National Occupational Analyses

Heavy Equipment Operator (Tractor-Loader-Backhoe)

2015

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FOREWORD

The Canadian Council of Directors of Apprenticeship (CCDA) recognizes this National Occupational Analysis (NOA) as the national standard for the occupation of Heavy Equipment Operator (Tractor-Loader-Backhoe).

Background

The first National Conference on Apprenticeship in Trades and Industries, held in Ottawa in 1952, recommended that the federal government be requested to cooperate with provincial and territorial apprenticeship committees and officials in preparing analyses of a number of skilled occupations. To this end, Employment and Social Development (ESDC) sponsors a program, under the guidance of the CCDA, to develop a series of NOAs.

The NOAs have the following objectives:

- to describe and group the tasks performed by skilled workers;
- to identify which tasks are performed in every province and territory;
- to develop instruments for use in the preparation of Interprovincial Red Seal Examinations and curricula for training leading to the certification of skilled workers;
- to facilitate the mobility of apprentices and skilled workers in Canada; and,
- to supply employers, employees, associations, industries, training institutions and governments with analyses of occupations.

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This analysis was prepared by the Labour Market Integration Directorate of ESDC. The coordinating, facilitating and processing of this analysis were undertaken by employees of the NOA development team of the Trades and Apprenticeship Division. The host jurisdiction of British Columbia also participated in the development of this NOA.

Comments or questions about National Occupational Analyses may be forwarded to:

Trades and Apprenticeship Division
Labour Market Integration Directorate
Employment and Social Development Canada
140 Promenade du Portage, Phase IV, 5th Floor
Gatineau, Quebec K1A 0J9
Email: redseal-sceaurouge@hrsdc-rhdcc.gc.ca

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STRUCTURE OF ANALYSIS

To facilitate understanding of the occupation, the work performed by tradespersons is divided into the following categories:

Blocks	largest division within the analysis that is comprised of a distinct set of trade activities
Tasks	distinct actions that describe the activities within a block
Sub-Tasks	distinct actions that describe the activities within a task
Key Competencies	activities that a person should be able to do in order to be called 'competent' in the trade

The analysis also provides the following information:

Trends	changes identified that impact or will impact the trade including work practices, technological advances, and new materials and equipment
Related Components	list of components, items, materials and other elements relevant to the block
Tools and Equipment	categories of tools and equipment used to perform all tasks in the block; these tools and equipment are listed in Appendix A
Context	information to clarify the intent and meaning of tasks
Required Knowledge	elements of knowledge that an individual must acquire to adequately perform a task

The appendices located at the end of the analysis are described as follows:

Appendix A — Tools and Equipment	non-exhaustive list of tools and equipment used in this trade
Appendix B — Glossary	definitions or explanations of selected technical terms used in the analysis
Appendix C — Acronyms	list of acronyms used in the analysis with their full name
Appendix D — Block and Task Weighting	block and task percentages submitted by each jurisdiction, and the national averages of these percentages; these national averages determine the number of questions for each block and task in the Interprovincial exam
Appendix E — Pie Chart	graph which depicts the national percentages of exam questions assigned to blocks
Appendix F — Task Profile Chart	chart which outlines graphically the blocks, tasks and sub-tasks of this analysis

DEVELOPMENT AND VALIDATION OF ANALYSIS

Development of Analysis

A draft analysis is developed by a committee of industry experts in the field led by a team of facilitators from ESDC. This draft analysis breaks down all the tasks performed in the occupation and describes the knowledge and abilities required for a tradesperson to demonstrate competence in the trade.

Draft Review

The NOA development team then forwards a copy of the analysis and its translation to provincial and territorial authorities for a review of its content and structure. Their recommendations are assessed and incorporated into the analysis.

Validation and Weighting

The analysis is sent to all provinces and territories for validation and weighting. Participating jurisdictions consult with industry to validate and weight the document, examining the blocks, tasks and sub-tasks of the analysis as follows:

BLOCKS	Each jurisdiction assigns a percentage of questions to each block for an examination that would cover the entire trade.
TASKS	Each jurisdiction assigns a percentage of exam questions to each task within a block.
SUB-TASKS	Each jurisdiction indicates, with a YES or a NO, whether or not each sub-task is performed by skilled workers within the occupation in its jurisdiction.

The results of this exercise are submitted to the NOA development team who then analyzes the data and incorporates it into the document. The NOA provides the individual jurisdictional validation results as well as the national averages of all responses. The national averages for block and task weighting guide the Interprovincial Red Seal Examination plan for the trade.

This method for the validation of the NOA also identifies common core sub-tasks across Canada for the occupation. If at least 70% of the responding jurisdictions perform a sub-task, it shall be considered common core. Interprovincial Red Seal Examinations are based on the common core sub-tasks identified through this validation process.

Definitions for Validation and Weighting

YES	sub-task performed by qualified workers in the occupation in a specific jurisdiction
NO	sub-task not performed by qualified workers in the occupation in a specific jurisdiction
NV	analysis Not Validated by a province/territory
ND	trade Not Designated in a province/territory
NOT COMMON CORE (NCC)	sub-task, task or block performed by less than 70% of responding jurisdictions; these will not be tested by the Interprovincial Red Seal Examination for the trade
NATIONAL AVERAGE %	average percentage of questions assigned to each block and task in Interprovincial Red Seal Examination for the trade

Provincial/Territorial Abbreviations

NL	Newfoundland and Labrador
NS	Nova Scotia
PE	Prince Edward Island
NB	New Brunswick
QC	Quebec
ON	Ontario
MB	Manitoba
SK	Saskatchewan
AB	Alberta
BC	British Columbia
NT	Northwest Territories
YT	Yukon Territory
NU	Nunavut

ANALYSIS

Safe working procedures and conditions, accident prevention, and the preservation of health are of primary importance to industry in Canada. These responsibilities are shared and require the joint efforts of government, employers, employees and manufacturers. It is imperative that all parties become aware of circumstances that may lead to injury or harm. Safe learning experiences and work environments can be created by controlling the variables and behaviours that may contribute to accidents or injury.

It is generally recognized that safety-conscious attitudes and work practices contribute to a healthy, safe and accident-free work environment.

It is imperative to apply and be familiar with the Occupational Health and Safety (OH&S) Acts and Workplace Hazardous Materials Information System (WHMIS) Regulations as well as other applicable regulations and legislation that may be sector specific including, for example; mining, construction and industrial requirements. As well, it is essential to determine workplace hazards and take measures to protect oneself, co-workers, the public and the environment.

Safety education is an integral part of training in all jurisdictions. As safety is an imperative part of all trades, it is assumed and therefore it is not included as a qualifier of any activities. However, the technical safety tasks and sub-tasks specific to the trade are included in this analysis

SCOPE OF THE HEAVY EQUIPMENT OPERATOR (TRACTOR-LOADER-BACKHOE) TRADE

"Heavy Equipment Operator (Tractor-Loader-Backhoe)" is this trade's official Red Seal occupational title approved by the CCDA. This analysis covers tasks performed by heavy equipment operators whose occupational title has been identified by some provinces and territories of Canada under the following names:

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
Heavy Equipment Operator (Tractor-Loader-Backhoe)			✓	✓	✓					✓			

These heavy equipment operators operate tractor-loader-backhoes (TLB) used in the construction and maintenance of roads, bridges, airports and utilities, and the construction of gas and oil pipelines, tunnels, buildings and other structures. They also operate equipment in surface mining, quarrying, and land clearing activities.

