

National Occupational Standards For Operating Engineers

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April 2005

AGGREGATE PLANT OPERATOR

Table of Contents

INTRODUCTION	2
FOREWORD	3
DEVELOPMENT OF THE OCCUPATIONAL ANALYSIS	4
SCOPE OF THE OCCUPATIONAL ANALYSIS	5
STRUCTURE OF THE OCCUPATIONAL ANALYSIS	6
A. PROFESSIONALISM	
1. Acts Professionally	7
2. Uses Communication Skills	10
B. SAFETY	
3. Interprets Applicable Legislation and Policies	12
4. Works Safely	14
5. Complies with Site Emergency Plan	16
C. PLANT SET-UP AND TAKE-DOWN	
6. Sets up/Mobilizes Plant	18
7. Takes Down/Demobilizes Plant	21
D. AGGREGATE PLANT AND EQUIPMENT	
8. Describes Aggregate Plant and Equipment	23
E. MAINTENANCE	
9. Performs Pre-operational Inspection and Daily Service	25
10. Complies with Scheduled Maintenance Requirements	31
F. OPERATING PROCEDURES	
11. Describes Product and Quality Control	32
12. Operates Plant	33
13. Follows Shut-down Procedures	36
DACUM CHART	37
ACKNOWLEDGEMENTS	40

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 coordination. 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 of 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 PROFESSIONALISM
Task 1 Acts Professionally

This task is important because it helps to:

- present positive image of industry
- demonstrate personal integrity and competence
- instill confidence and maintain relations with general public, site personnel, owners/clients, and their clients
- maintain employment and advance in industry

Trends:

- Employers and employees are placing more emphasis on company/personnel fit in relation to attitudes and values.
- There is less tolerance for unprofessional behaviour, including workplace violence, substance abuse, and harassment.
- There is increased awareness of the importance of a balanced lifestyle.
- There is an increasing demand for knowledgeable and experienced operators that have the interpersonal skills and desire to advance to supervisory and management levels.
- Individuals need to continually upgrade their knowledge and skills because of technological advances and new methodologies.

	Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
1.01	Demonstrates work ethic	<p>Knowledge of:</p> <ul style="list-style-type: none"> • principles of work ethic and expectations, such as be punctual, prepared for work, co-operative, honest, productive, and respectful <p>Ability to:</p> <ul style="list-style-type: none"> • follow principles of work ethic in all situations 	
1.02	Is aware of factors affecting personal health	<p>Knowledge of:</p> <ul style="list-style-type: none"> • factors affecting personal health • own current mental, emotional, and physical state • own limitations • factors/situations/conditions that cause stress in professional and personal life • working conditions on construction site • impact of fatigue on job performance 	
1.03	Resolves problems or disagreements with others	<p>Knowledge of:</p> <ul style="list-style-type: none"> • company policies and procedures • applicable legislation, such as harassment • conflict resolution techniques 	

Ability to:

- communicate effectively
- use calm approach
- be open-minded and flexible
- determine cause of problem or disagreement
- discuss and resolve issues
- walk away from conflict if necessary

1.04 Participates in professional development

Knowledge of:

- industry trends
- areas requiring ongoing learning, such as new equipment, technologies, techniques, and industry practices

Ability to:

- assess own knowledge and skills
- acquire information about training opportunities
- learn through various methods, such as on-the-job training, reading, courses, co-workers

1.05 Works with others

Knowledge of:

- own role and responsibilities
- roles and responsibilities of others in industry

Ability to:

- work as team member to achieve common goals
- keep open mind
- participate in workplace meetings
- communicate clearly and accurately
- co-ordinate job-related activities
- co-operate with others

1.06 Works independently

Knowledge of:

- company policies and procedures, such as work-alone plan
- applicable legislation, such as responsibilities of supervisor/owner and site personnel
- own role and responsibilities
- own capabilities and limitations
- work assignment, location, and working conditions

Ability to:

- confirm and clarify assignment
- take initiative, such as anticipate and prepare for next steps in job
- identify and resolve potential and actual problems
- communicate with other site personnel
- co-ordinate work with others
- complete assignment

BLOCK A PROFESSIONALISM
Task 2 Uses Communication Skills

This task is important because it helps to:

- work safely and efficiently
- reduce errors and miscommunication
- comply with applicable legislation and insurance requirements
- represent company and industry in professional manner
- summon help in emergency
- prevent injury, save lives, and limit damage to equipment and property

Trends:

- There is an increased use of communication devices to increase productivity and improve safety.
- There is an increasing legislative requirement for documentation and participation in job site meetings.

	Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
2.01	Speaks and listens effectively	Knowledge of: <ul style="list-style-type: none">• importance of effective communication• industry terms• roles of individuals on job site, such as supervisor, inspector, other tradespeople Ability to: <ul style="list-style-type: none">• listen carefully to what is said• confirm understanding, such as repeat or paraphrase instructions• communicate message clearly and accurately to others• exchange information with others, such as supervisor, signaller, general public, inspectors, other operators and tradespeople	
2.02	Uses documentation	Knowledge of: <ul style="list-style-type: none">• company policies and procedures• applicable legislation, such as Access to Information Act• own role and responsibilities• types of documentation required, such as log books, safety reports, maintenance reports, inspection reports, time cards• importance of complete, legible, and accurate documentation• where documentation is stored• industry terms	

Ability to:

- access and store documents as required
- provide complete, legible, and accurate information in documents in timely manner
- read and interpret equipment inspection documentation from previous shifts before conducting pre-operational inspection

2.03 Communicates using signals

Knowledge of:

- company policies and procedures
- applicable legislation
- role and responsibilities of signallers
- signallers on job site
- audible and warning signals used on job site
- hand signals

Ability to:

- identify and work with signallers
- communicate using audible signals, such as back-up alarm, site emergency horn
- communicate using hand signals

2.04 Uses electronic communication equipment

Knowledge of:

- manufacturers' specifications and operating instructions
- company policies and procedures
- applicable legislation
- types of communication equipment used on job site

Communication devices

Ability to:

- check communication devices to verify operating condition, such as complete radio check
- deliver and receive messages using communication equipment
- follow communication protocol

BLOCK B SAFETY
Task 3 Interprets Applicable Legislation and Policies

This task is important because it helps to:

- ensure health and safety of workers and public
- comply with applicable legislation
- prevent damage to property and environment
- decrease potential of litigation

Trends:

- There is an increasing amount of training and documentation required by amended and new legislation.
- There is an increasing demand for standardized national legislation to reduce confusion and duplication caused by differences between jurisdictions. Lack of standardized legislation may lead to fatalities and accidents, and to damage of equipment, property, and the environment.
- There is an increasing expectation that operators will be knowledgeable about relevant legislation.

	Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
3.01	Interprets federal, provincial/territorial, and municipal legislation	<p>Knowledge of:</p> <ul style="list-style-type: none"> • applicable federal, provincial/territorial, and municipal legislation, such as Highway Traffic Act, Occupational Health and Safety Act • where relevant legislation can be located <p>Ability to:</p> <ul style="list-style-type: none"> • locate relevant sections in legislation • read legislation • seek clarification of legislation 	
3.02	Interprets permits, licences, and insurance requirements	<p>Knowledge of:</p> <ul style="list-style-type: none"> • applicable permits, licences, and insurance requirements • authorities having jurisdiction <p>Ability to:</p> <ul style="list-style-type: none"> • locate permits, licences, and insurance documentation, such as over-dimensional permits, ground disturbance permits, air emissions permits, water use permits • read permits, licences, and insurance documentation • seek clarification on permits, licences, and insurance documentation 	<i>Permits, licences, insurance documentation</i>

3.03 Interprets environmental legislation

Knowledge of:

- relevant environmental legislation
- authorities having jurisdiction, such as department of fisheries, ministry of environment, municipality
- potential environmental damage caused by construction activities

Ability to:

- locate applicable permits on job site
- read environmental legislation
- seek clarification of environmental legislation

3.04 Interprets company policies and procedures

Knowledge of:

- where copies of company policies and procedures can be located

Ability to:

- read company policies and procedures
- stay current with company policies and procedures
- seek clarification on company policies and procedures

BLOCK B SAFETY
Task 4 Works Safely

This task is important because it helps to:

- protect self and others from injury or death
- comply with applicable legislation
- prevent damage to equipment and environment
- reduce unscheduled downtime

Trends:

- Legislation relating to PPE and training is frequently being amended to protect employees, employers, the environment, and the general public.
- The industry is involved in improving safety on job sites to reduce accidents.

	Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
4.01	Uses personal protective equipment (PPE)	<p>Knowledge of:</p> <ul style="list-style-type: none"> • company policies and procedures • applicable legislation • PPE required/recommended by manufacturers' manuals • PPE required for construction sites, such as footwear, hard hats, safety vests, safety glasses • PPE required for specific conditions, such as breathing apparatus for hazardous breathing conditions, dielectric boots and gloves for protection from electrical shock • inspection, care, and use of PPE <p>Ability to:</p> <ul style="list-style-type: none"> • identify PPE required for job site and situation • ensure PPE meets safety standard requirements, such as Canadian Standards Association (CSA) • inspect PPE for damage, and repair or replace as necessary • ensure PPE fits correctly 	<p><i>Steel-toed footwear, hard hat, safety gloves, appropriate safety glasses, high visibility vest, hearing protection, breathing apparatus, fall protection, and other applicable PPE</i></p>
4.02	Completes required health and safety training	<p>Knowledge of:</p> <ul style="list-style-type: none"> • manufacturers' specifications, such as recommended operating procedures • company policies and procedures • applicable legislation 	

Ability to:

- take required health and safety training, such as confined space entry, Workplace Hazardous Materials Information System (WHMIS), first aid, cardiopulmonary resuscitation (CPR)

BLOCK B SAFETY
Task 5 Complies with Site Emergency Plan

This task is important because it helps to:

- protect self
- prevent property damage
- ensure safety of public and job site personnel
- evacuate and secure area efficiently and effectively

Trends:

- Emergency exercises and preparedness activities are becoming more common.

	Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
5.01	Prepares for emergencies	<p>Knowledge of:</p> <ul style="list-style-type: none"> • manufacturers' specifications, such as equipment emergency shut-down procedure • company policies and procedures • site emergency response plan, such as evacuation routes, procedures, contact protocol • types of fires, i.e., Class A, B, C, and D • types of extinguishers • potential and actual hazards on work site • location of fire extinguishers and first aid stations (on equipment and site) and how to use them • inspection requirements for safety equipment and supplies, such as fire extinguisher, first aid kit <p>Ability to:</p> <ul style="list-style-type: none"> • take emergency response training, such as emergency response exercises, first aid, CPR 	<p><i>Site emergency response plan, fire extinguishers, fire blankets, respirators, masks, fire hoses, first aid kits, stretchers, WHMIS book, and other related tools and gear</i></p>
5.02	Responds to emergencies	<p>Knowledge of:</p> <ul style="list-style-type: none"> • manufacturers' specifications, such as equipment emergency shut-down procedure • company policies and procedures • site emergency response plan, such as evacuation routes, procedures, contact protocol • types of fires, i.e., Class A, B, C, and D • types of extinguishers • potential and actual hazards on work site • location of fire extinguishers and first aid stations (on equipment and site) and how to use them 	<p><i>Fire extinguishers, fire blankets, respirators, masks, fire hoses, first aid kits, stretchers, and other related tools and gear</i></p>

- inspection requirements for safety equipment and supplies, such as fire extinguisher, first aid kit

Ability to:

- follow emergency plan
- communicate or follow instructions
- assess risks and determine course of action
- operate emergency equipment and supplies

BLOCK C PLANT SET-UP AND TAKE-DOWN
Task 6 Sets up/Mobilizes Plant

This task is important because it helps to:

- ensure that plant is in safe operating condition
- meet legislative and other requirements
- ensure that plant is well organized for safe, efficient, and profitable operation

Trends:

- Consulting with the local community during the planning stages of the plant set-up process is being done more often.
- There are increased concerns and sensitivities regarding environmental issues.
- Equipment and technology on equipment are becoming increasingly complex.

	Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
6.01	Conducts site inspection	<p>Knowledge of:</p> <ul style="list-style-type: none"> • manufacturers' specifications for equipment • company policies and procedures • applicable legislation • local zoning and permit/licensing requirements • environmental concerns • requirements for plant layout, such as footings, drawings • stockpiling requirements • ground conditions • traffic patterns • location of utilities, such as water, electricity • prevailing wind conditions • access and exit points of site <p>Ability to:</p> <ul style="list-style-type: none"> • communicate with community and authorities having jurisdiction to determine zoning requirements, permit/licensing requirements, location of utilities, and environmental conditions and concerns • determine if site is suitable for plant, such as identify suitable water supply • position plant for optimal operation 	<i>Manufacturers' manuals and literature, PPE, site plan</i>

Aggregate Plant Operator Occupational Analysis

6.02	Arranges for planning and site preparation	<p>Knowledge of:</p> <ul style="list-style-type: none">• manufacturers' specifications for equipment• company policies and procedures• applicable legislation• environmental concerns• ground conditions, such as level area, compaction• location of utilities, such as power, water• location of emergency services, such as hospital, fire department <p>Ability to:</p> <ul style="list-style-type: none">• co-ordinate site activities for preparation of site• determine where to set components of plant on site	<p><i>Manufacturers' manuals and literature, PPE, site-specific documentation (such as site plan, permits/licences, environmental impact study)</i></p>
6.03	Co-ordinates transporting and unloading of equipment	<p>Knowledge of:</p> <ul style="list-style-type: none">• manufacturers' specifications• company policies and procedures• applicable requirements and legislation, such as permits affecting transport of equipment• transportation and handling equipment• spill kit procedures <p>Ability to:</p> <ul style="list-style-type: none">• organize equipment (such as crane, transport vehicle) needed for transporting and unloading plant equipment• identify where plant equipment should be located on site• use spill kit	<p><i>Manufacturers' manuals and literature, PPE, site-specific documentation, basic tools and supplies, spill kit</i></p>
6.04	Co-ordinates equipment set-up	<p>Knowledge of:</p> <ul style="list-style-type: none">• manufacturers' specifications• company policies and procedures• applicable legislation• plant set-up procedures, such as where components are placed on site and in what order• placement of and requirements for footings• spill kit procedures <p>Ability to:</p> <ul style="list-style-type: none">• arrange for applicable inspections• form and pour footings• co-ordinate equipment set-up• use spill kit	<p><i>Manufacturers' manuals and literature, PPE, site-specific documentation, basic tools and supplies, spill kit</i></p>

6.05 Starts up plant

Knowledge of:

- manufacturers' specifications
- company policies and procedures
- applicable legislation
- site plan

Ability to:

- start up and test equipment

Manufacturers' manuals and literature, PPE, site-specific documentation, basic tools and supplies, spill kit

BLOCK C PLANT SET-UP AND TAKE-DOWN
Task 7 Takes Down/Demobilizes Plant

This task is important because it helps to:

- protect environment
- meet legislative and other requirements
- facilitate next set-up of plant
- leave site in safe condition
- protect equipment from damage and theft
- protect public

Trend:

- There are increased concerns and sensitivities regarding environmental issues.
- Equipment and technology on equipment are becoming increasingly complex.

	Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
7.01	Takes down/demobilizes plant	<p>Knowledge of:</p> <ul style="list-style-type: none"> • manufacturers' specifications • company policies and procedures • applicable legislation • procedures and requirements for disassembly of plant equipment • spill kit procedures <p>Ability to:</p> <ul style="list-style-type: none"> • ensure that all aggregate materials are removed from plant equipment and storage facilities • disconnect and disassemble plant equipment in proper sequence • co-ordinate disconnection of utilities • clean plant equipment • drain water lines and pumps • use spill kit 	<i>Manufacturers' manuals and literature, PPE, basic tools and supplies, spill kit, site plan</i>
7.02	Co-ordinates loading and transporting of equipment	<p>Knowledge of:</p> <ul style="list-style-type: none"> • manufacturers' specifications • company policies and procedures • applicable legislation, such as permits affecting transport of equipment • transportation and handling equipment • applicable transporting requirements • next destination of plant equipment • route to next destination • spill kit procedures 	<i>Manufacturers' manuals and literature, PPE, basic tools and supplies, spill kit, site plan</i>

Ability to:

- organize equipment (such as crane, transport vehicle) needed for loading and transporting plant equipment
- ensure that plant equipment is properly loaded and transported to next destination
- use spill kit

7.03 Secures equipment for storage

Knowledge of:

- manufacturers' specifications
- company policies and procedures
- applicable legislation
- storage and security requirements
- blocking

Manufacturers' manuals and literature, PPE, basic tools and supplies, blocking, site plan

Ability to:

- remove or protect sensitive parts of equipment, such as programmable logic controls (PLCs)
- secure equipment in storage location

7.04 Identifies repairs needed prior to re-mobilization

Knowledge of:

- manufacturers' specifications
- company policies and procedures

Manufacturers' manuals and literature, PPE, maintenance records

Ability to:

- conduct inspections
- record repairs needed before next remobilization

7.05 Co-ordinates site cleanup

Knowledge of:

- manufacturers' specifications
- company policies and procedures
- applicable legislation
- acceptable condition of site according to pre-arranged agreements
- handling of hazardous materials

Manufacturers' manuals and literature, PPE, applicable documentation (such as contract, site plan, permit)

Ability to:

- communicate with subcontractors and authorities having jurisdiction
- restore site to acceptable condition according to pre-arranged agreements, such as replace topsoil, remove ground-leveling materials, remove equipment, seed grass)
- perform final check on site to confirm that nothing has been left

BLOCK D AGGREGATE PLANT AND EQUIPMENT
Task 8 Describes Aggregate Plant and Equipment

This task is important because it helps to:

- ensure safe and efficient operation of plant
- optimize quality of aggregate products
- reduce unscheduled plant downtime

Trend:

- New equipment (such as rotary impact crushers, high-speed cones) is improving productivity and product quality.
- Equipment is becoming more automated.
- There is an increased demand to meet more stringent product specifications, such as smaller washed aggregate.

	Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
8.01	Describes types of aggregate plants	Knowledge of: <ul style="list-style-type: none"> • crushing, screening, and washing plants, both stationary and mobile 	
8.02	Describes typical stages of aggregate plants	Knowledge of: <ul style="list-style-type: none"> • feed stage • crushing stage • screening stage • washing stage • stockpiling stage • outloading stage 	
8.03	Describes equipment in aggregate plants	Knowledge of: <ul style="list-style-type: none"> • crushers (such as cone, jaw, impactor, rolls), components, and functions • conveyors (such as belt, drag type), components, and functions • screens (such as single, double, triple-deck), components, and functions • washers (such as log, classifiers, spray bar), components, and functions • hoppers (also known as bins), components, and functions • water pumps, components, and functions • metal detectors, components, and functions • magnets, components, and functions • rock-breakers/clam-pickers, components, and functions • equipment in clarifying system (such as pumps, filters, containers), components, and functions 	

- 8.04 Describes equipment operating systems
- Knowledge of:
- hydraulic systems, components, and functions of all equipment
 - electrical systems, components, and functions of all equipment
 - lubrication systems, components, and functions of all equipment
 - pneumatic systems, components, and functions of all equipment
 - mechanical systems, components, and functions of all equipment
- 8.05 Describes basic tools and supplies
- Knowledge of:
- manufacturers' specifications for tools
 - basic tools required, such as screwdriver, hammer, assorted wrenches, self-locking pliers, grease gun, tape measure, hand scraper, level, sledgehammer, ratchet sets, sockets, shovel, screen gauge (i.e., sizing equipment)
 - basic power tools required, such as welders, electrical and pneumatic impact wrenches, grinders, power-jacks, drills, cutting torches, pressure washer
 - basic supplies required, such as window cleaner, rags, oil, grease, locks, tags

BLOCK E MAINTENANCE
Task 9 Performs Pre-operational Inspection and Daily Service

This task is important because it helps to:

- ensure continuous and safe operation of plant
- meet manufacturers' specifications, company policies and procedures, and applicable legislation
- prevent damage to equipment
- reduce unscheduled downtime

Trends:

N/A

	Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
9.01	Inspects safety equipment	<p>Knowledge of:</p> <ul style="list-style-type: none"> • manufacturers' specifications • company policies and procedures • applicable legislation • required safety equipment, such as reflectors, fire extinguisher, pylons, decals • normal operating conditions <p>Ability to:</p> <ul style="list-style-type: none"> • ensure that safety equipment is present and securely mounted • identify service needs, defects, and hazardous conditions through visual inspection • arrange for repair or replacement of defective components, such as fire extinguisher 	<p><i>Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, safety equipment</i></p>
9.02	Inspects and services operator station	<p>Knowledge of:</p> <ul style="list-style-type: none"> • manufacturers' specifications • company policies and procedures • applicable legislation • operator station and components, such as seat, instrument panel, communication devices • normal operating conditions <p>Ability to:</p> <ul style="list-style-type: none"> • locate and identify controls • identify missing or defective components or controls • clean windows and mirrors • adjust mirrors • ensure that controls are in correct position for starting • perform or arrange for repair or replacement of defective components 	<p><i>Manufacturers' manuals and literature, equipment maintenance documentation, PPE</i></p>

