list-style-type: none"> <li>Operating service truck to transport hand and power tools.</li> </ul>
Overtime		X		<ul style="list-style-type: none"> <li>Voluntary overtime hours may be needed, depending on production requirements.</li> </ul>
Shift Work		X		<ul style="list-style-type: none"> <li>12-hour rotating shifts required.</li> </ul>
Working Alone		X		<ul style="list-style-type: none"> <li>Works independent within a group of individuals. Check-in policy mandatory.</li> </ul>
Working with Others		X		

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

Section 7: Behavioural/Cognitive Demands

BEHAVIOURAL/COGNITIVE DEMANDS	CDA <sup>§</sup> RANKING SCALE				COMMENTS*
	1	2	3	4	
Degree of Self-Supervision Required			X		<ul style="list-style-type: none"> <li>Worker works independently without close supervision.</li> </ul>
Degree of Supervision Exercised	X				
Deadline Pressures (Time Pressure)	X				
Attention to Detail				X	<ul style="list-style-type: none"> <li>Many tasks completed using hand tools require attention to detail.</li> </ul>
Performance of Multiple Tasks Required		X			<ul style="list-style-type: none"> <li>The worker may be required to perform multiple tasks requiring the use of hand and power tools.</li> </ul>
Exposure to Distracting Stimuli			X		<ul style="list-style-type: none"> <li>Must be aware of other workers and other equipment.</li> <li>High noise levels.</li> </ul>
Need to Work Co-operatively with Others			X		<ul style="list-style-type: none"> <li>Worker works independently and within a group.</li> </ul>
Exposure to Emotional Situations	X				
Exposure to Confrontational Situations	X				
Responsibility and Accountability Required			X		<ul style="list-style-type: none"> <li>Responsibility and accountability for maintaining a safe work environment.</li> </ul>
Reading Literacy			X		<ul style="list-style-type: none"> <li>Reading instruction manuals.</li> <li>Workplace Hazardous Materials Information System (WHMIS) and MSDS sheets.</li> </ul>
Written Literacy	X				
Numerical Skills		X			<ul style="list-style-type: none"> <li>May have to carry out basic arithmetic operations such as addition and subtraction.</li> </ul>
Verbal Communication			X		<ul style="list-style-type: none"> <li>Person to person communication.</li> </ul>
Memory			X		<ul style="list-style-type: none"> <li>Must remember operating instructions.</li> </ul>
Computer Literacy	X				
Shift Work Demands				X	<ul style="list-style-type: none"> <li>Rotating shift schedule may be required, depending on company policies. Typical shift durations are 8-12 hours but may vary by site.</li> </ul>

<sup>§</sup> The Cognitive Demands Assessment (CDA) definitions and scale are outlined in [Appendix 3](#).

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

Section 8: Photographs



Figure 1: Shovels, sledge hammers, pinch bar



Figure 2: Tool box



Figure 3: Hoses and Y connectors



Figure 5: Clevis

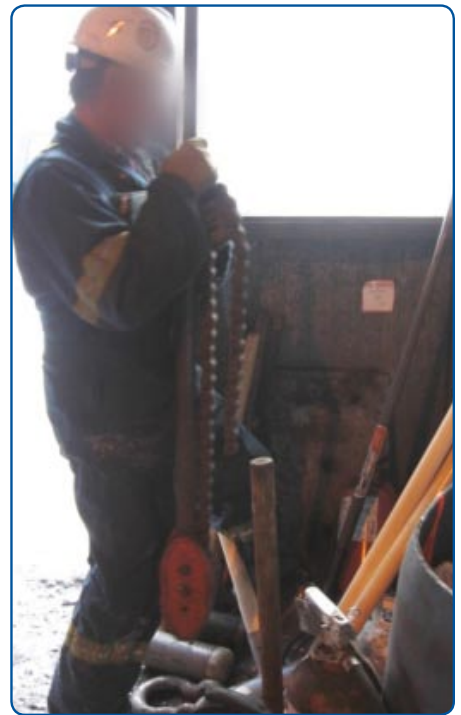


Figure 6: Chain wrench



Figure 4: Concrete saw



Figure 7: Sling

# Surface Miner

Area of Competence: Operate Mobile Equipment

## Assessment Report

## Minerals Processing Operator

### Operate Mobile Equipment — The Assessment Report

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#### Overview

Occupational Domain:	Surface Miner	National Occupational Standard (NOS) Area of Competence:	Operate Mobile Equipment
Hours of Work:	8-12 hour rotating shifts required. (Dependant on mine site)	Breaks:	~1- 1½ hours in total.
Shift Work:	Rotating schedule, which is dependant on the mine site.	National Occupational Classification (NOC) Level of Work:	Medium
Dates of Assessment:	February 24-26, 2009	Evaluators:	Tony Dias, H.B.K., C.K., C.R.S.P. Liliane Lamarche, B. Sc. (Kin.), C.K.

## Section 1: Detailed Task Description

Operating mobile equipment requires a significant amount of training. Each operator is generally assigned to a specific piece of equipment for a shift that he/she has been trained on and has been authorized to operate. Operators of smaller equipment may operate different pieces of equipment as required throughout a shift. Overall, this task falls within the Medium strength category, as defined by the National Occupational Classification.

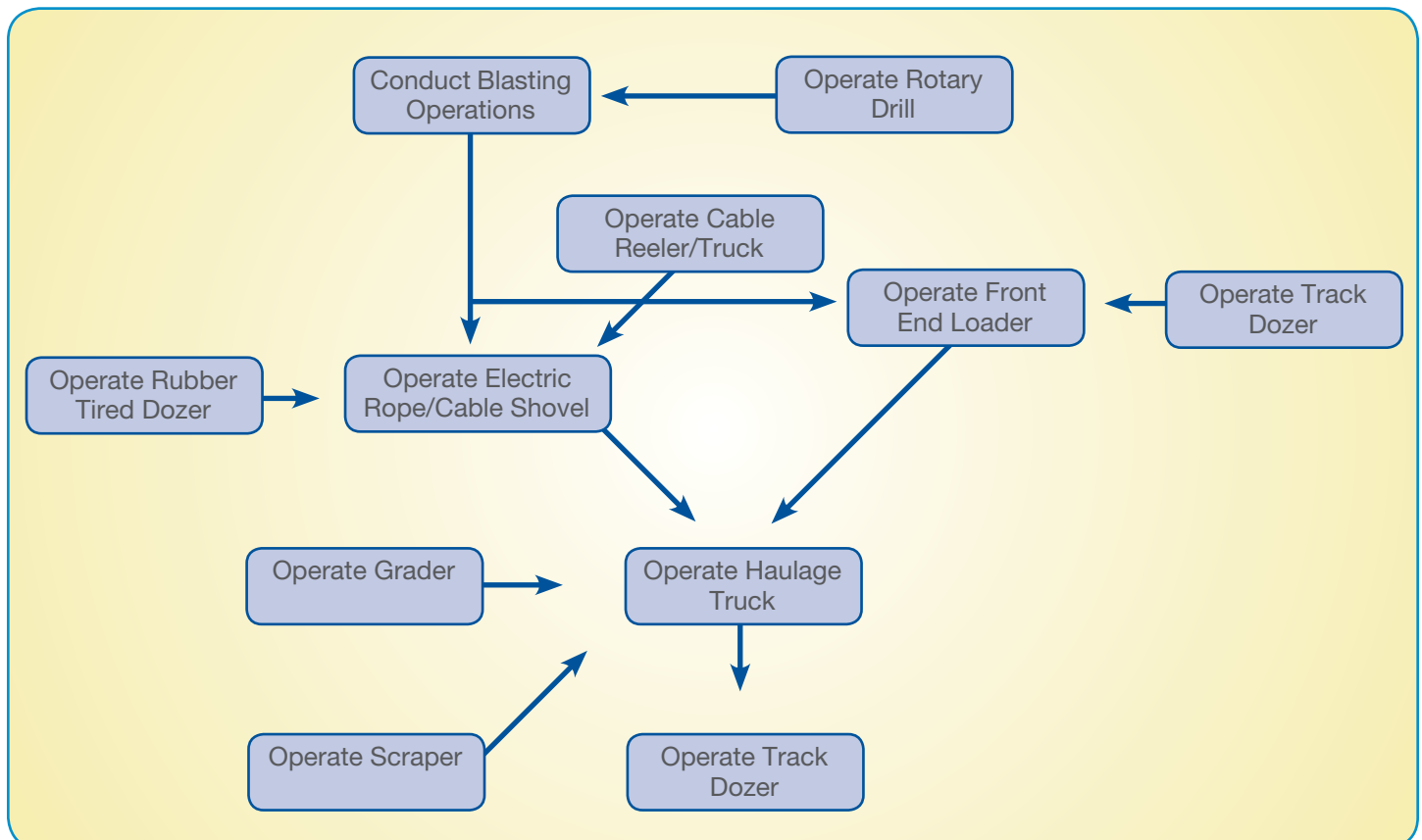
The operator is required conduct a pre-operational check of the assigned mobile equipment to ensure that it has no defects at the beginning of the shift or prior to using it. The operator is also required to conduct an operational check once the equipment has been started to ensure that all systems are operating properly. The operator must be able to mount and dismount the equipment safely not only to operate it but also to perform all required pre-operational checks. Once operating the assigned equipment the operator must follow all safety regulations to ensure the safety of self and others. The operator is required to shut down and dismount the equipment and block the wheels with wheel chocks (as legislated or as per company policy) at the end of the shift and perform a post-operational walk around check of the assigned equipment to identify any defects. The operator is responsible for assigned equipment as required during the shift.

A mobile equipment operator may be required to lift up to 36 kilograms on an occasional basis, carry up to 10 kilograms on an occasional basis and exert up to 36 kilograms of force to push and pull. The rotary drill operator may also be required to lift up to 70 kilograms (not daily). The amount of weight a worker may lift individually will vary based on provincial legislation or company policy.

The operator must be able to mount and dismount mobile equipment without limitations. Good sitting tolerance is required.

Functional neck, trunk, upper and lower extremity range of motion is also required.

## Section 2: Workflow



## Section 3: Task Objectives and Duties

### Overview

The operator must be authorized and trained to operate each piece of equipment to which he/she is assigned. Prior to operating, the workers are required to conduct any pre-operational checks on the mobile equipment, to ensure correct function, there are no defects, and that all fluids are at the required levels. The operator may be expected to operate multiple pieces equipment during a shift provided that they are trained and authorized to do so. This will vary based on the mine site.

### Essential Tasks

- 1. Operate Haulage Truck**
  - The operator is required to operate the haulage truck safely and productively.
- 2. Operate Scraper**
  - The operator is required to operate the scraper safely and productively.
- 3. Operate Grader**
  - The operator is required to operate the grader safely and productively.
- 4. Operate Track Dozer**
  - The operator is required to operate the track dozer safely and productively.
- 5. Operate Rubber-Tired Dozer**
  - The operator is required to operate the rubber-tired dozer safely and productively.
- 6. Operate Cable Reeler/Cable Truck**
  - The operator is required to operate the cable reeler/cable truck safely and productively.
- 7. Operate Front End Loader**
  - The operator is required to operate the front end loader safely and productively.
- 8. Operate Hydraulic Excavator/Backhoe**
  - The operator is required to operate the hydraulic excavator/backhoe safely and productively.
- 9. Operate Electric Rope/Cable Shovel**
  - The operator is required to operate the electric rope/cable shovel safely and productively.
- 10. Operate Rotary Drill**
  - The operator is required to operate the rotary drill safely and productively.

### Personal Protective Equipment (PPE)

- CSA approved safety footwear with a green and orange tag;
- Coveralls equipped with appropriate reflective markings;
- CSA approved fall arrest systems, which must be worn anytime while working 3 meters above grade;
- Hard hat with optional light clip;
- Safety glasses;
- Hearing protection, which may include ear plugs and/or ear muffs;
- Gloves (cotton);
- Dust mask and personal respirators, as required; and
- Additional task specific PPE, such as face shield, self-contained breathing apparatus, etc.

### Equipment

- Haulage Truck;
- Scraper;
- Grader;
- Track dozer;
- Rubber-Tired dozer;
- Cable reeler/Cable truck;
- Front End Loader;
- Hydraulic excavator/Backhoe;
- Electric rope/Cable shovel;
- Rotary drill; as well as
- Log books.

Section 4: Strength and Positional Requirements

STRENGTH REQUIREMENTS		FREQUENCY	LOAD (KG)	FORCE (KG OF FORCE)	COMMENTS*
Lifting/Lowering	Floor to Waist† (0-104cm)	Occasional	2.0-70.0		<ul style="list-style-type: none"> <li>CSA approved safety footwear (2.0-4.5 kg).</li> <li>Fire extinguisher (10.0 kg) on haulage truck.</li> <li>Pail of oil (10.0 kg) for rotary drill.</li> <li>Keeper bar (36.0 kg) for the hydraulic excavator.</li> <li>Drill steel cap (70.0 kg).</li> <li>Wheel chocks (9.0 kg).</li> </ul> <p><i>The amount of weight a worker may lift individually will vary based on provincial legislation or company policy.</i></p>
	Waist† to Shoulder† (104-137cm)	Occasional	1.0-5.0		<ul style="list-style-type: none"> <li>Shovel, broom and sledge hammer on drill (1.0-5.0 kg).</li> </ul>
	Floor to Shoulder† (0-137cm)	Occasional	5.5		<ul style="list-style-type: none"> <li>Fuel hose (5.5 kg) when fuelling haulage truck.</li> </ul>
	Above Shoulder† (>138cm)	Occasional	0.5-1.0		<ul style="list-style-type: none"> <li>Hard hat with ear muffs (0.5-1.0 kg).</li> </ul>
Carrying	Unilateral/ Bilateral	Occasional	<0.5-10.0		<ul style="list-style-type: none"> <li>Pail of oil (10.0 kg) for rotary drill ~2-5 m.</li> <li>Wrenches (5.0 kg).</li> <li>Workers may carry log books (&lt;0.5 kg), etc.</li> </ul>
Pushing/Pulling (kg of Force)	Vertical	Occasional		28.0	<ul style="list-style-type: none"> <li>Loosening/tightening keeper bar bolts on hydraulic excavator (28.0 kg of force). Force may be applied up or down.</li> </ul>
	Unilateral	Occasional		~6.0-36.0	<ul style="list-style-type: none"> <li>Opening / closing doors in equipment (~6.0-32.0 kg of force), etc.</li> <li>Pulling lube hose (21.0 kg of force) from fuel shack to haulage truck ~5-10 m.</li> <li>Pushing and pulling equipment control levers (&lt;1.0-6.0 kg of force).</li> </ul>
	Bilateral	Occasional		~6.0-36.0	<ul style="list-style-type: none"> <li>Bilateral pushing and pulling required for some repair or inspection tasks such as tightening bolts of bucket on heavy equipment (36 kg).</li> <li>Worker has the option of using one or two-hands.</li> </ul>

The Frequency Definitions are outlined in [Appendix 2](#).

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

† Anthropometrics are based on the 50th percentile male (waist height, standing 106.3±5.4 cm; shoulder height, standing 143.7±6.2 cm) and the 50th percentile female (waist height, standing 101.7±5.0 cm; shoulder height, standing 132.9±5.5 cm); Eastman Kodak Company (1986). *Ergonomic Design for People at Work: Volume 2*. New York: Van Nostrand Reinhold Company.

MOBILITY AND POSTURAL REQUIREMENTS		FREQUENCY	COMMENTS*
Sitting		Constant	<ul style="list-style-type: none"> <li>Required to be seated while operating all mobile equipment. The operator may adjust the seat height and the horizontal distance to the steering wheel.</li> <li>Operator may stand occasionally, if required, while operating the rotary drill.</li> </ul>
Standing		Occasional	<ul style="list-style-type: none"> <li>May stand for pre-shift meetings.</li> </ul>
Walking		Occasional	<ul style="list-style-type: none"> <li>To and from equipment at the beginning and at the end of the shift.</li> <li>During pre-operation inspection.</li> </ul>
Climbing	Stairs	Occasional	<ul style="list-style-type: none"> <li>Required to mount and dismount equipment such as the haulage truck, the electric rope/cable shovel and the rotary drill.</li> </ul>
	Ladders	Occasional	<ul style="list-style-type: none"> <li>Required to mount and dismount equipment, such as the haulage truck, scraper, grader, track dozer, rubber-tired dozer, cable reeler/cable truck, front end loader, hydraulic excavator/backhoe, the electric rope/cable shovel and the rotary drill.</li> </ul>
	Uneven Ground	Occasional	<ul style="list-style-type: none"> <li>At the beginning and at the end of the shift (may depend on location).</li> </ul>
Balancing		Occasional	<ul style="list-style-type: none"> <li>Required while climbing on equipment.</li> <li>Also required while performing operational checks.</li> </ul>
Crawling		Never	
Kneeling		Occasional	<ul style="list-style-type: none"> <li>Conducting pre-operational checks on all equipment at the beginning of the shift.</li> <li>Operator may choose between crouching or kneeling while performing inspection.</li> </ul>
Crouching/Squatting		Occasional	<ul style="list-style-type: none"> <li>Performing operational checks.</li> <li>May choose between crouching or kneeling while performing inspection.</li> </ul>
Trunk Movements		Occasional	<ul style="list-style-type: none"> <li>Partial trunk movements required to observe surroundings. Workers responsible for watching out for each others and be aware of surroundings.</li> </ul>
Neck Movements		Occasional	<ul style="list-style-type: none"> <li>Unrestricted neck range of motion in all directions is required. Especially important when observing surroundings.</li> <li>Full bilateral rotation needed when operating equipment, specifically when reversing.</li> <li>Neck extension may also be required to access two way radio (location of two-way radio may vary) and observe audible displays.</li> </ul>
Reaching	Forward/Backward	Occasional	<ul style="list-style-type: none"> <li>Operating equipment controls, which include levers, steering wheel.</li> <li>Using two-way radio.</li> </ul>
	Upper Level	Occasional	<ul style="list-style-type: none"> <li>Upper level reaching required while climbing ladders.</li> <li>Operator required to reach above shoulder level when using GPS system to indicate position to the Pit control. May be required to access the two-way radio, depending on the location within the control cab.</li> <li>Also required when performing pre-operational checks.</li> </ul>
	Sideways	Occasional	<ul style="list-style-type: none"> <li>May be required to access various control levers, closing equipment doors, performing pre-operational checks, etc.</li> </ul>

Continued...

MOBILITY AND POSTURAL REQUIREMENTS	FREQUENCY	COMMENTS*
<b>Elbow Posture</b> (Supination, Pronation)	Occasional	<ul style="list-style-type: none"> <li>Some pronation required while steering and operating equipment.</li> <li>Pronation needed when accessing controls and monitors, as well as recording information into the log book. Supination may be required when reading mine prints.</li> </ul>
<b>Wrist Posture</b> (Flexion, Extension, Ulnar/Radial Deviation)	Occasional	<ul style="list-style-type: none"> <li>Extension and flexion needed when operating equipment controls and switches.</li> </ul>
<b>Gripping</b>	Frequent	<ul style="list-style-type: none"> <li>Power grip needed when steering equipment, grasping handrails to enter and exit equipment, operating two-way radio, conducting pre-operational checks.</li> <li>Some equipment levers may also require power griping, which will vary depending on the type of equipment being operated.</li> </ul>
<b>Pinching</b>	Occasional	<ul style="list-style-type: none"> <li>Tip and key pinch grip required when operating switches and performing pre-operational checks.</li> </ul>
<b>Fine Finger Dexterity</b>	Occasional	<ul style="list-style-type: none"> <li>Needed when filling in log books.</li> </ul>
<b>Striking with Hand</b>	Never	
<b>Foot Action</b>	Occasional-Frequent	<ul style="list-style-type: none"> <li>Plantarflexion and dorsiflexion required to use the pedal controls while operating service equipment. A force of 6-20 kg is required to depress the pedals, which are located ~30 cm from the vehicle floor.</li> </ul>

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

Section 5: Sensory/Mental Requirements

SENSORY/MENTAL REQUIREMENTS		ESSENTIAL		COMMENTS*
		Yes	No	
Vision	Near	X		<ul style="list-style-type: none"> <li>Observing visual signals and various controls within the equipment.</li> <li>During inspection for the pre-operational checks.</li> </ul>
	Far	X		<ul style="list-style-type: none"> <li>Peripheral and far vision needed when operating equipment particularly for mobile equipment, such as haulage truck, scraper, grader, track dozer, rubber-tired dozer, cable reeler/cable truck, front end loader, hydraulic excavator/backhoe and the electric rope/cable shovel.</li> <li>Also needed when reading signs.</li> </ul>
	Colour		X	
Light Quality and Measurements		X		<ul style="list-style-type: none"> <li>All tasks are performed above ground. However, light levels will vary based on weather conditions, time of shift, and other light emitted from surrounding lighting and equipment. Light levels will vary from 0 Lux during the night to ~680 Lux during the day.</li> <li>Time of exposure to darkness may vary from 8-12 hours (based on seasonal time shifts).</li> </ul>
Hearing	Conversation	X		<ul style="list-style-type: none"> <li>Communicating over two-way radio and in-person.</li> </ul>
	Other Sounds	X		<ul style="list-style-type: none"> <li>Operational noise within equipment.</li> <li>Hearing protection is mandatory. Noise levels regularly exceed occupational exposure limits.</li> <li>Level of noise ranges from 68 dB-180 dB (heavy equipment operation).</li> <li>Ear plugs and/or earmuffs are available.</li> </ul>
Talking		X		<ul style="list-style-type: none"> <li>Conversing with the use of hearing protection while talking on two-way radio or in person.</li> </ul>
Reading/Writing		X		<ul style="list-style-type: none"> <li>Log books, as well as information from on board computer.</li> <li>Fire extinguisher gauges, mine prints/maps, reports, signs, warning signals, controls, symbols and abbreviations, as well as information on board computer.</li> </ul>
Feeling		X		<ul style="list-style-type: none"> <li>Operational awareness/equipment integrity.</li> </ul>
Judgement/Decision Making		X		<ul style="list-style-type: none"> <li>Worker is responsible to initiate communication with others, as needed, in order to work safely (must watch out for other workers and their equipment and communicate identified safety issues).</li> <li>Identifying hazards and minimizing risks.</li> </ul>
Concentration		X		<ul style="list-style-type: none"> <li>Multi-tasking, communicating while operating mobile equipment.</li> </ul>
Alertness		X		<ul style="list-style-type: none"> <li>Workers must be alert to workplace hazards, which may include weather conditions, other equipment.</li> <li>Workers must also be able to identify relevant information conveyed over two-way radio.</li> <li>Workers must also be able to identify relevant alarms and noise from the equipment, which will provide the worker feedback on how the equipment is operating.</li> <li>Must remain alert while performing repetitive tasks.</li> </ul>

\*Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

Section 6: Work Environment

WORK ENVIRONMENT	ESSENTIAL		COMMENTS*
	Yes	No	
Slippery Floors or Ground	X		<ul style="list-style-type: none"> <li>Wet/muddy and slippery surface surfaces. Surfaces vary depending on seasonal and weather conditions.</li> </ul>
Sloping or Uneven Terrain	X		<ul style="list-style-type: none"> <li>Ascending/descending ramps equipment, loose rocks.</li> </ul>
Inside Work	X		<ul style="list-style-type: none"> <li>All work is performed inside mobile equipment.</li> <li>Workers generally work in environmentally controlled cabs.</li> </ul>
Outside Work	X		<ul style="list-style-type: none"> <li>All work is performed outdoors inside mobile equipment.</li> <li>Occasionally required to work outside. May be exposed to different weather conditions when walking to various buildings, performing inspection of equipment, and while cleaning spills or leaks.</li> </ul>
Extreme Heat/Extreme Cold		X	
Dry/Humid	X		<ul style="list-style-type: none"> <li>Varies depending on seasonal weather conditions.</li> </ul>
Dust (PPE required)	X		<ul style="list-style-type: none"> <li>May be exposed to dust. Respirators are available and may be worn when required.</li> <li>Water is sprayed to reduce dust as much as possible in the fall, spring, and summer.</li> </ul>
Vapours/Fumes (PPE required)		X	
Chemical Irritants (PPE required)		X	
Noise (PPE required)	X		<ul style="list-style-type: none"> <li>Operational noise within equipment.</li> <li>Hearing protection mandatory, ear plugs and/or earmuffs are available. Noise levels regularly exceed the occupational exposure limits.</li> <li>Level of noise ranges from 68 dB-180 dB (heavy equipment operation).</li> </ul>
Moving Objects/Vehicles	X		<ul style="list-style-type: none"> <li>Other mobile and service equipment.</li> </ul>
Electrical Hazards		X	
Sharp Tools		X	
Congested/Confined Work Site		X	

Continued...

