



National Occupational Standards for Environmental Monitors



REGULATORY

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JOB DEFINITION

What are Environmental Monitors?

Environmental monitors (EMs) are individuals who observe the environment and the impacts of human and industrial activities, and communicate this information to various stakeholders. In this way, they may help to mitigate negative environmental impacts.

In addition to the Core document, which contains the core skills needed for all EM careers, there are two areas of specialization for EMs: Regulatory and Research. Regulatory EMs are those individuals who monitor the activities of industry to ensure compliance with land-use or other environmental impact agreements. Research EMs are those individuals who assist technicians/technologists in monitoring various factors of the environment. For instance, they assist in wildlife counts, surveys, or sampling.

Not all environmental monitors have or require all of the skills noted in these sets of standards, however, all skills that environmental monitors in Canada have are captured in the standards.

HOW TO USE THIS DOCUMENT

Category A consists of regulatory competencies that apply to all types of activities. Category B describes additional regulatory competencies required when conducting specific types of land- and water-use activities.

A. CORE

1. POSSESS REGULATORY MONITORING KNOWLEDGE AND SKILLS

A1.1 describe land- and water-use approval processes

- a) be aware of the approval processes required by federal, provincial/territorial, and Aboriginal regulatory agencies
- b) describe the terms and conditions under which a projects' activities can be lawfully carried out, including:
 - land-use approval:
 - a document that outlines the terms and conditions for the land-use activity
 - issued by various regulatory governing bodies, e.g., federal, provincial/territorial, local
 - varies in scope based on the nature, size, location, and phases of the project
 - terms and conditions vary, and may include:
 - location and area
 - timing restrictions
 - use of chemicals and hazardous materials
 - protection of ecosystems including wildlife, fisheries, and habitats
 - reporting requirements
 - reclamation
 - water-use approval:
 - a document that authorizes the use or withdrawal of water and the discharge of wastes
 - issued by various regulatory governing bodies, e.g., federal, provincial/territorial, local
 - varies in scope based on the nature, size, location, and phases of the project
 - terms and conditions vary, and may include:
 - location of sources
 - definitions of the approval, e.g., water quality guidelines, treatment requirements, class of licence
 - quantity, use, or withdrawals
 - maximum discharge limits
 - annual fees
 - testing and reporting protocols
- c) be aware of land ownership, status, and designations, e.g., national parks, migratory bird sanctuaries, crown-owned lands, reserve lands, mineral rights

A. CORE

1. POSSESS REGULATORY MONITORING KNOWLEDGE AND SKILLS

A1.2 describe pre-project activities

- a) planning the project
- b) conducting preliminary community consultations, e.g., limits of acceptable changes
- c) identifying Aboriginal and Treaty rights, land status, stakeholders, and users
- d) integrating local and traditional knowledge:
 - be aware of the impact of traditional knowledge
 - respect confidentiality and security of entrusted information
- e) conducting baseline studies, research, and environmental impact assessments
- f) conducting pre-program reconnaissance:
 - identifying appropriate routing
 - determining cultural and archaeological sites and other areas to avoid in order to minimize impacts on ecosystems
 - conducting aerial surveys
 - taking photographs
 - preparing area maps
- g) meeting requirements of screening, review, and regulatory agencies
- h) attending ongoing community consultations

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A1.3 follow protocol for regulatory monitoring

- a) prepare to monitor the project:
 - identify all personnel involved in the project and their roles, responsibilities, and the lines of authority
 - obtain reporting chain-of-command
 - obtain copies of related documentation
 - review the project description and all relevant documentation to determine allowed activities
 - review emergency response plans
 - collect local and traditional knowledge
 - plan monitoring activities, e.g., routing, methodologies, best practices
 - participate in project planning meetings
 - provide environmental orientation to project personnel, e.g., habitat hazards
 - gather required materials and equipment

A. CORE

1. POSSESS REGULATORY MONITORING KNOWLEDGE AND SKILLS

- b) monitor the project:
 - adhere to traditional protocols
 - follow workplace guidelines, e.g., safety, communications
 - watch for impacts on ecosystems
 - keep up to date with project activities
 - ensure compliance with terms and conditions, e.g., keep documentation on-site
 - record observations of project activities as directed
 - take samples as directed or required
 - respond to changing circumstances
- c) report to stakeholders (e.g., employer, community, industry) as directed, regarding:
 - non-compliance of terms and conditions
 - observations
 - daily and weekly activities
 - issues and concerns
- d) follow up on non-compliance issues as directed by the employer, regulatory agencies, and/or stakeholders:
 - revisit the site to determine whether corrective action has taken place:
 - document results in field notes and on report forms
 - take photographs
 - submit reports to your employer, regulatory agencies, and stakeholders