Heavy equipment operators (TLB) are employed by construction companies, heavy equipment contractors, public works departments and pipeline, logging, mining, oil, cargo-handling and other industries.

Heavy equipment operators operate tractor-loader-backhoes to move and load earth, rock, gravel or other materials during construction and related activities, including clean-up operations. They also maintain winter roads and move, load and unload cargo. Heavy equipment operators (TLB) are also responsible for preparing their equipment for transportation, conducting pre-operational checks on their equipment before each shift/daily and post-operational checks at the end of each shift/daily for cleaning, oiling and refueling their equipment.

Noise from machinery and equipment hinders communication at the work site. Often hand signals and flags are the only practical forms of communication. Distance between workers, the need to wear ear protection and the presence of dust and blind spots blocking eye contact with other workers also make communication difficult.

Key attributes for people entering this trade are good eye-hand coordination, mechanical aptitude, alertness and safety consciousness. Heavy equipment operators (TLB) sit in vehicles for extended periods of time. Adjusting equipment or co-ordinating activities with other workers may require some walking, lifting and bending.

The computer is increasingly being used for precision control to optimize heavy equipment operator (TLB) efficiencies. The use of computerized equipment has raised the level of ability of heavy equipment operators to perform more precise work resulting in higher productivity and quality of project. This in turn requires a higher and more complete level of training.

Satellite monitoring and diagnosing of equipment has been introduced and is becoming more widespread. The use of Global Positioning System (GPS) and wireless technology has been introduced to improve equipment operation. The use of remote control equipment is increasing in the industry, which produces more precise control and efficiencies. More training is typical in the industry which improves operating techniques and increases safety, reduces downtime and improves efficiency. A wide variety of new attachments are being developed and introduced to help improve efficiencies.

New ergonomic controls are continually adapted and improved for ease of use and to reduce heavy equipment operator (TLB) fatigue and injury, which in turn improves production. New cab designs featuring more open and improved visibility in heavy equipment operator stations, increases heavy equipment operator awareness and safety. New technology that is being introduced with more efficient engines and transmissions such as hydrostatic drive transmissions and electric powertrains, results in smoother transitions and operations, which also reduces heavy equipment operator fatigue. Advancements in technology are allowing heavy equipment operators to work in all environmental conditions, such as extreme temperature conditions.

More emphasis through due diligence is being placed on safety. Changes to regulations and standards will have an impact on the duties and the way industry and heavy equipment operators (TLB) deal with situations that arise on site. With increased emphasis on eco-friendly practices, operators are required to practice environmental stewardship (i.e. spill clean-up, erosion and emissions control).

Essential skills are needed for work, learning and life. They provide the foundation for learning all other skills and enable people to evolve with their jobs and adapt to workplace change.

Through extensive research, the Government of Canada and other national and international agencies have identified and validated nine essential skills. These skills are used in nearly every occupation and throughout daily life in different ways.

A series of CCDA-endorsed tools have been developed to support apprentices in their training and to be better prepared for a career in the trades. The tools can be used independently or with the assistance of a tradesperson, trainer, employer, teacher or mentor to:

- understand how essential skills are used in the trades;
- learn about individual essential skills strengths and areas for improvement; and
- improve essential skills and increase success in an apprenticeship program.

The tools are available online or for order at: http://www.hrsdc.gc.ca/essentialskills.

The essential skills profile for the heavy equipment operator (TLB) trade indicates that the most important essential skills are **numeracy** and **thinking skills**, such as **problem solving**.

The application of these skills may be described throughout this document within the competency statements which support each subtask of the trade. The following are summaries of the requirements in each of the essential skills, taken from the essential skills profile. A link to the complete essential skills profile can be found at www.red-seal.ca.

Reading
Heavy equipment operators (TLB) use reading skills to refer to manuals on the operation and maintenance of machinery. They are required to read material safety data sheets (MSDS) when working with products such as cleaners, oils, fuels and other chemicals. Heavy equipment operators may read pamphlets explaining regulations and codes, bulletins from unions, employers or other regulatory bodies, and memos or work orders with information on the nature of the work to be performed.

Document Use
Heavy equipment operators (TLB) work on a daily basis with documents such as labels on hazardous materials, signs, lists, operator's manuals, inspection forms, hazard assessment forms, log books and time sheets. They may read or mark stakes with station numbers and slope ratios, mark off caution areas on maps and make sketches or drawings. They may also be required to consult surveyor charts and blueprints.

Writing
Heavy equipment operators (TLB) may record information about work performed, time it took, materials used and problems encountered. They make entries in daily equipment reports (logbooks) during pre- and post-operational inspections. They also keep an equipment maintenance log to note repairs made and service schedules. They may write accident and incident reports describing details.

Oral Communication
Heavy equipment operators (TLB) use oral communication skills to give directions to, and listen to co-workers, interact with fuel suppliers, truck drivers and mechanics, and participate in safety committees and discussions at the work site concerning how to do a particular job. They may discuss job assignments, equipment problems and material shortages with supervisors, contractors or union dispatchers.

Numeracy
A heavy equipment operator's skills in numeracy are used to calculate, for example, the number of loads required to remove the sand and the weight distribution of a load being lifted. They may also measure and calculate the slope and ratio of ditches. Heavy equipment operators (TLB) estimate distances between the machine and various obstacles, width of ramps for space on either side of a machine and how many truckloads of fill are required. They may also be required to convert between the imperial and metric systems of measurement.

Thinking Skills
Heavy equipment operators (TLB) use their problem solving skills to deal with machinery breakdowns, ground conditions and difficult manoeuvring situations where space to move machinery is tight or objects stand in the way of completing jobs.

Decision making skills are required for determining materials and equipment needed, appropriate and safe preventative maintenance cycles to be performed on equipment, and when to make suggestions to supervisors such as about changes to soil cover specified on blueprints.

Heavy equipment operators require job task planning skills to coordinate their work with their co-workers. They may also be required to determine task sequencing or prioritization of tasks considering factors such as terrain, schedules of truck drivers and other suppliers, and unexpected factors such as maintenance emergencies or changing weather conditions.

Heavy equipment operators use thinking skills to understand and assess soil types and how weather affects soil conditions.

Working with Others
Although heavy equipment operators (TLB) work alone while operating their machines, on construction sites they are members of a team. They work to co-ordinate job tasks with others and must be aware of where other crew members, machines and general public are at all times.

Computer Use
Heavy equipment operators (TLB) use computer-controlled equipment such as electronic scales, GPS and advanced operating systems.

Continuous Learning
Heavy equipment operators (TLB) are expected to take courses throughout their career to stay up to date with regulations, health and safety procedures and new technology. These may include courses such as in hazmat, confined spaces and fall protection. They may be required to obtain or renew certificates or licenses such as WHMIS certificates, cardiopulmonary resuscitation (CPR) certificates, ground disturbance certificates, and radio operator and driver's licences. Specific training may also be required to work in areas such as oil field, mining and forestry industries.

BLOCK A COMMON OCCUPATIONAL SKILLS

Trends Technology is becoming more complex and being included as part of new equipment. Heavy equipment operators (TLB) are required to become more versatile in their skills and in the kinds of equipment they operate.