WORK ENVIRONMENT		ESSENTIAL		COMMENTS*
		Yes	No	
Working at Heights		X		<ul style="list-style-type: none"> <li>Workers may be required to perform work on scissors lifts, climb ladders, stairs and climb onto equipment to operate and perform pre-operational checks.</li> </ul>
Vibration	Whole Body	X		<ul style="list-style-type: none"> <li>The degree of vibration will vary according to the type of equipment; task performed, and mine location.</li> <li>Vibration ranges from 7-19 Hz.</li> </ul>
	Segmental	X		<ul style="list-style-type: none"> <li>Hand-Arm vibration ranges from 2-10 Hz and will vary according to the mine location.</li> </ul>
Vehicle Operation		X		<ul style="list-style-type: none"> <li>All mobile equipment.</li> </ul>
Overtime		X		<ul style="list-style-type: none"> <li>Voluntary overtime hours may be needed, depending on production requirements.</li> </ul>
Shift Work		X		<ul style="list-style-type: none"> <li>12- Hour rotating shifts required.</li> </ul>
Working Alone		X		<ul style="list-style-type: none"> <li>Works independent within a group of individuals. Check-in policy mandatory.</li> </ul>
Working with Others		X		

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

Section 7: Behavioural/Cognitive Demands

BEHAVIOURAL/COGNITIVE DEMANDS	CDA <sup>E</sup> RANKING SCALE				COMMENTS*
	1	2	3	4	
Degree of Self-Supervision Required				X	<ul style="list-style-type: none"> <li>Minimal supervision is required. Worker is responsible to initiate communication with others, as needed in order to work safely (must watch out for other workers and their equipment and communicate identified safety issues).</li> </ul>
Degree of Supervision Exercised			X		<ul style="list-style-type: none"> <li>May direct other operators (for example, shovel operator may direct haulage trucks or track dozer, haulage trucks may direct the grader and/ or the scraper).</li> <li>Worker is responsible for safety of self and others.</li> </ul>
Deadline Pressures (Time Pressure)			X		<ul style="list-style-type: none"> <li>Worker is expected to work in an efficient manner. All processes are coordinated; therefore work must be performed at a consistent pace to ensure efficiency while working safely.</li> <li>Time pressure may increase if having to respond to an emergency situation.</li> </ul>
Attention to Detail			X		<ul style="list-style-type: none"> <li>Must be aware of surroundings and communicate specific details to others as appropriate. May include details regarding weather conditions, specific sounds from equipment, etc., which will allow the worker to determine safety and efficient operation of equipment.</li> <li>Must have good spatial awareness.</li> </ul>
Performance of Multiple Tasks Required				X	<ul style="list-style-type: none"> <li>Each operator is required to operate a single piece of equipment at a time. However, he/she is required to perform multiple tasks at the same time in order to safely and effectively operate the equipment to which he/she is assigned.</li> </ul>
Exposure to Distracting Stimuli				X	<ul style="list-style-type: none"> <li>The worker is exposed to various stimuli. This includes but is not limited to visual signals within the equipment that is being operated.</li> <li>Must be able to differentiate various sounds from equipment which may indicate if the equipment is operating properly.</li> <li>Must be able to decipher relevant information transmitted over the two-way radio.</li> <li>May also encounter environmental stimuli such as weather conditions etc.</li> </ul>
Need to Work Co-operatively with Others			X		<ul style="list-style-type: none"> <li>Cooperation with others is essential.</li> <li>Work is performed individually. However, individual tasks are part of a larger process.</li> </ul>
Exposure to Emotional Situations			X		<ul style="list-style-type: none"> <li>Accidents on the job.</li> </ul>
Exposure to Confrontational Situations		X			<ul style="list-style-type: none"> <li>There may be clashes of personality.</li> </ul>

Continued...

BEHAVIOURAL/COGNITIVE DEMANDS	CDA <sup>§</sup> RANKING SCALE				COMMENTS*
	1	2	3	4	
Responsibility and Accountability Required				X	<ul style="list-style-type: none"> <li>Each worker is responsible and accountable for their own safety and for the safety of others. Must complete reports as required.</li> <li>Required to maintain contact with “Pit Control”.</li> </ul>
Reading Literacy		X			<ul style="list-style-type: none"> <li>Basic reading literacy required.</li> </ul>
Written Literacy		X			<ul style="list-style-type: none"> <li>Must complete reports as required (log book entries).</li> </ul>
Numerical Skills		X			<ul style="list-style-type: none"> <li>Basic numerical skills required for equipment operators.</li> </ul>
Verbal Communication			X		<ul style="list-style-type: none"> <li>Majority of communication is completed via two-way radio.</li> </ul>
Memory			X		<ul style="list-style-type: none"> <li>Required to memorize many details and sequences.</li> <li>Must be able to prioritize.</li> </ul>
Computer Literacy		X			<ul style="list-style-type: none"> <li>Must be able to understand GPS, and on-board systems.</li> </ul>
Shift Work Demands				X	<ul style="list-style-type: none"> <li>Rotating shift schedule may be required, depending on company policies. Typical shift durations are 12- hours but may vary by site.</li> </ul>

<sup>§</sup> The Cognitive Demands Assessment (CDA) definitions and scale are outlined in [Appendix 3](#).

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

## Section 8: Photographs



Figure 1: Haulage Truck

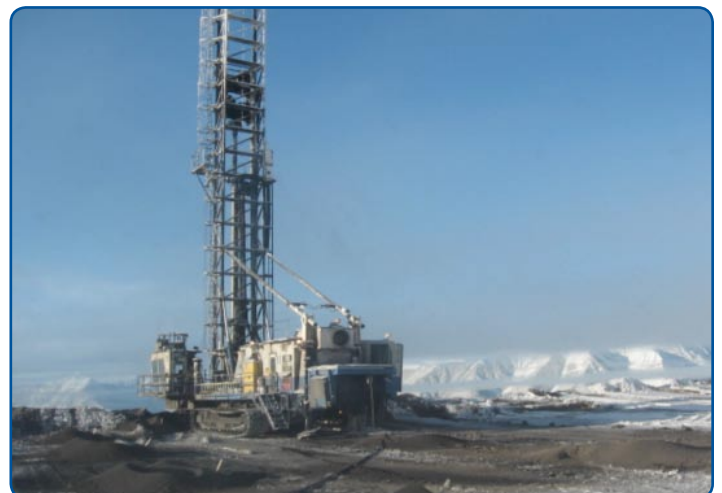


Figure 2: Rotary Drill

Section 8: Photographs



Figure 3: Front End Loader



Figure 4: Hydraulic Excavator



Figure 5: Track Dozer



Figure 6: Electric Rope/Cable Shovel



Figure 13: Grader



Figure 14: Scraper

# Surface Miner

Area of Competence: Conduct Blasting Operations

## Assessment Report

## Minerals Processing Operator Conduct Blasting Operations — The Assessment Report

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### Overview

Occupational Domain:	Surface Miner	National Occupational Standard (NOS) Area of Competence:	Conduct Blasting Operations
Hours of Work:	8-12 hour shifts required. Blaster may occasionally work night shifts.	Breaks:	~1- 1½ hours in total
Shift Work:	Rotating schedule, which is dependant on the mine site.	National Occupational Classification (NOC) Level of Work:	Medium
Dates of Assessment:	February 24-26, 2009	Evaluators:	Tony Dias, H.B.K., C.K., C.R.S.P. Liliane Lamarche, B. Sc. (Kin.), C.K.

## Section 1: Detailed Task Description

Blasters are responsible for preparing and conducting blasts in order to dislodge mineral or ore from rock. The blaster is responsible for identifying and selecting the required blasting explosives, agents, and detonators; and transporting them to the site where the blast is to be conducted. Before preparing the hole for detonation, the worker is required to conduct blast hole verification (a process where the blaster measures the depth of a blast hole and confirms hole location). Preparing the hole for detonation requires an aptitude for reading instructions and diagrams, outlining drill patterns, as well as determining depth and diameter of blast holes.

Once the blast hole has been prepared for detonation the blaster is ready to detonate the blast. Detonating the blast requires a series of steps to ensure that the blast is successful and performed in a safe manner. This includes developing a “tie-in” plan, evacuating the blast area of all personnel and equipment, setting up guarding, and ensuring that all warnings and signals are issued prior to detonation.

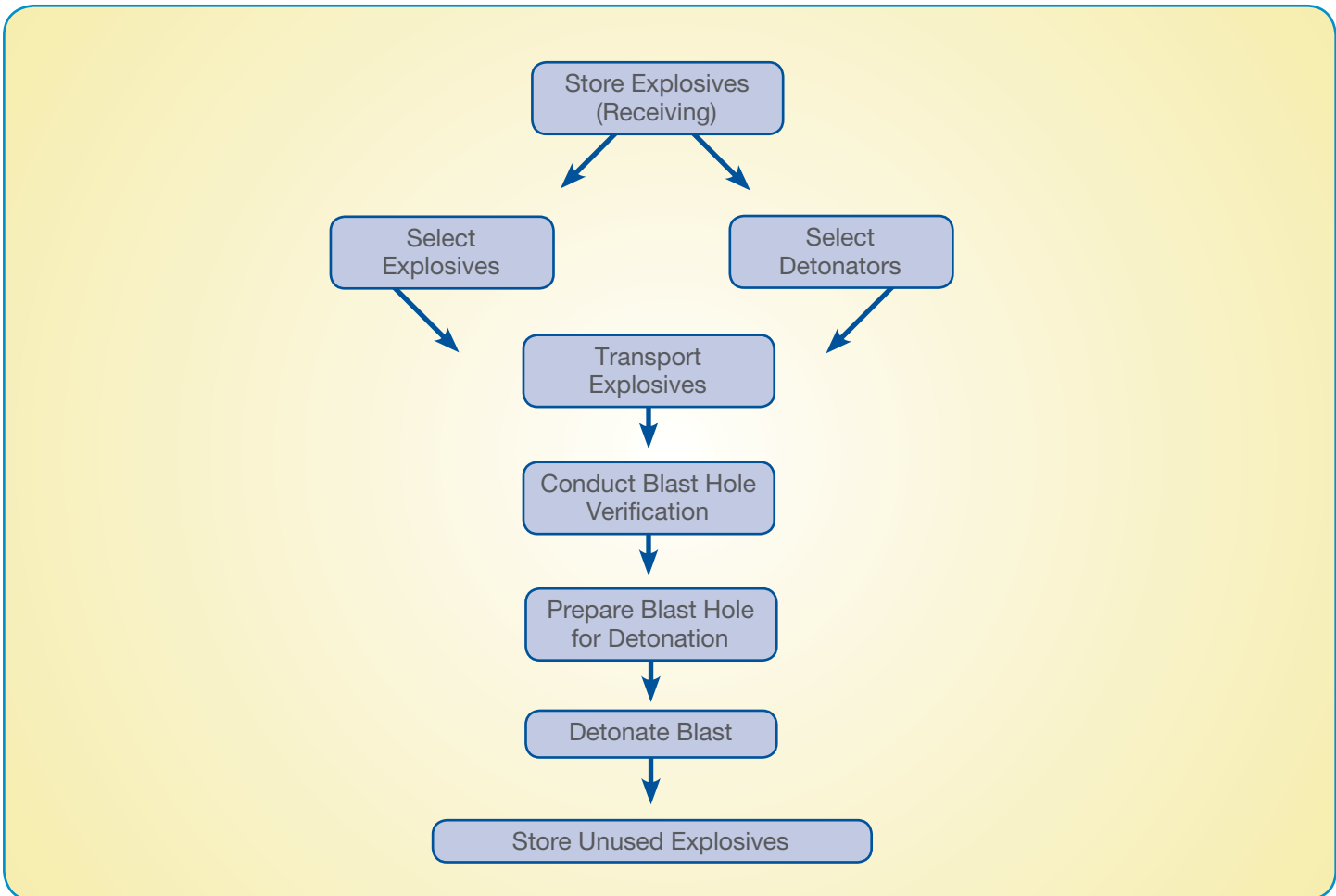
Prior, to re-entering the blast area, the blaster must check the blast area to ensure that the all gases have been disbursed and check for misfires.

The blaster is also responsible for maintaining and storing explosives, destroying “out of date” explosives and destroy frozen explosives.

Depending on the mine site the blaster may also be responsible for avalanche control.

The Blasting Operations job tasks fall within the Medium Strength category, as defined by the National Occupational Classification (N.O.C.).

## Section 2: Workflow



## Section 3: Task Objectives and Duties

### Overview

Blasting is a process used to fragment a large area in a short time frame, with the use of explosives. A qualified person will usually require a provincial blasting license in order to perform blasts, along with extensive training.

### Essential Tasks

#### 1. Select Explosives and Blasting Agents

- Open magazine door, identify and select required explosives and blasting agents.
- Lift and carry explosives and blasting agents from magazine and load on explosives truck.

#### 2. Select Detonators

- Open magazine door, identify and select required detonators and cords.
- Lift and carry detonators from magazine and load on explosives truck.

#### 3. Transport Explosives

- Transport explosives and detonators from storage magazine to blast site using designated vehicles.

#### 4. Conduct Blast Hole Verification

- Measure and inspect every hole. The workers must ensure that each hole is at the required design depth.
- Confirm hole location.

#### 5. Prepare Blast Hole For Detonation

- Install detonators and connectors.
- Load hole with explosive and fill the hole.
- Stem the collar of blast hole with the appropriate size stone, in order to avoid damaging the down lines with loading unit.

#### 6. Detonate Blast

- Perform evacuation procedure and ensure that the designated perimeter is clear of all personnel and equipment.
- Initiate blast.
- Check blast area prior to re-entry.

#### 7. Store Explosives

- Return surplus explosives and blasting agents, as well as the surplus detonators to designated magazine.
- Account for all explosives and blasting agents and detonators.
- Maintain and store explosives.

*Continued...*

#### ***Personal Protective Equipment (PPE)***

- CSA approved safety footwear with a green and orange tag;
- Coveralls equipped with appropriate reflective markings;
- Hard hat with light clip (light clip optional);
- Safety glasses;
- Hearing protection, which may include ear plugs and/or ear muffs;
- Gloves (cotton);
- Dust mask and personal respirators (as required); as well as
- Additional task specific PPE, such as face shield, self-contained breathing apparatus, etc.

#### ***Equipment***

- Two-way radios;
- Signs;
- Non sparking cutter;
- Stemming equipment;
- Explosives truck; and
- Measuring tape.

Section 4: Strength and Positional Requirements

STRENGTH REQUIREMENTS		FREQUENCY	LOAD (KG)	FORCE (KG OF FORCE)	COMMENTS*
Lifting/Lowering	Floor to Waist† (0-104cm)	Occasional	2.0-19.0		<ul style="list-style-type: none"> <li>CSA approved safety footwear (2.0-4.5 kg).</li> <li>Box of explosives and blasting agents (8.0-19.0 kg).</li> <li>Box of detonators (8.0-19.0 kg).</li> <li>Warning sign (~5 kg).</li> </ul> <p><i>The amount of weight a worker may lift individually will vary based on provincial legislation or company policy.</i></p>
	Waist† to Shoulder† (104-137cm)	Occasional	8.0-19.0		<ul style="list-style-type: none"> <li>Box of explosives and blasting agents (8.0-19.0 kg).</li> <li>Box of detonators (8.0-19.0 kg).</li> </ul> <p><i>The amount of weight a worker may lift individually will vary based on provincial legislation or company policy.</i></p>
	Floor to Shoulder† (0-137cm)	Never			
	Above Shoulder† (>138cm)	Occasional	0.5-19.0		<ul style="list-style-type: none"> <li>Box of explosives and blasting agents (8.0-19.0 kg) and box of detonators (8.0-19.0 kg). May be stored as high as 170 cm from the floor.</li> <li>Hard hat with ear muffs (0.5-1.0 kg).</li> </ul> <p><i>The amount of weight a worker may lift individually will vary based on provincial legislation or company policy.</i></p>
Carrying	Unilateral/ Bilateral	Occasional	8.0-19.0		<ul style="list-style-type: none"> <li>Box of explosives and blasting agents (8.0-19.0 kg).</li> <li>Box of detonators (8.0-19.0 kg).</li> <li>Carrying is performed to and from the storage magazine to the explosives truck, and from the explosives truck to the blast hole.</li> <li>Carrying distance may vary based on the how close the explosives truck can be driven to the storage magazine, and the distance from the explosives truck to the blast hole.</li> <li>Workers may also carry mine prints, log books, etc.</li> </ul> <p><i>The amount of weight a worker may lift individually will vary based on provincial legislation or company policy.</i></p>

Continued...

STRENGTH REQUIREMENTS		FREQUENCY	LOAD (KG)	FORCE (KG OF FORCE)	COMMENTS*
Pushing/Pulling (kg of Force)	Vertical	Occasional		~5.0	<ul style="list-style-type: none"> <li>Hose on powder truck</li> </ul>
	Unilateral	Occasional		~10.0-15.0	<ul style="list-style-type: none"> <li>Opening and closing explosives truck and magazine door (~10.0-15.0 kg).</li> <li>Worker has the option of using one or two- hands.</li> </ul>
	Bilateral	Occasional		~10.0-15.0	

The Frequency Definitions are outlined in [Appendix 2](#).

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

† Anthropometrics are based on the 50th percentile male (waist height, standing 106.3±5.4 cm; shoulder height, standing 143.7±6.2 cm) and the 50th percentile female (waist height, standing 101.7±5.0 cm; shoulder height, standing 132.9±5.5 cm); Eastman Kodak Company (1986). *Ergonomic Design for People at Work: Volume 2*. New York: Van Nostrand Reinhold Company.

