APPENDIX 11

CONTWOYTO LAKE
REMEDIATION PROJECT

SITE SPECIFIC HEALTH AND SAFETY PLAN (SSHSP)

ORIGINAL

Contwoyto Lake Weather Station Remediation, NU

Site Specific Health and Safety Plan

Prepared for:
Public Works and Government Services Canada

Prepared by:
Delta Engineering Ltd. /Carters Industries Ltd.,
A Joint Venture (DELTA)

Box 1447
Yellowknife, NT
X1A 2P1

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1.0 INTRODUCTION

1.1 Site Location

Contwoyto Lake Weather Station Remediation, NU
65° 29' 5" N
110° 22' 32" W
461m Elevation

Project Management Staff and Emergency Numbers

Name	Position	CONTACT #	ORGANIZATION
PROJECT MANAGEMENT			
Janice Lee	Project Manager	Ph: 867-766-8364 Cell: 867-445-2424	Public Works and Government Services Canada
Erika Solski	Project Manager	Ph: 867-975-4577	AANDC, CARD
Robert Johnson	Project Manager	Cell: (867) 446-4694	Delta Engineering Ltd.
Shawn Carter	Project Manager	Ph. (867) 874-6574 Cell: (867) 875-8170 Fax (867) 874-6154	Carter Industries Ltd.
TBA	Site Superintendent	Site Ph: TBA	TBA
Robert Johnson	Health and Safety Officer	Cell: (867) 446-4694	Delta Engineering Ltd.
SPILL RESPONSE NUMBERS			
NU 24 Hour Spill Reporting Line	GNU and AANDC	Ph. (867) 920.8130 (call collect if required) Fax: (867) 873-6924	Triggers multiple governmental and private organizations for spill response
Jimmy Noble	Enforcement Officer Environment	Ph. (867) 975-4644	Environment Canada
Erik Allain	Field Operations Manager	Ph. (867) 975-4295	AANDC
CANUTEC	Federal Department of Transportation	Ph. (613) 996.6666 (call collect if required)	Triggers multiple governmental and private organizations for spill response for dangerous goods
Robert Eno	Pollution Control Environmental Protection Services	Ph. (867) 975-7748 Fax (867) 975-7739	GNU Department of Environment
Danielle Morin	North Slave Region Environmental Protection Officer	Ph: 867-920-3387	GNWT Environment and Natural Resources
MEDICAL EMERGENCY			
24 Hour - Stanton Territorial Emergency Evacuation	N/A	Ph. (867) 669 4115 (call collect if required), or Ph. (867) 669-4111 (Yellowknife Hospital) or Ph. (867) 873-2222 (Yellowknife Ambulance)	Triggers the resources required for an emergency evacuation for an injured or ill employee
DISASTER RELIEF			
Canadian Red Cross	-	Ph. (780) 423.2680 Fax. (780) 428.7092	Canadian Red Cross
FIRE EMERGENCY			
24 Hour Forest Fire	N/A	Ph. 1-877-698-3473	Yellowknife Fire and Rescue Services

Name	Position	CONTACT #	ORGANIZATION
Emergency Phone Number (NWT Fire)		Ph. (867) 873-2222	
WILDLIFE EMERGENCY			
Wildlife Emergencies	GNU	Ph. (867) 982-7450	GNU Environment and Natural Resources
RCMP			
Kuglutuk RCMP	Headquarters	Ph. (867) 982-1111	RCMP
OCCUPATIONAL HEALTH AND SAFETY			
Peter Bengts	Chief Inspector of Mines	(867) 669 4412	NWT Workers Compensation Board – Mine Safety
WORKERS' COMPENSATION BOARD			
WSCC Accident-Incident Reporting	WSCC	Ph. 1-800-661-0792 Fax: 1-866-277-3677	Workers Compensation Board
AIR CHARTERS			
Air Tindi	Air Charter – Plane	Ph. (867) 669.8200 Fax. (867) 669.8219	Private Company
Summit Air	Air Charter – Plane	Ph. (867) 669.9789 Fax (867) 669.9649	Private Company
Great Slave Helicopters	Air Charter - Helicopter	Ph. (867) 873.2081 Fax (867) 873.6087 After Hours Ph. (867) 873.2081	Private Company

Delta Engineering Ltd. and Carter Industries Ltd. have joint ventured to complete the Contwoyto Lake Weather Station Remediation. This Joint Venture will be referred to as DELTA. Delta's main mailing address and phone numbers is as follows:

Delta Engineering Ltd. /Carter Industries Ltd. – A Joint Venture
Box 1447, Yellowknife, NT
X1A 2P1

1.2 Project Description

The aim of this project is to remediate the site and to leave as minimal presence in the area as possible. The footprint left behind must be acceptable to the effected aboriginal people for their future use and to ensure the safety of local wildlife and plants

Intensive work on the project has commenced in June 2014. Mobilization will occur during the winter with the construction of an ice landing strip to accommodate the supply of materials and equipment with heavy lift aircraft. The main tasks for 2014 include the following: Project Initiation, Mobilization, hydrocarbon impacted soil excavation, hydrocarbon soil treatment, hazardous material collection/containerization, building demolition, barrel collection/removal, surface debris collection and demobilization. It is also understood that additional work may be required to meet government goals for the site.

1.3 Site Description

Contwoyto Lake Weather Station Remediation Project is located approximately 390 km northeast of Yellowknife at 65^{o} 29' 5" north Latitude and 110^{o} 22' 32" west Longitude. The site consists of an abandoned weather station on an island on Contwoyto Lake. The site is accessible by float plane and twin otter aircraft on with tundra tires.

1.4 Health and Safety Policy Statement

Delta is committed to providing and maintaining a safe and healthy work environment for its employees and sub-contractors, through the use of a comprehensive health and safety program. It is the responsibility of the management and supervision of Delta to ensure that all personnel involved on any project are protected and that unforeseen hazards are eliminated.

To meet this objective, management, supervisors and employees will promote and support the Health and Safety Program. Managers will ensure that:

1. Supervisors and employees understand their responsibilities regarding health and safety.
2. All project members are informed of the policy, and the health and safety program.
3. Industry standards are to be met as a minimum.

Employees will be required to follow the rules set out in the Health and Safety Policy adopted by Delta.

Managers and supervisors are responsible to ensure that the Health and Safety Standards are followed by all individuals involved on the projects undertaken.

Delta recognizes that it cannot meet this goal without full cooperation from all personnel. This cooperation is needed and expected and will be adopted as part of the team building skills from the project teams.

1.5 Corporate Commitment

Delta's health and safety policy for the Contwoyto Lake Weather Station Remediation Project is based on five fundamental elements:

1. Management Commitment and Employee Involvement;
2. Worksite Hazard / Risk Analysis;
3. Hazard Prevention and Control;
4. Safety and Health Training; and
5. Safety Audit and Program Review

Management Commitment and Employee Involvement

This is the most important element in an effective health and safety policy. Without management's active support, such things as safety and health budgets, training, correction of hazards and employee support are not effective. Employees will reflect management's enthusiasm or lack of enthusiasm. Delta's Project Manager, Health and Safety Manager and Site

Superintendent are all committed to the implementation of this Site Specific Health and Safety Plan (SSHSP). The necessary supplies, equipment and manpower will be made available by the Project Manager and the Site Superintendent has the necessary authority to implement the SSHSP.

Workplace Hazard Analysis
Delta has the necessary understanding of the applicable acts, regulations and the Work to identify "recognized hazards". Hazards are analyzed through a predefined hazard assessment regime, which includes, but is not limited to Comprehensive Risk Assessments, Safe Work Plans, and preliminary Job Hazard Analysis, Site Wide Upper Management and Supervisory hazard analysis and hazard communication.

Hazard Prevention and Control
Delta has in place an industry standard risk assessment protocol, which identifies hazards and ranks the respective risk. The risk assessment process is used to:

- Define required or select currently available Safe Work Procedures for employees;
- Control and eliminate hazards;
- Justify the purchase of employee Personal Protective Equipment;
- Identify required employee safety and health training; and
- Aid in accident investigation

Safety and Health Training
The first step to effective hazard communication is to train supervisory staff in the known hazards of the work and their legislated responsibilities to employees. Supervisors must understand the importance of safety and the influence that their attitude towards safety has on the employee's safety ethic. Supervisors must be aware of how to implement management safety priorities and that top-level support for safety is present. Finally, the Site Supervisors must be aware of the available resources to implement an effective safety program.

Employees must be trained in the specific safety aspects of the work that they are to perform and will be trained with the hazardous material identification specific to the project site. In addition, employees must receive training on their rights and responsibilities to safety in the workplace.

Safety Audit and Program Review
Delta's top management is committed to continual improvement of SSHSP through continual internal review and employee evaluation. Delta's Project Manager/Health and Safety manager are responsible to ensure that the SSHSP is reviewed and updated in response to the following:

- facility configuration or operation changes that affect safety;
- changes in management structure;
- changes in the Scope of Work (SOW); and
- Serious incidents or frequent minor incidents

In addition, the overall SSHSP will be reviewed and updated by Delta Project Manager, if required, on a quarterly basis, independent of change.

Delta will ensure that the SSHSP is provided to the NU WSCC for review and comments at their discretion.

1.6 Purpose

The SSHSP is intended to be used as a training tool, reference source and binding policy document for all employees, supervisors, field staff, management, sub-contractors and Department Representative's (DR) Authorized Personnel performing work during the Project. More specifically the SSHSP is intended to:

- Promote a positive health and safety culture;
- Protect legal rights of employees;
- Protect life and health;
- Maintain WSCC costs at a minimum;
- Enable supervisors and employees to fulfill their legal duties and show due diligence;
- Produce positive side effects of a well-managed Health & Safety Program that includes increased productivity, improved quality service and client satisfaction;
- Meet or exceed the acts, regulations and client polices applicable to Occupational Health and Safety; and
- Meet contractual safety requirements.

1.7 Prime Contractor, Subcontractor and DR's Authorized Personnel

This manual is designed for guidance of Delta employees and managers in matters of health and safety. There is a difference in responsibility between Prime Contractor, Sub-Contractor, and DR's Authorized Personnel.

When Delta acts as a Prime Contractor, we are legally responsible for the health and safety of all employees, including other sub-contractor, on site. This responsibility mirrors that of an employer of a company, facility, etc., hence, it carries an increased:

a) liability,
b) regulatory responsibility, and
c) Care (beyond that of a professional/engineer's liability or code of ethics).

Acting as Prime Contractor, it is the responsibility of Delta to ensure that all sub-contractors and DR's Authorized Personnel complete their work in conformance to this Health and Safety Management Plan, and submit their own work specific Safe Work Plan (SWP) for review by the Prime Contractor's Health and Safety Manager.

1.8 General Practices

Administration

It will be the responsibility of the Project Manager to ensure that the Health and Safety Systems are properly documented and administrated.

Delta will communicate its Health and Safety Policy to all employees by:

a) Posting the policy on site
b) Address Health and Safety Policies in the field orientation presentations
c) Reviewing and referring to the policy with new employees during the hiring procedures

Worker Orientation Seminar
All workers are to be indoctrinated on site health and safety policies during a Worker Orientation Seminar. Worker Orientation Seminar is to be held on-site.

1.9 Management Responsibilities

Delta management will be responsible for the Project Specific Safety Policy while at all times encouraging individual initiative. The responsibilities of management include:

a) Appointing a Field Safety Coordinator to oversee Safety Program, and ensuring that the Safety Program meets or exceeds professional standards or provincial/federal Safety Regulations
b) Assign sufficient budget to projects so that supervisors can successfully implement and maintain the health and safety systems.
c) Promote the health and safety of the company.
d) Ensure that audits are performed on the systems and review the policies.
e) Reviewing all accident investigation reports to ensure they are serving their intended purpose and initiating change to prevent accidents from reoccurring.

1.10 Site Supervisor Responsibilities

The Supervisor's responsibilities include:

a) Implementation of the health and safety policy of Delta.
b) Ensure compliance with:
    - Local safety regulations;
    - WHMIS legislation; and
c) Regular Site inspections for compliance with safety codes and this manual.
d) Ensure that safety meetings are attended and that daily toolbox meetings are being performed.
e) Ensuring employees are properly trained and new employees are orientated to the Company's Safety Procedures.
f) Supplying PPE and ensuring its proper use.

g) Reporting accidents and near misses to the appropriate authorities, including when necessary:
    - Provincial authorities as required in their regulations
    - RCMP or local Police office
    - Owner or developer
    - Company manager
    - The employer of the injured employee
h) Act to eliminate unsafe working conditions that may cause a threat to health and safety.
i) Ensure that all safety reports are reviewed and any recommendations made are investigated.
j) Designating or hiring safety personnel, if certain safety requirements warrant, such as:

I. Floor Fire Marshall
II. Site Safety Manager
III. First Aid Technician (Standard Level)
IV. A Work Site Safety Representative
V. Work Site First Aid Personnel

1.11 Site Health and Safety Coordinator Responsibilities

The Site Health and Safety Coordinator has the following responsibilities and authority:

a) To implement the program and monitor its effectiveness
b) To attend any safety meeting at any workplace
c) To consider and act upon any recommendations dealing with safety
d) To recommend to Delta, new safety practices and changes to safety practices and general policy with respect to occupational health and safety
e) To direct employees and supervisors to correct any violations of the Provincial/Territorial or Company safety regulations
f) To consider recommendations from employees regarding occupational safety and health matters.
g) To promote safety awareness and activities within the work force.
h) To audit the Safety Program and report the findings to management

1.12 Site Employee Responsibilities

All employees are required to observe their personal safety and to assist the safety of all team members. This basic responsibility includes, but is not limited to, the following:

a) Reading the Corporate Health & Safety Manual
b) Maintaining cleanliness within the work area
c) Promptly reporting all accidents and injuries, no matter how slight and obtaining required medical attention
d) Immediately reporting unsafe conditions to the supervisor

e) Complying with the job applicable Safety Rules and Provincial/Territorial Safety Regulations
f) Complying with applicable safe work procedures
g) Cooperating in accident investigations in order to help prevent reoccurrence

Site personnel are the first line of defence to ensure that all team members are following the safety rules of the job site and the requirements of this document.

1.13 Regulatory Regime

NU/NWT Workers Safety and Compensation Commission
The SSHSP includes hazard analysis and Safe Work Plans (SWP) for review and approval by authorities having jurisdiction (AHJ). Work plans have been developed to anticipate, recognize, evaluate, and control workplace conditions that may cause workers' injury or illness.

Availability of Regulatory Information
Copies of the *Water Licence and Land Use Permit* will be available on-site.

1.14 Availability of OH&S Information

Information relating to OH&S will be made readily available to employees, Work Place Health and Safety Committee (WPHSC) members and inspectors. Employees can access OH&S information at all times through readily available information at a designated location at the site or through a request to the WPHSC. However, information subject to personal privacy laws, such as medical records only be provided to the respective employee or as per privacy laws and will be stored to prevent access by unauthorized persons.

Any information that affects all employees, such as water quality results, inspection reports (committee and regulatory), results of air quality testing, hazard assessment etc. will be posted in a conspicuous location for employees to view. MSDS sheets will be stored in a binder at the area of work where hazardous substances are encountered, at the main office at the site and at the medical facility.

1.15 Hazardous Substances & Chemical Exposure Limits

Remediation at the Contwoyto Lake Weather Station requires working with various hazardous substances. WSCC NUNAVUT SAFETY ACT Regulations address hazardous substances within Part IX *"Working Environment and Industrial Hygiene"*. Section 9.02. (1) of the WSCC NUNAVUT SAFETY ACT Regulations prescribe the *"Threshold Limit Values (TLV) for Chemical Substances and Physical Agents and Biological Exposure Indices"* published by the American Conference of Governmental Industrial Hygienists (ACGIH) as Occupational Exposure Limits (OEL). In the absence of ACGIH TLV criteria, U.S. Occupational Safety and Health Administration Permissible Exposure Limits (OSHA PEL), U.S. National Institute for Occupational Safety and Health Recommended Exposure Limits (NIOSH REL), Deutsche Forschungsgemeinschaft Maximum Concentrations Values in the Workplace (DFG MAK) or American Industrial Hygiene Association Workplace Environmental Exposure Levels (AIHA WEEL) criteria will be applied.

1.16 Hazard Communication

Information regarding chemical hazards within the work place will be communicated using the WHMIS regulations. During transport off-site, chemical hazard will be communicated using the federal Transportation of Dangerous Goods Act (TDGA) regulations. The communication of physical hazards will employ various techniques such as pre-work training, Job Hazard Analysis (JHA) and toolbox meetings. Training in identification will be provided if unique markers are required. Training will also be provided regarding the specific hazards related to each job task.

1.17 Risk Management Program

INTRODUCTION

Delta's Risk Management Program (RMP) is based on the Deming cycle, as it applies to OH&S (Figure 1: Deming Cycle). The cycle consists of, in order, Plan, Do, Check and Act. Each action is discussed below.

Figure 1: Deming Cycle

PLAN – identification of safety and environmental hazards and selection of mitigative measures designed to reduce the risk of the hazard to an acceptable level. Planning is generally comprised of various forms of hazard or risk assessment. For example, the Safe Work Practices (SWP) can be developed based on the results of hazard or risk assessment.

DO – implementation of the findings of the hazard or risk assessment at the operations level and training of staff in the SWP.

CHECK – checking and corrective action. Monitoring of the effectiveness of the Plan and do actions through supervision, daily monitoring and formal assessment by management.

ACT – management review of the effectiveness of the program. Review can be triggered by:

- a serious situation such as a lost time injury or a high level of near misses and/or minor injuries; or
- At pre-determined intervals as per a review schedule developed by the Project Manager.

Equal commitment to implementation of all four components of the risk management program is essential in ensuring safe work and productivity.

PLANNING – RISK ASSESSMENT

Introduction

Risk Assessment is a proven technique used in modern health, safety and environmental management systems. The process involves several steps to identify hazards, define exposure to those hazards, quantify risk, and verify that adequate controls are in place to eliminate or reduce the risk to an acceptable level. Risk assessment is a proactive process designed to identify, and control hazards before they cause an incident and is essential in managing work effectively and safely. Risk assessment can be accomplished through various techniques, each of which serves a differing purpose.

The following table describes the forms and frequencies of hazard/risk assessment that are to be employed during the Contwoyto Lake Weather Station Remediation Project.

Table 1: Hazard/Risk Assessment Method and Frequency

ID	METHOD	FREQUENCY	RESPONSIBILITY	COMMENTS
1	Formal Risk Assessment	Start of Project, at one month intervals or when deemed necessary by the Project Manager	Health and Safety Officer/Manager	Conducted with the Workplace OH&S Committee
2	Development of Safe Work Plan for Task	Prior to Initiating work tasks,	Health and Safety Officer/Manager	SWP cover hazards for work tasks which are going to occur over longer durations
3	Job Hazard Analysis	When completing work tasks beyond the scope of developed SWP	Site Superintendent	To be conducted with the employee prior to task
4	Confined Space Hazard Assessment	Prior to entry into a confined space	Site Superintendent	Refer to Confined Space Entry Program
5	Hot Work Hazard Assessment	Prior to initiating any hot work activity	Site Superintendent	Refer to Hot Work Permitting
6	Site Superintendent Daily Worksite Checks	Daily	Site Superintendent	Ensure all work crews are following developed SWP's for the work tasks

FORMAL RISK ASSESSMENT

Scope

This Standard applies to all aspects of work undertaken during the Field Program. A risk assessment of all aspects of Work shall be conducted by the Health and Safety Officer / Manager:

- at a minimum, during start up and once per month during project work;
- if deemed necessary by the Project Manager, following safety infractions such as increases in near misses and minor injuries, lost time accidents etc.;

- if deemed necessary, when major losses to cash flow or assets are incurred such as, damage to equipment, deviations from scope of work etc.;
- if deemed necessary by the Project Manager, following an environmental incident such as, spills, leaks or other forms of release of contaminants to the environment; and
- Any other instance when deemed necessary by the Project Manager.

Responsibility

The Health and Safety Officer / Manager is responsible to complete the Formal Risk Assessment (FRA), report the findings to the Project Manager and follow up to ensure that recommendations have been implemented. The Site Superintendent is responsible for implementing the recommendations of the FRA.

METHOD

Safe Work Plans

Safe Work Plans (SWP) will be developed for any task(s) which is expected to repeat either day to day throughout the duration of the project or be ongoing over a period of several days. The completion of the formal risk assessment allows the Health and Safety Manager the ability to develop SWP's for various work tasks in the area. Each job task and work process is broken down into actions or sub-tasks to ensure that all critical tasks are identified.

Included in the SWP is the scope to which the plan is approved, the roles and responsibilities of key staff members, Safe work procedures and any mitigation, controls and PPE requirements over and above the minimum PPE protection levels are outlined in the safe work plan.

Job Task Analysis

Each job task and work process is to be broken down further into more detailed actions or sub-tasks. It is important that all critical tasks are identified. Job task analysis can be done through direct observation of the job or through a blend of consultation and observation. Tasks and sub-tasks shall be listed.

Risk Identification

Risk covers six basic areas:

1. Employee and Public Safety,
2. Impact on the Environment;
3. Costs Include Property Damage and Penalties,
4. Public and Stakeholder Relations;
5. Socio-Economic Impacts, and
6. Regulatory Impacts

Risk Assessment Matrix

Each job task is given a rating 1-5 based on probability of occurrence and severity of potential impact in each of the six risk areas. Ratings are uniform with one being low severity of impact and low probability respectively, and five being high or severity of impact and frequent or recurring probability respectively for all six areas. These risks are entered into the following

matrix to determine the overall risk rating. The overall risk rating is calculated through the addition of the probability rating and the severity (consequence) rating.

Table 2: Blank Risk Assessment Matrix

Risk Assessment Worksheet for Determining Probability and Consequences of An Activity, Accident or Incident

	Probability of Incident Occurence	Rating	Consequences: Employee and Public Safety	Rating	Impact on the Environment	Rating	Costs Include Property Damage and Penalties	Rating	Public and Stakeholder Relations	Rating	Socio-Economic Impacts	Rating	Regualtory Impacts (Cumulative effect on overall rating determination)	Rating
1	Rare - once in 20 years		First Aid Injury or Potential for First Aid Injury		Insignificant, localized, but potentially cumulative		Up to $ 10,000		Minor or no inconvenience to the public in the affected area		No change		Noncompliance Noted or Monitored by Inspectors	
2	Unusual - once in 5 years		Medical Aid Injury with reversible health effects		Significant, localized and reversible		$ 10,000 to $ 100,000		Public disturbance in the affected area		Minor socio-economic change		Noncompliance Reportable Incident, Monitored by Inspectors	
3	Occassional - once per year		Lost Time Injury or Minor Occupational Illness		Serious, limited and reversible		$ 100,000 to $ 1,000,000		Some media attention and/or public disturbance in affected		Major socio-economic change		Violation of Regs; Reportable Incident, Legal Issues with possible Fines	
4	Frequent - several times per year or Seasonal		Serious Injury or Occupational Disease		Serious, extensive and/or reversible		$ 1,000,000 to $10,000,000		Local and possibly national headlines, serious community		Massive socio-economic change		Violation; Legal Issue with Fines, Prosecution, possible impact to business operations	
5	Regular - weekly or continuous		Fatality		Catastrophic, extensive and/or irreversible		>$ 10,000,000		National and possibly international headlines, disastrous community		Cultural extinction		Violation; Legal Issue with Fines, Prosecution, significant impact on business operations,	

Risk Assessment Rating Number = the Rating of Probability + the Highest Rating given to Consequences

Assigning a Risk Level

The risk level is assigned as a function of frequency and severity. Both values are collected from the Risk Assessment Matrix, when the rating for probability and severity are added the resulting sum will be the overall risk rating. Assigning severity and probability involves considering the risk level, judging the effectiveness of any mitigation or controls, and assigning a risk level. Other factors that are useful in assigning risk are personal experience, knowledge, and historical data. It may be necessary to re-examine the identified hazard or risk listed for the task to ascertain accurate risks. Assigning risk is, in most cases, a qualitative judgment, as detailed and useful data is not always readily available.

Table 3: Risk Assessment - Risk Level

RISK LEVEL	DESCRIPTION
5	Extreme Risk exposure with high likelihood of occurrence.
4	High Risk exposure is constant and potential severity is high with High probability of RISK resulting in incident. Incident is certain to occur, Risk not fully controlled. Expected – occurs often as part of the process.
3	Moderate Risk exposure is frequent and an incident could result in serious consequence with Moderate probability of RISK resulting in incident. Incidents happen, risk not fully eliminated. Possible – known to occur during the process.
2	Low Risk exposure is occasional and incident may result in minor consequence with Low probability of RISK resulting in incident. Occurrence is not likely but may have occurred in the past. Unusual – known to occur occasionally but not normally anticipated.
1	Very Low Risk exposure is limited and consequence is unlikely with Extremely Low probability of RISK resulting in incident. Occurrence very unlikely and may not have occurred in the past.

Risk Analysis

Once the tasks and risk have been identified and a risk level assigned, risk analysis can begin. All critical tasks and risk levels having a rating of 4 or 5 must be reviewed further on the Hazard/Risk Assessment Form. No task with a risk rating of greater than 3 will be permitted to commence prior to the selection and implementation of a mitigation measure to reduce the overall risk level to 3 or below. After mitigation has been selected / implemented the risk assessment undergoes a second assessment, this process is continued until the risk has been reduced to an acceptable level or the task / activity is deemed to risk adverse and prohibited.

Mitigation

Mitigation is the controls applied in an attempt to eliminate the risk or hazard. Alternatively, mitigation may only be able to bring the hazard or risk to an acceptable level without being able to eliminate it entirely. There are four main methods of controlling risk or hazard:

1. Substitution;
2. Engineering Controls;
3. Administrative Controls; and
4. Personal Protective Equipment (PPE).

These methods may be used alone, or in combination. PPE is always considered to be the last resort. The existing mitigation methods should be entered in the column to assist in assigning probability and establishing a risk level. This step can also be used to identify appropriate mitigation.

Substitution

Substitution is the most effective and preferred method of controlling a risk or hazard. It must be the first consideration in controlling exposure to a risk or hazard. This method simply substitutes a safer option. For example:

- Substituting a safer chemical for a dangerous one;
- Substituting a more environmentally friendly product;
- Substituting a tool to allow the work to be done more safely; and
- Substituting equipment that is better suited to the job.

Engineering Controls

Engineering Controls involve designing out the risk. Engineering controls physically prevent access to a risk or hazard and require no direct action from personnel. They are designed into the process and thus are automatic and do not require operator actions to initiate. Examples include:

- Isolating the hazard with an enclosure or physical barrier;
- Ergonomic design;
- Guarding; and
- Mechanical Ventilation

Administrative Controls

Administrative controls are procedures used to avoid exposure to a hazard, or risk that cannot be substituted or engineered out. Examples of administrative controls are:

- Codes of Practice;
- Safe Work Practices;
- Workplace specific training; and
- Medical surveillance

Personal Protective Equipment (PPE)

Personal Protective Equipment is the last resort when other methods have failed to eliminate or reduce the risk/hazard to an acceptable level. Examples of PPE are:

- Fire retardant coveralls;
- Respirator;
- Safety boots;
- Hardhats; and
- Work gloves

ACTION PLAN DEVELOPMENT

All risks rated at “5” or “4” must have recommendations developed to mitigate the hazard/risk. Risks rated at “3” are clear for work.

RISK CONTROLS

Having identified the risk, appropriate controls must be applied.

ACTION PLAN COMPLETION

Once the Action Plan items have been implemented, they can be signed off when verification is complete.

TRAINING REQUIREMENTS

This document has been written to be informative and self-explanatory for the first-time user. Further explanation can be requested from the Project Manager. Training will be provided to all employees required to complete the risk assessment.

FILING

All Risk Assessments are to be maintained at the project site for the period of the project, and then archived for a 5 year period following completion of the project at the Delta main office. All Formal Risk Assessment and follow up reports are to be filed in hard copy at the site and scanned to electronic format, following completion by the Health and Safety Officer / Manager.

SAFE WORK PLANS

Scope

Safe Work Plan (SWP) is a simplified approach to hazard analysis that is intended to be completed by the Learning & Development Manager and reviewed by the Site Superintendent, Supervisors and employees conducting the work under the following circumstances:

- Prior to completing a new work task not covered by an existing SWP; or
- When introducing a new employee to a work task.

Responsibility

The Site Superintendent is ultimately responsible to ensure that the SWP is followed. However, the worker supervisor is responsible to ensure the SWPs are reviewed and signed off as required, as stated above. Employees are responsible to actively participate in the SWP process. The Site Superintendent, Worker Supervisor and the Employee(s) are to sign-off after completing reviewing the SWP.

Procedure

A Safe Work Plan requires the completion of four steps, namely:

- Step 1 – Conduct Comprehensive Risk Assessment
- Step 2 – Select the Job or Task;
- Step 3 – Break the Task into Sequential Steps;
- Step 4 – Identify the Hazards Associated with Each Step; and
- Step 5 – Develop the Safety Controls for the Hazards at Each Step
- Step 6 – Develop the Safe Work Plan for the task

Selecting the Job Task

Safe Work Plans are developed for a series of tasks which will be ongoing throughout the duration of the work activity. It is important that all work tasks associated with the activity are covered in the procedures outlined in the SWP. Careful consideration must be given toward the work sequence and the overall requirements of the activity prior to developing the SWP to ensure nothing is omitted.

Breaking the Task into Sequential Steps

To determine the job steps, a basic question such as "What is the first thing that you do?" is a helpful starting point. Each of these steps should accomplish some discrete identifiable task. Each step should start with an action word, these high level tasks are further dissected until all tasks can be identified and their hazards addressed in the SWP. The intent at this point is to determine what is being done and what hazards and risks are involved at each stage.

Identifying the Hazards Associated with Each Step

The next step is to identify all of the hazards associated with each step. Identifying the proper safety controls required at each step can be done at this point or during the next step after all the hazards are identified. If solutions are generated at this point, there is some chance of missing some hazard potentials. In any event, an experienced worker is generally able to provide excellent insights as to what can go and has gone wrong at each step of the job or task.

At each step of the task, the hazard potentials are identified and recorded. For example, if the particular task is pouring a caustic liquid from one container to another, the potential hazards could be chemical burns to various parts of the body such as the eye, face, hands, or torso depending on the size of the container and nature of the procedure. Additionally, another potential hazard that could be associated with this task could be the strain of the back or arm depending on the size and weight of the container.

The following table lists examples of occupational hazards that can be referenced during the development of a SWP.

Table 4: SWP Hazards

INCIDENT TYPE	INJURY TYPE	PART OF BODY
Hit by	Contusion, Laceration	Eye
Hit on	Fracture, Dislocation	Face/Head
Slip, Trip, Fall	Sprain, Strain	Torso/Back
Lift, Push, Pull	Burn	Hands
Cumulative Trauma	Foreign Body	Arms
Transportation	Exposure	Feet/Legs
Other	Other	Other

Develop the Safety Controls for the Hazards at Each Step

The final step is to develop the necessary safety controls. The idea is to move the high risks out of the unacceptable range. The risks can be reduced by lowering the possibility that something will go wrong or by reducing the severity of the consequences if it does go wrong or by doing both. In some cases, judgments must be made about the potential

risks of alternate procedures that could be proposed. Minimizing risks at each step in the job is the goal.

For each hazard, develop and document the required safety controls. There are generally several controls that could do the job. The challenge is to determine the best one that is both cost effective and that will be implemented.

If the task appears to be highly hazardous and easy solutions to reducing the risks do not appear obvious, consider the possibilities of accomplishing the task in an entirely new way. Brainstorming ideas with operators, designers, and trades personnel can often result in cost-saving and less hazardous ways of accomplishing the task. Ensure that the proposed solutions do not result in addition risk or greater risks than the original method.

Typical hazard control measures include substitution (discussed above), engineering controls such as equipment design and ventilation, the development of procedures (i.e., administrative controls), and the requirements to use Personal Protective Equipment (PPE). PPE should always be considered as a last resort, after substitution, administrative and engineering controls have been ruled out or already applied.

Procedures can include the use of safety permits such as confined space entries. Other procedures can include periodic preventive maintenance inspections on safety interlocks, fire protection systems, or ladder conditions. Procedures could be developed to check periodically on compliance with the established safety rules or to review and implement currently in-place SWP. The use of PPE requirements could be established, such as wearing safety shoes during movement of materials. Similarly, improvements to the facility or equipment can be made to reduce the chance of accidents, such as improved lighting, interlocked safety guards, and improved material storage layouts.

Filing

All newly generated SWP's is to be filed in hard copy at the site in the SSHSP and scanned to electronic format, following the approval of the SWP by the Health and Safety Manager, SWPs are to be inserted into the end of this SSHSP for easy reference.

JOB HAZARD ANALYSIS

Scope

Job Hazard Analysis (JHA) is a simplified approach to hazard analysis that is intended to be completed by the Worker Supervisors and reviewed by the Site Superintendent along with the employees conducting the work under the following circumstances:

- Prior to completing a new work task not covered by the SWP; or
- When introducing a new employee to a work task.

A JHA allows the employee who is to complete the work to be directly involved in analyzing the hazards.

The Procedure for developing a JHA is very similar to that of a SWP, but on a smaller scale and is only required for task which are not covered under the scope of a previously

developed SWP. The development of JHA is for tasks which are specific and non-recurring onsite.

Responsibility

The Site Superintendent is ultimately responsible to ensure that the JHA is completed. However, the worker supervisor is responsible to ensure the JHA's are completed as required, as stated above. Employees are responsible to actively participate in the JHA. The Site Superintendent, Worker Supervisor and the Employee(s) are to sign-off after completing the JHA.

Procedure

A Job Hazard Analysis requires the completion of four steps, namely:

- Step 1 – Select the Job or Task;
- Step 2 – Break the Task into Sequential Steps;
- Step 3 – Identify the Hazards Associated with Each Step; and
- Step 4 – Develop the Safety Controls for the Hazards at Each Step

Selecting the Job Task

The JHA must be defined specifically. For example, broadly defined jobs such as constructing a building and making chemicals are not suitable for JHA. Alternatively, tasks such as breading a coating machine, assembling scaffolding, or charging a drum of chemicals in a reactor are suitable subjects for JHA. When selecting and prioritizing, the jobs to be reviewed, several factors need to be considered. Recording the specific task to be analyzed on the JHA form is the first step in a productive job safety analysis. This brief written description of the task also helps further to define the boundaries of the analysis.

Breaking the Task into Sequential Steps

After the task or job for review has been selected, the next step is to list all the discrete steps in performing the task. An experienced operator with the help of a co-worker, team leader, supervisor, or safety representative is usually the best choice to accomplish this. The operator can walk through the task and describe what is being done at each step. The supervisor or team leader can then record the steps on the first column of the job safety analysis form. Identifying the hazards and associated safety controls needed at each step should not be completed until all the steps in the job task are listed.

To determine the job steps, a basic question such as "What is the first thing that you do?" is a helpful starting point. Each of these steps should accomplish some discrete identifiable task. Selection of steps that are too broad in nature such as "charging the chemicals to the reactor" precludes understanding of the hazards presented at each step of the task, whereas selecting steps such as (1) close reactor charge port, (2) connect clean 2-in. solvent hose to reactor manifold, (3) open manifold valve at reactor level B, (4) start raw material pump, (4) etc., provides the basis for proper hazard identification. Notice that each step starts with an action word. The intent at this point is to determine what is being done.

An overly detailed procedure that provides a lot of descriptive information but little in the way of additional hazard information leads to boredom and needless paperwork. A proper balance is the challenge for selecting the steps in a JHA. An experienced operator may find that the JHA job steps selected are too basic. Alternatively, a new operator may find that the same information developed from a JHA is exactly what is needed to do the job safely. Consider combining jobs with only few steps together as well as breaking up jobs with too many or too complex tasks.

Identifying the Hazards Associated With Each Step

The following table lists examples of occupational hazards that can be referenced during the development of a JHA.

Table 5: JHA Hazards

INCIDENT TYPE	INJURY TYPE	PART OF BODY
Hit by	Contusion, Laceration	Eye
Hit on	Fracture, Dislocation	Face/Head
Slip, Trip, Fall	Sprain, Strain	Torso/Back
Lift, Push, Pull	Burn	Hands
Cumulative Trauma	Foreign Body	Arms
Transportation	Exposure	Feet/Legs
Other	Other	Other

Filing

All JHA's is to be filed in hard copy at the site and scanned to electronic format, following the approval of the JHA by the Site Superintendent. The Project Manager is responsible for filing and scanning the documents.

SITE SUPERINTENDENT DAILY WORKSITE CHECKS

Scope

The Site Superintendent Daily Worksite Checks are designed to ensure that basic worksite safety practices are being observed. The check is to be conducted using a checklist and on a daily basis.

Responsibility

The Site Superintendent and / or Health and Safety Officer / Manager is responsible to ensure that the checklists are filled out on a daily basis. The Site Superintendent is also responsible to address any deficiencies noted and to follow up to ensure the effectiveness of the solution. The Site Superintendent and / or Health and Safety Officer / Manager is to report the findings, solutions and follow-ups to the Project Manager, Health and Safety Officer / Manager.

Procedure

The Site Superintendent and / or Health and Safety Officer / Manager is to fill out the checklist contained in Appendix to this report. All items answered with a "NO" required mitigative measures to be put in place as soon as possible, by the Site Superintendent.

Form

Refer to Appendix at the end of this Plan

Filing

All Worksite inspections are to be filed in hard copy at the site and scanned to electronic format, following completion by the Site Superintendent. The Learning & Development Manager is responsible for filing and scanning the documents.

2.0 SITE SAFETY PLANS

Site Safety Plans will be identified under 2 categories:

1. general site-wide for all staff and visitors
2. work specific Safe Work Plans (SWP) for staff and visitors performing specialised work

General site-wide Site Safety Plans will be presented as part of the Worker Orientation Seminar. Workers and visitors will undergo a mandatory Worker Orientation Seminar when they first arrive on-site and will be required to sign a tracking sheet to show that they were in attendance, and that they will follow all procedures outlined in the general site-wide Site Safety Plans. These include the following:

1. Company Safety Rules
2. Workplace Health and Safety Committee
3. Workers Right
4. Emergency Response
5. Accident and Incident Investigation
6. Fire Safety
7. Major Illness or Injury Response
8. Wildlife Contingency
9. Working on and Near Water Bodies
10. Vehicle and ATV Use

Work specific SWPs will be presented to workers on an as-required basis. The Superintendent, H&S Officer, or the Field Engineer will review with the Site Foreman's which SWPs are required to be discussed and reviewed with the workers prior to any work performed. Once a worker has completed the review of an SWP, they will sign off that they will adhere to the SWP. Records of this will be kept in the Office by the Project Manager.

Some SWPs will require the use of permits, such as a confined space entry permit, or a hot work permit. This will be requested by the worker when such work is performed, and the permit will be reviewed by the Superintendent before any work is performed.

Job Hazard Analysis (JHAs) will be filled out if there is a highly specific task which has to be performed that is not already covered by an SWP. Refer to Appendix in this Plan.

3.0 COMPANY SAFETY RULES

3.1 Safety Execution Plan

a) Supervision

As per the NUNAVUT Safety Act, Delta shall ensure that all workers that are on-site are to be under the supervision of an e

Project Management Staff and Emergency Numbers

Name	Position	CONTACT #	ORGANIZATION
PROJECT MANAGEMENT			
Janice Lee	Project Manager	Ph: 867-766-8364 Cell: 867-445-2424	Public Works and Government Services Canada
Erika Solski	Project Manager	Ph: 867-975-4577	AANDC, CARD
Robert Johnson	Project Manager	Cell: (867) 446-4694	Delta Engineering Ltd.
Shawn Carter	Project Manager	Ph. (867) 874-6574 Cell: (867) 875-8170 Fax (867) 874-6154	Carter Industries Ltd.
TBA	Site Superintendent	Site Ph: TBA	TBA
Robert Johnson	Health and Safety Officer	Cell: (867) 446-4694	Delta Engineering Ltd.
SPILL RESPONSE NUMBERS			
NU 24 Hour Spill Reporting Line	GNU and AANDC	Ph. (867) 920.8130 (call collect if required) Fax: (867) 873-6924	Triggers multiple governmental and private organizations for spill response
Jimmy Noble	Enforcement Officer Environment	Ph. (867) 975-4644	Environment Canada
Erik Allain	Field Operations Manager	Ph. (867) 975-4295	AANDC
CANUTEC	Federal Department of Transportation	Ph. (613) 996.6666 (call collect if required)	Triggers multiple governmental and private organizations for spill response for dangerous goods
Robert Eno	Pollution Control Environmental Protection Services	Ph. (867) 975-7748 Fax (867) 975-7739	GNU Department of Environment
Danielle Morin	North Slave Region Environmental Protection Officer	Ph: 867-920-3387	GNWT Environment and Natural Resources
MEDICAL EMERGENCY			
24 Hour - Stanton Territorial Emergency Evacuation	N/A	Ph. (867) 669 4115 (call collect if required), or Ph. (867) 669-4111 (Yellowknife Hospital) or Ph. (867) 873-2222 (Yellowknife Ambulance)	Triggers the resources required for an emergency evacuation for an injured or ill employee
DISASTER RELIEF			
Canadian Red Cross	-	Ph. (780) 423.2680 Fax. (780) 428.7092	Canadian Red Cross
FIRE EMERGENCY			
24 Hour Forest Fire Emergency Phone Number (NWT Fire)	N/A	Ph. 1-877-698-3473 Ph. (867) 873-2222	Yellowknife Fire and Rescue Services

Name	Position	CONTACT #	ORGANIZATION
WILDLIFE EMERGENCY			
Wildlife Emergencies	GNU	Ph. (867) 982-7450	GNU Environment and Natural Resources
RCMP			
Kuglutuk RCMP	Headquarters	Ph. (867) 982-1111	RCMP
OCCUPATIONAL HEALTH AND SAFETY			
Peter Bengts	Chief Inspector of Mines	(867) 669 4412	NWT Workers Compensation Board – Mine Safety
WORKERS' COMPENSATION BOARD			
WSCC Accident-Incident Reporting	WSCC	Ph. 1-800-661-0792 Fax: 1-866-277-3677	Workers Compensation Board
AIR CHARTERS			
Air Tindi	Air Charter – Plane	Ph. (867) 669.8200 Fax. (867) 669.8219	Private Company
Summit Air	Air Charter – Plane	Ph. (867) 669.9789 Fax (867) 669.9649	Private Company
Great Slave Helicopters	Air Charter - Helicopter	Ph. (867) 873.2081 Fax (867) 873.6087 After Hours Ph. (867) 873.2081	Private Company

i. Experienced and trained Supervisor
ii. If drilling and blasting is done on-site, all workers shall be under the supervision of an open pit shift boss certificate
iii. Any person that supervises a portion of the work site shall possess a Level I supervisor's certificate.

b) Site First Aid
   i. All vehicles, where physically possible will contain safety materials such as:
      - First Aid Kit
      - Fire Extinguisher
      - Spare tires
      - Jack-all
      - Hand held two way Radio
   ii. Any minor first aid requirements will be handled directly by the Supervisor. Any perils requiring more specialized attention will be handled at the on-site First Aid facility.

c) Safety Meetings
   i. Daily Tool Box Meetings will outline the work that is required for the day and discuss any safety issues relating to the work or the project.
   ii. Due to the nature of the work proposed it is deemed that weekly safety meetings will be adequate. Scheduling will be decided once final crew allotments have been verified.
   iii. Supervisors will be responsible for chairing meetings and taking minutes. A copy of each week's minutes will be made available to the Departmental Representative and our superintendent and forwarded to the Yellowknife office.

d) Safety Audits by Contractor
   i. Safety audits will be undertaken by the Project Manager or an individual assigned to perform the audit in his place.
   ii. These audits will occur in conjunction with monthly visits to site.
   iii. A bi-monthly assessment of deficiencies in health, safety, medical/first aid supplies shall also be performed. This list shall be compiled by the Site Supervisors, and submitted to the DR, along with a schedule for upgrading deficiencies.

e) Accident and Incident Reporting
   i. Form is included in Appendix to this report.

f) WHMIS. Training
   i. All employees or their sub-consultants will have completed WHMIS.
   ii. WHMIS training may be provided on-site.

3.2 Company Safety Rules

All employees are required to follow the following rules as part of their employment contract with the company. The rules are:

1. The consumption of alcoholic beverages and illicit drugs is strictly forbidden.
2. Ensure that all required emergency white out supplies are in vehicles before traveling. Book your travel and let people at your destination know the expected time of your arrival.
3. Running, horseplay, scuffling, or fooling around is strictly forbidden on the job.
4. Zero tolerance for violence, harassment and discrimination.
5. Theft and vandalism of Company property will not be tolerated.
6. Seat Belts must be worn at all times. The only exception to the seat belt use is if it is not recommended on ice road travel.
7. Do not wear torn or loose clothing that could be caught in equipment, machines, tools or other objects, and be aware of the dangers associated in wearing rings, wrist watches, bracelets, or dangling neckwear.
8. Floors must be clear of oils, grease, refuse, or other types of materials, which may create a slipping hazard.
9. Store hoses, cables, ropes, wires, etc. when not in use to prevent tripping hazard.
10. Identify, store, and handle hazardous material in accordance with the Workplace Hazardous Materials Information System (WHMIS) regulations.
11. Do not remove guards, except for repair or adjustments, and replace them before operating equipment.
12. Never leave loose tools or materials where there is a danger of them falling or causing a trip hazard.
13. Always face a ladder when ascending or descending it.

14. Maintain good housekeeping, keep the truck and work areas clean.
15. Never smoke in a “NO SMOKING” area.
16. Always store gasoline, oil, grease, and other flammable liquids clear of the work area. Prominently display “NO SMOKING” signs in the storage areas.
17. Always turn in fire extinguishers to Supervisor immediately after use for recharging.

3.3 Camp Rules and Security

All employees are required to follow the following rules as part of their employment contract with the company. The rules are:

1. Property damage – Theft, vandalism, and/or damage to any property will not be tolerated.
2. Vehicle and equipment use – No vehicles or equipment (including snowmobile and ATVs) are to be used for recreational purposes within the camp or onsite. Only trained and authorized persons are permitted to operate equipment and/or vehicles and donning helmets for snowmobile and ATV use.
3. Smoking – Smoking will only be permitted in smoking areas. No smoking is allowed in sleeping quarters, washroom area, and kitchen/dining area. All none smoking areas are equipped with smoke detectors/alarms and at no time are the smoke detectors/alarms permitted to be turned off or disabled.
4. Alcoholic beverages – The possession and/or consumption of alcoholic beverages is strictly forbidden anywhere onsite and will result in immediate termination.
5. Drugs – The possession and/or consumption of illegal drugs is strictly forbidden anywhere onsite and will result in immediate termination.
6. Firearms – The possession or use of firearms, ammunition or other lethal weapons, unless approved by the Project Manager, are strictly forbidden. Wildlife Monitors and Superintendents have been given advanced approval and instruction by the Project Manager for the possession of fire arms as a deterrent/defence mechanism.
7. Security – Only authorized personnel are permitted onsite and within the camp. A list of persons approved at the site will be maintained by the Site Superintendent. All persons entering the camp must check in with the site health and safety coordinator and attend a site orientation meeting prior to any site activities.
8. Housekeeping – The camp and work areas are to be maintained in a clean and orderly manner. All wastes are to be disposed of in waste receptacles. Keep stairways, doors, access ways, and ladders clear of materials. Cleanup all spills immediately.
9. PPE – All personnel entering work areas must wear these minimum requirements: full length pants, shirt, CSA safety boots, CSA hard hat, CSA safety glasses, and reflective vest/outerwear. In addition, each personnel shall don rubber apron or rain suit, rubber gloves, and half-mask respirators for chemical mixing.
10. Nuisance – No horseplay, harassment, verbal abuse, or shouting will be allowed in the camp or work areas.
11. Emergency procedures, exits, signals, and alarms – In the case of an emergency, all personnel are to follow the applicable emergency procedures. The location of every

emergency exit will be posted in a conspicuous location for all personnel to observe. Emergency signals and alarms shall be placed such that they are audible and visible throughout the camp. During an emergency situation all personnel are to report to the muster station immediately and await further instructions.

THREE STRIKES TOLERANCE

The employee's enforcement is three strikes and you're out. The policy is applied as follows:

VERBAL WARNING - Infraction discussed with employee to rectify and modify any work practice. The discretion to apply a verbal versus a written warning is up to the Site Superintendent.

STRIKE ONE - First infraction
Written warning requesting compliance given to offender by Superintendent. Copy of warning forwarded to the Project Manager.

STRIKE TWO - Second infraction
Written warning requesting compliance given to offender by Project Manager. Copy of warning letter forwarded to Superintendent.

STRIKE THREE - Third infraction
Written acknowledgment of the third infraction signed by the Project Manager is to be given to the offender with an order to immediately leave the workplace. The offender is to be denied future access to the workplace.

An individual having three strikes may request for reinstatement after 1 year duration. The request must be to the Project Manager.

ZERO TOLERANCE INFRACTIONS

Three strikes and you're out does not Apply to Zero Tolerance behaviour. Zero Tolerance behaviour results in immediate removal from the site and includes the following:

- Intentional tampering of any worksite, equipment or supply;
- tampering with smoke or fire detectors/alarms, any other safety equipment or electrical outlets/fixtures;
- possession and/or consumption or use of alcohol or illegal drugs;
- possession or use of firearms, ammunition or other lethal weapons unless approved by the Project Manager;
- discrimination;
- fighting, physical violence, stealing, vandalism or destruction of property; and
- Harassment in any form.

4.0 WORKPLACE HEALTH and SAFETY COMMITTEE

4.1 Number of Employees

It is anticipated that approximately 10 Delta employees will be at the site at any one time.

4.2 NU Mines Health and Safety Act

The NUNAVUT Safety Act requires that a site with more than 15 employees establish an occupational health and safety committee. Therefore an OH&S committee is not required.

5.0 WORKERS RIGHTS

5.1 Training

All workers will receive training with respect to the following:

- Workers Right to Know; and
- Workers Right to Participate; and
- Workers Right to Refuse Unsafe Work

Workers Right to Know

All workers have the right to know about unsafe materials and/or dangerous machinery in the workplace. All workers must be on the lookout for hazards present on the worksite, and shall be taught how these hazards can affect health and safety. The first step is to get proper health and safety training; including learning how to identify workplace hazards and knowing the proper course of action.

Workers Right to Participate

All workers should report any unsafe practices or conditions that are identified. For example, if a worker notice's that an electrical power cord is frayed; notify a supervisor as soon as possible to fix it before an accident or fatality occurs. Workers have the right to participate in all health and safety matters through the Workplace Health and Safety Committee.

Workers Right to Refuse Unsafe Work

All workers have the right to refuse unsafe work. If it is thought that work or a piece of equipment is unsafe, a worker can stop this work immediately by citing his or her legal right to refuse unsafe work. Once a worker refuses to continue, procedures exist for rectifying the situation.

5.2 Workers Right to Refuse Work – Site Procedures

General

- The NUNAVUT SAFETY ACT pertains to the employees right to refuse work

Unsafe Work

- An employee may refuse to carry out any work or operate any equipment, tool or appliance if he or she has reasonable cause to believe that to do so would endanger the health or safety of any person;
- A shift boss or supervisor shall not knowingly perform or permit a worker to perform work which could endanger the health or safety of any employee
- An employee who refuses to carry out work or to operate any equipment, tool, or appliance in compliance with these provisions shall immediately report the circumstances to his or her shift boss or supervisor;

Investigation

- The shift boss or supervisor receiving a report shall immediately investigate the matter and ensure that any dangerous condition is remedied immediately and without delay, or if, in his or her opinion, the work refusal is not valid, the shift boss or supervisor shall so inform the employee who made the report.
- If the investigation required the NUNAVUT SAFETY ACT does not resolve the matter to the satisfaction of the employee who made the report under section 4.03, a further investigation shall be made by the supervisor or other management representative in the presence of the employee who made the report, together with an employee who:
    - has knowledge of the work in question; and
    - Is a worker selected by the employee refusing to carry out the work.
- Where a worker member of the Committee or the other worker selected by the employee refusing unsafe work is not available to carry out the investigation referred to in the NUNAVUT SAFETY ACT, the employee who made the report under the NUNAVUT SAFETY ACT may request the Employee representative of the Workplace Health and Safety Committee (WPHSC) to designate a worker to make the investigation with the supervisor;

Use of an Alternate Worker

- Where an employee refuses to carry out the work after the supervisor and a person have investigated the work refusal and are both of the opinion that no employee is endangered,

  (a) If the refusal is considered relatively unique to that particular employee, and
  (b) If there is no justification for an alternate employee to refuse to carry out the work in question,

  Then the supervisor, after informing the alternate employee of the reason for the refusal, may require him or her to perform the work;

- Where it is determined by an investigation that an employee may be endangered, no employee shall perform the work until the situation has been remedied to the satisfaction of the employee doing the work.