Related Components All components apply.

Tools and Equipment See Appendix A.

Task 1 Uses and maintains tools and equipment.

Context This task involves the maintenance of hand tools, power tools, and measuring and testing equipment. It also includes the use of grade checking and tracking, rigging and lifting, and safety and personal protective equipment (PPE).

Required Knowledge

K 1	capacity and configuration of rigging materials and hardware
K 2	OH&S Acts, WHMIS, local and municipal legislation and regulations
K 3	company policies and procedures
K 4	types of tools and equipment required for specific tasks
K 5	communication including hand signals and radio communication
K 6	symbols used to identify potential hazards
K 7	manufacturers' specifications
K 8	emergency preparedness such as first aid and working near water

Sub-task

A-1.01 Maintains hand and power tools.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

A-1.01.01	clean hand tools to ensure optimum operation
A-1.01.02	lubricate tools according to manufacturers' specifications
A-1.01.03	store tools in designated areas such as tool boxes or cabinets
A-1.01.04	use tools for their intended purpose
A-1.01.05	inspect tools for defects and take remedial action such as repairing, replacing, tagging and disposing

Sub-task

A-1.02 Maintains measuring and testing equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

A-1.02.01	clean and dry measuring and testing equipment before storing according to manufacturers' specifications
A-1.02.02	store measuring and testing equipment in a safe location according to company policy
A-1.02.03	service measuring instruments according to manufacturers' specifications
A-1.02.04	verify calibration levels according to manufacturers' specifications
A-1.02.05	recharge laser levels and batteries at the end of each shift

Sub-task

A-1.03 Uses grade checking and tracking instruments.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

A-1.03.01	verify calibration of equipment such as electronic equipment and laser levels before use at the beginning of each shift and throughout the shift
A-1.03.02	verify that project data file being used corresponds to the project
A-1.03.03	troubleshoot instruments for failures
A-1.03.04	monitor and verify accuracy of the instruments
A-1.03.05	install mobile signal receiver onto equipment and remove after use
A-1.03.06	interpret measurement data on tracking instruments and make necessary adjustments or responses

Sub-task

A-1.04 Uses rigging and lifting equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

A-1.04.01	inspect lifting equipment for deficiencies or damage such as cuts, tears, wear and fraying before each use and according to manufacturers' specifications
A-1.04.02	maintain rigging and lifting equipment according to manufacturers' specifications
A-1.04.03	replace, tag or remove and dispose of rigging equipment as needed and according to manufacturers' specifications
A-1.04.04	determine weight of load to be lifted
A-1.04.05	refer to load chart specifications to determine lifting capacity of the equipment
A-1.04.06	select rigging materials and configuration suited to the hoisting task and check certification

A-1.04.07	check rigging arrangement to ensure secure lifting
A-1.04.08	use tag lines to guide loads
A-1.04.09	respond to directions given by signal person

Sub-task

A-1.05 Uses personal protective equipment (PPE) and safety equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

A-1.05.01	wear PPE such as hard hats, safety boots, eye protection, reflective clothing and hearing protection according to site and company policies and safety regulations
A-1.05.02	inspect and maintain PPE according to manufacturers' specifications
A-1.05.03	place or store PPE in a safe location when not in use to prevent damage
A-1.05.04	store safety equipment such as fall protection equipment and gas monitors according to manufacturers' specifications
A-1.05.05	use safety equipment such as fall protection equipment, fire extinguishers and first aid kits according to manufacturers' specifications and jurisdictional regulations

Task 2 Maintains safe work environment.

Context This task involves assessing potential hazards, planning worksite safety strategies, securing unattended equipment, performing spill and sediment control procedures, and handling materials.

Communicating with others is vital to maintaining a safe work environment.

Required Knowledge

K 1	good housekeeping practices
K 2	contact information for local utilities
K 3	OH&S Acts, WHMIS
K 4	colour codes for utility markings and locates
K 5	site and company policies and procedures

K 6	procedures to control spills of hazardous materials
K 7	environmental legislation and regulatory requirements
K 8	safe handling of hazardous materials
K 9	soil types and how they affect the approach to the job
K 10	capabilities and limitations of different types of equipment

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Sub-task

A-2.01 Assesses potential hazards.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

A-2.01.01	review site plan and visually inspect the work area on a continual basis to identify potential hazards such as ground conditions, overhead hazards, proximity to obstructions, pedestrian and vehicle traffic, and manholes
A-2.01.02	ensure locate sheet is provided and current
A-2.01.03	identify the location of utilities
A-2.01.04	identify and mark location of potential hazards such as manholes and water valves using tools such as cones, ribbons and stakes
A-2.01.05	assess ground and environmental conditions such as rapidly changing weather to determine adverse effects on work location
A-2.01.06	review demolition plan to become aware of hazards and surroundings
A-2.01.07	inspect structure to avoid injury to co-workers and general public, or to prevent damage to surrounding property

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Sub-task

A-2.02 Plans worksite safety strategies.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

A-2.02.01	provide input into the emergency response plan (ERP)
A-2.02.02	practice good housekeeping by ensuring work area is clear of hazards

A-2.02.03	provide input into the location of garbage receptacles, fuel storage and temporary buildings
A-2.02.04	provide input into the layout of worksite materials, such as bedding sand, pipes and excavated fill
A-2.02.05	assess soil, ground and weather conditions to plan daily activities accordingly
A-2.02.06	remove visual barriers and obstructions to ensure eye contact with others and intended path of travel is clear
A-2.02.07	identify hazards related to soil stability such as potential cave in, and report to supervisor
A-2.02.08	ensure underground utilities are verified and exposed according to government legislation and regulations

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Sub-task

A-2.03 Secures unattended equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

A-2.03.01	perform post-operational inspection including locking doors, turning off and locking the master switch, and cycling hydraulics
A-2.03.02	park on a level location wherever possible
A-2.03.03	lower implements and attachments to the ground, apply park brakes, apply wheel chocks, engage lockouts, lock windows and doors, remove key from the ignition, and place guards on windows of unattended equipment
A-2.03.04	affix lockout tags to equipment that has been removed from service
A-2.03.05	store equipment and attachments in a designated location such as a building, compound, and fenced or delineated areas

Sub-task

A-2.04 Communicates with others.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

A-2.04.01	participate in the documentation of potential hazards
A-2.04.02	use pre-determined language and hand signals according to site and jurisdictional regulations
A-2.04.03	use communication equipment such as cell or satellite phones, 2-way radios, and equipment horns for signalling
A-2.04.04	use equipment to provide instruction for indicating dump location to other heavy equipment operators
A-2.04.05	communicate with truck drivers for tasks such as unloading, loading and equipment placement
A-2.04.06	signal driver that truck is loaded and ready to go
A-2.04.07	mentor and provide instruction to apprentices or new personnel
A-2.04.08	provide input to estimate materials such as aggregate or soil required to achieve specified elevations

Sub-task

A-2.05 Performs spill control procedures.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

A-2.05.01	prioritize spill control measures for factors such as health, environment and clean up according to site specific spill control plan/procedures
A-2.05.02	use spill kits to contain hazardous materials such as oil, fuel and antifreeze
A-2.05.03	prevent contamination of manholes or waterways and other potentially affected areas using methods such as digging a trench or dyke, diverting and blocking

