National Occupational Standards For Operating Engineers

April 2005

ENVIRONMENTAL REMEDIATION EQUIPMENT SPECIALIST

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Introduction

The Construction Sector Council (CSC) is one of 40 sector councils in Canada. Sector councils are industry-led, labour/management partnership organizations designed to address human resource development issues within specific industries.

The primary objective of the CSC is the development of a highly-skilled workforce and a safe workplace environment, contributing to the organizational productivity and individual prosperity of the members of the construction industry. The development of national occupational standards for operating engineer occupations is one of the many ways the CSC is meeting this objective.

The CSC acknowledges all of the subject matter experts who provided their valuable time and efforts toward the definition and validation of these national occupational standards. Without their combined contributions, the development of these occupational analyses (OAs) would not have been possible. A complete list of the subject matter experts can be found at the back of this document.

An OA has the following objectives:

- to identify and group the tasks performed by skilled workers in particular occupations
- to identify those tasks that are performed by skilled workers in every province and territory
- to develop instruments for use in the assessment and training leading to the certification of skilled workers
- to facilitate the mobility, in Canada, of trainees and skilled workers
- to supply employers and employees, and their associations, industries, training institutions, and governments with analysis of the tasks performed in particular occupations

Therefore, the standards define the skills, knowledge, and abilities required for an occupation and against which the qualifications of an individual in that occupation can be assessed.

The vision of the Construction Sector Council is to reach a point where operators who demonstrate the skills, knowledge, and abilities in the national occupational standards will possess the nationally recognized credentials and those credentials will assist the operator in obtaining employment anywhere in Canada.

Foreword

Operating engineer occupations can be grouped into three broad areas—hoist and crane operators, construction heavy equipment operators, and industrial equipment operators. Within each of these broad categories, there are several operating engineer occupations.

1. Hoist and Crane Operators

Crane operators' work tends to be centred in the construction industry. Operators work on a broad range of building sites including high-rise residential, institutional, and commercial structures, as well as most large industrial sites and many types of heavy engineering projects. The Statistics Canada Labour Force Survey (LFS) identifies around 4,000 crane operators in the construction industry across Canada. There are cyclical variations in employment, with low levels below 3,000 jobs in the mid-1990s and peak levels near 5,000.

2. Construction Heavy Equipment Operators

Heavy equipment operators are largely concentrated in the construction industry. Operators work on a variety of jobs from residential, institutional, and commercial structures to most large industrial sites and most types of heavy engineering. The LFS identifies around 37,000 equipment operators employed in the construction industry across Canada. This occupation is one of the larger trades in the industry, comparable in size to the workforce for electricians, pipe trades, and masonry trades. There are cyclical variations in employment, with low levels below 27,000 jobs in the early 1990s and peak levels near 40,000.

3. Industrial Equipment Operators

Industrial equipment operators encompass a variety of occupations ranging from forklift operators and environmental workers to tractor trailer drivers. The demand for environmental workers is increasing as knowledge, awareness, and regulations proliferate. Forklift training has taken on added importance due to safety regulations that require trained or certified forklift operators.

The mobility and accessibility of operating engineers is difficult if not impossible if there are no jurisdictional agreements on national occupational standards. The project to develop occupational analyses for national occupational standards for 29 operating engineer occupations began in January 2004 and was completed in March 2005.

Development of the Occupational Analysis

A draft analysis was developed by a knowledgeable team of consultants (process experts) who, with the assistance of a committee of subject matter experts in the field, identified all the tasks performed in the occupation. In order to facilitate an efficient and effective process, the 29 occupations were grouped according to commonalities. Profile meetings, with both process and subject matter experts, were held for each grouping between January and March 2004 in:

- Edmonton, Alberta
  - Excavating, Feb 5 & 6
  - Paving, Feb 9 & 10
- Morrisburg, Ontario
  - Grading, Feb 24 & 25
  - Crane and Hoisting, Mar 1 & 2
  - HAZMAT, Mar 3 & 4
  - Plant Operations, Mar 23 & 24
  - Concrete Pumping, Mar 25 & 26
- Montreal, Quebec
  - Hauling, Feb 26 & 27
- Vancouver, British Columbia
  - Utilities, Mar 16 & 17
  - Material Handling, Mar 18 & 19
- Quebec City, Quebec
  - Profile Completion Forum, Mar 29 – 31

The draft OAs were then distributed to more subject matter experts and stakeholders across Canada for review and input between June and September 2004. They were also posted on a website where subject matter experts were invited to provide feedback.

The combined input from the review was collated in October 2004. Recommendations were assessed and incorporated into the final draft, which included the identification of common core tasks performed in all occupations. Validation meetings were held for each grouping, with process and subject matter experts, between October 2004 and January 2005 in:

2004:

- Saskatoon, Saskatchewan
  - Utilities, Oct 20 – 22
  - Material Handling (including HAZMAT), Oct 26 – 29
- Halifax, Nova Scotia
  - Grading, Nov 2 – 5
- St John's, Newfoundland
  - Crane and Hoisting (including Concrete Pump), Nov 15 – 19
- Winnipeg, Manitoba
  - Excavating, Nov 23 – 25
  - Hauling, Nov 30 – Dec 3

2005:

- Vancouver, British Columbia
  - Paving, Jan 5 – 7
  - Plant Operations, Jan 10 – 12
- Victoria, British Columbia
  - Validation Forum, Feb 21 – 23

The OAs were then edited, translated, and published in both official languages.