Committee Investigation

- Where the procedures set out in the NUNAVUT SAFETY ACT fail to resolve the work refusal, the WPHSC shall conduct an investigation in the presence of the employee and either:

  (a) Develop a plan that is acceptable to an employee who will do the work and that will allow the work to proceed safely; or
  (b) Permit the employee to continue to refuse to work.

- The WPHSC shall submit to the Project Manager a report on the investigation that describes the situation and recommends the remedial action that the WPHSC has determined is required;
- Where the NUNAVUT SAFETY ACT fail to resolve the work refusal, the employee who made the report, the worker co-chairperson of the WPHSC or the Project Manager may appeal to the Chief Inspector for the designation of an inspector to resolve the refusal.

Inspector to Investigate

- The Chief Inspector shall designate an inspector who shall investigate the work refusal in the presence of the employee who so refused or the employee's designate and the Project Manager or the Project Manager's designate, which is the Site Superintendent;
- The inspector shall give his or her decision without delay upon concluding his or her investigation to the Project Manager, the employee and the WPHSC;
- The inspector’s decision is final.

6.0 EMERGENCY RESPONSE

The objectives of the following Emergency Response Plan (ERP) is to:

- protect the safety and well-being of employees (permanent or contract);
- protect the environment and the nearby communities;
- remediate any negative effects on the environment and nearby communities; and
- Return the work site to safe operating conditions as soon as possible to avoid project delays and cost overruns.

Documentation must be prepared to outline responsibilities and required actions of Delta employees in the event of an emergency situation. An emergency situation is any incident that has the potential to seriously and negatively affect:

- the environment;
- wildlife;
- the health and safety and well-being of the Client, employees, neighbouring communities and the public at large;
- Delta's ability to conduct business; and
- Delta's corporate and public reputation.

Emergencies do not occur as a planned event and can vary in magnitude. Therefore,

1. emergency situations must be anticipated and assessed for risk;
2. appropriate response plans must be developed;
3. workers and sub-contractors must know their basic responsibilities so they will be able to react positively in an emergency situation; and
4. all stakeholders, including applicable Government Agencies (GA), Local Communities (LC), Local Emergency Response Teams (LERT) and Non-Government Organizations (NGO) must be: informed of applicable emergency plans so: available resources can be identified; and all parties can be prepared to respond as per planned in the event of an emergency.

In any emergency situation, time is the most critical factor with respect to the damage that an emergency situation can affect: the quicker the initiation, the more orderly and effective the response. The first person that notices an incident must activate the plan immediately and take charge until supervisory and medical support arrive.

The Contwoyto Lake Weather Station Remediation is a remote site and as such third party resources cannot be expected to act as first responders. As such, all Delta field crews are required to act as first responders when on-site. The appropriate training will be provided prior to Work.

6.1 Communication

Emergency conditions on site will be notified to all workers by radio by announcing "Code one, Code one, and Code one". This will trigger an immediate shut down of all

work and all site personnel will stay off the radio except the Medic, Superintendent and whoever announced the Code One. Work will continue under shutdown mode until advised by the superintendent.

The medic will be responsible for advising should a medevac be required. In-the-event that a medevac is required the superintendent will be responsible for all co-ordination from the site and the Project Manager will support from Yellowknife.

The Project Manager will advise PWGSC Project Manager and AANDC Project Manager of any Code One that requires a Medivac as soon as the Medivac co-ordination has been completed. The site superintendent will advise the DR of the situation as soon as the Code One has been called off and if a medevac is required then the DR will be notified as soon as the logistics have been completed to trigger the medevac.

EMERGENCY NUMBERS

The following is an overall list of emergency contact numbers. Refer to the individual contingency plans contained herein for specific circumstances as to when to contact the listed individuals.

Table 6: Overall List of Emergency Phone Numbers

Project Management Staff and Emergency Numbers

Name	Position	CONTACT #	ORGANIZATION
PROJECT MANAGEMENT			
Janice Lee	Project Manager	Ph: 867-766-8364 Cell: 867-445-2424	Public Works and Government Services Canada
Erika Solski	Project Manager	Ph: 867-975-4577	AANDC, CARD
Robert Johnson	Project Manager	Cell: (867) 446-4694	Delta Engineering Ltd.
Shawn Carter	Project Manager	Ph. (867) 874-6574 Cell: (867) 875-8170 Fax (867) 874-6154	Carter Industries Ltd.
TBA	Site Superintendent	Site Ph: TBA	TBA
Robert Johnson	Health and Safety Officer	Cell: (867) 446-4694	Delta Engineering Ltd.
SPILL RESPONSE NUMBERS			
NU 24 Hour Spill Reporting Line	GNU and AANDC	Ph. (867) 920.8130 (call collect if required) Fax: (867) 873-6924	Triggers multiple governmental and private organizations for spill response
Jimmy Noble	Enforcement Officer Environment	Ph. (867) 975-4644	Environment Canada
Erik Allain	Field Operations Manager	Ph. (867) 975-4295	AANDC
CANUTEC	Federal Department of Transportation	Ph. (613) 996.6666 (call collect if required)	Triggers multiple governmental and private organizations for spill response for dangerous goods
Robert Eno	Pollution Control Environmental Protection Services	Ph. (867) 975-7748 Fax (867) 975-7739	GNU Department of Environment
Danielle Morin	North Slave Region Environmental Protection Officer	Ph: 867-920-3387	GNWT Environment and Natural Resources

Name	Position	CONTACT #	ORGANIZATION
MEDICAL EMERGENCY			
24 Hour - Stanton Territorial Emergency Evacuation	N/A	Ph. (867) 669 4115 (call collect if required), or Ph. (867) 669-4111 (Yellowknife Hospital) or Ph. (867) 873-2222 (Yellowknife Ambulance)	Triggers the resources required for an emergency evacuation for an injured or ill employee
DISASTER RELIEF			
Canadian Red Cross	-	Ph. (780) 423.2680 Fax. (780) 428.7092	Canadian Red Cross
FIRE EMERGENCY			
24 Hour Forest Fire Emergency Phone Number (NWT Fire)	N/A	Ph. 1-877-698-3473 Ph. (867) 873-2222	Yellowknife Fire and Rescue Services
WILDLIFE EMERGENCY			
Wildlife Emergencies	GNU	Ph. (867) 982-7450	GNU Environment and Natural Resources
RCMP			
Kuglutuk RCMP	Headquarters	Ph. (867) 982-1111	RCMP
OCCUPATIONAL HEALTH AND SAFETY			
Peter Bengts	Chief Inspector of Mines	(867) 669 4412	NWT Workers Compensation Board – Mine Safety
WORKERS' COMPENSATION BOARD			
WSCC Accident-Incident Reporting	WSCC	Ph. 1-800-661-0792 Fax: 1-866-277-3677	Workers Compensation Board
AIR CHARTERS			
Air Tindi	Air Charter – Plane	Ph. (867) 669.8200 Fax. (867) 669.8219	Private Company
Summit Air	Air Charter – Plane	Ph. (867) 669.9789 Fax (867) 669.9649	Private Company
Great Slave Helicopters	Air Charter - Helicopter	Ph. (867) 873.2081 Fax (867) 873.6087 After Hours Ph. (867) 873.2081	Private Company

6.2 Resources

The site is a remote Northern site and as such extensive communications infrastructure is not available for reporting, initiating and coordinating emergency response. The available means of communication will be limited to:

SITE INTERNAL COMMUNICATIONS

1. verbal communication;
2. hand held radios;
3. satellite phones; and
4. Emergency indicators such as flares and horns.

SITE EXTERNAL COMMUNICATIONS

1. internet;
2. office phones; and
3. satellite phones

Two satellite phones will be available for use and will be charged at all times. In addition, the satellite phones will be stored in a water tight, impact resistant case, along with a list of emergency phone numbers which will be located with the emergency satellite phones. The operations center will contain facsimile, internet and phones. Workers will be required to have at a minimum one hand held radio per work area and supervisors, field engineers and medical staff will be required to have a hand held radio on their person at all times.

6.3 Potential Emergency Situations

The following emergency situations could arise either during mobilization or Work with respect to the Project.

Table 7: Potential Emergency Situation

ID	EMERGENCY SITUATION	IMPACT (HUMAN ENVIRONMENTAL OR CAPITAL)
1	Spill of the following petroleum products (hazardous material) and/or hazardous materials while in transportation to or from the site by ice road or air into the site: a. Diesel b. Gasoline; c. Lubricants.	Human, Capital and Environmental
2	Spill of the following petroleum products (hazardous material) and/or hazardous wastes while in storage at the site a. Diesel; b. Gasoline; c. Lubricants. d. Hazardous Waste Collected for Off-Site Disposal	Human, Capital and Environmental
3	Environmental Fire	Human, Capital and Environmental
4	Infrastructure Fire	Human, Capital and Environmental
5	Employee attacked by wildlife.	Human and Capital
6	Employee injured at work site (i.e., physical injury and/or chemical exposure)	Human and Capital
7	Exposure to cold temperatures	Human
8	Major employee illness such as a heart attack.	Human

7.0 ACCIDENT and INCIDENT INVESTIGATION

FORMS
Forms located in appendix of this Plan

7.1 Definitions

INCIDENT
"Incident" means an unplanned an unwanted event that results in, or under slightly different circumstances could have resulted in, personal injury or property damage. Incidents range in seriousness and frequency and can be classified as follows:

- Near Miss;
- Dangerous Occurrence;
- Accident;
- Serious Injury; and
- Reportable Incident
- Any incident reports

Incidents following known patterns: the greater number of near misses the greater the likelihood of a minor injury. The greater number of minor injuries the greater the chance of a serious injury. The greater number of serious injuries the higher the likelihood of a work related death. The accident triangle quantifies the relationship between the occurrences of the various incidents.

NEAR MISS
"Near miss" means an unplanned and unwanted event that under slightly different circumstances could have resulted in, personal injury or property damage.

DANGEROUS OCCURRENCE
"Dangerous Occurrence" means

- an incident involving any lifting or hoisting device;
- an inrush of water;
- a cracking, seeping or failure of a dam or bulkhead;
- an outbreak of fire;
- a premature or unexpected explosion or ignition;
- an explosion or outbreak of fire in any way related to the operation of an air compressor, air receiver, compressed air line or steam boiler;
- loss of control or major damage to any mobile equipment;
- an uncontrolled fall of ground causing physical damage or the displacement of more than 50 t of material, and
- any unusual occurrence not listed above

ACCIDENT
"Accident" means incident that result, in personal injury or property damage.

SERIOUS INJURY

"Serious injury" is an accident that results in:

- a fracture of the skull, spine, pelvis, femur, humerus, fibula, tibia, radius or ulna;
- an amputation of a major part of a hand or foot;
- the permanent loss of the sight of an eye;
- any serious internal haemorrhage;
- any burn that is caused by electricity and requires medical attention;
- any third degree burn;
- any injury caused directly or indirectly by explosives;
- any asphyxiation or poisoning that causes a partial or total loss of physical control; and
- any other injury likely to endanger life or cause permanent impairment.

REPORTABLE INCIDENT

"Reportable incident" is defined under the NUNAVUT SAFETY ACT as an incident involving serious injury or death;

7.2 Incident and Dangerous Occurrence- Procedure

REPORTING

- Where a reportable incident occurs the Superintendent shall, without delay, notify the DR and Delta Project manager
- The Project Manager or Project Managers Designate (Site Superintendent) shall then notify a WSCC inspector, PWGSC PM and AANDC PM.
- Within 24 hours after a dangerous occurrence, the Project Manager or Project Managers Designate (Site Superintendent) shall give an oral report to a WSCC inspector.
- Within 72 hours after a dangerous occurrence or a reportable incident, the Project Managers Designate (Site Superintendent) shall send a written report to the chief inspector.

SCENE NOT TO BE DISTURBED

- no person shall, except for the purpose of preventing injury or relieving suffering, move or otherwise interfere with any wreckage or equipment at the scene of or connected with a reportable incident until an inspector has conducted an investigation of the incident and has given permission to do so;
- However, where an inspector is unable to conduct an immediate investigation of a reportable incident, an inspector may authorize a person to move or otherwise interfere with any wreckage or equipment at the scene of or connected with the reportable incident to the extent necessary to permit the resumption of operations;

- Where an inspector authorizes a person to move or otherwise interfere with any wreckage or equipment at the scene of or connected with the reportable incident, the inspector may require that the person take photographs, make drawings or take such other action as the inspector considers necessary to facilitate the investigation of the incident;
- Nothing herein authorizes a person to move or otherwise interfere with any wreckage or equipment at the scene of or connected with the reportable incident where a coroner or a police officer has secured the scene or the equipment under the Coroners Act.

INVESTIGATIONS AND REPORTS

- The Project Manager or the Project Managers Designate (Site Superintendent) shall ensure that an investigation of the health and safety circumstances surrounding reportable **incidents** and the causes of dangerous occurrences, is made by persons knowledgeable in the type of work involved and by the WPHSC co-chairpersons or their designates;
- On completion of the investigation, the Project Manager or the Project Managers Designate (Site Superintendent) shall have a report prepared that:
    - where possible, identifies the causes of the reportable incident or dangerous occurrence;
    - identifies any unsafe conditions, acts or procedures which contributed in any manner to the reportable incident or dangerous occurrence; and
    - makes recommendations that may prevent similar accidents.
- The Project Manager shall sign the report and send the report to the WPHSC for review and approval; and send the approved report to the chief inspector.

7.3 Notice of Fire

- The Project Manager or the Project Managers Designate (Site Superintendent) shall, without delay, notify the chief inspector of an outbreak of fire that:
    - endangers the health and safety of any person;
    - requires the use of mine rescue services; or
    - is, or is potentially, a hazard to surrounding areas.

7.4 Accidents other than Reportable Incidents & Dangerous Occurrences - Procedure

All other accidents, regardless of any injury, must be reported to the WSCC's Accident Reporting Toll Free number at 1-800-661-0792 within 24 hours. Within three (3) working days from the time the Site Superintendent becomes aware of an accident he or he must file an Employer's Report of Accident. Refer to Appendix at the end of this Plan, for the Employer's Report of Accident Form. A WSCC representative may be sent to the scene of an accident to interview witnesses, examine the site and verify information.

7.5 Near Misses - Procedure

All near misses must be reported to the Site Superintendent. The Site Superintendent is to record the near miss and undertake an investigation into the root cause of the near miss using the principles of the Site Investigation. Work for which the near miss is directly related is not to continue until the investigation is complete and mitigative measures are in-place.

7.6 Light Duties

All persons who are injured, no matter the degree of injury and if safe to do so, are to immediately report to the site medic for an assessment. If safe to do so all employees are to perform light duties. If an employee refuses light duties and is physically able to do so, that the employee must sign off that he or she is leaving the site at his or her own will and that he or she was offered light duties and refused to complete such work. Right to refuse work forms shall be filled out.

7.7 Site Investigation

INTRODUCTION

The purpose of the Site Investigation is to determine how and why an incident occurred and what is needed to prevent it from occurring again in the future. The purpose is not to affix blame, but to prevent future incidents and accidents.

PROCEDURE

Medical Response

Once an accident has been reported by field employees, the Site Superintendent is to ensure that medical response has been or is being provided to the injured person. If a medical response has not been issued, the Site Superintendent is to immediately contact the medic. If the employee is seriously injured then the Site Superintendent is to ensure that a medivac is dispatched.

Start of Investigation

The Site Superintendent is responsible to complete the accident investigation along with assistance from the Project Manager. Once the injured person has been provided with the immediate medical assistance or the incident situation has been stabilized, the investigation should begin as soon as possible. Delays can easily result in a change in the physical situation and surrounding circumstances. If there is an immediate continuing hazard, actions may need to be taken to secure unsafe situation to prevent injuries to the investigators or stabilize an unsafe situation for co-workers.

Accident Investigation from is to be filled out when completing steps #1 to #4, described below. Located in Appendix to this Plan

STEP #1 – SECURING THE SCENE AND GETTING THE FACTS

For accidents resulting in serious injuries, it may not be possible to interview the injured person for several days or longer. For this and other reasons, it is essential that the scene

of the accident be preserved until the essential facts around the situation are determined. Access to the scene is to be limited only to those persons approved by the Site Superintendent to partake in the investigation.

Immediate steps are to be taken to secure and document the immediate area of the incident and any other areas that are indirectly related to the incident. Required means of documentation are photographs and statements from co-workers and witnesses. Videotape and sketches can be used to reduce the number of photographs such as when a large area is involved.

Written reports of the incident are to be completed and signed off by all witness no later than by the end of the shift within which the injury took place. The only exception is if an injured person is physically unable to fill out a report. The injured person, if possible to do so, is then to be verbally interviewed and the information is to be transcribed by the Site Superintendent.

The purpose of the documentation process described above is to gather the facts so that an analysis of the causes of the incident can be determined. As such, it is very important that the scene be properly secured and accurately documented.

Documentation is to be conducted so as to gather relevant facts in the following areas without making judgments about them.

1. The Injured Person

- The nature of the injury
    - what part(s) of the body was affected;
    - how seriously;
    - medical input;
    - cumulative versus instantaneous;
    - new injury vs. aggravation of an existing injury;
- Work experience
    - how much job experience;
    - new employee;
    - new work assignment;
    - co-workers experienced;
- Extenuating circumstances
    - stress;
    - long working hours;
    - family pressures;

2. Facility Conditions/Situation

- Environmental conditions;
    - lighting levels;
    - noise levels;
    - temperature level;

- walking surface;
- spills;
- inside/outside;
- obstructions;
- recognized hazards;
- facility damage;
- time;
- day
- shift;
- witnesses;
- weights;
- measurements;
- samples;
- photographs;

3. The Job/Task Equipment Condition/Situation

- Job/Task
  - what happened;
  - what was the sequence of events;
  - were written operating procedures available;
  - were operating procedures verbally given;
  - what was the actual procedure that was undertaken;
  - how long was the person doing the task;
  - how much training was provided;
  - what safety controls were expected;
  - what actual safety controls were used;
  - what personal protective equipment was expected;
  - what personal protective equipment was used;
- Equipment
  - design conditions;
  - maintenance conditions;
  - safety conditions;
  - equipment damage, and if any, to what extent;
- Situation Re-enactment
  - if safe to do so, walk through the accident situation to corroborate other facts and information, pull the storey together.

At this point the facts should pull together (i.e., “add up”) and tell a consistent story. If there is a major discrepancy that cannot be explained or if there are conflicting facts, it is important to resolve them before making judgments regarding the causes of the incident.

STEP #2 – DETERMINING THE IMMEDIATE CAUSES

Now that the facts of the situation have been determined, the next step is to determine the immediate causes – the UNSAFE ACTS and UNSAFE CONDITIONS. With the facts of the investigation in mind, now start making judgments regarding the unsafe acts and unsafe conditions.

A. ACTS

1. Do Certain Things Better

- Does the employee need to
    - follow procedures better;
    - be more alert;
    - were the proper personal protective equipment;
    - do a better job in planning the task;
    - focus more attention of the job task

2. Stop Doing Certain Things

- Does the employee need to
    - stop wearing inappropriate clothing;
    - stop rushing and hurrying;
    - stop using unsafe equipment;
    - suing equipment unsafely;
    - creating unsafe conditions;

B. CONDITIONS

1. Improve the Equipment

- Does the equipment need to
    - be better guarded;
    - better maintained;
    - have sharp edges removed;
    - have better safety interlocks;
    - be redesigned;
    - more reliable.

2. Improve the Procedure

- Does the procedure need to
    - be developed;
    - a Job Hazard Analysis completed;
    - require less reaching;
    - require less lifting;
    - require better ergonomics

3. Improve the Environment

- Does the workplace need to
    - be less cluttered;
    - be better lighted;

- be warmer or colder;
- be less noisy.

The determination of such facts needs to be done in a non-threatening manner. If threatened, person's defences will naturally go up and determining what actually happened will be very difficult.

STEP #3 – DETERMINING THE UNDERLYING FACTORS

Now that judgments have been made on what acts and conditions need to be better or different, it must be determined why the employee acted the way and/or why the conditions existed. This will allow specific items to be identified and mitigative measures to be developed. The goal is to prevent the incident from reoccurring in the future. The following must be considered:

A. ACTS

1. Knowledge

- did the individual clearly know of
  - safety expectations;
  - rules and safety procedures;
  - hazards in the workplace;
  - necessary precautions

2. Ability

- was the employee able to do the job task;
- were the physical and mental requirements of the job determined;
- were skill development requirements satisfactorily completed;
- was the person temporarily disabled either physically or mentally

3. Motivation

- was there a competing interest to follow the safety rules
- were personal difficulties interfering;

B. CONDITIONS

1. Design

- did the equipment, facility or process need to be better
  - safeguarded;
  - specified;
  - engineered;

2. Maintenance

- did the equipment, facility or process need to be
  - inspected better;
  - have a formal written inspection procedure;
  - inspected at more frequent intervals

3. Actions of Another

- were the conditions created by someone other than the person injured. If so, to what extent.

STEP #4 – PREVENTATIVE MEASURES

The following mitigative measures are to be applied:

A. ACTS

1. The Employee Didn't Know

- consider if the management needs to adapt training and/or policies to ensure:
    - that the employees know their personal safety responsibilities;
    - workplace hazards and associated precautions have been identified and then more effectively communicating those expectations by:
        - establishing safety rules, procedures, and expectations for job-related, common tasks and emergency situations; and/or
        - broadcasting those rules and expectations on a continual, consistent basis.

2. The Employee Didn't Have the Necessary Ability

- consider if the management needs to establish or change the requirements of the job by:
    - determining the job requirements with respect to physical, mental and cogitative capabilities;
    - ensuring the job and/or task does not exceed the capability of the individual;
    - reviewing the requirements and capabilities with respect to a temporary or permanent disability;

3. The Employee Wasn't Properly Motivated

- consider if the management needs to establish a motivational intervention effort to discipline individuals for negative behaviour and/or reward individuals for following rules by:
    - confronting individuals whose behaviours are not consistent with the rules;
    - recognizing and rewarding those individuals who are following the rules;
    - ensuring that the intervention occurs continuously and before any inappropriate behaviours lead to an incident

B. CONDITIONS

1. Workplace Was Not Designed Properly

- consider if the management needs to improve safety design standards or apply risk assessments by:
    - ensuring that engineering safety standards are understood and applied;
    - applying regulatory, consensus and best practice safety standards;

- conducting hazard assessments and applying the results where the situation is complex or where standards alone are not sufficient

2. Workplace Was Not Maintained Properly

- consider if the management needs to establish maintenance safety procedures or fully implement safety inspection procedures by:
  - ensuring that preventive maintenance safety procedures are developed and applies;
  - ensuring that the safety inspection procedures are conducted;
  - improving quality and/or frequency of the safety inspections

3. Inappropriate Workplace Conditions Were Created By the Actions of Others

- consider if the management needs to establish safety procedures for others or to develop a motivation program to ensure that others such as contractors follow rules by:
  - ensuring that others, including outside contractors and visitors, know the safety rules;
  - determining if other individuals are following the rules; and/or
  - establishing adequate oversight and supervision of contractors and others.

8.0 FIRE SAFETY PLAN

8.1 Purpose

The purpose of the Fire Safety Plan is to:

1. Prepare employees and visitors to efficiently and safely identify and respond to fires so as to prevent or minimize, in order of importance:
    a. injuries or loss of life;
    b. damage to the environment; and
    c. damage to equipment and supplies; and
2. To provide the necessary resources and education to prevent a fire from occurring; and
3. To contain the necessary information to act as a training reference.

8.2 Scope

8.2.1 General

The Fire Safety Plan is applicable to: all work undertaken by Delta employees; and any activities conducted by visitors, during the course of the Contwoyto Lake Weather Station Remediation Project.

8.2.2 Incipient Stage Fires

All employees are expected to fight incipient stage fires within the immediate limits of their work areas. An incipient stage fire is defined as a fire which is in the initial or beginning stage and which can be controlled or extinguished by portable fire extinguishers, Class II standpipe or small hose systems without the need for protective clothing or breathing apparatus.

8.2.3 Controlled Burning

Some controlled burning of infrastructure/debris may occur during the work. To limit the risk of the spread of fire, select employees will be expected to apply water spray on adjacent infrastructure or other resources. The intent of the water spray is to:

- cool the adjacent infrastructure/resources to a temperature below the applicable flash point temperature; and
- to extinguish any air born embers that could act as a source of ignition.

Under no circumstances are such employees to approach to an unsafe distance or enter any burning infrastructure/resources.

8.2.4 Uncontrolled Fires beyond the Incipient Stage

No employees, under any circumstances, are to fight any uncontrolled fires beyond the incipient stage.

8.2.5 Infrastructure Fire

Only employees trained in fire response for infrastructure are to fight incipient stage fire within the infrastructure. No employees, under any circumstances, are to fight any uncontrolled fires (beyond the incipient stage) of the infrastructure.

8.2.6 Petroleum Hydrocarbon Fires

All employees are responsible to fight incipient stage Petroleum Hydrocarbon (PHC) fires. No employees, under any circumstances, are to fight any uncontrolled fires (beyond the incipient stage) of PHC.

8.2.7 Burn Pits

Burn pits may be established at locations on the site to allow for the controlled burning of wood waste. The burn pits shall be located in areas with a wind break to one side of the burn pile, to avoid embers from spreading. The burn pit labourers are to radio notify the site when burning is to take place, and a burn permit must be obtained from the local authorities. Personnel shall be advised to stay 100 metres from the burn pit, and appropriate fire pumps shall be set up to ensure that windblown embers are extinguished. Burn Permits are applied for prior to burning with the GNU, Environment and Natural Resources division. Burn Permit is to be kept on site and in Yellowknife office.

8.3 Responsibilities

8.3.1 Project Manager

The Project Manager is responsible to:

- ensure that the Site is assessed for conformance to the NFC prior to Work;
- ensure that a fire safety plan is developed, including hazard assessment, first responder, response plans, education and training/drills.
- ensure the necessary resources are available to ensure that the Site conforms to the NFC;
- ensure that the proper training is made available to all Employees to ensure that they understand their responsibilities as per the NFC. Training will be included in Worker Orientation Seminar, as well as additional hands-on training provided to workers.

8.3.2 Site Superintendent

The Site Superintendent is responsible to:

- act as the Fire Safety Plan designate;
- ensure that fire drills are executed no less than monthly;
- ensuring that occupancy lists are up to date daily and that employees remain in their assigned rooms;
- ensuring that the site meets the requirements of the NFC.

8.3.3 Medic

The site medic is responsible to:

- respond to any medical emergencies resulting from fire;
- assist an investigation team, when required, monitoring the team health and safety.
- operate field analytical equipment and interpret the results within the context of environmental and occupational health and safety; and
- provide technical assistance regarding fire safety, when required, to the Site Superintendent or any other person authorized by the Site Superintendent; and
- conduct monthly internal risk assessments of fire safety and report the results to the Project Manager.

8.4 Emergency Numbers

Refer to section 6.0 Emergency Response Plan for a complete list of Emergency Phone Numbers.

8.5 Background Information

8.5.1 Sources of Heat – Vapour Ignition

There are at least six sources of heat that may cause ignition of vapours:

- The sun
- Open flames
- Electricity
- Chemical reaction
- Friction
- Gas compression

8.5.2 Upper and Lower Explosive Limits

The explosive limit of a gas or a vapour is the limiting concentration (in air) that is needed for the gas to ignite and explode. There are two explosive limits for any gas or vapour, the Lower Explosive Limit (LEL) and the Upper Explosive Limit (UEL). At concentrations in air below the LEL there is not enough fuel to continue an explosion; at concentrations above the UEL the fuel has displaced so much air that there is not enough oxygen to begin a reaction. Concentrations of explosive gases are often given in terms of Percent Of Lower Explosive Limit (%LEL). LEL and UEL are generally expressed in terms of percent volume of air (% vol air)

Controlling gas and vapour concentrations outside the explosive limits is a major consideration in occupational safety and health. Methods used to control the concentration of a potentially explosive gas or vapour include use of sweep gas, an inert gas such as nitrogen or argon to dilute the explosive gas before coming in contact with air. Use of scrubbers or adsorption resins to remove explosive gases before release is also common. Gases can also be maintained safely at concentrations above the UEL,

although a breach in the storage container can lead to explosive conditions or intense fires.

8.5.3 Flash Point and Fire Point

The flash point of a flammable liquid is the lowest temperature at which it can form an ignitable mixture with oxygen. At this temperature the vapor may cease to burn when the source of ignition is removed. A slightly higher temperature, the fire point, is defined at which the vapor continues to burn after being ignited. Neither of these parameters is related to the temperatures of the ignition source or of the burning liquid, which are much higher. The flash point is often used as one descriptive characteristic of liquid fuel, but it is also used to describe liquids that are not used intentionally as fuels.

Every flammable liquid has a vapour pressure, which is a function of that liquid's temperature. As the temperature increases, the vapour pressure increases. As the vapour pressure increases, the vapour phase concentration of the flammable liquid in the air increases. Hence, it is the temperature which determines the concentration of evaporated flammable liquid in the air under equilibrium conditions. Different flammable liquids require different concentrations of the fuel in air to sustain combustion. The flash point is that minimum temperature at which there is a sufficient concentration of evaporated fuel in the air for combustion to propagate after an ignition source has been introduced.

8.5.4 Flammable and Combustible Liquids

Flammable and combustible liquids are liquids that can burn. They are classified, or grouped as either flammable or combustible, by their flashpoints. Generally speaking, flammable liquids will ignite (catch on fire) and burn easily usually at normal working temperatures. Combustible liquids have the ability to burn at temperatures that are usually above working temperatures.

There are several specific technical criteria and test methods for identifying flammable and combustible liquids. Under the Workplace Hazardous Materials Information System (WHMIS), flammable liquids have a flashpoint below 37.8°C (100°F). Combustible liquids have a flashpoint at or above 37.8°C (100°F) and below 93.3°C (200°F).

Flammable and combustible liquids themselves do not burn. It is the mixture of their vapours and air that burns. Gasoline, with a flashpoint of -40°C (-40°F), is a flammable liquid. Even at temperatures as low as -40°C (-40°F), it gives off enough vapour to form a burnable mixture in air. Bunker C Oil a combustible liquid, with a flashpoint of approximately 65^{o}C (175°F) (dependent upon degree of weathering), so it must be heated above that temperature before it can be ignited in air.

8.5.5 Vapour Density

Vapour density is the ratio of the density of a vapour/gas to that of the density of air, measured at standard conditions (i.e., $Vd_{x\text{- std.}} = Vd_x/Vd_{air\ -std.}$). The vapour/gas of a substance with a vapour density greater than one will sink and will accumulate in depressions. Alternatively, the vapours/gas of substance with a vapour density less than one will rise and disperse within the ambient atmosphere.

8.5.6 Flammable Solids

A flammable solid is one that will ignite through friction or spontaneous chemical reaction with moisture in the air. The temperature at which a solid begins to burn is called the ignition or kindling temperature

8.5.7 Auto Ignition Temperature

A material's auto ignition or ignition temperature is the temperature at which a material self-ignites without any obvious sources of ignition, such as a spark or flame. Most common flammable and combustible liquids have auto ignition temperatures in the range of 300°C (572°F) to 550°C (1022°F). Some have very low auto ignition temperatures. For example, ethyl ether has an auto ignition temperature of 160°C (356°F) and its vapours have been ignited by hot steam pipes. Serious accidents have resulted when solvent-evaporating ovens were heated to temperatures above the auto ignition temperature of the solvents used. Auto ignition temperatures, however, are intended as guides, not as fine lines between safe and unsafe. When working with substances with low auto ignition temperatures, supervisors shall instruct personnel to avoid applying any heat sources to the substances.

8.5.8 Oxidizer

An oxidizer is a type of chemical which a fuel requires to burn. Most types of burning on earth use oxygen, which is prevalent in the atmosphere. However combustion can be supported by oxidizers in the absence of atmospheric oxygen. For example, hydrogen peroxide can support combustion by providing an alternative source of oxygen, to that of the atmosphere.

8.5.9 Heat Release Rate

Heat release rate is a measurement of the energy released from a burning material over a specific time-period. It describes the material’s potential fire severity. Heat release rate is described in watts, British Thermal units (Btu’s) per second or joules per second. For example, a burning upholstered chair has a heat release rate between 80kW and 2.5 MW.

8.5.10 Heat of Combustion

Heat of combustion is the total potential heat output from a fire, measured in Btu’s or joules. For example, wood and cellulose products have a heat of combustion of about 8,000 Btu’s per pound; while hydrocarbons have a range from 16,000 to 24,000 Btu’s per pound.

8.5.11 Ventilation

Well-designed and maintained ventilation systems remove flammable vapours from the workplace and reduce the risk of fire and health problems. The amount and type of ventilation needed to minimize the hazards of flammable and combustible liquid vapours depend on such things as the kind of job, the kind and amount of materials used, and the size and layout of the work area.

An assessment of the specific ways flammable and combustible liquids are stored, handled, used and disposed of is the best way to find out if existing ventilation controls

(and other hazard control methods) are adequate. Some workplaces may need a complete system of hoods and ducts to provide acceptable ventilation. If flammable vapours are likely to condense, the ducts should have welded joints. Other workplaces may only require a single, well-placed exhaust fan. Use non-ferrous fan blades and shrouds (housing), and explosion-proof electrical equipment in ventilation systems for these liquids. Regular cleaning of the ducts, filters, plenums, etc. will decrease the severity of any fires and will reduce the likelihood of spontaneous combustion if some self-heating material is present. Ventilation equipment used to handle solvent vapours should meet the relevant fire code requirements.

If the ventilation keeps vapour levels below the occupational exposure limit of a chemical, usually there is little risk of fire or explosion. Vapour levels harmful to people are, in most cases, much below the lowest concentration of vapour in air that can burn. For example, toluene has a workplace exposure limit of 50 ppm). This is far below the Lower Explosive Limit (LEL) for toluene, which is 12,000 ppm.

In baking and drying ovens, enclosed air-drying spaces, ventilation ductwork or other enclosures where workers are not normally exposed to the vapour, keep vapour levels to 20 percent or less of the LEL.

8.5.12 Portable Fire Extinguishers

Introduction
A portable fire extinguisher can save lives and property by putting out a small fire (incipient stage fire) or suppressing it until addition support can arrive. Portable extinguishers, however, have limitations. They are not designed to fight large fires (post incipient stage) or fires that are spreading quickly. Most portable fire extinguishers have a short range of 6 – 10 feet and discharge completely in a very short time of 8 – 10 seconds. Portable extinguishers will do little against large or established fires.

Portable extinguishers are only useful if:

- The extinguisher is rated for the type of fire that is being fought. They are designed to fight specific classes of fires. The specific type of extinguisher to use depends on what is burning;
- The extinguisher is large enough to put out the fire. Fire comes in various sizes; generally, larger models can handle larger fires;
- The extinguisher is within easy reach. Never move through a fire to get to your fire extinguisher;
- The extinguisher is fully charged;
- The operator knows how to use the extinguisher. When something is on fire, there is no time to find the instruction book or to study the instructions printed on the extinguisher's label. All employees are to be trained in the operation of each type of portable fire extinguisher present in their work and living areas;
- The operator is to be strong enough to lift and operate the extinguisher. Most fire extinguishers are small and lightweight.

Types of Fire Extinguishers

Based on the fire classifications listed below, fire extinguishers shall be selected. Examples of fire extinguisher selection include;

- All machinery and site vehicles shall have type ABC fire extinguishers.
- The kitchen shall have a B fire extinguisher since the kitchen stoves will be heated with Propane.
- Burn pits will have a class A fire extinguisher
- Maintenance areas will have a class B fire extinguisher

Independent testing laboratories test and rate portable fire extinguishers to determine the type and size of fire each model can put out. Fire extinguishers that do not carry the label of an independent testing lab are not be used or purchased. Report such fire extinguishers immediately to the Site Supervisor. The Site Supervisor is to ensure that such extinguishers are removed and replaced. The Project Manager is responsible to ensure that certified fire extinguishers are purchased.

The A, B, C, D, K classifications describe a *fire's fuel* (*i.e. what's burning*). When the classifications are used for rating fire extinguishers, they tell you what classes of fire the unit should or should not be used on. The following describes the *fire's fuel*:

Class A

Class A Extinguishers will put out fires in ordinary combustibles, such as wood and paper. The following symbols identify a Class A fire extinguisher:

Class B

Class B Extinguishers should be used on fires involving flammable liquids, such as grease, gasoline, oil, etc. The following symbols identify a Class B fire extinguisher:

Class C

Class C Extinguishers are suitable for use on electrically energized fires. The presence of the letter "C" indicates that the extinguishing agent is non-conductive. The following symbols identify a Class C fire extinguisher:

Class D

Class D Extinguishers are designed for use on flammable metals and are often specific for the type of metal in question. There is no picture designator for Class D extinguishers. These extinguishers generally have no rating nor are they given a multi-purpose rating for use on other types of fires. The following symbol identifies Class D fire extinguishers:

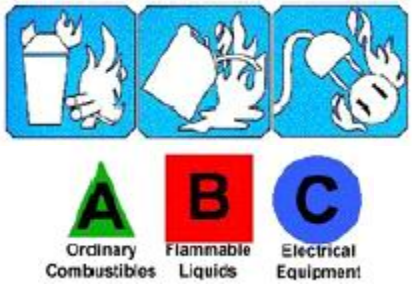
Class K

Class K Extinguishers are the newest classification providing for protection of cooking appliances that use combustible cooking media (vegetable or animal oils and fats). The following symbol identifies Class K fire extinguishers.

It should be noted that extinguishers provided for the protection of cooking grease fires shall only be of the sodium bicarbonate or potassium bicarbonate dry chemical type (Class B-C). Cooking grease fires are a special hazard requiring agents suitable for this application. Sodium bicarbonate and potassium bicarbonate dry chemicals are considered suitable for the special nature of heated grease fires; others may not be due to agent characteristics. Additionally, the residues of multipurpose dry chemical extinguishers (Class A-B-C) can cause corrosion when left in contact with metal surfaces.

Multi-Class Ratings

Multi-class rated fire (Class A-B-C) extinguisher may be used on Ordinary Combustibles, Flammable Liquids, or Electrical Equipment fires. Many extinguishers can be used on different types of fires and will be labelled with more than one designator, (e.g. A-B, B-C, or A-B-C.). The following traditional symbols identify multi-class fire extinguishers:



Alternatively, a new style of labelling for multi-class rated fire extinguishers can be present. The following displays such new style:

The new labelling style uses a diagonal red line drawn through the picture to indicate what type of fire this extinguisher is NOT suitable for. In the above example, the fire extinguisher could be used on Ordinary Combustibles and Flammable Liquids fires, but not for Electrical Equipment fires.

Extinguisher Size
A–rated and B–rated portable fire extinguishers are rated for the size of fire they can extinguish. When selecting a fire extinguisher, the rule of thumb, of course, is the bigger the better. Larger extinguishers, however, can be heavy and therefore difficult to operate. A compromise must be reached based on the anticipated extent of fire, extinguisher users, the risk of fire, available storage space and other factors. The Project Manager is responsible to ensure that the correct size of fire extinguisher is selected for each form of anticipated fire and as per regulatory requirements.

Operation of a Portable Fire Extinguisher
There are four basic steps to operating a portable fire extinguisher. An easy way to remember the procedure is to think of the word "PASS."

1) **P**ull the Pin: Holding the extinguisher with the nozzle pointing away from you, release the locking mechanism. In most cases, this means pulling out the pin located below the trigger.
2) **A**im low: Standing 6 to 8 feet away from the fire, point the extinguisher nozzle at the base of the fire – the lowest point of the fire nearest you. Extinguishers are designed to be operated in an upright position. Always hold the extinguisher vertically. Never cradle it horizontally or at an angle in your arms.
3) **S**queeze the trigger: Squeeze the trigger slowly and evenly. This will release the extinguishing agent and expel it through the nozzle.
4) **S**weep side to side: As the extinguishing agent is expelled, sweep the nozzle from side to side – "driving the fire back." As the fire closest to you goes out, you may move closer to the fire and continue the sweeping motion until the fire is extinguished. Remember, hold the extinguisher upright. If the fire does not diminish immediately, get out of the building!

8.6 Fire Prevention

8.6.1 Hazardous Materials/Waste – Flammable and Combustible Liquids

PROPERTIES AND SAFE WORK PRACTICES
Gasoline

Properties
Gasoline is extremely flammable. It will readily ignite at room temperature. It can release vapours that form explosive mixtures with air. Liquid can accumulate static

charge by flow or agitation. Vapours can be ignited by a static discharge. Gasoline vapour is heavier than air and may travel a considerable distance to a source of ignition and flash back to a leak or open container. Liquid can float on water and may travel to distant locations and/or spread fire. During a fire, irritating/toxic gases may be generated and can accumulate in confined spaces, resulting in a toxicity and flammability hazard. Containers may explode in heat of fire.

Safe Work Practices

This material is an EXTREMELY FLAMMABLE LIQUID and a SUSPECTED CANCER HAZARD. Before handling it is very important that engineering controls are operated and that protective equipment requirements are being followed. Only persons trained in the safe use of gasoline shall handle gasoline products. Eliminate all ignition sources (e.g. sparks, open flames, hot surfaces). Keep away from heat. Post "NO-SMOKING" signs. No smoking is to occur within 20 m of any gasoline. It is very important to keep areas where this material is used clear of other materials which can burn. Use non-sparking ventilation systems, approved explosion-proof equipment and intrinsically safe electrical systems in areas of use.

Keep aisles and exits free of obstruction. Immediately report leaks, spills or ventilation failures. Ground all drums, transfer vessels, hoses and piping. Ground clips must contact bare metal. When dispensing in other than a closed system, ensure dispensing container is bonded to receiving transfer equipment and container. Liquid can accumulate charge. In large-scale operations, increase conductivity with additive designed for that purpose, reduce flow rate in transfer operations, increase time the liquid remains in transfer piping and/or handle at lower temperature. To prevent sparking, generously wet hard surfaces before they are chipped, ground, etc, in potentially hazardous areas.

Never perform any welding, cutting, soldering, drilling or other hot work on an empty vessel, container or piping until all liquid and vapours have been cleared. Hot work permits must be issued prior to any hot work. Have suitable emergency equipment for fires, spills and leaks readily available.

Use in smallest possible amounts in a well ventilated area separate from the storage area. Avoid generating vapours or mists. Prevent the release of vapours and mists into the workplace air. Do not use with incompatible materials such as strong oxidizing agents (e.g., peroxides, nitric acid and perchlorates). These can increase the risk of fire and explosion. Do not dispense in storage area unless dispensing area is segregated by fire-resistant construction. Only use portable containers and dispensing equipment (faucet, pump, drip can) approved for flammable liquids. Do not siphon by mouth. Never return contaminated material to its original container. Label containers. Keep containers closed when not in use. Avoid damaging containers. Empty containers may contain hazardous residues.

Follow handling precautions on the Material Safety Data Sheet. Practice good housekeeping. Maintain handling equipment in good condition. Comply with applicable regulations.

Personal Protective Equipment

When vapours are present, workers are required to wear:

- a half mask respirator with organic vapour cartridges;
- fire resistant chemicals;
- splash proof chemical safety goggles;
- nitrile rubber gloves;

FLAMMABLE & COMBUSTIBLE LIQUID TRANSFER

Bonding and Grounding – Static Electricity

Electric charges can build up on an object or liquid when certain liquids (e.g., petroleum solvents, fuels) move in contact with other materials. This can occur when liquids are poured, pumped, filtered, agitated, stirred or flow through pipes. Even when liquids are transported or handled in non-conductive containers, something rubbing the outside surface of the container may cause a static charge to build up in the liquid. The amount of charge that develops depends, in part, on how much liquid is involved and how fast is it flowing or is being agitated or stirred.

Depending on circumstances, static electricity can be a nuisance or a hazard. Static cling in your clothes can be a nuisance but a spark that has enough energy to cause a fire or explosion is a definite hazard. To decide if static electricity is likely to be a hazard, you must consider several factors:

- Can a static electric charge be generated under the operating conditions?
- Can the charge accumulate?
- If it discharges, will it cause a spark?
- Is there an ignitable mixture (e.g., solvent vapour or dust in the air) in the area where a static electricity discharge can occur?
- Will the discharge generate an incendive spark (i.e., a spark that has enough energy to ignite the mixture of flammable/combustible vapour in air)?

If the answer to the above five questions is yes where a solvent or fuel is used, then static electricity can be a fire/explosion hazard. It means that the spark can ignite a vapour/air mixture that is within its flammable range, the concentration range between the upper and the lower flammable limits.

Flammable and Combustible Liquid – Static Electricity

Solvents and fuels produced from petroleum (e.g., benzene, toluene, mineral spirits, gasoline, jet fuel, diesel, jet-b etc.) can build up a charge when they are poured or flow through hoses. They tend to hold a charge because they cannot conduct electricity well enough to discharge when in contact with a conducting material, like a metal pipe or container that is grounded. When enough of a charge is built up, a spark may result. If the vapour concentration of the liquid in air is in the "flammable range" and the spark has enough energy, a fire or explosion can result.

According to the NFPA (Code 77), solvents that are soluble in water (or can dissolve some water themselves) do not build up static electricity. Examples of such liquids include alcohols and ketones like acetone. However, when liquids are transferred into

non-conductive containers (e.g., plastic, glass), even conductive solvents may build up a charge because the plastic or glass containers decrease the rate at which the charge in the solvent dissipates.

Procedures for Flammable and Combustible Liquid Transferring (Container to Container)
Transferring a liquid from one metal container to another may result in static electrical sparks. To prevent the build-up of static electricity and prevent sparks from causing a fire, it is important to bond metal dispensing and receiving containers together before pouring. Bonding is done by making an electrical connection from one metal container to the other. This ensures that there will be no difference in electrical potential between the two containers and, therefore, no sparks will be formed.

The best way to bond containers is to securely attach a special metal bonding strap or wire to both containers. Some liquid transfer pumps have self-bonding hoses. Bonding can also be done by keeping a solid metal-to-metal contact between the containers themselves or between a metal container and a conducting nozzle. These latter two methods are usually not reliable because a good electrical contact is often hard to make and maintain during the entire transfer.

In the flammable liquid storage and dispensing area, ground dispensing drums. Grounding is done by connecting the container to an already grounded object that will conduct electricity. This could be a buried metal plate, a metallic underground gas piping system, metal water pipes or a grounded, metal building framework. Bonding both containers and grounding one of them "drains off" static charges and prevents the discharge of sparks. All grounding and bonding connections must be bare metal to bare metal. Remove all dirt, paint, rust or corrosion from points of contact. Specially designed and approved bonding and grounding wire assemblies are available from safety equipment retailers.

Even if a liquid is conductive, filling or handling plastic or other non-conducting containers can be hazardous. The splashing and turbulence of the liquid in the container can cause a static electric charge to build up in the liquid or on conductive parts on the container that are not grounded. A spark with enough energy to ignite a vapour/air mixture in its flammable range (an incendive discharge) can originate from the liquid or from the container.

For medium-sized containers (5 - 60 U.S. gallons or about 19 - 227 L) it is advisable to ground any metal parts on the container (and nearby conductive surfaces that the container may come in contact) and fill the container from the bottom through a long, grounded metal pipe. This procedure will reduce the amount of static charge produced and will enable the generated charge to relax (dissipate) through the metal pipe.

When filling non-conducting portable containers, the NFPA recommends that a grounded dip pipe or grounded wire be in the liquid in the container while it is being filled. The filling rate should be minimized, especially if there is a filter in the line. Any metal parts of the container and metal funnel, if one is used, should also be grounded. When filling containers with low-conductivity liquids (i.e., ones with a conductivity less than 50

picoSiemens, pS), one should keep the grounded dip rod in the liquid for around 30 seconds after the filling is completed.

Similarly, filling an ungrounded portable fuel tank on a plastic-lined truck bed can cause spark-induced gasoline fires. For that reason, portable fuel tanks should be removed a safe distance from the vehicle (which, of course, is turned off) and be filled on the ground. The nozzle should be held in contact with the container while it is being filled.

Bonding and grounding are required when dispensing flammable or hot combustible liquids from storage drums to smaller electrically conductive containers. Similarly, whenever you transfer these liquids between conductive containers in any work areas, for example, when filling or draining dip tanks, mixers, rinse tanks or other equipment, bond both containers together and ground one of them. Check bonding and grounding connections regularly to ensure they are in good condition.

Bonding

Bonding means that two or more objects are either touching directly or are connected by a conductor such as a wire. The charge from one object is automatically shared with the other connected objects so that they all have the same charge and potential. Therefore, no spark can jump between objects.

Grounding

Bonding means that one or more objects are connected to the earth by a conductor such as a wire and/or grounding rod. Any charge on the object goes immediately to the ground, and the object remains neutral. Often several objects will be bonded together, and one of them will also be grounded. This results in all of the objects being effectively grounded.

Examples of Bonding and Grounding

Not Bonded or Grounded

If a truck has a static charge and is insulated from ground, it will hold its charge. The charge will stay in the truck. Truck is not grounded. The following figure displays a not bonded or grounded fuel transport truck.

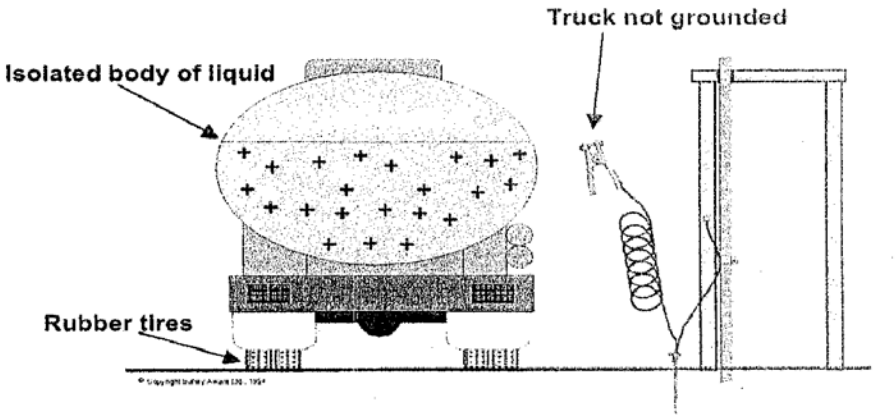


Figure 2: Grounded Fuel Transport Truck

Grounded

If a truck is properly grounded, the charge will continuously go to ground and not build up to a dangerous level. It must be grounded before loading starts. The charge is not stored and no hazard is created. The truck is grounded. The following figure displays a grounded fuel transport truck.

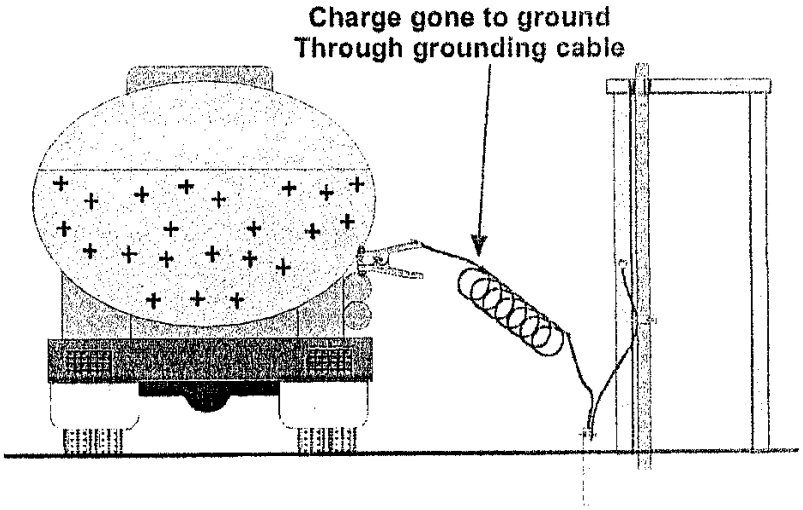


Figure 3: Grounded Fuel Transport Truck

Bonded

If a truck has a static charge and it is bonded to another truck, it will share the charge with the second truck. This will prevent a static discharge between the vehicles, if and when a spark gap is created. A charge is still present in both trucks and could present a hazard if another body is nearby.