A-2.05.04	use alternate methods or materials to contain spills, such as sawdust, sand, straw and plastic
A-2.05.05	remove and dispose of contaminated material according to environmental regulations

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Sub-task

A-2.06 Performs sediment control procedures.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

A-2.06.01	assist in installing sediment control materials such as silt fences and blankets to protect surrounding vegetation and waterways
A-2.06.02	seal up spoil piles to prevent erosion
A-2.06.03	plan work to minimize damage to the environment caused by sedimentation
A-2.06.04	perform operations away from riparian zones to avoid environmental damage

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Sub-task

A-2.07 Handles materials.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

A-2.07.01	use, store and dispose of materials such as oil, antifreeze, fuel and other materials that may influence environmental factors such as vegetation, insects, emissions, noise, animals and sun, in accordance with environmental legislation and regulations
A-2.07.02	transport materials such as oil, antifreeze and fuel in accordance with Transportation of Dangerous Goods (TDG) regulations and WHMIS
A-2.07.03	place construction materials such as excavated fill at a safe distance from excavation according to government regulations and legislation
A-2.07.04	load material onto, and unload material from barges according to best practices and regulations

Task 3 Organizes work.

Context This task includes the use of documentation such as time sheets, inspection checklists, health and safety forms, reporting forms and log books. It also includes interpreting survey indicators and data as well as determining method of approach.

Required Knowledge

K 1	metric and imperial measurement systems
K 2	basic abbreviations and symbols used in survey markings
K 3	construction drawing (blueprint) reading
K 4	equipment capabilities and limitations
K 5	expressions of slope and grade
K 6	colour codes for utility markings and locates

Sub-task

A-3.01 Checks grade.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

A-3.01.01	use grade checking devices such as GPS, laser, batter boards and string line to check and verify correct grade is achieved
A-3.01.02	attach string line to survey stakes from the markings on the survey stakes and use a line level and measuring tape to check grade
A-3.01.03	create reference points on the equipment to assist in obtaining the desired grade
A-3.01.04	express slopes using percent, ratio and degree

Sub-task

A-3.02 Uses documentation.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

A-3.02.01	complete forms such as time sheets, pre- and post-operational inspection checklists, health and safety forms, logbooks, injury, illness or incident reporting forms, work orders and hazard analysis reports
A-3.02.02	read and interpret documents such as maps, drawings, memos, charts, labels, locate sheets, MSDS and motor vehicle act
A-3.02.03	draw sketches to clarify job tasks

Sub-task

A-3.03 Interprets survey indicators and data.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

A-3.03.01	clarify abbreviations and symbols by consulting with surveyors or supervisor
A-3.03.02	identify markings on survey indicators such as survey stakes, benchmarks and hubs
A-3.03.03	set up survey stakes as offsets for excavation lines and gridlines
A-3.03.04	verify survey data such as grade elevation and location to ensure accuracy of data
A-3.03.05	notify immediate supervisor of inaccuracies or inconsistencies of survey data such as in GPS coordinates and elevations

Sub-task

A-3.04 Determines method of approach.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

A-3.04.01	use information from drawings and plans to assess method of approach
A-3.04.02	assess underground and overhead obstacles such as building protrusions, roof overhangs, overhead power lines, snow, bridges and overpasses, and determine if an alternate approach is plausible or needed
A-3.04.03	provide assistance with gathering historical or anecdotal information, and as-built records from local authorities for undocumented conditions
A-3.04.04	adapt operation based on site conditions and environmental information such as proximity to waterways, soil conditions and weather conditions
A-3.04.05	adapt operation based on equipment capability, limitations and availability
A-3.04.06	adapt operation based on number and types of equipment onsite
A-3.04.07	assess site conditions for haulage equipment

BLOCK B HEAVY EQUIPMENT (TLB) INSPECTION AND BASIC MAINTENANCE

Trends

Documentation of daily operations is becoming increasingly rigorous. Heavy equipment operator (TLB) responsibilities for maintenance and inspection are changing as technology advances. Computerization is reducing the need for manual checks and maintenance by heavy equipment operators, and requiring specialized mechanics to perform the maintenance.

There is a growing list of attachments that can be secured to the tractor-loader-backhoe such as compactor, hoe-ram, thumb, sheers, forks, sweeper and ripper. These attachments have greatly expanded the capacity and role of the tractor-loader-backhoe.

Related Components

All components apply.

Tools and Equipment

See Appendix A.

Task 4 Performs scheduled maintenance.

Context

This task encompasses any maintenance tasks that a heavy equipment operator (TLB) must know about or perform to ensure the daily operation of the machine.

Required Knowledge

K 1	good housekeeping practices
K 2	gauges and monitoring systems such as computer monitoring systems (CMS), attachment specific computers and their use
K 3	pre-oilers and auto-grease systems
K 4	glow plugs, pre-heat and ether start systems
K 5	safety equipment such as fire extinguishers, fire suppression systems, seat belts, warning devices and backup alarms
K 6	roll over protective structures (ROPS) and falling objects protective structures (FOPS)
K 7	tire pressure, condition and wear

K 8	manufacturers' specifications according to operation and maintenance manuals (OMM)
K 9	re-fuelling and greasing
K 10	TDG certification
K 11	tier 4 exhaust procedures such as Diesel Exhaust Fluid (DEF) and regeneration

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Sub-task

B-4.01 Maintains heavy equipment operator station.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

B-4.01.01	clean cab using tools such as hand brooms, rags and cleaners to remove dust
B-4.01.02	secure loose items to ensure safety
B-4.01.03	clean windows and mirrors to ensure visibility
B-4.01.04	adjust cab components to individual heavy equipment operator's ergonomics
B-4.01.05	lubricate cab components such as throttle pedal, door hinges and seat

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Sub-task

B-4.02 Maintains drive train systems, tires and rims.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

B-4.02.01	adjust tire pressure according to manufacturers' specifications
B-4.02.02	tighten loose wheel nuts according to manufacturers' specifications
B-4.02.03	grease drive train components according to manufacturers' specifications

Sub-task

B-4.03 Performs preventative maintenance.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

B-4.03.01	top up fluids as needed according to manufacturers' specifications
B-4.03.02	lubricate all fittings according to manufacturers' specifications
B-4.03.03	change and clean filters according to manufacturers' specifications
B-4.03.04	rotate and change teeth on buckets, cutting edges and corner bits according to manufacturers' specifications

Sub-task

B-4.04 Performs basic maintenance on attachments.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

B-4.04.01	maintain quick attach according to manufacturers' specifications
B-4.04.02	grease attachments such as hoe pack (hydraulic plate compactor), hydraulic breaker and thumb, ripper and hydraulic sheers according to manufacturers' specifications
B-4.04.03	check mounted systems such as GPS and laser systems, and make adjustments such as tightening clamps, electric lines, supports and receivers
B-4.04.04	adjust belts and stops on attachments according to manufacturers' specifications
B-4.04.05	ensure hydraulic lines are capped during storage
B-4.04.06	change and rotate wear points on equipment such as cutting edges, teeth and scarifiers as per manufacturers' specifications
B-4.04.07	visually inspect attachments such as, jib/side booms, rippers and winches for unusual wear, damage, cracks, oil leakage and broken welds
B-4.04.08	visually inspect bolts and pins on all attachments for security

Task 5 Performs inspections.

Context Performing pre- and post-operational inspections are an important part of ensuring the machine is prepared and safe for daily operations.