MOBILITY AND POSTURAL REQUIREMENTS		FREQUENCY	COMMENTS*
Sitting		Occasional	<ul style="list-style-type: none"> <li>Transporting explosives in explosives truck, driving to evacuate blast site.</li> </ul>
Standing		Frequent	<ul style="list-style-type: none"> <li>Needed when waiting for holes to be filled, preparing blast hole for detonation and installing detonators (down lines), firing hand pistol for avalanche control, pumping water from holes, and/or conducting blast hole verification.</li> </ul>
Walking		Frequent	<ul style="list-style-type: none"> <li>Carrying explosives, blasting agents and detonators from magazine to explosives truck and from explosives truck to the blast hole.</li> <li>May also be required when conducting blast hole verification, preparing blast hole for detonation, evacuating blast area, checking blast area (post blast).</li> </ul>
Climbing	Stairs	Occasional	<ul style="list-style-type: none"> <li>Climbing into explosives and service truck.</li> </ul>
	Ladders	Occasional	<ul style="list-style-type: none"> <li>Explosives/stem truck.</li> </ul>
	Uneven Ground	Occasional	<ul style="list-style-type: none"> <li>May be required to climb on uneven ground.</li> </ul>
Balancing		Occasional	<ul style="list-style-type: none"> <li>Climbing into the truck, walking, standing on uneven ground, crouching and kneeling on narrow or slippery surfaces.</li> </ul>
Crawling		Never	
Kneeling		Occasional	<ul style="list-style-type: none"> <li>Worker may kneel while conducting blast hole verification and /or preparing the blast hole for detonation. Worker has the option of crouching, squatting, or kneeling, as required.</li> </ul>
Crouching/Squatting		Occasional	<ul style="list-style-type: none"> <li>Lifting/lowering explosives, blasting agents and detonators, to/from magazine at low levels.</li> <li>Conducting blast hole verification and /or preparing the blast hole for detonation.</li> <li>Worker has the option of crouching, squatting, or kneeling, as required.</li> </ul>
Trunk Movements		Occasional	<ul style="list-style-type: none"> <li>Partial trunk movements required. Blast holes are located at ground level. Bending may be required to complete hole verification and preparing the hole for detonation.</li> </ul>
Neck Movements		Occasional	<ul style="list-style-type: none"> <li>Unrestricted neck range of motion in all directions is required.</li> <li>Static cervical flexion required when completing hole verification and preparing the hole for detonation.</li> <li>Full bilateral rotation needed when driving the explosives truck.</li> </ul>
Reaching	Forward/Backward	Occasional	<ul style="list-style-type: none"> <li>Transporting boxes, blasting equipment, writing in log books, using flash light, firing hand pistol for avalanche control. Also required when driving.</li> </ul>
	Upper Level	Occasional	<ul style="list-style-type: none"> <li>Accessing explosives, blasting agents and detonators from magazine and from explosives truck.</li> <li>May reach as high as 170 cm from the floor.</li> </ul>
	Sideways	Occasional	<ul style="list-style-type: none"> <li>May be needed when opening doors.</li> </ul>

Continued...

MOBILITY AND POSTURAL REQUIREMENTS	FREQUENCY	COMMENTS*
<b>Elbow Posture</b>	Occasional	<ul style="list-style-type: none"> <li>Pronation and supination needed when driving, selecting explosives, blasting agents, detonators, conducting hole verification, preparing the hole for detonation, etc.</li> </ul>
<b>Wrist Posture</b>	Occasional	<ul style="list-style-type: none"> <li>Extension and flexion needed when installing detonators, and descending explosives into the holes. Also required when driving.</li> </ul>
<b>Gripping</b>	Occasional	<ul style="list-style-type: none"> <li>Power grip needed when manipulating explosive, carrying or lifting boxes, firing hand pistol for avalanche control.</li> </ul>
<b>Pinching</b>	Occasional	<ul style="list-style-type: none"> <li>Tip pinch grip required when preparing explosives. Motor co-ordination, fine finger movements, and manual dexterity needed to load explosives in blast holes by hand, assembling connections, detonating charges.</li> <li>Tip pinch grip required when writing in log book.</li> </ul>
<b>Fine Finger Dexterity</b>	Occasional	<ul style="list-style-type: none"> <li>Needed when completing reports.</li> <li>Motor co-ordination, fine finger movements, and manual dexterity required when loading explosives in blast holes by hand, assembling connections, pressing or turning handles or buttons to detonate charges.</li> </ul>
<b>Striking with Hand</b>	Never	
<b>Foot Action</b>	Occasional	<ul style="list-style-type: none"> <li>Plantarflexion and dorsiflexion required to use the pedal controls while operating explosives truck.</li> </ul>

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

Section 5: Sensory/Mental Requirements

SENSORY/MENTAL REQUIREMENTS		ESSENTIAL		COMMENTS*
		Yes	No	
Vision	Near	X		<ul style="list-style-type: none"> <li>Preparing blast hole for detonation.</li> <li>Reading log books, instructions for handling, preparing and installing explosives, blasting agents and detonators.</li> </ul>
	Far	X		<ul style="list-style-type: none"> <li>Peripheral and far vision needed when driving. Also needed when reading signs and observing surroundings.</li> </ul>
	Colour	X		<ul style="list-style-type: none"> <li>Identifying explosives, blasting agents and detonators.</li> <li>Interpretative information presented on mine plans/prints; colour coded signs; recognize traffic, safety, and warning lights.</li> </ul>
Light Quality and Measurements		X		<ul style="list-style-type: none"> <li>Surface mining tasks require the ability to work in low level light, less than 100 Lux during night shift, when required.</li> <li>Ambient light (daytime) ~700 Lux.</li> </ul>
Hearing	Conversation	X		<ul style="list-style-type: none"> <li>Communicating over two-way radio and in-person.</li> </ul>
	Other Sounds	X		<ul style="list-style-type: none"> <li>Noise from surrounding equipment and blasting.</li> <li>Level of noise ranges from 50-90 dB. Noise levels may vary based on the location of the blast site and the amount of equipment operating in the area.</li> <li>Ear plugs and/or earmuffs are available.</li> </ul>
Talking		X		<ul style="list-style-type: none"> <li>Conversing with the use of hearing protection. Worker may be required to speak loud or shout.</li> </ul>
Reading/Writing		X		<ul style="list-style-type: none"> <li>Log books, manufacturer and legislative specifications for using explosives, signs.</li> </ul>
Feeling		X		<ul style="list-style-type: none"> <li>Judging if detonator is entrapped.</li> </ul>
Judgement/Decision Making		X		<ul style="list-style-type: none"> <li>All aspects of conducting blasting operations. Must use good judgement and decision making in order to work safely and efficiently.</li> <li>Identifying hazards and minimizing risks.</li> </ul>
Concentration		X		<ul style="list-style-type: none"> <li>Handling explosives, blasting agents and detonators safely.</li> <li>Preparing hole for detonation.</li> </ul>
Alertness		X		<ul style="list-style-type: none"> <li>Workers must be alert when handling explosives, blasting agents, and detonators.</li> <li>Must always assess workplace hazards, which may include ground conditions, explosives, blasting agent, and other equipment.</li> </ul>

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

Section 6: Work Environment

WORK ENVIRONMENT	ESSENTIAL		COMMENTS*
	Yes	No	
Slippery Floors or Ground	X		<ul style="list-style-type: none"> <li>Wet/muddy and slippery surface surfaces. Ground surface may vary according to seasonal and weather conditions.</li> </ul>
Sloping or Uneven Terrain	X		<ul style="list-style-type: none"> <li>Loose rocks and uneven terrain.</li> </ul>
Inside Work	X		<ul style="list-style-type: none"> <li>Transporting explosives.</li> </ul>
Outside Work	X		<ul style="list-style-type: none"> <li>Majority of time is spent outdoors. May encounter different weather conditions (Seasonal).</li> </ul>
Extreme Heat/Extreme Cold	X		<ul style="list-style-type: none"> <li>Exposed to environmental conditions when working outside, which will vary depending on the season.</li> </ul>
Dry/Humid	X		<ul style="list-style-type: none"> <li>May vary, depending on season and weather conditions.</li> </ul>
Dust (PPE required)	X		<ul style="list-style-type: none"> <li>May be exposed to dust. Respirators are available and may be worn when required.</li> <li>Water is sprayed to reduce dust as much as possible in the fall, spring, and summer.</li> </ul>
Vapours/Fumes (PPE required)	X		<ul style="list-style-type: none"> <li>Respiratory protection required to protect against site specific emissions. Depends on site.</li> </ul>
Chemical Irritants (PPE required)	X		<ul style="list-style-type: none"> <li>Skin protection required to protect against process specific irritants. Depends on site.</li> </ul>
Noise (PPE required)	X		<ul style="list-style-type: none"> <li>Ear plugs and/or earmuffs are available.</li> <li>Noise levels range between 50-90 dB, depending on whether mobile equipment is operating in the work area.</li> </ul>
Moving Objects/Vehicles	X		<ul style="list-style-type: none"> <li>May drive by other mobile and service equipment while transporting explosives. Must be aware of vehicles when filling up explosives and holes with rocks.</li> </ul>
Electrical Hazards	X		<ul style="list-style-type: none"> <li>Electrical storms.</li> </ul>
Sharp Tools	X		<ul style="list-style-type: none"> <li>Cutters for wet hole sleeves (pink plastic).</li> </ul>
Congested/Confined Work Site		X	

Continued...

WORK ENVIRONMENT		ESSENTIAL		COMMENTS*
		Yes	No	
Working at Heights		X		<ul style="list-style-type: none"> <li>Detonating and checking misfires from elevated platform.</li> </ul>
Vibration	Whole Body	X		<ul style="list-style-type: none"> <li>Exposed to low grade vibration while driving explosives truck (vibration ranges from 6-15 Hz). The degree of vibration and the duration of exposure will vary according to the blasting location, type of equipment used, and the mine.</li> </ul>
	Segmental		X	
Vehicle Operation		X		<ul style="list-style-type: none"> <li>Operating explosives truck.</li> </ul>
Overtime		X		<ul style="list-style-type: none"> <li>Voluntary overtime hours may be needed, depending on production requirements.</li> </ul>
Shift Work		X		<ul style="list-style-type: none"> <li>May be required depending on company policies. Typical shifts are 12-hours; however may vary by mine site.</li> </ul>
Working Alone		X		<ul style="list-style-type: none"> <li>Works within a group of individuals. Check-in policy mandatory.</li> </ul>
Working with Others		X		

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

Section 7: Behavioural/Cognitive Demands

BEHAVIOURAL/COGNITIVE DEMANDS	CDA <sup>§</sup> RANKING SCALE				COMMENTS*
	1	2	3	4	
Degree of Self-Supervision Required				X	<ul style="list-style-type: none"> <li>Required to follow many safety rules, to ensure that each blast conducted safely.</li> </ul>
Degree of Supervision Exercised			X		<ul style="list-style-type: none"> <li>Each blast site has an assigned blaster who is responsible for each blast. Therefore, each blaster must supervise the other workers, to ensure that all preparations are completed safely and properly.</li> </ul>
Deadline Pressures (Time Pressure)			X		<ul style="list-style-type: none"> <li>Worker must work at a steady pace to meet the daily blasting deadline. All surface mining processes must work in synchronicity to ensure the mine is operating efficiently.</li> </ul>
Attention to Detail			X		<ul style="list-style-type: none"> <li>Handling explosives safely, placing explosives at different heights and in different configurations, must account for all explosives, blasting agents and detonators used.</li> </ul>
Performance of Multiple Tasks Required			X		<ul style="list-style-type: none"> <li>Measuring, pumping, loading, and stemming holes.</li> </ul>
Exposure to Distracting Stimuli		X			<ul style="list-style-type: none"> <li>May be distracted by environmental stimuli.</li> </ul>
Need to Work Co-operatively With Others			X		<ul style="list-style-type: none"> <li>All workers have specific tasks to complete within a co-ordinated process.</li> </ul>
Exposure to Emotional Situations	X				
Exposure to Confrontational Situations		X			<ul style="list-style-type: none"> <li>There may be clashes of personality, which are dealt with quickly.</li> </ul>
Responsibility and Accountability Required				X	<ul style="list-style-type: none"> <li>Must account for all explosives, blasting agents, and detonators used.</li> <li>Must handle all explosives, blasting agents and detonators with caution.</li> <li>Responsible for evacuating blast perimeter.</li> </ul>
Reading Literacy			X		<ul style="list-style-type: none"> <li>Required to follow manufacturer and legislative specifications for using explosives.</li> </ul>
Written Literacy		X			<ul style="list-style-type: none"> <li>Ensure that the magazine records are accurate and up to date.</li> </ul>
Numerical Skills		X			<ul style="list-style-type: none"> <li>Basic math skills required.</li> </ul>
Verbal Communication			X		<ul style="list-style-type: none"> <li>Conversing with co-workers, two-way radio communication.</li> </ul>
Memory			X		<ul style="list-style-type: none"> <li>Must memorize how to tie blasting patterns.</li> </ul>
Computer Literacy		X			<ul style="list-style-type: none"> <li>Working remote firing device.</li> </ul>
Shift Work Demands				X	<ul style="list-style-type: none"> <li>Rotating shift schedule may be required, depending on company policies. 8-12 hour shifts required. Blaster may occasionally work night shifts.</li> </ul>

<sup>§</sup> The Cognitive Demands Assessment (CDA) definitions and scale are outlined in [Appendix 3](#).

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

Section 8: Photographs

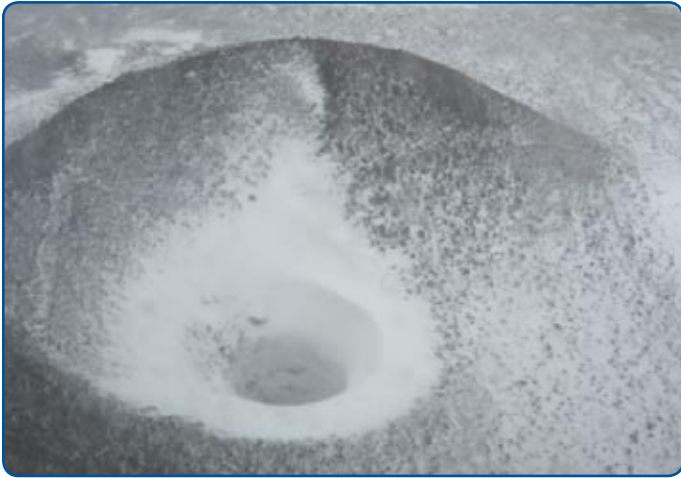


Figure 1: Blast Hole



Figure 2: Warning Sign



Figure 3: Storage Magazine



Figure 4: Explosives Truck

# Surface Miner

Area of Competence: Operate Service Equipment

## Assessment Report

## Minerals Processing Operator Operate Service Equipment — The Assessment Report

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### Overview

Occupational Domain:	Surface Miner	National Occupational Standard (NOS) Area of Competence:	Operate Service Equipment
Hours of Work:	Length of shift may vary from 8-12 hours. (Dependant on mine site)	Breaks:	~1- 1½ hours in total
Shift Work:	Rotating schedule may be required. (Depends on mine site)	National Occupational Classification (NOC) Level of Work:	Medium
Dates of Assessment:	February 24-26, 2009	Evaluators:	Tony Dias, H.B.K., C.K., C.R.S.P. Liliane Lamarche, B. Sc. (Kin.), C.K.

## Section 1: Detailed Task Description

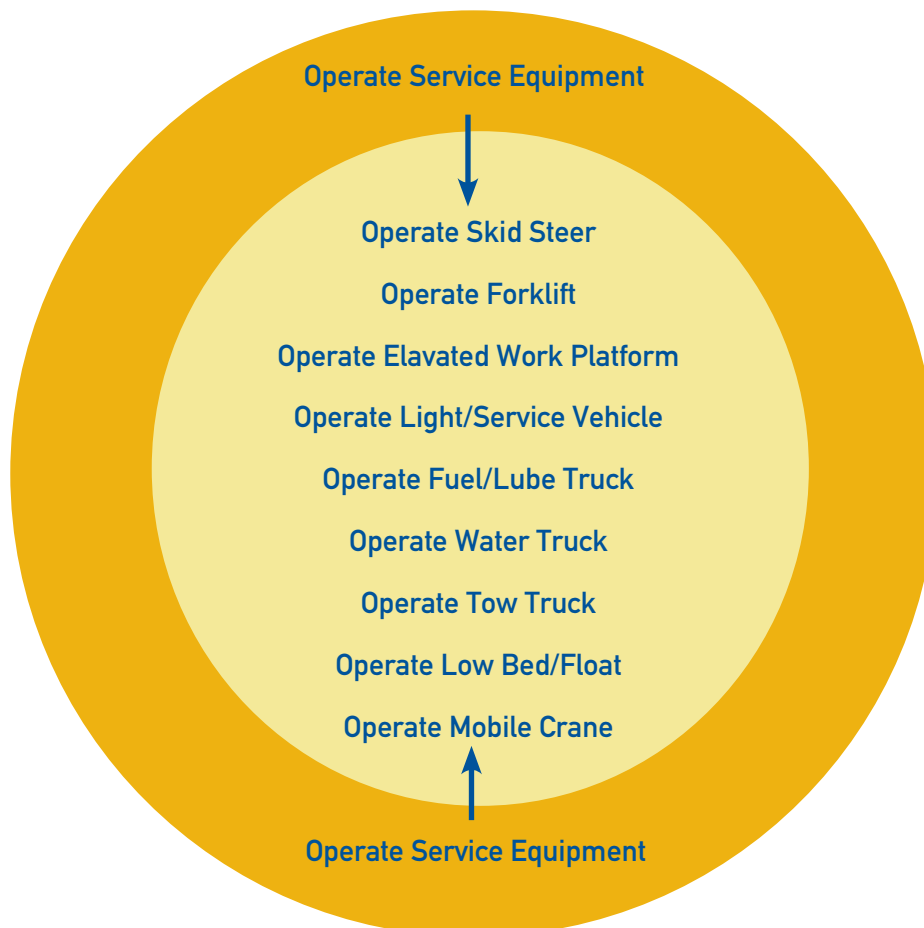
Operating service equipment requires a significant amount of training. The operator may operate multiple pieces of service equipment, as required during the shift. Depending on the type of equipment being operated, this task may fall between a Light to Heavy strength category, as defined by the National Occupational Classification (N.O.C.). For example operation of a skid steer, forklift, and water truck, fall within the Light strength category; however, operation of fuel/lube truck, tow truck, low bed/float, mobile crane and loading parts, supplies and tools on light service vehicle or elevated work platform, may fall within the Heavy strength category.

At the beginning of the shift or prior to using the service equipment, the operator is required to conduct a pre-operational check of the assigned service equipment, in order to ensure that there are no defects. The operator is also required to conduct an operational check once the equipment has been started, to ensure that all systems are operating properly. The operator must be able to mount and dismount the equipment safely, for operation, as well as to perform the required pre-operational checks. Once operating the assigned equipment, the operator must follow all safety regulations to ensure the safety of self and others. The operator is responsible for refuelling assigned equipment as required during the shift.

The service equipment operator must be able to lift, lower and carry parts, supplies and tools, which may range from 2 to 42.7 kilograms when loading the light service vehicle or loading parts supplies or tools onto the elevated work platform. The amount of weight a worker may lift or carry individually will vary based on provincial legislation or company policy. Good positional tolerances are also required, which include sitting, standing, walking, crouching and/or kneeling.

Full shoulder range of motion is also required.

## Section 2: Workflow



## Section 3: Task Objectives and Duties

### Overview

The operator must be authorized and trained to operate each piece of equipment to which he/she is assigned. The operator may be expected to operate multiple pieces of equipment during a shift provided that they are trained and authorized to do so. This will vary based on the mine site.

### Essential Tasks

#### 1. Operate Skid Steer

- Complete a pre-operational check to ensure that the skid steer has no defects and that all fluids are at the required levels.
- Conduct an operational check to ensure that the skid steer is functioning properly. Mount and dismount the skid steer as required.
- Operate the skid steer to load and unload materials and supplies. The skid steer is operated while seated.
- Refuel the skid steer as required.

#### 2. Operate Forklift

- Complete a pre-operational check to ensure that the forklift has no defects and that all fluids are at the required levels.
- Conduct an operational check to ensure that the forklift is functioning properly. Mount and dismount the forklift, as required.
- Operate forklift to transport and unload materials and equipment. The forklift is operated while seated or standing, depending on which model is used.
- Refuel the forklift, as needed.

#### 3. Operate Elevated Work Platform

- Complete a pre-operational check to ensure that the elevated work platform has no defects and that all fluids are at the required levels.
- Conduct an operational check to ensure that the elevated work platform is functioning properly.
- Load and secure tools, materials and supplies in bucket.
- Operate the elevated work platform to perform work that cannot be performed from ground level. Workers are required to wear harness and lanyard.
- The elevated work platform is operated while standing.
- Refuel the elevated work platform as required.

#### 4. Operate Light Service Vehicle

- Complete a pre-operational check to ensure that the light service vehicle has no defects.
- Conduct an operational check to ensure that the light service vehicle is functioning properly.
- Operate the light service vehicle to load, transport and unload materials, supplies and/or personnel. The light service vehicle is operated while seated.
- Refuel the light service vehicle, as required..

#### 5. Operate Fuel/Lube Truck

- Complete a pre-operational check to ensure that the fuel/lube truck has no defects.
- Conduct an operational check to ensure that the fuel/lube truck is functioning properly.
- Operate fuel/lube truck to transfer fuel to equipment. The fuel/lube truck is operated while seated. However, the operator must also be able to walk and/or stand to transfer fuel to equipment. Mount and dismount the fuel/lube truck, as required.
- Refuel the fuel/lube truck, as needed.

*Continued...*

#### **6. Operate Water Truck**

- Complete a pre-operational check to ensure that the water truck has no defects.
- Conduct an operational check to ensure that the water truck is functioning properly and that the water tank is full.
- Operate the water truck to control dust on roads and in working areas within the mine. The water truck is operated while seated. However, the operator must also be able to walk and/or stand to refill water tank. Mount and dismount the water truck, as required.
- Refuel the water truck, as needed.

#### **7. Operate Tow Truck**

- Complete a pre-operational check to ensure that the tow truck has no defects.
- Conduct an operational check to ensure that the tow truck is functioning properly.
- Operate tow truck to tow equipment. The tow truck is operated while seated. However, the operator must also be able to walk and/or stand to tow equipment. Mount and dismount the tow truck, as required.
- Refuel the tow truck, as required.

#### **8. Operate Low Bed/Float**

- Complete a pre-operational check to ensure that the low bed/float has no defects and that all fluids are at the required levels.
- Conduct an operational check to ensure that the low bed/float is functioning properly. Mount and dismount the low bed/float, as required.
- Operate the low bed/float to move equipment. The low bed/float is operated while seated. However, the operator must also be able to walk and/or stand to load and unload the low bed/float.
- Refuel the low bed/float, as required.

#### **9. Operate Mobile Crane**

- Complete a pre-operational circle check to ensure that the mobile crane has no defects.
- Set up mobile crane, conduct an operational check to ensure that the mobile crane is functioning properly, and travel to desired work location.
- Set up crane.
- Rig load.
- Operate mobile crane to lift/lower, pick, carry and swing loads. The mobile crane is operated while seated (required to travel the crane to the worksite). However, the operator may also have to walk and/or stand to operate the crane.