Aggregate Plant Operator Occupational Analysis

9.03	Inspects and services power sources	<p>Knowledge of:</p> <ul style="list-style-type: none">• manufacturers' specifications• company policies and procedures• applicable legislation• power sources, components (such as generator, switch gear, motor), and functions <p>Ability to:</p> <ul style="list-style-type: none">• locate components to be inspected• identify service needs, defects, and hazardous conditions through visual inspection, such as check that breakers are in on position on hard-wired system, check loose wires on genset system• select and use appropriate tools• perform basic maintenance on genset, such as add fluids, grease bearings• perform or arrange for repair or replacement of defective components	<p><i>Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, flashlight</i></p>
9.04	Inspects and services crushers	<p>Knowledge of:</p> <ul style="list-style-type: none">• manufacturers' specifications• company policies and procedures• applicable legislation• normal operating conditions• crushers, components, and functions• spill kit procedures <p>Ability to:</p> <ul style="list-style-type: none">• locate components to be inspected• identify service needs, defects, and hazardous conditions (such as leaks, obstructions) through visual inspection• select and use appropriate tools• perform basic maintenance, such as check fluid levels• use spill kit• perform or arrange for repair or replacement of defective components, such as worn parts	<p><i>Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, spill kit, hoses, hydraulic oil</i></p>

Aggregate Plant Operator Occupational Analysis

9.05	Inspects and services conveyor systems	<p>Knowledge of:</p> <ul style="list-style-type: none">• manufacturers' specifications• company policies and procedures• applicable legislation• conveyor systems, components [such as belts (V and flat), rollers, reducer gear box, electrical drive system], and functions <p>Ability to:</p> <ul style="list-style-type: none">• locate components to be inspected• identify service needs, defects, and hazardous conditions (such as broken cable to emergency stop, missing guards) through visual inspection• select and use appropriate tools• perform basic maintenance, such as clean under conveyors• perform or arrange for repair or replacement of defective components, such as belts, rollers, bearings	<p><i>Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, flashlight</i></p>
9.06	Inspects and services screens	<p>Knowledge of:</p> <ul style="list-style-type: none">• manufacturers' specifications• company policies and procedures• applicable legislation• screens (also known as screeners), components, and functions <p>Ability to:</p> <ul style="list-style-type: none">• locate components to be inspected• identify service needs, defects, and hazardous conditions through visual inspection• select and use appropriate tools• perform basic maintenance, such as remove build-up on screen cloth• perform or arrange for repair or replacement of defective components, such as screen cloth, drive belt	<p><i>Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, flashlight</i></p>

Aggregate Plant Operator Occupational Analysis

9.07	Inspects and services hoppers	<p>Knowledge of:</p> <ul style="list-style-type: none">• manufacturers' specifications• company policies and procedures• applicable legislation• hoppers, components, and functions <p>Ability to:</p> <ul style="list-style-type: none">• locate components to be inspected• identify service needs, defects, and hazardous conditions through visual inspection• select and use appropriate tools• perform basic maintenance, such as grease bushings, add pneumatic oil• perform or arrange for repair or replacement of defective components, such as gate	<p><i>Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, flashlight</i></p>
9.08	Inspects and services self-cleaning magnets	<p>Knowledge of:</p> <ul style="list-style-type: none">• manufacturers' specifications• company policies and procedures• applicable legislation• self-cleaning magnets, components, and functions <p>Ability to:</p> <ul style="list-style-type: none">• locate components to be inspected• identify service needs, defects, and hazardous conditions through visual inspection• select and use appropriate tools• perform basic maintenance, such as grease bearings and rollers• perform or arrange for repair or replacement of defective components, such as belts, cleats•	<p><i>Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, flashlight</i></p>
9.09	Inspects and services rock-breakers and clam-pickers	<p>Knowledge of:</p> <ul style="list-style-type: none">• manufacturers' specifications• company policies and procedures• applicable legislation• rock-breakers and clam-pickers, components, and functions <p>Ability to:</p> <ul style="list-style-type: none">• locate components to be inspected• identify service needs, defects, and hazardous conditions through visual inspection• select and use appropriate tools	<p><i>Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, flashlight</i></p>

- perform basic maintenance, such as grease bearings and bushings
- perform or arrange for repair or replacement of defective components, such as hoses, points

9.10 Inspects and services washers and clarifying system

Knowledge of:

- manufacturers' specifications
- company policies and procedures
- applicable legislation
- spill kit procedures
- washers, components, and functions

Ability to:

- locate components to be inspected, such as water clarification plant
- identify service needs, defects, and hazardous conditions through visual inspection
- select and use appropriate tools
- perform basic maintenance, such as grease bearings, clean water nozzles
- use spill kit
- perform or arrange for repair or replacement of defective components, such as worn parts

Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, flashlight, spill kit

9.11 Inspects and services dust control system

Knowledge of:

- manufacturers' specifications
- company policies and procedures
- applicable legislation
- dust control system, components, and functions

Ability to:

- locate components to be inspected
- identify service needs, defects, and hazardous conditions (such as plugged water nozzles, broken water lines) through visual inspection
- select and use appropriate tools
- perform basic maintenance, such as clean water nozzles
- perform or arrange for repair or replacement of defective components, such as hoses

Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, flashlight

9.12	Inspects and services storage and load-out systems	<p>Knowledge of:</p> <ul style="list-style-type: none">• manufacturers' specifications• company policies and procedures• applicable legislation• spill kit procedures• storage and load-out systems, components, and functions <p>Ability to:</p> <ul style="list-style-type: none">• locate components to be inspected• identify service needs, defects, and hazardous conditions (such as ice, worn conveyor belts) through visual inspection• select and use appropriate tools• perform basic maintenance, such as grease bearings• use spill kit• perform or arrange for repair or replacement of defective components, such as bearings, drive belts, rollers	<i>Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, flashlight, spill kit</i>
9.13	Starts up plant and checks monitoring and warning systems	<p>Knowledge of:</p> <ul style="list-style-type: none">• manufacturers' specifications• company policies and procedures• applicable legislation• impact of weather and seasonal conditions on equipment functions and fluids <p>Ability to:</p> <ul style="list-style-type: none">• check panel to ensure that controls are in correct position for starting• start genset and activate cross-over switch• turn on control panel power• check monitoring and warning systems• take scale readings• communicate with site personnel, such as ground personnel, water clarifier operator• start components in correct order manually or through computer controls	<i>Manufacturers' manuals and literature, equipment maintenance documentation, PPE</i>

BLOCK E MAINTENANCE
Task 10 Complies with Scheduled Maintenance Requirements

This task is important because it helps to:

- ensure continuous and safe operation of equipment
- validate manufacturers' equipment warranties
- prevent damage to equipment
- reduce unscheduled downtime

Trends:

- Increasingly, maintenance records are important to maintaining cost efficiency.

Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
10.01 Arranges for or performs scheduled maintenance	<p>Knowledge of:</p> <ul style="list-style-type: none"> • manufacturers' specifications • company policies and procedures • applicable legislation • factors that affect scheduled maintenance, such as where equipment is being used, weather, seasonal conditions <p>Ability to:</p> <ul style="list-style-type: none"> • read indicators that signal need for replacement, such as oil filter on cone crusher • read maintenance records and documentation relating to service, such as log books, repair lists • select and use appropriate tools • arrange for or perform scheduled maintenance, such as replace worn parts • comply with safety requirements, such as confined space, lock-out procedures 	<p><i>Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, fluids, filters</i></p>

BLOCK F OPERATING PROCEDURES
Task 11 Describes Product and Quality Control

This task is important because it helps to:

- produce quality aggregates
- meet job specifications and government standards

Trend:

- Consumers and government standards require more stringent specifications for aggregate.

Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
11.01 Describes properties, sources, and uses of aggregate	Knowledge of: <ul style="list-style-type: none"> • grading and quality standards for mineral aggregates • classifications for aggregate and concrete paving mixes • sources of aggregate, such as pits, quarries • uses of aggregate, such as paving aggregate, concrete materials, backfilling, road bases, shore erosion, breakwaters 	
11.02 Describes types and specifications of aggregates	Knowledge of: <ul style="list-style-type: none"> • types of aggregates, such as different classifications and gradations of stone and sand, both natural and manufactured • specifications of aggregates, such as drainage, compaction, stability, hardness 	
11.03 Describes quality control requirements	Knowledge of: <ul style="list-style-type: none"> • job specifications • aggregate quality and consistency, such as fractures, gradation • causes and remedies for typical quality control problems, such as incorrect gradation, percentage clay 	
11.04 Describes sampling and testing procedures	Knowledge of: <ul style="list-style-type: none"> • sampling procedures, such as belt and stockpile samples • testing procedures, such as compaction test, sieve test (i.e., wash and dry), percolation test, LA [JS1]abrasion (i.e., for hardness of stone), tensile strength rating (TSR) 	

BLOCK F OPERATING PROCEDURES
Task 12 Operates Plant

This task is important because it helps to:

- work productively and safely
- prevent damage to property and equipment
- fulfill job specifications

Trends:

- Consumers and government standards require more stringent specifications for aggregate.

	Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
12.01	Starts feed process	<p>Knowledge of:</p> <ul style="list-style-type: none"> • manufacturers' specifications • company policies and procedures • applicable legislation • daily work orders <p>Ability to:</p> <ul style="list-style-type: none"> • communicate with equipment operators and ground personnel before starting feed • activate feed process 	<i>Manufacturers' manuals and literature, PPE, communication devices</i>
12.02	Monitors and regulates raw aggregate feed	<p>Knowledge of:</p> <ul style="list-style-type: none"> • manufacturers' specifications • company policies and procedures • applicable legislation • daily work orders • correct flow of feed • capacity of plant <p>Ability to:</p> <ul style="list-style-type: none"> • monitor scales and meters • use information from product tests to make adjustments, such as change crusher sizing, use different sized screens 	<i>Manufacturers' manuals and literature, PPE</i>
12.03	Monitors operation of manually-controlled plant	<p>Knowledge of:</p> <ul style="list-style-type: none"> • manufacturers' specifications • company policies and procedures • applicable legislation • daily work orders • test results <p>Ability to:</p> <ul style="list-style-type: none"> • monitor control panel 	<i>Manufacturers' manuals and literature, PPE, communication devices</i>