Required Knowledge

K 1	machine-mounted laser levels and GPS
K 2	fuel, lubrication, electrical, hydraulic, cooling, air intake, suspension, brake and drive train systems
K 3	computer systems
K 4	OMM
K 5	heavy equipment operator's daily report
K 6	safety features
K 7	start-up and shut-down procedures
K 8	cold weather starting and operation
K 9	attachments
K 10	safety equipment such as fire extinguishers, fire suppression systems, seat belts, first aid kits, warning devices and backup alarms

Sub-task

B-5.01 Performs pre-operational inspections.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

B-5.01.01	inspect quick attach according to manufacturers' specifications
B-5.01.02	inspect engine compartment for maintenance items such as engine oil level, belts, hoses, debris build-up, coolant and exhaust system according to manufacturers' check list
B-5.01.03	check air intake system components such as air filters, dust bowls and air-restriction indicators
B-5.01.04	check tires and rims for secure mounting and damage such as wear, cuts and cracks
B-5.01.05	perform walk-around inspection of overall machine for damage, unnecessary wear, leakage and fluid levels such as hydraulic and fuel

B-5.01.06	inspect heavy equipment operator's station for seat belt adjustment and expiry date, cleanliness, loose debris and alternate escape routes
B-5.01.07	check to ensure controls such as transmission and hydraulic lockouts are in locked or neutral position according to manufacturers' specifications
B-5.01.08	turn on unit, visually inspect gauges for operation, continue start-up procedures according to manufacturers' specifications and continue to monitor gauges
B-5.01.09	cycle controls for operation, conduct warm-up procedures and recheck gauges and hydraulic levels according to manufacturer's specifications
B-5.01.10	conduct brake check and check operation of lockout devices
B-5.01.11	inspect safety equipment by testing horn, backup alarm and lights for operation, and checking first aid kits and emergency shut-down and fire suppression system if equipped
B-5.01.12	check ROPS and FOPS for damage
B-5.01.13	inspect drive train systems according to manufacturers' specifications

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Sub-task

B-5.02 Performs post-operational inspections.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

B-5.02.01	park equipment in the service position on level surface to check fluid levels at next start-up
B-5.02.02	allow equipment to cool down prior to shut-down according to manufacturers' specifications
B-5.02.03	perform post-operational inspection of overall equipment for damage such as excessive wear, cracks and leakage

Sub-task

B-5.03 Completes daily equipment logbook.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

B-5.03.01	fill out daily equipment logbook during pre-operational inspection according to company policy and jurisdictional regulations, and store according to company policy
B-5.03.02	complete daily equipment logbook during post-operational inspection according to company policy and jurisdictional regulations, and store according to company policy
B-5.03.03	ensure report is ready to be viewed or signed by foreman according to company policy and jurisdictional regulations

BLOCK C HEAVY EQUIPMENT OPERATOR (TRACTOR-LOADER-BACKHOE) TASKS

Trends

Advancements in technology are allowing workers to perform their duties with improved efficiency and safety. More efficient engines and transmissions, the use of GPS and, wireless technology, have helped improve worker efficiency.

Heavy equipment operator (TLB) functions are becoming more complex and precise, for example, pilot controls which incorporate multiple control functions, and electrical over hydraulic functions. New ergonomic controls and new cab designs not only improve ease of use and heavy equipment operator awareness, but also reduce their fatigue and injury.

There is a growing list of attachments that can be secured to the tractor-loader-backhoe such as compactor, hoe-ram, thumb, sheers, forks, sweeper and ripper. These attachments have greatly expanded the capacity and role of the tractor-loader-backhoe.

There are more stringent regulations around the spread of contaminants such as noxious weeds, bugs and other biological contaminants. These regulations affect what a heavy equipment operator has to do to the equipment before it can be moved.

Related Components

All components apply.

Tools and Equipment

See Appendix A.

Task 6 — Performs basic heavy equipment operator (tractor-loader-backhoe) functions.

Context This task involves smooth operation of equipment controls, effective set-up of machine for task at hand, the installation and removal of attachments, and monitoring of equipment performance. It also covers troubleshooting and emergency procedures.

Required Knowledge

K 1	quick attach procedures
K 2	three-point contact when entering and exiting machine
K 3	function and location of controls and gauges on various equipment such as parking brakes, shut-offs and throttles
K 4	limitations of equipment and attachments
K 5	communication methods such as hand signals and radio
K 6	content of OMM
K 7	significance of warning symbols and labels on equipment
K 8	emergency procedures such as fire suppression systems, fire extinguishers, muster points and ERP
K 9	contractor and company safety policies, OH&S Acts and other applicable regulations and legislation
K 10	lock-out and tag-out procedures
K 11	procedures for installing various attachments
K 12	types of attachments and their uses
K 13	compatibility of attachments to carriers
K 14	gear and speed selection based on grade and roughness of terrain
K 15	centre of gravity
K 16	work area
K 17	right-of-way
K 18	compaction and swell factors
K 19	types of soil such as granular aggregates, clay, organic, top soil and rock
K 20	factors that affect soil stability such as weather, vibration and surcharge
K 21	traveling on icy or slippery surfaces with TLB
K 22	snow and ice removal procedures

Sub-task

C-6.01 Maintains control of equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

C-6.01.01	enter and exit machine using three-point contact while facing machine
C-6.01.02	adjust seat and controls for ease of operation
C-6.01.03	adjust gear, throttle and speed according to grade and roughness of terrain to meet safety and production requirements
C-6.01.04	manipulate controls for smooth operation of equipment
C-6.01.05	maintain centre of gravity while manoeuvring equipment with load
C-6.01.06	maintain prescribed clearance between equipment, and obstacles and utilities

Sub-task

C-6.02 Positions equipment for task.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

C-6.02.01	determine location for set-up taking into consideration factors such as working in conjunction with other equipment, hazards, obstacles and the need for access/egress
C-6.02.02	stabilize equipment taking into consideration capabilities and limitations of equipment and ground conditions of work area

Sub-task

C-6.03 Monitors performance of equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

C-6.03.01 visually scan gauges for temperature and oil pressure to confirm that they are within safe operating range

C-6.03.02 identify signs of fluid leaks, loss of power or other equipment problems using senses such as sight, smell and feel

C-6.03.03 identify signs of equipment or component failure by feeling for vibration or listening for unusual sounds

Sub-task

C-6.04 Troubleshoots equipment problems.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

C-6.04.01 identify faulty components and fault codes in order to explain problem to service personnel or to order parts

C-6.04.02 interpret fault codes and monitor warning in order to determine course of action such as changes in operation or removal of debris off the cooling system

C-6.04.03 report extent of problem to supervisor to determine how production, safety and environment will be affected (major vs. minor shut-down)

Sub-task

C-6.05 Installs attachments.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

C-6.05.01	inspect and lubricate quick attach according to manufacturers' specifications
C-6.05.02	select type of attachment needed for job and equipment
C-6.05.03	select tools needed to complete installation
C-6.05.04	follow installation and removal procedures based on type of attachment and equipment being installed or removed, according to manufacturers' and job specifications
C-6.05.05	lubricate attachment according to manufacturers' specifications and job conditions
C-6.05.06	inspect attachment for faults such as cracks, missing bolts and loose hoses before and after installation, and before use
C-6.05.07	test equipment to ensure proper installation of attachment
C-6.05.08	remove and store attachments according to established procedures