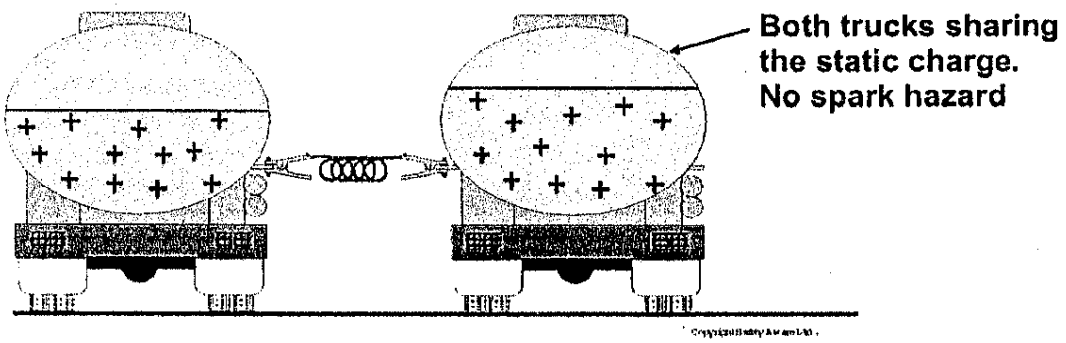


Figure 4: Bonded Fuel Transport Trucks

Bonded and Grounded

If a truck has a static charge and it is bonded to another truck, and one of the trucks is grounded, the static charge created will go to ground from both vehicles and eliminate the chances of a discharge through a spark gap. If a transfer of product must be done from one vehicle to another, this is the safest method.

The clamp used to ground a truck, drum or slip tank, must have a strong spring. If it is a toothed-type, the teeth must be sharp and not bent. Some clamps are made to snap over a round ball on the truck (Appleton Posts). A continuity tester must be used to determine if the load rack and the clamp are properly grounded. Some common reasons for failure are broken wires (sometimes inside a plastic cover), rust and paint under the ground clamps. A grounding clamp must be attached to clean bare metal. Never attach it to a dirty or painted surface, or to a non-conductive material such as a fibreglass fender.

Grounding at a Load Rack (National Fire Code 4.6.4.5 & 4.11.3.2)

A ground rod must be driven into the ground and be firmly affixed to a ground cable. The ground cable, "A", should be firmly affixed to the load rack and piping. A clamp, to ground the truck, may run from the ground rod or from the grounded load rack (See "B" and "C"). In either case, both clamp and load rack must be grounded.

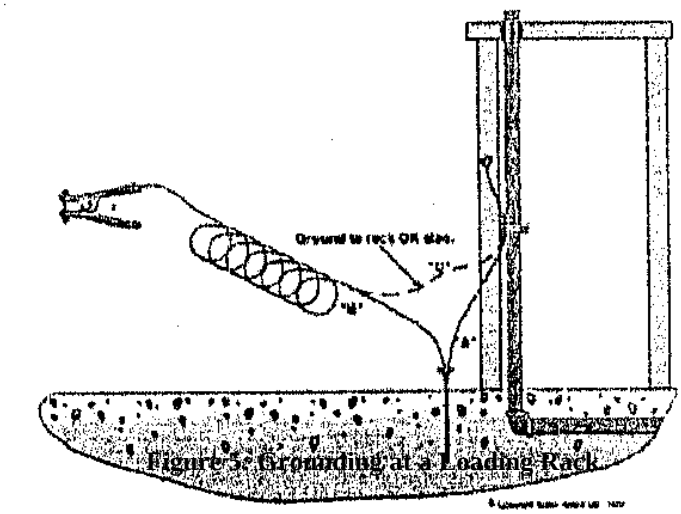


Figure 5: Grounding at a Loading Rack

Grounding While Unloading Into Above Ground Storage Tank

A ground rod must be driven into the ground and be firmly affixed to a ground cable. The ground cable must be firmly affixed to the off-loading piping. A second cable, firmly affixed to the off-loading piping, must have a clamp on the other end in order to ground tile truck. Both the truck and the off-loading rack or piping must be grounded.

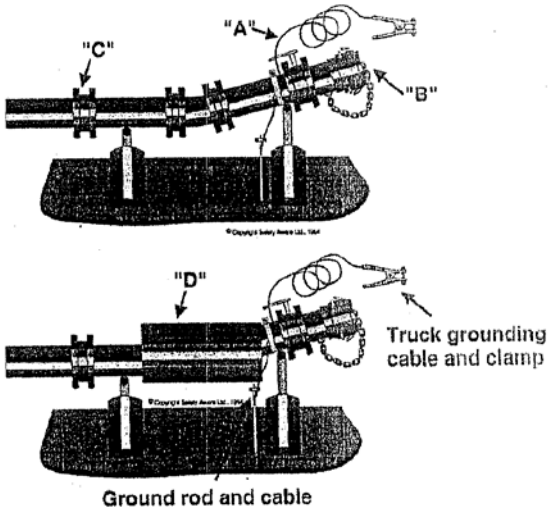


Figure 6: Grounding while Unloading into Above-ground Tank Farm

8.6.2 Hazardous Materials/Waste other than Flammable and Combustible Liquids

OXIDIZING MATERIALS

Properties and Safe Work Practices

Oxidizing materials support combustion by providing a source of oxygen (O_2), other than atmospheric O_2, to react with a combustible or flammable substance. Oxidizers are extreme fire hazards, as they can support and feed fires in the absence of atmospheric O_2, and thus can render useless, firefighting techniques that eliminate atmospheric O_2. For strong oxidizers such as concentrated Hydrogen Peroxide, simple contact with a reducer such leather clothing can result in combustion in the absence of alternative ignition source. The heat of reaction released by the interaction between the oxidizer and the reactant supports the heat required for combustion and the oxidant provides the O_2.

Storage

Before storing, inspect all containers to ensure that they are undamaged and properly labelled. Do not accept delivery of defective containers. Store oxidizing materials in containers recommended by the chemical supplier. Normally these are the same containers in which the material was shipped. Repackaging can be very dangerous especially when using contaminated or incompatible containers. Protect containers against banging or other physical damage when storing, transferring or using them. Do not use wooden pallets or other combustible pallets for storing containers of oxidizing materials.

Make sure containers are suitably labelled. For oxidizing materials requiring temperature control, the recommended storage temperature range should be plainly marked on the container. It is also a good practice to mark the date that the container was received or packaged and the date it was first opened or sealed.

Normally keep containers tightly closed when storing unless the supplier's instructions state otherwise. This helps to avoid contamination of the material or evaporation of solvents used to dilute oxidizers, such as organic peroxides, to safer concentrations. Some oxidizing agents, such as solutions of 8% or higher hydrogen peroxide in water, must be stored with specially vented caps. Hydrogen peroxide gradually decomposes at room temperature to produce oxygen gas and water. The properly working vent will prevent the build-up of pressure inside containers. The normal build-up of pressure could rupture an unvented container. Check vent caps regularly to ensure that they are working properly. Keep vented containers in the upright position. NEVER stack vented containers on top of each other.

Store oxidizing materials separately, away from processing and handling areas and away from other materials. Separate storage can reduce the risk of personal injury and damage in case of fires, spills or leaks. If totally separate storage is not possible, store oxidizing materials away from incompatible materials especially organic or other oxidizable materials (sometimes called reducing materials or reducing agents). Some oxidizing materials are incompatible or may react with each other, sometimes violently. Do not store them beside each other. Check the reactivity data and storage requirements sections of the MSDS for details about what materials are incompatible with a specific oxidizer.

Walls, floors, shelving, and fittings in storage areas should be constructed of non-combustible materials. Wood impregnated with a fire-retardant material is not fully protected against the increased fire hazard caused by contact with oxidizers. Protect metal construction materials against corrosion by painting them with a compatible coating. Ensure that floors in areas where oxidizers are stored are watertight; do not have cracks where these materials can lodge. Contain spills or leaks by storing in trays made from compatible materials. For larger containers, such as drums or barrels, provide dikes around storage areas, and sills or ramps at door openings.

Store oxidizer containers at a convenient height for handling, below eye level if possible, to reduce the risk of dropping containers. Avoid overcrowding in storage areas. Do not store containers in out-of-the-way locations where they could be forgotten. Store containers away from doors. Although it is convenient to place frequently-used materials next to the door, they could cut off the escape route if an emergency occurs. Store oxidizing materials in areas that are:

- labelled with suitable warning signs;
- well-ventilated;
- supplied with adequate firefighting equipment including sprinklers, where appropriate;
- supplied with suitable spill clean-up equipment and materials;
- free of ignition sources; and
- accessible at all times.

At all times:

- Allow only trained, authorized people into storage areas;
- Keep the amount of oxidizing materials in storage as small as possible;
- Inspect storage areas regularly for any deficiencies including damaged or leaking containers and poor housekeeping; and
- Correct all deficiencies as soon as possible.

All liquids shall be stored with appropriate containment underneath to avoid spills.

Transfer

Be very careful when dispensing oxidizers from storage containers into other containers. Avoid spilling material and contaminating your skin or clothing. Spills from open,

unstable or, breakable containers during material transfer have caused serious accidents. Dispense from only one container at a time. Finish all the dispensing of one material before starting to dispense another. Dispense the smallest amount possible, preferably only enough for immediate use. Keep containers closed after dispensing to reduce the risk of contaminating their contents.

Take care that the oxidizing materials do not contact combustible or other incompatible materials when they are dispensed. Use containers and dispensing equipment, such as drum pumps, scoops or spatulas that the chemical supplier recommends. These items must be made from materials that are compatible with the oxidizing materials you are using. Keep them clean to avoid contamination.

NEVER transfer liquids by pressurizing their usual shipping containers with air or inert gas. Ordinary barrels or drums may be damaged by the pressure. Moreover, if air is used, it may create a flammable atmosphere inside the container. NEVER pipette oxidizing liquids (or other chemicals) by mouth. Use a pipette bulb or aspirator instead.

Since some solid oxidizers may be shock sensitive, do not chip or grind lumps to break them up. If crystals have precipitated in containers of an oxidizing agent, contact your health and safety officer about their safe handling and disposal. Follow the chemical supplier's advice. Avoid sliding or skidding heavy metal containers such as drums or barrels across floors.

Handling

Make sure that all areas where oxidizing materials are used are free of combustible and other incompatible materials. Do not allow tobacco smoking or any other ignition sources around oxidizing materials. Ensure that temperatures in these areas do not become high enough to cause rapid decomposition of the materials. For example, hydrogen peroxide decomposes almost twice as fast for every 5.6°C (10°F) temperature rise. Always,

- Inspect containers for damage or leaks before handling them;
- Handle containers of oxidizers carefully to avoid damaging them;
- Keep containers of oxidizers tightly closed, except when actually using the material, to help avoid spillage or contamination of the container contents;
- Keep only the smallest amounts possible (not more than one day's supply) of oxidizers in work areas;
- Return unopened containers to the proper storage area and opened containers to a dispensing area at the end of the day;
- Check that all containers are properly labelled, and handle the containers so that the label remains undamaged and easy to read.
- Never return "used" or unused oxidizers to original containers of uncontaminated material. Trace amounts of contaminant might cause a dangerous decomposition.

COMPRESSED GAS

Properties and Safe Work Practices

There are three major groups of compressed gases stored in cylinders: liquefied, non-liquefied and dissolved gases. In each case, the pressure of the gas in the cylinder is commonly given in units of kilopascals (kPa) or pounds per square inch gauge (psig) (note: gauge pressure = total gas pressure inside cylinder - atmospheric pressure)

Atmospheric pressure is normally about 101.4 kPa (14.7 psi). It should be noted that compressed gas cylinder with a pressure gauge reading of 0 kPa or 0 psig is not really empty. It still contains gas at atmospheric pressure.

Liquefied Gases

Liquefied gases are gases that can become liquids at normal temperatures when they are inside cylinders under pressure. They exist inside the cylinder in a liquid-vapour balance or equilibrium. Initially the cylinder is almost full of liquid, and gas fills the space above the liquid. As gas is removed from the cylinder, enough liquid evaporates to replace it, keeping the pressure in the cylinder constant. Anhydrous ammonia, chlorine, propane, nitrous oxide and carbon dioxide are examples of liquefied gases.

Non-Liquefied Gases

Non-liquefied gases are also known as compressed, pressurized or permanent gases. These gases do not become liquid when they are compressed at normal temperatures, even at very high pressures. Common examples of these are oxygen, nitrogen, helium and argon.

Dissolved Gases

Acetylene is the only common commercially available dissolved gas. Acetylene is chemically very unstable. Even at atmospheric pressure, acetylene gas can explode. Nevertheless, acetylene is routinely stored and used safely in cylinders at high pressures (up to 250 psig at 21°C). This is possible because acetylene cylinders are fully packed with inert, porous filler. The filler is saturated with acetone or other suitable solvent. When acetylene gas is added to the cylinder, the gas dissolves in the acetone. Acetylene in solution is stable.

Flammable Compressed Gases

Flammable gases, such as acetylene, butane, ethylene, hydrogen, methylamine and vinyl chloride, can burn or explode under certain conditions. The concentration of the gas in air (or in contact with an oxidizing gas) must be between its Lower Explosive Limit (LEL) and Upper Explosive Limit (UEL).

Dangerously Reactive Compressed Gases

Some pure compressed gases are chemically unstable. If exposed to slight temperature or pressure increases, or mechanical shock, they can readily undergo certain types of chemical reactions such as polymerization or decomposition. These reactions may become violent, resulting in fire or explosion. Some dangerously reactive gases have other chemicals, called inhibitors, added to prevent these hazardous reactions. Common dangerously reactive gases are acetylene, 1,3-butadiene, methyl acetylene, vinyl chloride, tetrafluoroethylene and vinyl fluoride.

Oxidizing Compressed Gases

Oxidizing gases include any gases containing oxygen at higher than atmospheric concentrations (above 23-25 percent), nitrogen oxides, and halogen gases such as chlorine and fluorine. These gases can react rapidly and violently with combustible materials such as the following:

Safe Work Practices – Cutting Scrap Metal with Oxygen-Acetylene

Scrap metal on-site may be cut using oxygen and acetylene and cutting torches. The following guidelines shall apply to ensure that the use of an oxidant and flammable substance are managed properly.

- Oxygen and acetylene cylinders must be stored separately with safety caps secured;
- Oxygen and acetylene may be transported together for the sole purpose of cutting using cutting torches;
- During transport, cylinders must be securely strapped to a pickup truck, standing up;
- During transport, safety valves must remain closed;
- During use, cylinders and hoses shall be routinely inspected by workers and supervisors for the presence of leaks;
- Personnel utilizing cutting torches, oxygen, and acetylene must wear flame retardant coveralls at all times;
- Truck carrying oxygen and acetylene cylinders to contain a 20 lb ABC fire extinguisher; and
- All personnel to carry out cutting operations with a cutting torch are to receive appropriate fire safety training.

EXPLOSIVES

No forms of explosives are anticipated to be present at the Contwoyto Lake Weather Station Remediation Project.

AREAS and CLEARANCES – CLASS I to IV COMMODITIES & GROUP A to C PLASTICS

The size and clearances for Individual Storage Areas (ISA) not located adjacent to buildings shall conform to the values presented in (NFC 3.3.2.1)

Table 8: Size and Clearance for Individual Storage Areas not Adjacent to Buildings - Products other than Hazardous Materials/Wastes

PRODUCT CLASSIFICATION	MAXIMUM BASE AREA (M^2)	MAXIMUM HEIGHT OF STORAGE (M)	MINIMUM CLEARANCE SPACE AROUND EACH ISA (M)
Class III and IV commodities, Group A, B and C plastics, lumber, timber and wrecked vehicles	1,000	≤ 3	6
Manufactured buildings	1,000	>3 but ≤ 6	Twice the height of storage
Wood chips, hogged materials	15,000	18	9
Rubber tires, combustible pallets	1,000	3	15

However, if a building is located adjacent to a storage area the minimum clearance between the building and the storage area shall be not less than 15m (NFC 3.3.2.2).

Preparation and Maintenance
The storage area site shall be level and on solid ground (NFC 3.3.2.11.1). All storage areas and access routes or gateways to and into storage areas, respectively, shall be kept free of piles of snow (NFC 3.3.2.7.1). All outdoor storage areas shall be arranged such that there is a clear space of not less than:

- 30m between stored products and brush or forested areas; and
- 6m between stored products and uncontrolled grass or weeds.

Ignition Sources
Unless operated in a controlled manner that will not create a fire hazard, a device, operation or activity that produces open flames, sparks or heat shall not be permitted in an outdoor storage area (NFC 3.3.2.8.1). No smoking or burning of materials are permitted at any time, within the limits of any outdoor storage area (NFC 3.3.2.8.2 and 3.3.2.8.3)

Fire Emergency Procedures
At least one copy of the fire emergency procedures shall be prominently posted at each outdoor storage site (NFC 3.3.2.9.3).

Rubber Tires
Any access route to a storage area shall be located such that a clear space of not less than 6m is provided between stored rubber tires and the nearest side of the access route (NFC 3.3.3.3.1).

AREAS and CLEARANCES – CLASS I to IV COMMODITIES & GROUP A to C PLASTICS (Indoor Storage)

The size and clearances for Individual Storage Areas (ISA) located indoors shall conform to the values presented in Table 10: Size Limits for Individual Storage Areas - Class I-IV Commodities and Group A, B and C Plastics (NFC 3.3.3.2)

Table 9: Size Limits for Individual Storage Areas - Class I-IV Commodities and Group A, B and C Plastics

PRODUCT CLASSIFICATION	UNSPRINKLERED BUILDINGS		SPRINKLERED BUILDINGS	
	AREA, (M^2)	HEIGHT OF STORAGE (M)	AREA, (M^2)	HEIGHT OF STORAGE (M)
Class I Commodities	500	6.5	1,500	9.0
Class II Commodities	500	6.5	1,500	9.0
Class III Commodities, Group C Plastics	250	4.5	1,000	9.0
Closed Containers of Distilled Beverage Alcohol	250	4.5	1,000	9.0
Class IV Commodities, Group B Plastics	250	3.6	1,000	9.0
Group A Plastics	250	1.5	500	6.1

The following applies to the indoor storage of materials other than dangerous goods:

- tires shall not be stored indoors;
- combustible materials shall not be stored indoors;
- up to 3 m3 of loose combustible fibres are permitted to be kept in a fire compartment provided they are stored
- no individual storage are of baled combustible fibres shall exceed 250 m^2;
- no fuel-fired appliances and electrical heating elements are not permitted in a storage area for combustible fibres;

8.6.3 Hot Work

All hot work is to be done in accordance with Delta's Hot Work SWP as defined in the Site Specific Health and Safety Plan. The form is located as an appendix to this Plan

8.6.4 Camp Facilities

CARBON MONOXIDE

Carbon monoxide is an odourless, colorless and toxic gas. Because it is impossible to see, taste or smell the toxic fumes, CO can kill you before you are aware it is present. At lower levels of exposure, CO causes mild effects that are often mistaken for the flu. These symptoms include headaches, dizziness, disorientation, nausea and fatigue. The effects of CO exposure can vary greatly from person to person depending on age, overall health and the concentration and length of exposure. Carbon monoxide is harmful when breathed because it displaces oxygen in the blood and deprives the heart, brain, and other vital organs of oxygen. Large amounts of CO can overcome you in minutes without warning—causing you to lose consciousness and suffocate. CO poisoning can be reversed if caught in time. However, even if you recover, acute poisoning may result in permanent damage to the parts of your body that require a lot of oxygen such as the heart and brain. Significant reproductive risk is also linked to CO.

CO gas can come from several sources: gas-fired appliances, charcoal grills, wood-burning furnaces or fireplaces and motor vehicles. The following preventative measures are to be taken to reduce the risk of CO exposure to acceptable levels.

- Proper ventilation system that will remove CO must be present in work areas where potential CO exposure exists;
- Equipment and appliances that can produce CO (i.e., combustion processes are present) are to be maintained in good working order. Such equipment is to be regularly monitored and certified that it is properly functioning. The Site Superintendent is responsible for ensuring such inspections are performed at least once weekly;
- Equipment and appliances that can produce CO (i.e., combustion processes are present) are to be properly operated. For example, ventilation over ranges is to be on at all times during cooking, internal combustion engines are not to be operated in poorly ventilated areas, furnaces are to be installed and serviced by a certified professional etc.

- Whenever it is practical, possible and safe to do so, substitute electrically powered, battery operated or pneumatically (compressed air) operated equipment for gasoline-powered equipment. Approval from the Site Superintendent must be obtained prior to switching any equipment.
- The use of gasoline/diesel or other hydrocarbon powered engines, tools, appliances etc., in poorly ventilated areas is strictly prohibited, and will result in disciplinary actions;
- Personal CO monitors with audible alarms are to be worn by employees at all times and in a proper manner, if high potential exposure to CO exists;
- The atmosphere is to be tested regularly in areas where CO may be present, including confined spaces. The superintendent is responsible for testing such atmospheres, using the RKI Eagle Portable Gas Detection System; and
- The camp and building, other than abandoned infrastructure, in which work is regularly conducted are to be fitted with CO audible alarms;

8.7 Fire Response

8.7.1 Potential Fire Scenarios

The potential forms of fire/explosion are of concern for the Contwoyto Lake Weather Station Remediation Project:

Table 10: Potential Fire Hazards

ID	LOCATION	DESCRIPTION	NFPA CLASSIFICATION
1	Camp	Major and Minor	Class A and Potentially Class C and Class B
2	Site Infrastructure Other Than Camp	Major and Minor – not including hazardous materials and waste other than petroleum hydrocarbons.	Class A and Potentially Class B
3	Site Infrastructure Other Than Camp	Major and Minor	Class A and Class B
4	Fuel Storage – Petroleum Hydrocarbons	Hazardous materials (Diesel, Gas, Jet – B) .	Class B
5	Widespread wilderness	Brush Fire	Other – wildfire

8.7.2 Fire Detection

CAMP UNITS

The camp structures are to be individually outfitted with smoke detectors and carbon monoxide sensors.

WORK AREAS

- hot work is to be conducted with spotters;
- any controlled burning of infrastructure is to be undertaken with fire spotters. Fire spotters are to watch for fires 12 to 24 hours post burning;
- employees are to be aware of their working areas and are to watch for fires.

8.7.3 Fire Reporting

All persons are responsible to immediately report a fire when discovered. For situation where an automatic detector is not engaged employees are to shout three times “Fire”. This is to be done loudly so as all persons within the general area can here the verbal alarm. The employee is to then responsible to immediately report the fire to the Site Superintendent. In the absence of the Site Superintendent, the Medic is responsible to act as the fire reporting designate.

8.7.4 Evacuation

SCOPE

All persons are to evacuate the area of a fire upon notice. Only incipient stage fires are to be responded to. All other persons are to immediately evacuate the area of the incipient fire upon notice.

RESPONSIBILITIES

The site superintendent is responsible for ensuring all persons report to the muster station. Employees are responsible for immediately leaving the fire area and reporting to the pre-defined muster stations.

INTRODUCTION

In less than 30 seconds, a small flame can get completely out of control and turn into a major fire. It only takes minutes for thick black smoke to fill a residence. In minutes, a residence can be engulfed in flames. Most fires occur when people are asleep. If you wake up to a fire, you won't have time to grab valuables because fire spreads too quickly and the smoke is too thick. There is only time to escape.

A fire's heat alone can kill. Room temperatures in a fire can be 100 degrees at floor level and rise to 600 degrees at eye level. Inhaling this super-hot air will scorch your lungs. This heat can melt clothes to your skin. In five minutes, a room can get so hot that everything in it ignites at once: this is called flashover.

Fire starts bright, but quickly produces black smoke and complete darkness. If you wake up to a fire, you may be blinded, disoriented and unable to find your way around a building you are familiar with.

Fire uses up the oxygen you need and produces smoke and poisonous gases that kill. Breathing even small amounts of smoke and toxic gases can make you drowsy, disoriented and short of breath. The odourless, colorless fumes can lull you into a deep sleep before the flames reach your door.

Time is the biggest enemy in a residence fire. The longer you are inside the structure, the greater the risk that you will not make it out unharmed or alive.

PROCEDURE

Never stand up in a fire, always crawl low under the smoke and try to keep your mouth covered. If the hallway cannot be safely accessed, leave through the window. Report immediately to the Minor Fire muster station.

MUSTER STATION

Three muster stations have been identified:

1. Minor A/B/C and Camp Fire Muster Station – 150 m from major hazards
2. Major Class B Fire Muster Station - >800 m from major hazards and
3. Emergency Air Evacuation Muster station (Air Strip) ~ 5 km from major hazards.

A major wildfire could represent a circumstance for which a site evacuation would be necessary.

8.7.5 Common Fires Response

The following is a brief overview of how to extinguish various common forms of fires.

Even a small fire should be treated with respect, and you should never attempt to fight a fire unless it is safe to do so. Before fighting a fire, be sure you have an unobstructed exit route. If the fire you are fighting begins to spread or the room fills with smoke, leave the area immediately. Remember: big fires start small, and portable fire extinguishers have their limitations.

STAGES OF A FIRE

Stage 1 – Initial Fire (Insipient Stage): an initial fire can be generated from a combination of a variety of ignition sources, a vapour in the flammable range and a source of oxygen (i.e., fire triangle). Only the initial or insipient stage of fire is to be responded to by employees. For all other forms of fire, evacuation to a muster is the required response.

Stage 2 – Fire Build up: the initial fire generates more heat that causes further decomposition and vaporization of additional material that burns, producing dense smoke and toxic gases. The rate of fire build-up depends on the ease of ignition, measured by the ignition temperature.

Stage 3 – Flashover: when most of the combustible material reaches a temperature above the ignition temperature, the material bursts into flame, in a near explosive manner

Stage 4 – Fully Developed Fire: all combustible material is contributing to the fire, with extensive heat, smoke and toxic gas generation. Containing the fire becomes more important than extinguishing it.

INCIPIENT STAGE FIRES

As stated throughout the document, only incipient stage fires shall be directly responded to by staff. Portable fire extinguishers are to be used to fight insipient stage fires. Portable fire extinguishers are intended as a first line of defence to cope with fires of limited size. The selection and installation of portable fire extinguishers is independent

of whether the building is equipped with automatic sprinklers, standpipe and hose, or other fixed protection equipment.

Kitchen Fires

Do not attempt to extinguish grease-based fires with water as it reacts violently when poured on hot grease or oil. Small grease fires can be extinguished by placing a cover on the pan or smothering the fire with baking soda. Loose fitting, long-sleeved clothing should not be worn while cooking as the cloth may ignite and potentially cause serious injuries. Fire extinguishers should be within easy reach of cooks. Many cooking fires occur under normal cooking conditions and cannot be anticipated. The use of extinguishers can prevent small fires from spreading and are especially, effective on those fires, such as grease fires that cannot be easily extinguished by water.

Grease Fire – Frying Pan

The safest and easiest way to extinguish a frying-pan fire is to smother it by sliding a tight-fitting lid over the pan, and then turning off the burner. This will cut off the fire's supply of oxygen. Do not remove the lid or attempt to move the pan until the pan has cooled completely. Never attempt to carry the pan to a sink or outdoors. If you use a dry-chemical extinguisher, remember to stay back at least 6 feet to avoid splashing burning grease out of the pan. Never use water on this type of fire

Grease Fire – Oven or Broiler

Turn off your oven or broiler. Because kitchen ranges are vented, simply keeping the oven door or broiler drawer shut will usually contain, but probably not smother, the fire. However, opening the door or drawer will invariably cause the fire to flare up. When opening your oven door or drawer, do it slowly and with extreme care. Have a BC or ABC rated extinguisher ready. Do not attempt to move the pan or baking dish until the fire is out and the pan or dish has cooled completely.

A Wastebasket Fire

A fire in a wastebasket usually involves burning paper. Staying back from flames as far as possible, apply water to the fire until it is out, or use a portable fire extinguisher rated for Class A fires. A dry-chemical extinguisher that is rated only for Class B and C fires could be appropriate; however, because a BC extinguisher has no “A” rating it may not be fully effective.

Fires Involving Furniture, Drapes, or Tablecloths

These are Class A fires and they can be extinguished with water. Unlike wastebasket fires, fires involving furniture, drapes, or tablecloths are not "contained" and can spread rapidly. For this reason, it is often best to fight them with a portable fire extinguisher rather than buckets of water. Once the burning fabric is extinguished and completely cooled, it should be removed from the house; *the potential for rekindling, especially with furniture, is very high*. Be sure to protect yourself from burns when removing the item.

A Vehicle Fire

If a car fire involves only upholstery (for example, a fire in the back seat started by a cigarette), use any fire extinguisher available. If the fire involves the engine or

dashboard, however, the fire could quickly become very dangerous. Always shut off your engine. Such car fires can be fought with a fire extinguisher with a B:C or ABC rating. Do not open your hood; aim your extinguisher through the car's grill. If you cannot extinguish the fire immediately, leave the area, keep everyone far away from the car.

A Fire Involving Gas Lines

The only safe way to fight a fire in a kitchen range, furnace, or space heater involving natural gas or propane is to shut off the supply of gas. Know where gas-line shutoff valves are. The same is true for any fire involving heating oil under pressure (such as in a furnace burner). Never attempt to extinguish a gas fire without shutting off the fuel supply. An open gas line is a potential explosion hazard.

Additional Important Extinguishers

In addition, the following are important facts regarding the various forms of fire extinguishers;

- Dry Chemical extinguishers are usually rated for multiple purpose use. They contain an extinguishing agent and use a compressed, non-flammable gas as a propellant;
- Halon extinguishers contain a gas that interrupts the chemical reaction that takes place when fuels burn. These types of extinguishers are often used to protect valuable electrical equipment since they leave no residue to clean up. Halon extinguishers have a limited range, usually 4 to 6 feet. The application of Halon should be made at the base of the fire, even after the flames have been extinguished;
- Water extinguishers contain water and compressed gas and should only be used on Class A (ordinary combustibles) fires; and
- Carbon Dioxide (CO^2) extinguishers are most effective on Class B and C fires (liquids and electrical). Since the gas disperses quickly, these extinguishers are only effective from 3 to 8 feet. The carbon dioxide is stored as a compressed liquid in the extinguisher; as it expands, it cools the surrounding air. The cooling will often cause ice to form around the "horn" where the gas is expelled from the extinguisher. Since the fire could re-ignite, continue to apply the agent even after the fire appears to be out.

8.7.6 Carbon Monoxide Response

CARBON MONOXIDE

In the event that a Carbon Monoxide (CO) detector is triggered, the following actions are to be taken.

If no one is feeling ill:

- Evacuate the area – the Site Superintendent is to ensure that no one enters the area following evacuation;
- Silence the alarm – only the Site Superintendent has the authority to silence any alarm, including a carbon monoxide alarm. The alarm must be tagged out

following silencing, to act as reminder that the alarm is to be reactivated following an inspection;
- Turn off all appliances and sources of combustion (i.e. furnace and fireplace);
- Ventilate the general area with fresh air by opening doors and windows;
- The Site Superintendent and medic are to investigate the cause of the alarm and are to identify any sources of CO emission. The medic is to be put on standby. The medic is to monitor the status of the investigators via radio, from a safe location, exterior to the building/area;
- Prior to and during the inspection, the superintendent is to monitor the CO concentrations and %LEL in the ambient air using the RKI Eagle Portable Gas Detection System;
- If the carbon monoxide concentration in the ambient air is, at any point during the investigation, ≥25 ppm (28.75mg/m3) (ACGIH TWA), then the investigation team is to immediately leave the area. The LEL for CO is 12.5% and the UEL is 74% (10% LEL, 12,500 ppm (14,375 mg/m3). As such, the ACGIH TWA concentration will also protect against explosion hazard;
- The area is then to be re-ventilated until concentrations of CO are below the ACGIH TWA (25 ppm (28.75mg/m3);
- The building is not to be re-entered by employees until the source of CO has been identified and properly mitigated.

If illness is a factor:
- Evacuate all occupants immediately – the Site Superintendent is responsible for coordinating the evacuation and ensuring all employees are accounted for. The muster point is the same muster point that is to be used in the case of a fire emergency;
- Turn off all appliances and sources of combustion (i.e. furnace and fireplace);
- Ventilate the general area with fresh air by opening doors and windows;
- The medic is responsible to determine how many occupants are ill and determine their symptoms;
- The medic is responsible to apply first aid and, if required, initiate an emergency evacuation;
- The same investigation procedure, as described above, is to be undertaken.

Immediately Dangerous to Life or Health Atmospheres
- Use a full-face piece Self Contained Breathing Apparatus (SCBA) or a combination full-face piece supplied-air respirator with auxiliary self-contained air supply;
- Use intrinsically safe equipment and ensure all sources of ignition are removed.

8.8 Training
All persons entering the site are to undergo basic fire safety training. The Project Manager is responsible to provide such training to employees prior to any Work or site visits. The training is to include the information contained herein and other visual aids. The trainees are to sign off that the training has been issued, using the following format that can be transferred to a logbook.

Table 11: Fire Safety Training Checklist

DATE	SUBJECTS COVERED	EMPLOYEES IN ATTENDANCE	INTSTRUCTOR(S)	EMPLOYEE SIGNATURE	HEALTH AND SAFETY OFFICER SIGNATURE

9.0 MAJOR ILLNESS OR INJURY RESPONSE PLAN

9.1 Purpose

The purpose of the Major Illness or Injury Contingency Plan is to:

- Establish procedures for initiating and coordinating an emergency evacuation of a seriously injured or ill person from the Contwoyto Lake Weather Station Remediation Project to the nearest available medical facility.
- Minimize discomfort to injured or ill persons at the site while awaiting emergency evacuation.

9.2 Responsibilities

Table 12: Roles and Responsibilities

POSITION	RESPONSIBILITY
Project Manager	Preparing Major Illness or Injury Contingency Plan and ensuring the necessary resources are available to efficiently implement the plan.
	Ensuring that the necessary training resources are available and that a training program based on the Major Illness or Injury Contingency Plan is developed.
Site Superintendent	Ensuring that on-site resources other than medical response equipment is available and efficiently used during an emergency response.
	Ensuring that all WSCC requirements are met following an employee injury.
	Coordinating medical evacuation with external medical and emergency response resources and the On-site Medic.
Medic	Acting as the designate for any injuries and illness.
	Identifying medical situation that require emergency MEDIVAC and initiating the MEDIVAC plan.
	Maintaining medical records such that the privacy of the employee is maintained as per regulations.
	Providing and maintaining the required medical supplies
	Providing training to employees prior to Work as per the Major Illness or Injury Contingency Plan.
	Providing medical care as required at the Site for injured or ill persons
Employee	Immediately reporting any injuries or illnesses, or near misses as per the plan.
	Providing any medical information required to the Medic to allow treatment of medical conditions.
	Ensuring that any medications or medical requirements are filled in sufficient quantity prior to mobilizing to site.

9.3 Initial Response – Major Injury or Major Illness

9.3.1 Definitions

A major injury is considered an injury for which the injured person cannot report safely by his or herself to the site medic for treatment. A major illness is an immediate event such as a heart attack, where the person is incapacitated and cannot report safely by his or herself to the site medic for treatment.

9.3.2 Initial Response

Immediately following the identification of a Major Illness or Major Injury, the following steps are to be undertaken:

- Immediately report the medical emergency over the hand held radio, with the following steps
    - Cleary announce verbally “CODE ONE” three (3) times;
    - State your name;
    - State your location;
    - State the type of medical emergency (i.e., injury or illness);
    - Report the condition of the person and the situation that cause of the emergency if known;
    - report if any hazards that could affect the safety of the responders is present;
    - Begin medical first responder procedures until the Site Medic Arrives – DO NOT APPROACH the injured person unless it is safe to do so.

9.3.3 Emergency Evacuation

Only the Site Medic can request an emergency MEDIVAC. The Site medic is to evaluate the injured or ill person and decide if an emergency evacuation is required. If MEDIVAC is not required then the person is to be treated on-site by the Medic.

9.3.4 Procedures for Emergency Evacuation

If the injured or ill person requires MEDIVAC then the Medic will issue a request to the Site Superintendent to issue a request for MEDIVAC. The Site Superintendent is then to liaison between the on-site medic and the external emergency resources from the Communication Office. The Medic is to remain with the injured person to provide emergency medical assistance and/or to ease pain and discomfort until external emergency resources arrive.

The Site Superintendent is to request a MEDIVAC via the following steps. The steps were provided by Stanton Territorial Hospital Emergency Services.

REQUESTING A MEDIVAC

The medical travel unit at the Stanton Territorial Hospital is to be contacted by calling the 24-hour phone number of:

(867) 669-4115

1) You can request to be transferred directly to the Emergency Department. You must provide the following information to the medical travel unit:
2) Name of person calling and the phone #:
3) Patients Name:
4) Home Address, full mailing address if not from the NWT (Do not delay response if not immediately available):
5) Date of birth:
6) Health care number (Can be issued following response):
7) Next of kin:
8) Language spoken
9) Employer and full mailing address as follows:

Delta Engineering Ltd/Carter Industries Lt. – A Joint Venture
Box 1447, Yellowknife, NT
X1A 2P1

10) Is this a WSCC case?
11) Location (coordinates, latitude and longitude) as follows:

Contwoyto Lake, NU
Latitude: 65^{o} 29’ 5”
Longitude: 110^{o} 22’ 32”
Elevation: 461m

12) Current weather situation, visually
13) Patient’s diagnosis provided by on-site Medic
14) Special Equipment Needs applicable, i.e., a stretcher/oxygen/IVs /Wheelchair or Other.
15) Ground transportation required. Check off Ambulance/Taxi/Other.

Once all of this information has been provided: You will be advised that Air Tindi (or other airline charter company) or a Helicopter company will have to check the weather, which can take up to one hour. You will be given the name of the Medflight nurse that is on call and to expect a call from the Medflight nurse to provide them with the clinical situation of the patient in more detail. You will be kept in the loop from the Medical Travel Unit as to what type of aircraft will be coming to pick up the patient and the estimated time of arrival.

10.0 CATASTROPHIC INCIDENT PLAN

10.1 Purpose

The purpose of the Catastrophic Incident Plan is to coordinate the implementation of a response to a catastrophic incident.

10.2 Scope

The Catastrophic Incident Plan is applicable to: all employees, all sub-contractors, and all site visitors. A catastrophic incident is defined as any natural or man-made incident, including terrorism that results in extraordinary levels of mass injuries/casualties, damage, or disruption severely affecting the people, infrastructure, environment, and business. A catastrophic incident could include, but is not limited to:

1. Earthquake;
2. Aircraft crash;
3. Hurricane;
4. Major brush fire;
5. Tornado;
6. Major illness outbreak;
7. Cold climate conditions; and
8. Boat capsizing/sinking.

10.3 Responsibilities

10.3.1 Project Manager

The Project Manager is responsible to:

- Ensure that a Catastrophic Incident Plan is developed;
- Notifies the appropriate levels of government of a catastrophic incident occurrence; and
- Ensure the necessary resources are available to respond to a catastrophic incident on-site.

10.3.2 Site Superintendent

The Site Superintendent is responsible to:

- Notify the Project Manager of the occurrence of a catastrophic incident;
- Ensure on-site resources are available to respond to a catastrophic incident;
- Ensures all on-site personnel respond to the catastrophic incident according to the Catastrophic Incident Plan; and
- Coordinate medical evacuation with external medical support and on-site medic;

10.3.3 Medic

The Site Medic is responsible to:

- Respond to any medical emergencies resulting from catastrophic incidents;

- Assist an investigation team, when required, by acting as an external post that monitors the team's health and safety;
- Possess a valid St. John Ambulance and First Aid Level 2 Certificate or Canadian Red Cross First Responder Certificate; and
- Ensuring medical and first aid supplies, equipment, and facilities are maintained in a well manner.

10.3.4 Employees

All employees are responsible to:

- Immediately report the occurrence of a catastrophic incident to the Site Supervisor; and
- Respond to the catastrophic incident according to this Catastrophic Incident Plan.

10.4 Catastrophic Incidents

10.4.1 Earthquake

If a light earthquake causes minor damage to the site and emergency needs can be met without exceeding normal day-to-day safety resources, there should be no need to activate the Catastrophic Incident Plan. A major, damaging earthquake would require activation of this plan.

SITUATION ASSESSMENT

A situation assessment is important after a damaging earthquake in that an adequate assessment of the extent of damage is needed before the appropriate number and type of resources can be requested. It is important such that responses and resource can be prioritized effectively.

A situation assessment consist of locating damaged structures, determining rescue needs, watching for serious mass injuries, fires, serious hazardous materials spills, and any other critical situations. The Site Superintendent will be responsible for situation assessments following an earthquake.

LOGISTICS

After a severe earthquake, logistics determine the quick response of emergency responders to the incident. Site access could become a potential barrier due to the location of the site. The only means to access the site in the summer season is by air and in the winter by ice or air. Site access by air can occur via the site airstrip.

BUILDING INSPECTIONS

A number of buildings may have damage occur to them after an earthquake that is not readily visible. In the hours and days following an earthquake, aftershocks may cause the damaged buildings to fail. These buildings will need to be inspected by qualified inspectors prior to persons to enter.

BUILDING COLLAPSE

It is possible that a number of occupied structures will partially or fully collapse during or after an earthquake. The resources necessary to effectively perform a rescue will be managed by the Site Superintendent. Only trained and qualified personnel are to perform rescues within collapsed buildings due to the risk of further collapse.

EVACUATION

Evacuation may become necessary as a result of hazardous material releases, fires, or other events associated with an earthquake. All evacuations from site will occur through airlift by the most readily available aircrafts. Once evacuated, the Canadian Red Cross can provide information on the location of relatives and friends.

10.4.2 Aircraft Crash

Airplanes will frequently access the site during the entire duration of the project. In the event an aircraft crashes at the site the following steps are required to be followed:

1. Obtain the following information at the crash site:
    a. Civilian and/or military aircraft;
    b. Fatalities and/or injuries;
    c. Aircraft type;
    d. Registration number; and
    e. Debris on airstrip.
2. Inform Departmental Representative (DR). The DR shall contact the PWGSC Project Manager.
3. Contact the Delta Project Manager. The Project Manager shall contact the PWGSC Project Manager.
4. Contact the appropriate air charter company and inform them of the crash.

10.4.3 Tornados and High Winds

In Canada, more than 70 tornadoes a year strike populated regions. However, most are too weak to cause damage. Every province in Canada is prone to the risk of tornadoes. The figure below shows the number of tornadoes occurring in each province annually.

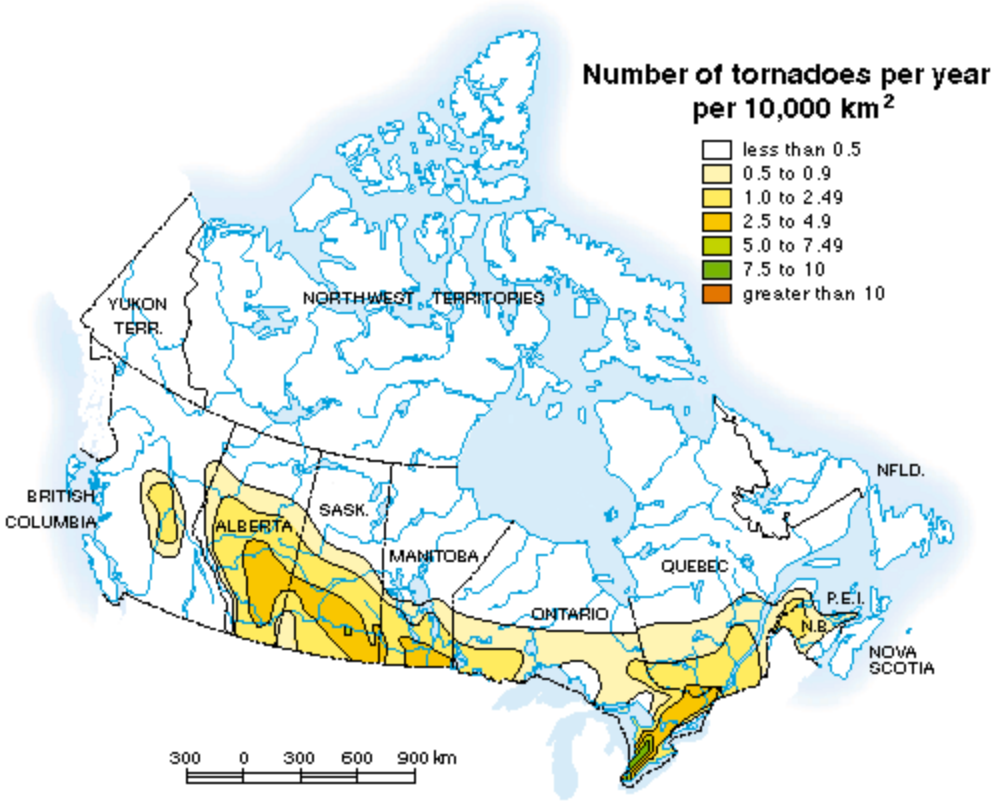


Figure 7: Map of Annual Number of Tornadoes in Canada

The risk of tornadoes is highest in southern Ontario. The extreme southern part of the Prairies receives the second largest number. The tornado risk is high in south central Alberta, southern Saskatchewan and Manitoba, north-eastern Ontario, and western Quebec. Overall, a third of the tornadoes formed in Canada occur in Ontario.

The rest of Canada (British Columbia, Yukon Territory, Northwest Territories, north-western Ontario, the St. Lawrence valley in Quebec, and the Atlantic Provinces) rarely experiences tornadoes. Therefore, tornadoes shall not be further discussed.

10.4.4 Major Illness Outbreak

A major illness outbreak is the spread of an infectious disease (such as SARS, anthrax, small pox, influenza, etc.) from human-to-human. If any workers believe they have been in contact with an infectious disease they are to immediately report to the on-site medic. The medic shall then evaluate the worker and situation. Following the medic evaluation, a medevac may be requested by the medic.

10.4.5 Cold Climate Conditions

PROTECTIVE MEASURES

Proper planning and preparation for exposure to cold conditions is essential. Sudden heart attacks increase during a cold snap. Cold air can cause blood pressure to go up, especially when skin is exposed. Hypothermia and frostbite can be avoided by following these guidelines:

1. Dress so that comfort is maintained, moisture dissipates adequately and excess heat radiates freely from the body.
2. Wear layered clothing. Proper layers trap warm air near the body but do not trap perspiration next to the skin. Breathable fabrics, such as cotton and wool, fulfill both functions. Layers might include thermal underwear, undershirt, tracksuit, sweater, snowsuit, hat, scarf and mittens or gloves. Minimize sweating by changing clothing to suit the activity level.
3. Wear a warm hat. At near-freezing temperatures almost half of body heat lost escapes through the head if it is uncovered.
4. One of the primary ways our bodies lose heat is through our breath. A scarf or mask conserves body energy and heat.
5. Protect feet and hands. Wear loose waterproof boots. If the boots have felt liners, carry an extra pair to replace damp ones. Mittens warm the hands more effectively than gloves. Carry an extra pair of mittens or gloves.
6. Try to stay in a heated environment, but avoid excessive sweating. Clothing wet with perspiration increases heat loss. In situations where it is likely that clothing may get wet from water exposure or excessive perspiration, it is necessary to have extra dry clothing available.

Whiteout

Whiteout conditions are common for this area due to occurrence of sustained high velocity winds which entrain snow. Such whiteouts can last for days. As such, sufficient fuel and food will be on-site to provide rations for 2 weeks at a time. Food rations are to be monitored and ordered when required by the Site Superintendent.

In the event of a whiteout, or a pending whiteout, the following actions are to be undertaken in the following order:

1. Stop work and contact the Site Superintendent via radio with your current location;
2. The Site Superintendent is to ensure that all persons have contacted him or her by radio;
3. When advised to do so by the Site Superintendent, and if safe to do so, return to the camp immediately; and
4. While operating a vehicle or piece of heavy equipment, ensure that the headlights are turned on.

Hypothermia

When exposed to cold temperatures, the body begins to lose heat faster than it can be produced. Prolonged exposure to cold will eventually use up the body's stored energy. The result is hypothermia, or abnormally low body temperature. Low body temperature affects the brain, making the victim unable to think clearly or move properly. This makes hypothermia particularly dangerous because a person may not know it is happening or be able to do anything about it. Every person should watch for signs of hypothermia in every other person in the group.

Hypothermia is most likely to occur at very cold temperatures. However, because water can extract heat from the body more than ten times faster than air, hypothermia can occur even at cool temperatures (above 4 ºC), if a person becomes chilled from rain, sweat or submersion in cold water.

SYMPTOMS

There are three stages of hypothermia: (1) mild hypothermia, (2) moderate hypothermia, and (3) severe hypothermia. As a person passes through each stage of hypothermia, the severity increases. Therefore, it is imperative to seek medical attention immediately when a person enters the first stage of hypothermia. The following sections outline the symptoms of each stage of hypothermia and are meant as a guideline to assist in identifying hypothermia.

A person with mild hypothermia will show the following symptoms:

a. shivering may be intermittent or constant and uncontrolled;
b. goosebumps;
c. numb hands, fumbles to perform tasks with fingers;
d. grogginess;
e. muddled thinking; and
f. normal breathing and pulse.

A person with moderate hypothermia will show the following symptoms:

a. violent shivering or an absence of shivering;
b. inability to think and pay attention;
c. slow, shallow breathing;
d. slow, weak pulse;
e. lack of muscle coordination, may stumble frequently;
f. lethargy;
g. drowsiness;
h. exhaustion;
i. memory loss; and
j. slurred and mumbled speech.

A person with severe hypothermia will show the following symptoms:

a. shivering stops;
b. weak, irregular or non-existent pulse;
c. rigid muscles;
d. dark and puffy skin;
e. irregular heartbeat;
f. little or no breathing; and
g. unconsciousness.

TREATMENT

If you notice any of these signs, take the person's temperature. If it is below 35 °C (95 °F), the situation is an emergency. Get medical attention immediately.

If medical care is not available, begin warming the person as follows:
Do not treat with direct heat.

1. Get the victim into a warm room or shelter;
2. If the victim's clothing is wet, remove it;
3. Warm the torso and head first (groin, abdomen, chest, neck and head) using an electric blanket, if available, or use skin-to-skin contact under loose, dry layers of blankets, clothing, sleeping bag, towels or sheets. Wrap heated objects before placing them next to the skin (torso). A victim should wear dry socks and toque to prevent further heat loss;
4. Warm beverages can help increase the body temperature, but do not give alcoholic or caffeinated beverages. Do not try to give beverages to an unconscious person;
5. After the body temperature has increased, keep the person dry and wrapped in a warm blanket, including the head and neck; and
6. Get medical attention as soon as possible. Take immediate action when someone is suffering from hypothermia. Prevent the victim from losing more body heat. Address mild hypothermia symptoms to prevent more advanced symptoms from developing. A person with severe hypothermia may be unconscious, and may not seem to have a pulse or to be breathing. In this case, stabilize the victim and handle very gently and get emergency assistance immediately. Even if the victim appears dead, cardio-pulmonary resuscitation (CPR) should be provided. CPR should continue while the victim is being warmed and until the victim responds or medical aid arrives. In some cases, hypothermia victims who appear to be dead can be resuscitated.

Frostbite

Frostbite is an injury to the body caused by freezing. Frostbite causes a loss of feeling and colour in affected areas. It most often affects the nose, ears, cheeks, chin, fingers or toes. Frostbite can permanently damage the body and severe cases can lead to amputation. The risk of frostbite is increased in people with reduced blood circulation and among people who are not dressed properly for extremely cold temperatures. Because the frozen tissue is numb, victims are often unaware of frostbite until someone else points it out. Use the buddy system and watch out for other members of the group to prevent frostbite.

SYMPTOMS

Symptoms vary with severity and damage:

1. Mild frostbite:
   - redness or pain in any skin area; and
   - numbness.
2. Moderate frostbite:
   - waxy, white or greyish-yellow skin;
   - numbness; and
   - burning sensation.
3. Severe frostbite:
   - skin turns blue to purple;

- skin may be blistered or splotchy;
- skin feels unusually firm or waxy; and
- numbness.