		<ul style="list-style-type: none"> • check monitors to ensure that equipment is operating properly • monitor production spread for actual or potential problems • perform ongoing cleaning, such as clean spills • communicate with ground personnel 	
12.04	Monitors operation of computer-controlled plant	<p>Knowledge of:</p> <ul style="list-style-type: none"> • manufacturers' specifications • company policies and procedures • applicable legislation • computer control system and how it operates • daily work orders • test results <p>Ability to:</p> <ul style="list-style-type: none"> • enter and adjust values in computer system • read and interpret computer displays • compare work orders to information from computer displays • monitor production spread for actual or potential problems • perform ongoing cleaning, such as clean spills • communicate with ground personnel 	<i>Manufacturers' manuals and literature, PPE, communication devices</i>
12.05	Monitors dust control system	<p>Knowledge of:</p> <ul style="list-style-type: none"> • manufacturers' specifications • company policies and procedures • applicable legislation • dust control system and how it operates <p>Ability to:</p> <ul style="list-style-type: none"> • activate dust control system, such as start pump • check dust levels visually • adjust dust control system 	<i>Manufacturers' manuals and literature, PPE</i>
12.06	Troubleshoots problems	<p>Knowledge of:</p> <ul style="list-style-type: none"> • manufacturers' specifications • company policies and procedures • normal operating characteristics <p>Ability to:</p> <ul style="list-style-type: none"> • identify problems and possible solutions • communicate problems accurately to others, such as maintenance personnel 	<i>Manufacturers' manuals and literature, PPE, basic tools and supplies, flashlight, communication devices</i>

Aggregate Plant Operator Occupational Analysis

12.07	Monitors amounts of raw and finished aggregate	Knowledge of: <ul style="list-style-type: none">• company policies and procedures• types and specifications of aggregate Ability to: <ul style="list-style-type: none">• monitor amounts of raw and finished aggregate in stock• communicate with appropriate person to order raw aggregate	<i>PPE</i>
12.08	Stockpiles materials	Knowledge of: <ul style="list-style-type: none">• manufacturers' specifications for equipment• company policies and procedures• daily work orders• procedures for stockpiling materials, such as set at clean location• characteristics of materials, such as segregation• sorting and separating of materials• prevailing wind patterns Ability to: <ul style="list-style-type: none">• stockpile materials as required by daily work orders• operate stacker	<i>Manufacturers' manuals and literature, PPE</i>

BLOCK F OPERATING PROCEDURES
Task 13 Follows Shut-down Procedures

This task is important because it helps to:

- improve safety and efficiency
- ensure that plant is in proper running order for next operation
- reduce unscheduled downtime

Trend:

N/A

	Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
13.01	Shuts down equipment	<p>Knowledge of:</p> <ul style="list-style-type: none"> • manufacturers' specifications • company policies and procedures • applicable legislation <p>Ability to:</p> <ul style="list-style-type: none"> • stop feed • allow systems to clean out • follow sequential procedures for shut down • record scale readings • record production volumes for shift • perform cleaning • perform housekeeping duties at operator station 	<i>Manufacturers' manuals and literature, PPE</i>
13.02	Performs post-operational service of equipment	<p>Knowledge of:</p> <ul style="list-style-type: none"> • manufacturers' specifications • company policies and procedures • applicable legislation <p>Ability to:</p> <ul style="list-style-type: none"> • conduct visual inspection of equipment • lubricate equipment • perform or arrange for repair or replacement of defective components • communicate problems to appropriate personnel, such as maintenance 	<i>Manufacturers' manuals and literature</i>

Aggregate Plant Operator DACUM Chart

Block	Task	Subtask					
A. PROFESSIONALISM	1. Acts Professionally	1.01 Demonstrates work ethic	1.02 Is aware of factors affecting personal health	1.03 Resolves problems or disagreements with others	1.04 Participates in professional development	1.05 Works with others	1.06 Works independently
	2. Uses Communication Skills	2.01 Speaks and listens effectively	2.02 Uses documentation	2.03 Communicates using signals	2.04 Uses electronic communication equipment		
B. SAFETY	3. Interprets Applicable Legislation and Policies	3.01 Interprets federal, provincial/territorial, and municipal legislation	3.02 Interprets permits, licenses, and insurance requirements	3.03 Interprets environmental legislation	3.04 Interprets company policies and procedures		
	4. Works Safely	4.01 Uses personal protective equipment (PPE)	4.02 Completes required health and safety training				
	5. Complies with Site Emergency Plan	5.01 Prepares for emergencies	5.02 Responds to emergencies				

