



# National Occupational Standards for Environmental Monitors



CORE



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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 this 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 STANDARDS ARE READ

Each standard has four sections:

1. Major Category:
  - identifies a general area of competency (knowledge, skills, and/or attitudes) required in the occupation
  - in the following example, the major category is F. TECHNICAL SKILLS
2. Skill:
  - identifies a responsibility within the general area of competency
  - in the following example, the skill is 1. USE TECHNICAL SKILLS
3. Subskill:
  - identifies a specific activity or task within the responsibility
  - in the following example, there are three subskills:
    - subskill F1.1 list equipment and tools needed for projects
    - subskill **F1.2 take photographs**
    - subskill **F1.3 use Global Positioning System (GPS)**
  - if the subskill is not bolded, as in F1.1, then individuals are expected to have knowledge only of the subskill
  - if the subskill is **bolded**, as in **F1.2** and **F1.3**, then individuals are expected to have knowledge of and be able to perform the subskill
4. Details of the Standard:
  - identify how the subskill can be achieved
  - examples are provided for clarification; when a list is introduced with *for example* or *e.g.*, this means that the list is NOT comprehensive

The two most important parts of standards are the subskill statements and the details, as these specify the expectations of the occupation. The categories and major skills are used to organize the competencies and to present them in a logical manner.



A. FOUNDATION SKILLS

1. POSSESS DESIRED PERSONAL QUALITIES

**A1.1 possess desired personal qualities**

- a) have a positive attitude about your role
- b) be prepared for physical work:
  - keep fit enough to carry out the tasks required
- c) be responsible for your own safety and well-being:
  - know your own limits
  - do not take unnecessary risks
- d) respect traditional protocols, for example:
  - have knowledge of the Aboriginal groups with whom you are working
  - respect customs, traditions, and social structures
  - be sensitive to cultural differences
  - ask for help or guidance in an appropriate manner
- e) respect the environment:
  - set a good example:
    - carry out activities with minimum impact to the environment
- f) be an advocate for the environment, e.g., talk about:
  - the importance of preserving the environment
  - your duties and responsibilities as an environmental monitor
- g) know how your practical knowledge and experiences contribute to the:
  - protection of the environment
  - goals of the project
- h) follow instructions and carry out tasks as directed
- i) be reliable and dependable:
  - carry out the terms of the employment agreement
  - call in to report your location at scheduled times
  - follow company and/or camp policies
  - maintain a good track record
- j) be able to work:
  - with minimal supervision
  - in varying weather conditions
  - for long hours
  - on different shifts
- k) be adaptable, e.g., be able to accept unforeseen changes in plans, conditions, and situations
- l) demonstrate initiative, for example:
  - identify tasks that need to be done
  - complete tasks without being told to do so
  - seek additional information as needed
- m) be willing to:
  - learn from co-workers and supervisors
  - take additional training when necessary

A. FOUNDATION SKILLS

1. POSSESS DESIRED PERSONAL QUALITIES

- n) acquire knowledge:
  - for new projects
  - about the industry sector
- o) be honest:
  - do not be concerned about expressing your opinions honestly
- p) be respectful of others' opinions, e.g., allow others to express concerns, listen to what others have to say
- q) be patient
- r) be confident, for example:
  - contribute your knowledge and experience
  - ask questions when unsure of instructions
  - do not take negative responses as personal attacks
- s) record instances of disrespectful/inappropriate behaviour or of conflict in your daily reports:
  - express your concerns to the appropriate individual
- t) have integrity:
  - care about what you are doing
  - stand up for what you feel is right

A. FOUNDATION SKILLS  
2. DEMONSTRATE WORKPLACE SKILLS

**A2.1 be a team player**

- a) know your role on the team
  - b) fulfill your role
  - c) work toward common goals:
    - carry out tasks in a manner that allows common goals to be achieved
  - d) work effectively with others, including those with whom you have had past conflict
  - e) communicate effectively:
    - share information so that others will benefit from your observations and experiences
  - f) provide relevant feedback to others:
    - talk to other team members about the value of their contributions
  - g) seek and accept feedback from others
- .....

**A2.2 use decision-making skills**

- a) identify issues and goals that are relevant to the situation:
  - keep them in mind during the decision-making process
- b) know the limits of your authority
- c) consider relevant factors when making a decision, including:
  - time
  - resources
  - who and what is impacted
  - severity and extent of impacts
- d) seek input from others when appropriate
- e) identify possible alternatives and their potential consequences
- f) implement the best alternative
- g) follow up:
  - evaluate the results of the decision

A. FOUNDATION SKILLS

2. DEMONSTRATE WORKPLACE SKILLS

**A2.3 be aware of your surroundings**

- a) acquire sufficient knowledge to be an effective observer
- b) observe your surroundings on a continual basis
- c) use your senses:
  - sight
  - touch
  - hearing
  - smell
  - taste
  - intuition
- d) interpret your observations

.....