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A1.4 monitor impacts on ecosystems

- a) use local knowledge of species in the area:
 - be aware of rare floral and faunal species and their habitats
- b) communicate concerns about project activities to your employer, regulatory agencies, and stakeholders
- c) provide information that may require an immediate change in project activities
- d) report observations of new or unexpected occurrences of species to relevant agencies
- e) report inappropriate activities of project personnel to your employer, regulatory agencies, and stakeholders, e.g., illegal hunting, feeding, or harassment of wildlife

A. CORE

2. MONITOR SUPPORT ACTIVITIES

A2.1 describe clearing of land

- a) the removal and/or displacement of trees, brush, and debris to clear an area for the construction of a work site or support activities
- b) involves the use of a variety of equipment

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A2.2 monitor clearing of land

- a) ensure compliance to all project terms and conditions, including:
 - seasonal restrictions
 - use of correct tools and equipment
 - cutting and piling of all salvageable wood
 - removing oversized stumps
 - appropriate placement of windrows
 - impact on the environment, and in particular, on water courses and riparian zones
 - proper removal and storage of snow, topsoil, and sub-surface materials
 - staying within authorized areas
 - avoiding sensitive areas
- b) watch for additional impacts to the environment, e.g., the destruction of culturally-sensitive areas or fish/wildlife habitats

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A2.3 describe road construction and maintenance

- a) building of and service to surface access to sites for land activities
- b) types of roads include permanent roads, temporary roads, and low-profile trails
- c) phases may consist of:
 - pre-project activities
 - preliminary survey and engineering of roads
 - clearing of the land
 - identifying water sources
 - establishing the road layout
 - surfacing the roads
 - installing infrastructure, e.g., culverts, bridges, stream crossings, approaches, ramps
 - erosion control

A. CORE
2. MONITOR SUPPORT ACTIVITIES

- d) maintenance may include:
- for gravel roads:
 - using dust control measures
 - controlling brush to maintain sightlines
 - clearing ditches and culverts
 - sloping roads
 - monitoring erosion
 - for ice and winter roads:
 - removing snow
 - filling holes with snow
 - watering the road
 - for wildlife management:
 - establishing access routes, e.g., breaks in snow banks and windrows
 - controlling use of attractants, e.g., salt
 - for road operations:
 - controlling access
 - controlling speed of vehicles
-

A2.4 monitor road construction

ensure compliance with project terms and conditions, including those related to:

- a) brush and debris disposal
- b) soil and sub-surface material handling
- c) off-line travel
- d) vehicles and equipment used
- e) fuel handling and storage
- f) erosion, rutting, and suspended-sediment control
- g) runoff management
- h) water resource use
- i) snow and ice depths on ice or winter roads
- j) staying within authorized areas

A. CORE
2. MONITOR SUPPORT ACTIVITIES

A2.5 monitor road maintenance and operation

ensure compliance with project terms and conditions, including those related to:

- a) vehicles and equipment used
- b) road surface rutting and erosion
- c) road corridor erosion and slope maintenance
- d) runoff management
- e) contamination of water sources
- f) suspended-sediment control
- g) staying within authorized areas
- h) for gravel roads:
 - dust control
 - deterioration of road bed
 - snow and ice control or removal
- i) for ice or winter roads:
 - maintenance of snow and ice cover
 - maintenance of animal crossings
- j) maintenance of structures, e.g., bridges, culverts
- k) operations:
 - speed control
 - controlled access

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A2.6 describe camps

- a) a base of operations and accommodation for work crews
- b) types include:
 - short- or long-term
 - fixed or mobile
- c) may be located on public, crown, or private land
- d) camp set-up may include:
 - surveying the camp location
 - establishing a water source
 - establishing solid and liquid waste management systems
 - setting up storage and handling areas for fuel and hazardous materials
 - establishing a muster area
- e) camp maintenance may include handling and disposal of:
 - solid and liquid wastes
 - fuel and hazardous materials