Sub-task

C-6.06 Performs emergency procedures.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

C-6.06.01	assess emergency to determine course of action
C-6.06.02	stop equipment, lower implement and attachment, lock-out (hydraulics, transmission, brakes) and perform engine shut-down
C-6.06.03	initiate established ERP according to assessed situation
C-6.06.04	inform supervisor, co-workers and general public of hazards

Sub-task

C-6.07 Compacts material with attachments.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	no	NV	no	yes	ND	ND	yes	ND	ND	ND

Key Competencies

C-6.07.01	operate towable compacting attachments such as vibratory plate tampers to achieve required densities
C-6.07.02	coordinate water application with co-workers
C-6.07.03	offset compaction to achieve even densities
C-6.07.04	avoid disturbing compaction while manoeuvring around obstacles such as utilities, manholes and fire hydrants

Sub-task

C-6.08 Performs cut and fill operations.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

C-6.08.01	identify reference points to delineate the perimeter of the work area
C-6.08.02	adjust operation based on material and changing ground conditions
C-6.08.03	visually assess ground elevations for highs and lows
C-6.08.04	select and use ground engaging tools and equipment such as angle buckets and blades
C-6.08.05	use equipment functions such as angle and tilt to obtain correct slope and grade
C-6.08.06	maintain a profile according to site plan
C-6.08.07	determine action to be taken when encountering obstacles such as rocks, logs and debris
C-6.08.08	remove and disperse excess materials
C-6.08.09	synchronize operation of equipment with other heavy equipment operators

Sub-task

C-6.09 Clears snow and ice.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

C-6.09.01	use appropriate blade or bucket for snow removal
C-6.09.02	prepare equipment for snow and ice conditions such as installing tire chains, lightings and hazard warnings according to regulations and legislation
C-6.09.03	adjust speed of equipment according to road conditions
C-6.09.04	apply appropriate down pressure on snow removal attachments to prevent damage to surface being plowed and blade, and to maintain steering and traction control
C-6.09.05	move snow to designated area within large areas such as a parking lot using slot method, if possible
C-6.09.06	blow snow from area using loaders with blower attachment
C-6.09.07	identify obstacles and use caution
C-6.09.08	maintain control of equipment when clearing snow and ice taking into consideration adverse weather conditions
C-6.09.09	load trucks with snow

Task 7 Transports equipment.

Context This task involves mobilization and demobilization of equipment. It includes preparing, loading and securing equipment for transportation as well as unloading. Driving equipment on public roads is also part of this task.

Required Knowledge

K 1	licensing (equipment and driver) and permitting requirements
K 2	road regulations
K 3	jurisdictional regulations and company policies for loading and unloading of equipment
K 4	lighting requirements such as beacons, flashing lights and head/tail lights
K 5	signage requirements such as “slow vehicle” and “over dimension” signs
K 6	types of trailers and their uses and limitations

K 7	loading and unloading techniques according to type of trailer used
K 8	weight and size of attachments for safe placement on trailer
K 9	height, width and weight restrictions for load
K 10	necessary disassembly of equipment
K 11	positioning of equipment on trailer
K 12	changes to centre of gravity of equipment after removal of attachments
K 13	cleaning requirements of equipment before transport
K 14	tie-down points and procedures
K 15	rigging and lifting techniques

Sub-task

C-7.01 Prepares equipment for transportation.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

C-7.01.01	clean equipment to prevent debris from falling during transportation, or to prevent contamination of next site
C-7.01.02	secure attachments and components as required

Sub-task

C-7.02 Loads equipment and attachments for transportation.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

C-7.02.01	load attachments onto haul unit using equipment such as forks and rigging quick attach
C-7.02.02	manoeuvre equipment onto haul unit while maintaining stability
C-7.02.03	position equipment based on the directions of the transport person
C-7.02.04	set parking brakes, lower implements and attachments, and shut down engine depending on weather conditions, jurisdictional regulations and manufacturers' specifications

Sub-task

C-7.03 Assists in securing equipment for transportation.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

C-7.03.01	help tie down equipment and attachments as required
C-7.03.02	help block wheels as required
C-7.03.03	close and cover windows and doors to prevent damage during transport
C-7.03.04	cover exhaust pipes on stopped engines to prevent turbo damage during transport

Sub-task

C-7.04 Unloads equipment and attachments.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

C-7.04.01	identify hazards such as overhead power lines, underground utilities, slippery decks and unlevel ground
C-7.04.02	remove tie-downs
C-7.04.03	remove exhaust coverings
C-7.04.04	perform a walk-around inspection to identify any potential damage during transport
C-7.04.05	start-up engine, lift implements and attachments and disengage parking brakes
C-7.04.06	manoeuvre equipment off of haul unit while maintaining stability and following directions of transport person
C-7.04.07	lift attachments off haul unit

Sub-task

C-7.05 Drives equipment on roads.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

C-7.05.01	clean equipment body and tires to prevent traffic hazards and spreading debris on roads
C-7.05.02	clean and inspect lights/beacons, windows and slow moving signage to ensure they are visible and functioning
C-7.05.03	test steering and back-up alarm, and ensure brake pedals are locked together before accessing public roads
C-7.05.04	arrange for escort vehicle as required
C-7.05.05	lock rear boom in the transport position
C-7.05.06	carry bucket low
C-7.05.07	operate equipment using methods such as ride control and two wheel drive according to manufacturers' specifications and, government regulations and legislation

Task 8 Operates tractor-loader-backhoe.

Context This task involves using tractor-loader-backhoes to place and stockpile material, to lift, to excavate and backfill trenches, ditches and excavations, and to load trucks. It also includes performing clean-up operations.

Required Knowledge

K 1	safety regulations relating to trenching, demolitions, clearing land, lifting, stockpiling, confined space awareness and traffic control
K 2	soil types and factors affecting soil stability and environmental conditions
K 3	slope ratios for various soil types
K 4	types of equipment and attachments and their capabilities and limitations (boom reach)
K 5	colour coding for locations of underground utilities
K 6	sorting and recycling procedures such as for demolition materials, asphalt waste and wood waste

K 7	jurisdictional regulations for trenching and excavations
K 8	precautions necessary when working around buried or overhead utilities
K 9	grade stakes, worksite plans and GPS
K 10	rigging requirements
K 11	water control
K 12	effect of weight of machine on loose fill and trench
K 13	compaction and swell factors, and proctor tests
K 14	cycle time
K 15	hand signals for lifting
K 16	two-pedal brake system
K 17	stabilizers and boom lock feature
K 18	control pattern
K 19	change in centre of gravity and reduction in equipment capacity when using various attachments such as rock breakers and extended forks

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Sub-task

C-8.01 Places material.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

C-8.01.01	place granular backfill in lifts
C-8.01.02	place bedding in trench with due care following directions of signal person to avoid injury to workers and damage to tools and equipment
C-8.01.03	spread and grade material in lifts by adjusting the bucket to achieve a level and smooth surface

Sub-task

C-8.02 Excavates trenches and ditches.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