**A2.4 use organizational skills**

- a) arrive at work on time
- b) review the project status:
  - read notes from the previous shift
  - share information about the project with others
- c) record instructions
- d) follow up on tasks in a timely manner
- e) plan your workday in advance, e.g., prepare your itinerary and/or checklists
- f) ensure that equipment and materials are operational:
  - arrange for repairs or replacement as required
- g) maintain an orderly workplace, e.g., store equipment correctly and in the proper location
- h) prepare updates for the next shift, e.g., shift notes, weekly reports

A. FOUNDATION SKILLS

3. MEET TERMS AND CONDITIONS OF THE JOB

A3.1 identify the purpose of policies and procedures

- a) to provide guidance for personal conduct
  - b) to promote safety and security for personnel, the public, the environment, and the project
- .....

**A3.2 follow policies and procedures**

- a) familiarize yourself with all relevant policies and procedures of your employer and of other stakeholders:
    - determine which policies and procedures apply to your job
    - read the policies and procedures manual
    - ask your supervisor
    - attend staff meetings
  - b) ask for clarification if you are unsure about any policies or procedures
  - c) adhere to policies and procedures when on the job
  - d) be aware that infractions may cause injury, death, damage to the environment, loss of employment, and/or loss of the employer's licence to operate:
    - halt task if you perceive that you or your crew are in danger:
      - consult supervisor
      - change situation
- .....

**A3.3 meet terms of employment**

- a) know your job description
- b) know the conditions of employment
- c) meet your responsibilities as specified in the job description and by the conditions of employment

B. COMMUNICATION

1. USE COMMUNICATION SKILLS

**B1.1 use listening skills**

- a) listen with the goal of understanding the speaker's message
  - b) respect the speaker's feelings and opinions
  - c) be patient
  - d) display interest
  - e) paraphrase or ask questions to:
    - confirm understanding
    - clarify information
  - f) observe the speaker's behaviours, body language, and tone of voice to see if they reinforce or contradict the verbal message
- .....

**B1.2 use speaking skills**

- a) know your audience, i.e., the person or people to whom you are speaking:
    - respect individuals and their points of view
    - know and respect their customs
    - take into account their ages and experiences
    - use traditional languages or translators when appropriate
  - b) speak slowly, clearly, and concisely
  - c) make eye contact
  - d) introduce your topic
  - e) outline key points of the issue:
    - provide a summary of your main points
    - use visual aids, including maps and pictures, when necessary
  - f) ensure understanding:
    - use your listening skills
    - ask questions
    - paraphrase questions/responses
  - g) be aware of your body language, tone of voice, and speed of delivery
- .....

**B1.3 foster community relationships**

- a) contact the community in order to determine to whom you should speak
- b) respect:
  - individuals and their points of view
  - protocols for establishing dialogue, e.g., first meeting generally focuses on building a relationship



B. COMMUNICATION

1. USE COMMUNICATION SKILLS

- customs and cultural protocols, e.g., gift giving
- cultural differences
- c) use:
  - traditional language or an interpreter
  - non-technical language
- d) explain:
  - who you are, i.e., your background and experiences
  - why you are there
  - what you want to know
  - who the stakeholders are
  - what will happen to the information given
- e) listen actively:
  - do not interrupt
- f) ask questions or seek clarification, if appropriate
- g) be aware of your body language and tone of voice

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**B1.4 use conflict-resolution skills**

- a) know your audience, i.e., the person or people to whom you are speaking:
  - know and respect their customs
  - use traditional languages when appropriate
- b) avoid a confrontational approach
- c) identify the concern or issue
- d) explain the concern/issue and potential impacts, e.g., problem of non-compliance with a regulation
- e) ask questions to seek clarification
- f) work toward an acceptable solution

.....

**B1.5 take field notes**

- a) be aware that all documentation (e.g., field notes, journals, logbooks, reports, log sheets, photographs, sample results) can be used in a court of law
- b) use notebooks supplied by your employer, by regulatory agencies, or by clients as necessary
- c) use notebooks as directed, e.g., do not leave spaces, use both sides of the page
- d) number the pages in the notebook
- e) initial/sign and date all entries

B. COMMUNICATION

1. USE COMMUNICATION SKILLS

- f) print legibly
- g) record all observations:
  - record information as soon as possible
- h) cross out mistakes with a single line:
  - initial corrections
  - do not erase mistakes
- i) use appropriate language
- j) provide all required information, for example:
  - date
  - time
  - weather conditions
  - names of crew members
  - your name, as note taker
  - incidental observations
- k) be concise and clear
- l) reference photographs and/or sketches that correspond to observations and notes
- m) secure field notes, for example:
  - transcribe information for reports as required
  - duplicate notes as necessary
- n) when the field notebook is full, hand it in to your employer:
  - field notes are the property of your employer
- o) maintain a personal record of activities, e.g., record of when your notebook was handed in to your employer

.....