A. CORE
2. MONITOR SUPPORT ACTIVITIES

A2.7 monitor camps

ensure compliance with project terms and conditions, including those related to:

- a) posting permits
 - b) handling and disposal methods for solid and liquid wastes
 - c) wildlife management, e.g., preventing access to waste sites, diverting wildlife movement
 - d) maintaining water supply and quality
 - e) handling spills of fuel and hazardous materials
 - f) staying within authorized areas
 - g) controlling noise levels
 - h) unauthorized activities of camp personnel
-

A2.8 describe general construction operations

- a) construction of permanent or temporary structures
 - b) may be located on public, crown, or private land
 - c) activities may include:
 - pre-project activities
 - water course modification
 - establishing solid and liquid waste handling sites
 - setting up storage and handling areas for fuel and hazardous materials
 - site maintenance:
 - may include disposal of:
 - solid and liquid wastes
 - fuel and hazardous materials
-

A2.9 monitor general construction operations

ensure compliance with project terms and conditions, including those related to:

- a) posting permits
- b) handling and disposal of waste materials
- c) feeding wildlife
- d) maintaining water supply and quality
- e) handling spills of fuel and hazardous materials
- f) staying within authorized areas
- g) non-specified environmental impacts, e.g., inappropriate activities

A. CORE

2. MONITOR SUPPORT ACTIVITIES

A2.10 describe storage and handling of solid and liquid waste materials

- a) specific areas are designated for the storage of solid and liquid waste materials
- b) may be established at camps or work sites
- c) may include requirements for collection, storage, containment, and disposal

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A2.11 monitor storage and handling of solid and liquid waste materials

ensure compliance with project terms and conditions, including those related to:

- a) how it is collected
- b) frequency of collection
- c) where it is stored
- d) how it is contained
- e) how it is disposed of
- f) frequency of disposal

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A2.12 describe transportation, storage, and handling of fuel and hazardous materials

- a) specific areas, routes, times, and methods are designated for the transportation, storage, and handling/transfer of fuel and hazardous materials
- b) may be established at camps or work sites
- c) may include:
 - approval of fuel and hazardous materials:
 - handling protocols
 - spill and release contingency plans
 - approved containers and labelling
 - certification of transportation personnel
 - location of storage and handling areas
 - protection of surrounding lands and water bodies, including berms and secondary containment requirements
 - signs in appropriate languages to notify the public of any dangers
 - markers to ensure that petroleum product storage areas are visible

A. CORE
2. MONITOR SUPPORT ACTIVITIES

- d) maintenance of sites may include:
- reporting on locations and quantities of materials
 - checking for leaks
 - posting a watchperson on-site
 - ensuring that containers are labelled to identify owners and contents
 - reporting spills according to spill contingency plans
 - disposing of all hazardous materials in an approved manner
-

A2.13 identify potential locations of hazardous material spills or releases

- a) airports and landing sites
 - b) camps or work sites
 - c) communities
 - d) drill sites and leases
 - e) dump sites and land fills
 - f) equipment accident sites
 - g) fuel and hazardous materials storage and transfer sites
 - h) manufacturing plants
 - i) military installations and orphan sites
 - j) mines and tailings ponds
 - k) pulp and paper mills
 - l) radio communication repeater sites
 - m) staging areas
 - n) transportation and utility corridors
 - o) vehicles and vehicle refuelling areas
 - p) water and sewage treatment sites
-

A2.14 monitor transportation, storage, and handling of fuel and hazardous materials

ensure compliance with project terms and conditions, including those related to:

- a) location, layout, and condition of storage and handling/transfer sites
- b) condition of transportation vehicles
- c) condition of containers
- d) labelling of vehicles and containers
- e) spills, leaks, and releases

A. CORE

2. MONITOR SUPPORT ACTIVITIES

- f) adherence to approved:
 - storage and refuelling procedures
 - spill contingency plans
 - transportation and delivery methods
- g) upgrading of existing sites to meet current standards
- h) procedures during adverse weather conditions

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A2.15 describe site decommissioning and reclamation/remediation operations