C-8.02.01	maintain consistent grade according to engineering specifications
C-8.02.02	maintain wall slope based on soil type and conditions, engineer's specifications, or jurisdictional regulations and legislation
C-8.02.03	maintain proper walkway by clearing all obstructions as per jurisdictional regulations/legislation
C-8.02.04	strip trench walls and slopes of loose rock and other materials
C-8.02.05	create a smooth trench bottom to minimize bedding and provide good surface for installation of utilities, wires and pipes
C-8.02.06	separate material in preparation for backfilling (frost lumps, rocks, finer materials)
C-8.02.07	stabilize equipment using outriggers and loader bucket
C-8.02.08	use extend-a-hoe to increase reach

Sub-task

C-8.03 Backfills trenches and excavations.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

C-8.03.01	place bedding to specifications to support utilities
C-8.03.02	confirm installation is complete and safe for backfilling by checking workers and tools are out of the trench, joints are completed and service connections are completed
C-8.03.03	protect piping or utilities by applying backfill techniques and procedures such as covering with finer material (shading) according to job specifications
C-8.03.04	manage piles of imported aggregates (sand, rock and pit run) to minimize waste and avoid contamination with other materials

C-8.03.05	return excavated material to point of origin, as required
C-8.03.06	place material in lifts with appropriate thickness to obtain required compaction

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Sub-task

C-8.04 Loads trucks.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

C-8.04.01	minimize travel during truck loading operation to optimize cycle time
C-8.04.02	maximize traction using methods such as wheels on the ground and reduced acceleration to reduce tire wear and rutting
C-8.04.03	spot for trucks to be loaded using signals such as horns and position of bucket
C-8.04.04	square machine to dig material
C-8.04.05	remove excess material, keeping the bucket low while carrying to prevent spillage and improve stability
C-8.04.06	centre load to avoid spillage
C-8.04.07	visually check tailgate of truck to make sure it is locked
C-8.04.08	empty material gently into the truck to minimize impact
C-8.04.09	balance load to meet axle weight restrictions
C-8.04.10	signal driver that truck is loaded and ready to go
C-8.04.11	position equipment in tripod position for backhoe loading and to avoid contact with truck (hitting sideboards, counterweights against wheels)

Sub-task

C-8.05 Lifts material.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

C-8.05.01	lift and place shoring without disturbing installed utilities
C-8.05.02	determine weight of load to be lifted to ensure machine is capable of handling the load
C-8.05.03	select rigging, including taglines, for task at hand to avoid failure during lifting
C-8.05.04	check rigging to ensure load is rigged for task at hand to avoid failure during lift
C-8.05.05	confirm lift capability
C-8.05.06	secure load using tie-offs such as chains, straps and rope
C-8.05.07	carry load using best practices such as low to ground and heavy end up hill

Sub-task

C-8.06 Stockpiles material.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

C-8.06.01	load front bucket to optimal capacity while minimizing wheel spin
C-8.06.02	remove excess material, keeping the bucket low while carrying, to prevent spillage and improve stability
C-8.06.03	build ramp to access stockpile
C-8.06.04	identify grades of materials and create buffer between stockpiles to prevent cross-contamination
C-8.06.05	maintain clean and level worksite to avoid tire damage and increase efficiency

Sub-task

C-8.07 Performs clean-up operations.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	ND	ND	yes	ND	ND	ND

Key Competencies

C-8.07.01	clean up excavation area using attachments such as sweepers, 4-in-1 buckets and pallet forks
C-8.07.02	sweep material using attachments such as power angle or fixed angle broom according to job specifications
C-8.07.03	pick up small amounts of remaining material using methods such as using the backstop method, using another piece of equipment, or using a 4-in-1 bucket

APPENDICES

APPENDIX A TOOLS AND EQUIPMENT

Hand and Power Tools and Accessories

adjustable wrenches
air compressors
battery chargers
booster cables
brooms
chain saws
circular saws
cold chisels
combination wrenches
cutting torches
drills (electric and cordless)
extension cords
fuel transfer pump
generator
grease guns (manual, electric and cordless)
grinders (electric and cordless)
hack saws
hammers (ball peen, claw, sledge)
hydraulic jacks
load binders and chains
oil cans
oil filter wrenches
pliers
pneumatic impact wrenches
pressure washers
pry bars
pumps (water, discharge, fire)
punches
ratchet straps
scrapers
screwdrivers
skid tanks
socket sets
squeegees
tiger torch
tire inflation tools
tire pressure gauges
tool boxes
torque wrenches
track shovels
trouble lights
welder
wire brushes
whisk brooms
wood blockings

Measuring, Testing and Diagnostic Equipment

antifreeze testers
battery testers
digital hand levels
electronic and laser levels
eye levels
global positioning system (GPS)
grade stakes
line levels
measuring tapes
oil sample kits
slope meters
string boxes
string levels
test lights
transit levels and rods

Rigging and Lifting Equipment

come-alongs
hold down chains
hooks
shackles
slings (synthetic, chain, wire rope)
swift lifts
tag lines

Personal Protective Equipment (PPE) and Safety Equipment

coveralls
ear plugs and muffs
eye wash stations
face shields
fall arrest systems
fire axes and shovels
fire backpack
fire blankets
fire extinguishers
fire-retardant clothing
first aid kits
gas monitors
gloves
hard hats
life jackets
reflectors
respirators
safety boots
safety glasses
safety pants
safety vests
self-contained breathing apparatus (SCBA)
spill kits
travel alarms
trench boxes
truck under guard (lateral) protection

Attachments

angle brooms (power angle and fixed angle)
asphalt cutters
blades (chuck, dozer, ice)
bucket sweepers
buckets (general, excavation, trenching, ditching, clean-up, frost, vee, 4-in-1, grapple)
buncher heads
grapple loaders
hydraulic breakers, thumbs, knuckles and spreaders
jib booms (stingers)
landscape rakes
packer wheels
planers (cold, high flow, standard flow, surface)
post hole augers
rippers
scarifiers (forestry and earth moving)
snow blowers
snow plows
stump splitters
tillers
tree spades
trench compactors
vibratory plate tampers

Related Heavy Equipment Machinery

backhoes
boom trucks
cold planers
compact rollers
compactors concrete pavers
concrete pump
crawler-tractor (dozer)
directional drill
dragline
forklift
front end loaders
front shovels (conventional and hydraulic)
graders
hydraulic excavators
industrial tractors
loaders (knuckleboom, log, track, rubber-tired)
material handlers
paving equipment (asphalt pavers, shuttle buggies)
pipelayers
road reclaimers

Related Heavy Equipment Machinery (cont'd)

scrapers (pull-type, self-propelled)
screeds
skid steer loaders
soil stabilizers
tandem dump trucks
telehandlers
track loaders
track-type tractors
trenchers
wheel dozers
wheel loaders
motor graders
multi-terrain loaders
off highway tractors
off highway trucks (articulated and rigid framed)