**B1.6 complete reports**

- a) be aware that reports can be used in a court of law
- b) use forms supplied by your employer, by regulatory agencies, or by clients as necessary
- c) present information in a logical sequence
- d) write or print legibly, when hand writing reports
- e) use appropriate language
- f) provide all required information
- g) be concise and clear
- h) reference photographs and/or sketches that correspond to observations and notes
- i) sign and date reports
- j) submit reports to your employer and the industry as required

C. LOCAL KNOWLEDGE  
1. USE LOCAL KNOWLEDGE

C1.1 identify the importance of local knowledge

local knowledge assists in understanding:

- a) the well-being of the environment
  - b) the well-being of the community
  - c) the wisest use of the resources
  - d) the value of the local knowledge
  - e) safety while on the land
  - f) baseline conditions
- .....

**C1.2 acquire local knowledge**

- a) spend time on the land to gain first-hand local knowledge
  - b) participate in and respect community activities
  - c) participate in focus groups
  - d) attend meetings, conferences, and gatherings
  - e) speak with Elders, resource users, local people, landowners, and other knowledgeable residents:
    - use their language if possible
  - f) review maps
  - g) review local traditional knowledge database if available
  - h) obtain information from government departments, agencies, special interest groups, and individuals
  - i) use local library and Internet resources
  - j) take training courses
- .....

C1.3 describe local land and water use

- a) knowledge about historical land and water use, including:
  - location of:
    - travel ways
    - migration paths
    - land- and water-use sites
  - cultural and common place names
  - resource harvesting, gathering, and other seasonal activities
  - traditional users of the area
  - non-traditional land and water use in the area, e.g., military

C. LOCAL KNOWLEDGE

1. USE LOCAL KNOWLEDGE

- b) current land and water use, including:
  - resource harvesting, gathering, and other seasonal activities
  - land classifications
  - locations of transportation and utility corridors
  - users of the area
- c) desired future land and water use, e.g., community plans

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C1.4 describe knowledge of local geography

include:

- a) land features and characteristics
- b) water bodies, e.g., ground and surface:
  - ice conditions
  - characteristics

.....

C1.5 describe knowledge of local vegetation

include:

- a) whether species are native or non-native
- b) characteristics, for example:
  - edible or toxic
  - successional status
  - morphological condition
  - bio-indicator use
- c) presence
- d) abundance
- e) seasonal patterns
- f) physical attributes, e.g., erosion control, shelter
- g) medicinal or traditional uses
- h) harvest management practices
- i) cultural significance
- j) listed species, e.g., endangered, at-risk

C. LOCAL KNOWLEDGE  
1. USE LOCAL KNOWLEDGE

C1.6 describe knowledge of local wildlife

include:

- a) whether species are native or non-native
  - b) population sizes and status
  - c) harvest management practices, e.g., seasons, quotas, methods
  - d) seasonal characteristics
  - e) preferred and critical habitats
  - f) behaviours, e.g., migration, calving, denning
  - g) life cycle times
  - h) bio-indicator status, including health
  - i) traditional uses
  - j) cultural significance, including disposition of meat and fish
  - k) listed species
- .....

C1.7 describe knowledge of local climate

include:

- a) seasonal patterns
  - b) temperatures
  - c) amount of precipitation
  - d) signs of weather change
  - e) unique characteristics, e.g., snow conditions
  - f) evidence and impacts of short- and long-term climate change
- .....

C1.8 describe knowledge of local political environment

include:

- a) Aboriginal rights
- b) instruments of governance, including:
  - traditional
  - local/community
  - municipal/regional
  - provincial/territorial
  - federal
  - international
- c) influential community members

C. LOCAL KNOWLEDGE

1. USE LOCAL KNOWLEDGE

d) scope and jurisdiction of:

- regulatory and advisory boards
- councils
- committees
- government agencies
- non-governmental agencies

e) historic and current relationships and collaborations

D. LAND SKILLS  
1. USE LAND SKILLS

D1.1 define land skills

abilities that enable an individual to function safely on the land, including:

- a) selecting and navigating routes
  - b) maintaining and operating equipment
  - c) identifying and avoiding hazards
  - d) having wilderness survival skills
  - e) having wilderness first aid skills
  - f) finding and preparing food and water
  - g) building and maintaining a fire
  - h) finding or building a shelter
  - i) using rope
- .....