TREATMENT

If you detect symptoms of frostbite, seek medical care. Because frostbite and hypothermia both result from exposure, first determine whether the victim also shows signs of hypothermia, as previously described. Hypothermia is a more serious medical condition and requires emergency medical assistance.

If there is frostbite but no sign of hypothermia and immediate medical care is not available, proceed as follows:

1. Get the victim into a warm room as soon as possible.
2. Unless absolutely necessary, do not walk on frostbitten feet or toes – this increases the damage.
3. Immerse the affected area in warm, not hot, water. The temperature should be comfortable to the touch for unaffected parts of the body.
4. If warm water is not available, try to warm the affected area using body heat. For example, the heat of an armpit can be used to warm frostbitten fingers.
5. Do not use direct heat, rub the area, break blisters or rub the frostbitten area with snow. These actions can cause more damage.
6. Do not use a heating pad, heat lamp, or the heat of a stove, fireplace or radiator for warming. Affected areas are numb and can be easily burned.

11.0 WILDLIFE CONTINGENCY PLAN

11.1 Potential Encounters

The following animals, if encountered at the Contwoyto Lake Weather Station Remediation Project, could present a risk to the safety of employees and visitors:

- Black Bear;
- Grizzly Bear;
- Wolverine;
- Moose;
- Muskox;
- Caribou; and
- Wolf

Of the above listed animals the bears present the greatest risk to human health as they are the most likely to be encountered in this area. As such, the plan will focus on bear encounters. However, the basic principles of the plan can be applied to other dangerous animals such as a wolverine, if encountered.

11.2 Roles and Responsibilities

The following outlines the roles and responsibilities of employees with respect to the Wildlife Contingency.

Table 13: Roles and Responsibilities with Respect to Wildlife Contingency

POSITION	RESPONSIBILITY
Project Manager	Preparing Wildlife Contingency Plan and ensuring the necessary resources are available to efficiently implement the plan.
	Ensuring that the necessary training resources are available and that a training program based on the Wildlife Contingency Plan is developed.
Site Superintendent	Implementing the Wildlife Contingency Plan at site when required (i.e., Primary Designate)
	Ensuring that fire arms and ammunition are stored as per regulations.
	Issuing fire arms and ammunition.
	Ensuring that the response team is properly trained and certified as per the Plan.
	Documenting training.
	Reporting bear encounters as per the Wildlife Response Plan.
Bear Monitor	Responding to wildlife encounters and patrolling camp and work areas on a regular basis to ensure safety of crew
Medic	Issuing bear deterrents.
	Providing training to employees prior to Work as per the Wildlife Response Plan.
Employee	Immediately reporting wildlife encounters as per regulations to the Designate
	Responding to wildlife encounters as per the Wildlife Response Plan

11.3 Training

All persons entering the site are to undergo wildlife safety training. The Project Manager is responsible to provide such training to employees prior to any Work or site visits. The training is to include the information contained herein and a wildlife safety video specific

for bear awareness. The trainees are to sign off that the training has been issued, using the following format that can be transferred to a logbook.

Table 14: Bear Safety Training Checklist

DATE	SUBJECTS COVERED	EMPLOYEES IN ATTENDANCE	INSTRUCTOR(S)	EMPLOYEE SIGNATURE	HEALTH AND SAFETY OFFICER SIGNATURE

11.4 Acts, Regulation and Guidelines

The following Wildlife Contingency Plan has been developed in accordance with:

- DIAND EH&S SOP – 017 (A) & (B);
- the NUNAVUT Hunting Regulations; and
- the Firearms acts and its applicable regulations.

In addition the following publications were referenced:

- Safety in Black and Grizzly Bear Country, RWED1; and
- Canadian Firearms Safety Course Student Handbook, Aiming for Safety, Department of Justice Canada2.

11.5 Firearm Protocol

11.5.1 Firearms and Ammunition

GENERAL

AMMUNITION

All ammunition must be of .30 or larger calibre. The empty cartridges are not to be less than 44mm in length. Ammunition of the following type is NOT to be used:

- rim fire;
- non-expanding bullets;
- steel-jacketed;
- tracer or
- prohibited ammunition, such as

[1] Sections of the Safety in Black and Grizzly Bear Country have been reproduced herein for the purpose of employee education.

[2] Sections of the Canadian Firearms Safety Course Student Handbook, Aiming for Safety, have been reproduced herein for the purpose of employee education.

- any cartridge that can be fired from a commonly available semi-automatic handgun or revolver and has projectile specifically designed to penetrate body armour;
- any projectile that can ignite on impact, is made to be used in or with a cartridge, and is not more than 15mm in diameter;
- any cartridge that can be fired from a shotgun and contains projectiles, known as flechettes, or any similar projectiles.

Only center-fire ammunition is permitted. All ammunition is properly fit the firearm that is being used.

FIREARMS

Non-restricted firearms are to be used at the site, including:

- rifles; and
- shotguns.

Only under exceptional circumstances is a handgun that is not a prohibited firearm to be used. The use of such a firearm will require a restricted firearm license and pre-approval by the Crown.

Firearms are only to be used by the following persons:

- Wildlife Monitor;
- Site Superintendent.

No prohibited devices are to be used with firearms, including but not limited to,

- any part of a weapon or accessory of a weapon that is prescribed by regulation to be a prohibited device;
- a handgun barrel that is equal to or less than 105 mm in length;
- a device designed to muffle or stop the sound of a firearm (silencer);
- a cartridge magazine prescribed by regulation to be a prohibited device; and
- replica firearms.

Unauthorized use of a firearms and failure to abide by the above listed points are very serious offenses and will result in immediate removal from site and potential charges under various legislation.

Firearms are not to be loaded when not in use.

STORAGE

Ammunition must not be stored along with any flammable goods. The ammunition is to be stored along with the firearm in the Site Superintendents room. The firearm and ammunition are to be locked in the closet at all times when not in use. No trigger lock is required as the firearms and ammunition are strictly for use in controlling animal predators in a remote wilderness area. Firearms are to be Proven Safe and stored unloaded.

11.5.2 License Requirements

All persons who carry a firearm must have a valid Federal Possession and Acquisitions License. The license must be available for issuance to an inspector upon request. Copies of the license are to be stored in personnel files. Wildlife response team members shall be experienced in using firearms at remote Northern locations and will have a hunting background. In addition, all firearm(s) are to be licensed.

11.5.3 Issuing Firearms

Only the Site Superintendent can issue firearms. A logbook will be maintained and stored with the firearms that tracks:

- the date that the fire arm was issued;
- the type of firearm that was issued;
- the number of ammunition issued;
- the type of ammunition issued;
- the person issuing the firearm;
- the person receiving the firearm; and
- the reason for issuing the firearm.

The above information is to be entered into the following form. The form is to be reproduced within a log book.

Table 15: Tracking Firearm Issuance Form Template

DATE	FIREARM TYPE	# OF AMMUNITION	TYPE OF AMMUNITION	ISSUER NAME AND SIGNATURE	RECEIVER NAME AND SIGNATURE	REASON FOR ISSUANCE OF FIREARM

However, in the event of an emergency, the logbook can be filled out following the issuance of the firearm. Notwithstanding, the logbook must be filled out prior to issuing the firearm for any other reason than an emergency situation. An emergency situation is defined as any time a bear or other dangerous animal has been spotted within five (5) km of the camp or is threatening the health and safety of an employee.

11.5.4 Tracking Ammunition

If a firearm is discharged, the number of rounds and the reason for discharging are to be recorded. Such information is to be recorded by the Site Superintendent in the following form. The form is to be reproduced within a logbook.

Table 16: Tracking Firearm Use

PERSON WHO DISCHARGE AMMUNITION	NO. OF ROUNDS FIRED	TYPE OF AMMUNITION FIRED	REASON FOR DISCHARGE	SS SIGNATURE

11.6 Basic Safety Principles

11.6.1 Basic ACTS of Safety for Firearms

The four basic Acts of firearm safety are as follows

1. **A**ssume every firearm is loaded.
    a. Regard any firearm as a potential danger;
2. **C**ontrol the muzzle direction at all times.
    a. Identify the safest available muzzle direction;
    b. Keep the firearm pointed in the safest available direction at all times;
    c. The muzzle of a firearm **MUST NOT** be pointed towards yourself or any other person at any time. Pointing firearms at persons is a federal offense and will treated as a serious incident.
3. **T**rigger finger must be kept of the trigger and out of the trigger guard.
    a. Resist the temptation to put your finger on the trigger or inside the trigger guard when you pick up a firearm;
    b. Accidental discharge is far more likely to occur if your finger is on the trigger or inside the trigger guard;
4. **S**ee that the firearm is unloaded when not required to be loaded for Wildlife Response – **PROVE** it safe
    a. Do not initially handle the firearm unless you can PROVE it safe;
    b. Check to see that both chamber and magazine are empty. Do this any time you initially handle a firearm
    c. Pass or accept only open and unloaded firearms. This is an **IMPORTANT HABIT** to develop.

11.6.2 PROVE it Safe

Proving a firearm safe requires the following step to be completed in the listed order:

1. **P**oint the firearm in the safest available direction (Not at yourself or any other person);

2. **R**emove all cartridges;
3. **O**bserve the chamber;
4. **V**erify the feeding path; and
5. **E**xamine the Bore.

The firearm is now unloaded and safe until it leaves the direct control of the person who unloaded and completed PROVE it safe procedures on the firearm.

11.7 Social Responsibilities of a Firearm User

The following is a summary of the social responsibilities of a firearm user:

- Store all firearms and ammunition properly;
- Explain firearms safety to all persons who are within the general area of the firearms storage;
- Remove firearms from situation of potential violence;
- Act sensibly and carefully while around firearms;
- Never consume drugs or alcoholic beverages when around firearms;
- Always get permission when shooting on someone else's property;
- Maintain your firearm in good working condition;
- Have your eyesight checked regularly;
- Avoid firing near any buildings or roads, unless an emergency situations requires otherwise;
- Know and respect firearms regulations and local by-laws; and
- Wear safety equipment.

11.8 Preventing and Responding to Bear Encounters

11.8.1 Distinguishing Between Grizzly and Black Bears

Grizzlies and black bears are generally dormant during the winter months. They usually enter dens in October or November, and emerge in April or May. However, a bear may leave its den early during warm winters or if it is disturbed. Up to four (but usually two) squirrel-size cubs are born in the den in midwinter.

Black bears are sometimes confused with grizzly bears because the two species may appear similar in size, and both vary in color from black to brown, cinnamon or blond. The two species can be distinguished by several physical features.

GRIZZLY BEARS

Grizzlies have a stout, chunky build, a prominent shoulder hump, a massive head with an upturned muzzle or "dishface," and long claws (about 6- 8 cm). Adult male grizzlies can weigh more than 300 kg. Females are smaller than males.

BLACK BEARS

Black bears have a smaller, less robust build, flat or straight shoulders, a straight muzzle, and short, curved claws. Adult males average 100-150 kg, but can weigh more than 275 kg. Females are smaller than males.

The following figure presents the visual features that can be used to distinguish a black bear from that of a grizzly bear.

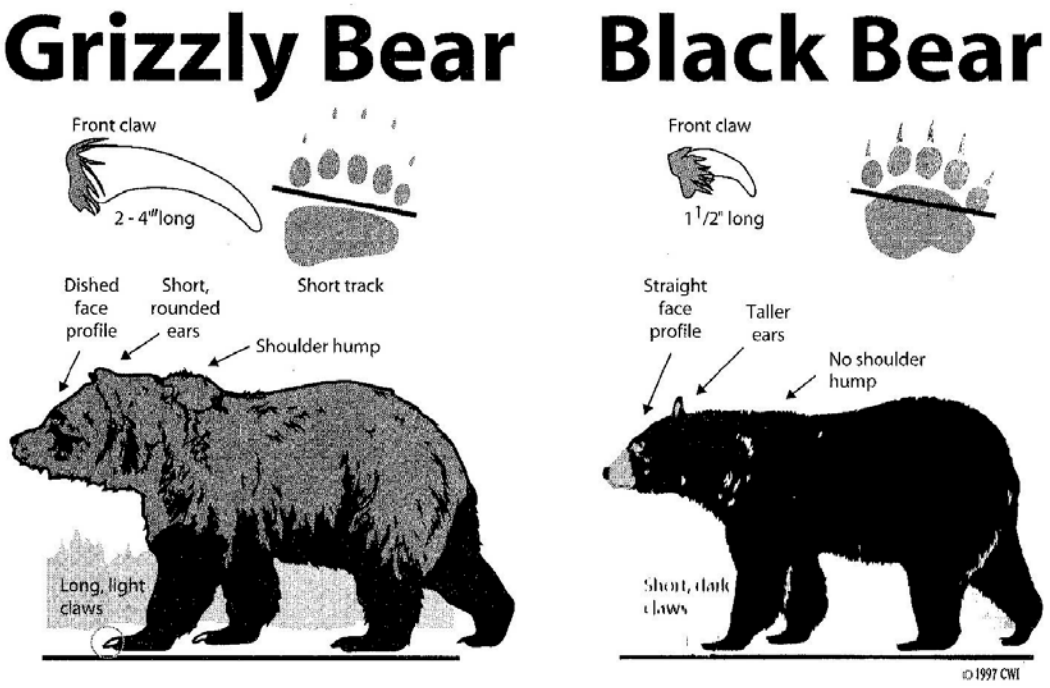


Figure 8: Distinguishing Features of Grizzly and Black Bears

EATING HABITS

Grizzly bears and black bears are both omnivorous. That is, they eat whatever is available. They rely mainly on vegetation, such as roots, grass and berries, but also eat fish, remains of dead animals, insects, small mammals such as ground squirrels, and garbage. Grizzlies also prey on moose, muskox and caribou. Grizzly bears have been known to prey on black bears. Both animals are extremely dangerous when near a food source as they will aggressive defend such resources.

BEHAVIOR

A bear's reaction to you will be influenced by many factors and is therefore never entirely predictable. Given the opportunity, bears usually avoid people. Some bears are more dangerous or aggressive than others. Old or wounded bears may be in pain or starving. They may aggressively seek food from people if they are unable to obtain enough on their own. Any bear that has become accustomed to people and shows no fear of them is dangerous.

Every bear defends a critical space. The size of the space varies with each bear and each situation: it may be a few hundred metres. Intrusion into this space is considered a threat and may provoke an attack. All female bears aggressively defend their cubs. If a female

with cubs is surprised at close range, or separated from her cubs she is likely to charge. A sudden charge is the mother's natural defence against danger to her young. A female black bear may act less aggressively if her cubs can escape up a tree and she can defend them by standing at its base.

However, she is still dangerous and may become suddenly aggressive if provoked. Bears also aggressively defend their food, and are often reluctant to leave it until it is all eaten. In some cases, a bear that is threatened may engage in displays intended to scare away an opponent. These may include huffing, panting, hissing or growling; looking directly at you, sometimes with lowered head or ears laid back; slapping on o both feet on the ground; jaw popping; or charging to within several metres, then stopping suddenly or veering to the side. Threat displays may be followed by an attack, but may also end with the bear walking or running away.

A bear standing on its hind legs is probably trying to pick up your scent and figure out what you are. It may sniff the air or swing its head from side to side. Bears do not charge standing on their hind legs.

Most grizzlies avoid contact with humans if possible. However, there is good reason for their reputation for ferocity. If cornered, threatened, or surprised, the grizzly can be very aggressive, and will usually stand its ground or charge.

Black bears are often less aggressive and flee from danger. However, because they are more curious and adaptable than grizzlies, they quickly become accustomed to human activity, and may develop aggressive food seeking habits, which make them dangerous. Therefore, treat all black bears with caution.

In a very few cases, a bear has stalked a person that it apparently considered potential prey. Although such incidents are rare, you should know the difference between the behaviour of a hunting bear, and the behaviour of a threatened bear. A hunting bear does not bother with displays and shows no signs of annoyance of fear. It may approach you directly at a fast walk or run, follow you, or circle carefully making cautious approaches.

11.8.2 Preventing Bear Encounters

CAMP FACILITIES

BEAR FENCE
The camp shall be surrounded by an electrified bear fence that that will be inspected daily by the Bear Monitor to ensure its integrity.

WILDLIFE MONITORS
One wildlife monitor will monitor the area within the site work limits at all times during Work.

Any employee working within or visitor entering the area outside of the limits are to be ensure that there is no sign of bear activity prior to commencing work. The

superintendent shall maintain observance for wildlife activity and workers shall be observant during the work. Prior to commencing work the area shall be inspected for wildlife activity.

DAILY AREA CHECKS FOR WILDLIFE OR SIGNS OF WILDLIFE

A worker/superintendent shall perform a check on the general area prior to and following Work. The morning check is to be performed prior to breakfast. The evening check is to be conducted after dinner. The checks will be conducted using an available quad and are to follow a prescribed route. The exact route is to be selected following mobilization to the site. A firearm is to be taken during such checks. The results of the previous night and morning patrols are to be discussed in the daily morning toolbox meetings. However, any wildlife sighting and/or signs of wildlife are to be immediately reported to the Site Superintendent who is to take appropriate actions as per the Wildlife Contingency Plan.

FOOD

- Do not feed any wildlife;
- All food must be consumed in the dining room. No food is to be consumed outdoors;

GARBAGE

- Food wrappers and juice containers must be deposited in the dining-room garbage containers;
- Garbage from dining-room garbage containers must be stored inside a building in a securely closed container until ready for incineration;
- All food waste and garbage is to be incinerated on a daily basis by the camp manager or other authorized employee using the on-site garbage incinerator. All persons incinerating garbage are to be trained in proper use of the incinerator to ensure safe work and complete combustion of garbage. Incomplete combustion can leave behind organic matter that will remain a wildlife attractant.

BUILDINGS

- Check the area immediately outside doors before exiting buildings;
- Check the interior of all rooms of abandoned building prior to entrance for signs of bear or other large animal activity. This includes initial entrance into the building and also when moving from one room to another within a building. If signs of bear activity are present leave immediately by the same path that was used to enter. Under no circumstances is a room to be entered if bear signs are present or even suspected to be present as interiors of buildings are confined spaces within which animals will react aggressively;
- Watch for signs of digging under skirting of buildings;
- Watch for bear tracks;
- Keep all doors closed, unless moving personnel or equipment into or out of buildings.
- Ensure that all access doors to areas under buildings are closed and secured, unless work is actually being performed.

DEAD WILDLIFE

- DO NOT APPROACH any dead wildlife. Bears will aggressively defend food resources. Such encounters are often resulted in either a person or bear casualty;
- Report any dead wildlife found immediately to the Site Superintendent.
- Report any sightings of ravens or sea gulls diving and circling an area.

FUEL HANDLING AND STORAGE

- Fuel and synthetic materials can act as strong bear attractants;
- Store fuel only in designated container and areas;
- Fill equipment prior to leaving Work area to avoid the necessity of carrying additional fuel supplies;
- Avoid spills and clean up spill of fuel immediately;
- Only store materials impacted by hydrocarbons as per the Spill Contingency Plan;
- Do not use vehicles or equipment that are leaking fuel or other hydrocarbons.

11.8.3 Responding to a Bear

IN THE VICINITY

- Take note of the location of the sighting;
- If safe to do so, take note of what direction the bear is heading;
- Record a brief description of the bear;
- If you have a radio, contact the Site Superintendent and report the presence of the bear.
- If you do not have a radio, report the bear sighting to the Site Superintendent verbally as soon as possible. The reporting takes precedent over work;
- Monitor the movement of the bear, if it is within sight of camp and it is safe to do so (i.e., It is several hundred meters away and there is a vehicle or a secure building nearby).

IN THE CAMP

- Take note of the location of the bear.
- Take note of the direction of travel and what it is doing.
- Contact the Site Superintendent and report the presence of the bear. The Site Superintendent will immediately report the sighting to the Medic;
- Sound the bear alarm – a central air horn will be located at the camp. One long blast means that a bear or other dangerous animal is in the camp and that all persons must seek nearby shelter;
- Immediately after hearing the alarm, contact the Site Supervisor with your location and if you are in immediate danger and require assistance. The Site Supervisor will advise on the last known location of the bear;
- The Site Superintendent is to ensure, as soon as possible after the bear sighting, that all persons are accounted for and their locations and current status are known;
- Monitor the movement of the bear, if safe to do so, until bear response personnel arrive;

- Stay indoors or at a safe distance of over 500 meters. DO NOT APPROACH the bear under any circumstances;
- Keep all doors closed and close all windows;
- Obey all instruction issued by the Site Superintendent.

BEAR TEAM RESPONSE PROCEDURES

WILDLIFE RESPONSE TEAM

The Wildlife Response Team (WRT) shall consist of the following people:

- The Medic;
- the Site Superintendent;
- a Camp Monitor (maintain communication at camp).

BEAR RESPONSE EQUIPMENT

Bear response equipment shall consist of:

Firearms

- 1 x 12 gauge pump action defender shotgun;
- 12 gauge, 3 in. Magnum slugs;
- 12 gauge Cracker Shells;
- 12 gauge Rubber Bullets;
- 30-06 5 shot bolt action rifle or equivalent; and
- 220 grain ammunition.

The following figures display the fire arms that will be present on-site for bear response.

Figure 9: Defender Shot Gun

Figure 10: 30-06, 5 shot Bolt Action Rifle

Bear Deterrents

- starter pistol
- .22 calibre blanks for pistol
- screamer and banger tubes for starter pistol.
- knife; and
- bear spray.

Response Vehicles

- quad or side by side for response on rugged terrain.

Communications

- hand held radio;
- satellite radio w/ impact and water resistant case and emergency numbers; and
- emergency flare.

RESPONDING TO A BEAR

1) Bear sighted in general vicinity

- General vicinity means not within the Work area, but within 5 km of the Work area;
- When a bear is reported in the general vicinity, the wildlife response team will collect the bear response equipment and proceed to the last known location of the bear. There must be at least two people responding to bear sightings. The shotgun magazine shall be fully loaded with slugs when responding to a bear. 12 gauge deterrents are to be hand loaded, one at a time. The defender shot gun can accommodate 3 slugs. The 45-70 level action rifle can accommodate 4 shells.

a) Bear between 2 km and 5 km away from camp

- If the bear is not headed towards the camp, the team will only observe its behaviour and direction of travel until they are confident that it is not heading towards the camp;
- If the bear is headed towards the camp, the team will fire cracker shell and/or screamer rounds in an effort to drive it further away from camp; and
- Upon returning to the camp the team leader shall report the incident to the Site Superintendent who will in turn report to Wildlife and Economic Development.

b) Bear between camp and 2 km away from camp

- The team will fire deterrent rounds and aggressively drive the bear away from the camp;
- Upon returning to the camp the team leader shall report the incident to the Site Superintendent who will in turn report Wildlife and Economic Development.

2) Bear in camp

- An attempt to move the bear out of the camp shall only be made if it is safe to do so and no personnel are in immediate danger;
- If personnel are in immediate danger, or if it is not possible to remove the bear without endangering someone, the bear is to be shot;
- Wildlife response team shall ensure that everyone has been notified and accounted for the location of all personnel. An update list of employees will be kept by the health and safety officer;
- Ensure that the bear has a clear avenue of escape;

- Ensure that there are no people in the direction that the bear is likely to take in leaving the camp.
- Ensure that there is not more than one bear;
- If it is safe to do so, use rubber bullets, screamers and/or cracker shells to drive the bear out of camp;
- Follow the bear and continue to use deterrents until you are confident that it is leaving the area;
- If you lose sight of the bear, STOP and return to camp; and
- Upon returning to the camp the team leader shall report the incident to Department of Resources, Wildlife and Economic Development.

3) Destroying a Problem Bear

- A problem bear is a bear that either is directly threatening health and safety or has returned to camp more than once;
- If the bear is standing sideways, it shall be destroyed by shooting at the large shoulder bones, into the chest area;
- When facing head on, a bear shall be destroyed by shooting into the chest area;
- A minimum of two shoots shall be fired into the vital areas;
- The bear is not to be approached until it is certain that it is dead;
- The shotgun is to be reloaded, cocked and ready to fire before approaching the dead bear;
- Before shooting, consider what is beyond the bear, as the slug may pass through the bear;
- Upon killing a bear, the hide shall be removed, with the claws and the head attached. The hide shall be placed into a freezer. The body shall be disposed of as per directions issued by a Wildlife Officer;
- The incident must be reported immediately to the Wildlife Officer in Kuglutuk at (867) 982-7450;
- All reasonable efforts must be made to ensure the hide and other valuable parts do not spoil and that these are turned over to a Wildlife Officer.

4) Close Encounter with Bear by Employees Other Than Wildlife Response Team

There is always the possibility that you may surprise a bear at close range, or

a) The bear is unaware of you and feeding

- If you can do so undetected, leave the area. Quietly go back the way you came. Move only when the bear's head is down. Stop when it lifts its head to look around. Stay downwind. When you are a safe distance away, wait until the bear leaves or make a wide detour around it; and
- If you cannot leave undetected, let the bear sense you by smell first. Quietly move upwind. If possible, keep the bear in sight. The bear may leave when it smells a person nearby.

b) The bear is unaware of you, but approaching

- Give the bear the right-of-way.

- Try to get out of the way without being noticed. If that is not possible, announce your presence. Bears should be able to determine that you are a human by the time they are 100-150 m away; and
- Give the bear a chance to leave

c) The bear is aware of you, but distant:

- Stay calm;
- Continue walking slowly, but head away from the bear;
- Do not run unless you are sure you can reach safety;
- If the bear follows, leave behind a cap, scarf, etc. to distract it and allow it to identify you as a person from your scent;
- If you are dealing with a grizzly bear, climb a tree if a large one is available. Remember, however, that black bears can climb trees easily, and grizzlies may climb if the spacing of limbs permits; and
- If there is a bird colony nearby, or something else that could be a distraction to the bear, you could head in that direction.

d) The bear is aware of you and close

- In close confrontations, the bear is likely to feel threatened. Its natural tendency is to reduce or remove the threat. Help it by acting as non-threatening as possible, particularly if it is an adult bear or a female with young. Do not make sudden movements. Monitor the bear's movements but avoid direct eye contact. If the bear is young and possibly curious, you may have to be more aggressive to drive it away. To help you act appropriately, assess the situation and try to determine why the bear is acting the way it is;
- Help the bear identify you as a person. It may leave. Stay upwind if possible. Talk in low tones and slowly wave your arms;
- Give the bear the opportunity to leave. Make sure it has an open escape route;
- Back away slowly and/or climb a tree if appropriate; and
- Try to deter the bear if you are in a safe position.

e) The bear is close to you and threatening

- Try to scare the bear off with an appropriate deterrent if you are equipped to do so;
- If you have no deterrent, or if the attempt is unsuccessful, act as non-threatening as possible;
- Talk in a calm, but authoritative voice;
- Do not make fast or sudden movements that might startle or provoke the bear;
- Do not imitate a bear's aggressive sounds, signals, or postures; and
- Feed a slug or cartridge into the chamber of your gun, keeping an eye on the bear. Back off slowly and steadily and drop a hat or scarf or other article to distract the bear. Do not drop your backpack as it can help protect the spine in the event the bear charges. Drop food only as a last resort (this provides a bad example for this bear’s next encounter with a person).

f) The bear is very close (less than 50 m in open areas, closer in forests) and approaching

- If the bear does not respond to a deterrent, stand your ground;
- If you are unarmed, do not play dead unless the bear charges;
- Standing will enable you to dodge an attack, to distract the bear by dropping something or by flashing clothing; you will also be able to monitor the bear's actions; and
- If you are armed and the bear continues to approach and act aggressively, be prepared to shoot.

g) The bear charges

- A bear charges at high speed, on all four legs, often crouched low to the ground. It does not charge on its hind legs;
- Many charges made by grizzlies and black bears are bluffs. These bears often stop or veer to the side at the last moment. However, it may be difficult to know if a charge is a bluff until the bear is very close;
- If you are faced with a charging bear (or a bear at close distance that is hunting you as potential prey), you have two options: shoot to kill if you have a gun, or play dead (see below) if you are unarmed.
- If the bear definitely knows what you are and it is not deterred, you are likely considered prey, (its next meal). Aggressively fighting and trying to hurt it as badly as possible is your best option.

11.9 Minimizing the Impact on Wildlife

Wildlife may be impacted by the loss or modification of habitat and disturbance from vehicles and equipment during sensitive life-cycle periods (e.g., breeding and rearing). The following guidelines are intended to minimize impacts on wildlife from project activities:

- Drivers will maintain a safe and appropriate speed on the roads especially the winter road, and drivers will not chase animals down roads. Instead, drivers will stop and turn off their headlights to allow stressed animals to disperse;
- Recreational or sustenance hunting, firearm use, and/or fishing are not permitted on any site;
- Dogs are not permitted on any site unless prior authorization is obtained from the AANDC Project Manager;
- When encountering wildlife, remember they have the right of way;
- Never feed wildlife. Feeding wildlife may cause them to stay at the site and become used to human contact. The consequences of feeding may result in serious harm to humans, and/or the animal being relocated or destroyed; Feeding animals will result in removal from site and termination of employment;
- If encountering wildlife on the road, stop the vehicle and allow wildlife to pass. Be sure to:
  - Remain in the vehicle;
  - Avoid using the horn;
  - Avoid provoking the animals; and

- Wait for the animal(s) to pass before continuing.

12.0 WORKING ON OR NEAR WATER

12.1 Purpose

To detail the procedures to be followed when personnel are required to work near or over open water, and where a fall into the water is possible.

12.2 Scope

This procedure applies to all employees including independent contractors working at the site. A permit for working near or over open water must be obtained from the site manager prior to any work being started.

12.3 Roles and Responsibilities

Site Superintendent,

- Ensure these procedures are implemented and maintained.
- Ensure that the PPE is maintained onsite and available for employee use during work on or around waterways
- Ensure training is provided regarding SWP procedures, emergency response plans and PPE, requirements, usage and maintenance.
- Issue working on or around waterways permits

Supervisors

- Are responsible for ensuring that all personnel who work near or over open water have been trained and comply with this procedure.
- Ensuring permit is in place prior to initiating work activity.
- Identify any potential hazards and present to work crew.
- Ensure proper PPE is utilized and this SWP is complied with in its entirety.

Personnel

- are responsible for understanding and complying with this procedure.
- donning and maintaining PPE
- describe any hazards they identify to their supervisor prior to initiating work tasks

Safety officers

- are responsible for monitoring compliance with this procedure and revising this procedure as circumstances change.
- Issuance of PPE required for working on or around waterways
- Issuance of training required for PPE use and SWP

12.4 PPE Requirements

- Level D protection as a standard
- Hand Held Radio
- Personal Floatation Device (PFD)

- Floatation Suit
- Life Ring
- Throw Bag

12.5 Procedure

- All personnel who work near or over open water must wear flotation vests or suits while performing the work. Unless the perimeter of their workplace has appropriate, standard guardrails to prevent a fall into the water.
- Under cold water conditions, flotation suits are required to provide some protection from hypothermia. Floatation vests are acceptable only during the months of July and August. The mine manager or designate has the discretion to vary this two (2) month period based on local weather temperatures.
- For emergency rescue, a life ring complete with throwing rope must be available at all docks, rafts and other work platforms near or over open water, that do not have guardrails.
- Radio contact and check in must be maintained at predetermined intervals as described in the permit.
- A second person must be present whenever work is conducted where steep banks or slopes could hinder or prevent a person(who has fallen in the water), from exiting the water. The second person must also wear a floatation suit and be equipped with a rope and life ring. If the person performing the work falls into the water, the second person will use the life ring and rope to pull the person to a safe point to exit the water. Always use the Buddy system.
- All banks and berms constructed around the perimeter of the body of water must properly contain the water and be placed and built according to approved company standards and safety legislation.
- When operating equipment around water, sound footing and stable placement of the equipment must be ensured to prevent upset. Equipment must be equipped with emergency escape hatches and personal flotation devices (PDFs) should be worn.
- If work is to be performed at night, sufficient lighting must be provided at all points where there is a risk of workers falling into water.
- If work is to performed at certain distances above the water level, all precautions such as guardrails, safety belts, and appropriate fall arrest equipment, must be used.
- Guardrails and/or berms must be installed where traffic is regularly moving by the water hazard or when equipment is parked nearby.
- Floating barges and/or platforms containing pumps or other types of equipment must be equipped with walkways and suitable railings to protect workers from accidentally falling off.
- Any persons who fall into water should see the first aid attendant if there is a chance that they may be exposed to hypothermia.

13.0 WORKING ON OR AROUND ICE

13.1 Purpose

To detail the procedures to be followed when personnel are required to work or around Ice, and where a breakthrough into the water is possible.

13.2 Scope

This procedure applies to all employees including independent contractors working at the site. A permit for working on or around ice must be obtained from the superintendent prior to any work being started.

Performing work using heavy equipment on ice will require a thorough risk assessment and approval by the Project Manager prior to initiation of work task.

13.3 Roles and Responsibilities

Site Superintendent

- Ensure these procedures are implemented and maintained.
- Ensure that the PPE is maintained onsite and available for employee use during work on or around ice surfaces
- Ensure training is provided regarding SWP procedures, emergency response plans and PPE, requirements, usage and maintenance.
- Issue working on or around ice permits for given loading capacity

Project Manager

- Provide technical assistance as to ice thickness measuring procedures and techniques
- Determine if ice capacity is sufficient to support the required loading.
- Identify the limits of the allowable work area and the required spacing of personnel and equipment in the work area.

Supervisors

- Are responsible for ensuring that all personnel who work on or around ice have been trained and comply with this procedure.
- Ensuring permit is in place prior to initiating work activity.
- Identify any potential hazards, ice that appears to be thin or weak in any way and present to work crew.
- Ensure that ice thickness is measured and sufficient to support the required loading.
- Minimize static loading, ensure no loads remain in place for extended periods.
- Ensure proper PPE is utilized and this SWP is complied with in its entirety.

Personnel

- are responsible for understanding and complying with this procedure.
- donning and maintaining PPE.

- describe any hazardous they identify to their supervisor prior to initiating work tasks.
- maintain radio contact with safety officer during work.

Medic

- are responsible for monitoring compliance with this procedure and revising this procedure as circumstances change.
- issuance of PPE required for working on or around waterways.
- issuance of training required for PPE use and SWP.
- maintain radio contact with work crews.

13.4 Preparation

There are four things to focus on when planning an outing on the ice: your **physical condition**, your **clothing**, your **equipment**, and your **procedures**.

Physical condition

Anyone who goes out on the ice should be in reasonably good condition and be able to sustain periods of intense exertion if an emergency arises—either falling through the ice themselves or rescuing someone who does. Being able to swim, or at least being comfortable staying afloat, is important in an emergency and can reduce the chances for panic.

Clothing

Naturally you should choose clothing that provides protection from low air temperatures, wind, and precipitation while at the same time allowing you mobility. But in addition, when you select clothing, keep in mind the possibility of falling through the ice. Clothing that would severely restrict your ability to swim or to stay afloat is not a good choice. Hip boots or waders should never be worn, as they can fill with water and restrict movement while adding weight. A personal flotation device (PFD) should be worn. This can be a vest or jacket, either inflatable or naturally buoyant.

Equipment

Include items for testing and measuring the ice thickness, as well as items for rescue or self-rescue. In the first category are a heavy ice chisel, an ice drill or auger (manual or powered), a measuring tape or stick that can be hooked under the bottom edge of the ice in an auger hole, and possibly a perforated ladle for cleaning ice out of the auger holes. In addition to the PFD, bring a rope or rescue throw bag containing a rope that floats. Ice rescue picks sold for ice fishermen are an excellent idea. They thread through your jacket sleeves like children's mittens and are immediately available in an emergency for pulling yourself out of the water onto the ice.

Procedures

- Never go out on an ice cover alone, and never go out on the ice if there is any question of its safety.
- Consult with site superintendent and field engineer, perform a visual inspection prior to application for working on or around ice permit.

- Temporary permit will be issued upon completion of the visual inspection to proceed with the measuring of ice thickness to delineate allowable work area and determine allowable loading.
- Floater suit and floating rope is required during ice thickness measurements. Rope is to be fastened securely to the shore and connected to each employee to allow for self or assisted rescue should a breakthrough occur. A team member is to remain on shore at all times during this task.
- Working on or around ice permit will be issued based on the safe work area and safe loading.
- No one is to work on or around ice alone the buddy system is to be employed and radio contact is to be maintained with the safety officer at intervals determined in the work permit.
- While you are planning the outing, obtain the record of air temperature for the past several days and continue observing air temperatures while the ice will be used to support loads.
- Always let someone know of your plans and when you will return.
- When you arrive at the water's edge, visually survey the ice. Look for open water areas, and look for signs of recent changes in water levels: ice sloping down from the bank because the water dropped, or wet areas on the ice because the water rose and flooded areas of the ice that couldn't float because it was frozen to the bottom or the banks. (If the ice is snow-covered, look for wet areas in the snow.)
- Listen for loud cracks or booms coming from the ice. In a river this can mean the ice is about to break up or move; on a lake larger than several acres such noises may be harmless responses to thermal expansion and contraction.
- Look for an easy point of access to the ice, free of cracks or piled, broken ice.
- If you are taking a vehicle or other equipment on the ice, go out on foot first. Vigorously probe ahead of yourself with the ice chisel. If the chisel ever goes through, carefully turn around and retrace your steps back to shore, and try again some other day.
- Near shore, listen for hollow sounds while probing. Ice sloping down from the bank may have air space underneath. This is not safe; ice must be floating on the water to support loads.
- After getting on the ice, others in the group should follow in the leader's steps, but stay at least 10 feet or 3 meters apart.
- Only after you have learned the characteristics of the ice cover should any vehicle be taken on the ice.

13.5 What You Need To Know About the Ice

Once on the ice it is time to begin more systematic observations of the ice sheet you want to use to support a load. There may be many variations in the structure, thickness, temperature, and strength of a floating freshwater ice sheet.

How thick is the ice?

This is determined by drilling holes with the drill or ice auger. The technique is to drill a hole and check the ice thickness every 150 feet or 50 meters along the center of the intended path, and during road construction perimeter holes at 300 feet or 100 meters.

This should be done more frequently if the ice thickness is quite variable. Note whether the ice in each hole is clear (sometimes called black ice) or white (due to air bubbles—sometimes called snow ice). Measure the thickness of both kinds.

On rivers the ice thickness and quality can change a lot in a short distance; be particularly alert to variations in ice thickness due to bends, riffles or shallows, junctions with tributaries, etc. For both rivers and lakes, warm inflows from springs can create areas of thinner ice. The ice near shores can either be thinner (due to warm groundwater inflow or the insulating effect of drifted snow) or thicker (due to the candle-dipping effect of variable water levels).

Measure the snow cover thickness on the ice cover; significant variations in thickness may mean highly variable ice thicknesses.

How thick does it need to be? A simple formula to estimate the minimum ice thickness required to support a load is

$$P = 4h^2 \text{ or } h = (P/4)^{1/2}$$

h = is the ice thickness in centimetres
p = is the load, or gross weight, in kilograms.

You can also use the graph or table to determine the minimum thickness.

Remember that the load is the *total* load in kilograms (not a vehicle's load capacity).

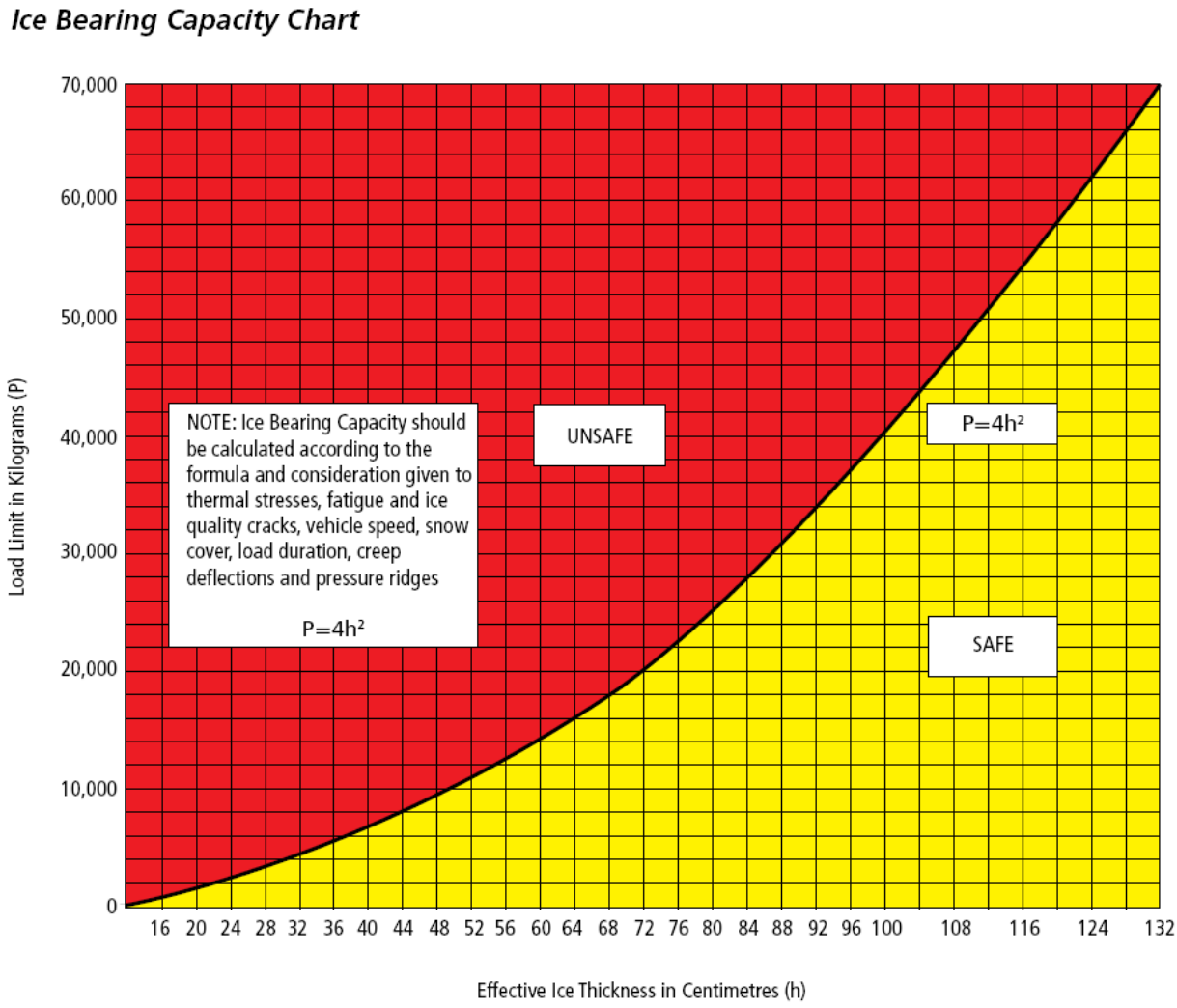


Figure 11: Ice Bearing Capacity Chart

The graph is valid when the load (such as a person on foot, or a wheeled or tracked vehicle) is distributed over a reasonable area of a continuous ice sheet. The larger the load, the greater the area it should cover for the calculation to remain valid. *Neither large loads that are concentrated in relatively smaller areas, nor loads that are at or near the edge of a large opening in the ice, are safely described by the equation, graph, or table.* In such cases, seek more advice.

The equation and graph assume clear, sound ice. If white, bubble-filled ice makes up part or all of the ice thickness. Count it as only half as much clear ice.

Therefore, $P = 4([h(black\ ice) + 1/2h(white\ ice)]^2$

Any recent large snowstorm creates a new load on the ice. If the new snow is heavy enough, the ice sheet will sag and its top surface will be submerged below the water level. Then water will flood the top of the ice sheet through cracks, saturating the lower

layers of the snow. Until this slush is completely frozen, *stay off* the ice sheet. When the saturated snow becomes frozen, it is an added thickness of white ice.

Contrary to what you would expect, a rapid, large air temperature drop makes an ice sheet *brittle*, and the *ice may not be safe* to use for 24 hours or more.

If the air temperature has been *above freezing* for at least 6 of the past 24 hours, multiply the load by 1.3 before you use the equation (or use the lower dashed line on the graph), obtaining a larger minimum ice thickness to account for any possible weakening. If the air temperature stays above freezing for 24 hours or more, the ice starts losing strength, and the equation, figure, and table no longer represent safe conditions. *Stay off the ice!*

You are likely to encounter cracks in the ice. Cracks are either wet or dry. If they are dry, they do not penetrate the ice sheet and are not a concern. If they are wet, multiply the load by 2, as shown on the graph, before you use the equation to obtain the required minimum ice thickness.

No static loads should be left on the ice sheet, this formula does not apply to static loading. Static loads place additional stress on the ice sheet and must be removed as soon as possible to prevent the failure of the ice sheet.

13.6 Safe Operations on the Ice Cover

If using an enclosed vehicle, *always* drive with the windows or a door open for quick escape.

If you drive across wet cracks, your path should be as close to perpendicular to them as possible, instead of parallel to them.

A load deflects the ice slightly into a bowl shape. When you drive on floating ice, this moving bowl generates waves in the water. If the speed of the waves equals the vehicle speed, the ice-sheet deflection is *increased* and the ice is much more likely to break. The problem is more serious for thin ice and shallow water. In general you avoid this danger by driving below 15 mph.

When there are two loads on the ice, the safe distance between them is about 100 times the ice thickness at the required minimum thickness. This is shown in the third column of the table. When the two loads are different, choose the spacing shown for the larger load. At ice thicknesses greater than the required minimum, this spacing can be reduced.

A loaded ice sheet will creep, or deform, over a long period of time, *without any additional load*. If an ice sheet has to be loaded for a long period, drill a hole near the load. *If the water begins to flood the ice through the hole, move the load immediately*. Remember this if your vehicle ever becomes disabled: if left for a few days, it may break through the ice as a result of long-term creep

13.7 Safe Rescue Techniques In the Event of Breakthrough

The following provides a brief description of the effects cold water has on the human body. Safe Rescue procedures are also described for both self-rescue and assisted rescue after a person or vehicle has broken through the ice.

Effects of Breaking through the ice

Personnel should be aware of the following, to be properly aware and informed about what may happen during a breakthrough event.

a. Immediately upon submersion into ice water, the victim involuntarily intakes a sudden gasp of air, referred to as the cold gasp reflex. If the victims head is underwater when the gasp takes place, this will result in instant drowning.
b. The person will continue to hyperventilate for one to two minutes; this is normal and will subside.
c. The person will have good control of their hands and limbs for five to seven minutes. After that point, the victim will be unable to grasp onto ropes or reaching aids.
d. Humans will <u>not</u> become even mildly hypothermic for a full 15 minutes when submerged in cold water. If capable of floating or otherwise remaining on top of the water, humans will survive one hour or more in ice water.
e. The body naturally redirects warm blood from the hands and limbs to the inner core in an attempt to preserve heat. While this preserves the vital organs, it also deprives the victim of their ability to swim. The overwhelming majority of ice water victims die by drowning, not hypothermia.

Self-Rescue Techniques (not vehicle mounted)

a. Immediately upon entering the water, relax and control breathing. Your clothing will provide some measure of buoyancy.
b. Turn and swim back in the direction you initially traveled from; the distance to that ice is known and was capable of supporting your weight up to the area you broke through.
c. Swim as quickly as possible to the ice edge; your clothing will begin absorbing water, making swimming and extracting from the ice more difficult.
d. If carrying ice picks, use them. The time and effort to recover these tools from your clothing, and while your hands still have dexterity are worthwhile.
e. Raise your feet horizontal with the ice, begin kicking hard and pull yourself onto the ice. Maintain a horizontal position when moving onto and across the ice to distribute your weight.
f. The ice edge may be weakened due to the wave action of your submersion, you may continue breaking through the edge for several feet. Continue working in the same direction; do not move to a different area.

g. If unable to extract yourself from the water, hold onto the edge and stop moving. Allow your clothing to freeze onto the ice to ensure you stay in place, allowing rescuers an opportunity to reach you.
h. Once out of the water, roll or crawl until you are sure you are on solid ice.
i. Immediately get into a heated vehicle or shelter.
j. Remove wet clothing.
k. Immediately report the incident and request medical support.

Extraction Drills from Vehicles

a. Do not panic. Although every situation is unique, the majority of vehicles that break through ice either float for several seconds to minutes or become partially hung up on ice. Floatation times vary according the vehicle type, degree of air tightness and cargo.
b. Exit the vehicle as quickly as possible. Do not wait for the vehicle to stop moving or fill up with water.
c. If the doors cannot be opened, exit through the side window. If necessary, kick out the windshield and exit.

If the Vehicle is Hung Up or Floating

a. If possible, avoid becoming wet. If able to step directly onto ice, immediately adopt a horizontal position and crawl, log roll or slide away from the vehicle.
b. If unable to step directly onto the ice, enter the water slowly, and control your breathing.
c. Move away from the vehicle quickly. Large objects that sink do not create suction; however, the creation of massive air bubbles created by sinking vehicles temporarily destroys water tension, making floatation in the immediate area difficult or impossible.
d. Follow self-rescue techniques described above.

If Vehicle Cab is submerged

a. Do not panic. Rushed, uncontrolled efforts to exit the cab is your greatest danger.
    - Be prepared to have extremely limited to no vision underwater; and
    - The vehicle is likely to roll in any direction and sink upside down.
b. Grasp the door handle and orient yourself to the front of the vehicle before undoing your seat belt.
c. If the vehicle is rolling, you will float towards the surface as soon as you undo your seat belt. This means you may be floating towards the floor or corner of your cab. Remain oriented; your exit might be below you.
d. Carry out the following drill:
    - Keep one hand on the door handle or opened window;
    - Orient your head and body forward in the cab;
    - With your other hand, undo your seat belt;
    - Immediately turn 90 degrees to the open door or window and exit;
    - Kick hard to the surface; and
    - Grab and hold onto any floating debris.

e. Carry out your self-rescue drills as described above

All personnel to be recovered from the icy water are to be treated with first aid immediately, and transported to the nearest treatment facility.

Assisted Rescue

Upon discovery of a breakthrough, rescue personnel shall proceed with extreme caution. A quick assessment shall be conducted, to assess a) if a person is underwater; b) extent of the breakthrough; and c) safe distance from the breakthrough. If a person is underwater, rescue personnel shall never dive into the water to perform a rescue. Such shall only be done by qualified diving personnel with appropriate cold-climate diving gear. The procedure is as follows:

Coherent victim floating in water:

a. Tie a loop in the nylon rope, and throw towards the person floating in the water; and
b. Pull victim to safety from a safe distance from the ice breakthrough.

Incoherent or unconscious victim floating in water:

a. Supervisory personnel trained in ice rescue dons ice rescue dry suit;
b. Ice rescue sled is tied off with a long rope, to a truck or ski-doo;
c. Ice rescuer to walk ice sled to the vicinity of the breakthrough;
d. Ice rescuer pulls victim onto ice sled;
e. Support personnel pull in the ice sled, to assist ice rescuer and victim to safety.

All personnel to be recovered from the icy water are to be treated with first aid immediately, and transported to the nearest treatment facility.

Should a drowning occur, only certified divers shall be brought in to retrieve the victim.

15.0 PPE PROGRAM

15.1 Introduction

Personal Protective Equipment (PPE) is equipment worn by a worker to minimize exposure to specific occupational hazards such as injurious physical, chemical or biological agents. Examples of PPE are respirators, gloves, aprons, fall protection, and full body suits, as well as head, eye and foot protection. Using PPE is only one element in a complete safety program that would use a variety of strategies to maintain a safe and healthy occupational environment. PPE does not reduce the hazard itself nor does it guarantee permanent or total protection. PPE must always be used as per training and must not be allowed to ensure a false sense of protection against workplace hazards.

Controlling a hazard at its source should be the first choice because this method will eliminate it from the workplace altogether or isolate it from the worker. This "safe place" approach may require substitution of a material with non-hazardous ones, isolation of hazards, addition of safety features to existing equipment, redesign of the work processes, or purchase of new equipment. When the hazard cannot be removed or controlled adequately, PPE must be used if the work process is to continue and should be used in conjunction with additional engineering controls, guards, and safe work practices, if possible. PPE is considered a point-of-contact form of worker protection in that is protects the worker during the contact with a hazard.