#### ***Personal Protective Equipment (PPE)***

- CSA approved safety footwear with a green and orange tag;
- Coveralls equipped with appropriate reflective markings;
- CSA approved fall arrest systems, which is required when working 3 meters above grade;
- Hard hat;
- Safety glasses;
- Hearing protection, which may include ear plugs and/or ear muffs;
- Gloves (cotton, leather, rubber, welder and hot gloves);
- Lockout procedure;
- Dust mask and personal respirators; and
- Additional task specific PPE, such as face shield, self-contained breathing apparatus, etc.

*Continued...*

#### ***Equipment***

- Skid Steer;
- Forklift;
- Elevated work platform;
- Light service vehicle;
- Fuel/lube truck;
- Water truck;
- Tow truck;
- Low bed/Float; and/or
- Mobile crane.

Section 4: Strength and Positional Requirements

STRENGTH REQUIREMENTS		FREQUENCY	LOAD (KG)	FORCE (KG OF FORCE)	COMMENTS*
<b>Lifting/ Lowering</b>	Floor to Waist† (0-104cm)	Occasional	2.0-42.7		<ul style="list-style-type: none"> <li>CSA approved safety footwear (2.0-4.5 kg).</li> <li>Loading/unloading parts, supplies and tools onto elevated work platform or light service truck (2.0-42.7 kg).</li> <li>Parts may include: sledge hammers (small-6.8 kg, big-9.2 kg), pinch bar (6.0 kg), arch rope roll (8.0 kg), Y connectors (small-10.8 kg, big-21.2 kg), clevis (12.9-20.0 kg), reducer (42.7 kg), chain wrench (21.1 kg) and tool box (4.0-11.0 kg), chain saw (5.0 kg), concrete saw (13.4 kg) and tool box (4.0-11.0 kg), fire extinguisher (10.0 kg), impact gun (5.0 kg), 20 foot ladder (16.0 kg), grader tooth (10.0 kg), loader tooth (22.0 kg), etc. **</li> </ul>
	Waist† to Shoulder† (104-137cm)	Occasional	2.0-42.7		<ul style="list-style-type: none"> <li>Loading/unloading parts, supplies and tools onto elevated work platform or light service truck (2.0-42.7 kg).</li> <li>Parts may include: sledge hammers (small-6.8 kg, big-9.2 kg), pinch bar (6.0 kg), arch rope roll (8.0 kg), Y connectors (small-10.8 kg, big-21.2 kg), clevis (12.9-20.0 kg), reducer (42.7 kg), chain wrench (21.1 kg) and tool box (4.0-11.0 kg), chain saw (5.0 kg), concrete saw (13.4 kg) and tool box (4.0-11.0 kg), fire extinguisher (10.0 kg), impact gun (5.0 kg), 20 foot ladder (16.0 kg), grader tooth (10.0 kg), loader tooth (22.0 kg), etc.</li> <li>Full propane tank (25.0 kg) for forklift. **</li> </ul>
	Floor to Shoulder† (0-137cm)	Occasional	5.5		<ul style="list-style-type: none"> <li>Fuel hose (5.5 kg) when fuelling haulage truck.</li> </ul>
	Above Shoulder† (>138cm)	Occasional	2.0-42.7		<ul style="list-style-type: none"> <li>Hard hat with ear muffs (0.5-1.0 kg).</li> <li>Loading/unloading parts, supplies and tools onto elevated work platform or light service truck (2.0-42.7 kg).</li> <li>Parts may include: sledge hammers (small-6.8 kg, big-9.2 kg), pinch bar (6.0 kg), arch rope roll (8.0 kg), Y connectors (small-10.8 kg, big-21.2 kg), clevis (12.9-20.0 kg), reducer (42.7 kg), chain wrench (21.1 kg) and tool box (4.0-11.0 kg), chain saw (5.0 kg), concrete saw (13.4 kg) and tool box (4.0-11.0 kg), fire extinguisher (10.0 kg), impact gun (5.0 kg), 20 foot ladder (16.0 kg), grader tooth (10.0 kg), loader tooth (22.0 kg), etc.</li> <li>Tools may be stored on shelves, located up to 197 cm above the floor. **</li> </ul>

Continued...

STRENGTH REQUIREMENTS		FREQUENCY	LOAD (KG)	FORCE (KG OF FORCE)	COMMENTS*
Carrying	Unilateral/ Bilateral	Occasional	2.0-42.7		<ul style="list-style-type: none"> <li>Transporting parts, supplies and tools to elevated work plat form or light service truck (2.0-42.7 kg).</li> <li>Parts may include: sledge hammers (small-6.8 kg, big-9.2 kg), pinch bar (6.0 kg), arch rope roll (8.0 kg), Y connectors (small-10.8 kg, big-21.2 kg), clevis (12.9-20.0 kg), reducer (42.7 kg), chain wrench (21.1 kg) and tool box (4.0-11.0 kg), chain saw (5.0 kg), concrete saw (13.4 kg) and tool box (4.0-11.0 kg), fire extinguisher (10.0 kg), impact gun (5.0 kg), 20 foot ladder (16.0 kg), grader tooth (10.0 kg), loader tooth (22.0 kg), etc.</li> <li>Workers may also carry log books (&lt;0.5 kg). **</li> </ul>
	Vertical	Occasional		3.0-58.0	<ul style="list-style-type: none"> <li>Worker has the option of using one or two-hands.</li> <li>Opening / closing equipment doors and doors to buildings (~3.0-32.0 kg of force); Moving tow arm control box (20.0-28.0 kg of force) on tow truck; Pushing and pulling equipment control levers (&lt;1.0-6.0 kg of force), hoist controls (4.4 kg of force).</li> <li>Moving swing arm on the tow truck (14.0 kg of force).</li> <li>Pulling lube hose (21.0 kg of force) from fuel shack to haulage truck ~5-10 m.</li> <li>Pulling hoses (53.0-58.0 kg of force).</li> <li>Moving slings (36.0 kg of force).</li> </ul>
Unilateral	Occasional		3.0-58.0		
Pushing/ Pulling (kg of Force)	Bilateral	Occasional		3.0-58.0	

The Frequency Definitions are outlined in [Appendix 2](#).

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

† Anthropometrics are based on the 50th percentile male (waist height, standing 106.3±5.4 cm; shoulder height, standing 143.7±6.2 cm) and the 50th percentile female (waist height, standing 101.7±5.0 cm; shoulder height, standing 132.9±5.5 cm); Eastman Kodak Company (1986). *Ergonomic Design for People at Work: Volume 2*. New York: Van Nostrand Reinhold Company.

MOBILITY AND POSTURAL REQUIREMENTS		FREQUENCY <sup>2</sup>	COMMENTS*
Sitting		Occasional -Constant	<ul style="list-style-type: none"> <li>Sitting is required to drive/travel service equipment, (with the exception of the elevated work platform and the standing forklift) to worksite.</li> <li>The frequency will vary according to the type of equipment being operated (for example, a worker may be assigned to the water truck for a whole shift. Whereas, equipment such as the skid steer or a forklift may only be used several times a day).</li> </ul>
Standing		Occasional	<ul style="list-style-type: none"> <li>Pre-shift meetings, working from the elevated work platform, conducting pre-operational checks on service equipment, fuelling equipment, operating mobile crane and forklift, hooking up equipment to tow truck, loading tools and equipment, etc.</li> </ul>
Walking		Occasional	<ul style="list-style-type: none"> <li>To and from equipment at the beginning and at the end of the shift.</li> <li>Conducting pre-operational checks, fuelling equipment, operating mobile crane, hooking up equipment to tow truck, loading tools and equipment, etc.</li> </ul>
Climbing	Stairs	Occasional	<ul style="list-style-type: none"> <li>Required to mount and dismount equipment, such as light service vehicle, fuel/lube truck, water truck, tow truck, low bed/float, and mobile crane.</li> </ul>
	Ladders	Occasional	<ul style="list-style-type: none"> <li>Mounting and dismounting tow truck and low bed/float.</li> </ul>
	Uneven Ground	Occasional	<ul style="list-style-type: none"> <li>May encounter uneven ground when operating the crane.</li> </ul>
Balancing		Occasional	<ul style="list-style-type: none"> <li>Required while climbing on equipment.</li> <li>Also required while performing operational checks.</li> </ul>
Crawling		Never	
Kneeling		Occasional	<ul style="list-style-type: none"> <li>Conducting pre-operational checks.</li> <li>Operator may also choose to crouch/squat or stoop while pre-operational checks.</li> </ul>
Crouching/Squatting		Occasional	<ul style="list-style-type: none"> <li>Conducting pre-operational checks.</li> <li>Operator may also choose to crouch/squat or stoop while pre-operational checks.</li> </ul>
Trunk Movements		Occasional	<ul style="list-style-type: none"> <li>Partial trunk movements required to observe surroundings and operate equipment. Must be able to turn the trunk in order to perform over the shoulder checks (when reversing equipment).</li> </ul>
Neck Movements		Occasional-Frequent	<ul style="list-style-type: none"> <li>Unrestricted neck range of motion in all directions is required. Especially important when observing surroundings.</li> <li>Full bilateral rotation needed when operating equipment (specifically while reversing equipment).</li> <li>Neck extension may also be required to access two-way radio (the location of two-way radio may vary).</li> </ul>

Continued...

MOBILITY AND POSTURAL REQUIREMENTS		FREQUENCY	COMMENTS*
Reaching	Forward/Backward	Frequent	<ul style="list-style-type: none"> <li>Operating equipment controls (including levers, steering wheel, switches), loading tools, small equipment and parts on light service vehicle and elevated work platform, working from elevated work platform, hooking equipment to tow truck, conducting pre-operational checks, using two-way radio.</li> </ul>
	Upper Level	Occasional	<ul style="list-style-type: none"> <li>Upper level reaching required while climbing ladders, accessing two-way radio (location of two-way radio may vary depending on where it is positioned within the control cab), conducting pre-operational checks, loading/unloading parts, supplies and tools onto service equipment, hooking up equipment to tow truck, etc.</li> </ul>
	Sideways	Occasional	<ul style="list-style-type: none"> <li>May be required to access various control levers, closing equipment doors, performing pre-operational checks, etc.</li> </ul>
Elbow Posture		Occasional - Frequent	<ul style="list-style-type: none"> <li>Some pronation required while steering, operating equipment and performing pre-operational checks, etc.</li> <li>Pronation needed when accessing controls, recording information into the log book.</li> </ul>
Wrist Posture		Occasional	<ul style="list-style-type: none"> <li>Extension and flexion needed when operating equipment controls and switches.</li> <li>The majority of tasks are performed with the wrist in neutral posture.</li> </ul>
Gripping		Frequent - Constant	<ul style="list-style-type: none"> <li>Power grip needed when steering equipment, grasping handrails to enter and exit equipment, operating two-way radio, operating controls, loading/unloading parts, supplies and tools onto service equipment.</li> </ul>
Pinching		Occasional	<ul style="list-style-type: none"> <li>Tip and key pinch grip required when operating switches and performing pre-operational checks, etc.</li> </ul>
Fine Finger Dexterity		Never	
Striking with Hand		Never	
Foot Action		Occasional - Constant	<ul style="list-style-type: none"> <li>Plantarflexion and dorsiflexion required to use the pedal controls while operating service equipment. A force of 6-20 kg is required to depress the pedals, which are located ~30 cm from the vehicle floor.</li> </ul>

‡ The frequencies documented will vary depending on the type of service equipment operated, the location of work area, and mine site.

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

Section 5: Sensory/Mental Requirements

SENSORY/MENTAL REQUIREMENTS		ESSENTIAL		COMMENTS*
		Yes	No	
Vision	Near	X		<ul style="list-style-type: none"> <li>Observing visual signals, display and controls within the equipment.</li> </ul>
	Far	X		<ul style="list-style-type: none"> <li>Peripheral and far vision needed when driving/travelling.</li> <li>Also needed when reading warning and traffic signs.</li> </ul>
	Colour	X		<ul style="list-style-type: none"> <li>Warning signals within the equipment.</li> </ul>
Light Quality and Measurements		X		<ul style="list-style-type: none"> <li>All tasks are performed above ground. However, light levels will vary based on weather conditions, time of shift, and other light emitted from surrounding lighting and equipment. Light levels will vary from 0 Lux during the night to ~700 Lux during the day.</li> <li>Time of exposure to darkness may vary from 8 - 12 hours (based on seasonal time shifts).</li> </ul>
Hearing	Conversation	X		<ul style="list-style-type: none"> <li>Communicating over two-way radio and in-person.</li> </ul>
	Other Sounds	X		<ul style="list-style-type: none"> <li>Operational noise within equipment.</li> <li>Hearing protection is mandatory. Noise levels regularly exceed occupational exposure limits.</li> <li>Level of noise ranges from 68 - 103 dB. Exposure to noise levels will vary based on which equipment is being operated.</li> <li>Ear plugs and/or earmuffs are available.</li> </ul>
Talking		X		<ul style="list-style-type: none"> <li>Conversing with the use of hearing protection while talking on two-way radio or in person.</li> </ul>
Reading/Writing		X		<ul style="list-style-type: none"> <li>Log books, as well as information from on-board computer.</li> </ul>
Feeling			X	
Judgement/Decision Making		X		<ul style="list-style-type: none"> <li>Worker is responsible to initiate communication with others, as needed; in order to work safely (must watch out for other workers and their equipment and communicate identified safety issues).</li> </ul>
Concentration		X		<ul style="list-style-type: none"> <li>Multi-tasking, communicating while operating equipment.</li> </ul>
Alertness		X		<ul style="list-style-type: none"> <li>Workers must be alert to workplace hazards, which may include weather conditions, other equipment.</li> <li>Workers must also be able to identify relevant information conveyed over two-way radio.</li> <li>Workers must also be able to identify relevant alarms and noise from the equipment, which will provide the worker with feedback on how the equipment is operating.</li> </ul>

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

Section 6: Work Environment

WORK ENVIRONMENT	ESSENTIAL		COMMENTS*
	Yes	No	
Slippery Floors or Ground	X		<ul style="list-style-type: none"> <li>Wet/muddy and slippery surface surfaces. Ground surface may vary according to seasonal and weather conditions.</li> </ul>
Sloping or Uneven Terrain	X		<ul style="list-style-type: none"> <li>Ascending/descending ramps equipment, loose rocks.</li> </ul>
Inside Work	X		<ul style="list-style-type: none"> <li>Operating service equipment. Temperature inside cab is controlled.</li> </ul>
Outside Work	X		<ul style="list-style-type: none"> <li>Many job tasks requiring the use of service equipment are performed outdoors.</li> </ul>
Extreme Heat/Extreme Cold	X		<ul style="list-style-type: none"> <li>Exposed to environmental conditions when working outside, which will vary depending on the season.</li> </ul>
Dry/Humid	X		<ul style="list-style-type: none"> <li>May vary, depending on season and weather conditions.</li> </ul>
Dust (PPE required)	X		<ul style="list-style-type: none"> <li>May be exposed to dust. Respirators are available and may be worn when required.</li> <li>Water is sprayed to reduce dust as much as possible in the fall, spring, and summer.</li> </ul>
Vapours/Fumes (PPE required)		X	
Chemical Irritants (PPE required)		X	
Noise (PPE required)	X		<ul style="list-style-type: none"> <li>Operational noise produced by service and other equipment. Level of noise ranges from 68 - 103 dB.</li> <li>Hearing protection is mandatory; ear plugs and/or earmuffs are available.</li> </ul>
Moving Objects/Vehicles	X		<ul style="list-style-type: none"> <li>Other mobile and service equipment.</li> </ul>
Electrical Hazards	X		<ul style="list-style-type: none"> <li>Overhead lines.</li> </ul>
Sharp Tools		X	
Congested/Confined Work Site		X	
Working at Heights	X		<ul style="list-style-type: none"> <li>Workers may be required to perform work on elevated work platform, climb ladders and stairs to access equipment, climbing on equipment to perform pre-operational checks. Workers are required to wear fall arrest systems, when working 3 meters above the ground.</li> </ul>

Continued...

WORK ENVIRONMENT		ESSENTIAL		COMMENTS*
		Yes	No	
Vibration	Whole Body	X		<ul style="list-style-type: none"> <li>The degree of vibration and duration of exposure will vary according to the type of equipment used; task performed, and mine location.</li> <li>Vibration ranges from 6-17 Hz when operating the various types of service equipment.</li> </ul>
	Segmental	X		<ul style="list-style-type: none"> <li>May be exposed to vibration when operating controls and holding onto steering wheel while driving/travelling.</li> <li>Hand-arm vibration ranges from 3-12 Hz. The degree of vibration and duration of exposure will vary according to the type of equipment used; task performed, and mine location.</li> </ul>
Vehicle Operation		X		<ul style="list-style-type: none"> <li>All service equipment.</li> </ul>
Overtime		X		<ul style="list-style-type: none"> <li>Voluntary overtime hours may be needed, depending on production requirements.</li> </ul>
Shift Work		X		<ul style="list-style-type: none"> <li>12-hour rotating shifts required.</li> </ul>
Working Alone		X		<ul style="list-style-type: none"> <li>Works independent within a group of individuals. Check-in policy mandatory.</li> </ul>
Working with Others		X		

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

Section 7: Behavioural/Cognitive Demands

BEHAVIOURAL/COGNITIVE DEMANDS	CDA <sup>e</sup> RANKING SCALE				COMMENTS*
	1	2	3	4	
Degree of Self-Supervision Required				X	<ul style="list-style-type: none"> <li>Worker is responsible for operating one piece of equipment at a time.</li> <li>Work environment does not permit for close supervision.</li> </ul>
Degree of Supervision Exercised			X		<ul style="list-style-type: none"> <li>Worker is responsible for safety of self and others.</li> <li>Must follow all safety rules and regulations while operating service equipment.</li> </ul>
Deadline Pressures (Time Pressure)			X		<ul style="list-style-type: none"> <li>Worker is expected to work in an efficient manner.</li> <li>All processes are coordinated; therefore work must be performed at a consistent pace to ensure efficiency while working safely.</li> <li>Time pressure may increase if having to respond to an emergency situation.</li> </ul>
Attention to Detail		X		X	<ul style="list-style-type: none"> <li>The amount of attention to detail varies greatly depending on which piece of equipment that is being operated (for example, operating a crane requires a lot of attention to detail, whereas operating a water truck requires very little attention to detail).</li> <li>Must be aware of surroundings and communicate specific details to others as appropriate (may include details regarding weather conditions, specific sounds from equipment, etc., which will allow the worker to determine safety and efficient operation of equipment).</li> <li>Must have good spatial awareness.</li> </ul>
Performance of Multiple Tasks Required			X		<ul style="list-style-type: none"> <li>An operator may be required to operate multiple pieces of service equipment in the same shift.</li> </ul>
Exposure to Distracting Stimuli			X		<ul style="list-style-type: none"> <li>The worker is exposed to various stimuli, such as auditory or visual.</li> <li>May also encounter environmental stimuli such as weather conditions, distractions within the shop, etc.</li> <li>Service equipment may be used to perform multiple tasks.</li> </ul>
Need to Work Co-operatively With Others			X		<ul style="list-style-type: none"> <li>Cooperation with others is essential.</li> <li>Some tasks are performed individually. Others may require a team effort.</li> </ul>
Exposure to Emotional Situations	X				
Exposure to Confrontational Situations		X			<ul style="list-style-type: none"> <li>There may be differences of opinion.</li> </ul>
Responsibility and Accountability Required				X	<ul style="list-style-type: none"> <li>Each worker is responsible and accountable for their own safety and for the safety of others.</li> </ul>
Reading Literacy			X		<ul style="list-style-type: none"> <li>Basic reading literacy required to read operating manuals, standardized procedures, etc.</li> </ul>

Continued...

BEHAVIOURAL/COGNITIVE DEMANDS	CDA <sup>‡</sup> RANKING SCALE				COMMENTS*
	1	2	3	4	
Written Literacy		X			<ul style="list-style-type: none"> <li>Must complete reports as required, such as log book entries.</li> </ul>
Numerical Skills		X	X		<ul style="list-style-type: none"> <li>Basic numerical skills required (i.e.: Crane operator must calculate weight of loads to endure that the crane is stable).</li> <li>Amount of numerical calculations will vary based on type of equipment.</li> </ul>
Verbal Communication			X		<ul style="list-style-type: none"> <li>Majority of communication is completed via two-way radio.</li> </ul>
Memory			X		<ul style="list-style-type: none"> <li>Must remember how to operate different equipment.</li> <li>Remembering different operating procedures.</li> </ul>
Computer Literacy		X			<ul style="list-style-type: none"> <li>Some equipment may be equipped with on-board computer systems.</li> </ul>
Shift Work Demands				X	<ul style="list-style-type: none"> <li>Rotating shift schedule may be required, depending on company policies.</li> <li>Typical shift durations are 8-12 hours, which may vary according to mine site.</li> </ul>

<sup>‡</sup> The Cognitive Demands Assessment (CDA) definitions and scale are outlined in [Appendix 3](#).