D1.2 describe the importance of land skills

the possession of land skills provides individuals with confidence when out on the land, helping them to function effectively, avoid danger, keep calm, and survive

.....

**D1.3 navigate routes**

- a) select the most appropriate:
    - route
    - mode of transportation
  - b) adjust the route only if necessary, e.g., if the river is frozen or open
  - c) use natural and/or man-made navigational aids, e.g., sun, stars, snow build-up on rocks, wind direction, Global Positioning System (GPS), compass, maps
  - d) remember land features to help you to navigate the return trip
- .....

**D1.4 use survival skills**

- a) stay on your planned route:
  - if you become lost, stay in one place
- b) keep calm:
  - maintain self-control
- c) assess the situation

D. LAND SKILLS

1. USE LAND SKILLS

- d) provide encouragement and leadership, if with a group
  - e) make use of safety, survival, first aid, navigation, and communication equipment:
    - signal for help
  - f) find or make a shelter
  - g) build and maintain a fire
  - h) find and prepare food and water
  - i) find alternative medicines, if needed
- .....

**D1.5 obtain food and water**

- a) recognize:
    - wildlife signs
    - edible vegetation and growing habitats
  - b) acquire food and water
  - c) prepare food and water
  - d) store food safely, e.g., protect from spoilage and wildlife
- .....

**D1.6 build a fire**

- a) select an appropriate site, considering:
  - the wind direction
  - fire hazard conditions
  - safety
- b) gather sufficient fuel, including kindling
- c) prepare the fire site as necessary, e.g., create a fire wall to reflect or contain heat
- d) arrange the fuel to suit the purpose of the fire
- e) ignite the fire
- f) maintain the fire
- g) extinguish the fire properly



D. LAND SKILLS  
1. USE LAND SKILLS

**D1.7 construct a shelter**

- a) select an appropriate location that will provide protection from:
    - cold
    - wind
    - dampness
    - insects
    - wildlife
    - sun
  - b) select a type of shelter appropriate to the location
  - c) gather appropriate materials to be used for the frame and cover
  - d) locate the opening on the lee side
  - e) continue to improve the shelter as necessary
- .....

**D1.8 use rope**

- a) be aware of the range of uses for rope, cord, and twine
- b) be able to tie basic knots in order to secure items
- c) use the type of knot appropriate for the purpose

E. SAFETY

1. COMPLY WITH HEALTH, SAFETY, AND ENVIRONMENTAL REQUIREMENTS

**E1.1 comply with health, safety, and environmental requirements**

- a) follow your employer's health, safety, and environmental policies and procedures
- b) comply with additional requirements or exceptions for local conditions, e.g., Occupational Health and Safety (OH&S), Labour Code, Workplace Hazardous Materials Information System (WHMIS), snow mobile helmets in extreme cold
- c) observe and respect traditional protocols

E. SAFETY  
2. FOLLOW SAFETY GUIDELINES

**E2.1 learn safety procedures for company and project sites**

- a) complete safety and equipment training
  - b) familiarize yourself with company and/or site-specific emergency response plans
  - c) know your rights, for example, your right to:
    - know what kind of work you are doing
    - refuse dangerous work
    - participate in health and safety committees
  - d) report unsafe conditions and activities to your supervisor/employer
  - e) participate in safety meetings, e.g., tailgate meetings
- .....

**E2.2 follow guidelines for personal survival and first aid kits**

- a) ensure that survival and first aid kits:
    - are available at all times
    - contain items that are:
      - appropriate to the region, season, and activities
      - required by company's policies
      - related to your own personal needs
      - not expired
  - b) inform co-workers of personal conditions, e.g., allergies, physical health
  - c) know how to use items, e.g., take first aid training
  - d) ensure that survival and first aid kits are restocked after use
- .....