Delta will reduce the level of PPE required by collection and containerization of hazardous material at the beginning the project. The project contains PCB Amended Paints, hazardous liquids and potentially compressed gases. These hazards will be collected and contained by HAZWOPPER trained crews to reduce the risk to human health that these products create. The crews will be required to work under strict PPE guidelines under the supervision of the Superintendent until such time as the hazards are removed and confirmed clean by the DR. Minimum PPE requirements will be respirators, tyvek suits, rubber gloves, goggles, rubber boots and hard hats. Decontamination will take place at the work site and no PPE will be allowed outside the work area.

15.2 Purpose

If hazards are present, or likely to be present, the following shall be completed:

- Select, provide and require the use of appropriate PPE for each affected employee;
- Communicate PPE selection decisions to each affected employee;
- Select and provide PPE that properly fits each affected employee.
- Conduct and document appropriate employee training.

The PPE does not include an evaluation of respiratory hazards and the assignment of respiratory protection measures. These matters are addressed in the Respiratory Protection Plan.

15.3 Requirements

The PPE requirements shall include the following elements:

- PPE selection based on site hazards;
- PPE use and limitations;
- PPE maintenance and storage;
- PPE decontamination and disposal;
- PPE training and proper fitting;
- PPE donning and doffing;
- PPE inspection procedures prior to, during and after use;
- Evaluation of the effectiveness of the PPE; and
- Limitations during temperature extremes, heat stress and other medical considerations.

The above elements of the PPE are based on the requirements of Title 29 CFR Part 1910.120(g)4(iii)(5).

15.4 Responsibilities

15.4.1 Project Manager

The Project Manager shall:

- Ensure that the Personal Protective Equipment Program (PPEP) is developed according to regulations;
- Ensure that the necessary resources are available to implement the plan and training in a timely manner;
- Ensure that a qualified persons is appointed to develop and execute the PPEP;
- Ensure that a comprehensive Hazard Assessment is carried out prior to the project initiation to ensure that proper PPE has been selected and will be made available prior to Work;
- Ensure that the PPEP is reviewed:
- When PPE was responsible for avoiding or causing an incident; and
- Regularly at a monthly interval.

15.4.2 Site Superintendent

The Site Superintendent shall:

- ensure that all employees are issued the proper PPE according to the requirements of the PPEP;
- ensure that employees are adhering to the PPEP through daily inspections of all worksites;
- monitor the inventories of PPE at site to ensure that the necessary supplies of PPE are available when required;
- order the necessary PPE supplies when required;

- identify and reprimand employees who are breaching the requirements of the PPEP
- report immediately to the Project Manager, Health and Safety Officer / Manager when a violation of PPE protocol has occurred; and
- ensure that all employees are properly trained in the requirements of the PPEP prior to any Work.

15.4.3 Health and Safety Officer - Medic

- Issue PPE in accordance with PPEP and recommendations of Site Supervisor.
- Keep a log of all PPE issued to employees within their employee files
- Maintain the PPE storage area in a secure and organized manner
- Maintain and inventory of PPE onsite and provide ordering requirements to Site Superintendent for approval
- Conduct daily work area PPE inspections; report any discrepancies between operational conditions and PPEP to Site Superintendent.

15.4.4 Employee

The Employee shall:

- partake actively in all training in accordance with the PPEP;
- wear PPE as per training and the requirements of PPEP;
- not use defective PPE;
- report immediately to their direct supervisor any malfunctioning PPE or incidents involving PPE or the lack of use of PPE;
- properly dispose of any malfunctioning PPE.

15.4.5 Hazard Classes

The following hazard classes will be employed:

1. Impact;
2. Penetration;
3. Compression (roll over);
4. Chemical;
    a. ingestion;
    b. absorption; and
    c. puncture[3]
    d. skin irritant
    e. eye splash
5. Biological
    a. ingestion;
    b. absorption; and
    c. puncture[4]

[3] Inhalation exposure route is addressed within the Respiratory Protection Plan.

6. Heat;
7. Harmful Dust (Particulate);
8. Nuisance Dust (Particulate);
9. Radiation – Non-Ionizing;
10. Radiation – Ionizing;
11. Drowning;
12. Pinch Point;
13. Falling;

15.4.6 Selection of PPE

The following common PPE is required to be worn by all persons entering the worksite at any time.

Table 17: Common PPE Requirements

PPE	PROTECTION	COMMENTS
Hard Hat	Vertical impact to head	Requires conformance to CAN/CSA Z94.1 Industrial Protective Headwear-Performance, Selection, Care and Use. Class C – no protection from electrical hazards is required for hard hats for common work activities.
Work Gloves	Pinch and impact to hand	Basic leather work glove – not required for tours or non-work situations. For Work around tailings pond water, chemical resistant saranax gloves will be used.
High Visibility Vest	Prevents injury due to high visibility of worker by other workers	Requires conformance to CAN/CSA Z96-02 High Visibility Safety Apparel.
Steel Toed Work Boots	Impact to foot	Requires conformance to CAN/CSA Z195.1 Guideline on Selection, Care and Use of Protective Footwear. For Work around tailings pond water, chemical resistant steel toed rubber boots will be used.
Coveralls	Nuisance dust and material from contacting cloths and body.	Coveralls, when working near tailings pond water, chemical resistant suits will be used.
Safety Glasses	Impact to eye	CAN/CSA Z94.3.1 Protective Eye Wear: A User's Guide

15.5 PPE Use and Limitations

15.5.1 Tyvek Garments

HOODED CHEMICAL PROTECTIVE GARMENTS

The following hooded chemical protective garment will be used at the site – Hooded Tyvek. The Tyvek suits are not fully encapsulating and thus provides a lesser degree of splash protection to the face and neck.

Tyvek coveralls provide a barrier to particles less than 1 micron in size and is for use against dry particulate hazards, aerosols and light liquid splashes. Tyvek suits are not vapour protective in any manner and do not protect to any significant degree against

[4] Inhalation exposure route is addressed within the Respiratory Protection Plan

chemical penetration. Tyvek suits are to be disposed of at the end of each shift as per the decontamination plan.

USE AND LIMITATIONS

Potential Misuse

All Tyvek® garments are not intended for protection against ionizing radiation. All Tyvek® garments are not intended for protection from cryogenic liquids and gases (colder than -200° C). If there is a risk of exposure to liquefied gases warmer than 163° K (-100° C), the use of an ensemble certified to the optional liquefied gas requirements of NFPA 1991 (2000 edition) should be considered. The wearer should be protected from cold temperature hazards, such as frostbite, by use of insulating undergarments. If the danger of exposure to biological aerosols or chemical warfare chemicals exists, the use of a protective ensemble certified to the optional Chemical and Biological Terrorism requirements of NFPA 1991 (2000 Edition) or garments certified to Class 1 or Class 3 of NFPA 1994 should be considered. Each of these provides a different level of performance. If the danger of flash-fire exists, actions such as substitution, engineering controls, work practices and administrative controls should be implemented to mitigate that risk. Exposure of personnel should be minimized or avoided. At a minimum, fire suppression equipment and personnel should be ready and manned to conduct fire suppression should a flash fire occur. No Tyvek® garment is intended for firefighting activities, nor for protection from hot liquids, steam, molten metals, welding, electrical arc or thermal radiation. All Tyvek® garments are not suitable for use in all situations and environments with all chemical and hazardous materials.

Always Use the Buddy System

Never enter a contaminated area alone. A minimum of two people should enter contaminated areas together. Two additional people, in equally protective garments should be available to affect rescue of the entry team. All persons entering the contaminated area should wear appropriate protective equipment.

Static Electricity

Under certain conditions, such as cold and dry weather, it is possible that garments might build and discharge static electricity. Discharges are not normally dangerous except in situations where the generation of an electrical spark could ignite a flammable atmosphere or startle the wearer. When operating around flammable chemicals, steps to eliminate potential static discharges should be used. In these situations, steps have been recommended such as, but not limited to, water spray, the use of an over-cover, raising humidity level of the work area, use of a commercial, anti-static application coating, grounding straps on equipment and personnel, inherently static-dissipating under- and over-garments, and testing of the worker's static dissipation before entry into the classified area. However, in the case of explosive or flammable atmospheres, even if sophisticated and elaborate steps are taken to manage static formation and dissipate static charge, the risk of severe injury remains if an uncontrolled or accidental ignition occurs. Tyvek® chemical protective garments should not be worn in potentially flammable or explosive atmospheres. Should wearers of any Tyvek® garments determine they are in such an environment, they should retreat immediately.

Avoid Exothermic Reactions

Certain chemicals produce a large amount of heat when they react with water. If garments are heavily contaminated with a water-reactive chemical, there is a possibility that the garment may be damaged during field decontamination from the high reactive heat. The excess chemical may have to be removed with dry sand or non-reactive absorbent before water decontamination.

Avoid Continuous Exposure

These garments should not be immersed in chemicals. These garments should not be exposed to continuous hazardous liquid chemical splash or deluge. Do not wade through liquid pools of hazardous chemicals if it is not necessary. Direct, liquid chemical exposure to the ensemble should be as limited as possible. If exposed to direct splash or a deluge of hazardous chemicals, leave the area immediately and decontaminate.

Use of Adhesive Tape to Seal Tyvek® Garments

Adhesive tape cannot provide a completely liquid- or vapour-tight seal. Taping can reduce bulk flow if carefully applied. During an emergency situation it may be difficult to carefully apply tape. Taping should be viewed, primarily, as a means to hold clothing items in place; to hold a hood over the respirator, to hold a sleeve over a glove, to hold a pant leg over a boot, or to hold a closure flap closed. Taping does not provide reliable barrier.

Limitations of Liquid-Splash Protection

Hooded Tyvek® garments without visors are not liquid-tight around the hood/respiratory interface. Careful taping may reduce bulk liquid flow around this interface, but should not be relied upon for total barrier. The wrist and ankle openings of garments without attached gloves or socks have similar limitations. Garments with more protective designs should be used in lieu of taping as well as implementation of engineering controls, work practices and administrative controls to reduce the potential for exposure.

Exposure to Heat and Flame

Tyvek® protective garments, other than Tychem® ThermoPro, will burn. No Tyvek® garment should be worn around heat, open flames, sparks or any other possible ignition source nor in potentially explosive or flammable environments. Wearing garments made of NOMEX® or any other flame-resistant fabric, under Tychem® garments, other than Tychem® ThermoPro, will not reduce burn injury during a flash fire.

CHEMICAL RESISTANT GLOVES

SILVER SHIELD 4H – 4 Mil

Silver Shield 4H chemical resistant gloves are not to be worn by themselves as they do not provide resistance to tear, abrasion or puncture. Silver Shield gloves are to be worn inside a pair Saranex or Barricade type gloves so as to act as an additional inner barrier, should it be required. The Silver Shield gloves can be re-used following decontamination and are not to be disposed of unless physically damaged so as to allow direct penetration of chemicals.

BARRICADE AND SARANEX

- Chemical protective gloves made of Barricade or Saranex, and that are resistant to tear, abrasion or puncture, are to be worn as the outer glove during when working with contaminated water.

Saranex or Barricade outer gloves are only to be disposed of if physically damaged so as to allow direct penetration of chemicals.

15.6 PPE Maintenance and Storage

MAINTENANCE

PPE is to be worn as per training and is to be properly decontaminated after each use. Defective PPE is to be immediately destroyed or flagged. Under no circumstances is defective PPE to be simply left or placed back into storage. All PPE is to be stored in the designated location following use.

STORAGE

General

No specific storage life data is available. Garments are to be labelled and retired to "Training Use Only" after 5 years. Garments may be used as long as they pass a full visual inspection. Uncontaminated garments that do not pass a visual inspection should be retired and labelled "For Training Use Only" or be discarded.

Optimum Storage Conditions

Preferably, garments should be stored in a cool, dark, dry location free of dirt and insects. Sunlight, ozone, high temperatures (>120° F), vehicle exhaust fumes, compression under heavy weights and sharp edges or projections are some conditions known to degrade the materials in these ensembles. Garments should be stored in boxes, in bags or on hangers. Never step on chemical protective garments. Never place or store heavy objects on top of chemical garments.

Site Specific Storage

A separate area will be constructed for storing clean PPE. No contaminated PPE is to be transfer to or stored within this unit under any circumstances. Separate lockers are to be constructed for workers. A locked room will store PPE prior to issuance to employees.

15.7 PPE Training and Proper Fitting

TRAINING

Training with respect to PPE will include:

- When PPE is necessary;
- What PPE is necessary and which PPE has been selected for each work task;
- How to properly put on, take off, adjust and wear PPE;
- The limitations of the PPE
- How to determine if PPE is no longer effective or is damaged

- How to get replacement PPE
- How to properly care for, maintain, store, and dispose of PPE

Retraining is required whenever:

- Changes in the workplace render the previous training obsolete.
- Changes in the type of PPE render previous training obsolete.
- An observation of inadequacies in an employees' knowledge or use of assigned PPE that indicates an employee has not retained the necessary understanding or skill.

It must verify that each employee who is required to use PPE has received and understood the required training.

15.8 PPE Donning and Doffing

DONNING

The wearer is to be helped by a second person in donning and doffing a chemical protective ensemble. A ground cloth is to be used to avoid contamination and damage to the garment. A stable chair, bench or stool which is free of sharp edges and projections is also be utilized.

Non Encapsulating Suits

- Conduct a visual inspection of the garment before you begin donning:
- Remove all jewelry and personal items (pens, key rings, badges, pagers, knife cases, etc.) that might damage the garment;
- Check function of respirator and place nearby donning location;
- Visually check size and condition of outer boots and place nearby;
- Open garment closure completely;
- Read garment size label to assure proper fit;
- Apply anti-fog to inside of visor, if present;
- Remove shoes. If the garment has attached socks, these socks are worn inside outer chemical boots. These sock boots do not have adequate durability or slip resistance to be worn as the outer footwear covering;
- An assistant should help the wearer don the garment;
- While sitting, insert feet into garment legs and down into sock boot, if so equipped. Stretch legs out to maximum extension while pulling garment up around hips;
- If the garment has outer boot covers, pull the boot covers up and don outer boots. Then pull boot cover down over boots as far as possible. If the garment does not have socks, pull the garment cuff up before donning the boot, then pull the cuff down over the outside of the boot;
- Place one hand in the sleeve and pull garment sleeve to shoulder. Make sure hand is securely inside the glove, if attached;
- Place other hand in sleeve and glove, if attached, and pull the garment over that shoulder;

- If gloves are not attached to the garment, pull up the sleeve, don the gloves and pull the sleeve opening over the gauntlet of the glove;
- Don respirator face-piece and check its function. If using an SCBA, disconnect the air supply from the face-piece, if possible, to save air supply;
- Don protective headgear, if it is worn underneath the garment hood, and communication equipment;
- Place attached hood over the head and close zipper;
- After checking that the zipper is completely closed, the flaps should be folded over the zipper and sealed;
- In the case of an air-line breathing system, complete all connections and adjustments;
- If not already done, connect the respirator face-piece to the air supply and make sure the respirator is functioning properly and adequate air is being provided to the wearer;
- Place separate hood overhead and attach underarm straps (NFPA 1994, Class 3 only).

DOFFING

Non Encapsulating Garments

- Decontaminate as per the Decontamination Plan;
- If the garment has been contaminated or is suspected of being contaminated, the wearer should continue to use his respirator until the garment has been doffed and removed;
- An assistant should help the wearer doff the garment after field decontamination. If the garment has been contaminated, the assistant should wear protective clothing and respiratory equipment;
- If a separate outer hood is used, it should be removed and discarded;
- If the wearer is wearing an SCBA or PAPR, the assistant should help the wearer remove the respirator tank or filter unit without disconnecting the face-piece. The tank or filter unit should either be held by another person or placed in a safe, dry position. While the wearer stands, the assistant should remove the hood, then open the closure and peel the garment down and away from the wearer's shoulders. The assistant should help the wearer remove his arms from the sleeves;
- Lower the garment below the hips and sit down. Have the assistant remove the boots, pull the garment off the legs and remove the garment to a remote location;
- Once the garment has been removed, the wearer can disconnect and remove the respiratory face-piece and harness.

15.9 PPE Inspection Procedures Prior to, During and After Use for Multiuse Chemically Resistant Suits

TYCHEM GARMENT INSPECTION

The following inspection procedures apply to the Tychem TK 122T.

All Tychem® garments should be inspected at the following times:

- Upon receipt from supplier;
- After the garment is worn and before the garment is worn again. Contaminated, damaged or altered garments should not be re-used; and
- Annually.

Garment inspection is important. It ensures that the integrity of the garment has been maintained. The first inspection should be performed upon receipt to ensure that the integrity was not compromised during transit. This inspection should be done immediately upon receipt in order to ensure no damage occurred during shipping. An inspection must also be performed before wearing. Contaminated, damaged or altered Tychem® garments should not be used. Annual follow-up inspection is recommended for garments in storage. Inspection of garments should include the following steps:

1. Lay the garment on a clean, smooth surface;
2. Use a flashlight inside and examine the outside of the garment for holes, cuts, or tears. Apparent stitch holes covered by seam sealing tape do not constitute a defect;
3. Examine the seam tape for lifts or inadequate seal;
4. Examine the garment material and seams for signs of damage. Fabrics and seams sometimes have visual blemishes that do not affect barrier performance. Such blemishes can include dullness or white frosted areas adjacent to the seam tape. A breach or rupture of the barrier film is cause for rejection. Tincture of Iodine is used to confirm a physical breach. Apply Tincture of Iodine to the suspect area and wipe off the excess with a dry towel. If a dark brown stain remains, the barrier layer has been breached and the garment should be rejected. Areas immediately adjacent to the seam tape may take a slight yellow stain as a result of heat exposure during manufacture. This slight yellow stain is not a defect. The edges of the seam tape may also develop a thin, but prominent staining of the exposed edge. This is not a defect;
5. Examine the visor (if present) for a tight seal and make sure the visor offers clear vision;
6. Examine the garment air distribution system (if present) to make sure that it is connected properly and appears to be in working order;
7. Examine the garment gloves (if present) to make sure they are in good working order;
8. Examine the interface between the gloves and the garment if gloves are attached to the garment;
9. Examine the interface between the boots and the garment if the boots are attached to the garment;
10. Examine the garment zipper and zipper cover to make sure they are in good working order. Lubricate the zipper using a small amount of paraffin wax or lubricant supplied by the closure manufacturer;
11. Examine the garment exhalation valves (if present) to make sure they are not obstructed and are in good working order;
12. Examine all garment snaps, closures, adjustment straps and options to make sure they are not obstructed and are in good working order;

13. Examine garment-warning label(s) to make sure they are firmly attached and can be read easily;
14. Non-certified vapour-protective (Level A) garments and garments compliant with NFPA 1991 and Class 1 of NFPA 1994 should be checked for pressure integrity during each garment inspection.

TYVEK GARMENT INSPECTION

Tyvek garments should be examined prior to use for any tears rips or other defects. If such defects are identified the Tyvek coveralls are to be disposed of and an new pair is to be issued.

15.10 Limitations during Temperature Extremes, Heat Stress and other Medical Considerations

WEARERS MUST BE PHYSICALLY FIT

All Tyvek® garments should only be worn by persons who are in good physical condition. Working in chemical protective clothing is strenuous. In an emergency situation or hot environment, the wearer may experience heat stress. Persons who show symptoms of heat stress such as nausea, dizziness, high heart rates, or excessive heat build-up should leave the work area immediately and remove the ensemble as quickly as possible after decontamination. Persons in doubt about their physical condition should check with a physician before wearing chemical protective ensembles.

MANAGE AND PREVENT HEAT STRESS

These garments interfere with the natural regulation of body temperature. This can lead to a rise in core body temperature and heat stress. The wearer should be aware of the symptoms and treatment of heat stress. The wearer can take several steps to limit and/or prevent heat stress, such as the use of a cooling system, and implementing a conservative work/rest schedule. The maximum time the ensemble can be worn depends on such variables as the air supply, ambient condition, climate inside the ensemble, physical and psychological condition of the wearer, work rate and work load.

15.11PPE Selection and Requirements

It is expected that various combinations of PPE will be required for various work tasks. Delta intends to completed the high risk Hazardous Waste Collection and Containerization early in the program to reduce the overall health and safety risk on the site. The assessment of the hazards will be completed early in the mobilization phase so that proper PPE can be selected for various work areas involving hazardous materials. It is expected that JHA assessment work will outline appropriate PPE levels for work containerizing the following materials;

- Fuels and solvents
- PCB Amended Paints
- Lead Based Paint
- Metal Impacted Soils

- Hydrocarbon Impacted Soils
- General site Operation – Minimum standards for PPE

15.12 Decontamination

Decontamination will be an integral part of the PPE process when dealing with Hazardous Waste such as PCB Paint, Lead Paint and Compressed Gas collection and containerization. The collection and containerization of hazardous waste is an integral part of the overall health and safety approach adopted by Delta, which has a philosophy of reducing work place hazards, thereby reducing workers exposure to injury. Following this approach, Delta will remove the hazardous waste material early in the field program to reduce the risk of exposure to the workers.

A decontamination station will be assigned close to the work area where the workers will change from regular work close that can be worn into the camp and into approved PPE for working with Hazardous Materials. All work in the areas of hazardous material collection will require the use of appropriate PPE by all workers entering within 20 meters of the work area. The workers will depart the work area during breaks and at the end of the work day through the decontamination station where dirty tyvek suits will be discarded, masks will be cleaned and stored, boots will be cleaned, dirty gloves removed and disposed of and goggles will be cleaned and stored.

The procedures and operation of the decontamination station will be monitored by the Superintendent who will ensure proper use to protect the site from contamination. The decontamination station will be relocation to separate work areas to reduce the potential for transfer of contamination around the site.

16.0 CONFINED SPACE ENTRY

16.1 Roles and Responsibilities

The following positions are applicable to confined space entry:

16.1.1 Superintendent

The superintendent shall:

- conduct the pre-Work hazard assessment;
- assign the required PPE based on the initial hazard assessment;
- conduct assessment of the PPEP:
- as scheduled on a periodic basis;
- when PPE was responsible for avoiding or causing an incident
- report the findings/recommendations of all assessments of the PPEP to the Project Manager and DR;
- implement any recommendations based on an assessment of the PPEP; and
- follow up on recommendations to ensure that they are implemented and effective.

16.1.2 Entrant

(employee)– the employee(s) entering the confined space. The Entrant is responsible for: ensuring that all PPE is worn as per training;

1) filling out entry permit along with supervisor;
2) performing work as per the entry permit;
3) participating fully in confined space entry training;
4) immediately leaving the confined space if conditions change, are not as per permit or new tasks are identified during the entry;
5) partaking in pre-briefing information sessions and safety discussions;
6) properly monitoring environment within the confined space as per training; and
7) monitoring the conditions of any other staff entering the tank.

16.1.3 Standby

(**employee**) – the employee(s) monitoring the condition of the worker inside the water treatment plant. The standby is responsible for:

1) continuously monitoring the responsiveness of the entrant(s);
2) not leaving his or her post at any time;
3) being focused on the entrant at all times when confined space work is underway.
4) ensuring the correct emergency PPE are available and in working condition; and
5) immediately responding to emergency situations in a safe manner that does not put his or her health in danger as well.

16.1.4 Hazard Analyst

(**Project/ Manager or Medic**) – the qualified person developing the safe work practice for entering the confined space. The hazard analyst is responsible for:

1) identifying confined spaces;
2) assessing the chemical and physical hazards associated with each confined space that must be entered;
3) developing safe work practices for entering the confined space, based on hazard assessment results;
4) monitoring the performance of ventilation during a confined space entry;
5) partaking in pre-briefing information sessions and safety discussions;
6) reviewing confined space entry plans on a monthly basis and prior to entry; and
7) communicating risks to entrant, standby, supervisor and emergency responders.
8) securing all confined spaces on-site to avoid accidental entry;
9) reviewing confined space entry plan prior to issuing confined space entry permit;
10) filling out all portions of confined entry permit;
11) ensuring the atmosphere is as anticipated through air monitoring;
12) ensuring the entry does not occur unless absolutely essential and no other means is available to complete the work;
13) ordering stop work if conditions become dangerous, differ from permit or new tasks become apparent upon entry; and
14) alerting emergency staff.

16.1.5 Emergency Responder

(**employee**) – the qualified employees responsible for responding to a confined space emergency situation. The emergency responder is responsible to:

1) prepare quickly to respond once notified;
2) to immediately respond to an emergency situation in a manner that does not put his/her health in additional danger.

16.2 Hazard Assessment

16.2.1 General

A hazard assessment must be conducted for a confined space prior to any entry by any person at any time. The hazard assessment is to be performed by the superintendent. The output of a hazard assessment will be a SWP for entering the specific confined space. The hazard assessment is to address the hazardous conditions within the confined space due to the design, use, contents and work required within the confined space. Specific hazards include, but are not limited to:

Oxygen enrichment or deficiency
The concentration of O_2 must be within 19.5% to 23%. In addition if O_2 is expected to differ from 20.9% (normal ambient concentration) than the reasons for the variance must be clearly defined to ensure that the difference is constant with time and not a result of changing O_2 with time (i.e., chemical/biological reaction consuming oxygen, gas purging oxygen etc.);

Flammable Gas, Vapour or Mist

Any flammable vapours, gases and/or mists and their respective sources must be identified. The LEL for each substance must be clearly specified. Methods for eliminating the flammable substance or venting flammable gas from the confined space must be ascertained. In addition, methods for monitoring the LEL must be described.

Toxic Gas
Methods for eliminating the toxic gases or venting toxic gas from the confined space must be ascertained. Confined space is to have adequate ventilation and monitoring of HCN levels must be completed prior, during and after work activities. Any indication of levels >50% of TLV will require additional controls prior to the issuance of the permit.

Combustible Dust
Any potential substances that could form concentrations of dust that are flammable must be identified. Methods for preventing the formation of dust or removing the substance from the confined space are to be identified. Ventilation could negatively affect the concentrations of dust due to entrainment of dust in the flow path of the ventilation.

Other Hazardous Atmospheres
Chemicals that could be present in concentrations above their ACIGH TLV-TWA are to be identified. Methods for removing the chemicals prior to entry or methods of ventilation that remove the hazardous atmosphere are to be developed. In addition, methods for monitoring the concentrations of the hazardous substance are to be listed.

Additional Hazards
Additional hazards to those listed above also need to be addressed. Additional hazards include, but are not limited to, engulfment or entrapment, pooling water (i.e., drowning hazard), contained pressure in pipes, methods of egress, noise exposure, thermal extremes, slip and trip and lighting.

Changing Conditions
Consideration should be given to situations that could cause the atmospheric conditions to rapidly change during confined space entry. Such conditions include, disturbing material, opening barrels, reservoirs etc. during sampling, changes in temperature and humidity, the addition of water, etc. Methods for avoiding change and monitoring change are to be identified.

16.2.2 Hazard Ranking and Entry Procedures

LEVEL 1

A level 1 confined space is tested free of hazardous atmospheres. Any confined space shall be entered only where:

- There is easy egress from all accessible parts of the confined space;
- Mechanical equipment in the confined space is disconnected from its power and locked out;
- All pipes and other supply lines whose connections are likely to create a hazard are blanked off and their control valves are closed and locked out;

- The confined space is tested and evaluated by a competent person who records the results of each test in a permanent record, and certifies in writing in the permanent record that the confined space is free from hazard and will remain free from hazard while any employee is in the confined space having regard to the nature and duration of the work to be performed;
- Another employee who has been trained is stationed outside the confined space;
- The employee is equipped with a safety harness and lanyard;
- Means of communication are established and present;
- Emergency equipment is located near the access port including:
    - Emergency alarm
    - Fire extinguisher
    - Extra self-contained breathing apparatus.

LEVEL 2

A level 2 confined space may contain a hazardous gas, vapour, dust or fume; or Oxygen content of less than 19.0% or more than 23% at atmospheric pressure and which may be purged and ventilated to provide a safe atmosphere. A level 2 confined space shall be entered only when:

- All of the procedures applicable to level 1 have been completed;
- The space is purged and ventilated to provide a safe atmosphere;
- The measures necessary to maintain a safe atmosphere have been taken;
- Suitable arrangements have been made to remove the employee from the confined space should the employee require assistance;
- A person adequately trained in artificial respiration is conveniently available.

LEVEL 3

A level 3 confined space may contain a hazardous gas, vapour, dust or fume, or an oxygen content of less than 19.0% or more than 23% at atmospheric pressure and which cannot be purged and ventilated to provide and maintain a safe atmosphere. A level 3 confined space shall be entered only when:

- All of the procedures applicable to level 1 have been completed with the exception of the permanent record stating that the confined space is free from and shall remain free from hazard;
- The employee entering is using a suitable breathing apparatus and a safety harness or other similar equipment to which is securely attached a rope, the free end of which is held by a trained employee equipped with an alarm who is keeping watch outside the confined space;
- The employee entering is using such other equipment as is necessary to ensure the employee's safety;
- The safety harness, rope and other equipment mentioned above have been inspected by a competent person and are in good working order and are recorded in the permanent record, and
- A person adequately trained in artificial respiration is conveniently available.

EXPLOSIVE OR FLAMMABLE ATMOSPHERE

Where the gas or vapour in a confined space is likely to be explosive or flammable, the confined space shall be entered only where:

- The concentration of the gas or vapour has been tested by a competent person and found not in excess of 50% of the lower explosive limit of the gas or vapour;
- The concentration of the gas or vapour has been recorded in the permanent record;
- The only work performed is that of cleaning or inspecting and of such a nature that it does not create any source of ignition;
- Cold work may be performed in a confined space that contains or is likely to contain an explosive or flammable gas or vapour where the concentration does not and is not likely to exceed 10% of the lower explosive limit of the gas or vapour.

16.3 Securing Access

Prior to work, the site superintendent, based on recommendations from the Project Manager, is to secure all access to confined spaces. When possible the entry to the confined space is to be permanently secured. However, barricading and clearly identifying the entrance to a confined space will suffice.

16.4 Training

Prior to any work, and based on the hazard assessment, workers are to receive training on the location of all confined spaces, the protocol for entering confined spaces, emergency response and written procedures specific to working within a confined space. Training is to incorporate physical hands on training in simulated situations prior to any confined space work.

16.5 Confined Space Entry Permit

A confined space entry permit is to be filled out by the site superintendent and the employees involved in the confined space entry, prior to any confined space work. The permit is to be clearly displayed on the exterior of the entrance to the confined space during work. A confined space entry permit is to include:

Date
When the work is to be completed is to be listed;

Location of work
States where the work is to take place;

Purpose of Entry
Declares as to why workers are required to enter the confined space. A brief description of why other alternatives that do not require confined space entry have been ruled should be included;

Names of Key Positions

Who is responsible for what position and their responsibilities should be clearly defined. This will allow order to be established and safety discussions to be focused;

Permit Start and Stop Times
Confined space entry permits are only valid for a period of time. This period is to be clearly stated;

Atmospheric Hazard Level
The specific hazards associated with the confined space are to be listed and the mitigative measures put in place to address the hazardous environment are to declared (i.e., PPE);

Monitoring
The equipment used for and methods employed to monitor the atmosphere are to be described for each atmospheric hazard. Standard methods are to be referenced and attached if required; The required frequency of testing is also to be defined;

Ventilation
The forms of ventilation and the reasons for using ventilation are to be declared. Proper procedures for operating the ventilation are to be referenced and attached if required;

Lockout
Hazards that require lockout are to be identified along with the lockout procedure and steps;

Entry/Exit List
The No. and names of persons entering and leaving the confined space are to be tracked during the entry to ensure that all persons are accounted for;

Special Considerations
Any special considerations specific to the confined space are to be clearly identified.

When filling out the confined space entry permit, all persons are to contribute in the process and discuss the circumstances prior to entry.

16.6 Signing Off

The confined space entry form attached as an appendix to this plan must be signed off by the Site Superintendent prior to entry.

17.0 HOT WORK PROGRAM

17.1 Purpose

The purpose of this procedure is to establish the requirements for the hot works program for the Contwoyto Lake Weather Station Remediation Project.

17.2 Training

Training required to complete hot work is as follows;

- competency in the task being completed (i.e., welding, grinding, cutting etc) and an understanding of the tasks hazards;
- Use and implementation of the Hot Works Permit System; and
- Training and knowledge of basic fire extinguisher use and operations.

17.3 Safe Work Procedures

17.3.1 Pre- Program Inspection

Prior to the project commencement, the Superintendent will conduct an inspection of the project to identify areas that contain flammable or combustible materials or explosion hazards. The inspections will be repeated monthly or after any significant change in operations that could affect fire conditions. Warning signs shall be posted in areas with such hazards.

17.3.2 Hot Work Permit

Job tasks that span for a week or more may have long-term permits issued. The issuance of such a permit is at the discretion of the Site Superintendent. The Site Superintendent and the worker and the fire watch (if required) will sign the permit. Keep the hot work permit on file in the project office. The Site Superintendent has the right to issue any conditions or limits to any license at any time.

17.3.3 Hot Work Procedures

The Site Superintendent and the employee conducting the work will inspect the job site before commencing work to identify any flammable or combustible materials or explosion hazards in the immediate area. Fire prevention precautions will include the following:

- All flammable or combustible material and explosion hazards found shall be removed to a safe location if possible;
- If removal is not possible, the flammable or combustible material or explosion hazard material shall be protected with a fire-proof insulating blanket or shield;
- The floor shall be swept clean;
- Combustible floors shall be wetted or covered with fire resistant sheets;
- Pressurized vessels, piping and equipment shall be removed or isolated and vented;

- All wall and floor openings shall be covered;
- Area shall be tested for explosive atmospheres;
- Explosive atmospheres shall be eliminated;
- Welding flash screen shall be in place, and
- Supervision in the surrounding area shall be notified.

17.3.4 Fire Watch

If required by the Site Superintendent as a permit condition, assign a standby employee as a fire watch in the area while the hot work is being performed. Train the fire watch in fire prevention and firefighting methods. The fire watch shall stay at the site of the work for 30 minutes after completion of the work to ensure any smouldering embers are extinguished before they can ignite into fire. Fire watch for major burning activities shall be assigned time periods based on an assessment of the hazards.

17.3.5 Fire Extinguisher

Bring appropriate portable fire extinguishing equipment to the hot work site. A minimum 20-1b type ABC is required. The fire watch or employee shall operate the equipment as necessary.

17.3.6 Job Completion

Return the completed hot work permit to the project office for filing.

17.4 On-Site Burning

17.4.1 Regulatory Requirements

GNU Wildlife Officers will be contacted based in Kuglutuk prior to any open fires to ensure that permits are not required and if they are required then permits will be obtained before any open fires are allowed. Permits are not required for burning waste in a device designed for and capable of confining the fire.

17.4.2 Contractual Requirements

The following describes the contractual conditions that must be met with respect to fires and burning of waste at the Contwoyto Lake Weather Station Remediation.

FIRES

- Fires and burning of rubbish on-site is permitted only when approved by the Department Representative and in accordance with Government of NUNAVUT regulations;
- Provide supervision, attendance and fire protection measures as directed by the Crown Engineer.
- No burning of structures in-place is permitted;
- incineration of hydrocarbons will not be permitted unless approved by authorities with the Government of NUNAVUT

DISPOSAL OF OPERATION CENTER AND CAMP WASTE

- Burn Operations Center and Camp combustible wastes in fuel fired incinerators, except for Styrofoam and plastics. Delta will containerize the Styrofoam, plastics and ash/debris resultant from burning, and transport back to Yellowknife to be recycled or delivered to a licensed disposal facility;
- Kitchen and non-hazardous waste materials are to be kept to a minimum. Burn these wastes in the incinerator, and containerize and transport any residual waste to Yellowknife to be placed in the landfill.
- Materials not suitable for burning must be containerized and shipped to Yellowknife and either placed in the Yellowknife Landfill or Delta will find an appropriate disposal location once in Yellowknife.

18.0 LOCKOUT and TAG OUT PROGRAM

18.1 Purpose

The purpose of this procedure is to establish the requirements for Lockout and Tag Out for the Contwoyto Lake Weather Station Remediation Project.

18.2 Overview

18.2.1 Sources of Energy

Machines and equipment may have one or several different sources of energy inherent in their operation. It is essential to identify all sources of energy. The following lists key sources of energy that could require lock out.

ELECTRICAL

Machines and equipment may have several sources of electrical energy supplying different controls and motors. The sources may be operated manually, remotely or through automatic controls.

HYDRAULIC

Every hydraulic cylinder, hydraulic line, pump or reservoir tank has the potential of releasing liquid under high pressure.

PNEUMATIC

Pneumatic cylinders, valves, lines, reservoir pressure tanks and compressors are all energy sources that must be identified.

STEAM

High and low pressure steam lines may release steam causing serious burns.

RADIATION

Radiation energy may be in the form of gamma radiation, x-ray, microwave or lesser. Potential sources could include thickness gauges, bin level gauges, presence sensing devices, dryers, cutters, and alignment devices.

SPRINGS

Spring-loaded equipment could release as the equipment is dismantled for maintenance.

GRAVITY

Parts of equipment that are moveable and elevated could fall or move while other energy sources are shut off.

CHEMICAL

Reactive chemicals left in a process could continue to react even after all other energy sources have been shut off.

18.2.2 Sources of Material Flow

Many processes have a number of sources of material that flow to and through the process. This material may be fed to the process from other areas not included in the lockout. Each source of material flow should be identified. The following describes common forms of material flow.

NATURAL GAS LINES

There may be several different natural gas lines serving a process.

WATER LINES

An unexpected release of water during maintenance could be both dangerous and damaging.

MATERIAL PIPE LINES

Material may be piped to a process from remote areas through pumps located at and controlled from locations remote from the confined space.

CHUTES

Chutes feeding solid material to a process may be operated by a gate located at and controlled from locations remote from the confined space.

CONVEYORS

Conveyor systems feeding a process should be identified and the power sources located.

18.2.3 Locks

Use only sturdy keyed locks made by a reputable company for locking out. Combination locks will not be used.

18.2.4 Keys

Ensure each lock has one and only one key. No locks will be keyed-alike so that one key opens two or more locks. Do not make or use master keys. Do not make duplicate keys.

18.2.5 Assignment for Single Lockout

Assign a personal lock to every employee working on a piece of equipment or entering a confined space that requires a single lockout. The employee shall attach their lock and a lockout tag with required information to the appropriate switch or valve and keep the key in their possession until they have completed the job or left the job at the end of their shift. The supervisor shall also apply a “project lock” on the lockout. The project lock shall be the first lock on and the last lock off.

18.2.6 Multiple Lockout Box

Use the following procedure when multiple lockouts are involved for a piece of equipment or confined space:

- Where a piece of equipment or a confined space requires multiple lockouts, provide a lockout box that contains the required number of locks with corresponding keys.

- Identify each lock with a code number. A lockout box for the lock out system is available at the Contwoyto Lake Weather Station Remediation Project;
- The lockout box will be under the control of the project supervisor who will keep it locked when not assigning locks;
- The supervisor, together with another person knowledgeable in the lockout procedures for the piece of equipment or confined space, will identify all sources of energy to be locked out, following the documented procedures;
- Where the lockout procedures are not documented, an engineer familiar with lockout procedures and with design of the equipment or confined space will develop a written procedure;
- The supervisor together with the engineer will identify specific switches, valves, and other devices for lockout and shall apply a lock and lockout tag to each;
- The lock code number will identify which lock has been placed on which switch or valve. Place a written record of lock assignment inside the lockout box;
- Return all keys for locks used to the lockout box and the supervisor will apply a project lock to the lockout box. The project lock shall be the first lock on and the last lock off. The supervisor will keep the key in their possession until the job is completed or at the end of a shift; and
- Issue a personal lock to every employee working on the equipment or confined space locked out and these employees will each place their lock on the lockout box multiple hasp and keep the key in their possession until they have completed the job or left the job at the end of their shift.

18.2.7 Lock Removal

GENERAL

The employee who attaches a lock is responsible for and is the only person authorized to remove the lock at the completion of the project or the end of the shift.

EMPLOYEE NOT AT SITE

If an employee leaves the project site and forgets to remove a lock then the Site Superintendent will investigate the situation and determine if it is safe to remove the lock. If required, the lock can be cut off.

SHIFT CHANGE LOCKOUT

At the end of the shift, all employees leaving the project shall remove their locks and tags. However, the project lock shall be left in place. The Supervisor of the finishing shift shall personally brief the Supervisor of the starting shift and pass on the key to the project lock to the Supervisor of the starting shift. A project will always be locked out until the investigation and repairs (if required) are completed.

18.2.8 Lockout Tags

Each lock used to lockout energy or material flow source will have a lockout tag attached. The tag shall have the following information:

- Employee’s name
- Employee’s number, if available

- Date and time lock attached
- Reason for lockout

The tag will be removed when the lock is removed.

18.2.9 Identification of Switches and Valves

Identify all switches and valves controlling energy sources or material flow sources with a unique code number. Mark the code number on or near the switch or valve to clearly indicate its identity. Ensure that the code numbers are clear, legible and durable.

18.2.10 Checklists

Develop a checklist for each machine or operation identifying all energy and material flow sources to be locked out by appropriate code number. The checklist will serve as part of the record for lockout. Mark the checklist appropriately as each lockout is applied. The individual applying the locks will sign the checklist.

18.3 Lockout Procedures

The following procedures are a guideline for developing a lockout procedure for various energy sources.

18.3.1 Electrical

- Alert the operator that the machine or process is about to be locked out;
- Turn off all operating switches before turning off the main disconnect switch. CAUTION - Turning off a main disconnect switch under load may cause an explosion;
- Stand to the right side of the main disconnect switch. Turn your face away from the switch. Use the left hand to operate the switches;
- Turn off the main disconnect switch;
- Lockout the main disconnect switch. Be sure to lock the switch and not just the box cover;
- Attach a completed lockout tag to the lock;
- Test the disconnect switch to be sure it cannot be moved to the on position;
- Test the switch contact points with a voltage meter to be sure that the down side of the switch is not energized. The up side of the switch should test energized. If the up side of the switch is not energized, then a test on the down side of the switch cannot ensure that the switch is open and de-energized;
- Test the operating switch to ensure that the power is off.
- Before turning on the power at the completion of the project, notify the operator.

HYDRAULIC, PNEUMATIC AND STEAM

- Alert the operator that the machine or process is about to be locked out;
- Slowly turn off valves;
- Place a chain through the valve handle and around the pipe and secure with a lock
- Attach a completed lockout tag to the lock;
- Block any moving parts, which may fall or move when pressure is released;

- Release the pressure in the line through the bleed off valve. Some shut-off valves may have automatic bleeders;
- Test the operating switch to ensure that the pressure has been released;
- Before pressurizing the system following completion of the project notify the operator.

SPRINGS, GRAVITY AND FLYWHEELS

- Before shutting down any source of energy, determine if parts of the machine or process may move either due to spring action or gravity when the energy is shut off;
- Ensure that the blocks used are sufficient to hold the part secure without crushing;
- Block all machine parts that may move, while ensuring that no body parts are endangered;
- Attach a completed lockout tag to each block;
- After completing a project and before removing the blocks, notify the operator.

CHEMICAL

Ensure that all valves, lines, pipes and containers that are to be opened are drained and flushed to remove hazardous materials.

SUPPLY LINES

Follow the procedures in section Hydraulic, Pneumatic, Steam.

CHUTES

Follow the procedures in section above Hydraulic, Pneumatic, and Steam.

CONVEYORS

Alert the operator that the conveyor is about to be locked out. Follow the procedures in section Electrical Safety.

18.3.2 Employee Training

All employees who may be assigned to conduct maintenance on machines or processes having energy sources or material flow sources shall receive training on the following subjects:

1. Purpose of lockouts;
2. Sources of energy;
3. Sources of material flow;
4. Locks;
5. Lockout tags;
6. Identification of switches and valves;
7. Checklists; and
8. Lockout procedures.

19.0 MOBILE EQUIPMENT OPERATION

19.1 Purpose

The purpose of this policy is to establish the requirements for mobile equipment operation safety at the Contwoyto Lake Weather Station Project. Delta will employ a variety of heavy equipment and ATV's at the site and the following information is given in the case of needing to use mobile equipment at site, upon approval from the Department Representative.

19.2 Qualifications

- Only qualified personnel, or personnel in training under supervision, are permitted to operate equipment, except for purposes of training or testing;

19.3 Safety Devices

- Ensure all equipment include the following:
    - A service braking system;
    - An emergency stopping system;
    - A parking brake system;
    - Audible back-up alarm and flashing light;
    - Minimum 9kg (20 lb) ABC extinguisher;
    - Seatbelts;
    - Buggy whip equipped with a light and flag;
    - Lights or reflectors that show the width of the vehicle to a person in the path of its direction of travel;
    - Brakes that will stop and hold the vehicle under full load conditions on all operating grades;
    - Rear view mirror where the view to the rear of the operator is limited.
- Windshield and window of a motor vehicle must consist of safety glass and be maintained to provide unobstructed vision;
- Provide a cab, screen or other adequate overhead protection on:
    - Front-end loaders or other excavating machines.
- Do not tamper with safety devices on equipment. Such activity will result in immediate dismissal and removal from site and potential criminal charges.

19.4 Operation Inspection – Motor Vehicles

- Maintain and operate all vehicles in accordance with manufacturer's specifications;
- Inspect vehicles at the start of each shift. Do not operate vehicles if conditions pose a hazard to safe operation.

- Complete a pre-shift vehicle / equipment checklist and keep the checklist on the vehicle for that shift. The pre-inspection must be completely filled out and signed off by the supervisor or mechanic;
- Tag-out vehicles that have been found to have safety defects;
- Immediately report any vehicle/equipment defects found to the immediate supervisor.

19.5 Routine Maintenance

A procedure for the testing, maintenance and inspection of each motor vehicle shall be adopted and the procedure shall:

- Schedule the motor vehicle for routine inspections and maintenance, taking into consideration the manufacturer's recommendations and the conditions of use;
- Itemize the tests to be carried out following maintenance work and before first use;
- Provide a record of the testing, maintenance and inspections that have been carried out in a bound logbook. Each logbook must be specific to the piece of equipment and must be readily available on-site for inspection.

19.6 Road Safety

19.6.1 Speed Limits

- Motor vehicles shall be operated at speeds that provide for the safety of all concerned. The Site Superintendent is to establish speed limits and post such speed limits. Operating speeds are dependent on:
    - road conditions;
    - clearance;
    - restricted visibility;
    - traffic volume;
    - the presence of pedestrians
- With due regard for the above, maximum speeds for travel of motor vehicles must be posted in a conspicuous place in the vehicle.
- The posted Speed limit at the Site in the Vicinity of the camp is 20km/h.

19.6.2 Right of Way

- Pedestrians have the right of way over all mobile equipment, Although pedestrians must travel with due care and attention as visibility of heavy equipment is limited;
- Emergency vehicles have the right of way over all other vehicles;
- Vehicles in tow have the right of way over vehicles under power;
- Large vehicles have the right of way over smaller vehicles;
- Loaded vehicles have the right of way over empty vehicles;
- Drivers of smaller vehicles must ensure being seen by heavy equipment operators.

19.6.3 Safety of Pedestrians

- The safety of pedestrians is the responsibility of both the pedestrian and the motor vehicle operators;
- Pedestrians must advise mobile vehicle operators of their presence;
- Pedestrians should always remain observant of mobile vehicle operations, walk in the operator's line of sight, and stay a safe distance from operating vehicles;
- Vehicle operators must acknowledge the presence of pedestrians and adjust their driving accordingly;
- Vehicle operators must remain in control of vehicles at all times so as not to endanger pedestrians.

19.6.4 Direction of Movement

Traffic will move on the right side of the road and pass on the left in all areas.

19.6.5 Headlights

For greater visibility, headlights are to be on at all times on all motor vehicles and passenger vehicles.

19.6.6 Road Signs

Road signs must be posted indicating:

- stop intersections;
- restricted clearance
- reduced visibility
- restricted or closed roads;
- any other hazardous condition deemed appropriate by the Site Superintendent.

19.6.7 Unattended Vehicles

- When leaving heavy equipment unattended Lower the forks, bucket or blade to the ground or floor;
- If lowering the forks, bucket or blade to the ground or floor causes a hazard to a worker, block the forks, bucket or blade in the raised position;
- Do not leave suspended loads unattended.
- Park vehicles in the following condition:
    - Turned toward the wall if on an incline
    - Shift in park position
    - Lights and motor off
    - Manual transmission in gear
    - Master switch off
    - Chock wheels with blocks
    - Bucket or forks down, where applicable. Do not leave suspended loads unattended.
- Park vehicles clear of other traffic. Do not block access to:

- Electric distribution equipment
- Garages
- Ramps
- Firefighting or emergency equipment
- Disabled Vehicles

- Where a motor vehicle is disabled or parked in the traveled portion of a roadway, provide a warning to approaching traffic using one or more of the following:
  - Flashing lights
  - Traffic cones / triangles
  - Reflectors
  - Lamps
  - A worker suitably equipped so as to be readily seen, who directs traffic approaching the area

19.7 Transporting Workers

19.7.1 Passenger Vehicles

Vehicles other than buses that are being used for transporting workers must:

- Have suitable seats and seatbelts or other facilities (no seat, no ride);
- Be limited to the maximum number of passengers posted in or on the vehicle;
- When enclosed, be equipped with an emergency exit;
- Workers carrying personal hand tools and equipment in vehicles must store them in a safe and secure manner.

19.7.2 Operations Vehicles

- Passengers are not permitted on operations vehicles that are not equipped with properly designed and installed seats with seatbelts available;
- Passengers may be permitted without appropriate seats if it has been authorized for training or for inspecting the equipment, but only if adequate provision has been made for the safety of the passenger;
- The load on a vehicle shall be adequately secured.
- The maximum load of a vehicle transporting workers shall be posted on the vehicle in a conspicuous location.

19.8 Loading and Hauling

- Break large rocks before loading to prevent equipment instability during movement;
- Load material in a manner that minimizes spill during movement;
- Truck operators must remain inside the truck cab during loading to avoid the hazard of falling material;

- An operator who may be endangered during the loading of a vehicle shall vacate the vehicle;
- The truck operator must sound the horn before moving the vehicle.

19.9 General Safety Precautions

- Ensure vehicles with poor visibility or oversized loads are moved with the assistance of a signal person. Perform a walk-around prior to moving the vehicle;
- Take care around pinch points of large equipment;
- Barricade swing areas of cranes to prevent access;
- Do not walk under suspended loads or equipment components;
- Stay away from cables or ropes being used to pull other equipment.
- Do not walk between running equipment and stationary objects;
- Do not work on vehicles or equipment components while the components are suspended by hydraulic pressure. Only work on equipment or components that are safely blocked or secured to prevent movement;
- Do not pass a suspended load over a worker;
- Only maintenance workers, or operators under the direction of a mechanic, may move equipment into and out of the shop. Park equipment off to the side and check with the maintenance supervisor. When required to move supplies into a shop always use a guide;
- Sound the horn before moving and whenever visibility is poor;
- Headlights must be on whenever a vehicle is in motion;
- Have another worker stationed to direct and warn the operator if the vehicle is to be operated in reverse and the operator has limited visibility;
- Be aware of pipes and electrical cables;
- Maintain three points of contact with the vehicle during mounting and dismounting vehicles. “Three-point contact” means contact with two hands and one foot, or two feet and one hand, at all times during the movement, until you reach a solid base (ground, cab, platform, etc.);
- Do not carry any material or tools in the cab. Keep the floor area clean;
- Do not stand in the winged area of a vehicle when the motor is running;
- When traveling in a moving vehicle, it is best to either slow down to a safe speed or stop the vehicle in a safe location before using the radio. Radios can distract drivers – judgment is necessary to ensure the use of radio communication does not compromise safety.

20.0 LADDERS

20.1 Purpose

The purpose of this procedure is to establish the requirements for using ladders during work at the Contwoyto Lake Weather Station Remediation Project.

