

Introduction to Underground Mining
University of Alaska Mining and Petroleum Training Service and
Centre for Northern Innovation in Mining
January 2020



PROGRAM OUTLINE

INTRODUCTION TO UNDERGROUND MINING

PREPARED BY: _____

DATE: _____

APPROVED BY: _____

Shelagh Rowles, Dean

DATE: _____

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INTRODUCTION TO UNDERGROUND MINING

PROGRAM DESCRIPTION:

This program offers students an opportunity to prepare for entry-level employment as underground miners through a combination of theory and practical experience. Students will obtain basic safety training at Yukon College's Ayamdigut Campus in Whitehorse and participate in two fourteen day ten-hour per day training shifts in Delta Junction, Alaska.

DURATION:

The Introduction to Underground Mining program is 306-hours of primarily hands-on training. Students first spend approximately 48 hours in Whitehorse-based classes that discuss introductory mine-related information, health and safety certifications and coaching services. Students then participate in 2, two-week hands-on components (258 hours) in Delta Junction, Alaska at a world-class training and research facility.

Program: January 20th, 2020 – March 16th, 2020

ADMISSION REQUIREMENTS:

- Standard First Aid -CPR-C
- Good physical condition
- Ability to lift up to 50 lbs
- Good vision and hearing
- Alcohol and drug free for the duration of the program
- Ability to take direction

LEARNING OUTCOMES & OBJECTIVES:

At the end of this program, students will have:

- Mastered the fundamentals of the Core Competencies required for an entry-level miner.
- Know the basic safety procedures in an underground setting and know the reasons these procedures are required.

COURSE WORK OUTLINE:

(Individual course titles are under review and may change)

PROGRAM FACULTY:

Ginny Coyne, Centre for Northern Innovation in Mining, Yukon College
 Wayne Schmidt, Centre for Northern Innovation in Mining, Yukon College
 Bill Bieber, Executive Director University of Alaska MAPTS Trainer and Paramedic
 Peter Alexie Jr., Simulator Instructor
 Jim Smith, Underground Mine Training Instructor
 Daren Case, Surface and Underground Safety and Hard Skills Trainer

SYLLABUS:**Part One: Introduction to Underground Mining (Yukon College)****Hours: 48**

This first part of the program includes an overview of the mining life cycle, ore bodies, development and production mining. The curriculum is based on the Saskatchewan Institute of Applied Science and Technology training modules and includes Yukon specific examples where applicable. The part of the program also includes:

- An overview of Occupational Health and Safety statutes, regulations and work practices presented by Yukon Workers' Compensation Health and Safety Board (YWCHSB).
- Transportation of Dangerous Goods (TDG) Confined Spaces, Fall Protection, Rigging & Hoisting /Crane Operator and WHMIS (Workplace Hazardous Materials Information System) certifications.
- Life and career planning.

Part Two: Underground New Miner Camp Syllabus (Mining and Petroleum Training Service (MAPTS) Delta Junction, Alaska)**Hours: 258**

Module Overview

Module	Objectives	Evaluation	Hands-on (hrs)	Classroom Hrs
1: Orientation to UG New Miner Camp at DMTC	Overview of four week program	Discussion Evaluation	Ongoing	3
2: Soft-skills	Develop/strengthen working behaviors & personal management skills	Discussion, Evaluation, Desktop exercises	Ongoing	2
3: Regulatory Compliance Review	Review of students' comprehension of compliance requirements	Discussion Evaluation	Ongoing	2
4: Introduction to the	Knowledge of UG areas	Discussion	3	2