- a) includes various activities and methods for restoring or repairing land and water courses
- b) may consist of:
 - using approved plans
 - removing hazardous chemicals or materials
 - removing structures or equipment
 - revegetation or reforestation
 - restoring habitats or creating new habitats
 - repopulating and monitoring fish and wildlife
 - hydrogeological testing, e.g., testing domestic wells
 - recontouring/sloping of land
 - conducting long-term tests or inspections to ensure that reclamation is complete
 - documenting and reporting requirements

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A2.16 monitor site decommissioning and reclamation/remediation operations

ensure compliance with project terms and conditions, including those related to:

- a) disposing of wastes and structures
- b) replacing stored materials, e.g., soil replacement and recontouring
- c) using indigenous flora and fauna
- d) conducting environmental sampling

A. CORE
2. MONITOR SUPPORT ACTIVITIES

A2.17 describe dust abatement activities

- a) measures taken to control the release of dust into the environment as a result of land-use activities
- b) phases may consist of:
 - setting up and operating air quality monitoring equipment
 - applying approved dust abatement materials, e.g., water, calcium chloride
 - monitoring wildlife, soil, and water quality

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A2.18 monitor dust abatement activities

ensure compliance to project terms and conditions, including those related to:

- a) monitoring wildlife and air, soil, and water quality
- b) applying dust abatement materials
- c) monitoring saturation and runoff from dust abatement operations
- d) recording locations and rates of applications of any chemicals for future reference

B. LAND AND WATER ACTIVITIES

1. MONITOR SEISMIC OPERATIONS

B1.1 describe seismic operations

- a) a method of exploration used to identify locations of possible sub-surface resource-bearing formations
- b) uses explosives, vibrating machinery, sonar, or other techniques in marine areas
- c) the process sends seismic waves into the earth:
 - seismic waves encounter changes in the density and characteristics of layers of rock
 - detectors, called geophones or hydrophones, record the timing and the strength of the reflected waves back to the earth's surface
 - scientists use this data to estimate the depth, structure, and types of rocks in the area
- d) phases may consist of:
 - pre-project activities
 - surveying
 - construction of:
 - access roads and approaches
 - setbacks for pipelines, domestic wells, and other utilities
 - camps
 - seismic lines
 - staging areas
 - airstrips/helipads
 - wharves/jetties
 - project operations, such as:
 - water sourcing
 - drilling shot holes and shooting
 - vibroseis
 - recording
 - demobilization and clean up
 - site and line decommissioning and reclamation
 - follow-up monitoring

B. LAND AND WATER ACTIVITIES
1. MONITOR SEISMIC OPERATIONS

B1.2 monitor seismic operations

- a) accompany surveyors to monitor line/route selection
- b) monitor and/or restrict traffic on access roads and lines
- c) accompany crews on lines to ensure compliance with project terms and conditions, including those related to:
 - water overflow
 - equipment use and maintenance
 - compaction, erosion, and rutting
 - impact on wildlife, water wells, man-made structures, and other land users, e.g., ranchers, trappers, hunters
 - soil blow outs and sink holes
 - reclamation procedures

B. LAND AND WATER ACTIVITIES
2. MONITOR DRILLING OPERATIONS

B2.1 describe drilling operations

- a) a method of exploration for underground resources
- b) types of drilling include:
 - diamond drilling
 - reverse circulation
 - pneumatic
- c) phases may consist of:
 - pre-project activities
 - surveying
 - construction of:
 - access roads and staging areas
 - camps
 - sumps
 - drill sites
 - borrow pits
 - airstrips/helipads
 - wharves/jetties
 - project operations, such as:
 - mobilizing equipment
 - setting up equipment, camp, and supplies on-site
 - drilling to target depths in stages
 - moving equipment and supplies throughout the stages
 - demobilization and clean up
 - decommissioning
 - site reclamation

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B2.2 monitor drilling operations

- a) monitor vehicular traffic on lease area
- b) ensure compliance with project terms and conditions, including those related to:
 - road construction and maintenance
 - erosion, rutting, and suspended-sediment control
 - handling and disposal of drilling fluids, cuttings, and solid wastes
 - the condition of the lease area
 - protection of water wells and water courses
 - handling hazardous materials and fuels