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

Section 8: Photographs



Figure 1: Skid Steer



Figure 2: Forklift



Figure 3: Elevated Work Platform



Figure 4: Water Truck



Figure 5: Mobile Crane



Figure 6: Low Bed Float



Figure 7: Tow Truck

# Surface Miner

Area of Competence: Operate Portable Production Equipment

## Assessment Report



## Minerals Processing Operator *Operate Portable Production Equipment — The Assessment Report*

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### Overview

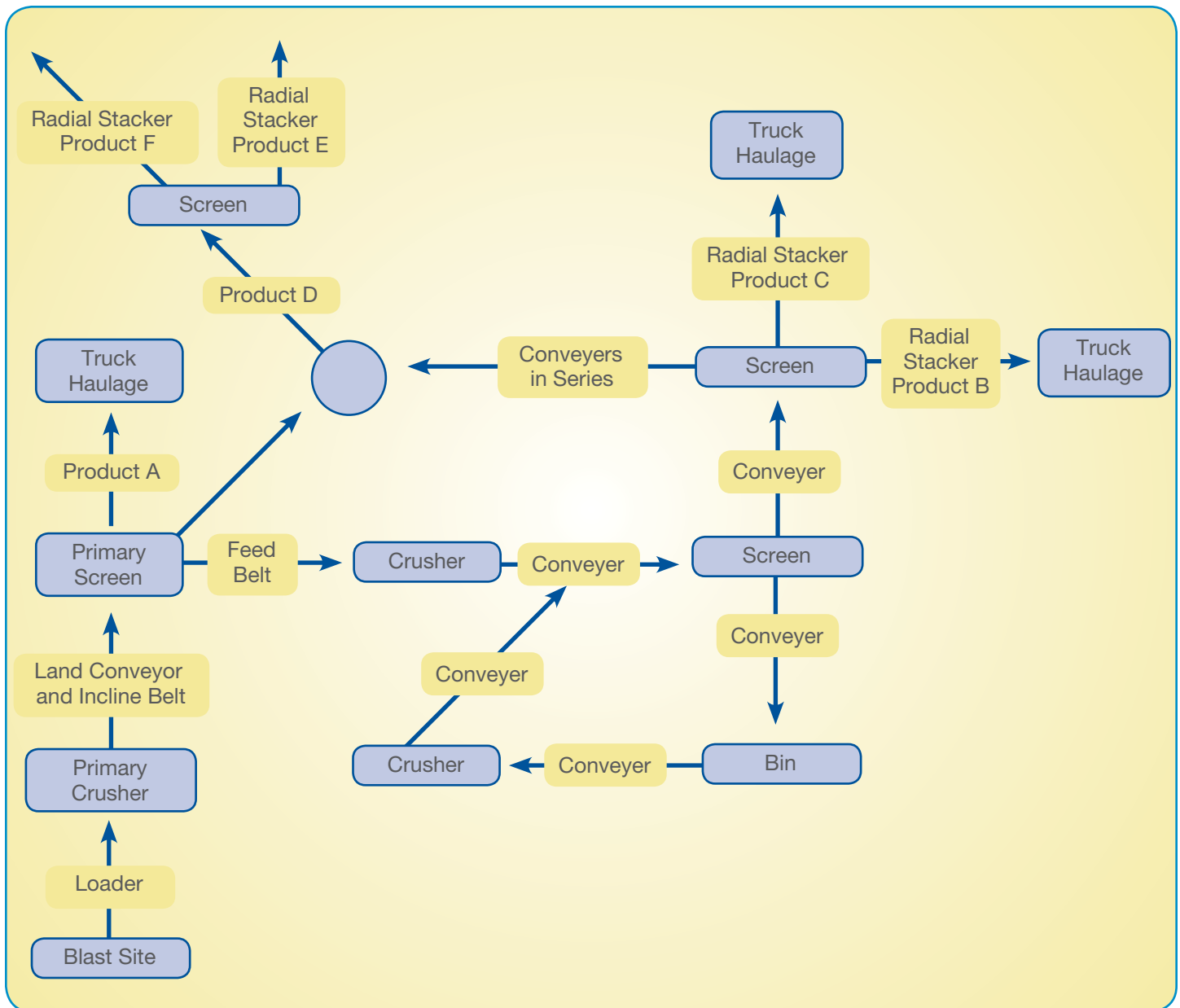
Occupational Domain:	Surface Miner	National Occupational Standard (NOS) Area of Competence:	Operate Portable Production Equipment
Hours of Work:	8-, 10-, 12- hour shifts	Breaks:	Variable
Shift Work:	Workers may be required to work shift work. Schedule and rotation will be dependent on the employer.	National Occupational Classification (NOC) Level of Work:	Heavy
Dates of Assessment:	August 11, 2009	Evaluators:	Trevor Hawksby, B.Sc. (H.K.), C.K. Tony Dias, HKB, CK, CRSP

### Section 1: Detailed Task Description

According to the National Occupation Classification (N.O.C. #9611), the Operate Portable Production Equipment job tasks fall within the Heavy strength category.

Workers are required to inspect, operate, maintain, and repair the portable screening, crushing and conveying equipment used in Surface Mining projects. The portable equipment may be computer controlled or may require manual operation. Operation of the Portable equipment requires the ability to stand and walk on uneven/sloping ground, on a frequent basis. Maintenance and repair of the portable conveyors, screens and crushers may require the ability to lift/carry/push/pull loads greater than 20 kg, on an occasional basis. Full neck, shoulder, and trunk postures are required, on an occasional basis in order to operate, maintain, and/or repair portable equipment. Workers also require the ability to occasionally kneel, crouch/squat, and crawl.

### Section 2: Workflow



## Section 3: Task Objectives and Duties

### Overview

Operators are required to operate portable equipment, in order to convey feed/material throughout the mining process. Prior to operation, workers are required to inspect the work area and conduct pre-operational checks. They will conduct pre-operational checks to ensure all components are in place, correctly functioning, as well as identify and/or rectify any problems. Operators are required to provide as needed maintenance/repairs on all screens, conveyors and stackers. Workers are required to set-up and secure all portable production equipment and are responsible for operation of all portable production equipment. Note: At some mining locations the equipment is moved on a regular basis, whereas some mining locations the equipment will remain stationary for extended periods of time.

### Essential Tasks

#### 1. Operate Portable Crushers

- Inspect workplace for hazards and/or potential hazards and remove or guard them
- Set-up and secure crusher
- Conduct pre-operational/operational checks
- Start crusher
- Operate crushers
- Adjust components
- Remove blockages
- Lock-out/Tag-out electrical equipment for repair/maintenance
- Lock-out/Tag out diesel equipment
- Perform scheduled or non-scheduled maintenance
- Shut-down crusher (normal/emergency situations)
- Move crusher and components to new location

#### 2. Operate Portable Screen

- Inspect workplace for hazards and/or potential hazards
- Set-up and secure portable screen
- Conduct pre-operational/operational checks
- Start screen
- Operate screen
- Lock-out/Tag-out electrical equipment for repair/maintenance
- Lock-out/Tag out diesel equipment
- Remove blockages
- Perform scheduled or non-scheduled maintenance
- Shut-down screen (normal/emergency situations)
- Move screen and components to new location

#### 3. Operate Portable Conveyor

- Inspect workplace for hazards and/or potential hazards and remove or guard them.
- Set-up and secure portable conveyor(flat and incline)
- Conduct pre-operational/operational checks (stopped)
- Perform scheduled or non-scheduled maintenance
- Start conveyor

*Continued...*

- Monitor flow
- Remove blockages
- Lock-out/Tag-out electrical equipment for repair/maintenance
- Lock-out/Tag out diesel equipment
- Perform scheduled or non-scheduled maintenance
- Shut-down conveyor (normal/emergency situations)
- Move conveyor and components to new location
- Set-up guards

**4. Operate Radial Stacker Conveyor**

- Inspect workplace for hazards and/or potential hazards.
- Set-up and secure radial stacker conveyor
- Perform scheduled or non-scheduled maintenance
- Start Radial Stacker
- Conduct pre-operational/operational checks
- Convey materials
- Monitor flow
- Remove blockages
- Lock-out/Tag-out electrical equipment for repair/maintenance
- Lock-out/Tag out diesel equipment
- Shut-down radial stacker conveyor (normal/emergency situations)
- Move radial stacker conveyor and components to new location
- Set-up guards

***Personal Protective Equipment (PPE)***

- Safety boots;
- Coveralls, equipped with appropriate reflective markings;
- Fall arrest harness;
- Hard hat;
- Safety glasses (at some locations);
- Hearing protection, which may include ear plugs and/or ear muffs (at some locations);
- Gloves;
- Respirator (at some mine sites); and
- Additional task specific PPE, such as face shield, specialized hand and forearm protection, PPE for welding tasks etc.

***Equipment***

- Hand tools;
- Skid steer;
- Welding equipment;
- Belt stand;
- Shovel;
- Pneumatic, electric and hydraulic power tools; and/or
- Lift assist equipment (including chains, chain falls; hoists etc.)

Section 4: Strength and Positional Requirements

STRENGTH REQUIREMENTS		FREQUENCY	LOAD (KG)	FORCE (KG OF FORCE)	COMMENTS*
<b>Lifting/ Lowering</b>	Floor to Waist† (0-104cm)	Occasional	1-43		<ul style="list-style-type: none"> <li>• Objects may be lifted when performing pre-use and operational checks and/or maintenance tasks (such as replacing parts on conveyor, radial stacker, screen and crusher system, which may include drive rollers/motors, gear boxes, belts, frames.</li> <li>• Rollers 9-26kg</li> <li>• Chain 14kg (variable depending on gauge and length)</li> </ul>
	Waist† to Shoulder† (104-137cm)	Occasional	1-43		<ul style="list-style-type: none"> <li>• 4' belt patch 11kg (varies depending on length), lifted ground to 100cm (variable height)</li> <li>• Railway ties 40kg-2 person lift</li> <li>• 20L pail of hydraulic oil (20kg)</li> <li>• Ice and dust control bags floor to waist (23kg)</li> <li>• Screens 16 to 85kg (1 or 2 person lift)- will have to carry up steps and to skid steer loader- typically lifted floor to shoulder</li> <li>• Crusher hammers 22kg</li> </ul>
	Floor to Shoulder† (0-137cm)	Occasional	1-26		<ul style="list-style-type: none"> <li>• Tools may be stored in storage rooms, tool boxes, shops etc. Storage heights will typically start at floor level to a level &gt;200cm from the floor</li> <li>• Hand tools Negl. to 9kg</li> <li>• Clamps &lt;9kg</li> <li>• Bolt cutters 5kg</li> <li>• 10' fibreglass ladder 20kg</li> <li>• 12' ladder 24kg</li> <li>• Shovelling approximately 15kg with bottom hand to lift spade full of dirt</li> <li>• Parts may be lifted by two people or by using lift assist equipment when required.</li> <li>• Heavy parts weighing &gt;27 kg are typically lifted by more than one person, or with use of a chain block, hoist, lift assist device or skid steer.</li> </ul>
	Above Shoulder† (>138cm)	Occasional	1-20		<ul style="list-style-type: none"> <li>• Chain 14kg (variable depending on gauge and length)</li> <li>• Railway ties 40kg</li> <li>• Belt Patch 11kg</li> <li>• Hand tools Negl. To 9kg</li> </ul>

Continued...

STRENGTH REQUIREMENTS		FREQUENCY	LOAD (KG)	FORCE (KG OF FORCE)	COMMENTS*			
Carrying	Unilateral/ Bilateral	Occasional	1-43		<ul style="list-style-type: none"> <li>Objects may be carried when performing pre-use and operational checks and/or maintenance tasks (such as replacing parts on conveyor, radial stacker, screen and crusher system, which may include drive rollers/ motors, gear boxes, belts, frames.</li> <li>Rollers 9-26kg</li> <li>Chain 14kg (variable depending on gauge and length)</li> <li>4' belt patch 11kg (varies depending on length), lifted ground to 100cm (variable height); 20L pail of hydraulic oil (20kg)</li> <li>Ice and dust control bags floor to waist (23kg)</li> <li>Screens 16 to 85kg (1 or 2 person lift)- will have to carry up steps and to skid steer loader-typically lifted floor to shoulder</li> <li>Crusher hammers 22kg; Hand tools Negl. to 9kg; Bolt cutters 5kg</li> <li>10' fibreglass ladder 20kg; 12' ladder 24kg</li> <li>Parts may be moved by two people or by using lift assist equipment when required.</li> <li>Heavy parts weighing &gt;43 kg are typically carried by more than one person, or with use of a chain block, hoist, lift assist device or skid steer.</li> <li>Some tools, parts etc. may be carried &gt;100m and/or up and down stairs.</li> </ul>			
					Vertical	Occasional	1-20+	<ul style="list-style-type: none"> <li>Pulling electrical cable for equipment 25kg (distance can exceed 100m and may require ability to ascend and descend sloped ground.</li> <li>Push/pull screens 30-43kg</li> <li>Manoeuvre welding equipment 20+kg</li> <li>Objects, tools, equipment, parts may require pushing/pulling when performing pre-operational and operational checks, as well as maintenance or repair tasks.</li> <li>Vertical pull forces are required if using chain blocks to lift parts into place</li> <li>Using hand tools to tighten/loosen bolts in order to complete maintenance tasks (negligible – 20+ kg of force).</li> <li>Shovelling (push down with foot &gt; body weight force with one foot)</li> <li>Push forward on shovel with both hands when shovelling (20+kg)</li> </ul>
					Unilateral	Never		
Pushing/ Pulling (kg of Force)	Bilateral	Occasional	1-43					

The Frequency Definitions are outlined in [Appendix 2](#).

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

† Anthropometrics are based on the 50th percentile male (waist height, standing 106.3±5.4 cm; shoulder height, standing 143.7±6.2 cm) and the 50th percentile female (waist height, standing 101.7±5.0 cm; shoulder height, standing 132.9±5.5 cm); Eastman Kodak Company (1986). *Ergonomic Design for People at Work: Volume 2*. New York: Van Nostrand Reinhold Company.

MOBILITY AND POSTURAL REQUIREMENTS		FREQUENCY	COMMENTS*
Sitting		Occasional	<ul style="list-style-type: none"> <li>Sitting may be required when operating mobile equipment to move parts or equipment.</li> </ul>
Standing		Frequent	<ul style="list-style-type: none"> <li>Required during pre-operational and operational checks, equipment operation, as well as during maintenance tasks.</li> </ul>
Walking		Frequent	<ul style="list-style-type: none"> <li>Surfaces are uneven, sloped, potentially unstable, muddy, wet and/or slippery. Outside exposure is typical.</li> <li>Operation of Portable Production Equipment involves more walking than standing.</li> </ul>
Climbing	Stairs	Occasional	<ul style="list-style-type: none"> <li>May be required during pre-operational and operation checks, as well as during portable production equipment system maintenance.</li> <li>The number of stairs climbed will be dependent on the portable production equipment location.</li> </ul>
	Ladders	Occasional	<ul style="list-style-type: none"> <li>Working at heights to realign/repair/replace conveyor belts, rollers, greasing equipment, cleaning conveyors/rollers; screen and crusher maintenance.</li> </ul>
	Uneven Ground	Constant	<ul style="list-style-type: none"> <li>Workers are required to ascend and descend sloped ground on a frequent basis. The degree of slope is dependent on how the processed material is stored at the mine site.</li> <li>Workers are required to stand on uneven ground for a majority of daily tasks.</li> </ul>
Balancing		Constant	<ul style="list-style-type: none"> <li>Constant balance is required to work on uneven surfaces.</li> </ul>
Crawling		Occasional	<ul style="list-style-type: none"> <li>May be required for inspection and maintenance activities.</li> <li>Task is not required on a daily basis.</li> </ul>
Kneeling		Occasional	
Crouching/Squatting		Occasional	
Trunk Movements		Occasional	
Neck Movements		Occasional	<ul style="list-style-type: none"> <li>Full neck range of movement required when performing pre-operational and operational checks, as well as maintenance tasks on the equipment.</li> </ul>
Reaching	Forward/Backward	Occasional-Frequent	<ul style="list-style-type: none"> <li>Full range of movement required when performing pre-operational and operational checks, as well as operation and maintenance tasks on all portable production equipment. Typical reach is within 100cm; however some maintenance/inspection tasks will require reaches exceeding 100cm.</li> <li>Vertical reach may exceed 200 cm; however ladders are available when required.</li> <li>Some equipment such as radial stackers can be lowered so that ladders are not required for maintenance tasks.</li> </ul>
	Upper Level	Occasional	
	Sideways	Occasional	
Elbow Posture		Occasional	<ul style="list-style-type: none"> <li>Full range of movement required when performing pre-operational and operational checks, as well as maintenance tasks on the equipment.</li> </ul>
Wrist Posture		Occasional	
Gripping		Occasional	<ul style="list-style-type: none"> <li>Medium to heavy grip strength required when performing operational and maintenance tasks. Significant grip forces are required for tasks such as: manipulate screens, use hand shovels, pull electrical cable, lifting crusher hammers, using hand tools etc.</li> <li>Operation of skid steer</li> </ul>
Pinching		Occasional	<ul style="list-style-type: none"> <li>Light to medium pinch strength required when installing conveyor belt clips etc.</li> </ul>

Continued...

MOBILITY AND POSTURAL REQUIREMENTS	FREQUENCY	COMMENTS*
Fine Finger Dexterity	Occasional	<ul style="list-style-type: none"> <li>May be required when performing pre-operational and operation checks, as well as maintenance tasks etc.</li> <li>Required for operation of computerized Portable Production Equipment control panels.</li> <li>Lock-out/Tag out tasks</li> </ul>
Striking with Hand	Occasional	<ul style="list-style-type: none"> <li>To depress emergency buttons</li> <li>Not required on a daily basis</li> </ul>
Foot Action	Occasional	<ul style="list-style-type: none"> <li>Operating mobile equipment.</li> <li>Shovelling</li> </ul>

\*Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Operate Portable Production Equipment tasks.

### Section 5: Sensory/Mental Requirements

SENSORY/MENTAL REQUIREMENTS		ESSENTIAL		COMMENTS*
		Yes	No	
Vision	Near	X		<ul style="list-style-type: none"> <li>To conduct pre-operational and operational checks.</li> <li>Monitor equipment operations and perform maintenance tasks.</li> </ul>
	Far	X		<ul style="list-style-type: none"> <li>To ensure safety of self and others due to moving objects/vehicles, view pre-operational and operational checks, as well as complete maintenance.</li> </ul>
	Colour		X	
Light Quality and Measurements		X		<ul style="list-style-type: none"> <li>Requires the ability to work in low level light (less than 100 Lux during the night shift). Ambient light (daytime) approximately 700 Lux.</li> </ul>
Hearing	Conversation	X		<ul style="list-style-type: none"> <li>Communication between workers, supervisors, and others, is required to ensure safety and address operational issues along the system.</li> </ul>
	Other Sounds	X		<ul style="list-style-type: none"> <li>Vehicle horns, work site alarms, equipment noises, etc.</li> <li>Hearing protection may be mandatory at some sites depending on noise levels. Noise levels may exceed occupational exposure limits.</li> </ul>
Talking		X		<ul style="list-style-type: none"> <li>Communication between workers, supervisors, and others, required to convey issues.</li> <li>Talking loudly is required to talk above machinery/background noise or if the workers are wearing hearing protection.</li> </ul>
Reading/Writing		X		<ul style="list-style-type: none"> <li>Writing in pre-operational check books, log books, shift notes, etc.</li> </ul>
Feeling		X		<ul style="list-style-type: none"> <li>May be required during maintenance tasks.</li> </ul>
Judgement/Decision Making		X		<ul style="list-style-type: none"> <li>Identify solutions to problems that are associated with Portable Production Equipment.</li> </ul>
Concentration		X		<ul style="list-style-type: none"> <li>Focus on work task at hand, to ensure proper operation of the equipment.</li> <li>Concentration required identifying and eliminating hazards.</li> </ul>
Alertness		X		<ul style="list-style-type: none"> <li>Must be aware of surroundings (ground type/grading, mobile equipment, workers), to ensure safety of self and other workers.</li> </ul>

\*Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Operate Portable Production Equipment tasks.

Section 6: Work Environment

WORK ENVIRONMENT	ESSENTIAL		COMMENTS*
	Yes	No	
Slippery Floors or Ground	X		<ul style="list-style-type: none"> <li>Worker regularly encounters wet/slippery ground.</li> <li>Worker is exposed to icy ground conditions in the winter months.</li> <li>Constant exposure to environmental conditions.</li> </ul>
Sloping or Uneven Terrain	X		<ul style="list-style-type: none"> <li>Worker is typically exposed to sloping/loose ground and uneven terrain.</li> </ul>
Inside Work	X		<ul style="list-style-type: none"> <li>May perform some documentation tasks inside the office.</li> </ul>
Outside Work	X		<ul style="list-style-type: none"> <li>A majority of work tasks are performed in an outside environment.</li> </ul>
Extreme Heat/Extreme Cold	X		<ul style="list-style-type: none"> <li>Constant exposure to environmental conditions-season dependent</li> </ul>
Dry/Humid	X		<ul style="list-style-type: none"> <li>Constant exposure to environmental conditions-season dependent.</li> </ul>
Dust (PPE required)	X		<ul style="list-style-type: none"> <li>Conditions vary depending on mine and work site; respirators available when required.</li> </ul>
Vapours/Fumes (PPE required)		X	
Chemical Irritants (PPE required)		X	
Noise (PPE required)	X		<ul style="list-style-type: none"> <li>Workers are required to wear hearing protection if noise levels exceed occupational exposure limits.</li> </ul>
Moving Objects/Vehicles	X		<ul style="list-style-type: none"> <li>Mobile equipment in work area, potential exposure to moving machinery parts (lock-out/tag out procedures applies.)</li> </ul>
Electrical Hazards		X	<ul style="list-style-type: none"> <li>Electrical work is performed by licensed electricians</li> <li>Lock out Tag out procedures are followed.</li> </ul>
Sharp Tools	X		<ul style="list-style-type: none"> <li>Knives to cut belts</li> </ul>
Congested/Confined Work Site		X	

Continued...