DMTC Work Environment	of DMTC and functions	Evaluation Exam		
5: Housekeeping	Maintenance of workplace in a safe and efficient manner	Field evaluation	Ongoing	1
6: Rigging	Knowledge of safe rigging in underground environment	Field evaluation	2	1
7: Mine Utilities	Knowledge of UG mine systems and maintenance	Field evaluation	10	2
8: Ground Control	Inspection of ground, hazard recognition, ground control methods	Field evaluation	19	3
9: Mine Maps & Ventilation	Orientation to UG environment with mine maps	Field evaluation	2	2
10: Work Practices	Practicum of common tasks assigned to UG laborers	Field evaluation	20	0
11: Simulator Training: Haul Truck & LHD/Scoop-tram	Practicum of Simulated UG Haul Truck	Discussion Observation Skills Evaluation	60	0
12: HEO Classroom Theory	Knowledge of UG HEO equipment; Safe work practices around and with UG mine machinery and Surface Operations at an UG Mine	Field evaluation	18	6
13: Heavy Equipment Operations (Walk around)	Knowledge of HEO responsibilities and Equipment Introduction	Field Evaluation; Skills Exam	34	6
14: HEO Equipment Training (Driving Skills)	Heavy Equipment Operator Training in an UG environment and a surface area of an UG mine	Skills Evaluation; Written and Practical Exams	64	0
15: Hard-skills Exam	Desktop Evaluations & Exams for Hard-skills Knowledge	Exam Results	6	2
16: Practical Exam	Hands-On Evaluations & Exams	Exam Results	20	0

MAPTS Underground New Miner Camp Syllabus

Module 1 – Orientation to MAPTS Underground New Miner Camp at DMTC

Segment	Subjects	Objectives
I	Camp Rules	Emergency procedures; HAZCOM
		Substance & alcohol policies
		Personal emergencies
II	Classroom & Participation Rules	Expectations of students Participation
		Class times
		Fatigue
III	Camp Orientation & Tour	Camp orientation
		Camp operations Camp infrastructure: gen-set ops, water system, garbage disposal, switchgear
		PPE issued
		Meal times
		Assignment of sleeping quarters
IV	Soft Skills Explanation	Yukon staff
		MAPTS staff
V	UG Training Explanation	Underground mine environment and hands-on training
VI	Simulator Training Explanation	

		Instructor training module & evaluation
VII	HEO Training Explanation	

Module 2 - Soft Skills

Segment	Subjects	Objectives
I	Personal Management Skills	
II	Organizing and Managing your Life: Self/Home/Work	
		Manage personal life while away from home or in a camp-life setting
		Managing life interruptions to balance Employer needs
		Effective time management and scheduling skills
		Working closely with stay-at-home spouse
III	Decision Making	
		Making sound personal decisions
		Making sound professional decisions
IV	Goal Setting	
		SIAST: Module K Job Readiness Looking for a job Starting a job Changing Jobs First Aid and CPR
		Personal growth
		Professional job progression & Employer's expectation
		Money management
V	Understanding and appreciating cultural differences	
		Working with multi-cultures
		Understanding how cultural differences can be misunderstood – conflict resolution
VI	Working Behaviours	

		Fit for duty
		Working independently
		Working with others
		Conflict resolution in the workplace
		Deadline pressures
		Responsibility and accountability
		Reading literacy requirements
		Writing literacy requirements
		Attention to detail
		Performance of multiple tasks
		Exposure to distracting stimuli
		Perception skills
		Numerical skills requirement
		Verbal communication
		Memory requirements
		Shift-work demands
VII	Essential work-related tasks of the UG and Surface Miner	
		Effective communications
		Active listening
		Completion of reports

Module 3 – Regulatory & Compliance Review

Segment	Subjects	Objectives
I	Regulations: Federal, State (Province); Local MSHA vs Yukon OH&S Regulations	Review SIAST module 3B regulations
II	Company policies, standards, procedures, rules, government, legislation & standards environmental	Review
III	Miner’s Rep’s Collective Bargaining Agreements	Review

Module 4 - Intro to the Work Environment (Representative Mine & DMTC)