Scope of the Occupational Analysis

This occupational analysis identifies all of the tasks that a qualified operator must be able to perform. The performance of these tasks is dependent on a range of related activities, described in the body of the analysis as subtasks. The analysis is composed mainly of tasks that operators perform frequently, including such tasks as cleaning, driving, and maintenance.

Most operators have a range of experience on different types of equipment. Regardless of the type of equipment, the duties of the operator remain relatively constant. Accomplishment of the operator's tasks depends largely on knowledge of the equipment and its components, experience in a wide variety of situations, and an ability to determine the most appropriate means of proceeding with the work.

Though not described in the analysis, other important attributes of operators include mechanical aptitude, mathematical ability, excellent vision, and a high degree of physical co-ordination. Operators are also often called upon to perform their jobs in extremely difficult conditions.

Although this analysis is not a training document, it is worthwhile noting that aspiring operators may find it useful to reflect on their own abilities to deal with lengthy periods of physical restriction and isolation coupled with frequent subjection to pressures of time and productivity. Operators are often required to demonstrate the ability to concentrate for long periods of time while enduring physical discomfort and inclement weather conditions.

Heavy equipment is used in virtually every facet of the construction sector. In some cases, an operator may work for years on a single site, such as a plant, and may, during that time, operate only one type of equipment and therefore perform similar and relatively constant tasks. Operators who work for contractors may rarely work on the same site more than once and may perform a tremendous variety of tasks using a wide range of equipment types and sizes. The work of an operator often overlaps with that of other equipment operators.

Structure of the Occupational Analysis

To facilitate the understanding or the nature of the occupation, the work performed is divided into the following divisions:

A. BLOCK	the largest division within the analysis and reflects a distinct operation relevant to the occupation
B. TASK	the distinct activity that, combined with others, makes up the logical and necessary steps the operator is required to perform to complete a specific assignment within a BLOCK
C. SUBTASK	the smallest distinct, measurable, and observable activities into which it is practical to divide any work activity; combined with other SUBTASKS, these fully describe the logical steps required to complete a TASK

The importance of a task describes the benefits that operators, employers, and the public receive as a result of an operator's ability to perform the task.

Trends are any shifts or changes that are occurring in the industry and affect the task.

Supporting Knowledge and Abilities are the elements of skill and knowledge that an individual must acquire to perform the task adequately.

Tools and Supplies are those items that are needed to perform the skill.

BLOCK A OPERATING PROCEDURES
Task 1 Handles Hazardous Substances

This task is important because it helps to:

- prevent damage to loads, property, and equipment
- maintain productivity while following safe working procedures
- combine equipment operation skills with proper handling of hazardous materials

Trends:
N/A

	Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
1.01	Follows procedures for exposing buried containers	Knowledge of: • standard operating procedures • applicable legislation • manufacturers' and industry standards • types and properties of hazardous substances Ability to: • follow procedures for exposing containers	*Standard operating procedures, copies of legislation, manufacturers' and industry standards, PPE*
1.02	Follows procedures for handling containers	Knowledge of: • standard operating procedures • applicable legislation • manufacturers' and industry standards • types and properties of hazardous substances • signs of container deterioration Ability to: • follow procedures for handling containers	*Standard operating procedures, copies of legislation, manufacturers' and industry standards, PPE*
1.03	Follows procedures for handling contaminated solids	Knowledge of: • standard operating procedures • applicable legislation • manufacturers' and industry standards • types and properties of hazardous substances Ability to: • follow procedures for handling contaminated solids	*Standard operating procedures, copies of legislation, manufacturers' and industry standards, PPE*

1.04	Follows procedures for handling contaminated fluids not in containers	Knowledge of: • standard operating procedures • applicable legislation • manufacturers' and industry standards • types and properties of hazardous substances Ability to: • follow procedures for handling contaminated fluids not in containers	*Standard operating procedures, copies of legislation, manufacturers' and industry standards, PPE*

BLOCK A OPERATING PROCEDURES
Task 2 Operates Equipment on Contaminated Sites

This task is important because it helps to:

- maintain productivity while following safe working procedures
- prevent further contamination
- fulfill job specifications
- prevent cross-contamination
- contain and transport contaminated material for treatment or disposal safely

Trends:

- Advances in technology are resulting in an increase of specialized equipment for environmental remediation.

	Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
2.01	Accesses equipment	Knowledge of: • standard operating procedures • applicable legislation • manufacturers' and industry standards • equipment to be operated • appropriate route to equipment Ability to: • follow donning procedures • take appropriate route to equipment	*Standard operating procedures, copies of legislation, manufacturers' and industry standards, PPE*
2.02	Ensures readiness of equipment and accessories for task	Knowledge of: • standard operating procedures • applicable legislation • manufacturers' and industry standards • equipment's design details and accessories • accessories required for contamination zone, such as operator station's air supply or filtration system • compatibility of equipment (such as hose and tank materials) with hazardous substances being handled Ability to: • inspect accessories, such as supply in tanks • verify compatibility of equipment with hazardous substances	*Standard operating procedures, copies of legislation, manufacturers' and industry standards, PPE*

2.03	Follows procedures for handling hazardous substances	Knowledge of: • standard operating procedures • applicable legislation • manufacturers' and industry standards • types and properties of hazardous substances Ability to: • follow procedures for handling hazardous substances	*Standard operating procedures, copies of legislation, manufacturers' and industry standards, PPE*
2.04	Follows procedures for hauling hazardous substances	Knowledge of: • standard operating procedures • applicable legislation, including transportation of dangerous goods, documentation requirements • manufacturers' and industry standards • types and properties of hazardous substances Ability to: • follow procedures for hauling hazardous substances	*Standard operating procedures, copies of legislation, manufacturers' and industry standards, PPE*
2.05	Operates equipment and accessories	Knowledge of: • manufacturers' specifications • job specifications • standard operating procedures • applicable legislation • manufacturers' and industry standards • shift durations and rotations • indicators of potential contamination Ability to: • follow procedures for handling hazardous substances • monitor site conditions • report unidentified contaminants	*Standard operating procedures, copies of legislation, manufacturers' and industry standards, PPE*
2.06	Monitors equipment and accessory performance and condition	Knowledge of: • manufacturers' specifications • standard operating procedures • applicable legislation • manufacturers' and industry standards • normal operating performance and conditions	*Standard operating procedures, copies of legislation, manufacturers' and industry standards, PPE*

		• impact of accessories (such as umbilical cords) on operation of equipment • adverse effects on equipment and accessories that can be caused by hazardous substances Ability to: • use own senses to monitor equipment performance • read and interpret information from monitoring and warning systems and operator aids • recognize abnormal performance and conditions • assess deficiencies and respond appropriately • report deficiencies	
2.07	Parks in appropriate location	Knowledge of: • standard operating procedures • applicable legislation • manufacturers' and industry standards • site control measures • designated parking zone • appropriate route to parking zone Ability to: • follow appropriate route to parking zone • park in appropriate location	*Standard operating procedures, copies of legislation, manufacturers' and industry standards, PPE*
2.08	Follows decontamination procedures when removing equipment from site	Knowledge of: • manufacturers' specifications • applicable legislation • standard operating conditions • manufacturers' and industry standards • decontamination procedures for equipment Ability to: • follow decontamination procedures when removing equipment from site	*Standard operating procedures, copies of legislation, manufacturers' and industry standards, PPE*

BLOCK B FIRST RESPONSE
Task 3 Serves as Member of First Response Team

This task is important because it helps to:
- assist with responses to emergencies
- contain emergency situations
- prevent further damage, injury, or contamination

Trends:
- There is increasing recognition of the need for operators to be trained as members of the first response team.

	Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
3.01	Describes role as member of first response team	Knowledge of: • role of operator as member of first response team as clearing access paths for other first responders and assisting in rescue and recovery of life and property, and in demolition and cleanup	
3.02	Obtains information about situation	Knowledge of: • authorities having jurisdiction • information resources, such as fire department, police, regional emergency measures organization • roles and responsibilities of first response team members • personal and equipment limitations • known and potential hazardous substances involved Ability to: • identify those in charge on site • consult with team members about level of risk and possible courses of action • make decisions based on risk assessment	*Manufacturers' manuals and literature, PPE*
3.03	Carries out course of action	Knowledge of: • steps to follow for assigned tasks • safety procedures Ability to: • follow steps for assigned tasks • minimize risk by following safety procedures	*PPE*

Environmental Remediation Equipment Specialist DACUM Chart

Block	Task	Subtask					
A. OPERATING PROCEDURES	**1. Handles Hazardous Substances**	1.01 Follows procedures for exposing buried containers	1.02 Follows procedures for handling containers	1.03 Follow procedures for handling contaminated solids	1.04 Follows procedures for handling contaminated fluids not in containers		
	2. Operates Equipment on Contaminated Sites	2.01 Accesses equipment	2.02 Ensures readiness of equipment and accessories for task	2.03 Follows procedures for handling hazardous substances	2.04 Follows procedures for hauling hazardous substances	2.05 Operates equipment and accessories	2.06 Monitors equipment and accessory performance and condition
		2.07 Parks in appropriate location	2.08 Follows decontaminatio n procedures when removing equipment from site				
B. FIRST RESPONSE	**3. Serves as Member of First Response Team**	3.01 Describes role as member of first response team	3.02 Obtains information about situation	3.03 Carries out course of action			

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The CSC acknowledges all of the subject matter experts who provided their valuable time and efforts toward the definition and validation of these national occupational analyses. Without their combined contributions, the development of these OAs would not have been possible.

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