WORK ENVIRONMENT		ESSENTIAL		COMMENTS*
		Yes	No	
Working at Heights		X		<ul style="list-style-type: none"> <li>Work on ladders may be required. Some machinery is elevated.</li> </ul>
Vibration	Whole Body	X		<ul style="list-style-type: none"> <li>Worker may encounter some total body vibration around crusher, screens etc. The degree and duration of exposure will vary according to the type of equipment; task performed; and mine location.</li> <li>Vibration frequencies vary from 100-400 Hz for various locations around the site. Exposure is absorbed through the feet in a standing position.</li> <li>Operate skid steer (sitting)-(6-17Hz) Typical duration of &lt; 34% of workday. Exposure is absorbed through the feet in a seated position.</li> </ul>
	Segmental	X		<ul style="list-style-type: none"> <li>Exposure when operating power tools such as grinders, impact wrenches, reciprocating saws.</li> <li>The degree and duration of exposure will vary according to the type of equipment and task performed.</li> <li>Vibration frequency ranges from 375-1250 Hz depending on the type of equipment used. E.g. Grinders 500 to 1200Hz.</li> </ul>
Vehicle Operation		X		<ul style="list-style-type: none"> <li>Operate Skid Steer.</li> </ul>
Overtime		X		<ul style="list-style-type: none"> <li>Overtime may be optional and is dependant on mine site.</li> </ul>
Shift Work		X		<ul style="list-style-type: none"> <li>Shift work dependant on mine site.</li> </ul>
Working Alone		X		<ul style="list-style-type: none"> <li>Workers will work alone and work with others when performing operational tasks.</li> </ul>
Working with Others		X		

\*Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Operate Portable Production Equipment tasks.

Section 7: Behavioural/Cognitive Demands

BEHAVIOURAL/COGNITIVE DEMANDS	CDA <sup>£</sup> RANKING SCALE				COMMENTS*
	1	2	3	4	
Degree of Self-Supervision Required		X			<ul style="list-style-type: none"> <li>Worker is responsible for ensuring equipment is operating correctly.</li> </ul>
Degree of Supervision Exercised		X	X		<ul style="list-style-type: none"> <li>Worker may be required to provide to work direction to other staff as the situation requires.</li> </ul>
Deadline Pressures (Time Pressure)		X			<ul style="list-style-type: none"> <li>There are timeline pressures to meet production targets and ensure optimal operation of the system.</li> </ul>
Attention to Detail		X			<ul style="list-style-type: none"> <li>Monitor product quality.</li> </ul>
Performance of Multiple Tasks Required		X			<ul style="list-style-type: none"> <li>Worker may be monitoring multiple pieces of equipment and correcting multiple factors along the work process to ensure efficiency.</li> </ul>
Exposure to Distracting Stimuli				X	<ul style="list-style-type: none"> <li>Worker is likely subjected to multiple stimuli simultaneously, such as high noise levels, visual inspection (look of product), and auditory stimuli (alarms, bells, sound of motors, etc.) to monitor operational processes of convey feed system.</li> </ul>
Need to Work Co-operatively with Others			X		<ul style="list-style-type: none"> <li>Some tasks require working co-operatively with others.</li> </ul>
Exposure to Emotional Situations	X				
Exposure to Confrontational Situations		X			<ul style="list-style-type: none"> <li>Some customer confrontation may occur at some mine sites.</li> </ul>
Responsibility and Accountability Required				X	<ul style="list-style-type: none"> <li>High degree of responsibility and accountability required to ensure safety of self and others, and ensure efficiency of operational processes.</li> </ul>
Reading Literacy		X			<ul style="list-style-type: none"> <li>Log books.</li> </ul>
Written Literacy		X			<ul style="list-style-type: none"> <li>Log book (corrective action in log book, defective equipment, complete incident reports, as needed, complete end of shift report, etc.).</li> </ul>
Numerical Skills		X			<ul style="list-style-type: none"> <li>Use of basic mathematical skills required.</li> </ul>
Verbal Communication			X		<ul style="list-style-type: none"> <li>Communicating operational process issues to co-workers/supervisors.</li> </ul>
Memory			X		<ul style="list-style-type: none"> <li>Many of the operational processes require the need to recall learned information.</li> </ul>
Computer Literacy		X			<ul style="list-style-type: none"> <li>To control conveyor processes.</li> </ul>
Shift Work Demands				X	<ul style="list-style-type: none"> <li>Shift work dependant on mine site.</li> </ul>

<sup>£</sup> The Cognitive Demands Assessment (CDA) definitions and scale are outlined in [Appendix 3](#).

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

Section 8: Photographs



Figure 1: Chain Blocks, Jacks, Hoists, Ropes, Pulleys



Figure 2: Radial Stacker Conveyor



Figure 3: Portable Conveyors and Screen



Figure 4: Remote Radial Stacker

# Surface Miner

Area of Competence: Develop Personal Competencies

## Assessment Report

## Minerals Processing Operator

### *Develop Personal Competencies — The Assessment Report*

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#### Overview

Occupational Domain:	Surface Miner	National Occupational Standard (NOS) Area of Competence:	Develop Personal Competencies
Hours of Work:	8-12 hour rotating shifts required. (Dependant on mine site).	Breaks:	~1- 1½ hours in total
Shift Work:	Rotating schedule, which is dependant on the mine site.	National Occupational Classification (NOC) Level of Work:	Light to Heavy
Dates of Assessment:	February 24-26, 2009	Evaluators:	Tony Dias, H.B.K., C.K., C.R.S.P. Liliane Lamarche, B. Sc. (Kin.), C.K.

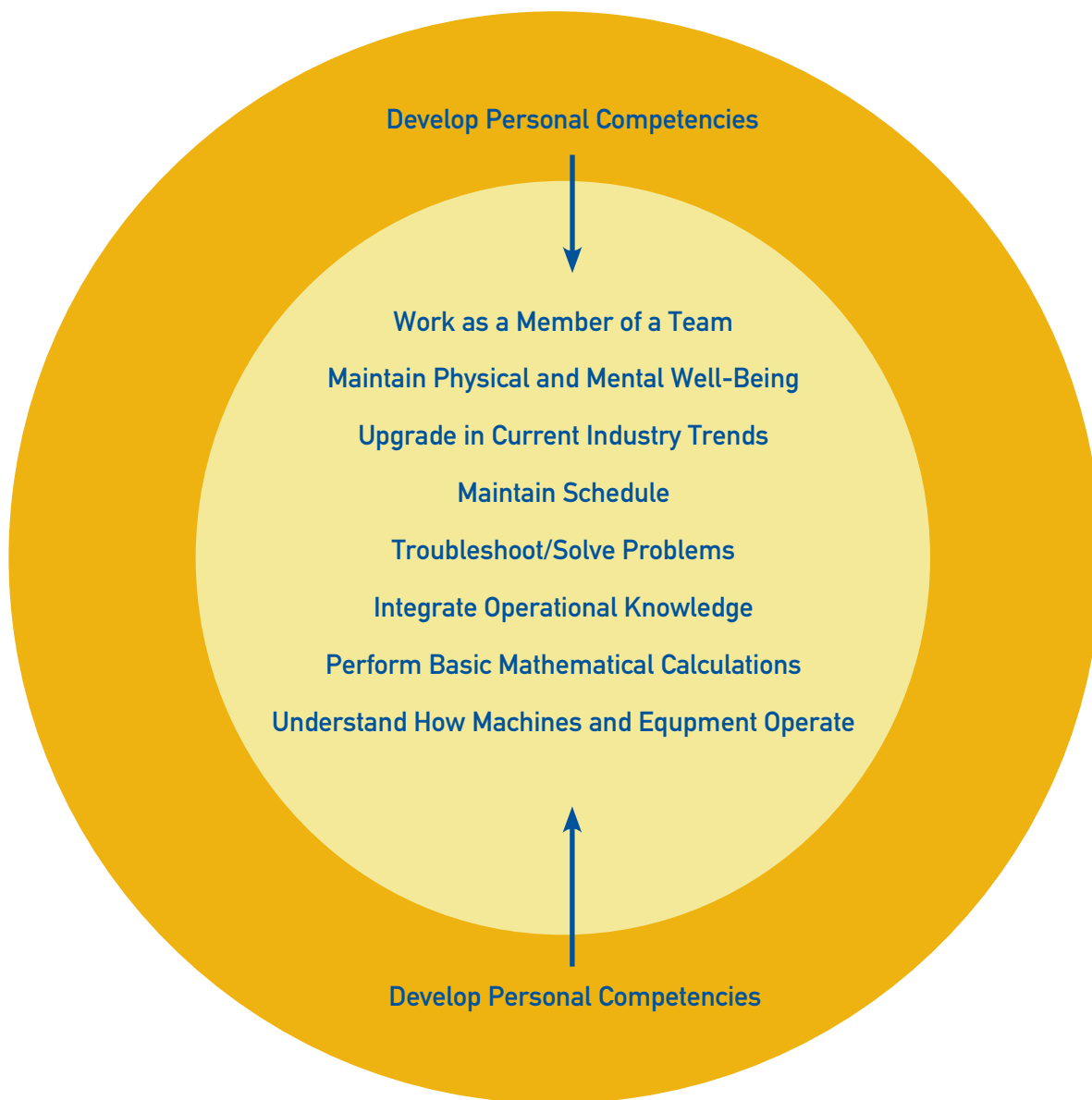
### Section 1: Detailed Task Description

According to the National Occupation Classification (N.O.C.), this job classification falls within the Light to Heavy strength category. The strength requirements for developing personal competencies tasks will vary.

A worker must be able walk, climb stairs, ladders and uneven ground. Workers should also have functional range of motion in the neck, trunk, upper and lower extremities.

Workers must take personal initiative in order to maintain and/or improve physical and mental well-being and identify competencies which require additional training.

### Section 2: Workflow



## Section 3: Task Objectives and Duties

### Overview

Developing personal strong competencies within the surface mining industry requires workers to stay up to date on current industry/company trends. Employers are required to provide workers with training to ensure that they perform work in a safe and efficient manner. Workers are required to participate in all relevant training initiatives. Workers must also take initiative in maintaining good physical and mental well-being.

### Essential Tasks

#### Work as Member of Team

- Workers must be accountable, adaptable, aware of diversities in the workplace, responsible, respectful and focussed.

#### 2. Maintain Physical and Mental Well-being

- Workers should maintain an active lifestyle.
- Workers must never work under the influence of drugs or alcohol.
- Workers must be appropriately dressed, well rested and ready to work.
- Workers must utilize family and employee assistance programs to deal with personal issues.

#### 3. Upgrade in Current Industry Trends

- Worker must participate in and request training in new technologies.
- Worker must be able to adapt and be open to change.

#### 4. Maintain Schedule

- Worker must be on time for work, take required rest breaks and manage time effectively.

#### 5. Troubleshoot/Solve Problems

- Worker must be able to identify and solve problem by relying on personal experience and/or seeking advice from competent co-workers.

#### 6. Integrate Operational Knowledge

- Worker must participate in company orientation.
- Worker must be able to integrate overall knowledge and past experience into a specific job.

#### 7. Perform Basic Mathematical Calculations

- Worker must be able to perform basic mathematical calculations.

#### 8. Understand How Machines and Equipment Operate

- Worker must be able to use training manuals and programs.
- Worker must be able accept ongoing evaluation and feedback.
- Worker must be able set and achieve realist operational goals.
- Worker must posses a degree of mechanical understanding and aptitude.

Continued...

**Personal Protective Equipment (PPE)**

- CSA approved safety footwear with a green and orange tag;
- Coveralls, equipped with appropriate reflective markings;
- CSA approved fall arrest systems (required when working 3 meters above the ground);
- Two-way radio;
- Hard hat with or without light clip;
- Safety glasses;
- Hearing protection, which may include ear plugs and/or ear muffs;
- Gloves (cotton, leather, rubber, welding and hot gloves);
- Dust mask and personal respirator (as required);
- Safety fall arrest; and
- Additional task specific PPE, such as face shield, self-contained breathing apparatus, etc.

**Equipment**

- |                                |                           |  |
|--------------------------------|---------------------------|--|
| • Haulage truck;               | • Forklift;               | • Chain saw;   |
| • Scraper;                     | • Elevated work platform; | • Concrete saw;                                      |
| • Grader;                      | • Light service vehicle;  | • Wrenches (socket, adjustable, pipe, box-end, etc); |
| • Track dozer;                 | • Fuel/Lube truck;        | • Impact gun;  |
| • Rubber-Tired dozer;          | • Water truck;            | • Y connectors;                                      |
| • Cable reeler/Cable truck;    | • Tow truck;              | • Chain wrench;                                      |
| • Front end loader;            | • Low bed/Float;          | • Reducer;   |
| • Hydraulic excavator/Backhoe; | • Mobile crane;           | • Handsaws;  |
| • Electric rope/Cable Shovel;  | • Tool box;               | • Sledge hammers;                                    |
| • Rotary drill;                | • Ladders;                | • Screwdrivers; and/or                               |
| • Skid steer;                  | • Pinch bar;              | • Hose repair equipment.                             |
| • Explosives truck;            | • Clevis;                 |  |

Section 4: Strength and Positional Requirements

STRENGTH REQUIREMENTS		FREQUENCY	LOAD (KG)	FORCE (KG OF FORCE)	COMMENTS*
Lifting/Lowering	Floor to Waist† (0-104cm)	Occasional - Frequent	<0.5-43.0		<ul style="list-style-type: none"> <li>Lifting at this level may vary from &lt;0.5-43.0 kg. The amount of weight lifted varies based on which job task the worker is assigned.</li> <li>Lifting frequency will also vary based on which job task the worker is assigned or trained in. **</li> </ul>
	Waist† to Shoulder† (104-137cm)	Occasional - Frequent	<0.5-43.0		<ul style="list-style-type: none"> <li>Lifting at this level may vary from &lt;0.5-43.0 kg. The amount of weight lifted varies based on which job task the worker is assigned.</li> <li>Lifting frequency will also vary based on which job task the worker is assigned or trained in.**</li> </ul>
	Floor to Shoulder† (0-137cm)	Occasional	5.5		<ul style="list-style-type: none"> <li>Fuel hose (5.5 kg) when fuelling haulage truck.</li> </ul>
	Above Shoulder† (>138cm)	Occasional - Frequent	<0.5-43.0		<ul style="list-style-type: none"> <li>Lifting at this level may vary from &lt;0.5-43.0 kg. The amount of weight lifted varies based on which job task the worker is assigned.</li> <li>Lifting frequency will also vary based on which job task the worker is assigned or trained in. **</li> </ul>

Continued...

STRENGTH REQUIREMENTS		FREQUENCY	LOAD (KG)	FORCE (KG OF FORCE)	COMMENTS*
Carrying	Unilateral/ Bilateral	Occasional - Frequent	<0.5-43.0		<ul style="list-style-type: none"> <li>• Loads will vary from &lt;0.5-43.0 kg. The amount of weight lifted varies based on which job task the worker is assigned.</li> <li>• Carrying frequency will also vary based on which job task the worker is assigned or trained in. **</li> </ul>
	Vertical	Occasional	28.0		<ul style="list-style-type: none"> <li>• Loosening/tightening keeper bar bolts on hydraulic excavator (28.0 kg of force). Force may be applied up or down.</li> </ul>
Pushing/Pulling (kg of Force)	Unilateral	Occasional		1.0-58.0	<ul style="list-style-type: none"> <li>• Forces will vary from 1.0-58.0 kg. The amount of force exerted will vary based on which job task the worker is assigned.</li> <li>• Pushing/pulling frequency will also vary based on which job task the worker is assigned or trained in.</li> </ul>
	Bilateral	Occasional			

The Frequency Definitions are outlined in [Appendix 2](#).

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

† Anthropometrics are based on the 50th percentile male (waist height, standing 106.3±5.4 cm; shoulder height, standing 143.7±6.2 cm) and the 50th percentile female (waist height, standing 101.7±5.0 cm; shoulder height, standing 132.9±5.5 cm); Eastman Kodak Company (1986). *Ergonomic Design for People at Work: Volume 2*. New York: Van Nostrand Reinhold Company.

MOBILITY AND POSTURAL REQUIREMENTS		FREQUENCY	COMMENTS*
Sitting		Occasional – Constant	<ul style="list-style-type: none"> <li>Worker may choose to sit during meetings and training sessions. However, frequency will vary depending on type and duration of training. Mobile equipment simulator will require the worker to sit.</li> <li>Sitting frequency will also vary based on which job task the worker is assigned or trained.</li> </ul>
Standing		Occasional – Constant	<ul style="list-style-type: none"> <li>Worker may choose to stand during meetings and training sessions. However, frequency will vary depending on type and duration of training.</li> <li>Standing frequency will also vary based on which job task the worker is assigned or trained.</li> </ul>
Walking		Occasional – Constant	<ul style="list-style-type: none"> <li>Walking frequency will vary based on which job task the worker is assigned or trained.</li> </ul>
Climbing	Stairs	Occasional	<ul style="list-style-type: none"> <li>Mounting and dismounting service and mobile equipment (heights may vary based on type of vehicle).</li> </ul>
	Ladders	Occasional	<ul style="list-style-type: none"> <li>Mounting and dismounting service and mobile equipment (heights may vary based on type of vehicle).</li> </ul>
	Uneven Ground	Occasional	<ul style="list-style-type: none"> <li>Worker may have to climb on uneven ground (rock, snow).</li> </ul>
Balancing		Occasional	<ul style="list-style-type: none"> <li>Climbing on equipment.</li> <li>Balancing on elevated work platform, ladders and stairs.</li> </ul>
Crawling		Never	
Kneeling		Occasional	<ul style="list-style-type: none"> <li>May kneel when learning to inspect, repair, and maintain equipment.</li> </ul>
Crouching/Squatting		Occasional	<ul style="list-style-type: none"> <li>May crouch/squat when learning to inspect, repair, and maintain equipment.</li> </ul>
Trunk Movements		Occasional	<ul style="list-style-type: none"> <li>Functional range of motion in all directions may be needed to work safely.</li> <li>Awkward postures are adopted when performing some inspection and maintenance tasks, attention to safety when performing awkward tasks is required.</li> <li>Examples include, but are not limited to: mobile, service equipment and completing inspection tasks.</li> </ul>
Neck Movements		Occasional	
Reaching	Forward/Backward	Occasional – Constant	<ul style="list-style-type: none"> <li>Training on different equipment, job tasks and tools.</li> <li>Practicing new skills on mobile and service equipment.</li> </ul>
	Upper Level	Occasional	<ul style="list-style-type: none"> <li>Training on different equipment, job tasks and tools.</li> <li>Practicing new skills on mobile and service equipment.</li> </ul>
	Sideways	Occasional	<ul style="list-style-type: none"> <li>Training on different equipment, job tasks and tools.</li> <li>Practicing new skills on mobile and service equipment.</li> </ul>
Elbow Posture		Occasional – Constant	<ul style="list-style-type: none"> <li>Full elbow range of motion in the elbow is required when practicing new skills on mobile and service equipment.</li> </ul>
Wrist Posture		Occasional – Constant	<ul style="list-style-type: none"> <li>Full wrist range of motion in the elbow is required when practicing new skills on mobile and service equipment.</li> </ul>
Gripping		Occasional – Constant	<ul style="list-style-type: none"> <li>Gripping frequency will vary based on the tools and equipment that the worker is learning to use.</li> </ul>

Continued...