Segment	Subjects	Objectives
I	UG Mining Terminology & Other Need to Know	
		SIAST: Module J Glossary of Terms
II	Identify Surface Areas of UG Mine	
		<p>Staff:</p> <p>Management and supervisory staff Safety, Health and Environmental Staff</p> <p>Contractors and consultants Production operations dispatcher Equipment Operators Maintenance Staff Mobile Equipment General Facilities, Vendors, visitors, etc.</p> <p>Physical Plants: Security, admin office, medic, H&S office, hoist room, warehouse, MSDS location, permit station, control room, check-in/out system (brass board)</p> <p>Roads</p>
		Crusher bins or stockpiles dump points Mill
III	Identify UG Areas of the Mine	
		<p>Working Areas of the Mine:</p> <ul style="list-style-type: none"> • Active • Water • Restricted
		Travel routes, ramp layouts, traffic controls, escape ways, shaft stations, substations, refuge stations, battery charging stations, ore/waste pass systems, terminology
IV	Surface/UG Mine Emergencies	
		Fires. firefighting and firefighting equipment, appropriate response
		Emergency and fire procedures in place

		at the mine Location of refuge stations, routes and markings
V	Communications Systems in Place at the Mine	
		Pagers, multi- channel radios, cage call systems, telephones, email, bulletin boards, alarms, safety signage, checking-out systems (brass board)
VI	Intro to Mine Safety	
	Workplace Hazards Identification	
		Recognition of hazards
		HazCom/WHIMIS (see Module 5/II)
		Physical hazards
		JSA
		Ground conditions; faulty ground support; washing down deformed plates, cracked cement, rock-filled or broken screens, spalling, snapping or shredded bolts
		Open holes above/below; faulty ground support; washing down
		Rock noises
		UG hydrology
		Isolation of area and reporting deficiencies
	Explosives	Alarms, signals
		Emergencies
	PPE	
		Respiratory protection
		Types
		Selection, use
		Care and maintenance
	Perform General Inspections	
		PPE (see Module 4/VI/ PPE)
		Fire safety & extinguisher training (see Module 4/IV)
		Ventilation (see module 9)
		Hand and power tools
		LOTO/ tagging equipment; reporting
		Housekeeping (see Module 5)
		Mobile equipment
		Workplace examinations
		Rigging (see Module 6/F)

		Ladder and scaffold safety
VII	Task Training	
VIII	Examination of Work Area	
IX	Facility Specific	
		Camp rules; emergency procedures; Muster point
		Camp policies

Module 5 – Housekeeping

Segment	Subjects	Objectives
I	General Housekeeping	
		Cleanup of spills and leaks
		Obstruction-free workplace; storing of tools and equipment
		Accident avoidance
		Stockpiling supplies; inventory for work projects
II	HAZCOM/WHIMIS	Review of labels, MSDS, secondary storage, signage (see module 4/VI/B)
	Muck Handling	SIAST: Module 5/H Moving muck UG.doc Scooptram ops.doc Ore truck operation.doc Slushing.doc Mucking machines.doc conveyors.doc
		Obstruction-free workplace; storing of tools and equipment
	Drilling	
		Housekeeping methods

Module 6 - Rigging

Segment	Subjects	Objectives
I	Rigging and Staging	SIAST: Module 6/F Rigging Accessories.doc Slings.doc Lifting devices.doc Hanging pipe.doc Fixed and mobile stagings.doc
		Terminology
		Hardware
		Basic rigging techniques
		Inspection techniques, Safe lifting

Module 7 – Mine Utilities

Segment	Subjects	Objectives
		All hands on skills

Module 8 – Ground Control

Segment	Subjects	Objectives		
I	Rock Mechanics	Ground conditions		
		Rock identification		
		ID bad ground		
		Faults, fractures, seams		
		Common ore, grades, waste		
II	Inspection Techniques			
	Scaling			
	Barricade			
III	Scale Loose Rock	Plan and organize worksite by visual inspection; sizing up for materials needed; selecting and delivering materials to staging area		
		Select bar for specific job based on length, metal type, size and condition		
		Identify and respond to abnormal ground conditions		
		Wash down face; select, repair, fasten connecting hoses, select water flow		
		Visual & Sounding techniques and inspections		
		Sounding and scaling with scaling bar		
		Isolating area		
		IV	Drill Rock	Identification of ground
				Inspect/prepare for scaling (see 8/III)
				Bleeding air/water lines
Prepare face for drilling; set up drills; pre-op on drills				
Drilling patterns				
Manual drilling (briefly; drill/shoot safety bay)				
Maintaining and operating drills				
V	Rock Bolting	Tearing down, storing, moving drills		
		Rockbolts & screening; I-bolts for utilities		
		Drilling patterns		