B. LAND AND WATER ACTIVITIES
3. MONITOR OIL AND GAS OPERATIONS

B3.1 describe oil and gas operations

- a) producing and processing oil and gas
- b) phases may consist of:
 - pre-project activities
 - exploration drilling
 - surveying
 - construction of:
 - access roads and approaches
 - drilling sites
 - borrow pits
 - flaring areas
 - staging areas
 - airstrips/helipads
 - camps
 - sumps
 - gathering lines
 - well-completion activities, such as:
 - installing production tubing and well heads
 - perforating casing and cementing
 - well and formation stimulating
 - demobilizing completion equipment
 - building production facilities, e.g., pump jacks, compressor stations
 - clean up and interim reclamation, i.e., non-operations area
 - downhole abandonment
 - demobilization of drilling equipment
 - decommissioning
 - site reclamation

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B3.2 monitor oil and gas operations

- a) monitor traffic on the lease area and access roads
- b) ensure compliance with project terms and conditions, including those related to:
 - road construction and maintenance
 - river/stream crossings
 - erosion, rutting, and suspended-sediment control
 - protection of water wells and water courses
 - spills, leaks, releases, and emissions

B. LAND AND WATER ACTIVITIES

3. MONITOR OIL AND GAS OPERATIONS

- equipment use and maintenance
- condition of the lease area
- air, soil, and water quality
- waste handling
- handling fuel and hazardous materials

B. LAND AND WATER ACTIVITIES

4. MONITOR PIPELINE CONSTRUCTION AND OPERATIONS

B4.1 describe pipeline construction and operations

- a) the installation, operation, and maintenance of pipelines
- b) phases may consist of:
 - pre-project activities
 - surveying
 - construction of infrastructure, such as:
 - access roads
 - boring under water bodies or other structures/infrastructure
 - rights-of-way
 - staging areas
 - cathodic beds
 - river/stream crossings
 - campsites
 - animal crossings
 - equipment, fuel, and hazardous materials storage facilities
 - water management, e.g., drainage, dewatering
 - construction of pipelines and associated facilities, e.g., compressor and pigging sites
 - demobilization of construction equipment
 - rights-of-way reclamation
 - vegetation management
 - ongoing monitoring and maintenance
 - decommissioning
 - site reclamation

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B4.2 monitor pipeline construction and operations

ensure compliance with project terms and conditions, including those related to:

- a) soil handling
- b) water quality, e.g., sedimentation
- c) disposal of pipeline testing fluids
- d) equipment use and maintenance, e.g., track damage to soils
- e) condition of the rights-of-way and facility lease
- f) pipeline maintenance
- g) wildlife management, e.g., adequate crossings and passages
- h) vegetation growth
- i) geoseismic instability, e.g., ground movement
- j) checking for leaks
- k) signage

B. LAND AND WATER ACTIVITIES

5. MONITOR QUARRYING OPERATIONS

B5.1 describe quarrying operations

- a) the extraction of granular or hard rock materials from a quarry, borrow pit, or gravel pit:
- a method of surface material extraction
- b) phases may consist of:
- pre-project activities
 - surveying
 - construction of:
 - access roads
 - overburden storage sites
 - work sites
 - camps
 - wastewater treatment facilities
 - erosion controls
 - project operations, such as:
 - removing overburden
 - excavating or blasting
 - crushing, screening, and washing
 - air quality control, e.g., dust, exhaust
 - noise management
 - stockpiling
 - hauling
 - wildlife management
 - water management, e.g., drainage, dewatering
 - leachate treatment, e.g., acid rock runoff
 - secondary production
 - site security
 - demobilization
 - decommissioning and reclamation:
 - handling and disposal of liquid and solid wastes
 - contouring for drainage control, prevention of slumping, and erosion
 - establishing final grade
 - replacing overburden
 - replacing topsoil
 - revegetation
 - wildlife management

B. LAND AND WATER ACTIVITIES
5. MONITOR QUARRYING OPERATIONS

B5.2 monitor quarrying operations

ensure compliance with project terms and conditions, including those related to:

- a) pre-stripping of work areas
- b) blasting activities
- c) handling and disposal of liquid and solid wastes
- d) hauling procedures, e.g., spillover clean up, covering loads
- e) the condition of the lease area
- f) material storage
- g) proper drainage of the site
- h) protection of water wells and water bodies
- i) dust control
- j) noise management
- k) creation of hazardous terrain