Aggregate Plant Operator DACUM Chart

Block	Task	Subtask					
C. PLANT SET-UP AND TAKE-DOWN	6. Sets Up/Mobilizes Plant	6.01 Conducts site inspection	6.02 Arranges for planning and site preparation	6.03 Co-ordinates transporting and unloading of equipment	6.04 Co-ordinates equipment set-up	6.05 Starts up plant	
	7. Takes Down/Demobilizes Plant	7.01 Takes down/demobilizes plant	7.02 Co-ordinates loading and transporting of equipment	7.03 Secures equipment for storage	7.04 Identifies repairs needed prior to re-mobilization	7.05 Co-ordinates site cleanup	
D. AGGREGATE PLANTS AND EQUIPMENT	8. Describes Aggregate Plant and Equipment	8.01 Describes types of aggregate plants	8.02 Describes typical stages of aggregate plants	8.03 Describes equipment in aggregate plants	8.04 Describes equipment operating systems	8.05 Describes basic tools and supplies	
E. MAINTENANCE	9. Performs Pre-operational Inspection and Daily Service	9.01 Inspects safety equipment	9.02 Inspects and services operator station	9.03 Inspects and services power sources	9.04 Inspects and services crushers	9.05 Inspects and services conveyor systems	9.06 Inspects and services screens
		9.07 Inspects and services hoppers	9.08 Inspects and services self-cleaning magnets	9.09 Inspects and services rock-breakers and clam-pickers	9.10 Inspects and services washers and clarifying system	9.11 Inspects and services dust control system	9.12 Inspects and services storage and load-out systems
		9.13 Starts up plant and checks monitoring and warning systems					

Aggregate Plant Operator DACUM Chart

Block	Task	Subtask					
E. MAINTENANCE, con'd	10. Complies with Scheduled Maintenance Requirements	10.01 Arranges for or performs scheduled maintenance					
F. OPERATING PROCEDURES	11. Describes Product and Quality Control	11.01 Describes properties, sources, and uses of aggregate	11.02 Describes types and specifications of aggregates	11.03 Describes quality control requirements	11.04 Describes sampling and testing procedures		
	12. Operates Plant	12.01 Starts feed process	12.02 Monitors and regulates raw aggregate feed	12.03 Monitors operation of manually-controlled plant	12.04 Monitors operation of computer-controlled plant	12.05 Monitors dust control system	12.06 Troubleshoots problems
		12.07 Monitors amounts of raw and finished aggregate	12.08 Stockpiles materials				
	13. Follows Shut-down Procedures	13.01 Shuts down equipment	13.02 Performs post-operational service of equipment				

Acknowledgements

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.

Utilities:

Dave Jurasek, ON
George Lawrence, ON
Allan MacDonald, ON
Shawn McAdam, NB
Hilford Morrell, AB
Rae Munroe, ON
Dave “Chatter” Prosofsky, AB
Paul Weaver, AB

Material Handling:

Bernie Elliott, ON
Alain Jacques, QC
Frank Jones, BC
Bruno Malbasa, MB
Shawn McAdam, NB
John McIsaac, BC
Rae Munroe, ON
Jim Oleksyn, SK
Bob Raymack, MB
Terry Robichaud, NB
Bob Tytko, ON

Grading:

Guenther Bott, ON
Gerry Chouinard, QC
Alain Jacques, QC
Grant Labrash, BC
Richard Lagace, NB
Blair Lentz, ON
Rae Munroe, ON
Daryl Sweetland, MB
Darrell Tremblay, BC
Ron Ward, ON

Crane:

Harry Boon, NB
Kevin Caines, NL
Steve Deady, ON
John Doherty, MB
Joe Dowdall, ON
Charlie Eddy, NL
Oneil Lapointe, ON
Marty McDonnell, AB

Craig McIntosh, BC
Rae Munroe, ON
Len Phelan, BC
Len Poitras, SK
Gary Snow, NL

Plant Operations:

Reynold Amey, BC
Roger Beck, NS
Mervyn Benson, NS
Vito DeFrancesco, ON
Barry Dupres, MB
Jeff Emino, NS
Nelson Fowler, NB
Rae Munroe, ON
Peter Serrette, MB
Kent Walker, ON

HAZMAT:

Bernie Elliott, ON
Frank Jones, BC
Dan O’Keefe, BC
Bruno Malbasa, MB
John McIsaac, BC
Tom Miller, ON
Rae Munroe, ON
Jim Oleksyn, SK
Bob Raymack, MB
Randy Stegner, ON
Bob Tytko, ON

Concrete Pumping:

Mike Bruce, ON
Kevin Caines, NL
Steve Deady, ON
Joe Dowdall, ON
Charlie Eddy, NL
Stan Fortune, ON
Nelson Fowler, NB
Wayne Hannah, ON
Marty McDonnell, AB
Craig McIntosh, BC
Rae Munroe, ON
Len Phelan, BC

Gary Snow, NL

Excavating:

Archie Fontaine, BC
Dan Johnson, MB
Merv Marcynuk, MB
Harold McBride, ON
Robert Middleton, MB
Rae Munroe, ON
Vance Simpson, MB
Jack Walker, AB
Pat Watson, BC
Gary Snow, NL

Hauling:

Alain Jacques, QC
Archie Fontaine, BC
Bruce Hecht, AB
Dan Henry, MB
Richard Lagace, NB
Robert Middleton, MB
Rae Munroe, ON
Shawn Robertson, ON
Larry Smith, NL
Scott Smith, ON
Ernest Wainio, ON

Paving:

David Alves, ON
Gordon Biegler, AB
Orest Cesmistruk, NS
Frank Cardile, AB
Peter Gamble, ON
Rae Munroe, ON
Greg Paciorka, MB
Brian Parisien, MB
Robert Parisien, MB
Todd Paterson, ON
Rick Spaidal, BC