Module 9 - Mine Maps & Ventilation

Segment	Subjects	Objectives
I	Read and Interpret Mine Plans/ Prints	
		Able to review and comprehend all symbols, abbreviations, and color coding on any mine plans/or prints
		Able to understand the different ground classifications, according to company policies
		Able to communicate any questions or concerns to the appropriate personnel, for clarification
II	Ventilation	
		Mine ventilation systems
		Inspect air flow
		Identify location of doors, barricades, markings and instructions on doors
		Repairs and reporting deficiencies according to government and company requirements

Module 10 – Work Practices

Segment	Subjects	Objectives
I	Conveying Messages with Hand, Cap Light and Audible Signs	
		Company procedures and/or government regulations for signaling
		Using cap light signals when communicating with any heavy equipment operators
II	Use and Respond to Communication Devices	Recognize bells, whistles, horns, according to company policies, and/or government regulations
		Workers must be able to listen and converse using telephones and/or two-way radios
		Workers must be able to identify and read signs, such as symbols, color coding, as well as recognize traffic signs, as needed

Module 11 – Simulator Training

Segment	Subjects	Objectives
<i>Note: This module is under conversion by MAPTS Instructors</i>		
		LHD/ scooptram operations

Module 12 – Heavy Equipment Classroom Theory

Segment	Subjects	Objectives
I	Underground Mine Cycle	
		Grading, hauling, stocking ore to proper area
II	Haul Truck Operator Responsibilities	
	PPE	Review
	Traffic Rules	
	HEO Tasks	
	Heavy Equipment Parking/ Shutdown	
	Accident/ Near Miss reporting	
	Mine Site Hazards	
	Equipment Tag-out	
	Equipment Fires	
	Blasting Procedures and Alarms	
	Safe Operation of Machine	3 points of contact; maintaining control
	Brake Test	
	Pre-load Procedures	
	Haul Truck Box Operations	
	Dump Procedures	
	Waste or Stockpiles	
III	Hauling to the Surface	
		Dump points and dump point safety
IV	Housekeeping	(See module 5)
V	Emergency Evacuation & Emergency Procedures	(See module 4/IV)

Module 13 - HEO Haul Truck Operations (Walk-arounds/Familiarization)

Segment	Subjects	Objectives
I	Walk-around Inspections, Familiarization with Haul Truck	
		Terminology
		Visual & hands-on familiarization of haul truck and systems for inspection purposes
II	Cab and Controls	
		Familiarization with cab and controls
		Safety Equipment
III	Communication	
		Radio
		Hand signals
		Lock-out tag-out reporting
IV	Mine-Site Forms	
		Equipment walk-around checklist, load count sheet, safety card, time sheet
		Company specific
V	Pre-Operational Procedures	
		Company specific
		MAPTS curriculum

Module 14 – Heavy Equipment Operator Driver Training (Hands-On Driving/Operating Skills)

Segment	Subjects	Objectives
<i>This is all hands on training</i>		
I	Haul Truck & LHD Scooptram	The student will demonstrate how to safely operate an underground haul truck and LHD Scooptram. This will include discussing safety requirements, pre-start checks, inspections, walk-around procedures and performance monitoring; performing maintenance, troubleshooting, repairs and basic operator functions; and hauling and dumping materials.
II	Jumbo Drill Bolter	
III	Working Around Utility vehicles	
IV	Driving Skills	
	Walk-around Inspection	

	3-point Contact	
	Start-up Procedures	
	Systems Tests	
	Operating Procedures	
	Shutdown Procedures	
V	Mine Site Forms	
Hard skills Exam	Curriculum	

Module 15 – Hard skills Evaluation & Examination

Segment	Subjects	Objectives
I	Exams and Evaluations	

Module 16 - Practical Exams (Hands-On Evaluations)

Segment	Subjects	Objectives
I	Exams and results	