MOBILITY AND POSTURAL REQUIREMENTS	FREQUENCY	COMMENTS*
<b>Pinching</b>	Occasional	<ul style="list-style-type: none"> <li>• Tip pinch grip required when writing or recording information such as taking notes or completing written tests. Key pinch grip needed when holding published training material.</li> </ul>
<b>Fine Finger Dexterity</b>	Occasional	<ul style="list-style-type: none"> <li>• Completing reports.</li> <li>• May also be used when typing or using computer.</li> </ul>
<b>Striking with Hand</b>	Never	
<b>Foot Action</b>	Occasional	<ul style="list-style-type: none"> <li>• Plantarflexion and dorsiflexion required to use the pedal controls while practicing to operating service and mobile equipment. A force of 6-20 kg is required to depress the pedals, which are located ~30 cm from the vehicle floor.</li> <li>• Putting on CSA approved safety footwear.</li> </ul>

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

Section 5: Sensory/Mental Requirements

SENSORY/MENTAL REQUIREMENTS		ESSENTIAL		COMMENTS*
		Yes	No	
Vision	Near	X		<ul style="list-style-type: none"> <li>Reading training material, analysing and visualizing controls panels, warning signals, alarms, signs, devices, lights, controls, symbols, and abbreviations, etc.</li> <li>Must be able to visualize three-dimensional layouts.</li> </ul>
	Far	X		<ul style="list-style-type: none"> <li>Peripheral and far vision required when practicing new tasks.</li> </ul>
	Colour		X	
Light Quality and Measurements		X		<ul style="list-style-type: none"> <li>All tasks are performed above ground. However, light levels will vary based on weather conditions, time of shift, and other light emitted from surrounding lighting and equipment. Light levels may range from 0 Lux during the night to ~700 Lux during the day.</li> <li>Time of exposure to darkness may vary from 8 - 12 hours (based on seasonal time shifts).</li> </ul>
Hearing	Conversation	X		<ul style="list-style-type: none"> <li>Communicating over two-way radio, and in-person.</li> </ul>
	Other Sounds	X		<ul style="list-style-type: none"> <li>Recognizing different sounds produced by different equipment.</li> <li>Hearing protection mandatory, ear plugs and/or earmuffs are available. Noise levels may regularly exceed the occupational exposure limits (specifically inside mobile equipment).</li> <li>Level of noise may range from 68 dB-180 dB and may vary based on the task being performed or equipment being operated.</li> </ul>
Talking		X		<ul style="list-style-type: none"> <li>Conversing with the instructor to acknowledge comprehension and asking questions.</li> <li>May have to converse with the use of hearing protection.</li> </ul>
Reading/Writing		X		<ul style="list-style-type: none"> <li>Reviewing training material and operational manuals.</li> <li>Understanding mine prints/maps, reports and logs books, signs, warning signals, signs, devices, controls, symbols and abbreviations as well as information on the computer, etc.</li> </ul>
Feeling			X	
Judgement/Decision Making		X		<ul style="list-style-type: none"> <li>Integrating operational knowledge, setting operational goals, making decisions regarding physical and mental well being, managing time effectively, reporting equipment and/ or tool damages, making decisions pertaining to health and safety, upgrading in current industry standards, identifying problems, etc.</li> <li>Identifying hazards and minimizing risks.</li> </ul>
Concentration		X		<ul style="list-style-type: none"> <li>Worker must be able to learn and apply new information Worker must also adapt to continuous technological changes.</li> <li>Performing work tasks safely.</li> </ul>
Alertness		X		<ul style="list-style-type: none"> <li>Workers must be alert in order to retain new information and work safely.</li> </ul>

\*Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

Section 6: Work Environment

WORK ENVIRONMENT	ESSENTIAL		COMMENTS*
	Yes	No	
Slippery Floors or Ground	X		<ul style="list-style-type: none"> <li>Wet/muddy and slippery surfaces. Surface conditions may vary depending on seasonal and weather conditions.</li> </ul>
Sloping or Uneven Terrain	X		<ul style="list-style-type: none"> <li>Ascending/descending grades, ramps and loose rocks.</li> </ul>
Inside Work	X		<ul style="list-style-type: none"> <li>Workers generally work inside environmentally controlled cabs while operating mobile and service equipment.</li> </ul>
Outside Work	X		<ul style="list-style-type: none"> <li>Workers are required to work outside while operating service equipment, conducting blasting operations, using hand and power tools, walking to and from buildings/equipment.</li> <li>Workers may be exposed to different weather conditions such as snow and rain.</li> </ul>
Extreme Heat/Extreme Cold	X		<ul style="list-style-type: none"> <li>Seasonal weather conditions.</li> </ul>
Dry/Humid	X		<ul style="list-style-type: none"> <li>May vary, depending on season and weather conditions.</li> </ul>
Dust (PPE required)	X		<ul style="list-style-type: none"> <li>May be exposed to dust. Respirators are available and may be worn when required.</li> <li>Water is sprayed to reduce dust as much as possible in the fall, spring, and summer.</li> </ul>
Vapours/Fumes (PPE required)		X	
Chemical Irritants (PPE required)		X	
Noise (PPE required)	X		<ul style="list-style-type: none"> <li>Operational noise within equipment.</li> <li>Hearing protection mandatory, ear plugs and/or earmuffs are available. Noise levels regularly exceed the occupational exposure limits.</li> <li>Level of noise ranges from 68 dB-180 dB (noise levels may vary based on the task and equipment being operated).</li> </ul>
Moving Objects/Vehicles	X		<ul style="list-style-type: none"> <li>Mobile and service equipment.</li> </ul>
Electrical Hazards	X		<ul style="list-style-type: none"> <li>May work around power lines and with power tools. Must be aware of potential hazards especially when working around water and/or rain.</li> </ul>
Sharp Tools	X		<ul style="list-style-type: none"> <li>Cutters for wet hole sleeves (pink plastic).</li> <li>Axes, box cutters, power tools and saws.</li> </ul>
Congested/Confined Work Site	X		<ul style="list-style-type: none"> <li>Entering and working in tanks, bins and confined spaces.</li> </ul>

Continued...

WORK ENVIRONMENT		ESSENTIAL		COMMENTS*
		Yes	No	
Working at Heights		X		<ul style="list-style-type: none"> <li>Workers may be required to perform work on scissors lifts, climb ladders, stairs and climb onto equipment to operate and perform pre-operational checks.</li> </ul>
Vibration	Whole Body	X		<ul style="list-style-type: none"> <li>Operating mobile and service equipment. The degree of whole body vibration will vary according to the type of equipment; task performed, and mine location.</li> <li>Vibration ranges from 6-19 Hz.</li> </ul>
	Segmental	X		<ul style="list-style-type: none"> <li>Using power tools, operating service and mobile equipment. The degree and duration of exposure will vary according to the type of equipment; task performed, and mine location.</li> <li>Hand-Arm vibration ranges from 12 to 33 Hz.</li> </ul>
Vehicle Operation		X		<ul style="list-style-type: none"> <li>Must be able to operate mobile and service equipment safely.</li> </ul>
Overtime			X	
Shift Work		X		<ul style="list-style-type: none"> <li>12- Hour rotating shifts required (May depend on mine site).</li> </ul>
Working Alone		X		<ul style="list-style-type: none"> <li>Works independent within a group of individuals. Check-in policy mandatory.</li> </ul>
Working with Others		X		

\*Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

Section 7: Behavioural/Cognitive Demands

BEHAVIOURAL/COGNITIVE DEMANDS	CDA <sup>£</sup> RANKING SCALE				COMMENTS*
	1	2	3	4	
Degree of Self-Supervision Required		X		X	<ul style="list-style-type: none"> <li>Workers must demonstrate a high degree of initiative and self-supervision in order to develop personal competencies not only to work safely and effectively in a surface mining environment but also to maintain/improve personal health and well-being.</li> <li>Examples include but are not limited to the following:                             <ul style="list-style-type: none"> <li>Maintaining an active lifestyle.</li> <li>Not being under the influence of drugs or alcohol.</li> <li>Obtaining sufficient rest.</li> <li>Utilizing family and employee assistance programs to deal with personal issues.</li> <li>Request training in new technologies.</li> <li>Identifying and solving problems by relying on personal experience and/or seeking advice from competent co-workers.</li> </ul> </li> </ul>
Degree of Supervision Exercised	X			X	<ul style="list-style-type: none"> <li>The degree of supervision exercised will vary significantly based on the competency and worker experience. More experienced worker may be responsible for mentoring less experienced workers.</li> </ul>
Deadline Pressures (Time Pressure)		X	X		<ul style="list-style-type: none"> <li>Workers are expected to attain specific training milestones within designated time periods.</li> </ul>
Attention to Detail			X	X	<ul style="list-style-type: none"> <li>The amount of attention to detail will vary based on the area of competency.</li> <li>Attention to detail is required in order to learn new information and/or processes and applying new learned skills and information while working in the mine.</li> <li>Many tasks need to be performed in sequence.</li> </ul>
Performance of Multiple Tasks Required	X			X	<ul style="list-style-type: none"> <li>Worker must be able to learn and apply new information. Worker must also adapt to continuous technological changes.</li> </ul>
Exposure to Distracting Stimuli	X		X		<ul style="list-style-type: none"> <li>Worker must adapt to learning and applying new information.</li> <li>Worker must have good work-life balance.</li> <li>The amount of exposure to distracting stimuli varies based on the area of competency.</li> </ul>
Need to Work Co-operatively With Others	X			X	<ul style="list-style-type: none"> <li>Cooperation with others is essential.</li> <li>Work is performed individually. However, individual tasks are part of a larger process.</li> <li>The amount of co-operation with others varies based on area of competency.</li> </ul>
Exposure to Emotional Situations	X				

Continued...

BEHAVIOURAL/COGNITIVE DEMANDS	CDA <sup>§</sup> RANKING SCALE				COMMENTS*
	1	2	3	4	
Exposure to Confrontational Situations	X	X			<ul style="list-style-type: none"> <li>Workers may encounter clashes of personality.</li> </ul>
Responsibility and Accountability Required			X	X	<ul style="list-style-type: none"> <li>Each worker is responsible and accountable for developing specific personal competencies in order to work safely and perform an assigned job effectively. Personal safety and the safety of other workers is dependant on each worker being competent in the job that they have been assigned.</li> <li>Workers are expected to reach specific training milestones within a specified amount of time.</li> <li>Workers are responsible for personal competencies.</li> </ul>
Reading Literacy	X	X			<ul style="list-style-type: none"> <li>Worker is required to integrate operational knowledge acquired through basic reading literacy.</li> <li>Worker must consult training and operating manuals in order to learn information.</li> <li>Worker must understand the Workplace Hazardous Materials Information System, must be able to read MSDS sheet, etc.</li> </ul>
Written Literacy	X	X			<ul style="list-style-type: none"> <li>Filling in log books, completing tests, etc.</li> </ul>
Numerical Skills		X			<ul style="list-style-type: none"> <li>Basic mathematical skills, may have to perform basic addition, subtraction, multiplication, division, and measurement conversion.</li> </ul>
Verbal Communication	X		X		<ul style="list-style-type: none"> <li>Person to person conversational, communicating over two-way radio, obtaining new information during training, asking questions.</li> </ul>
Memory		X	X		<ul style="list-style-type: none"> <li>Required to memorize many details and sequences.</li> <li>Must be able to prioritize.</li> </ul>
Computer Literacy	X	X			<ul style="list-style-type: none"> <li>Worker needs to be open-minded and willing to change and to learn new technologies and practices.</li> </ul>
Shift Work Demands	X				

<sup>§</sup> The Cognitive Demands Assessment (CDA) definitions and scale are outlined in [Appendix 3](#).

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

# Surface Miner

Area of Competence: Communicate

## Assessment Report

## Minerals Processing Operator

### Communicate — The Assessment Report

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### Overview

Occupational Domain:	Surface Miner	National Occupational Standard (NOS) Area of Competence:	Communicate
Hours of Work:	Length of shift may vary from 8-12 hours. (Dependant on mine site).	Breaks:	~1- 1½ hours in total
Shift Work:	Rotating schedule may be required depending on mine site.	National Occupational Classification (NOC) Level of Work:	Light
Dates of Assessment:	February 24-26, 2009	Evaluators:	Tony Dias, H.B.K., C.K., C.R.S.P. Liliane Lamarche, B. Sc. (Kin.), C.K.

## Section 1: Detailed Task Description

Overall, the Communication job tasks fall within the Light strength category, as defined by the National Occupation Classification (N.O.C.).

As a Surface Miner, workers are required to use many forms of communication when interacting with their co-workers, supervisors, contractors, and/or visitors.

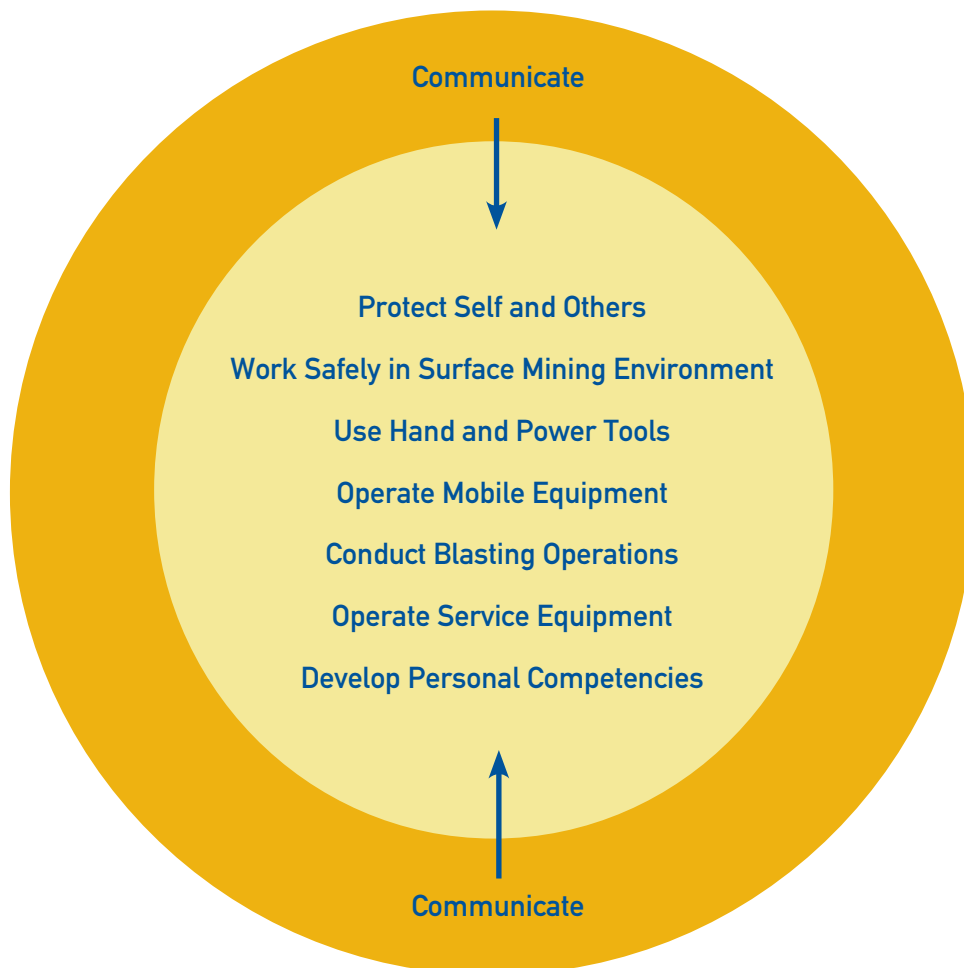
Effective communication within a surface environment requires that a worker speak clearly and concisely, in order to convey relevant and required information that is critical to workers safety and the efficiency of the mining operation. Fluency in English and/or French (depending on different regions) is recommended. Workers must learn and use mining specific terminology. The worker must also be able to actively listen to information conveyed over the two-way radio and in person to ensure that all information is clearly understood.

The worker is also required to communicate and convey messages using hand signals.

The worker is also required to learn how to use graphic user interface such as Global Positioning Systems (GPS) and on-board computer systems.

The worker is also required to complete reports.

## Section 2: Workflow



## Section 3: Task Objectives and Duties

### Overview

Must be able to effectively communicate with supervisors, co-workers, contractors, and/or visitors. This may include, but is not limited to, communication using verbal, audible, written, electronic devices, as well as interpretation of signs.

### Essential Tasks

#### 1. Speak Clearly and Concisely

- Workers must be able to communicate clearly and concisely with each other, and supervisors using appropriate language and mine terminology.
- Workers must be able to convey any safety concerns, and/or questions.

#### 2. Listen Actively

- Workers must be able to listen and retain relevant information that is conveyed over two-way radio.
- Workers must be able to repeat and understand all instructions given.

#### 3. Convey Messages with Hand Signals

- Workers must be able to use appropriate hand signals to communicate with and to direct other workers.

#### 4. Use Two-Way Radio/ Electronic Communication

- Workers are required to use a two-way radio to conduct the majority of communication.

#### 5. Use Workplace Software and Hardware

- Depending on the mining company, workers may be required to operate and/or communicate using a computer.
- Basic keyboarding and mouse skills may be needed.
- Must use Global Positioning Systems (GPS) or on-board computer systems to communicate with Pit Control.

#### 6. Complete Reports

- Workers must be able to complete log books to communicate defects and for accountability.

### Personal Protective Equipment (PPE)

- CSA approved safety footwear with a green and orange tag;
- Coveralls equipped with appropriate reflective markings;
- CSA approved fall arrest systems, which is required when working 3 meters above grade;
- Hard hat;
- Safety glasses;
- Hearing protection, which may include ear plugs and/or ear muffs;
- Gloves (cotton, leather, rubber, welder and hot gloves);
- Lockout procedure;
- Dust mask and personal respirators; and
- Additional task specific PPE, such as face shield, self-contained breathing apparatus, etc.

### Equipment

- Two-way radio;
- Warning signs;
- Operator alert indicators/icons;
- Traffic signs; and/or
- Battery powered lights.

Section 4: Strength and Positional Requirements

STRENGTH REQUIREMENTS		FREQUENCY	LOAD (KG)	FORCE (KG OF FORCE)	COMMENTS*
Lifting/Lowering	Floor to Waist <sup>†</sup> (0-104cm)	Occasional	<0.5	-	<ul style="list-style-type: none"> <li>CSA approved safety footwear.</li> <li>Two-way radio (&lt;0.5 kg). Location of two-way radio will vary within different types of machines.</li> </ul>
	Waist <sup>†</sup> to Shoulder <sup>†</sup> (104-137cm)	Occasional	<0.5	-	<ul style="list-style-type: none"> <li>Two-way radio (&lt;0.5 kg). Location of two-way radio will vary within different types of machines.</li> </ul>
	Floor to Shoulder <sup>†</sup> (0-137cm)	Never	-	-	
	Above Shoulder <sup>†</sup> (>138cm)	Occasional	<0.5	-	<ul style="list-style-type: none"> <li>Two-way radio (&lt;0.5 kg). Location of two-way radio will vary within different types of machines.</li> </ul>
Carrying	Unilateral/ Bilateral	Occasional	<0.5	-	<ul style="list-style-type: none"> <li>Workers may carry log books (&lt;0.5).</li> </ul>
Pushing/Pulling (kg of Force)	Vertical	Never	-	-	
	Unilateral	Occasional	-	Negligible	<ul style="list-style-type: none"> <li>Turn signals while operating service or mobile equipment.</li> </ul>
	Bilateral	Never	-	-	

The Frequency Definitions are outlined in [Appendix 2](#).

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

† Anthropometrics are based on the 50th percentile male (waist height, standing 106.3±5.4 cm; shoulder height, standing 143.7±6.2 cm) and the 50th percentile female (waist height, standing 101.7±5.0 cm; shoulder height, standing 132.9±5.5 cm); Eastman Kodak Company (1986). *Ergonomic Design for People at Work: Volume 2*. New York: Van Nostrand Reinhold Company.

MOBILITY AND POSTURAL REQUIREMENTS		FREQUENCY	COMMENTS*
Sitting		Frequent	<ul style="list-style-type: none"> <li>Aside from pre-shift meetings, most communication occurs over a two-way radio while operating equipment.</li> <li>Horn signals while operating mobile equipment and service equipment, such as haul trucks, scrapers, scrapers, fuel trucks, water trucks, etc.</li> </ul>
Standing		Occasional	<ul style="list-style-type: none"> <li>Pre-shift meetings.</li> </ul>
Walking		Occasional	<ul style="list-style-type: none"> <li>Preparing for blasting operations (workers may work a part of a team). Verbal communication required.</li> </ul>
Climbing	Stairs	Occasional	<ul style="list-style-type: none"> <li>Required to climb stairs in order to access two-way radios, which are located inside equipment.</li> </ul>
	Ladders	Occasional	<ul style="list-style-type: none"> <li>May be required to climb ladders in order to access two-way radios, which are located inside equipment.</li> </ul>
	Uneven Ground	Occasional	<ul style="list-style-type: none"> <li>Verbal communication with co-workers (blasting operations).</li> </ul>
Balancing		Never	
Crawling		Never	
Kneeling		Never	
Crouching/Squatting		Occasional	<ul style="list-style-type: none"> <li>May be required to communicate with co-workers during blasting operations.</li> </ul>
Trunk Movements		Occasional	<ul style="list-style-type: none"> <li>Partial trunk movements required to observe surroundings. Workers responsible for watching out for each other and communicating safety issues.</li> </ul>
Neck Movements		Occasional	<ul style="list-style-type: none"> <li>The majority of communication conducted in a surface mining environment occurs while operating mobile and service equipment. Therefore, unrestricted neck range of motion in all directions is required in order to communicate and operate equipment safely.</li> <li>Neck extension may also be required to access two-way radio (location of two-way radio may vary) and to observed audible displays.</li> </ul>
Reaching	Forward/Backward	Occasional	<ul style="list-style-type: none"> <li>Accessing two-way radio (this will vary based on the location of the radio within the operating cab). May also be used when conveying hand signals.</li> </ul>
	Upper Level	Occasional	<ul style="list-style-type: none"> <li>Accessing two-way radio (this will vary based on the location of the radio within the operating cab). May also be used when conveying hand signals.</li> </ul>
	Sideways	Occasional	<ul style="list-style-type: none"> <li>Accessing two-way radio (this will vary based on the location of the radio within the operating cab). May also be used when conveying hand signals.</li> </ul>
Elbow Posture		Occasional	<ul style="list-style-type: none"> <li>Pronation needed to access two-way radio, and/or communicate with the use of computers.</li> </ul>
Wrist Posture		Occasional	<ul style="list-style-type: none"> <li>Accessing the two-way radio.</li> </ul>
Gripping		Never	
Pinching		Occasional	<ul style="list-style-type: none"> <li>Tip pinch grip required when operating two-way radio and writing.</li> </ul>
Fine Finger Dexterity		Occasional	<ul style="list-style-type: none"> <li>Needed when filling in log books. May also be used when typing.</li> </ul>

Continued...