**E2.3 follow guidelines for personal safety**

- a) notify your employer/co-workers of your work plan and daily activities
- b) wear appropriate clothing, e.g., related to weather conditions and the job:
  - carry extra clothing
- c) wear required personal protective equipment (PPE)
- d) carry appropriate tools and equipment
- e) conduct/adjust work activities according to the conditions
- f) know your own limitations
- g) know the limitations of others:
  - be aware of their health and safety
- h) ensure that tools and equipment are in good working condition
- i) follow guidelines for safe travel and field work:
  - respect limitations of equipment and mode of transportation

E. SAFETY

2. FOLLOW SAFETY GUIDELINES

**E2.4 follow guidelines for safe travel and field work**

- a) create a daily journey management plan that specifies:
  - date and time of departure
  - expected date and time of return
  - destination
  - route and alternate route
  - emergency contact numbers
  - mode of travel
  - who you will notify at departure and arrival
- b) travel with someone whenever possible
- c) carry safety, survival, first aid, navigation, and communication equipment as required
- d) listen to/read weather and marine forecasts and fire risk and road condition reports:
  - know where to obtain this information, e.g., Internet, radio
- e) share your journey management plan with your project supervisor or other appropriate personnel
- f) follow your journey management plan:
  - report back to your supervisor if a need to change the plan arises
  - call in at scheduled times
- g) use land skills
- h) identify and avoid hazards
- i) do not exceed limitations of your method of transportation

.....

**E2.5 follow guidelines for lifting**

- a) be aware of the surrounding conditions:
  - do not put yourself or others at risk of injury, especially in remote areas
- b) consider the size and weight of the article to be lifted:
  - ask for assistance with very large or heavy objects
- c) use mechanical/moving devices when possible
- d) use correct lifting techniques, e.g., keep your back straight, lift with your legs

**E2.6 follow guidelines for maintaining and operating equipment**

- a) identify the types of equipment used
  - b) review maintenance and operating requirements
  - c) follow maintenance guidelines, for example:
    - establish calibration and maintenance schedule
    - carry spare parts and consumables, e.g., fuel, batteries
  - d) follow operating guidelines, including site-specific operating requirements
  - e) store, secure, and transport equipment properly, e.g., sign equipment out and in
  - f) inform your supervisor of problems or maintenance deficiencies
- .....

**E2.7 follow guidelines for handling, storing, and disposing of fuel**

- a) follow federal, provincial/territorial, and company guidelines for transportation, storage, use, and disposal of fuel, e.g., locations, labels, types of containers
  - b) site and store fuel tanks properly
  - c) refuel in ventilated areas away from open flames:
    - provide electrical grounding as necessary
  - d) filter fuel as needed to remove dirt and water
  - e) know the location of spill kits and fire extinguishers
- .....

**E2.8 follow guidelines for handling firearms, ammunition, and explosives**

- a) comply with legislation, e.g., obtain firearms acquisition certificate (FAC)
- b) learn how to handle firearms and ammunition safely
- c) follow safety guidelines for storage, transportation, and operation of firearms and explosives

E. SAFETY

2. FOLLOW SAFETY GUIDELINES

**E2.9 follow guidelines for using wildlife deterrents**

- a) take wildlife orientation courses
  - b) follow manufacturers' guidelines and company policies:
    - for sprays:
      - assess condition of canisters daily
      - dispose of used canisters appropriately
    - for bangers:
      - handle bangers with caution:
        - bangers contain explosives
- .....

**E2.10 follow guidelines for loading and boarding aircraft**

- a) be aware of the potential hazards of helicopters and fixed wing aircraft
  - b) complete a safety orientation
  - c) follow the pilot's instructions at all times
  - d) wait for the pilot's acknowledgement before approaching or leaving the aircraft
  - e) do not smoke near aircraft
  - f) do not carry aerosol cans in passenger areas
- .....

**E2.11 follow guidelines for operating and travelling in watercraft**

- a) comply with legislation, e.g., take required training, possess small craft operator's permit
- b) be familiar with capabilities and limitations of watercraft
- c) adhere to safety guidelines
- d) be considerate of:
  - other water users
  - impact on the environment
- e) recognize potential hazards, e.g., nets
- f) be able to troubleshoot and repair minor mechanical problems

E. SAFETY

3. FOLLOW GUIDELINES FOR USE AND HANDLING OF HAZARDOUS MATERIALS

E3.1 describe Workplace Hazardous Materials Information System (WHMIS)

- a) a Canada-wide communication system for sharing information about hazardous materials used on a job site:
- explains hazards and how to control and prevent chemical accidents
- b) consists of three components:
- a labelling system, which gives basic information about hazardous materials
  - material safety data sheets (MSDS), which contain additional detailed information about use, storage, and hazards
  - an employee education and certification program

Note: WHMIS is a mandatory training certification program. The description of WHMIS in this document serves as a reference only.

.....