APPENDIX B GLOSSARY

attachment	an accessory attached or designed to be attached to a machine
aggregates	broad category of coarse particulate material used in construction, including sand, gravel, crushed stone, slag, recycled concrete and geosynthetic aggregates
bedding	material placed under and around pipe for support and protection
cycle time	time it takes to accomplish a task such as moving bucket out of a ditch and back again
falling objects protective structure (FOPS)	heavy duty structure for protection of the machine operator from falling objects. Usually has four posts and a strong roof
locate sheet	document from utility authorities which provides the location of underground utilities such as gas, sewer and electrical
logbook	book of documented history of maintenance and inspections done on a piece of equipment
pile	small assemblage of material
proctor test	test to measure density of compacted soils
riparian zone	areas that surround water bodies in the watershed that are composed of moist to saturated soils, water-loving plant species and their associated ecosystems
roll over protective structure (ROPS)	roll bar or similar device to help protect the driver in case the machine tips over
stockpile	supply of materials such as aggregates, wood or other materials, gathered and held in reserve for use
swell factors	increase of bulk in soil or rock when it is dug or blasted
thumbs	device on an excavator stick to assist in holding material in bucket such as rocks, wood, brush and stumps
trench box	engineered steel or aluminum structures that are used to help protect workers who work inside trenches

vibratory plate tamper	device used to compact soil
weights	ballast added to the tractor or implement to improve balance, traction, stability or digging force

APPENDIX C ACRONYMS

CMS	computer monitoring system
CPR	cardiopulmonary resuscitation
DEF	Diesel Exhaust Fluid
ERP	emergency response plan
FOPS	falling objects protective structure
GPS	Global Positioning System
MSDS	material safety data sheet
OH&S	Occupational Health and Safety
OMM	operation and maintenance manual
PPE	personal protective equipment
ROPS	roll over protective structure
SCBA	self-contained breathing apparatus
TDG	Transportation of Dangerous Goods
TLB	tractor-loader-backhoe
WHMIS	Workplace Hazardous Materials Information System

APPENDIX D BLOCK AND TASK WEIGHTING

BLOCK A COMMON OCCUPATIONAL SKILLS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	30	10	30	25	NV	30	30	ND	ND	20	ND	ND	ND	25%

Task 1 Uses and maintains tools and equipment.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	20	32	40	45	NV	20	20	ND	ND	20	ND	ND	ND	28%

Task 2 Maintains safe work environment.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	50	41	40	32	NV	60	40	ND	ND	40	ND	ND	ND	43%

Task 3 Organizes work.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	30	27	20	23	NV	20	40	ND	ND	40	ND	ND	ND	29%

BLOCK B HEAVY EQUIPMENT (TLB) INSPECTION AND BASIC MAINTENANCE

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	20	30	40	25	NV	30	30	ND	ND	20	ND	ND	ND	28%

Task 4 Performs scheduled maintenance.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	70	40	50	60	NV	30	50	ND	ND	65	ND	ND	ND	52%

Task 5 Performs inspections.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	30	60	50	40	NV	70	50	ND	ND	35	ND	ND	ND	48%

BLOCK C HEAVY EQUIPMENT OPERATOR (TLB) TASKS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	50	60	30	50	NV	40	40	ND	ND	60	ND	ND	ND	47%

Task 6 Performs basic heavy equipment operator (TLB) functions.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	40	35	30	33	NV	35	30	ND	ND	35	ND	ND	ND	34%

Task 7 Transports equipment.

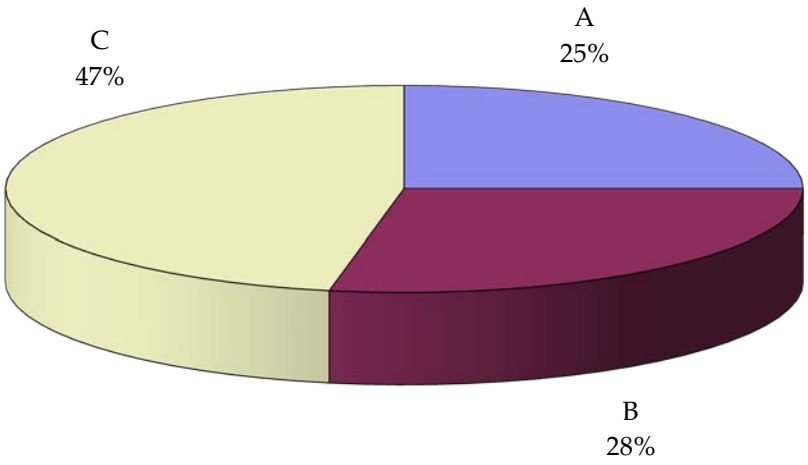
	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	20	20	20	20	NV	15	30	ND	ND	15	ND	ND	ND	20%

Task 8 Operates tractor-loader-backhoes.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	40	45	50	47	NV	50	40	ND	ND	50	ND	ND	ND	46%

APPENDIX E

PIE CHART*



TITLES OF BLOCKS

BLOCK A	Common Occupational Skills	BLOCK C	Heavy Equipment Operator (Tractor-Loader-Backhoe) Tasks
BLOCK B	Heavy Equipment Inspection and Basic Maintenance		

*Average percentage of the total number of questions on an interprovincial examination, assigned to assess each block of the analysis, as derived from the collective input from workers within the occupation from all areas of Canada. Interprovincial examinations typically have from 100 to 150 multiple-choice questions.

APPENDIX F

TASK PROFILE CHART — Heavy Equipment Operator (Tractor-Loader-Backhoe)

BLOCKS	TASKS	SUB-TASKS				
A - COMMON OCCUPATIONAL SKILLS	1. Uses and maintains tools and equipment.	1.01 Maintains hand and power tools.	1.02 Maintains measuring and testing equipment.	1.03 Uses grade checking and tracking instruments.	1.04 Uses rigging and lifting equipment.	1.05 Uses personal protective equipment (PPE) and safety equipment.
	2. Maintains safe work environment.	2.01 Assesses potential hazards.	2.02 Plans worksite safety strategies.	2.03 Secures unattended equipment.	2.04 Communi-cates with others.	2.05 Performs spill control procedures.
		2.06 Performs sediment control procedures.	2.07 Handles material.			
	3. Organizes work.	3.01 Checks grade.	3.02 Uses documentation.	3.03 Interprets survey indicators and data.	3.04 Determines method of approach.	
B - HEAVY EQUIPMENT INSPECTION AND BASIC MAINTENANCE	4. Performs scheduled maintenance.	4.01 Maintains heavy equipment operator station.	4.02 Maintains drivetrain systems, tires and rims.	4.03 Performs preventative maintenance.	4.04 Performs basic maintenance on attachments.	
	5. Performs inspections.	5.01 Performs pre-operational inspections.	5.02 Performs post-operational inspections.	5.03 Completes daily equipment logbook.		
C - HEAVY EQUIPMENT OPERATOR (TRACTOR-LOADER-BACKHOE) TASKS	6. Performs basic heavy equipment operator (tractor-loader-backhoe) functions.	6.01 Maintains control of equipment.	6.02 Positions equipment for task.	6.03 Monitors performance of equipment.	6.04 Trouble-shoots equipment problems.	6.05 Installs attachments.

BLOCKS	TASKS	SUB-TASKS				
		6.06 Performs emergency procedures.	6.07 Compacts material using attachments.	6.08 Performs cut and fill operations.	6.09 Clears snow and ice.	
	7. Transports equipment.	7.01 Prepares equipment for transportation.	7.02 Loads equipment and attachments for transportation.	7.03 Assists in securing equipment for transportation.	7.04 Unloads equipment and attachments.	7.05 Drives equipment on roads.
	8. Operates tractor-loader-backhoes.	8.01 Places material.	8.02 Excavates trenches and ditches.	8.03 Backfills trenches and excavations.	8.04 Loads trucks.	8.05 Lifts material.
		8.06 Stockpiles material.	8.07 Performs clean-up operations.			