B. LAND AND WATER ACTIVITIES

6. MONITOR FOREST-HARVESTING OPERATIONS

B6.1 describe forest-harvesting operations

- a) the cutting of trees for commercial and non-commercial use
- b) types include:
 - clear-cut logging
 - block cutting pattern
 - selective cutting
- c) phases may consist of:
 - pre-project activities, e.g., cut block layout, forest inventory, riparian zone management
 - surveying
 - construction of:
 - access roads
 - landings
 - work sites
 - camps
 - staging areas
 - project operations:
 - mobilizing equipment
 - creating buffer zones
 - cutting trees
 - erosion control
 - managing culled trees, including salvage and disposal
 - hauling
 - water management, e.g., runoff, stream buffers
 - processing facilities, e.g., sawmills, decking sites, pulp mills:
 - storage
 - shipping facilities, e.g., rail, ports
 - hazardous materials management
 - demobilization
 - post-harvest assessment of:
 - salvaging
 - number and species of seedlings needed for reforestation
 - surface conditions
 - silviculture, e.g., revegetation, vegetation management, insect controls

B. LAND AND WATER ACTIVITIES
6. MONITOR FOREST-HARVESTING OPERATIONS

B6.2 monitor forest-harvesting operations

ensure compliance with project terms and conditions, including those related to:

- a) harvesting techniques
- b) access agreements
- c) protection of riparian zones
- d) identifying wildlife trees and culturally-modified trees
- e) construction/maintenance of stream crossings and culverts
- f) erosion, rutting, and suspended-sediment control
- g) water management
- h) maintaining wildlife corridors and buffer zones
- i) solid waste disposal
- j) air emissions
- k) staying within authorized areas
- l) the condition of the lease area

B. LAND AND WATER ACTIVITIES
7. MONITOR MINING OPERATIONS

B7.1 describe mining operations

- a) process used to extract ore
- b) types include:
 - open pit
 - underground
 - strip
 - placer
- c) phases may consist of:
 - pre-project activities
 - surveying
 - construction of infrastructure, which may include:
 - access roads
 - airstrips/helipads
 - wharves/jetties
 - power generation facilities
 - maintenance buildings
 - processing plants
 - camps
 - tailings containment and wastewater ponds
 - overburden storage sites
 - project operations, including:
 - mobilizing heavy equipment
 - removing overburden
 - handling and storing fuel, explosives, and hazardous materials
 - extracting and processing ore:
 - excavating or blasting
 - crushing
 - screening
 - stockpiling
 - transporting concentrates
 - solid and liquid waste management
 - water management
 - deposition of tailings and waste rock
 - ongoing resource evaluation
 - air quality management, e.g., dust, exhaust
 - noise management
 - wildlife management
 - site security
 - demobilization

B. LAND AND WATER ACTIVITIES
7. MONITOR MINING OPERATIONS

- decommissioning and site reclamation, which may include:
 - shaft closure or capping
 - wildlife management
 - contouring for drainage control
 - prevention of slumping and erosion
 - establishing final grade
 - replacing overburden
 - replacing topsoil
 - revegetation
 - ongoing post-closure monitoring

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B7.2 monitor mining operations

ensure compliance to project terms and conditions, including those related to:

- a) management and disposal of tailings
- b) water use, for example:
 - discharge of mine water, e.g., temperature, pH
 - protection of source water, e.g., ground, surface
- c) storage of waste rock, e.g., acid rock drainage
- d) drainage/runoff control
- e) vehicle traffic and transportation safety
- f) hauling techniques
- g) particulate from concentrator plants, e.g., air, soil, water
- h) decommissioning and reclamation activities

B. LAND AND WATER ACTIVITIES

8. MONITOR POWER GENERATION OPERATIONS

B8.1 describe power generation operations

- a) the construction, operation, and maintenance of structures and equipment used to generate and distribute electricity
- b) types include:
 - hydroelectric
 - co-generation
 - alternative sources, e.g., wind, solar, geothermal
 - nuclear
 - coal
- c) phases may consist of:
 - pre-project activities
 - surveying
 - construction of:
 - camps
 - access roads
 - crossings
 - staging areas
 - airstrips/helipads and rail lines
 - fuel and hazardous materials storage
 - rights-of-way, e.g., power lines, pipe lines
 - production facilities, e.g., dam site, reactors, wind turbines, coal mine
 - transfer sites and transmission lines
 - project operations, which may include:
 - transmission infrastructure
 - storage sites
 - building structures
 - ongoing repair and maintenance
 - water level controls
 - air emission controls
 - nuclear waste management
 - demobilization
 - decommissioning
 - site reclamation