E3.2 identify hazardous materials symbols

- a) Class A – compressed gases, e.g., natural gas, propane, Freon



- b) Class B – flammable and combustible materials, e.g., gasoline, aviation fuels, paint and paint thinner, explosives, lubricating oils



E. SAFETY

3. FOLLOW GUIDELINES FOR USE AND HANDLING OF HAZARDOUS MATERIALS

- c) Class C – oxidizing materials, e.g., hydrogen peroxide, chlorine, potassium permanganate



- d) Class D – poisonous and infectious materials:

- D1 – materials causing immediate and serious toxic effects, e.g., hydrogen sulphide, household solvents, mercury, herbicides, pesticides



- D2 – materials causing other toxic effects, e.g., gasoline, lead, asbestos, drilling fluids, polychlorinated biphenyl (PCB), household solvents



- D3 – biohazardous infectious materials, e.g., treated and untreated sewage and waste water





E. SAFETY

3. FOLLOW GUIDELINES FOR USE AND HANDLING OF HAZARDOUS MATERIALS

- e) Class E – corrosive materials, e.g., sulphuric acid (e.g., battery acid), hydrochloric acid, salt water



- f) Class F – dangerously reactive materials, e.g., mixtures of strong acids and alkalines



.....

**E3.3 respond to hazardous material spills, leaks, and releases**

- a) assess the situation:
- consider risk to health, safety, and the environment
  - protect yourself and others:
    - evacuate the area if required
    - control access to the area
  - protect the environment, e.g., flora, fauna, water courses, terrain
  - identify the product:
    - if the material cannot be identified, assume that it is dangerous
- b) address the situation, if it is safe to do so:
- take appropriate action, e.g., shut off the supply valve
- c) report the spill to the site supervisor and/or the appropriate authority

E. SAFETY

3. FOLLOW GUIDELINES FOR USE AND HANDLING OF HAZARDOUS MATERIALS

**E3.4 follow guidelines for handling and disposing of hazardous materials**

- a) be familiar with hazardous materials management systems and legal liabilities, for example:
  - company- or site-specific guidelines
  - operational requirements
  - legislation
  - spill contingency plans
- b) use appropriate guidelines and procedures
- c) document use of hazardous materials, e.g., the type of hazardous material used, methods of storage and disposal
- d) maintain records for sub-contracted disposal systems

4. FOLLOW FIRE SAFETY GUIDELINES

E4.1 identify frequent causes of fire

- a) improper handling and storage of flammable materials, equipment, and supplies
  - b) gas leaks
  - c) human error
  - d) natural causes
- .....

E4.2 describe wildfires

- a) identify common causes of wildfires
  - b) describe factors that affect wildfires, e.g., wind, moisture, amount of fuel available
  - c) describe characteristics of wildfires
- .....

**E4.3 use wildfire awareness and safety guidelines**

- a) be aware of:
    - potential risks to, for example:
      - human lives
      - residences
      - pipeline routes
      - trap lines
      - archaeological sites
    - hazards and conditions, e.g., smoke
    - fire suppression techniques
  - b) in the event of a wildfire:
    - contact your site supervisor, who will contact the appropriate agencies
    - give the location, size, and direction of the wildfire
    - evacuate to a safe area, preferably near an access or water
- .....

E4.4 identify the components of a fire

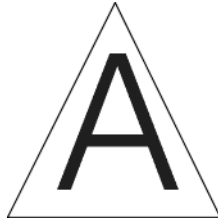
- a) fuel
- b) heat or ignition source
- c) oxygen

E. SAFETY

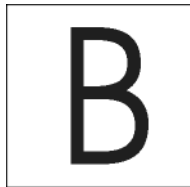
4. FOLLOW FIRE SAFETY GUIDELINES

E4.5 identify classes of fire

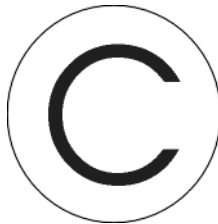
a) Class A – ordinary combustibles, e.g., wood, cloth, paper



b) Class B – flammable liquids or vapours, e.g., gasoline, propane



c) Class C – energized electrical equipment



d) Class D – combustible metals, e.g., magnesium



E. SAFETY  
4. FOLLOW FIRE SAFETY GUIDELINES

E4.6 describe how to extinguish different classes of fire

- a) extinguish Class A fires by:
  - cooling the fire
  - smothering the fire
  - removing the fuel source
  - using a type A or ABC fire extinguisher
- b) extinguish Class B fires by:
  - smothering the fire
  - using a type B, BC, or ABC fire extinguisher
- c) extinguish Class C fires by:
  - turning off the main power source
  - if the fire remains energized, use type C, BC, or ABC fire extinguisher:
    - never use water or a type A extinguisher
- d) extinguish Class D fires by:
  - using a type D fire extinguisher

.....