20.2 Ladder General Requirements

- If possible to do so, scaffolding, not a ladder, should be used where a job requires an elevated work platform;
- Do not paint or treat wooden ladders except with clear finishes;
- Inspect all ladders before use. Remove any damaged ladders from service. Report damaged equipment to the supervisor immediately;
- Use fibreglass ladders, which are not good conductors, for work in proximity to electrical equipment. Do not use aluminum ladders in proximity to electrical equipment. Wooden ladders are not recommended as they are usually reinforced with wire on the rails and can be conductive when wet;
- Tie off all ladders at the top. Another worker shall hold the ladder until tie-off is complete. The top of the ladder must extend at least 1 m (3 ft) beyond the supporting object when the ladder is used for access to an elevated work area;
- Wear full body harness when working off ladders more than 3m (10ft) in elevation. Tie the body harness to a substantial structure other than the ladder. Do not extend the body in a manner that allows the belt buckle to pass beyond the rails when working off of the ladder'
- Ladders are not a substitute for safe work platforms. The primary purpose of ladders is for access / egress;
- Place ladders on a solid base;
- Do not stand on the top two rungs of any ladder. On a stepladder the cap is not considered a rung;
- Always maintain 3-point contact and face the ladder when climbing up or down. Do not carry tools or material in your hands when climbing; use a rope for hoisting or lowering;
- Do not place ladders near doorways, roadways or equipment access routes, unless the door or access route is made temporarily inoperative and signs are posted. Do not place materials in proximity to the base or landing of any ladder;
- Keep all boots and footwear clean of mud, grease or other slippery materials, which could cause loss of footing;
- Place extension ladders at a ratio of 1:4, base to height;
- Keep a minimum overlap section of 1m (3ft) at all times on extension ladders. Secure fly sections to prevent unintentional movement of the fly section latches, if the ladder is moved. Never use an extension ladder in the inverted position;
- Do not place ladders against flexible or moveable surfaces;

- When erecting long, awkward or heavy ladders, get help to avoid potential injury. One worker should secure the base of the ladder while the other walks it into position;
- Equip each ladder with a tie-off rope and non-skid safety feet, or secure the ladder at the base. Make sure the ladder is adequately tied off. The top of the ladder must extend at least 1 m (3 ft) beyond the supporting object when the ladder is used for access to an elevated work area;
- After an extension section has been raised to the desired height, check to see that safety dogs or latches are engaged and that the extension rope is secured to a rung on the base section of the ladder;
- Extension ladders must be overlapped a minimum of three rungs. Do not take extension ladders apart to use either section separately;
- When using stepladders, ensure they are locked in the fully open;
- Your feet must stay below the top rung and the top platform; the second last step is the maximum height;
- Always descend a ladder step by step. Never jump off a ladder;
- Never place tools or material on the steps or platform;
- Obtain specific safety assignments before using a two-man stepladder;
- Stepladders must be tied off or held secure by another worker when the feet of a worker are more than 3 metres above the floor or ground.

21.0 ATV OPERATION

21.1 Purpose

The objective of this policy is to establish the requirements for ATV operation at the Contwoyto Lake Weather Station Remediation Project.

21.2 General

All employees who operate ATVs must adhere to the following procedures:

- ATVs are not for recreational use.
- Only qualified (trained) operators may operate an ATV;
- The Site Superintendent is responsible for ensuring that all operators receive training in the safe operation of ATVs. This training must be documented in the training records;
- Tools, equipment and cargo must be safely secured to the ATV;
- Follow safe driving procedures. Maintain a safe speed and keep the ATV under control;
- ATVs may never be used for racing, chasing, jumping, or to harass wildlife;
- ATVs may only carry the number of people according to the manufacturer's recommendation;
- Ensure the concentration of toxic exhaust fumes do not exceed prescribed safe levels for all people working on or in vehicles.

21.3 On-Site ATV Use

- Pre-use checks are mandatory at the start of every shift or trip to ensure the safety of the equipment. Report all defects in steering, brakes and lights to the supervisor and fix defects prior to operation. Document defects and repairs in a log book for ATV's;
- No ATV may be operated unless it is entirely free of fuel leaks;
- DOT approved helmets must be worn at all times when operating ATVs. If the helmet is not equipped with a face shield, then goggles or safety glasses must be worn;
- Operators must carry a hard hat to wear, as necessary, when they are off the machine. Earplugs should be worn when operating the ATV for an extended period of time (i.e., over 1 hour);
- The headlight must be on at all times when operating an ATV. The machine must be equipped with a buggy whip with fluorescent flag;

ATVs must be operated only in areas that minimize damage to

Project Management Staff and Emergency Numbers

Name	Position	CONTACT #	ORGANIZATION
PROJECT MANAGEMENT			
Janice Lee	Project Manager	Ph: 867-766-8364 Cell: 867-445-2424	Public Works and Government Services Canada
Erika Solski	Project Manager	Ph: 867-975-4577	AANDC
Robert Johnson	Project Manager	Cell: (867) 446-4694	Delta Engineering Ltd.

Name	Position	CONTACT #	ORGANIZATION
Shawn Carter	Project Manager	Ph. (867) 874-6574 Cell: (867) 875-8170 Fax (867) 874-6154	Carter Industries Ltd.
TBA	Site Superintendent	Site Ph: TBA	TBA
Robert Johnson	Health and Safety Officer	Cell: (867) 446-4694	Delta Engineering Ltd.
SPILL RESPONSE NUMBERS			
NU 24 Hour Spill Reporting Line	GNU and AANDC	Ph. (867) 920.8130 (call collect if required) Fax: (867) 873-6924	Triggers multiple governmental and private organizations for spill response
Jimmy Noble	Enforcement Officer Environment	Ph. (867) 975-4644	Environment Canada
Erik Allain	Field Operations Manager	Ph. (867) 975-4295	AANDC
CANUTEC	Federal Department of Transportation	Ph. (613) 996.6666 (call collect if required)	Triggers multiple governmental and private organizations for spill response for dangerous goods
Robert Eno	Pollution Control Environmental Protection Services	Ph. (867) 975-7748 Fax (867) 975-7739	GNU Department of Environment
Danielle Morin	North Slave Region Environmental Protection Officer	Ph: 867-920-3387	GNWT Environment and Natural Resources
MEDICAL EMERGENCY			
24 Hour - Stanton Territorial Emergency Evacuation	N/A	Ph. (867) 669 4115 (call collect if required), or Ph. (867) 669-4111 (Yellowknife Hospital) or Ph. (867) 873-2222 (Yellowknife Ambulance)	Triggers the resources required for an emergency evacuation for an injured or ill employee
DISASTER RELIEF			
Canadian Red Cross	-	Ph. (780) 423.2680 Fax. (780) 428.7092	Canadian Red Cross
FIRE EMERGENCY			
24 Hour Forest Fire Emergency Phone Number (NWT Fire)	N/A	Ph. 1-877-698-3473 Ph. (867) 873-2222	Yellowknife Fire and Rescue Services
WILDLIFE EMERGENCY			
Wildlife Emergencies	GNU	Ph. (867) 982-7450	GNU Environment and Natural Resources
RCMP			
Kuglutuk RCMP	Headquarters	Ph. (867) 982-1111	RCMP
OCCUPATIONAL HEALTH AND SAFETY			
Peter Bengts	Chief Inspector of Mines	(867) 669 4412	NWT Workers Compensation Board – Mine Safety
WORKERS' COMPENSATION BOARD			
WSCC Accident-Incident Reporting	WSCC	Ph. 1-800-661-0792 Fax: 1-866-277-3677	Workers Compensation Board
AIR CHARTERS			
Air Tindi	Air Charter – Plane	Ph. (867) 669.8200 Fax. (867) 669.8219	Private Company
Summit Air	Air Charter – Plane	Ph. (867) 669.9789 Fax (867) 669.9649	Private Company

Name	Position	CONTACT #	ORGANIZATION
Great Slave Helicopters	Air Charter - Helicopter	Ph. (867) 873.2081 Fax (867) 873.6087 After Hours Ph. (867) 873.2081	Private Company

- , trees and plants. Preservation of the tundra, trees and plants is extremely important. ATVs must only be operated on established or approved trails;
- ATV operators must ensure they do not run over electric cables;
- Park ATVs in a location to avoid heavy equipment in use;
- Establish a routine so ATVs can travel on site roads and avoid conflicts with heavy equipment;
- ATVs towing trailers must be equipped with and use safety chains;
- ATV trailers may only be used for transporting cargo – not people.

21.4 Off – Site ATV Use

Permission must be obtained from the Site Superintendent whenever travel is expected to be outside the work areas as presented in the Wildlife Plan. This will require the following:

- Written call-in procedure with the site
- Mobile radio and satellite phone
- Map or drawing outlining the route, GPS coordinates or waypoints are best, if possible;
- Two people and two ATVs must travel together, one must be the wildlife monitor who is equipped with a firearm;
- Tools, extra gas and oil, and spare parts including spark plugs and belts;
- Survival gear to be determined based on the duration/length of the trip and the Job Safety Analysis (JSA); this may include tent, sleeping bags, rope, water, food, stove, etc.;
- Standard First-aid kit, hypothermia kit if working on ice;
- Written Emergency Response Plan

21.5 Training

Training programs must include:

- Safe driving procedures for the conditions at the site;
- Refresher training when equipment and / or operating conditions change;
- Remedial training, as necessary, to address accident records or instances of inadequate operating performance;
- Correct procedures to follow in the event of an accident.

22.0 SPILL CONTINGENCY PLAN

22.1 Effective Date of Spill Contingency Plan

November 15/2013 to March 31, 2015

22.2 Distribution List

The plan and the most recent revisions have been distributed to the Project Management staff listed in the following table located in section 0

Project Management Staff and Emergency Numbers.

22.3 Purpose and Scope

The purpose of this plan is to outline response actions for potential spills of any size, including a worst case scenario for Delta and all subcontractors on site at the Contwoyto Lake Weather Station Remediation Project. The plan identifies key response personnel and their roles and responsibilities in the event of a spill, as well as the equipment and other resources available to respond to a spill. It details spill response procedures that will minimize potential health and safety hazards, environmental damage, and clean-up efforts. The plan has been prepared to ensure quick access to all the information required in responding to a spill.

22.4 Company Environmental Policy

Delta is committed to the concept of sustainable development and the protection of the environment and human health. Delta's environmental, health and safety policy is to:

- protect employees, the public and the environment
- fully comply with all applicable legislation, regulations, and authorizations
- work proactively with federal, territorial and Aboriginal governments, other relevant organizations, and the general public, on all aspects of environmental protection
- anticipate future spill control requirements and make provision for them
- keep employees, contractors, Inspectors, Land and Water Boards, appropriate governments (Aboriginal, federal and territorial), and the public informed of any changes at the site.

The plan is presented to all staff during their on-site orientation sessions. All employees and contractors are aware of the locations of the plan on-site at the Contwoyto Lake Weather Station Remediation Project and in the head office in Yellowknife. During the orientation meeting, training sessions are scheduled to ensure employees have an understanding of the steps to be undertaken in the event of a spill. All employees and contractors are shown where spill kits are stored, are aware of their contents and are trained in using spill equipment and responding to spills. The company is committed to keeping personnel up to date on the latest technologies and spill response methods.

22.5 Project Description

The aim of this project is to remediate the site and to leave as minimal presence in the area as possible. The footprint left behind must be acceptable to the effected aboriginal people for their future use and to ensure the safety of local wildlife and plants.

Intensive work on the project will commence in February 2014. Mobilization will occur during march/april 2014 while the site is accessible via ice strip or Winter Road. The main tasks for 2014 include the following: Project Initiation, Mobilization, Camp Construction, building demolition, hydrocarbon impacted soils treatment, barrel collection/removal, metal impacted soil collection/removal and general debris collection.

22.6 Site Description

The Contwoyto Lake Weather Station Remediation Project is located on a remote island on the Contwoyto Lake in NUNAVUT. The site historically have been accessed by winter road however since 2010 the winter road has not been constructed.

22.7 List of Hazardous Materials

The following table shows the fuel requirements for the duration of the project at Contwoyto Lake Weather Station Remediation Project. The following figure describes the amount of fuel that will contain hazardous materials at the site.

Table 18: Hazardous Materials (Fuels)

Year	Fuel Requirement (L)			Mobilization Approach
	Diesel	Gas	Propane	
2014	80,000	2500	5000	Airlift

Propane is used for the kitchen and is stored in propane cylinders inside the camp perimeter. Smaller amounts of other petroleum products and oils/lubricants are stored on-site in a Maintenance Shed.

Waste oil is stored in empty 200L drums and will be incinerated on site if it meets incineration criteria.

Sewage will be incinerated. Grey water from the main camp complex will be treated and disposed on site once test prove compliance.

22.8 Existing Preventative Measures

Planning for an emergency situation is imperative, due to the nature of the materials stored on-site as well as the remoteness of the site. Along with the preventative measures outlined below, adequate training of staff and contractors is paramount.

All diesel requirements for the 2014 season will be airlifted to site in 200L drums. They will be offloaded into bladders in the fuel storage area. Protective flame retardant clothing, steel toe boots, hard hats and safety glasses are worn while unloading fuel.

The storage area for diesel fuel and gasoline are bermed for containment. Spill kits are located wherever fuel is stored or used. Portable drip trays are used when refuelling vehicles to avoid any leaks/drips onto the land.

The site superintendent or designate will conduct visual inspections to check for leaks and damage to the fuel storage containers, as well as for stained or discoloured soils around the fuel storage areas and motorized equipment. For example lids and caps are checked for tight seals. Regular maintenance and oil checks of all motorized equipment are also undertaken to avoid preventable leaks.

22.9 Additional Copies

Several copies of the plan are kept on site at all times. A copy is also held at Delta's office in Yellowknife, Northwest Territories and on-site. Additional copies of the plan can be obtained by contacting the Project Manager directly at the phone number or e-mail presented in this plan.

22.10 Process for Staff Response to Media and Public Inquiries

All inquiries are to be directed to the project manager at the Yellowknife Office. If the project manager is not available, there will be another staff member available to act in this position. If a reporter or member of the public arrives at the site unexpectedly, the official in charge of responding to their questions will be the site superintendent or acting site superintendent. Prior to responding to their questions, they should make every effort possible to contact the Project Manager to discuss the situation.

The site superintendent should always keep the project manager informed of any news or updates of potential interest to the media or general public, such that the company is prepared to deal with inquiries any time.

If a spill has occurred, then a NU Spill Report needs to be filled out. This information is available for the public to view upon request by contacting the NU Spill Line or by viewing the GNU Hazardous Materials Spills Database online at http://www.e-engine.ca/eps_spillreport/

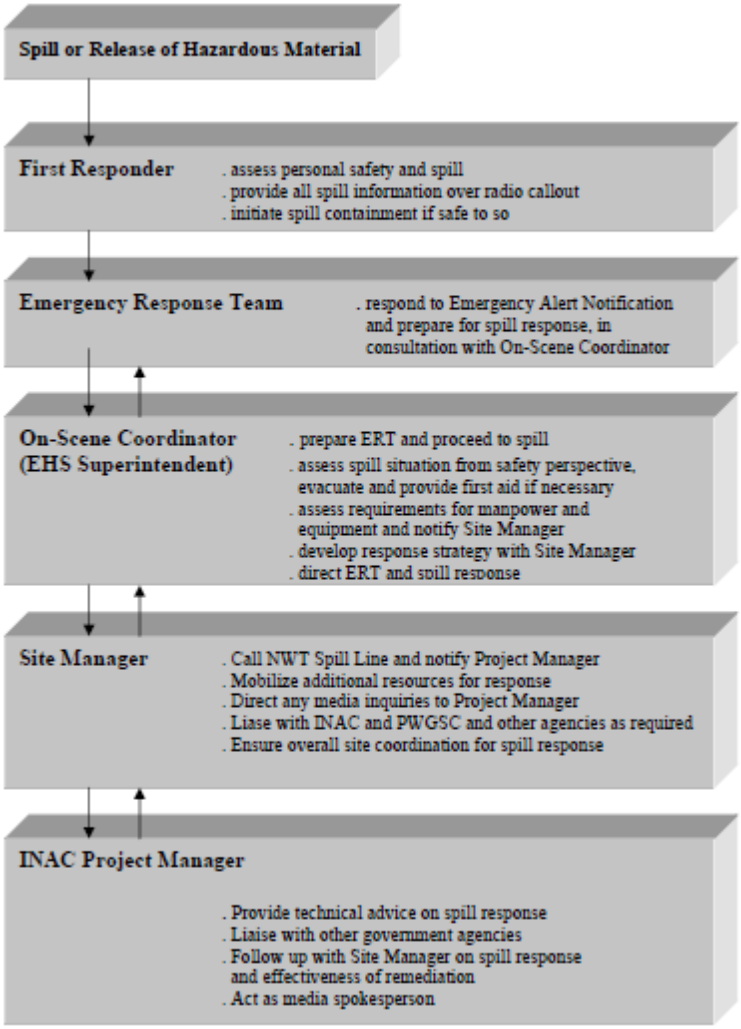
22.11 Response Organization

The flow chart depicted in the below figure identifies the response organization and when applicable their alternates, as well as the chain of command for responding to a spill or release. The duties of various response personnel are summarized, contact information is provided including 24-hour phone numbers for responsible people and the location of communications equipment on site is discussed.

An emergency satellite phone is located in the office. In the event of a spill involving danger to human life, this phone will be used to contact Robert Eno 1-867-975-7748 and emergency response personnel in Yellowknife, if applicable. In addition, all employees and contractors carry two-way radios for communication with the site superintendent and other staff on site.

Following reporting of the spill to the site superintendent, he/she will report spills to the NU 24-Hour Spill Line as necessary. The site superintendent will also inform the head office for tracking spills in company databases and notify the head office in the event of media inquiries. The 24-hour emergency head office number is 867-446-4694.

SPILL RESPONSE ORGANIZATION



For the organization chart above, the Site Manager is also the Site Superintendent.

22.12 Action Plan

Potential Environmental Impacts of Spill

Overall for all hazardous materials discussed below, impacts are lower during winter as snow is a natural sorbent and ice forms a barrier limiting or eliminating soil or water contamination, thus spills can be more readily recovered when identified and reported.

Gasoline

Environmental Impacts: Gasoline may be harmful to wildlife and aquatic life. It is not readily biodegradable and has the potential for bioaccumulation in the environment. Gasoline is quick to volatize. Runoff into water bodies must be avoided.

Worst Case Scenario: All fuel drums were punctured or open simultaneously and contents seeped into surrounding soil and water bodies. This could cause illness or death to aquatic life and indirectly affect wildlife feeding from the land and water.

Diesel Fuel

Environmental Impacts: Diesel may be harmful to wildlife and aquatic life. It is not readily biodegradable and has the potential for bioaccumulation in the environment. Diesel burns slowly and thus risk to the environment is reduced during recovery as burn can be more readily contained compared with volatile fuels. Runoff into water bodies must be avoided.

Worst Case Scenario: All fuel drums were punctured or open simultaneously and contents seeped into surrounding soil and water bodies. This could cause illness or death to aquatic life and indirectly affect wildlife feeding from the land and water.

Propane

Environmental Impacts: Propane may be harmful to wildlife and the surrounding environment. It has the potential to accumulate in the environment. Propane is extremely volatile and is the most flammable material stored on-site, thus immediate impacts to the surrounding environment are a concern.

Worst Case Scenario: All cylinders were punctured or failed simultaneously and contents leaked into the surrounding environment and ignited leading to an explosion. This could cause serious environmental impacts in the immediate surroundings. Safety during emergency response to a propane spill is of the utmost concern.

Waste Oil and Miscellaneous Oils/Grease

Environmental Impacts: Waste Oils may be harmful to wildlife and aquatic life. It is not readily biodegradable and has the potential for bioaccumulation in the environment. Runoff into water bodies must be avoided.

Worst Case Scenario: All storage drums were punctured or open simultaneously and contents seeped into surrounding soil and water bodies. This could cause illness or death to aquatic life and indirectly affect wildlife feeding from the land and water.

22.13 Procedures

22.13.1 Procedures for Initial Actions

- Ensure safety of all personnel.
- Assess spill hazards and risks.
- Remove all sources of ignition.
- Stop the spill if safely possible e.g. shut of pump, replace cap, tip drum upward, patch leaking hole. Use the contents of the nearest spill kit to aid in stopping the spill if it is safe to do so. Tyvek suits and chemical master gloves are located in the spill kit and should be worn immediately if there is any risk of being in contact with fuel.
- No matter what the volume is, notify site superintendent via two-way radio (all employees carry these, as well as on-site contractors if they are not accompanied by an employee).
- Contain the spill – use contents of spill kits to place sorbent materials on the spill, or use shovel to dig dike to contain spill. Methods will vary depending on the nature of the spill. See section 22.13.3 Procedures for Containing and Controlling the Spill for more details.

22.13.2 Spill Reporting Procedures

Report spill immediately to site superintendent, who will determine if spill is to be reported.

Each spill kit, as well as the office and site superintendent, will have copies of the NU Spill Report form to be filled out. Fill out and fax or e-mail the Spill Report to the staff of the NU 24-Hour spill line. Also fax or e-mail the report to the head office in Yellowknife.

NU 24-Hour Spill Line E-mail: spills@gov.nu.ca

Head Office in Yellowknife: Delta Engineering Ltd Phone: 867-446-4694

22.13.3 Procedures for Containing and Controlling the Spill

- Initiate spill containment by first determining what will be affected by the spill.
- Assess speed and direction of spill and cause of movement (water, wind and slope).
- Determine best location for containing spill, avoiding any water bodies.
- Have a contingency plan ready in case spill worsens beyond control or if the weather or topography impedes containment.

22.14 Specific Spill Containment Methods for Land, Water, Ice and Snow

1) CONTAINMENT OF SPILLS ON LAND

Spills on land include spills on rock, gravel, soil and/or vegetation. It is important to note that soil is a natural sorbent, thus spills on soil are generally less serious than spills on water as contaminated soil can be more easily recovered. Generally spills on land occur during the late spring, summer or fall when snow cover is at a minimum. It is important that all measures be undertaken to avoid spills reaching open water bodies.

Dykes

Dykes can be created using soil surrounding a spill on land. These dykes are constructed around the perimeter or down slope of the spilled fuel. A dyke needs to be built up to a size that will ensure containment of the maximum quantity of fuel that may reach it. A plastic tarp can be placed on and at the base of the dyke such that fuel can pool up and subsequently be removed with sorbent materials or by pump into barrels or bags. If the spill is migrating very slowly a dyke may not be necessary and sorbents can be used to soak up fuels before they migrate away from the source of the spill.

Trenches

Trenches can be dug out to contain spills as long as the top layer of soil is thawed. Shovels, pick axes or a loader can be used depending on the size of trench required. It is recommended that the trench be dug to the bedrock or permafrost, which will then provide containment layer for the spilled fuel. Fuel can then be recovered using a pump or sorbent materials.

2) CONTAINMENT OF SPILLS ON WATER

Spills on water such as rivers, streams or lakes are the most serious types of spills as they can negatively impact water quality and aquatic life. All measures need to be undertaken to taken to contain spills on open water.

Booms

Booms are commonly used to recover fuel floating on the surface of lakes or slow moving streams. They are released from the shore of a water body to create a circle around the spill. If the spill is away from the shoreline, a boat will need to be used to reach the spill, and then the boom can be set out. More than one boom may be used at once. Booms may be also be used in streams and should be set out at an angle to the current. Booms are designed to float and have sorbent materials built into them to absorb fuels at the edge of the boom. Fuel contained within the circle of the boom will need to be recovered using sorbent materials or pumps and placed into barrels or bags for disposal.

Weirs

Weirs can be used to contain spills in streams and to prevent further migration downstream. Plywood or other materials found on site can be placed into and across the width of the stream, such that water can still flow under the weir. Spilled fuel will float on the water surface and be contained at the foot of the weir. It can then be removed using sorbents, booms or pumps and placed into barrels or plastic bags.

Barriers

In some situations barriers made of netting or fence material can be installed across a stream, and sorbent materials placed at the base to absorb spilled fuel. Sorbents will need to be replaced as soon as they are saturated. Water will be allowed to flow through. This is very similar to the weir option discussed above.

Note that in some cases, it may be appropriate to burn fuel or to let volatile fuels such as gasoline evaporate after containment on the water surface. This should only be undertaken in consultation with, and after approval from the AANDC or lead agency Inspector.

3) CONTAINMENT OF SPILLS ON ICE

Spills on ice are generally the easiest spills to contain due to the predominantly impermeable nature of the ice. For small spills, sorbent materials are used to soak up spilled fuel. Remaining contaminated ice/slush can be scraped and shovelled into a plastic bag or barrel. However, all possible attempts should be made to prevent spills from entering ice covered waters as no easy method exists for containment and recovery of spills if they seep under ice.

Dykes

Dykes can be used to contain fuel spills on ice. By collecting surrounding snow, compacting it and mounding it to form a dyke down slope of the spill, a barrier is created thus helping to contain the spill. If the quantity of spill is fairly large, a plastic tarp can be placed over the dyke such that the spill pools at the base of the dyke. The collected fuel can then be pumped into barrels or collected with sorbent materials.

Trenches

For significant spills on ice, trenches can be cut into the ice surrounding and/or down slope of the spill such that fuel is allowed to pool in the trench. It can then be removed via pump into barrels, collected with sorbent materials, or mixed with snow and shovelled into barrels or bags.

Burning

Burning should only be considered if other approaches are not feasible, and is only to be undertaken with the permission of the INAC or lead agency Inspector.

4) CONTAINMENT OF SPILLS ON SNOW

Snow is a natural sorbent, thus as with spills on soil, spilled fuel can be more easily recovered. Generally, small spills on snow can be easily cleaned up by raking and shovelling the contaminated snow into plastic bags or empty barrels, and storing these at an approved location.

Dykes

Dykes can be used to contain fuel spill on snow. By compacting snow down slope from the spill, and mounding it to form a dyke, a barrier or berm is created thus helping to contain the spill. If the quantity of spill is fairly large, a plastic tarp can be placed over the dyke such that the spill pools at the base of the dyke. The collected fuel/snow mixture can then be shovelled into barrels or bags, or collected with sorbent materials.

5) WORST CASE SCENARIOS

Dealing with spilled fuel which exceeds the freeboard of a dyke or barrier would present a possible worst case scenario for the site. To contain the overflow, a trench or collection pit would have to be created downstream of the spill to contain the overflow.

Another worst case scenario would be an excessive spill on water may be difficult to contain with the booms present at the site. In this case, an emergency response mobile unit would have to be called in to deal with the spill using appropriate equipment.

22.14.1 Procedures for Transferring, Storing and Managing Spill Related Wastes

In most cases, spill clean-ups are initiated at the far end of the spill and contained moving toward the center of the spill. Sorbent socks and pads are generally used for small spill clean-up. A pump with attached fuel transfer hose can suction spills from leaking containers or large accumulations on land or ice, and direct these larger quantities into empty drums. Hand tools such as cans, shovels, and rakes are also very effective for small spills or hard to reach areas. Heavy Equipment can be used if deemed necessary, and given space and time constraints.

Used sorbent materials are to be placed in plastic bags for future disposal. All materials mentioned in this section are available in the spill kits located at the fuel storage areas, in trucks, the mechanic shop, and in camp. Following clean-up, any tools or equipment used will be properly washed and decontaminated, or replaced if this is not possible.

For most of the containment procedures and spilled petroleum products and materials used for containment will be placed into empty waste oil containers that will be WHMIS labelled and sealed for proper disposal at an approved facility.

22.14.2 Procedures for Restoring Affected Areas

Once a spill of reportable size has been contained, Delta will consult with the AANDC or Lead Agency Inspector assigned to the file to determine the level of clean-up required.

The Inspector may require a site-specific study to ensure appropriate clean up levels are met. Criteria that may be considered include natural biodegradation of oil, replacement of soil and re-vegetation.

22.15 On-site Resources

Spill Kits are located throughout the sites (fuel storage area and camp). The contents are described below. In addition, earth moving and other equipment located at site is also listed below.

22.15.1 Contents of Spill Kits

- 4 Tyvek splash suits
- 4 pairs of chemical master gloves
- 10 large bags with ties for temporary use

- 2 oil only booms (5” x 10’)
- 50 oil only mats (16” x 20”)
- 5 sorbent socks
- 10 sorbent pads
- 2 large tarps and rolls of polyethylene sheeting
- 1 roll duct tape
- 1 utility knife
- 1 field notebook and pencil
- 1 rake
- 1 pick axe
- 3 aluminum scoop shovels
- 1 instruction binder
- Aquaguard Skimmer
- Empty Drums
- Hatch Removal Sock

22.15.2 Earth Moving and Other Equipment Resources

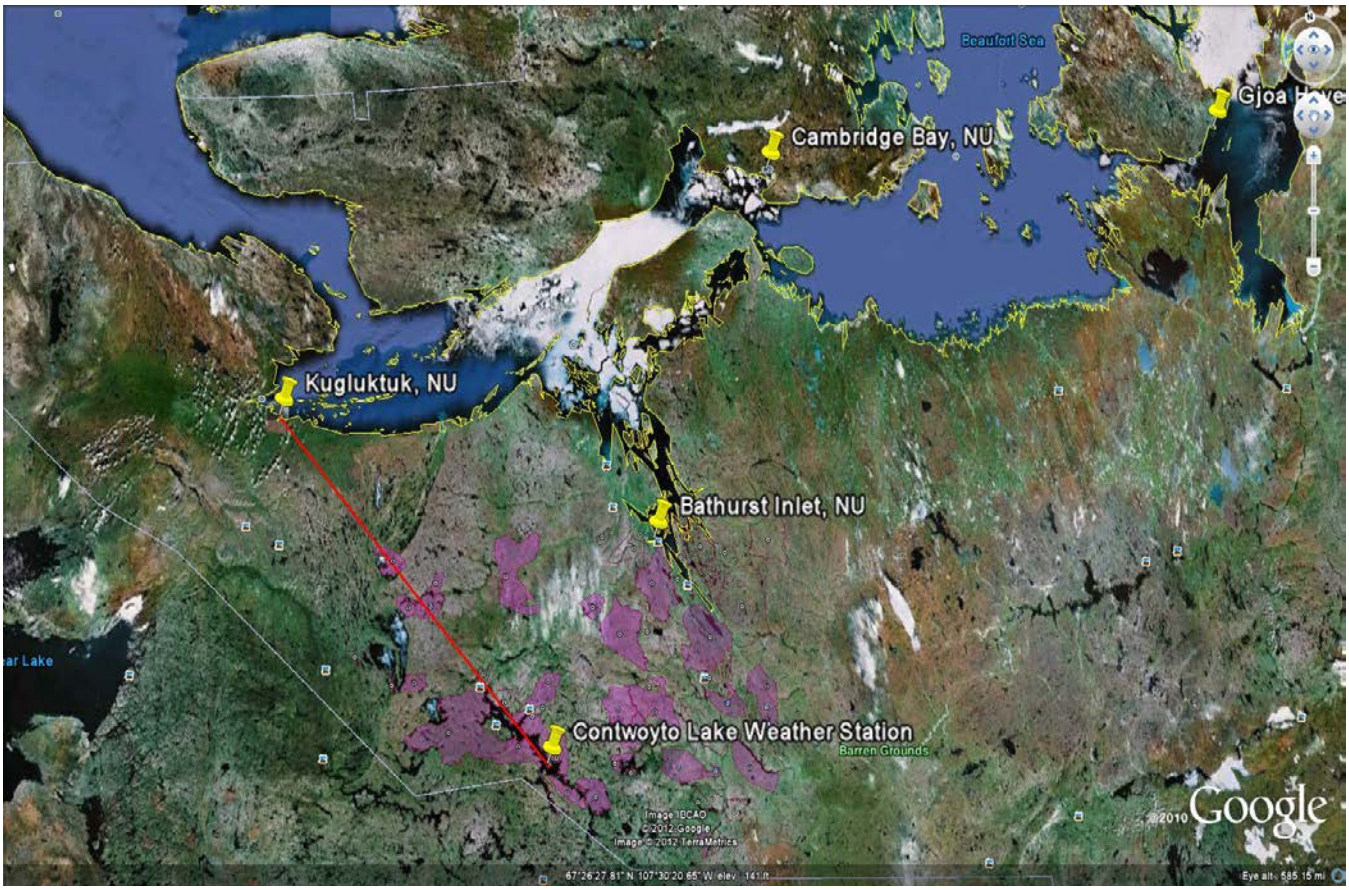
- Loaders
- 2 all-terrain vehicles
- 3 fuel transfer hoses with pumps tool kit including hack saw, hammer, screwdrivers, etc.

22.16 Outline of Training Program

The employee and contractor training program was developed by the Project Manager, and has been distributed by the site superintendent. The following are key steps in the program:

- all individuals entering the site are required to participate in an orientation session
- during this session, all locations of the spill plan and spill kits are provided on a map in hard copy
- an overview of the plan is provided by the site superintendent or designate leading the orientation session
- specific training sessions, including mock spill exercises, are scheduled for individuals directly involved in handling hazardous materials to ensure they know all steps to be undertaken in handling these materials, as well as the steps involved in the event of a spill, including the proper use of spill kits
- all employees and contractors are required to have their WHMIS training, before working on the site

APPENDIX A – Site Location Map



APPENDIX B – Material Safety Data Sheets

The Contwoyto Lake Weather Station Remediation Project will have a centralized MSDS information centre on the property located in the kitchen of the camp. This centre contains MSDS sheets for all products that remain on the property. Copies of MSDS sheets for diesel fuel, unleaded gasoline, lubricating oil and propane have been appended to this plan.

Material Safety Data Sheet

GASOLINE - ETHANOL

1. Product and company identification

Product name : GASOLINE - ETHANOL

Synonym : SuperClean, SuperClean 94 (Montreal), GASOHOL, Regular, Mid-Grade, Plus, WinterGas, RegularClean, PlusClean, marked or dyed gasoline, Super Premium (94 RO), E-10, Ethanol blended gasoline

Code : GASOHOL

Material uses : Gasoline-Ethanol is used in spark ignition engines including motor vehicles, farm vehicles, inboard and outboard boat engines, small engines and recreational vehicles.

Manufacturer : PETRO-CANADA
P.O. Box 2844
150 – 6th Avenue South-West
Calgary, Alberta
T2P 3E3

In case of emergency : Petro-Canada: 403-296-3000
Canutec Transportation: 613-996-6666
Poison Control Centre: Consult local telephone directory for emergency number(s).

2. Hazards identification

Physical state : Clear liquid.

Odour : Gasoline

WHMIS (Canada) :

Class B-2: Flammable liquid
Class D-2A: Material causing other toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Emergency overview : WARNING!

FLAMMABLE LIQUID AND VAPOUR. CAUSES RESPIRATORY TRACT, EYE AND SKIN IRRITATION. CANCER HAZARD - CAN CAUSE CANCER. CONTAINS MATERIAL WHICH MAY CAUSE HERITABLE GENETIC EFFECTS.

Flammable liquid. Irritating to eyes, respiratory system and skin. Keep away from heat, sparks and flame. Avoid exposure - obtain special instructions before use. Do not breathe vapour or mist. Avoid contact with eyes, skin and clothing. Can cause cancer. Risk of cancer depends on duration and level of exposure. Contains material which may cause heritable genetic effects. Use only with adequate ventilation. Keep container tightly closed and sealed until ready for use. Wash thoroughly after handling.

Routes of entry : Dermal contact. Eye contact. Inhalation. Ingestion.

Potential acute health effects

Inhalation : Inhalation of this product may cause respiratory tract irritation and Central Nervous System (CNS) Depression, symptoms of which may include; weakness, dizziness, slurred speech, drowsiness, unconsciousness and in cases of severe overexposure; coma and death.

Ingestion : Ingestion of this product may cause gastro-intestinal irritation. Aspiration of this product may result in severe irritation or burns to the respiratory tract. Ingestion of this product may cause Central Nervous System (CNS) Depression, symptoms of which may include; weakness, dizziness, slurred speech, drowsiness, unconsciousness and in cases of severe overexposure; coma and death.

Skin : Irritating to skin.

Eyes : Irritating to eyes.

Potential chronic health effects

2 . Hazards identification

Chronic effects : This product contains an ingredient or ingredients, which have been shown to cause chronic toxic effects. Repeated or prolonged exposure to the substance can produce blood disorders.

Carcinogenicity : Can cause cancer. Risk of cancer depends on duration and level of exposure.

Mutagenicity : Contains material which may cause heritable genetic effects.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Medical conditions aggravated by over-exposure : Repeated or prolonged contact with spray or mist may produce chronic eye irritation and severe skin irritation. Repeated skin exposure can produce local skin destruction or dermatitis.

See toxicological information (section 11)

3 . Composition/information on ingredients

Name	CAS number	%
Gasoline	86290-81-5	90 - 97
Toluene	108-88-3	10-20
Ethanol	64-17-5	5-10
Benzene	71-43-2	0.5-1.5

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

4 . First-aid measures

Eye contact : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash skin thoroughly with soap and water or use recognised skin cleanser. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.

Inhalation : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Ingestion : Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

Notes to physician : No specific treatment. Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

5 . Fire-fighting measures

Flammability of the product : Flammable.

Extinguishing media

Suitable : Use dry chemical, CO_2, alcohol-resistant foam or water spray (fog).

Not suitable : Do not use water jet.

5 . Fire-fighting measures

Special exposure hazards : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Products of combustion : Carbon oxides (CO, CO2), nitrogen oxides (NOx), lead, aldehydes, ketones, phenols, polynuclear aromatic hydrocarbons, smoke and irritating vapours as products of incomplete combustion.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Special remarks on fire hazards : Extremely flammable in presence of open flames, sparks, and heat. This product can accumulate static charge and ignite. Vapours are heavier than air and may travel considerable distance to sources of ignition and flash back.

Special remarks on explosion hazards : Do not pressurise, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Containers may explode in heat of fire. Runoff to sewer may create fire or explosion hazard.

6 . Accidental release measures

Personal precautions : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapour or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see section 8).

Environmental precautions : Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods for cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble or absorb with an inert dry material and place in an appropriate waste disposal container. Use spark-proof tools and explosion-proof equipment. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Approach the release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see section 13). Use spark-proof tools and explosion-proof equipment. Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilt product. Note: see section 1 for emergency contact information and section 13 for waste disposal.

7 . Handling and storage

Handling : Put on appropriate personal protective equipment (see section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Do not get in eyes or on skin or clothing. Do not ingest. Avoid breathing vapour or mist. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use non-sparking tools. Take precautionary measures against electrostatic discharges. To avoid fire or explosion, dissipate static electricity during transfer by earthing and bonding containers and equipment before transferring material. Empty containers retain product residue and can be hazardous. Do not reuse container. Ground all equipment containing material.

7 . Handling and storage

Storage : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination. Ensure the storage containers are grounded/bonded.

8 . Exposure controls/personal protection

Ingredient	Exposure limits
Gasoline	**ACGIH TLV (United States).** TWA: 300 ppm 8 hour(s). STEL: 500 ppm 15 minute(s).
Toluene	**ACGIH TLV (United States).** TWA: 20 ppm 8 hour(s).
Ethanol	**ACGIH TLV (United States).** STEL: 1000 ppm 15 minute(s).
Benzene	**ACGIH TLV (United States). Absorbed through skin.** TWA: 0.5 ppm 8 hour(s). STEL: 2.5 ppm 15 minute(s).

Consult local authorities for acceptable exposure limits.

Recommended monitoring procedures : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

Engineering measures : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapour or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal protection

Respiratory : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. Recommended: A NIOSH-approved air-purifying respirator with an organic vapour cartridge or canister may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits. Protection provided by air-purifying respirators is limited. Use a positive-pressure, air-supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstances where air-purifying respirators may not provide adequate protection.

Hands : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
Recommended: polyvinyl alcohol (PVA), Viton. Consult your PPE provider for breakthrough times and the specific glove that is best for you based on your use patterns. It should be realized that eventually any material regardless of their imperviousness, will get permeated by chemicals. Therefore, protective gloves should be regularly checked for wear and tear. At the first signs of hardening and cracks, they should be changed.

8 . Exposure controls/personal protection

Eyes : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Skin : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

9 . Physical and chemical properties

Physical state : Clear liquid.

Flash point : -43°C (-45.4°F) (NFPA)

Auto-ignition temperature : Not available.

Flammable limits : Lower: 1.4% (NFPA)
Upper: 7.6% (NFPA)

Colour : Clear, undyed liquid. May be dyed for taxation purposes.

Odour : Gasoline

Odour threshold : Not available.

pH : Not available.

Boiling/condensation point : 26 to 200°C (78.8 to 392°F)

Melting/freezing point : Not available.

Relative density : 0.7 to 0.78 kg/L @ 15°C (59°F)

Vapour pressure : 41 to 107 kPa (307 to 802 mm Hg) @ 15°C (59°F)

Vapour density : 3 to 4 [Air = 1] (NFPA)

Volatility : Not available.

Evaporation rate : Not available.

Viscosity : 0.6 cSt @ 40°C (104°F)

Pour point : Not available.

Solubility : Hydrocarbon components virtually insoluble in water. Ethyl alcohol is completely soluble in water.

10 . Stability and reactivity

Chemical stability : The product is stable.

Hazardous polymerisation : Under normal conditions of storage and use, hazardous polymerisation will not occur.

Materials to avoid : Reactive with oxidising agents, acids and interhalogens.

Hazardous decomposition products : May release COx, NOx, aldehydes, ketones, phenols, polynuclear aromatic hydrocarbons, smoke and irritating vapours when heated to decomposition.

11 . Toxicological information

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Gasoline	LD50 Dermal	Rabbit	>5000 mg/kg	-
	LD50 Oral	Rat	13600 mg/kg	-
Toluene	LD50 Dermal	Rabbit	12125 mg/kg	-
	LD50 Oral	Rat	636 mg/kg	-
	LC50 Inhalation Vapour	Rat	7585 ppm	4 hours
Ethanol	LD50 Dermal	Rabbit	>15800 mg/kg	-
	LD50 Oral	Mouse	3450 mg/kg	-

11 . Toxicological information

	LC50 Inhalation Vapour	Rat	8850 mg/m³	4 hours
Benzene	LD50 Dermal	Rabbit	>8240 mg/kg	-
	LD50 Oral	Rat	930 mg/kg	-
	LC50 Inhalation Vapour	Rat	13228 ppm	4 hours

Conclusion/Summary : Not available.

Chronic toxicity

Conclusion/Summary : Not available.

Irritation/Corrosion

Conclusion/Summary : Not available.

Sensitiser

Conclusion/Summary : Not available.

Carcinogenicity

Conclusion/Summary : Not available.

Classification

Product/ingredient name	ACGIH	IARC	EPA	NIOSH	NTP	OSHA
Gasoline	A3	2B	-	-	-	-
Toluene	A4	3	D	-	-	-
Ethanol	A3	-	-	-	-	-
Benzene	A1	1	A	+	Proven.	+

Mutagenicity

Conclusion/Summary : Not available.

Teratogenicity

Conclusion/Summary : There is a wealth of information about the teratogenic hazards of Toluene in the literature; however, based upon professional judgement regarding the body of evidence, WHMIS classification as a teratogen is not warranted.

Reproductive toxicity

Conclusion/Summary : Not available.

12 . Ecological information

Environmental effects : No known significant effects or critical hazards.

Aquatic ecotoxicity

Conclusion/Summary : Not available.

Biodegradability

Conclusion/Summary : Not available.

13 . Disposal considerations

Waste disposal : The generation of waste should be avoided or minimised wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14 . Transport information

Regulatory information	UN number	Proper shipping name	Classes	PG*	Label	Additional information
TDG Classification	UN1203	GASOLINE	3	II		-
DOT Classification	Not available.	Not available.	Not available.	-		-

PG* : Packing group

15 . Regulatory information

United States

HCS Classification : Flammable liquid
Irritating material
Carcinogen

Canada

WHMIS (Canada) : Class B-2: Flammable liquid
Class D-2A: Material causing other toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

International regulations

Canada inventory : All components are listed or exempted.

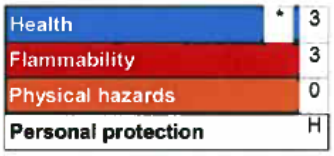
United States inventory (TSCA 8b) : All components are listed or exempted.

Europe inventory : All components are listed or exempted.

16 . Other information

Label requirements : FLAMMABLE LIQUID AND VAPOUR. CAUSES RESPIRATORY TRACT, EYE AND SKIN IRRITATION. CANCER HAZARD - CAN CAUSE CANCER. CONTAINS MATERIAL WHICH MAY CAUSE HERITABLE GENETIC EFFECTS.

Hazardous Material Information System (U.S.A.) :



National Fire Protection Association (U.S.A.) :

References : Available upon request.
™ Trademark of Suncor Energy Inc. Used under licence.

Date of printing : **4/22/2010.**

Date of issue : 22 April 2010

Date of previous issue : 4/22/2010.

Responsible name : **Product Safety - RS**

Indicates information that has changed from previously issued version.

16 . Other information

For Copy of (M)SDS : Internet: www.petro-canada.ca/msds

Canada-wide: telephone: 1-800-668-0220; fax: 1-800-837-1228

For Product Safety Information: (905) 804-4752

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Material Safety Data Sheet

DIESEL FUEL

1. Product and company identification

Product name : DIESEL FUEL

Synonym : Seasonal Diesel, #1 Diesel, #2 Heating Oil, #1 Heating Oil, D50, D60, P40, P50, Arctic Diesel, Farm Diesel, Marine Diesel, Low Sulphur Diesel, LSD, Ultra Low Sulphur Diesel, ULSD, Mining Diesel, Naval Distillate, Dyed Diesel, Marked Diesel, Coloured Diesel, Furnace special

Code : W104, W293; SAP: 120, 121, 122, 129, 135, 287

Material uses : Diesel fuels are distillate fuels suitable for use in high and medium speed internal combustion engines of the compression ignition type. Mining Diesel has a higher flash point requirement, for safe use in underground mines.

Manufacturer : PETRO-CANADA
P.O. Box 2844
150 – 6th Avenue South-West
Calgary, Alberta
T2P 3E3

In case of emergency : Petro-Canada: 403-296-3000
Canutec Transportation: 613-996-6666
Poison Control Centre: Consult local telephone directory for emergency number(s).

2. Hazards identification

Physical state : Bright oily liquid.

Odour : Mild petroleum oil like.

WHMIS (Canada) :

Class B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).
Class D-2B: Material causing other toxic effects (Toxic).

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Emergency overview : WARNING!

COMBUSTIBLE LIQUID AND VAPOUR. CAUSES EYE AND SKIN IRRITATION.

Combustible liquid. Severely irritating to the skin. Irritating to eyes. Keep away from heat, sparks and flame. Do not get in eyes. Avoid breathing vapour or mist. Avoid contact with skin and clothing. Use only with adequate ventilation. Wash thoroughly after handling.

Routes of entry : Dermal contact. Eye contact. Inhalation. Ingestion.

Potential acute health effects

Inhalation : Inhalation of this product may cause respiratory tract irritation and Central Nervous System (CNS) Depression, symptoms of which may include; weakness, dizziness, slurred speech, drowsiness, unconsciousness and in cases of severe overexposure; coma and death.

Ingestion : Ingestion of this product may cause gastro-intestinal irritation. Aspiration of this product may result in severe irritation or burns to the respiratory tract.

Skin : Severely irritating to the skin.

Eyes : Irritating to eyes.

Potential chronic health effects

Chronic effects : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

2 . Hazards identification

Fertility effects : No known significant effects or critical hazards.

Medical conditions aggravated by over-exposure : Repeated skin exposure can produce local skin destruction or dermatitis.

See toxicological information (section 11)

3 . Composition/information on ingredients

Name	CAS number	%
Kerosine (petroleum), hydrodesulfurized/Fuels, diesel/Fuel Oil No. 2	64742-81-0/68334-30-5/68476-30-2	100

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

4 . First-aid measures

Eye contact : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash skin thoroughly with soap and water or use recognised skin cleanser. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.

Inhalation : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Ingestion : Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

Notes to physician : No specific treatment. Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

5 . Fire-fighting measures

Flammability of the product : Combustible liquid

Extinguishing media

Suitable : Use dry chemical, CO_2, water spray (fog) or foam.

Not suitable : Do not use water jet.

Special exposure hazards : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Products of combustion : Carbon oxides (CO, CO2), nitrogen oxides (NOx), sulphur oxides (SOx), sulphur compounds (H2S), smoke and irritating vapours as products of incomplete combustion.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Special remarks on fire hazards : Flammable in presence of open flames, sparks, and heat. Vapours are heavier than air and may travel considerable distance to sources of ignition and flash back. This product can accumulate static charge and ignite.

Special remarks on explosion hazards : Do not pressurise, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Runoff to sewer may create fire or explosion hazard.

6 . Accidental release measures

Personal precautions : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapour or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see section 8).

Environmental precautions : Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods for cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble or absorb with an inert dry material and place in an appropriate waste disposal container. Use spark-proof tools and explosion-proof equipment. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Approach the release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see section 13). Use spark-proof tools and explosion-proof equipment. Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilt product. Note: see section 1 for emergency contact information and section 13 for waste disposal.

7 . Handling and storage

Handling : Put on appropriate personal protective equipment (see section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapour or mist. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use non-sparking tools. Take precautionary measures against electrostatic discharges. To avoid fire or explosion, dissipate static electricity during transfer by earthing and bonding containers and equipment before transferring material. Empty containers retain product residue and can be hazardous. Do not reuse container.

Storage : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination. Ensure the storage containers are grounded/bonded.

8 . Exposure controls/personal protection

Ingredient	Exposure limits
Kerosine (petroleum), hydrodesulfurized	**ACGIH TLV (United States). Absorbed through skin.** TWA: 200 mg/m³ 8 hour(s).
Fuels, diesel	**ACGIH TLV (United States). Absorbed through skin.** TWA: 100 mg/m³, (Inhalable fraction and vapour) 8 hour(s).
Fuel oil No. 2	**ACGIH TLV (United States). Absorbed through skin.** TWA: 100 mg/m³, (Inhalable fraction and vapour) 8 hour(s).

Consult local authorities for acceptable exposure limits.

8 . Exposure controls/personal protection

Recommended monitoring procedures : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

Engineering measures : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapour or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal protection

Respiratory : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. Recommended: organic vapour cartridge or canister may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits. Protection provided by air-purifying respirators is limited. Use a positive-pressure, air-supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstances where air-purifying respirators may not provide adequate protection.

Hands : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
Recommended: nitrile, neoprene, polyvinyl alcohol (PVA), Viton. Consult your PPE provider for breakthrough times and the specific glove that is best for you based on your use patterns. It should be realized that eventually any material regardless of their imperviousness, will get permeated by chemicals. Therefore, protective gloves should be regularly checked for wear and tear. At the first signs of hardening and cracks, they should be changed.

Eyes : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Skin : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

9 . Physical and chemical properties

Physical state : Bright oily liquid.

Flash point : Diesel fuel: Closed cup: ≥40°C (≥104°F)
Marine Diesel Fuel: Closed Cup: ≥60°C (≥140°F)
Mining Diesel: Closed Cup: ≥52°C (≥126°F)

Auto-ignition temperature : 225°C (437°F)

Flammable limits : Lower: 0.7%
Upper: 6%

Colour : Clear to yellow (This product may be dyed red for taxation purposes).

Odour : Mild petroleum oil like.

Odour threshold : Not available.

pH : Not available.

Boiling/condensation point : 150 to 371°C (302 to 699.8°F)

9 . Physical and chemical properties

Melting/freezing point	:	Not available.
Relative density	:	0.80 to 0.88 kg/L @ 15°C (59°F)
Vapour pressure	:	1 kPa (7.5 mm Hg) @ 20°C (68°F).
Vapour density	:	4.5 [Air = 1]
Volatility	:	Semivolatile to volatile.
Evaporation rate	:	Not available.
Viscosity	:	Diesel fuel: 1.3 - 4.1 cSt @ 40°C (104°F) Marine Diesel Fuel: 1.3 - 4.4 cSt @ 40°C (104°F)
Pour point	:	Not available.
Solubility	:	Insoluble in cold water, soluble in non-polar hydrocarbon solvents.

10 . Stability and reactivity

Chemical stability	:	The product is stable.
Hazardous polymerisation	:	Under normal conditions of storage and use, hazardous polymerisation will not occur.
Materials to avoid	:	Reactive with oxidising agents and acids.
Hazardous decomposition products	:	May release COx, NOx, SOx, H2S, smoke and irritating vapours when heated to decomposition.