MOBILITY AND POSTURAL REQUIREMENTS	FREQUENCY	COMMENTS*
Striking with Hand	Never	
Foot Action	Occasional - Constant	<ul style="list-style-type: none"> <li>Plantarflexion and dorsiflexion required to use the pedal controls while operating service and mobile equipment. A force of ~6-20 kg is required to depress the pedals, which are located ~30 cm from the vehicle floor. The frequency will vary depending on the task performed, the equipment operated, and the mine site.</li> </ul>

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

### Section 5: Sensory/Mental Requirements

SENSORY/MENTAL REQUIREMENTS		ESSENTIAL		COMMENTS*
		Yes	No	
Vision	Near	X		<ul style="list-style-type: none"> <li>Reading log books and accessing two-way radio.</li> <li>Observing GPS and on-board computer systems within equipment.</li> </ul>
	Far	X		<ul style="list-style-type: none"> <li>Peripheral and far vision needed when reading signs and observing hand signals.</li> </ul>
	Colour	X		<ul style="list-style-type: none"> <li>Recognizing traffic and safety signs.</li> <li>Recognizing and interpreting different warning lights.</li> </ul>
Light Quality and Measurements		X		<ul style="list-style-type: none"> <li>All tasks are performed above ground. However, light levels will vary based on weather conditions, time of shift, and other light emitted from surrounding lighting and equipment. Light levels will vary from 0 Lux during the night to ~700 Lux during the day.</li> <li>Time of exposure to darkness may vary from 8 - 12 hours (based on seasonal time shifts).</li> </ul>
Hearing	Conversation	X		<ul style="list-style-type: none"> <li>Communicating over two-way radio and in-person.</li> </ul>
	Other Sounds	X		<ul style="list-style-type: none"> <li>Operational noise within equipment.</li> <li>Hearing protection mandatory, ear plugs and/or earmuffs are available. Noise levels may regularly exceed the occupational exposure limits (specifically inside mobile equipment).</li> <li>Level of noise ranges from 68 dB-180 dB.</li> </ul>
Talking		X		<ul style="list-style-type: none"> <li>Conversing with the use of hearing protection. Worker may be required to speak loud or shout.</li> </ul>
Reading/Writing		X		<ul style="list-style-type: none"> <li>Reviewing log books, signs, as well as information from onboard systems.</li> <li>Completing reports.</li> </ul>
Feeling			X	
Judgement/Decision Making		X		<ul style="list-style-type: none"> <li>Communicate safe working conditions.</li> <li>Identifying hazards and minimizing risks.</li> </ul>
Concentration		X		<ul style="list-style-type: none"> <li>Multi-tasking, communicating while operating mobile equipment.</li> </ul>
Alertness		X		<ul style="list-style-type: none"> <li>Workers must also be able to identify relevant information conveyed over two-way radio.</li> <li>Workers must also be able to identify relevant alarms and noise from the equipment, which will provide the worker feedback on how the equipment is operating.</li> </ul>

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

Section 6: Work Environment

WORK ENVIRONMENT		ESSENTIAL		COMMENTS*
		Yes	No	
Slippery Floors or Ground			X	
Sloping or Uneven Terrain			X	
Inside Work		X		<ul style="list-style-type: none"> <li>Most communication is completed inside equipment or buildings.</li> </ul>
Outside Work			X	
Extreme Heat/Extreme Cold			X	
Dry/Humid			X	
Dust (PPE required)		X		<ul style="list-style-type: none"> <li>May be exposed to dust. Respirators are available and may be worn when required.</li> <li>Water is sprayed to reduce dust as much as possible in the fall, spring, and summer.</li> </ul>
Vapours/Fumes (PPE required)			X	
Chemical Irritants (PPE required)			X	
Noise (PPE required)		X		<ul style="list-style-type: none"> <li>Operational noise within equipment.</li> <li>Hearing protection mandatory, ear plugs and/or earmuffs are available. Noise levels regularly exceed the occupational exposure limits.</li> <li>Level of noise ranges from 68 dB-180 dB. (Noise levels may vary based on the task and equipment being operated).</li> </ul>
Moving Objects/Vehicles		X		<ul style="list-style-type: none"> <li>Mobile and service equipment.</li> </ul>
Electrical Hazards			X	
Sharp Tools			X	
Congested/Confined Work Site			X	
Working at Heights		X		<ul style="list-style-type: none"> <li>Working from elevated work platform.</li> </ul>
Vibration	Whole Body	X		<ul style="list-style-type: none"> <li>Communicating while operating mobile and service equipment. The degree of vibration and duration of exposure will vary according to the type of equipment used; task performed, and mine location.</li> <li>Vibration ranges from 6-19 Hz when operating the various types of service and/or mobile equipment.</li> </ul>
	Segmental	X		<ul style="list-style-type: none"> <li>Communicating operating mobile and service equipment. May be exposed to vibration when operating controls and holding onto steering wheel while driving/travelling.</li> <li>Hand-Arm vibration ranges from 3-12 Hz. The degree of vibration and duration of exposure will vary according to the type of equipment used; task performed, and mine location.</li> </ul>

Continued...

WORK ENVIRONMENT	ESSENTIAL		COMMENTS*
	Yes	No	
Vehicle Operation	X		<ul style="list-style-type: none"> <li>Required to communicate with co-workers when operating mobile and service equipment.</li> </ul>
Overtime	X		<ul style="list-style-type: none"> <li>Voluntary overtime hours may be needed, depending on production requirements.</li> </ul>
Shift Work	X		<ul style="list-style-type: none"> <li>12-hour rotating shifts required.</li> </ul>
Working Alone	X		<ul style="list-style-type: none"> <li>Works independent within a group of individuals. Check-in policy mandatory.</li> </ul>
Working with Others	X		

\*Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.

Section 7: Behavioural/Cognitive Demands

BEHAVIOURAL/COGNITIVE DEMANDS	CDA <sup>e</sup> RANKING SCALE				COMMENTS*
	1	2	3	4	
Degree of Self-Supervision Required				X	<ul style="list-style-type: none"> <li>Minimal supervision is required.</li> <li>Worker is responsible to initiate communication with others, as needed, in order to work safely and maintain awareness of production expectations.</li> </ul>
Degree of Supervision Exercised		X			<ul style="list-style-type: none"> <li>Worker is responsible for safety of self and other and may communicate safety issues to others.</li> </ul>
Deadline Pressures (Time Pressure)			X		<ul style="list-style-type: none"> <li>Worker is expected to work in an efficient manner.</li> <li>All processes are coordinated. Therefore work must be performed at a consistent pace to ensure efficiency while working safely.</li> <li>Time pressure may increase if having to respond to an emergency situation.</li> </ul>
Attention to Detail			X		<ul style="list-style-type: none"> <li>Worker must be aware of surroundings and communicate specific details to others as appropriate (may include details regarding weather conditions, specific sounds from equipment, etc., which will allow the worker to determine safety and efficient operation of equipment).</li> </ul>
Performance of Multiple Tasks Required				X	<ul style="list-style-type: none"> <li>Worker is required to operate a single piece of equipment at a time. However, he/she is required to perform multiple tasks at the same time in order to safely operate the assigned equipment.</li> </ul>
Exposure to Distracting Stimuli				X	<ul style="list-style-type: none"> <li>The worker is exposed to various stimuli, such as visual signals when operating equipment. The worker must be able to decipher relevant information transmitted over the two-way radio.</li> <li>May also encounter environmental stimuli such as weather conditions, distractions, etc.</li> </ul>
Need to Work Co-operatively with Others				X	<ul style="list-style-type: none"> <li>Co-operation with others is essential.</li> </ul>
Exposure to Emotional Situations	X				
Exposure to Confrontational Situations	X				
Responsibility and Accountability Required				X	<ul style="list-style-type: none"> <li>Each worker is responsible and accountable for their own safety and for the safety of others. Verbal communication plays an essential role in ensuring that a safe and efficient work environment is maintained.</li> <li>Worker may also convey messages via hand signals (such as lifting signals, crane signals, confirm signals, ensure visual contact).</li> <li>Must complete reports as required.</li> <li>Required to maintain contact with “Pit Control”.</li> </ul>

Continued...

BEHAVIOURAL/COGNITIVE DEMANDS	CDA <sup>£</sup> RANKING SCALE				COMMENTS*
	1	2	3	4	
Reading Literacy	X				
Written Literacy		X			<ul style="list-style-type: none"> <li>• Must complete reports as required (log book entries).</li> </ul>
Numerical Skills		X			<ul style="list-style-type: none"> <li>• Basic numerical skills required for equipment operators.</li> <li>• More complex math skills required for conducting blasts.</li> </ul>
Verbal Communication				X	<ul style="list-style-type: none"> <li>• Majority of communication is completed via two-way radio.</li> </ul>
Memory				X	<ul style="list-style-type: none"> <li>• The worker is required to memorize many details and sequences.</li> <li>• Must be able to prioritize tasks.</li> </ul>
Computer Literacy		X			<ul style="list-style-type: none"> <li>• Must be able to understand GPS, depletion and on-board computer systems.</li> </ul>
Shift Work Demands				X	<ul style="list-style-type: none"> <li>• Rotating shift schedule may be required, depending on company policies. 8-12 hour rotating shifts required. May depend on mine site.</li> </ul>

£ The Cognitive Demands Assessment (CDA) definitions and scale are outlined in [Appendix 3](#).

\* Tasks outlined in the Comments section of this report are examples only and are not inclusive of all Surface Mining tasks.



# Minerals Processing Operator Appendix

### Appendix: 1: Strength Definitions

The following information was obtained from the National Occupational Classification (N.O.C.) 2006 Career Handbook.

#### Strength

The use of strength in the handling of loads such as pulling, pushing, lifting and/or moving objects during the work performed.

RATING	N.O.C. STRENGTH CATEGORY	N.O.C. DEFINITION
1	Limited	<p><b>Work activities involve handling loads up to 5 kg.</b></p> <p>Examples:</p> <ul style="list-style-type: none"> <li>Examining and analyzing financial information</li> <li>Selling insurance to clients</li> <li>Conducting economic and technical feasibility studies</li> <li>Administering and marking written tests</li> </ul>
2	Light	<p><b>Work activities involve handling loads of 5 kg but less than 10 kg.</b></p> <p>Examples:</p> <ul style="list-style-type: none"> <li>Repairing soles, heels and other parts of footwear</li> <li>Filing materials in drawers, cabinets and storage boxes</li> <li>Preparing and cooking meals</li> <li>Repairing paintings and artifacts</li> </ul>
3	Medium	<p><b>Work activities involve handling loads between 10 kg and 20 kg.</b></p> <p>Examples:</p> <ul style="list-style-type: none"> <li>Setting up and operating finishing machines or finishing furniture by hand</li> <li>Measuring, cutting and applying wallpaper to walls</li> <li>Adjusting, replacing or repairing mechanical or electrical components using hand tools and equipment</li> <li>Operating film cameras to record live events</li> </ul>
4	Heavy	<p><b>Work activities involve handling loads more than 20 kg.</b></p> <p>Examples:</p> <ul style="list-style-type: none"> <li>Operating and maintaining deck equipment and performing other deck duties aboard ships</li> <li>Shoveling cement into cement mixers and assisting in the maintenance and repair of roads</li> <li>Measuring, cutting and fitting drywall sheets for installation on walls and ceilings</li> <li>Operating power saws to thin and space trees in reforestation area</li> </ul>

### Appendix: 2: Frequency Definitions

The following information was obtained from the United States Department of Labour Standards (1993).

#### Frequency

FREQUENCY RATING	PERCENT OF WORKDAY	HOURS (BASED ON AN 8-HOUR SHIFT)
Occasional	0-33%	0 – 2 hours and 40 minutes
Frequent	34-66%	2 hours and 41 minutes – 5 hours and 20 minutes
Constant	67-100%	5 hours and 20 minutes – 8 hours

Appendix: 3: Behavioural Cognitive Demands Assessment Key

CDA CATEGORY and DEFINITION	CDA RANKING SCALE
<p><b>Degree of Self-Supervision Required:</b> The extent of self-supervision required in the course of duties. Where this demand is rated high and the demand for performance of Multiple Tasks Required and/or Accountability and Responsibility is also high, the worker may be expected to exercise good problem solving and judgement.</p>	<ol style="list-style-type: none"> <li>1. No self supervision required (fully supervised)</li> <li>2. Occasional self-supervision is required (supervisor frequently provides work directions or guidance.)</li> <li>3. Frequent self-supervision required (supervisor occasionally provides work directions or guidance)</li> <li>4. Predominately self-supervised throughout the shift (may contact supervisor to obtain work direction as needed.</li> </ol>
<p><b>Degree of Supervision Exercised:</b> The extent of work directions and/or supervision provided to other workers.</p>	<ol style="list-style-type: none"> <li>1. No supervisory responsibility</li> <li>2. Provides work directions only with no other supervisory duties.</li> <li>3. Provides work directions and some elements of managing work performance with the exclusion of disciplinary action</li> <li>4. Has full supervisory responsibility for other employees.</li> </ol>
<p><b>Deadline Pressures (time pressure):</b> The extent to which work tasks are expected to be completed within a given time period or the extent to which as fast paced work tempo is required because of the nature of work or work volume. Low rating implies low demand to complete tasks according to a timeline whereas a high rating implies that many of the work tasks must be completed under time pressure.</p>	<ol style="list-style-type: none"> <li>1. Worker is not exposed to time pressures because the work is self-paced, without rigid time constraints.</li> <li>2. Time pressure is low: there is occasional pressure to meet deadlines or work within time constraints, the volume of work and the work pace are moderate.</li> <li>3. Time pressure is moderate: there is frequent pressure to meet deadlines or work within time constraints and/or the volume of work is high and the work tempo is moderately fast.</li> <li>4. Time pressure is high: the majority of work is performed under rigid time constraints and the volume of work is high (assumes that the work tempo is high or the worker must extend the workday to manage the volume of work)</li> </ol>
<p><b>Attention to Detail:</b> The extent to which work tasks require attention to or concentration on details of information. A high demand implies that insufficient attention to detail will result in work errors and/or inefficiencies. The rating does not reflect the extent of attention/concentration required due to external environmental stimuli.</p>	<ol style="list-style-type: none"> <li>1. Attention to or concentration on details is not required</li> <li>2. Attention to detail or concentration is required for some tasks, although not at an intensive level</li> <li>3. Significant attention to detail or concentration required for many tasks or intense attention to detail or concentration required for some tasks.</li> <li>4. Intense attention to detail or concentration is required for the majority of the shift.</li> </ol>

Continued...

CDA CATEGORY and DEFINITION	CDA RANKING SCALE
<p><b>Performance of Multiple Tasks Required:</b> The responsibility for performing and monitoring more than one task or function at a time and for judging when tasks or functions require attention. It requires the ability to prioritize tasks and manage time effectively (juggle various tasks efficiently). It does not reflect the performance of sub tasks concurrently within one task assignment or activity.</p>	<ol style="list-style-type: none"> <li>1. Not responsible for concurrent multiple tasks. Responsible for performing one task at a time until completion or further directions from supervisor.</li> <li>2. Some responsibility for multiple tasks, but with very clear guidelines or cues about when to perform each task.</li> <li>3. Responsible for multiple tasks, with some time management skill and judgement required to determine priorities.</li> <li>4. Constantly responsible for multiple concurrent tasks and/or functions and must exercise a high degree of judgement to determine when to attend each task.</li> </ol>
<p><b>Exposure to Distracting Stimuli:</b> Exposure to visual, auditory or other sensory stimuli in proximity of the worker such that it could be distracting during the performance of work duties. Auditory stimuli many include verbal conversations of colleagues in an open office area, phones ringing, alarms, pagers, motors and noises that are loud, sudden or unpredictable in occurrence. Visual stimuli may include movement of people, vehicles, objects, and noticeable changes in illumination.</p>	<ol style="list-style-type: none"> <li>1. Little or no distracting visual, auditory, or other visual stimuli.</li> <li>2. Minor degree of distracting stimuli present during some tasks or portions of the shift.</li> <li>3. Moderate degree of distracting stimuli during some tasks or portions of the shift.</li> <li>4. High degree of distracting stimuli are present for the majority of the shift or for any portion of the shift where it is essential to work effectively despite distracting stimuli (i.e. very noisy, busy environment with multiple stimuli)</li> </ol>
<p><b>Need to Work Co-operatively with Others:</b> The degree to which a worker must work co-operatively with others. This may include team projects, shared job duties, management interaction with staff, etc. This rating considers the extent to which one must have good communication skills, good teamwork and interpersonal skills, be open minded, diplomatic or have good negotiation skills.</p>	<ol style="list-style-type: none"> <li>1. Not required to work co-operatively with others, other than to receive directions from supervisors.</li> <li>2. Infrequently required to work co-operatively with others, although may be in proximity to others.</li> <li>3. Required to work in co-operation with others for some tasks.</li> <li>4. The majority of work requires close co-operation with others.</li> </ol>
<p><b>Exposure to Emotional Situations:</b> Where the worker may face emotional or stressful circumstances (i.e. an ambulance attendant with a dying patient or attending a traumatic accident), or exposure to situation where a client of the public may be emotionally distressed and the worker is required to interact with the individual in order to complete a job requirement. Exposure to emotionally distressed clients may be in person or over the telephone.</p>	<ol style="list-style-type: none"> <li>1. No exposure to emotionally or stressful circumstances or emotionally distressed individuals in the normal course of duties.</li> <li>2. Infrequent exposure (approx. monthly) to emotionally distressed individuals with whom the worker must interact in order to complete the job requirements.</li> <li>3. Occasional exposure (approx. weekly) to emotionally stressful circumstances or emotionally distressed individuals with whom the worker must interact in order to complete the job requirements.</li> <li>4. Frequent exposure (approx. daily) to emotionally stressful circumstances or emotionally distressed individuals with whom the worker must interact in order to complete job requirements.</li> </ol>

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CDA CATEGORY and DEFINITION	CDA RANKING SCALE
<p><b>Exposure to Confrontational Situations:</b> Exposure to situations where, in the course of their duties, workers may be directly confronted by an individual or may encounter confrontational situations requiring any action on their part. The confrontation may be in person or over the telephone. The client or public may be verbally aggressive or abusive, insistent, hostile, loud, threatening, disruptive, or may refuse to follow instruction. It would be beneficial in the “comments” box to indicate whether there are any security or safety measures in place.</p>	<ol style="list-style-type: none"> <li>1. No Exposure to Confrontational Situations in the course of duties.</li> <li>2. Occasional exposure (up to weekly) to confrontational situations in which assistance is immediately available.</li> <li>3. Occasional Exposure to Confrontational Situations (up to weekly) where assistance is not immediately available.</li> <li>4. Frequent exposure (up to daily) to confrontational situations or hostile people whether or not assistance is available.</li> </ol>
<p><b>Responsibility and Accountability Required:</b> The extent of liability or safety risk that could result if the employee does not exercise appropriate judgement or attention during the performance of job tasks. A high rating indicates that the job is a safety-sensitive position with the potential for grave consequences if errors or inattention occur.</p>	<ol style="list-style-type: none"> <li>1. Errors in judgement or attention would have insignificant consequences.</li> <li>2. Errors in judgement or attention would create inconvenience.</li> <li>3. Errors in judgement or attention could create difficulty of significant expense.</li> <li>4. Errors in judgement or attention could have grave or life-threatening consequences.</li> </ol>
<p><b>Reading Literacy:</b> The ability to comprehend English text.</p>	<ol style="list-style-type: none"> <li>1. No reading required in the course of duties.</li> <li>2. Minimal reading ability is required in order to recognize single words, short phrases, or names.</li> <li>3. Moderate reading ability is required. E.g. to follow written instructions.</li> <li>4. A high degree of reading literacy is required to read reports, manuals, or other documents with a high degree of comprehension.</li> </ol>
<p><b>Written Literacy:</b> The requirement to create English text. It is independent of the physical ability to produce text in a specific format. E.g. handwriting, typing or keyboarding.</p>	<ol style="list-style-type: none"> <li>1. No composing English text is required in the course of duties.</li> <li>2. Required to compose text in which accurate grammatical construction and spelling are not essential, e.g. messages, forms, lists etc.</li> <li>3. Required to create memos or letters with accurate spelling, grammatical form and/or careful wording.</li> </ol>
<p><b>Numerical Skills:</b> The requirement to process and analyze numerical information even if the calculation is performed electronically. Higher ratings reflect the need for abstract mathematical thinking.</p>	<ol style="list-style-type: none"> <li>1. No number manipulation required other than counting.</li> <li>2. Required to carry out basic arithmetic operations such as addition and subtraction.</li> <li>3. Required to use more complex arithmetic operations such as division, manipulation, percentages, and ratios.</li> <li>4. Required to use abstract mathematical formulae or carry out complex mathematical operations, e.g. accounting.</li> </ol>

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CDA CATEGORY and DEFINITION	CDA RANKING SCALE
<p><b>Verbal Communication:</b> The extent to which a job requires the ability to clearly comprehend and express ideas and information in spoken English. Higher ratings reflect the complexity of the content or the extent to which good communication skills are required.</p>	<ol style="list-style-type: none"> <li>1. Little or no requirement for communication skills: receives and relays concrete information only.</li> <li>2. Basic communication skills are required to comprehend and communicate information at a basic level within well-defined parameters e.g. communicate status of job or job task with supervisor.</li> <li>3. Moderate communication skills are required to comprehend and communicate information fluently e.g. to work crews.</li> <li>4. Highly developed communication skills are required to comprehend and communicate effectively in complex situations. E.g. explaining the design of a complex system, exchanging information with physicians regarding public health issues, policy discussions, and conflict resolution.</li> </ol>
<p><b>Memory:</b> The extent to which a job requires the ability to retrieve and recall information on demand that has been previously learned. Level of difficulty is dependent on the complexity and amount of the information, the context in which it must be recalled and how frequently the information is used.</p>	<ol style="list-style-type: none"> <li>1. Little or no need to remember information and apply to work tasks e.g. clear processes/instructions are available for carrying out job tasks.</li> <li>2. Basic memory ability is required to recall information that is applied to work tasks on a regular basis without rigid timelines.</li> <li>3. Moderate memory ability is required to recall many different pieces of detailed information and/or sequences which may have to be recalled infrequently, or because there are time constraints within which to recall information.</li> <li>4. High memory ability is required to recall many different pieces of detailed information and/or sequences which may have to be recalled in demanding situations e.g. due to deadline pressures or being sent out of context.</li> </ol>
<p><b>Computer Literacy:</b> The extent to which a job requires the ability to use computer technology.</p>	<ol style="list-style-type: none"> <li>1. Not required to use computers in the course of duties.</li> <li>2. Required to use computers for basic data input e.g. using a hand scanner, using basic email for communication only.</li> <li>3. Required to use one or more computer programs at a competent level. E.g. MS Word.</li> <li>4. Extensive computer knowledge and problem solving ability required. E.g. IT Support, programmers, key users.</li> </ol>
<p><b>Shift Work:</b> The extent to which the shift schedule places additional cognitive and physical demands on the worker.</p>	<ol style="list-style-type: none"> <li>1. Shift work is not required.</li> <li>2. Shift rotation (two-week rotation, rotated backwards, or exceeds 3 days).</li> <li>3. Weekly shift rotation is inconsistent and is based on production demand.</li> <li>4. Shift rotation and shift starts just prior to sunrise.</li> </ol>



260 Hearst Way, Suite 401

Ottawa, ON

K2L 3H1

Tel: 613-270-9696

Fax: 613-270-9399

Email: [info@mihrc.ca](mailto:info@mihrc.ca)

Website: [www.mihrc.ca](http://www.mihrc.ca)