**E4.7 use fire extinguishers**

- a) use the appropriate extinguisher for the type of fire
- b) use the PASS system:
  - **P** – pull the pin to activate the extinguisher
  - **A** – aim at the base of the fire
  - **S** – squeeze the trigger to release the fire retardant
  - **S** – sweep from side to side
- c) inform your supervisor whenever an extinguisher has been used

.....

**E4.8 follow fire safety guidelines**

- a) be familiar with:
  - climate and weather conditions
  - fire hazard status
  - locations of:
    - fire extinguishers
    - gas shut-off valves
    - electrical shut-off switches
  - evacuation routes
  - operating techniques for fire extinguishers

E. SAFETY

4. FOLLOW FIRE SAFETY GUIDELINES

- b) use, store, and dispose of flammable materials safely
- c) use caution with sources of ignition when working with or near flammable or explosive materials
- d) contact the appropriate authority (e.g., fire department, forestry service, site supervisor) if a fire is detected:
  - authority will initiate emergency response

F. TECHNICAL SKILLS  
1. USE TECHNICAL SKILLS

F1.1 list equipment and tools needed for projects

- a) required equipment and tools:
- notebook and reporting forms
  - pencil and other writing supplies
  - personal protective equipment (PPE)
  - communication equipment
  - personal supplies
  - survival and first aid kits
  - waterproof watch
  - Global Positioning System (GPS) and extra batteries
  - compass
  - camera, film, and extra batteries
- b) other equipment and tools as required, depending on the project
- .....

**F1.2 take photographs**

- a) plan photographs so that they can be used to enhance documentation:
- follow instructions for taking photographs
- b) follow manufacturer's instructions for correct:
- care, use, and maintenance of camera
  - type of film, disk, or memory card
  - camera settings
- c) record in your field notes a description of photographs taken
- d) process and catalogue photographs as directed, e.g., date stamp
- .....

**F1.3 use Global Positioning System (GPS)**

- a) use to:
- locate and record locations
  - mark way points
  - delineate areas
  - record elevations
  - assist with navigation from one position to another
  - provide precise locations, especially in the absence of landmarks
  - determine:
    - time and date
    - speed of travel
    - distance between two points

F. TECHNICAL SKILLS

1. USE TECHNICAL SKILLS

- b) follow the manufacturer's instructions for the care, maintenance, and operation of GPS unit
  - c) know the co-ordinate system and datum to which your GPS has been set:
    - change the co-ordinate system and datum, if required
  - d) input information and save it as required
  - e) use recommended power adapters and antennae in vehicles if available
  - f) leave the GPS on for navigation during travel
  - g) do not rely solely on the GPS:
    - use it in conjunction with a map, compass, and/or your own observations
- .....

**F1.4 use systems of measurement**

- a) understand limitations of measuring systems
  - b) use the appropriate:
    - measuring tool, e.g., measuring tape, scale
    - measurement unit and system:
      - understand the system of measurement and conversion to/from metric as necessary
  - c) ensure that the unit of measurement is recorded when taking readings or collecting data
  - d) use various co-ordinate systems to measure geographical position, e.g., Universal Transverse Mercator (UTM), North American Datum (NAD)
- .....

**F1.5 use electronic communication tools and office equipment**

- a) familiarize yourself with the communication tools and office equipment required for the project:
  - read manufacturers' instructions
  - ask questions
  - ask for assistance, if necessary
- b) follow manufacturers' instructions
- c) operate portable communication devices:
  - for two-way radios:
    - use radios for business purposes only
    - ensure that the:
      - radio is working properly
      - battery is recharged at the end of the shift
    - use the appropriate channels



F. TECHNICAL SKILLS  
1. USE TECHNICAL SKILLS

- use radio protocol:
    - do not break into another transmission unless necessary
    - use appropriate language and etiquette
    - speak clearly and concisely:
      - for long transmissions, pause and speak more slowly than normal
  - make sure that the channel is clear after completing your transmission
  - for cell, mobile, and satellite telephones:
    - know the capabilities and limitations of the equipment
    - keep telephones warm and dry
  - carry spare batteries
  - position yourself at high elevations when transmitting, if possible
  - flag aerial antennas:
    - ensure that they are visible
- d) use facsimile and photocopy machines:
- ensure that there is adequate paper available
  - request assistance of office staff, if required
- e) use computers and software packages

.....