11 . Toxicological information

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Kerosine (petroleum), hydrodesulfurized	LD50 Dermal	Rabbit	>2000 mg/kg	-
	LD50 Oral	Rat	>5000 mg/kg	-
	LC50 Inhalation Vapour	Rat	>5000 mg/m³	4 hours
Fuels, diesel	LD50 Dermal	Mouse	24500 mg/kg	-
	LD50 Oral	Rat	7500 mg/kg	-
Fuel oil No. 2	LD50 Oral	Rat	12000 mg/kg	-

Conclusion/Summary : Not available.

Chronic toxicity

Conclusion/Summary : Not available.

Irritation/Corrosion

Conclusion/Summary : Not available.

Sensitiser

Conclusion/Summary : Not available.

Carcinogenicity

Conclusion/Summary : Not available.

Classification

Product/ingredient name	ACGIH	IARC	EPA	NIOSH	NTP	OSHA
Kerosine (petroleum), hydrodesulfurized	A3	-	-	-	-	-
Fuels, diesel	A3	3	-	-	-	-
Fuel oil No. 2	A3	3	-	-	-	-

Mutagenicity

Conclusion/Summary : Not available.

Teratogenicity

Conclusion/Summary : Not available.

Reproductive toxicity

Conclusion/Summary : Not available.

12 . Ecological information

Environmental effects : No known significant effects or critical hazards.

Aquatic ecotoxicity

Conclusion/Summary : Not available.

Biodegradability

Conclusion/Summary : Not available.

13 . Disposal considerations

Waste disposal : The generation of waste should be avoided or minimised wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14 . Transport information

Regulatory information	UN number	Proper shipping name	Classes	PG*	Label	Additional information
TDG Classification	UN1202	DIESEL FUEL	3	III		-
DOT Classification	Not available.	Not available.	Not available.	-		-

PG* : Packing group

15 . Regulatory information

United States

HCS Classification : Combustible liquid
Irritating material

Canada

WHMIS (Canada) : Class B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).
Class D-2B: Material causing other toxic effects (Toxic).

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

International regulations

Canada inventory : All components are listed or exempted.

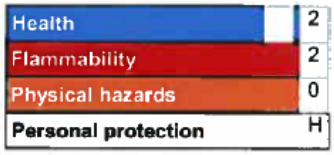
United States inventory (TSCA 8b) : All components are listed or exempted.

Europe inventory : All components are listed or exempted.

16 . Other information

Label requirements : COMBUSTIBLE LIQUID AND VAPOUR. CAUSES EYE AND SKIN IRRITATION.

Hazardous Material Information System (U.S.A.) :



National Fire Protection Association (U.S.A.) :

References : Available upon request.
TMMC Marque de commerce de Petro-Canada - Trademark

Date of printing : **12/17/2009.**

Date of issue : 3 July 2009

Date of previous issue : No previous validation.

Responsible name : **Product Safety - DSR**

Indicates information that has changed from previously issued version.

For Copy of (M)SDS : Internet: www.petro-canada.ca/msds

Canada-wide: telephone: 1-800-668-0220; fax: 1-800-837-1228

For Product Safety Information: (905) 804-4752

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Superior Propane
A division of Superior Plus LP

MATERIAL SAFETY DATA SHEET

GUARDIAN

SECTION 1 – PRODUCT INFORMATION

Product Name:	Propane	Supplier:	Superior Propane A Division of Superior Plus LP 1111 - 49th Avenue N.E. Calgary, AB T2E 8V2 Business: (403) 730-7500
Trade Name:	LPG (Liquefied Petroleum Gas), LP-Gas		
Chemical Formula:	C_3H_8		
WHMIS Classification:	Class A – Compressed Gas Class B, Division 1 – Flammable Gas	24-Hour Emergency Contact:	Canutec (613) 996-6666

Application and Use: Propane is commonly used as a fuel for heating, cooking, automobiles, forklift trucks, crop drying and welding and cutting operations. Propane is used in industry as a refrigerant, solvent and as a chemical feedstock.

SECTION 2 – HAZARDOUS INGREDIENTS

COMPONENTS	CAS No	% VOLUME (v/v)	LD_{50} (RAT, ORAL)
Propane	74-98-6	90% -99%	Not Applicable
Propylene	115-07-1	0% - 5%	Not Applicable
Ethane	74-84-0	0% - 5%	Not Applicable
Butane and heavier hydro carbons	106-97-8	0% - 2.5%	Not Applicable

Occupational Exposure Limit:
Based upon animal test data, the acute toxicity of this product is expected to be inhalation: 4 hour LC50 = 280,000 ppm (Rat)

Note: Composition is typical for HD-5 Propane per The Canadian General Standard Board CGSB 3.14 National Standard of Canada. Exact composition will vary from shipment to shipment.

SECTION 3 – CHEMICAL AND PHYSICAL DATA

Form:	Liquid and vapour while stored under pressure	pH:	Not available
Boiling Point:	-42°C @ 1 atm	Solubility in Water :	Slight, 6.1% by volume @ 17.8°C
Freezing Point:	-188°C	Specific Gravity:	0.51 (water = 1)
Evaporation Rate:	Rapid (Gas at normal ambient conditions)	Appearance/Odour:	Colourless liquid and vapour while stored under pressure. Colourless and odourless gas in natural state at any concentration. Commercial propane has an odourant added, ethyl mercaptan, which has an odour similar to boiling cabbage.
Vapour Pressure:	1435 kPa (maximum) @ 37.8°C		
Vapour Density:	1.52 (Air = 1)		
Coefficient of Water/ Oil Distribution:	Not available	Odour Threshold:	4800 ppm

With proper handling, transportation and storage, adding a chemical odourant such as ethyl mercaptan has proven to be a very effective warning device, but all odourants have certain limitations. The effectiveness of the odourant may be diminished by a person's sense of smell, by competing odours and by oxidation which may cause a potentially dangerous situation.

SECTION 4 – FIRE OR EXPLOSION HAZARD

Flash Point: -103.4°C

Method: Closed cup

Flammable Limits: Lower 2.4%, Upper 9.5%

Auto Ignition T emperature: 432°C

Hazardous Combustion Products: Carbon monoxide can be produced when primary air and secondary air are deficient while combustion is taking place.

Fire and Explosive Hazards : Explosive air -vapour allowed to leak to atmosphere.

Sensitivity to Impact: No

Sensitivity to Static Discharge: Yes

Fire Extinguishing Precautions: Use water spray to cool exposed cylinders or tanks. Do not extinguish fire unless the source of the escaping gas that is fueling the fire can be turned off. Fire can be extinguished with carbon dioxide and/or dry chemical (BC). Container metal shells require cooling with water to prevent flame impingement and the weakening of metal. If sufficient water is not available to protect the container shell from weakening, the area will be required to be evacuated. If gas has not ignited, liquid or vapour may be dispersed by water spray or flooding.

Special Fire Fighting Equipment: Protective clothing, hose monitors, fog nozzles, self-contained breathing apparatus.

SECTION 5 – REACTIVITY DATA

Stability: Stable

Conditions T o A void: Keep separate from oxidizing agents. Gas explodes spontaneously when mixed with chloride dioxide.

Incompatibility: Remove sources of ignition and observe distance requirements for storage tanks from combustible material, drains and openings to building.

Hazardous Decomposition Products: Deficient primary and secondary air can produce carbon monoxide.

Hazardous Polymerization: Will not occur.

Superior Propane
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GUARDIAN

SECTION 6 – TOXICOLOGICAL PROPERTIES OF MATERIAL

Routes of Entry: Skin Contact, Eye Contact, Inhalation

Inhalation: Simple asphyxiant. No effect at concentrations of 10,000 ppm (peak exposures). Higher concentrations may cause central nervous system disorder and/or damage. Lack of oxygen may cause dizziness, loss of coordination, weakness, fatigue, euphoria, mental confusion, blurred vision, convulsions, breathing failure, coma and death. Breathing high vapour concentrations (saturated vapours) for a few minutes may be fatal. Saturated vapours may be encountered in confined spaces and/or under conditions of poor ventilation. Avoid breathing vapours or mist.

Skin and Eye Contact: Exposure to vapourizing liquid may cause frostbite (cold burns) and permanent eye damage.

Ingestion: Not considered to be a hazard.

Acute Exposure: Contact with Liquefied Petroleum Gas may cause frostbite or cold burns. Propane acts as a simple asphyxiant as oxygen content in air is displaced by the propane. At increasing concentration levels, propane may cause dizziness, headaches, loss of coordination, fatigue, unconsciousness and death.

Chronic Exposure: No reported effects from long term low level exposure.

Sensitization to Product: Not known to be a sensitizer.

Occupational Exposure Limits: American Conference of Governmental Industrial Hygienists (ACGIH) lists as a simple asphyxiant.

ACGIH TLV: 1000 ppm

Carcinogenicity, Reproductive Toxicity, Teratogenicity, Mutagenicity: No effects reported.

Other Toxicological Effects: None

SECTION 7 – PREVENTATIVE MEASURES

Eyes:	Safety glasses or chemical goggles are recommended when transferring product.
Skin:	Insulated gloves required if contact with liquid or liquid cooled equipment is expected. Wear gloves and long sleeves when transferring product.
Inhalation:	Where concentration in air would reduce the oxygen level below 18% air or exceed occupational exposure limits in section 6, self-contained breathing apparatus is required.
Ventilation:	Use in well-ventilated areas. Use with explosion proof mechanical ventilation in confined spaces or poorly ventilated areas.

SECTION 8 – EMERGENCY AND FIRST AID PROCEDURES

Eyes:	Should eye contact with liquid occur, flush eyes with lukewarm water for 15 minutes. Obtain immediate medical care.
Skin:	In case of "Cold Burn" from contact with liquid, immediately place affected area in lukewarm water and keep at this temperature until circulation returns. If fingers or hands are frostbitten, have the victim hold his hand next to his body such as under the armpit. Obtain immediate medical care.
Ingestion:	None considered necessary.
Inhalation:	Remove person to fresh air. If breathing is difficult or has stopped, administer artificial respiration. Obtain immediate medical care.
Spill or Leak:	Eliminate leak if possible. Eliminate source of ignition. Ensure cylinder is upright. Disperse vapours with hose streams using fog nozzles. Monitor low areas as propane is heavier than air and can settle into low areas. Remain upwind of leak. Keep people away. Prevent vapour and/or liquid from entering into sewers, basements or confined areas.

SECTION 9 – TRANSPORTATION, HANDLING AND STORAGE

- Transport and store cylinders and tanks secured in an upright position in a ventilated space away from ignition sources (so the pressure relief valve is in contact with the vapour space of the cylinder or tank).
- Cylinders that are not in use must have the valves in the closed position and be equipped with a protective cap or guard.
- Do not store with oxidizing agents, oxygen, or chlorine cylinders.
- Empty cylinders and tanks may contain product residue. Do not pressurize, cut, heat or weld empty containers.
- Transport, handle and store according to applicable federal and provincial codes and regulations.

Transportation of Dangerous Goods (TDG)
TDG Classification: Flammable Gas 2.1

TDG Shipping Name: Liquefied Petroleum Gas (Propane)

PIN Number: UN1075

SECTION 10 – PREPARATION INFORMATION

Prepared by: Superior Propane
Health Safety and Environment Team

Telephone: (403) 730-7500
Revision: March 1, 2008
Supersedes: March 24, 2005

APPENDIX C – NU Spill Report Form

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR	REPORT TIME	☐ ORIGINAL SPILL REPORT, OR ☐ UPDATE # _____ TO THE ORIGINAL SPILL REPORT	REPORT NUMBER _____-_____
B	OCCURRENCE DATE: MONTH – DAY – YEAR	OCCURRENCE TIME		
C	LAND USE PERMIT NUMBER (IF APPLICABLE)	WATER LICENCE NUMBER (IF APPLICABLE)		
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION	REGION ☐ NWT ☐ NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN		
E	LATITUDE DEGREES MINUTES SECONDS	LONGITUDE DEGREES MINUTES SECONDS		
F	RESPONSIBLE PARTY OR VESSEL NAME	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION		
G	ANY CONTRACTOR INVOLVED	CONTRACTOR ADDRESS OR OFFICE LOCATION		
H	PRODUCT SPILLED	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES	U.N. NUMBER	
	SECOND PRODUCT SPILLED (IF APPLICABLE)	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES	U.N. NUMBER	
I	SPILL SOURCE	SPILL CAUSE	AREA OF CONTAMINATION IN SQUARE METRES	
J	FACTORS AFFECTING SPILL OR RECOVERY	DESCRIBE ANY ASSISTANCE REQUIRED	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT	
K	ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS			

L	REPORTED TO SPILL LINE BY	POSITION	EMPLOYER	LOCATION CALLING FROM	TELEPHONE
M	ANY ALTERNATE CONTACT	POSITION	EMPLOYER	ALTERNATE CONTACT LOCATION	ALTERNATE TELEPHONE

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION STATION OPERATOR	EMPLOYER	LOCATION CALLED YELLOWKNIFE, NT	REPORT LINE NUMBER (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

PAGE 1 OF _____

APPENDIX D – Instructions for Completing the Spill Report Form

Instructions for Completing the NT-NU Spill Report Form

This form can be filled out electronically and faxed to the spill line at 867-873-6924. Commencing on January 2, 2007, the form can also be e-mailed as an attachment to spills@gov.nt.ca. Until further notice, please verify receipt of e-mail transmissions with a follow-up telephone call. Spills can still be phoned in by calling collect at 867-920-8130.

A. Report Date/Time	The actual date and time that the spill was reported to the spill line. If the spill is phoned in, the Spill Line will fill this out. **Please do not fill in the Report Number:** the spill line will assign a number after the spill is reported.
B. Occurrence Date/Time	Indicate, to the best of your knowledge, the exact date and time that the spill occurred. Not to be confused with the report date and time (see above).
C. Land Use Permit Number /Water Licence Number	This only needs to be filled in if the activity has been licenced by the Nunavut Water Board and/or if a Land Use Permit has been issued. Applies primarily to mines and mineral exploration sites.
D. Geographic Place Name	In most cases, this will be the name of the city or town in which the spill occurred. For remote locations – outside of human habitations – identify the most prominent geographic feature, such as a lake or mountain and/or the distance and direction from the nearest population center. **You must include the geographic coordinates** (Refer to Section E).
E. Geographic Coordinates	This only needs to be filled out if the spill occurred outside of an established community such as a mine site. Please note that the location should be stated in degrees, minutes and seconds of Latitude and Longitude.
F. Responsible Party Or Vessel Name	This is the person who was in management/control/ownership of the substance at the time that it was spilled. In the case of a spill from a ship/vessel, include the name of the ship/vessel. Please include full address, telephone number and e-mail. Use box K if there is insufficient space. **Please note that, the owner of the spilled substance is ultimately responsible for any spills of that substance, regardless of who may have actually caused the spill.**
G. Contractor involved?	Were there any other parties/contractors involved? An example would be a construction company who is undertaking work on behalf of the owner of the spilled substance and who may have contributed to, or directly caused the spill and/or is responding to the spill.
H. Product Spilled	Identify the product spilled; most commonly, it is gasoline, diesel fuel or sewage. For other substances, avoid trade names. Wherever possible, use the chemical name of the substance and further, identify the product using the four digit UN number (eg: UN1203 for gasoline; UN1202 for diesel fuel; UN1863 for Jet A & B)
I. Spill Source	Identify the source of the spill: truck, ship, home heating fuel tank and, if known, the cause (eg: fuel tank overfill, leaking tank; ship ran aground; traffic accident, vandalism, storm, etc.). Provide an estimate of the extent of the contaminated/impacted area (eg: 10 m^2)
J. Factors Affecting Spill	Any factors which might make it difficult to clean up the spill: rough terrain, bad weather, remote location, lack of equipment. Do you require advice and/or assistance with the cleanup operation? Identify any hazards to persons, property or equipment: for example, a gasoline spill beside a daycare centre would pose a safety hazard to children. Use box K if there is insufficient space.
K. Additional Information	Provide any additional, pertinent details about the spill, such as any peculiar/unique hazards associated with the spilled material. State what action is being taken towards cleaning up the spill; disposal of spilled material; notification of affected parties. If necessary, append additional sheets to the spill report. Number the pages in the same format found in the lower right hand corner of the spill form: eg. "Page 1 of 2", "Page 2 of 2" etc. **Please number the pages to ensure that recipients can be certain that they received all pertinent documents.** If only the spill report form was filled out, number the form as "Page 1 of 1".
L. Reported to Spill Line by	Include your full name, employer, contact number and the location from which you are reporting the spill. Use box K if there is insufficient space.
M. Alternate Contact	Identify any alternate contacts. This information assists regulatory agencies to obtain additional information if they cannot reach the individual who reported the spill.
N. Report Line Use Only	**Leave Blank.** This box is for the **Spill Line's use only.**

APPENDIX E – Immediately Reportable Spill Quantities

Immediately Reportable Spill Quantities

TDG Class	Substance for NWT 24 Hour Spill Line	Immediately Reportable Quantities
1 2.3 2.4 6.2 7 None	Explosives Compressed gas (toxic) Compressed gas (corrosive) Infectious substances Radioactive Unknown substance	Any amount
2.1 2.2	Compressed gas (flammable) Compressed gas (non-corrosive, non-flammable)	Any amount of gas from containers with a capacity greater than 100 L
3.1 3.2 3.3	Flammable liquids	> 100 L
4.1 4.2 4.3	Flammable solids Spontaneously combustible solids Water reactant	> 25 kg
5.1 9.1	Oxidizing substances Miscellaneous products or substances excluding PCB mixtures	> 50 L or 50 kg
5.2 9.2	Organic peroxides Environmentally hazardous	> 1 L or 1 kg
6.1 8 9.3	Poisonous substances Corrosive substances Dangerous wastes	> 5 L or 5 kg
9.1	PCB mixtures of 5 or more ppm	> 0.5 L or 0.5 kg
None	Other contaminants (e.g. crude oil, drilling fluid, produced water, waste or spent chemicals, used or waste oil, vehicle fluids, waste water, etc.)	> 100 L or 100 kg
None	Sour natural gas (i.e. contains H2S) Sweet natural gas	Uncontrolled release or sustained flow of 10 minutes or more

In addition, all releases of harmful substances, regardless of quantity, are to be reported to the NWT spill line if the release is near or into a water body, is near or into a designated sensitive environment or sensitive wildlife habitat, poses imminent threat to human health or safety, poses imminent threat to a listed species at risk or its critical habitat, or is uncontrollable.

APPENDIX F – Health and Safety Forms

F-1: Employers Report of Accident

WORKERS' COMPENSATION BOARD
Northwest Territories and Nunavut

EMPLOYER'S REPORT OF ACCIDENT

If a worker is injured at work, you need to complete this form so that the claim can proceed.

Employer Information

Email Address		
Business Name	Contact Person	
Mailing Address	Community	Postal Code
Telephone (include area code)	Fax (include area code)	Worker's Supervisor Name

Worker Information

Last Name	First Name	
Street Address		
Mailing Address	Community	Postal Code
Date of Birth YY | MM | DD	❑ Male ❑ Female	
Telephone (include area code)	Social Insurance Number	
Worker's Occupation	Is a job description available? ❑ Yes ❑ No If yes, please attach	
What province or territory was the worker hired in?		
Is the worker a subcontractor? ❑ Yes ❑ No	Is the worker an owner or operator? ❑ Yes ❑ No	

Accident Details

1. Place of Accident – Name of City/Town, Province/Territory		
2. Was the worker on the employer's premises when the accident occured? ❑ Yes ❑ No		
3. Accident Date YY | MM | DD	Time AM / PM	4. Date first reported to employer YY | MM | DD — Time AM / PM
5. Date first disabled from work? YY | MM | DD	Time AM / PM	6. Time worker commenced work on the day of the accident? Time AM / PM
7. Does the worker have a job to return to? If no, explain. ❑ Yes ❑ No		
8. Was first aid rendered? ❑ Yes ❑ No If yes, when? By whom?		
9. Name and address of attending health care professional		

Complete All Questions Below – (Give full explanation – attach extra sheets if necessary)

10. Were the worker's actions at the time of injury for the purpose of your business? ❑ Yes ❑ No	
11. Is the activity part of the worker's regular work? ❑ Yes ❑ No If no, explain	12. Are you satisfied the incident occured as reported? ❑ Yes ❑ No If no, explain
13. Please describe the accident in as much detail as possible. Include where it took place, what the worker was doing at the time of injury, what equipment was being used, and whether gas, chemicals, or extreme temperatures were involved. Was language a contributing factor? (attach sheet if necessary).	
14. What part of the worker's body was injured? (left/right side, hand, eye, back, etc.) What type of injury did they experience? (sprain, bruise, etc.)	
15. Was anyone not employed by you involved in the accident? ❑ Yes ❑ No If yes, explain.	
16. Was the worker disabled longer than the date of the accident? ❑ Yes ❑ No	
17. If no time loss, is the worker performing modified duties? If yes, provide list of duties.	
18. Is light duty available? ❑ Yes ❑ No If yes, when? YY | MM | DD	
19. Has the worker been advised of light duties? ❑ Yes ❑ No If yes, when? YY | MM | DD	
20. Please supply a list of duties available. (attach sheet if necessary)	

IF THE WORKER WAS DISABLED LONGER THAN THE DATE OF THE ACCIDENT, PLEASE CONTINUE. IF NOT, PLEASE SIGN AT THE BOTTOM OF THE NEXT PAGE.

Worker's Full Name:	WCB Claim Number:

Complete All Questions Below –
Give Full Explanation – attach extra sheets if necessary

21. Has the worker returned to work? ❑ Yes ❑ No If yes, when? YY | MM | DD

22. Will you pay the worker for the period of disability? ❑ Yes ❑ No
If yes, for how long? (e.g. 1 month, 6 months, etc.)
Will you continue to pay the employee benefits while the worker is receiving compensation payments? (e.g. travel, Northern living allowance) ❑ Yes ❑ No If yes, please explain

23. Worker's type of employment ❑ permanent ❑ seasonal ❑ casual ❑ summer student ❑ apprentice ❑ part-time

24. Is the job subject to seasonal layoffs ❑ Yes ❑ No
or lack of work layoffs ❑ Yes ❑ No

Wage Information – please complete

25. Date of hire YY | MM | DD 26. If non-permanent, what is the expected end date of employment? YY | MM | DD

27. Usual hours and days in work week Days off ______________
______ hours ______ days from ______ AM / PM to ______ AM / PM
e.g. 40 hrs/week hours 5 days from 8 (AM) PM to 5 AM / (PM)

28. If worker works an irregular work week (shifts, turnarounds, etc.), please supply one complete shift cycle
Date shift cycle started ______________ Number of days on ______________ Number of days off ______________

Circle days on:

M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S

29. What is the hourly rate of pay? ________ /hr
How often is the worker paid? ❑ Weekly ❑ Bi-Weekly ❑ Monthly ❑ Other – please explain

30. Specify amount of time off for lunch Is worker paid for the time? ❑ Yes ❑ No

31. Does the worker receive any other benefits? ❑ Yes If yes, explain and give amounts.
i.e. (vacation pay, settlement allowance, etc.) ❑ No

32. Does the worker regularly work overtime ❑ Yes ❑ No?

33. Provide an estimate of regular overtime hours (weekly / monthly / yearly) ______________
At what rate? ❑ Double-time ❑ Time and a half ❑ Other ______________

34. Give worker's exact gross earnings for the 12 months prior to accident date

IMPORTANT:

NOTIFICATION OF ACCIDENT MUST REACH THE WORKERS' COMPENSATION BOARD OFFICE WITHIN THREE WORKING DAYS OF ACCIDENT. IT IS RECOMMENDED THAT THIS FORM BE FAXED IN THE NORTHWEST TERRITORIES TO 1-866-277-3677 OR IN NUNAVUT AT 1-867-979-8501.

Completed by (please print)		Signed at (city, town, village)
Authorized Signature	**Phone Number**	**Date**

If you would like assistance filling in this form, or more information, please contact one of our offices listed below, or go to our website: www.wcb.nt.ca or www.wcbnunavut.ca.

"... An employer who fails to submit completed accident reports on a timely basis is liable to penalties as follow:

- $250 for each occurrence for the first 2 occurrences.
- $500 for the next 2 occurances
- $1,000 for each additional occurrence.

Decisions not to apply the late reporting penalty must be approved by the NWT or Nunavut manager of Claimant Services.

Where the employer fails to submit accident reports as required or requested by the board, the board may make a special investigation of the facts and circumstances surrounding an injury and charge the cost of the investigation to the employer (per Policy 11.02 '*Reporting an Accident*', WCB of the Northwest Territories and Nunavut Policy Manual)."

Head Office: Box 8888 • Yellowknife, NT X1A 2R3 • Telephone: (867) 920-3888 • Toll Free: 1-800-661-0792 • Fax: (867) 873-4596 • Toll Free Fax 1-866-277-3677
or
❑ Box 669 • Iqaluit, NU X0A 0H0 • Telephone: (867) 979-8500 • Toll Free: 1-877-404-4407 • Fax: (867) 979-8501

F-2: Refusal to Perform Light Duties

DATE
NATURE OF INJURY
MEDICAL JUSTIFICATION FOR LIGHT WORK
LIGHT WORK OFFERED **OFFERED BY:**
EMPLOYEE - REFUSAL TO COMPLETE LIGHT WORK I hereby indicate, by my signature below, that • I understand that I am medically able to perform light duty at site and have refused to do so; and • that by leaving site I will not be paid wages in my absence from the site. Name: _____ Signature: _____
SUPERVISOR Name: _____ Signature: _____
MEDIC Name: _____ Signature: _____

F-3: Accident Investigation Form

This form should be completed for all accidents/incidents and occupational illnesses arising from work, which occur at Delta premises or involve Delta employees, its sub-contractors or the public.\
Note: Refer to SSH&S Programs Manual "Incident Investigation" for assistance

Report Number: _____ **Date:** _____

Division: _____ **Business Unit:** _____

1. Project Information

Client: _____

Project Name: _____

Project Description: _____ Project Location: _____

Type of Contract: _____ Contract No: _____ Project No: _____

Prime Contractor:

2. Incident Description

Employer of Worker Involved: _____

TLICHO ☐ Client ☐ Prime Contractor ☐ Subcontractor ☐ Personal Contract ☐

Location of Incident: _____ Date: _____ Time: _____

Description of Incident:

3. Severity of Incident (Tick one box only)

☐ Fatality ☐ Lost Time Injury ☐ Medical Treatment Case ☐ Loss of Consciousness

☐ Restricted Work ☐ First Aid ☐ Near Miss/Dangerous Occurrence

☐ Other (Please specify)

Time lost as result of incident # of days

4. Injured Worker Information

Family Name: _____ First Name: _____ Initial: _____

Date of Birth: _____ Sex: _____ Employee Number: _____

Department: _____ Date of Hire: _____

Occupation: _____ Time on Occupation: _____

Immediate Supervisor: _____ Telephone Number: _____

Job Safety Training? Yes ☐ No ☐ Date of Training: _____

5. Injury Description

(See Lists In Appendix A)

Body Part	Injury/Illness	Type of Occurrence	Source of Injury	Severity

Report Number:

6. Injury Treatment

First Aid Provided: (describe)

Name of First Aider: Time First Aid Provided:

Medical Aid Provided: (describe)

Name of Medical Professional:

Location: Time Medical Aid Provided:

Management Investigator: Telephone:

Non-management Investigator: Telephone:

Reported by: Telephone:

7. Worker Activity

Job being performed at time of injury:

Description of Job:

Was this the normal job for worker involved? Yes ☐ No ☐

Personal Protective Equipment Worn by Worker:

Was a Work Permit Obtained for the Job? Yes ☐ No ☐

Were Proper Safe Procedures Followed? Yes ☐ No ☐

If No, explain:

8. Incident Site Conditions

Location:

General Description of Site:

Housekeeping/Condition of Site:

Equipment Involved: I.D. No.

Safety Equipment / Guards in Place? Yes ☐ No ☐

If No, explain:

Safety Equipment / Guards Used? Yes ☐ No ☐

If No, explain:

Lighting: Visibility: Temperature:

Noise:

Environmental Conditions:

Report Number:

9. Damages

Equipment

Equipment Damaged: _____ I.D. No. _____

Description of Damage: _____

Outstanding Equipment Repair Orders: _____

Was there a Malfunction? Yes ☐ No ☐

If Yes, explain: _____

Date of Last Safety Inspection: _____

Estimated Repair Time: Estimated Repair Costs:

Property

Property Damaged: _____

Description of Damage:

Estimated Repair Time: Estimated Repair Costs:

Report Number:

Interview supervisors, co-workers, observers, first people at the scene, emergency response personnel, others.

10. Witness Interview

Witness No.		
Date of Interview:	Time of Interview:	
Family Name:	First Name:	Initial:
Employer:	Occupation:	

Where were you at the time of the incident?

What were you doing?

What drew your attention to the incident?

Did you have a clear view of the incident scene before, during, or after the incident happened?

What did you do then?

Did you notice anything unusual?

Describe what happened in your own words and include the time each event happened.

What do you think caused the incident?

What would you recommend to prevent another incident like this?

Interviewer:	Employer:
Co-interviewer:	Employer:

Copy page for additional interviews.

Report Number:

Describe significant events in the order they happened from assignment of task to conclusion of incident:

11. Chain Of Events		
Date	**Time**	**Description of Event**

Report Number:

Check “Yes” or ‘No” for each statement. Check “Failure” if you believe a failure was associated with the event.

12. Failure Identification				
Event No.	**Event Description**	**Yes**	**No**	**Failure**
30	Worker returned to normal work.	☐	☐	☐
29	Worker returned to restricted work.	☐	☐	☐
28	Worker recovering off work.	☐	☐	☐
27	Medical aid administered.	☐	☐	☐
26	Worker transported to medical facility.	☐	☐	☐
25	First aid administered	☐	☐	☐
24	Worker injured.	☐	☐	☐
23	Property damaged.	☐	☐	☐
22	Worker was attentive	☐	☐	☐
21	Housekeeping was adequate	☐	☐	☐
20	Working environment was safe	☐	☐	☐
19	Hazard controls functioning properly.	☐	☐	☐
18	Hazard controls were in place.	☐	☐	☐
17	Equipment functioned properly	☐	☐	☐
16	Equipment was used properly	☐	☐	☐
15	Proper equipment was used	☐	☐	☐
14	Proper procedures / practices were followed.	☐	☐	☐
13	Proper personal protective equipment was worn.	☐	☐	☐
12	Pre-job safety meeting conducted to discuss hazards.	☐	☐	☐
11	Work permit obtained.	☐	☐	☐
10	Safe Work Plan developed	☐	☐	☐
9	Adequate supervision was provided.	☐	☐	☐
8	Worker was adequately skilled in job procedures.	☐	☐	☐
7	Worker was properly trained on safe work practices.	☐	☐	☐
6	Safe work practices were developed for the job	☐	☐	☐
5	Job safety analysis was completed for job	☐	☐	☐
4	Project risk assessment was completed and on file.	☐	☐	☐
3	Roles and responsibilities clearly defined for all workers	☐	☐	☐
2	Safety, Health and Environment Policy on display	☐	☐	☐
1	Safety, Health and Environment Policy developed.	☐	☐	☐
		☐	☐	☐
	Other:	☐	☐	☐
		☐	☐	☐
		☐	☐	☐
		☐	☐	☐
		☐	☐	☐
		☐	☐	☐
		☐	☐	☐
		☐	☐	☐
		☐	☐	☐
		☐	☐	☐

Report Number:

13. Prime Cause (See Lists In Appendix B)	
Category	Type

Detail only events from page 5 with failures.

14. Cause Analysis				
Event No.	Event	Yes	No	Failure
		☐	☐	☐
Description of Failure (Cause)				
Corrective Action				
Person Responsible for Action:				
Completion Date:		Follow-up Date:		

Event No.	Event	Yes	No	Failure
		☐	☐	☐
Description of Failure (Cause)				
Corrective Action				
Person Responsible for Action:				
Completion Date:		Follow-up Date:		

Event No.	Event	Yes	No	Failure
		☐	☐	☐
Description of Failure (Cause)				
Corrective Action				
Person Responsible for Action:				
Completion Date:		Follow-up Date:		

Copy page for more events if necessary.

Reference Section 4 "Injury Description"

Injury Description Lists

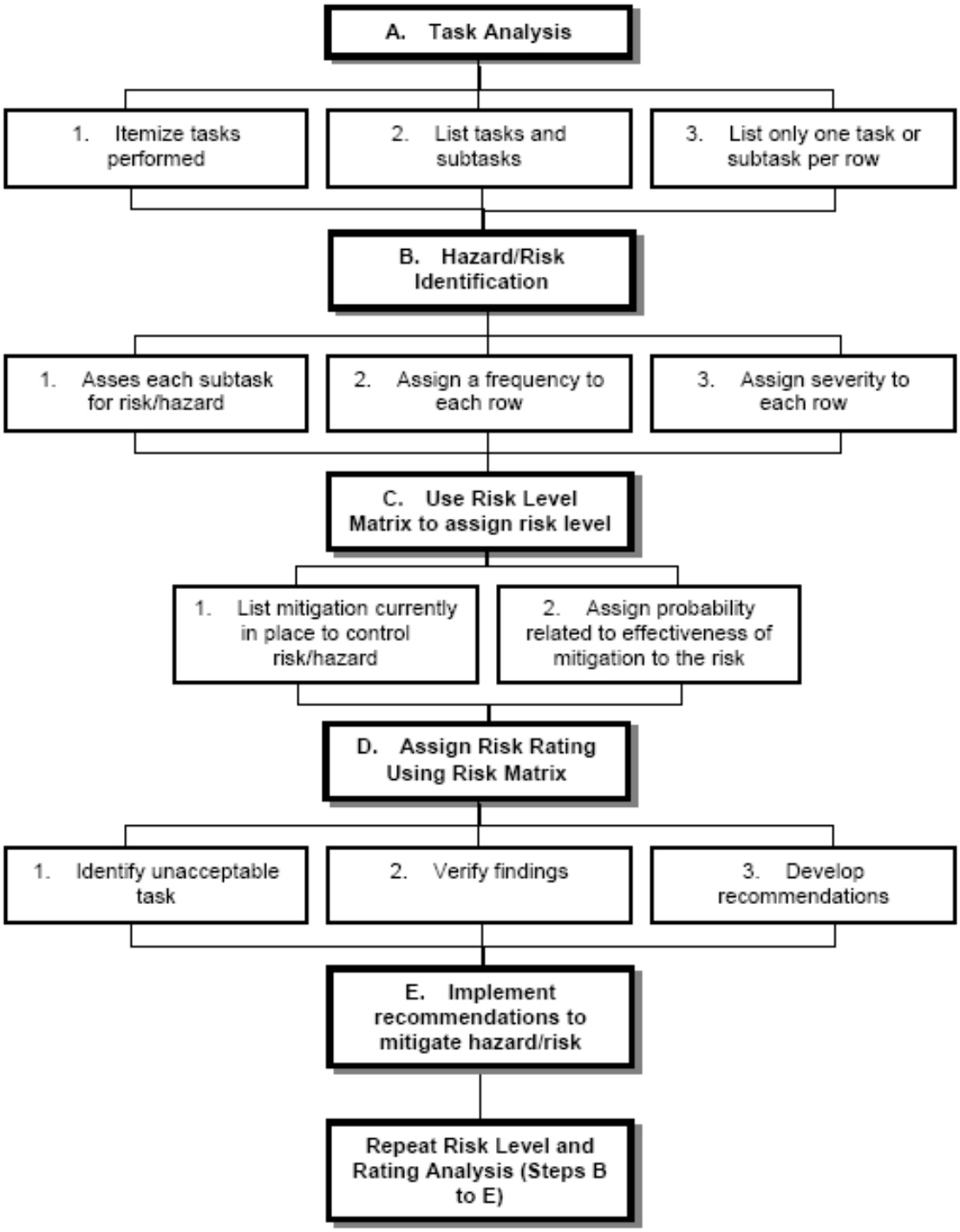
Body Part	Type of Injury	Type of Illness	Type of Occurrence	Source of Injury
Head	Abrasion	AIDS	Caught between	Cold
Eye	Asphyxiation	Asbestosis	Caught in	Concrete Work
Ear	Bruise	Asthma	Caught on	Crane / Lifting Device
Nose	Burn	Black Lung	Collision with	Debris
Teeth	Carpal Tunnel Syn.	Cancer	Contact with	Door
Face	Concussion	Club Finger	Dismounting from	Electrical Energy
Neck	Contusion	Dermatitis	Exposed to	Equipment Malfunction
Shoulder	Crush	Emphysema	Fall from elevation	Explosives
Arm	Cut	Heat Stress	Fall on same level	Fire
Elbow	Degloving	Hepatitis A	Fall into	Heat
Wrist	Dislocation	Hepatitis B	Fall onto	Hydraulic Pressure
Hand	Drowning	Hepatitis C	Inhalation of	Ladder
Finger	Fracture	Mesothelioma	Ingestion of	Manual Material Handling
Thumb	Frostbite	Poisoning	Jumping from/over	Mobile Equipment
Chest	Hearing Impairment	Pneumoconiosis	Lifting of	Noise
Back	Hernia	Sensitization	Over exertion of	Oxygen Depletion
Abdomen	Hyperextension	Silicosis	Posture	Operating Equipment
Internal Organs	Imbedded Object	Other	Pressure release from	Pneumatic Pressure
Pelvis	Impalement		Repetitive motion	Radiation Energy
Groin	Over Exposure		Run over by	Scaffold
Leg	Puncture		Slip on	Stairway
Knee	Raynauds Syndrome		Stabbed with	Stationary object
Ankle	Sight Impairment		Stepped in	Steam Pressure
Foot	Sprain		Stepped on	Steel Work
Toe	Strain		Stretching for	Tool, Hand
Circulatory System	Tear		Struck against	Tool, Power
Respiratory System	Tinnitus		Struck by falling object	Hazardous Materials
Nervous System	Twist		Struck by flying object	Vehicle
Reproductive System	Other		Struck by moving object	Window
Other			Trip over	Working Surface
			Other	Other
				Severity
				Near Miss
				First Aid
				Medical Aid
				Unconsciousness
				Lost Time
				Critical
				Fatality

Appendix B

Reference Section 13 "Prime Cause"

Prime Cause of Incident	
Category	**Type**
Human Factors	Error of judgment
	Failure to follow rules
	Fatigue
	Horseplay
	Instructions misunderstood
	Lack of experience
	Lapse of concentration
	Undue haste
	Unsafe attitude
	Working without authorization
	Other (Please specify)
Management	Communication
	Supervision
	System of work
	Training
	Other (Please specify)
Plant/Equipment	Construction/Design
	Installation
	Maintenance
	Mechanical Failure
	Operation/Use
	Safety Device
	Other (Please specify)
PPE	Design
	Maintenance
	Not provided/unavailable
	Not used
	Wrong type used
	Other (Please specify)
Work Environment	Access/Egress
	Defective Workplace
	Design/Layout
	Housekeeping
	Lack of room
	Lighting
	Noise/Distraction
	Weather
	Other (Please specify)
Other	Third Party
	Other (Please specify)

F-4a: Risk Assessment – Flow Chart



F–4b: Risk Assessment Matrix

Risk Assessment Worksheet for Determining Probability and Consequences of An Activity, Accident or Incident

Name or Numer of Incident to be rated;

	Probability of Incident Occurence	Rating	Consequences																	
			Employee and Public Safety	Rating	Impact on the Environment	Rating	Costs Include Property Damage and Penalties	Rating	Public and Stakeholder Relations	Rating	Socio-Economic Impacts	Rating	Regualtory Impacts (Cumulative effect on overall rating determination)	Rating						
1	Rare - once in 20 years		First Aid Injury or Potential for First Aid Injury		Insignificant, localized, but potentially cumulative		Up to $ 10,000		Minor or no inconvenience to the public in the affected area		No change		Noncompliance Noted or Monitored by Inspectors							
2	Unusual - once in 5 years		Medical Aid Injury with reversible health effects		Significant, localized and reversible		$ 10,000 to $ 100,000		Public disturbance in the affected area		Minor socio-economic change		Noncompliance Reportable Incident, Monitored by Inspectors							
3	Occassional - once per year		Lost Time Injury or Minor Occupational Illness		Serious, limited and reversible		$ 100,000 to $ 1,000,000		Some media attention and/or public disturbance in affected area		Major socio-economic change		Violation of Regs; Reportable Incident, Legal Issues with possible Fines							
4	Frequent - several times per year or Seasonal		Serious Injury or Occupational Disease		Serious, extensive and/or reversible		$ 1,000,000 to $10,000,000		Local and possibly national headlines, serious community relations impact		Massive socio-economic change		Violation; Legal Issue with Fines, Prosecution, possible impact to business operations							
5	Regular - weekly or continuous		Fatality		Catastrophic, extensive and/or irreversible		>$ 10,000,000		National and possibly international headlines, disastrous community relations		Cultural extinction		Violation; Legal Issue with Fines, Prosecution, significant impact on business operations, potential prosecution							

Risk Assessment Rating Number = the Rating of Probability + the Highest Rating given to Consequences

F-4d: Risk Assessment – Formal Risk Assessment List

- ☐ **Chemical Hazards & Harmful Substances**
  (chemical, biological, coal dust, fly ash, fumes, mists & vapours)
- ☐ **Confined Space Hazards**
  (atmosphere, physical hazards, access & egress, temperature extremes)
- ☐ **Fire & Explosion Hazards**
  (explosive atmosphere, flammable materials, fire protection)
- ☐ **Lifting & Handling Loads – Manual Handling**
  (weight, size, shape of load, ergonomic, repetitive motion)
- ☐ **Noise Exposure Hazards**
  (>85dBa, hand tools, equipment, machinery, process exposure)
- ☐ **Powered Mobile Equipment**
  (modes of transportation, traffic, equipment, equipment condition, dangerous movement, competency)
- ☐ **Psychological Hazards**
  (violence, harassment, stress, fatigue, conditions, working alone)
- ☐ **Environmental Hazards**
  (temperature extremes, poor lighting, housekeeping, access)
- ☐ **Contact Hazards**
  (electricity, steam, radiation, flying debris, sharp objects)
- ☐ **Fall Hazards – Body or Object Falls**
  (fall to lower level or on same level, slip or trip, slippery surfaces)
- ☐ **Physical Hazards – Movement**
  (struck by or against, caught in or on, hung up, caught between)
- ☐ **Exertion Hazards – Force**
  (excessive force, overstress or exertion, overextension, overload)
- ☐ **Excavation Hazards**
  (soil stability, water, entry & exit, buried facilities, loose materials)
- ☐ **Tool & Equipment Hazards**
  (tool or equipment failure or condition, incorrect tool, incorrect use)
- ☐ **Respiratory Hazards**
  (atmosphere, respirator type, fit & maintenance, ventilation)
- ☐ **Wildlife Hazards**
  (animals, rodents, bears, arachnids, snakes)

F-4e: Job Hazard Analysis Form

JOB HAZARD ANALYSIS FORM (JHA) (pg 1 of 2)

Contwoyto JHA-

Job:

Job Steps	Potential Hazards / Risks	Consequences E / I / F/ S	Recommended Safety Measures

Information JHA Summary Sheet (pg 2 of 2):

Job Being Analyzed: _____

JHA Supervisor: _____

Worker:	Signature:

Department: _____

Department Supervisor: _____

JHA Date: _____

JHA Revision #: _____

**Consequences:* E-equipment damage, I-injury, F-fatality, S-spill

(additional sheet, if required)

Job Steps	Potential Hazards / Risks	Consequences E / I /F/S	Recommended Safety Measures

F-4f: Workplace Inspection Checklist

AREA INSPECTED BY:
POSITION:
SIGNATURE:
DATE:
REVISION #1:
DOCUMENT ID:

ID	DESCRIPTION	Y	N	N/A
CHEMICAL STORAGE AND HANDLING				
1	Are flammable liquids stored as per the NFC and as described in the Fire Response Plan			
2	Are flammable liquids stored independently of combustible liquids and other incompatible materials (refer to fire plan)			
3	Are signs warning of flammable/combustible liquids visible and in place (i.e., no smoking signs etc.)			
4	Are proper fuelling practices being observed such as grounding and prevention of spills			
5	Smoking rules are being practiced by staff			
6	Combustible/Flammable liquids are not stored in doors in excess of what is required			
7	Proper fire suppression equipment is present at each worksite where a fire hazard is present			
8	Is proper PPE being used correctly when handling hazardous materials/waste			
HAZARD COMMUNICATION				
1	All containers containing hazardous materials/waste are properly labelled according to TDGA and/or WHMIS			
2	Material Data Sheets are up to date and stored such that easy access by staff is allowed			
3	Required safety signs are posted			
4	Lockout tags are present if required and are not tampered with			
MATERIAL HANDLING				
1	All hoists are in good condition (hook safety latches in place, wire rope not kinked, controls labelled, weight capacity listed on hoist and crane rails, not leaking fluids)			
2	All hoist mechanisms are free from interference			
3	Are synthetic slings legibly labelled and free from knots			
4	Are hoist wire ropes free of broken/cut strands, tangling, kinks, distortion and corrosion			
5	Are weight capacities marked on chain slings and lifting fixtures? Is equipment in good working condition			
6	Are storage racks tidy and properly secured			
7	Are work areas free of clutter to prevent trips/slips and falls			
EQUIPMENT				
1	Equipment is not leaking			
2	Equipment operators are operating heavy equipment safely			
3	Equipment operators are operating equipment such that tires are not being damaged or excessively worn			
4	Equipment pre-inspections have been completed			
5	Hoses are in good condition			
6	Hand tools are being used properly and are in good working condition			
7	Ladders are being properly used and are in good condition			
8	Equipment have fire extinguishers			
ELECTRICAL SAFETY				
1	All electrical equipment requiring grounding are grounded			
2	Electrical panels and disconnects are accessible			
3	Are extension cords used only on a temporary basis (less than 90 days)			
4	Are power tool cords in good condition			
5	Are wires covered and not exposed			

ID	DESCRIPTION	Y	N	N/A
LIFE SAFETY/HAZARD ASSESSMENT				
1	Are employees performing job functions safely			
2	Do jobs appear to be ergonomically safe			
3	Have permit required confined space been marked and identified			
4	Are aisles, doors, emergency equipment, and pull boxes accessible and not blocked			
5	Is the 3’ area around fire extinguishers maintained and clear			
6	Are emergency eye wash stations present and filled			

F-5: Confined Space Pre-Inspection Form

PROJECT:	PROJECT NO.:	CONTRACTOR:
DATE OF ISSUE:	PERIOD OF WORK:	TASK SUPERVISOR:
IDENTIFICATION OF CONFINED SPACE TO BE ENTERED:		

GENERAL WORK SCOPE		CONTRACTOR
Mechanical:		
Sandblast:		
Cleaning:		
Scaffolding:		
Inspections:		
Other:		

NOTE: A SAFE WORK PERMIT MUST BE ISSUED PRIOR TO ENTRY !!!

THE FOLLOWING ITEMS HAVE BEEN DISCUSSED:

	Y	N	N/A	COMMENTS
Identification of the confined space				
Location of the confined space				
Access route to the confined space				
Available safety shower/eye wash location				
Permit issuing location				
Are the workers qualified?				
Have the workers any medical limitations?				
Have any workers any communication limitations?				
Scope of work to be performed?				Attach documents and drawings
Type of permits required				Hot ☐ Cold ☐ Other ☐
Notification of Shift Supervisor				
Notification of Fire Marshall				

CONFINED SPACE ISOLATION AND PREPARATION:

	Y	N	N/A	COMMENTS
Blanking				
Are blank locations procedures in place?				Review and attach
Normal process stream contents				
Has the confined space been chemical cleaned?				
Chemical cleaning agents				
Neutralising agents				
How is the confined space steamed?				
Has the confined space been water washed?				
How is the confined space ventilated?				
0_2 test required prior to entry?				Specify
L.E.L. tests required prior to entry?				
H_2S test required prior to entry?				
Are other tests required prior to entry?				Specify
Are additional tests required during the shift?				Specify
Is continuous monitoring required for the above tests?				Specify

Confined space internal physical hazards				
Confined space external physical hazards				
Are any asbestos containing materials present?				

CONFINED SPACE EQUIPMENT AND PROCEDURES:

	Y	N	N/A	COMMENTS
Have you checked your electrical cords? (plug/insulation damage)				
Are electrical cords plugged into external G.F.I.?				
Have you checked your welding cables?				Required for hazardous entry
Have you tested your oxyacetylene & inert gas hoses?				Remove when not in use
Are pneumatic tools/hoses secured?				Remove when not in use
Have you inspected the pneumatic hoses/gaskets?				
Will cable/hoses/cords be protected at manway?				
Is electrical lockout or disconnect required?				
Will exhaust fumes from equipment be a hazard?				Keep away from manway
Do you have a method of breaking vacuum to the vacuum hose from the truck?				
Diesel equipment emergency shutdown				Automatic ☐ Manual ☐
All equipment shutdown when unattended				
Do you have the required fire protection at the work site and for your equipment?				Specify

PPE REQUIRED FOR CONFINED SPACE OTHER THAN MINIMUM STANDARDS:

	Y	N	N/A	COMMENTS
F.R. rated disposable coveralls				
F.R. rated rubber clothing				
H_2S personal monitor				
Hearing protection				
Gloves				Rubber ☐ Leather ☐ Other ☐
Air purifying respirators (FIT testing)				Type: Cartridge
Supplied breathing air or S.C.B.A. use				
Body harness c/w life line				
Other				

CONFINED SPACE SAFETY WATCH RESPONSIBILITIES:

	Y	N	N/A	COMMENTS
Has the safety watch been identified?				How
Has the safety watch the required PPE?				
Do you have the I.D. card entry board?				
Communication in place with workers?				Type
Emergency request communications				Radio ☐ Channel ☐ Air Horn ☐
Is instruction required on radio/horn operation?				
Discuss emergency evacuation procedures				
Does the safety watch have communications?				
Is the safety watch trained?				
Housekeeping at entrance of confined space?				
Permit posted at job site?				

VERTICAL CONFINED SPACE ENTRY AND/OR EMERGENCY RESCUE EQUIPMENT.
CHECK OFF ITEMS REQUIRED AT WORK SITE

	Y	N	N/A
Tripod/winch for vertical entry of confined space			
Secondary fall protection for tripod			
Body harness and spreader bar for tripod use			
Stretcher ☐ or help harness			
S.C.B.A. for standby and emergency rescue (no unassisted rescue)			

IF SUPPLIED BREATHING AIR IS REQUIRED FOR CONFINED SPACE ENTRY WORK, COMPLETE AND SIGN THE FOLLOWING CHECKLIST

	Y	N	N/A
Are all workers adequately trained?			
Has the equipment to be used been inspected?			
Is the area secure, signs, barricades, etc.?			
Is an additional backup person required?			
Is bottle watch to act as confined space entry watch?			
Does the backup or watch person have the required PPE?			
Are the required communications/warning devices at the work site?			

ADDITIONAL INFORMATION OR COMMENTS:

DATE	NAME (PRINT)	SIGNATURE	COMPANY

We (the undersigned), understand the terms of the discussion from the pre-entry meeting.