B. LAND AND WATER ACTIVITIES
8. MONITOR POWER GENERATION OPERATIONS

B8.2 monitor power generation operations

ensure compliance with project terms and conditions, including those related to:

- a) contamination of air, water, or soil
- b) deposits of sediment into the water
- c) environmental parameters of outflow water, e.g., temperature, oxygen
- d) transmission line construction and maintenance activities
- e) monitoring hazards to lines
- f) monitoring upstream and downstream effects
- g) impact on wildlife
- h) maintenance flow requirements
- i) reservoir water levels
- j) removal of old dumpsites and graveyards in reservoir construction

B. LAND AND WATER ACTIVITIES

9. MONITOR ARCHAEOLOGICAL AND PALEONTOLOGICAL OPERATIONS

B9.1 describe archaeological and paleontological operations

- a) the process used to research, protect, and preserve archaeological and paleontological sites
- b) levels of research include:
 - documentation overview
 - field surveys
 - excavation and extraction
- c) phases may consist of:
 - pre-project activities
 - surveying
 - construction of infrastructure, which may include:
 - access roads and approaches
 - airstrips/helipads
 - camps
 - project operations, including:
 - excavation
 - site mapping, e.g., laying out grids
 - demobilization
 - site restoration

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B9.2 monitor archaeological and paleontological operations

ensure compliance with project terms and conditions, including those related to:

- a) excavation techniques
- b) erosion controls
- c) access agreements
- d) staying within authorized areas
- e) maintaining wildlife corridors
- f) timing restrictions
- g) the condition of the excavation site
- h) the security of the site and items

B. LAND AND WATER ACTIVITIES
10. MONITOR AGRICULTURAL OPERATIONS

B10.1 describe agricultural operations

- a) consists of activities such as cultivating crops and raising livestock
- b) operations may consist of:
 - clearing of land
 - use of pesticides, e.g., herbicides
 - use of antibiotics and growth hormones
 - ground and surface water use
 - tilling land
 - application of fertilizers
 - storage and application of manure
 - handling and storage of fuel and hazardous materials
 - handling and disposal of liquid and solid wastes

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B10.2 monitor agricultural operations

ensure compliance with appropriate legislation, including that related to:

- a) contamination of groundwater and water, e.g., deposits of sediment into the water
- b) environmental parameters of outflow water, e.g., temperature, oxygen, coliform bacteria
- c) maintenance of stream buffer zones
- d) fish habitat and migrations
- e) impacts on wildlife
- f) maintenance of stream flow and groundwater levels
- g) land application procedures, e.g., pesticides, fertilizers, manure
- h) soil erosion and loss

B. LAND AND WATER ACTIVITIES

11. MONITOR AQUACULTURE OPERATIONS

B11.1 describe aquaculture operations

- a) consists of activities related to cultivating fin fish, shellfish, and seaweed
- b) operations may consist of:
 - constructing infrastructure
 - use of pesticides, e.g., algicides
 - use of antibiotics and growth hormones
 - ground and surface water use
 - application of food
 - handling and storage of fuel and hazardous materials
 - handling and disposal of liquid and solid wastes

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B11.2 monitor aquaculture operations

ensure compliance with appropriate legislation, including that related to:

- a) contamination of ground and surface water, e.g., release of nitrogen, phosphorus, or sediment into the water
- b) environmental parameters of the water, e.g., temperature, oxygen
- c) waste food and animal waste
- d) impacts on wildlife
- e) application procedures, e.g., biocides, antibiotics
- f) maintenance of stream flow and groundwater levels

B. LAND AND WATER ACTIVITIES
12. MONITOR FISHING OPERATIONS

B12.1 describe fishing operations

- a) consists of activities related to harvesting and processing of fish
- b) operations may consist of:
 - use of fishing vessels
 - constructing infrastructure, e.g., wharf, buildings, roads
 - use of pesticides, e.g., algicides, wood preservatives
 - ground and surface water use
 - handling and storage of fuel and hazardous materials
 - handling and disposal of liquid and solid wastes

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B12.2 monitor fishing operations

ensure compliance with appropriate legislation, including that related to:

- a) contamination of ground and surface water, e.g., release of nutrients, sediment, or heat into the water
- b) environmental parameters of the water, e.g., temperature, oxygen, salinity
- c) ship and land operation
- d) impacts on marine and land wildlife and resources
- e) application procedures, e.g., biocides
- f) maintenance of stream flow and groundwater levels
- g) ocean dumping, e.g., disposal of ballast waters
- h) transportation and introduction of non-native invasive species, e.g., zebra mussel
- i) fish capture methods, e.g., appropriate and legal fishing gear

GLOSSARY

archaeological site	a geographic location that contains material evidence and/or remains of human activity
authorization	written permission to conduct an activity
baseline	a standard that serves as a starting point for analysis
berm	a dyke made of gravel, dirt, snow, ice, or metal; used to contain or divert hazardous materials or water runoff
block cutting	the clear cutting of part of a stand (or stands) of trees, often in the formation of alternating blocks
blow out	a hole caused by explosives set off too close to the surface, or caused by natural gas escaping during drilling operations
clear cut	removing an entire stand of trees from an area at one time, regardless of their potential use
community consultation	to meet with stakeholders (including Aboriginal groups, general public, industry, management agencies, and regulatory bodies) to identify and address issues, collect data, and respond to specific questions posed by interested parties
compressor station	a site with equipment that is used to increase the pressure in pipelines
concentrate	the desired mineral with the waste removed
crossing	a location where people or animals traverse water or land
cull	to reject all or part of a log; to eliminate seedlings or animals considered to be substandard or of marginal quality
decommission	to close down or take out of service
demobilization	to disassemble and remove structures and equipment from a location
drill	a machine with a rotating column of steel pipe and a bit at the end; used to bore through geological material

environmental impact assessment (EIA)	a formal process to determine all potential physical, biological, and socio-economic effects of an activity; provides the basis for an environmental impact statement
geophone	a sensitive vibration-detecting instrument used in conducting seismic surveys; also known as a <i>jug</i>
granular materials	sand, gravel, and crushed rocks
hydroelectric	generating electricity from water power
hydrophone	a sensitive, vibration-detecting instrument used in water
ice/winter road	seasonal transportation route; built on land or ice; built using snow and water
lease	an agreement that allows someone other than the owner of the land to use the land for a specified time and purpose in return for payment
open-pit mine	mining by excavation from the surface
ore	surface or sub-surface materials that are mined and processed to extract a valuable component, e.g., kimberlite is the ore that contains diamonds
overburden	soil and rock that must be removed before desired materials below can be extracted
overflow	water that flows out of cracks or openings in ice on lakes and rivers
park	protected area that may have specific use, e.g., recreation, natural or cultural heritage protection
placer mine	mining granular deposits that have concentrations of economic minerals
reconnaissance	a preliminary survey or inspection
reforestation	the natural or artificial restocking of an area with forest trees; typically refers to the planting of seedlings
regulatory agency	an authority responsible for issuing a licence, permit, or other authorization required for development under any federal or provincial/territorial law

right-of-way	a strip of land over which a person or company is granted right of passage
salvage	to recover, save, or preserve resources, such as topsoil or timber
seismic survey	the gathering and recording of patterns of induced shock wave reflections or refractions from sub-surface geological formations; used to create detailed models of the underlying geological structure
selective cutting	periodic harvesting of individually-selected trees to improve a stand of trees or to harvest older or valuable trees; trees are selected based on criteria such as diameter, height, species, health, condition, or economic value
shooting	detonating a series of explosives during seismic operations
shot hole	a hole drilled for the placement of an explosive device; used in seismic operations
sightline	the line of vision
silviculture	the art, science, and practice of controlling the establishment, composition, health quality, and growth of forest stands
spill contingency plan	a plan that outlines procedures for responding to fuel and hazardous material spills
staging area	<ol style="list-style-type: none">1. an area cleared on narrow travel ways to allow space for heavy equipment and other vehicles to park and wait for their turn to travel2. land cleared during a logging operation to store or partially process cut trees or logs from the surrounding area
strip mine	a mine where surface materials are removed in successive strips to expose and extract ore
underground mine	mining below ground using tunnels and shafts
vibroseis	process of producing seismic shock waves with vibrator vehicles