F1.6 describe mapping

- a) maps are created from:
- aerial photography
  - control survey plans
  - satellite imagery
- b) different types of maps are used, e.g., bathymetric, topographic, vegetation
- c) information found on a map can be, for example:
- name of the area
  - datum, e.g., NAD83, NAD87
  - co-ordinates, latitude, and longitude
  - map's number
  - scale
  - legend and symbols
  - declination
  - contour intervals
  - natural formations

F. TECHNICAL SKILLS

1. USE TECHNICAL SKILLS

**F1.7 use maps**

- a) use the map best suited to the task
- b) identify:
  - the scale
  - the location of the activity
  - the routes to be taken
  - the land classification
  - any special or sensitive areas
- c) interpret information
- d) reference the map's number when recording information
- e) share and clarify information when consulting with your employer and the industry















# APPENDIX 1

## GROUND-TO-AIR SIGNALS

### Ground-to-Air signals

These symbols are an internationally recognised emergency code. Find a reasonably flat, clear area and make the symbols out of groundsheets, wood, or any material laid on the ground with a colour contrasting with the background.

	Require doctor - Serious injury		All is well
	Require medical supplies		No / Negative
	Unable to proceed		Yes / Affirmative
	Indicate direction to proceed		Not understood
	Am proceeding this way		Require map and compass
	Require food and water		Probably safe to land here

Source: ScoutWeb South Africa  
([www.scouting.org.za/resources/backwoods/GroundToAir.pdf](http://www.scouting.org.za/resources/backwoods/GroundToAir.pdf), accessed March 30, 2004)



## **APPENDIX 2**

# **SAMPLE PHONETIC ALPHABET**

A	ALPHA
B	BRAVO
C	CHARLIE
D	DELTA
E	ECHO
F	FOXTROT
G	GOLF
H	HOTEL
I	INDIA
J	JULIET
K	KILO
L	LIMA
M	MIKE
N	NOVEMBER
O	OSCAR
P	PAPA
Q	QUEBEC
R	ROMEO
S	SIERRA
T	TANGO
U	UNIFORM
V	VICTOR
W	WHISKEY
X	X-RAY
Y	YANKEE
Z	ZULU

 **GLOSSARY**

aerial photos	photographs that present land and water features as they appear from the air
aviation fuel	fuel for an aircraft; also referred to as <i>av gas</i>
bio-indicator	a characteristic that offers information about an organism and/or its surroundings
control survey plan	establishes northing, easting, and elevation; used as a base for map creation
co-ordinates	a means to identify a location by using degrees latitude and longitude
datum	a piece of information; a fixed starting point of a scale; plural is <i>data</i>
edible	safe to eat
Elder	an individual regarded with respect because of his/her wisdom and knowledge
elevation	the height above a given level, usually sea level
environment	includes land, water, air, vegetation, wildlife, climate, people, and their relationships
flammable	easily set on fire; also known as <i>inflammable</i>
Global Positioning System (GPS)	a system of satellites and portable receivers that are able to pinpoint the location of each receiver on the earth's surface; used for navigation
habitat	an area distinguished by the set of organisms that occupy it; the natural environment characteristically occupied by an organism
herbicide	a substance toxic to some plants; used to destroy unwanted vegetation

journey management plan	a plan that specifies destination, departure date and time, route and alternate route, mode of travel, estimated arrival date and time, reporting requirements at departure and arrival, and emergency contact numbers
latitude	the distance north or south from the equator
lee side	the downwind side of an object
local knowledge	“a body of knowledge specific to a geographical location or period of time and may be closely intertwined with traditional knowledge” [Legat, Allice (ed.), Report of the Traditional Knowledge Working Group]
longitude	the distance east or west from a standard meridian, e.g., Greenwich
meridian	a system of lines running north and south; used as part of a survey system
migration	the movement patterns of species in response to natural phenomena or instinct
morphological	relates to the form of an organism
navigate	to determine a travel route
North American Datum	a co-ordinate system based on lines of longitude and latitude, e.g., NAD27, NAD83
pesticide	a chemical or biological substance used to deliberately kill or suppress unwanted plants or animals; includes herbicides, insecticides, algicides, and fungicides
protocol	a set of rules that apply to a procedure
satellite imagery	digital data acquired from space; data is manipulated to enhance and highlight features of interest
sensitive areas	areas that are subject to risk, e.g., calving areas for caribou, nesting sites for peregrine falcons, den sites for grizzlies

special interest group	a group of people or a corporation with a common interest, concern, or purpose
species	a group of individuals that have major characteristics in common and (usually) can only breed with each other
successional status	replacement of one species by another; can lead to a stable community, i.e., climax
toxic	a poisonous product or organism
Universal Transverse Mercator (UTM)	a metric system of mapping using a grid of parallel lines
vegetation	plant life in an area
way point	location within a co-ordinate system, e.g., longitude and latitude; often refers to a reading taken from a Global Positioning System (GPS)
wildlife	all non-human life in an area

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