DATE	NAME (PRINT)	SIGNATURE	COMPANY	DATE	NAME (PRINT)	SIGNATURE	COMPANY

F-6: Hot Work Permit

HOT WORKS PRECAUTIONS

(Front & Back must be posted at Hot Works area)

Cutting ❑ Welding ❑ Brazing ❑ Grinding

Surrounding equipment/facilities protected	YES ❑	NO ❑
Fire Blankets required	YES ❑	NO ❑
Welding Shields in place	YES ❑	NO ❑
Fire Extinguisher at work location	YES ❑	NO ❑
Welding Machine grounded	YES ❑	NO ❑
Area identified flagged off	YES ❑	NO ❑
Cables/Gauges/Hoses/Flashback Arrestors intact	YES ❑	NO ❑
Fire Watch - during Hot Works & 4 hours after complete	YES ❑	NO ❑
Is there a smoke detector located close to the Hot Works	YES ❑	NO ❑
Is the atmosphere explosive	YES ❑	NO ❑
Have precautions been taken for any combustible materials on floors, walls, ceilings or roof made of combustible material	YES ❑	NO ❑
Are combustible materials present within 15 metres	YES ❑	NO ❑
Are there any openings, cracks and holes where sparks may drop to combustible material	YES ❑	NO ❑
Have ducts or conveyors that could transport sparks to distant combustibles been identified or shut down for the Hot Works	YES ❑	NO ❑
If the building is sprinkled, is the sprinkler operational	YES ❑	NO ❑
Have the welders and cutters been trained in the safe operation of their equipment	YES ❑	NO ❑
Has a Safe Work Plan been conducted for the Hot Works	YES ❑	NO ❑
Hot Works will comply with SLDP OP#0046	YES ❑	NO ❑
Is the Hot Works conducted in a confined space (if yes follow procedures for confined space OP#0072)	YES ❑	NO ❑

HOT WORKS PERMIT

Cutting ❑ Welding ❑ Brazing ❑ Grinding ❑

Date of Hot Works: _____

Location of Hot Works: _____

_____

Permit Expires: Date: _____ Time: _____

Description of Hot Work: _____

_____

Worker Signature: _____

Supervisor's Signature: _____

Fire Watch Signature: _____

Mine Manager Signature: _____

No. 2008- 0173

HOT WORKS PERMIT

(Copy to Colomac Mine)

Cutting ❑ Welding ❑ Brazing ❑ Grinding ❑

Date of Hot Works: _____

Location of Hot Works: _____

Dept/Contractor Conducting Hot Works:

_____

Fire Watch for Hot Works:

_____

Work to be Performed:

_____

_____

_____

Worker: _____

Supervisor: _____

Fire Watch: _____

Date: _____ Time: _____

Permit expires: Date: _____

Time: _____

Mine Manager: _____

Date: _____

No. 2008- 0173

HOT WORKS PERMIT

(Copy to Security or Alternate for 4-Hour Fire Watch)

Cutting ❑ Welding ❑ Brazing ❑ Grinding ❑

Date of Hot Works: _____

Location of Hot Works: _____

Permit Expires: _____

Date: _____ Time: _____

Fire Watch: _____

Mine Manager: _____

See Back for Safety Precautions and Review

OP#0096

APPENDIX G – Background Information Regarding Respiratory Protection

G-1: User Seal Check Using Tight-Fitting Elastomeric Face pieces

G-1.1: Negative Pressure Seal Check

A negative-pressure user seal check can be conducted on air-purifying respirators and atmosphere supplying respirators equipped with tight-fitting face pieces. This check may be difficult or impossible to conduct on respirators incorporating air-purifying elements (size or shape) that do not allow the inhalation inlets to be temporarily sealed.

The procedure for conducting the negative-pressure user seal shall be conducted as follows:

- The user seal check consists of closing off the inlet opening(s) of the respirator air-purifying elements so that upon inhalation, passage of air into the face piece will not occur. In the case of air-supplied respirators, the user seal check consists of closing off the air supply hose;
- To avoid possible disruption of the facial seal, a non-permeable, flexible plastic wrap may be used to seal the air inlet(s) instead of attempting to maintain a seal with the hands;
- The user shall inhale gently and hold his/her breath for at least 5s. The face piece will collapse slightly on the face and shall remain collapsed while the breath is held;
- During this period, the face piece shall not be disturbed by the user attempting to maintain a seal on the inlet opening of the air-purifying elements.
- If the face piece remains collapsed while a breath is being held, the user seal check is successful;
- If the face piece does not remain collapsed while a breath is being held, the user shall verify that nothing obstructs the sealing surface, adjust the face piece and harness, and repeat the user seal check;
- If the face piece still does not remain collapsed while a breath is being held, the user shall remove the respirator, inspect the components for the cause of the leakage, correct any problems discovered, or obtain a replacement respirator and repeat the user seal check;
- Users shall not use a respirator for which a user seal check cannot be completed successfully.

G-1.2: Positive-Pressure User Seal Check

A positive-pressure user seal check can be conducted on respirators equipped with tight-fitting face pieces that contain both inhalation and exhalation valves. It should be noted that for some respirators, the positive-pressure user seal check requires that the exhalation valve cover be removed, then replaced following completion of the user seal check.

The procedure for conducting the positive-pressure user seal check shall be as follows:

- The user shall don the respirator face piece, closing off the exhalation valve or breathing tube or both, and exhale gently;
- During this period, the face piece shall not be disturbed by the user attempting to maintain a seal on the exhalation valve;
- If a slight positive pressure can be maintained inside the face piece without detection of any outward leakage of air, the user seal check is successful;
- If a slight positive pressure cannot be maintained inside the face piece for 5 s, the user shall verify that nothing obstructs the sealing surface, adjust the face piece and harness, and repeat the user seal check;
- If a slight positive pressure still cannot be maintained inside the face piece, the user shall remove the respirator, inspect the components for the cause of the leakage, correct any problems discovered, or obtain a replacement respirator and repeat the user seal check;
- The user shall not use a respirator for which a user seal check cannot be completed successfully.

G-2: Airborne Hazards

G-2.1: Dust

Dusts are particles that are formed or generated from solid organic or inorganic – materials by reducing their size through mechanical processes such as crushing, grinding, drilling, abrading, or blasting.

G-2.2: Fumes

Fumes are particles formed when a volatilized solid, such as a metal, condenses in cool air. This physical change is often accompanied by a chemical reaction, such as oxidation. Examples are lead oxide fumes from smelting and iron oxide fumes from arc-welding. A fume can also be formed when a material such as magnesium metal is burned or when welding or gas cutting is done on galvanized metal.

G-2.3: Mists

Mist is a state that is formed when a finely divided liquid is suspended in the air. These suspended liquid droplets can be generated by condensation from the gaseous to the liquid state or by breaking up a liquid into a dispersed state, such as by splashing, foaming, or atomizing. Examples are the oil mist produced during cutting and grinding operations, acid mists from electroplating, acid or alkali mists from pickling operations, paint spray mist from spraying operations and the condensation of water vapour to form a fog or rain.

G-2.4: Gases

Gases are formless fluids that occupy the space or enclosure and which can be changed to the liquid or solid state only by the combined effect of increased pressure and decreased temperature. Examples are welding gases such as acetylene, nitrogen, helium and argon; and carbon monoxide generated from the operation of internal combustion engines. Another example is hydrogen sulfide, which is formed wherever there is decomposition of materials containing sulfur under reducing conditions.

G-2.5: Vapour

Vapours are the gaseous form of substances that are normally in the solid or liquid state at room temperature and pressure. They are formed by evaporation from a liquid or solid, and can be found where parts cleaning and painting takes place and where solvents are used.

G-2.6: Smoke

Smoke consists of carbon or soot particles resulting from the incomplete combustion of carbonaceous materials such as coal or oil. Smoke generally contains droplets as well as dry particles.

G-3: Respirator Classification, Characteristics and Limitations

G-3.1: General

NEGATIVE vs POSITIVE PRESSURE RESPIRATORS

An important aspect of respirator operation and classification is the air pressure within the face piece. When the air pressure within the face piece is negative during inhalation with respect to the ambient air pressure, the respirator is termed a negative-pressure respirator. When the pressure is normally positive with respect to ambient air pressure throughout the breathing cycle, the respirator is termed a positive-pressure respirator. The concept of negative and positive pressure operation is important when considering potential contaminant leakage into the respirator.

LOOSE FITTING vs TIGHT FITTING

TIGHT FITTING

The tight-fitting respirator is designed to form a seal with the face of the wearer. It is available in three types: quarter mask, half mask, and full face piece. The quarter mask covers the nose and mouth, where the lower sealing surface rests between the chin and the mouth. The half mask covers the nose and mouth and fits under the chin. The full face piece covers the entire face from below the chin to the hairline.

LOOSE FITTING

The loose-fitting respirator has a respiratory inlet covering that is designed to form a partial seal with the face. These include loose-fitting face pieces, as well as hoods, helmets, blouses, or full suits, all of which cover the head completely. The best known loose-fitting respirator is the supplied air hood used by the abrasive blaster. The hood covers the head, neck, and upper torso, and usually includes a neck cuff. Air is delivered by a compressor through a hose leading into the hood. Because the hood is not tight-fitting, it is important that sufficient air is provided to maintain a slight positive-pressure inside the hood relative to the environment immediately outside the hood. In this way, an outward flow of air from the respirator will prevent contaminants from entering the hood.

CLASSIFICATION OF RESPIRATORS

Respirators may be classified according to mode of operation as follows:

- atmosphere-supplying respirators:
  - self-contained (open- and closed-circuit, demand and pressure-demand);
  - supplied-air (demand, pressure-demand, and continuous-flow); or
  - combination self-contained and supplied-air;
- air-purifying respirators:
  - gas- and vapour-removing;
  - particulate-removing; or
  - combination gas, vapour, and particulate-removing; or
- combination atmosphere-supplying and air-purifying respirators.

G-3.1: Atmosphere Supplying Respirators

Atmosphere Supplying Respirators (ASR) provide a breathing atmosphere that is independent of atmospheric conditions.

Except for some supplied-air suits, no protection is provided against skin irritation by material such as ammonia and hydrogen chloride, or against the absorption of materials such as hydrogen cyanide, tritium oxide, or organic phosphate pesticides through the skin. Fit testing of every user of tight-fitting face pieces shall be required.

SELF CONTAINED BREATHING APPARATUS

The supply of air, oxygen or oxygen-generating materials is carried by the user. The period over which the device will provide protection is limited by the amount of air or oxygen in the apparatus, the ambient atmospheric pressure (service life is cut in half by doubling the atmospheric pressure) and the degree of physical activity. The actual service time is usually less than the NIOSH rated service time. Some SCBA devices have a short service life (less than 15 min) and are suitable only for escape from an IDLH atmosphere. SCBA devices are typically heavy and bulky. Their use requires more physical exertion, more training, and more maintenance than most other respirators.

Closed Circuit SCBA (Oxygen Only)

Demand or pressure-demand closed-circuit SCBA are typically available in the following configurations and types:

- compressed gaseous oxygen; or
- chemical oxygen generation.

All types are equipped with either a face piece or a mouthpiece and nose-clamp. Compressed oxygen systems use high-pressure gaseous oxygen from a gas cylinder that passes through a pressure-reducing valve to a reservoir. Compressed oxygen systems utilize pressure-relief valves, bypass systems, saliva traps, etc. In both systems, the user inhales, and the gaseous oxygen is delivered from the reservoir to the face piece or mouthpiece utilizing appropriate tubing, check valves, regulators, etc. Exhaled breathing gas is directed into a carbon dioxide removal medium and then the breathing gas recirculates through the system.

Makeup oxygen may enter the reservoir on a continuous basis or when the volume of breathing gas in the reservoir is reduced sufficiently to activate an oxygen admission valve. Some types of oxygen closed- circuit SCBA may utilize both a continuous flow as well as a demand system to supply gaseous oxygen to the reservoir.

Chemical oxygen systems generate gaseous oxygen by a chemical reaction. Water vapour and carbon dioxide in the exhaled breath react with the chemical in the canister, causing gaseous oxygen to be generated. The gaseous oxygen passes into a breathing bag reservoir from which the user of the SCBA inhales. The exhaled breathing gas is returned to the canister where carbon dioxide and moisture contained in the exhaled breath react with the chemical to generate gaseous oxygen. The process is continuous until the oxygen-generating chemical is consumed. The volume of oxygen generated by

this system is directly proportional to the volume of moisture and carbon dioxide in the exhalation breath of the user of the SCBA.

The closed-circuit operation conserves oxygen and permits longer service life at reduced weight. Units are available with up to 4 h rated service time. Closed-circuit devices provide high-temperature breathing air due to the chemical reactions inherent to their operation.

Open Circuit Self Contained Breathing Apparatus
Open-circuit SCBA are available in the following configurations:

- demand; and
- pressure-demand.

Unlike closed circuit SCBA, exhaled air passes through a valve(s) in the facepiece to the ambient atmosphere. Demand types are equipped with a facepiece, or mouthpiece and nose-clamp combination. The demand valve permits oxygen or air flow only during inhalation. Demand-type respirators are equipped with a demand valve that is activated on initiation of inhalation and permits the flow of breathing atmosphere to the facepiece. On exhalation, pressure in the facepiece becomes positive and the demand valve is deactivated.

The pressure-demand type maintains a positive pressure in the facepiece or hood by utilizing special regulators and exhalation valves. The apparatus may have provision for the user to select the demand or positive-pressure mode of operation, in which case the demand mode should be used only when donning or removing the apparatus.

Except on escape-type units, a manually operated bypass system shall be required if the mode of failure of regulator or demand valve cuts off the air supply. This bypass permits the user to breathe and to conserve the breathing-gas supply.

Demand SCBA are considered negative-pressure respirators and are not suitable" for use where an SCBA is required.

SUPPLIED AIR RESPIRATORS

For supplied air respirators the respirable air supply is not limited to the quantity a person can carry. The devices are lightweight and simple. However, supplied-air respirators are limited to use in atmospheres from which the user can escape unharmed without the aid of the respirator (non-IDLH), should the air supply fail. Maximum use concentrations based on contaminant toxicity apply. The user is restricted in movement by the air-supply hose and must return to a respirable atmosphere by retracing the route of entry.

Air-Line Respirator
Respirable air is supplied through a small diameter hose from a compressor or compressed-air cylinder(s). The hose is attached to the user by a belt and can be detached rapidly in an emergency. A flow-control valve or orifice is provided to govern the rate of airflow to the user. Exhaled air passes to the ambient atmosphere through a

valve(s) or opening(s) in the enclosure (face piece, helmet, hood, or suit). Up to 90 m of hose length is permissible.

Airline respirators are available in the following configurations:

- demand;
- pressure-demand; and
- continuous-flow.

Demand types are equipped with a face piece and a demand valve that is activated on initiation of inhalation and permits the flow of breathing atmosphere to the face piece. On exhalation, pressure in the face piece becomes positive and the demand valve is deactivated.

Pressure-demand types are equipped with a face piece, an exhalation valve, and a regulator, all of which are configured to contribute to maintaining positive pressure in the face piece when a proper face-to-face piece seal is maintained by the user.

Continuous-flow types are equipped with a face piece, hood, helmet, or suit. It requires at least 115 L/min (4 ft^3/min) of air to tight-fitting face pieces and 170 L/min (6 CFM) of air to loose-fitting helmets, hoods, and suits. Air is supplied to a suit through a system of internal tubes and valves to the head, trunk, and extremities.

Continuous-flow and pressure-demand types are designed to maintain a positive pressure in the face piece and are less apt to permit inward leakage of contaminants. Supplied-air suits may protect against atmospheres that irritate the skin or that may be absorbed through the skin.

Airline respirators provide no protection if the air supply fails. The demand-type respirator develops a negative pressure in the face piece on inhalation and therefore can only be used in an atmosphere where a non-powered air-purifying respirator is suitable. Continuous-flow types require a higher volume of breathing air than demand or pressure-demand, because the air is flowing at a constant rate independent of breathing rate.

An instantaneous negative pressure may be created in pressure-demand and continuous-flow supplied – air respirators if the respirator is over breathed. The material of the airline itself may be permeable to substances such as aromatic hydrocarbons. For this reason, only air supply hoses made expressly for airline respirators should be used. The NIOSH approved respirator includes the air supply hoses, therefore substitution of other hose or other respirator manufacturer's air supply hose voids the approval and the respirator is no longer considered accepted. Some contaminants, such as tritium, may penetrate the material of an airline suit.

Combination Air Line Respirator with Auxiliary Self-Contained Air Supply
The auxiliary self-contained air supply on this type of device allows the user to work in an IDLH atmosphere. To escape from an IDLH atmosphere in the event that the primary air supply fails to operate, the user switches to the auxiliary self-contained air supply.

The escape route shall be planned such that the time needed to escape does not exceed the rated service time of the auxiliary air supply. The auxiliary air supply shall only be used to enter the hazardous atmosphere before connecting to an air supply line if the rated service time is at least 15 min, and the time for entry does not exceed 25% of the rated service time of the auxiliary air supply.

AIR PURIFYING RESPIRATORS

For the case of an air-purifying respirator, ambient air, prior to being inhaled, is passed through a filter, cartridge, or canister that removes particles, vapours, gases, or a combination of these contaminants. Air-purifying respirators are available in two modes of operation:

- non powered; and
- powered.

The breathing action of the user operates the non-powered types. The powered types contain a blower carried by the user that passes ambient air through an air-purifying component, and then supplies purified air to the face piece. Non-powered types are equipped with a face piece or mouthpiece and nose clamp. Powered types are equipped with a face piece, helmet, hood, or suit.

Certain types of air-purifying devices may be used for escape purposes only. Selection and application of respirators for escape purposes should be conducted in close consultation with the manufacturer of the device and the regulatory authority.

Air-purifying respirators shall not be used where the oxygen content of the air is less than the equivalent of 19.5% at sea level. In addition, air-purifying respirators shall not be used in IDLH atmospheres. Maximum use concentrations based on contaminant toxicity, respirator face piece style, and mode of operation apply.

The proper type of canister, cartridge, or filter shall be selected for the particular atmosphere and conditions. The time period over which protection is provided is dependent on the canister, cartridge, or filter type, the concentration of a contaminant, humidity levels in the ambient atmosphere, and the user's respiratory rate.

Non-powered, air-purifying respirators may cause discomfort due to a noticeable resistance to inhalation. This problem is minimized in powered respirators. Powered respirators are limited by battery life.

Fit testing is required for users of all tight-fitting face piece respirators. Some respirator face pieces may present special problems to individuals required to wear corrective lenses.
Escape-only air-purifying respirators shall not be used for entry into contaminated atmospheres.

Vapor and Gas Removing Respirator

Vapour- and gas-removing respirators are equipped with cartridge(s) or canister(s) to remove a single vapour or gas, a single class of vapours or gases (for example, organic vapour), or a combination of two or more classes of vapours and gases from the air.

Vapour- and gas-removing respirators are available in the following inlet configurations:

- a full-face piece respirator that provides protection against eye irritation in addition to providing respiratory protection;
- quarter- and half-face piece respirators; and
- mouthpiece respirator that is used only for escape applications.

For a mouthpiece respirator, mouth-breathing prevents detection of contaminant by odor. The nose clamp must be secured in place to prevent breathing through the nose.

The use of vapour- and gas-removing respirators should be avoided in atmospheres where the contaminant(s) lacks sufficient warning properties (eg, odour, taste, or irritation), unless the cartridges contain an end-of-service-life indicator for the contaminant, or a change-out schedule has been established that would ensure that the cartridge is changed before the service life has ended.

Little protection is provided against particulate contaminants. A rise in the canister or cartridge temperature indicates that a gas or vapour is being removed from the inhaled air. An uncomfortably high temperature indicates a high concentration of gas or vapour and requires an immediate return to fresh air.

Particulate Removing Respirator

Particulate-removing respirators are equipped with filter(s) to remove particulate matter from the air. The filter may be a replacement part or a permanent part of the respirator. The filter may be of the single-use or reusable type. Particulate filters for non-powered respirators are available in three minimum efficiencies and three classes. The three efficiencies are 95%,99%, and 99.97% (referred to as 100%). The three classes are Class N, Class R, and Class P.

Class N filters are suitable for any particulate not containing oil. Class R and P filters are suitable for any particulate. Particulate filters for powered air-purifying respirators are available in one efficiency only (99.97%), and these filters are designated as He.

Particulate-removing respirators are available in the following inlet configurations:

- a full-face piece respirator that provides protection against eye irritation in addition to providing respiratory protection; and
- quarter- and half-face piece respirators, including a filtering facepiece type.

Protection is provided against non-volatile particles only. No protection is provided against gases and vapours. The following limitations apply:

- Class N filters are not suitable for particulates where oil is present;

- Class R filters are restricted to a maximum of 8-h use or total respirator particulate load of 200 mg;
- Class N and P filters may also have restrictions on their useful life; the manufacturer should be consulted; and
- He filters should be replaced before the airflow falls below the required volume.

Combination Particulate, Vapor and Gas Removing

Combination particulate- and vapour/gas-removing respirators are equipped with cartridge(s) or canister(s) to remove particulate matter, vapours, and gases from the air. The filter may be a permanent or a replaceable part of a cartridge or canister. The limitations of both vapour/gas- and particulate-removing air-purifying respirators apply.

COMBINATION ATMOSPHERE-SUPPLYING AND AIR-PURIFYING RESPIRATORS

An atmosphere-supplying respirator with an auxiliary air-purifying attachment may provide protection in the event that the air supply fails. A combination atmosphere-supplying respirator with an auxiliary air-purifying element may be used only when the concentration of airborne contaminants in the workplace does not exceed the maximum use concentration of the respirator when used in the air-purifying mode.

G-4: Quantitative Respirator Fit Test

G-4.1: Health and Safety Issues

To date, CSA is not aware of any study that concluded that the use of CSA approved qualitative fit test protocols present a danger to the health and safety of the person conducting the QLFT or of the test subject when they are conducted in the prescribed manner. Unique issues associated with each challenge agent are addressed in the respective QLFT protocols. Refer to the manufacturer's MSDS for appropriate handling and disposal procedures of the challenge agents.

Diligence in adhering to the protocols will ensure that the respirator user is fitted and assigned a respirator that is protective within the specifications and limitations defined and/or referenced in the CSA Standard Z94.4-02.

G-4.2: Introduction of QLFT to Respirator Users

The person conducting the QLFT shall address the following topics with the test subject:

- an explanation of the QLFT procedure, the reasons it is required, and the importance of using a respirator that provides an effective, reproducible face-to-face piece seal;
- explanations of the importance of the test to convince the test subject to co-operate fully in the QLFT;
- a description of the challenge agent used in the QLFT and how to identify it;
- selection by the test subject of a properly fitting and comfortable respirator from those that are appropriate to the application;
- the respirator being equipped with the appropriate filters and/or chemical cartridges for the challenge agent being used;
- the necessity for the test subject to successfully complete the positive or negative pressure user seal check with the selected respirator prior to proceeding with the QLFT;
- proper donning of the respirator in accordance with the manufacturer's instructions;
- the necessity, during the QLFT, to wear other personal protective equipment that the test subject may be required to use in the workplace that may affect the face-to-face piece seal;
- an explanation of the QLFT exercises and how to perform them during the QLFT;
- the importance of using, in the workplace, the specific brand, model, and size of face piece that was used to pass the QLFT; and
- the necessity to always inspect a respirator before using it in order to ensure that it is in proper working condition.

G-4.3: Selection and Assessment of Respirators

Each face piece represents a different size and shape. The test subject shall select the most comfortable face piece from a variety of appropriate models and sizes. The test subject is to hold each face piece against their face and chooses one that they feel will

provide the best fit and comfort. The test subject shall be shown how to don a respirator, how to position it on the face, how to set strap tension, and how to assess a comfortable fit. A mirror shall be available to assist the subject in evaluating the fit and positioning of the respirator. If the appropriate face piece for the application cannot be found, a protective alternative shall be made available. A small percentage of users will not be able to use any tight-fitting face piece.

The more comfortable face pieces are recorded and the most comfortable face piece is donned and worn at least 5 min to assess comfort. Assessment of comfort shall include reviewing the following points with the test subject:

- proper placement of the chin;
- fit and position of the face piece on the nose (if a half face piece);
- strap tension;
- accommodation of spectacles and/or eye protection, without adversely affecting face-to-face piece seal;
- intelligible speech without an obvious break in the face-to-face piece seal;
- tendency for the face piece to slip (stability);
- full contact of the sealing surface of the face piece to the face;
- self-observation in the mirror; and
- time for assessment of comfort in relation to the face-to-face piece seal.

Consideration should be given to the respirator configuration (eg, with combination cartridges) that is to be worn in the test subject's workplace, including other protective equipment The test subject shall be told to seat the face piece by rapidly moving the head side to side and up and down, within a comfortable speed range and motion. The test subject shall perform the positive-pressure and/or negative-pressure user seal checks. Failure of the user seal check shall be cause to select an alternative respirator. Upon obtaining a successful user seal check, the subject is then ready for fit testing. After passing the fit test, the test subject shall be questioned again regarding the comfort of the respirator. If it has become uncomfortable, another model of respirator shall be tried. The user shall be given the opportunity to select a different face piece and be retested if during the on the-job use the chosen face piece becomes increasingly uncomfortable.

G-4.4: Fit Test Exercises

The following exercises shall be performed while the person conducting the QLFT challenges the respirator seal with the test agent. Each exercise described as follows shall be performed for at least 30 seconds;

- normal breathing;
- deep breathing. Be certain breaths are deep and regular;
- turning head from side to side. Be certain movement is complete, within the test subject's comfortable range of motion. Alert the test subject to inhale and exhale when the head is at either side and to avoid bumping on the shoulder;
- nodding head up and down. Be certain that the test subject's movements are complete, within a comfortable range of motion. Alert the test subject to inhale when the head is in the fully up position, to exhale when the head is in the fully down position, and to avoid bumping the respirator on the chest;

- talking. Talk aloud and slowly for the duration of this exercise. The person being tested should be instructed to talk about a subject that is relevant to work activities, or if they wish they can read the Rainbow Passage:

  > *"When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow";* and

- normal breathing.

G-4.5: Irritant Smoke (Stannic Chloride) QLFT Protocol

INTRODUCTION

The sensitivity screening test and the QLFT procedure for the irritant smoke protocol requires exposure of the test subjects to challenge concentrations of irritant smoke containing hydrogen chloride in excess of regulated OEL and maximum use concentration for certain types of respiratory protective equipment. The person conducting the QLFT may also be exposed. The person conducting the QLFT and the test subject must be aware of this fact.

The test subject shall not be placed in a hood or enclosure during the irritant smoke fit testing. The irritant smoke sensitivity screening test and the QLFT shall be performed in a location with exhaust ventilation sufficient to prevent contamination of the testing area or contamination of the ventilation system.

The person conducting the QLFT shall ensure that the test subject has successfully completed a positive or negative-pressure user seal check.

The prescribed QLFT protocol shall be used to ensure a controlled exposure to the challenge agent. Avoid continuing to expose the test subject as soon as it is evident that they do not react to the test agent.

PREPARATION OF THE QLFT IRRITANT SMOKE TUBE

Preparation of the QLFT irritant smoke tube shall be as follows:

- Use the tube breaking tool provided by the manufacturer to break both ends of a glass irritant smoke tube.
- Attach a short length of rubber tubing to the outlet end of the irritant smoke tube.
- Attach the other end of the irritant smoke tube to the tubing and aspirator bulb provided by the manufacturer.
- To produce smoke for the fit test, gently squeeze the aspirator bulb to force air through the irritant smoke tube.

Appropriate hand and eye protection should be worn while breaking the tube.

SENSITIVITY SCREENING TEST

The test subject shall be exposed to a weak concentration of the irritant smoke to become familiar with its characteristic odour in the following manner. By squeezing the aspirator bulb to create positive-pressure air flow through the irritant smoke tube, the person conducting the irritant smoke sensitivity-check generates a weak concentration of the irritant smoke within approximately 1 m of the test subject. The test subject then brings a handful of the smoke to within approximately 20 cm of the nose and inhales gently. The result should be a slight involuntary cough or verbal acknowledgement of the odour of the smoke.

RESPIRATOR SELECTION

Respirators shall be selected as described in B-2.3, except that each respirator shall be equipped with combination organic vapour/acid gas and HEPA filter cartridges; N-100, R-100, or P-100 filters may replace the HEPA filter component of the combination cartridge.

FIT TESTING

When conducting QLFT on subjects using half-facepiece respirators, advise the test subjects that the smoke can be irritating to the eyes. Instruct the QLFT subject to keep his or her eyes closed throughout the complete test and until the conductor of the QLFT instructs them the test has been completed. When conducting QLFT on subjects using full-facepiece respirators, the test subjects may keep their eyes open throughout the QLFT.

The qualitative fit test utilizing the irritant smoke method shall be done in the following manner:

- Remind the test subjects to ensure their eyes remain closed if they are using a quarter- or half-facepiece respirator for the test;
- Obtain verbal confirmation from the test subject that this instruction is understood;
- Using the aspirator bulb provided with the irritant smoke kit, the person conducting the QLFT directs the stream of irritant smoke from the tube towards the respirator face-to-facepiece seal area on the test subject. Start from a distance at least 300 mm from the facepiece and gradually move to within approximately 50 mm, moving around the entire perimeter of the facepiece while continuing to generate only sufficient irritant smoke to challenge the periphery of the facepiece seal.;
- Gradually direct the smoke around the entire perimeter of the face-to-facepiece seal of the respirator, paying particular attention to the areas under the chin and in the area of the bridge of the nose if quarter- or half-facepiece respirators are involved;
- Avoid directing the irritant smoke directly into the air-purifying element(s) of the respirator.

The exercises described in B-2.4 shall be performed while the person conducting the fit test challenges the respirator seal with the test agent. Each exercise shall be performed

for 30 s. The person conducting the QLFT shall control the stream of smoke as described by the supplier of the kit.

If the test subject detects the irritant smoke, the person conducting the QLFT shall stop the test and attempt to determine the reason for and the location of the leak. If possible, the person conducting the QLFT should attempt to correct the cause of the leak and repeat the test. If the repeated QLFT is unsuccessful, then the test respirator is rejected and another respirator shall be selected and the QLFT repeated.

When a test subject passes the irritant smoke fit test without evidence of a response, the person conducting the fit test shall repeat the sensitivity screening test using the smoke from the same irritant smoke tube used in the QLFT to confirm their reaction to the smoke. If the test subject fails to recognize the characteristic odour, the result of this QLFT shall be considered void.

G-5: Guidelines for the Selection, Installation, Maintenance, and Cleaning of Compressor/Purification- Type Breathing Air Systems

G-5.1: Introduction

The following guidelines on the fundamentals of the selection process and the basic requirements for safe installation, maintenance, and cleaning procedures are provided to assist the Project Manager and Site Superintendent in complying with the requirements of this CSA Z180.1-00 *Compressed Breathing Air and Systems*. This information is in addition to the Manufactures recommendations. In the event of conflict between B-5 and manufactures recommendations, the manufactures recommendations take precedent.

G-5.2: Selection

Three important factors should be carefully considered when selecting a compressed breathing air system:

- the operating (or working) pressure (specific to each model of air-line respirator);
- the output airflow rate capacity (compressor must match range required for proper function of respirator model. Required output flow rate also dependent on number of airlines per compressor and hose length/diameter); and
- the air storage capacity required for the end-user application.

The type and size of compressor and/or purification system selected will limit output airflow rates at the specified pressure. By working closely with the manufacturer and/or supplier, ensure that:

- the compressor output matches both the purification system's volume and pressure rating capabilities; and
- the complete system has the capacity to supply all of the compressed breathing air requirements at the rated pressure to all air-supplied respirators that will be used on the air distribution system under normal and emergency conditions.

The selection process should take into account current, future, and anticipated emergency requirements.

Minimum airflow rate requirements for air-supplied respirators can vary from 114 L/min (4 cfm) (for tight-fitting facepieces) and 170 L/min (6 cfm) (for loose-fitting helmets/hoods) to a maximum of 425 L/min (15 cfm) at rated pressures ranging from 241 kPa (35 psig) to 827 kPa (120 psig). If supplied-air suits are being used, the airflow rates could increase significantly. For specific airflow rates and pressure ratings, contact the manufacturer or supplier of the equipment being used.

When selecting a compressor/purification system, ensure the equipment can effectively remove liquid condensate and water vapour. Water vapour is a prime contaminant in compressed breathing air systems. Condensed water can trap and carry other contaminants.

For more detailed information on the selection process for compressed breathing air systems, refer to NIOSH Guide to Industrial Respiratory Protection (September, 1987), DDHS (NIOSH) 87-116, Appendix F, Breathing Air Systems for Use with Pressure-Demand Supplied Air Respirators in Asbestos Abatement".

G-5.3: Operating Pressures

Low-pressure systems operate in the range of 345-1379 kPa (50-200 psig). Medium-pressure systems generally operate in the range of 2.1 – 10.3 MPa (300-1500 psig). High-pressure systems operate in the range of 13.8 – 41.4 kPa (2000-6000 psig). Consider selecting a compressor and/or purification system that is rated at a much higher pressure than is required at the point of usage (i.e., respirator face-piece). Higher operating pressures will allow the compressor and purification/filtering systems to remove the contaminants form the air more effectively, allow the storage of a greater volume of air in a smaller area, and compensate for pressure drop when air is delivered through long lengths of pipeline.

G-5.4: Air Output Rates

Low-pressure and medium-pressure air compressors generally have air output rates ranging from 283 L/min (10 cfm) to 14,158 L/min (500 cfm). High-pressure compressors deliver air in the range of 142-,7,079 L/min (5-250 cfm).

G-5.5: Air Compressor System

Multi-stage, oil-lubricated, reciprocating air compressors, driven by electric motors or internal combustion engines, are the most commonly used equipment in compressed breathing air applications. If the compressor is electric motor-driven, ensure the appropriate rated electrical power is available at the point of installation and that the electrical wiring, starter, compressor motor, controls, alarms, etc, conform to the provisions of the local electrical code. Always consult the manufacturer when supplying power from a generator to ensure that the compressor is not damaged.

G-5.6: Carbon Monoxide Danger

Internal combustion engines can produce high levels of deadly carbon monoxide in the exhaust gases. If an internal combustion engine-driven compressor is selected, it is very important to make sure that the exhaust gases are not ingested into the compressor air intake.

Mobile breathing air compressor systems driven by internal combustion engines shall be equipped with monitoring equipment to detect carbon monoxide contamination in the breathing air. The monitoring shall have a 5 mL/m3 (ppm) CO level audiovisual alarm and have an automatic shutdown device that: activates when the concentration of carbon monoxide exceeds the acceptable exposure level determined by the authority having jurisdiction. The carbon monoxide monitor shall be calibrated to the manufacturer's specifications, and written calibration records shall be kept.

G-5.7: Other Features

The reciprocating compressor is available with either an air-cooled or water-cooled system. Standard compressor equipment shall include, but not necessarily be limited to:

- inter-stage coolers and after-coolers;
- low-oil-pressure shutdown switch with light and alarm;
- high-compressor temperature switch with light and alarm;
- hour meter for monitoring operating time;
- final stage pressure gauge;
- on-off magnetic starter switch;
- automatic pressure shutdown switch; and
- drain traps with drain valves and pressure-relief valves on each stage.

G-5.8: Safety Features

In order to enhance the overall efficiency and safe operation of the system, the inclusion of the following additional equipment should be considered:

- automatic condensate drain system to allow trapped oil and water condensate to be automatically flushed out into a drain collection box while the compressor is operating and on shutdown;
- complete set of air-pressure gauges to monitor all stages of compression and oil pressure: this allows the operator to easily and quickly check that the compressor is performing within the manufacturer's specifications. The gauges are also very useful during troubleshooting procedures;
- electronic cartridge monitoring system with alarm light and automatic compressor shutdown switch: this will allow the operator to confirm that the purification cartridges are actually in the chamber and installed correctly, and also alert the operator when the cartridges are contaminated with water; and
- countdown controller with alarm light and audible alarm that will automatically shut down the compressor and alert the operator to change the purification cartridge(s).

G-5.9: Air Purification Systems

The purification system shall be capable of continuously eliminating harmful matter in order to produce compressed breathing air that meets the requirements of CSA Z180.1-00 *Compressed Breathing Air and Systems.* This requires that the purification system be correctly installed in an area providing ample space on all sides to ensure good ventilation and maintenance accessibility. The purification system shall be placed in an area in accordance with the manufacturer's instructions.

G-5.10: Purification Elements

The effectiveness of the typical air-purification train requires that the purification elements making up the system be placed in the correct sequence. A basic unit shall consist of

- a coalescing filter with a manual or automatic liquid drain and coarse particulate filter (designed to remove liquid water and oil, mists, and some particulate matter); followed by
- several chemical sorbent beds, such as a molecular sieve (designed to trap water; may also have the capacity to remove certain acid gases and reduce the concentration of carbon dioxide), activated carbon (for removing certain organic vapours/odours), and a catalytic bed (to convert carbon monoxide to carbon dioxide); followed by
- a fine particulate filter (to trap "fines" that may break away from the sorbent beds).

It is essential to protect the activated charcoal and the catalytic beds from water vapour contamination. Water contamination of the chemical beds renders them ineffective in removing contaminants. Some low-pressure purification systems do not dehydrate the air. To ensure the delivery of dry air into the breathing air pipelines, the inclusion of a regenerative desiccant or refrigerant dryer may be appropriate. Dry air will reduce the possibility of ice blockage in the pressure-reduction system of the air-supplied respirator, reduce the frequency of system maintenance to correct corrosion and contamination caused by water condensate, and extend the life of the sorbent/catalytic beds.

G-5.11: Additional Equipment

Additional equipment that should be considered includes:

- check valves on the inlet and outlet of the purification system to prevent sudden backflow that could damage the purification filter media and chemical sorbent beds;
- cartridge end-of-service life indicator - for example, an electronic indicator with an integral visual/audible alarm and shutdown capability;
- carbon monoxide monitor with an in-the-line sensor connected to the outlet pipeline of the purifier, an integral visual and audible alarm, and the ability to accurately detect and indicate the presence of carbon monoxide in air within the limit specified in CSA Z180.1-00 *Compressed Breathing Air and Systems.* of this Standard; and
- Pressure Maintaining Valve (PMV) to provide back-pressure to the system, prevent pressure loss in the purification chambers, and maintain air flow until a preset shutoff pressure is reached.

G-5.12: Storage Vessels and Cylinders

Air storage vessels and cylinders are available in a broad variety of types, sizes, and pressures, and can be custom-manufactured to meet the needs of the application. It is important to ensure that all pressurized vessels are properly tested, marked, and labelled in accordance with the applicable requirements of local, provincial, and federal regulations. All breathing air storage vessels shall have internal surfaces, valves, fittings, etc, properly cleaned for breathing air use to ensure they are free of contaminants. All pressure vessels shall be periodically inspected and tested in compliance with the applicable standards and regulations.

G-5.13: Deterioration

Stored breathing air, if not changed regularly, may become stale, and if stored wet, may lead to loss of oxygen caused by metal oxidation in steel receivers and cylinders or corrosion in alloy cylinders.

G-5.14: Sources of Information

For detailed information on pressure storage vessels and cylinders and their respective inspection and testing requirements, refer to:

- CSA Standard B340;
- CSA Standard CAN/CSA-B339;
- CSA Standard B51; and
- CSA Standard C-1, C-6, C-6.1 and C-6.2.

APPENDIX H – Safe Work Plans or Policies Amended or Generated Throughout the Project

H-1: Drug and Alcohol Policy

APPENDIX H-1

DRUG & ALCOHOL POLICY

TERMS

Drug and alcohol abuse contributes to billions of dollars of lost productivity and thousands of work place injuries every year. Our policy is to employ a work force free from alcohol abuse or the use of illegal drugs. This company takes drug and alcohol abuse as a serious matter and will not tolerate it. The company absolutely prohibits the use of alcohol or non-prescribed drugs at the work place or while on company premises. It also discourages non-work place drug and alcohol abuse. The use, sale or possession of alcohol or drugs while on the job or on company property will result in disciplinary action, up to and including termination, and may have legal consequences. Employees are expected and required to report to work on time and in appropriate mental and physical condition for work. It is our intent and obligation to provide a drug-free, healthful and safe work environment. Delta reserves the right to demand a drug or alcohol test of any employee based upon reasonable suspicion. Reasonable suspicion includes, but is not limited to, physical evidence of use, involvement in an accident, or a substantial drop off in work performance. Failure to take a requested test may lead to discipline, including possible termination.

The company also cautions against use of prescribed or over-the-counter medication which can affect your work place performance. You may be suspended or discharged if the company concludes that you cannot perform your job properly or safely because of using over-the-counter or prescribed medication. Please inform your supervisor prior to working under the influence of a prescribed or over-the-counter medication which may affect your performance.

Employees must report any conviction under a criminal drug statute for violations occurring on or off the Company's premises while conducting company business. A report of a conviction must be made within two (2) days after the conviction. Delta will make every effort to assist its employees who wish to seek treatment or rehabilitation for drug or alcohol dependency. Conscientious efforts to seek such help will not jeopardize any employee's job and will not be noted in any personnel record. You may also be required to agree to random testing and a “one-strike” rule.

If you have a drug or alcohol problem, please ask for our help!

EMPLOYEE AGREEMENT ON DRUG AND ALCOHOL POLICY

I have read, understand, and agree to comply with the foregoing policies, rules, and conditions. I am aware that violations of this guideline may subject me to disciplinary action, including termination from employment, legal action and criminal liability. I further understand that I have responsibility to maintain a positive representation of the company and govern myself accordingly. Furthermore, I understand that this policy can be amended at any time.

Dated: _____

EMPLOYEE	COMPANY
_____	_____
Authorized Signature	Authorized Signature
_____	_____
Print Name and Title	Print Name and Title

H-2: Firearms and Wilderness Policy

Handlers

Only trained, certified and authorized individuals shall be permitted to handle firearms on the site. As a minimum, all handlers must possess a current Possession only license for non-restricted firearms issued by the Chief Firearms officer of the Territory/Province in which they reside under the authority of the Firearms Act, Statutes of Canada. Handlers must carry this license on their person at all times while using firearms and must be able to produce it upon request. A copy of this certificate shall be retained in the site office as well as in the head office in Yellowknife. All firearms shall be handled in accordance with approved safe handling practices. The principles outlined in the acronyms A.C.T.S and P.R.O.V.E shall be employed at all times while handling firearms. Only a small number of handpicked individuals shall be authorized to handle firearms on site as part of a Wildlife Response Team. Each person who is qualified and authorized to handle firearms on site will have a criminal background check done before being allowed to handle firearms and at 6 month intervals thereafter.

Wildlife Response Team

The Wildlife Response Team shall consist of as many people as necessary in order to provide adequate coverage for all shifts. A Team Leader shall be appointed to oversee all related activities and to direct and coordinate all operations. The team Leader may also appoint an assistant to be in charge in the event of his absence.

Training

Each individual who is chosen to be a member of the Wildlife Response Team shall have either previously attended an approved firearms safety course put on by a reputable instructor, or must do so prior to being permitted to handle firearms on site. Ongoing training for handlers of firearms shall be conducted on a bi-weekly basis beginning April 1st and ending November 30th each year. The training components shall consist of classroom and field instruction as well as range time. The classroom portion shall consist of theoretical aspects related to firearms such as anatomy, cleaning methods and techniques. Field instruction shall focus on the practical aspects of safe handling and shooting. The range time will consist of shooting practice in order to increase accuracy. Clay pigeons may also be employed in order to allow practise on moving targets. Each Wildlife Response Team member shall participate in an initial firearms safety orientation on site and will be informed of this policy and all other rules as they relate to firearms safety and will sign a waiver and release form as well as a firearms orientation acknowledgement form. A firearms safety video will also be shown initially to all team members. A written and practical exam will be created and each team member must pass these tests with a minimum of 80% in order to be allowed to handle firearms. Records of training including exams shall be kept on site and copies forwarded to the head office in Yellowknife. All members of the Wildlife Response Team shall undergo First Aid training. The importance of firearms safety and accident prevention will be continually stressed to all team members throughout all training sessions. All Wildlife Response Team members shall receive annual professional bear safety, awareness and management training including the use of all bear deterrents.

Firing Range

A location sufficiently distant from all buildings, water bodies, people, operations and hazardous materials shall be permanently designated as the firing range. Proper procedures shall be created for range safety and all people using the range shall be made aware of these procedures as part of their training. A Range Master shall be designated and shall be in charge of the range at all times during use of the range. A location with a sufficient natural backstop shall be chosen or one shall be constructed to catch bullets in order to prevent ricocheting.

Firearms Storage

Firearms which are provided to the site shall be stored in the appropriate lockable gun closet and kept unloaded during storage. The cabinet shall be locked at all times except for while the firearm is being removed from or restored to the cabinet. The key for the lockable gun cabinet shall remain in the possession of the primary designated firearm handler; a second key may be issued to a secondary handler upon approval of site management.

Transport

During transport, all firearms shall be kept either in a locked hard cased portable gun storage case or with an approved trigger lock in place. Firearms shall be kept unloaded during transport and stored in a safe location away from heat/ignition sources and in a secure fashion.

Cleaning, Inspection & Maintenance

Firearms shall be cleaned promptly after each use and on a regular basis as the situation may dictate. Cleaning supplies and methods shall be in accordance with the firearm manufacturers' specifications as found in the owner's manual. Firearms shall be stored in a clean and dry environment at all times. All firearms shall be inspected before each use and at regular intervals as required and maintained as per manufacturer's specifications. Any damaged firearm will be immediately removed from service, have the firing pin, bolt or mechanism removed if possible, be tagged out of service and repaired or replaced expeditiously.

Ammunition

Only approved ammunition of the proper type and dimension recommended by the manufacturer shall be used. Ammunition shall be kept clean and dry at all times and shall be kept away from all ignition sources. All ammunition shall be stored in the appropriate gun storage cabinet, in a separate area from the firearms, or in a separate lockable ammunition case specifically designed for that purpose with the lock engaged. All ammunition shall be stored in accordance with Federal and Territorial regulations. During times of transport, ammunition will be stored in a portable ammunition case with the lock engaged and in a safe location. Spent casings shall be collected and deposited in the site landfill in a non-burnable location.

PPE

The use of appropriate Personal Protective Equipment will be employed at all times during firearms use whether for training, practice or actual wildlife management purposes. Appropriate PPE shall consist of the following: Safety glasses and Hearing protection of the muff variety.

Wildlife Response Plan

A wildlife response plan shall be created and all members of the Wildlife Response Team shall be trained on their roles during an emergency situation. This plan will include protocols pertaining to what the appropriate response is for encounters, attacks and sightings. A more basic plan will be drawn up which will contain information pertaining to the actions to be taken by camp residents during an attack or encounter; this plan will be posted in conspicuous locations throughout camp and will be brought to the attention of all camp residents. Job Hazard Analyses shall also be created for wildlife encounters and for handling, carrying and using firearms which will be reviewed and signed by all Wildlife Response Team Members.

Remote Wilderness Operations

Firearms will not be issued to individuals or groups performing work in remote wilderness locations. An armed and dedicated Bear Monitor who is a member of the Wildlife Response team will be provided for purposes of protection for individuals or groups who must perform remote site work. All individuals who must perform work in remote sites shall receive wilderness training including wilderness first aid, bear safety and awareness and shall be trained in the use of all bear deterrents. All individuals working in remote locations will sign out a bear belt which will be worn at all times while out in the field. A first aid kit, GPS, compass, maps as well as a means of communication with the camp and any other emergency or safety equipment necessary shall be taken along. A Job Hazard Analysis will be completed and signed off by all people involved in the remote site work. A work plan will be created and submitted by all groups needing to perform remote site work which will include critical information such as location, times, nature of work check in intervals etc. which will be approved and signed off by site management/safety prior to setting out.

Bear Monitors

A bear monitor shall be a member of the Wildlife Response team and shall have undergone the previously mentioned training and certification process. A bear monitor shall not engage in any other activities while acting as a bear monitor that would take their focus our attention away from bear monitoring duties.

Sightings & Encounters

All bear sightings and encounters shall be reported and the details recorded in a permanent log. A detailed log shall also be kept of all bear monitoring activities. Details relating to discharges of firearms shall be recorded and reviewed periodically. All wildlife issues including but not limited to bear encounters, visits to buildings and incinerators shall be promptly reported to a wildlife officer located in Kuglutuk, NU.

Deceased Wildlife

Deceased wildlife shall also be reported and recorded. No person shall approach any dead wildlife due to the potential for predacious animals to be nearby. In the event that a deceased animal must be handled or relocated, a bear monitor will be deployed with the clean-up crew to stand guard and monitor for any predatory activity. The appropriate PPE for handling deceased wildlife will be donned including rubber gloves.

H-3: Policy on Harassment, Violence and Discrimination

Legal Requirement:
http://www.hrsdc.gc.ca/en/gateways/nav/top_nav/program/labour.shtml

Philosophy and Commitment
Delta recognizes the diversity of its employees and is committed to providing a workplace where all individuals are treated with fairness, respect, dignity and respect.

Delta recognizes that harassment, whether based on race, creed, colour, sex, marital status, nationality, ancestry, place of origin, age disability, family status, political beliefs, sexual preference or religion is discrimination.

Delta is committed to providing a work environment where there is respect amongst co-workers and the provision of a flexible conflict resolution system that offers effective solutions to workplace conflicts.

Delta is committed to providing a safe workplace where any form of violence or horseplay considered a breach of conduct for employment.

Nothing in this policy shall deem to restrict the authority of managers in performance review, counselling, disciplinary action or other appropriate interactions between employees and supervisors. This policy applies to every employee, contractor, and visitor in the service of Delta.

Actions

Delta Engineering maintains a zero tolerance for harassment, violence and discrimination on our project sites and the work place. Any person observed and proven to have breached these policies will be immediately removed from the work place. Any complaint submitted to a supervisor will be investigated immediately by the superintendent and Project Manager. The outcome of the investigation will be shared with the complainant and appropriate actions taken.

Violence on the job site will result in immediate dismissal of all parties involved and report generated by the Superintendent and delivered to the Project Manager for action.

H-4: First Aid Equipment, Facilities, Services and Qualifications

To provide for the proper treatment and transportation of persons who may be injured at work, Delta shall supply and make readily accessible to employees, as a minimum, the first aid equipment, supplies, facilities and services specified by the *NUNAVUT Safety Act and Regulations.*

All first aid equipment, supplies and facilities shall be kept clean, dry and ready for use. All equipment and supplies listed in the tables below shall be checked weekly and maintained or replenished as necessary. This will be documented in the forms provided at the end of this section. If any deficiencies are noted, the medic or person in charge of the first aid facility shall place an order to replenish the supplies and equipment.

All first aid equipment shall meet the requirements of Schedules 1, 2 and 3 unless the *NU Health and Safety Act and Regulations* specify otherwise or unless the chief inspector orders otherwise.

Each employee shall be made aware of the location of first aid for his or her worksite and how to call for first aid. This will be instructed during the Worker Orientation Seminar. This seminar is to be given to all employees, department representatives and visitors.

Signs clearly indicating the location of, and how to call for, first aid shall be posted conspicuously throughout the project site.

The manager shall ensure that a first aid facility is in the charge of a person who:

A. Has the qualifications specified in Schedule 3.1 of the NUNAVUT Safety Act and Regulations for the number of persons at the site, or an equivalent or greater qualification or certificate; as follows:

Table 19: Requirements and Qualifications of First Aid Attendants

Number of Persons at Mine Site	Qualifications
1 to 8	Holder of a current St. John Ambulance Standard First Aid Certificate or Canadian Red Cross Standard First Aid Certificate.
9 to 20	Holder of a current St. John Ambulance Advanced First Aid, Level 1 Certificate or Canadian Red Cross First Responder Certificate (for a two week course).
21 to 60	Holder of a current St. John Ambulance Advanced First Aid, Level 2 Certificate or Canadian Red Cross First Responder Certificate (for a two week course).
More than 60	Medical professional, including a doctor, nurse, paramedic or emergency medical technician, who is currently certified or registered by a Canadian jurisdiction and holds a current St. John Ambulance Advanced First Aid, Level 2 Certificate, or a Canadian

	Red Cross First Responder Certificate (for a two week course).

B. Shall only perform duties which allow the prompt response to a request for first aid and rendering of first aid in a clean and sanitary condition; and is suitable trained to administer first aid in any area of a site.

C. There shall be an effective means of communication between the medic or person in charge of the first aid facilities and all worksites to be served.

The first aid facility shall be adequately illuminated, heated and ventilated.

1) First aid equipment and supplies shall be provided and maintained at the following places (if applicable):

a. Refuge stations
b. Shaft stations
c. Underground and surface workshops
d. A worksite where diamond drilling equipment is used
e. Collars
f. Control rooms in mills and concentrators
g. Other places where required by an inspector

2) The equipment and supplies required at the above locations shall meet the requirements of *Schedule 1* of the *NUNAVUT Safety Act and Regulations* and shall be checked weekly and maintained or replenished as necessary. Schedule 1 equipment and supplies is as follows:

Table 20: Schedule 1 of the NWT NUNAVUT Safety Act and Regulations

Quantity	Equipment/Supply Name (Schedule 1)
Other than the *basket stretcher* and the *blankets*, the following items shall be kept in a container that can be readily be taken to the scene of an injury:	
1	Current edition of the manual *First Aid-Safety Oriented*
5 pairs	Latex gloves
200	Adhesive bandages, assorted sizes
1	Sterile bandage compress, 10.2 cm
4	Bandage compresses, 20.32 cm
1 package of 12	Sterile burn dressings
6	Sterile gauze eye pads
1 package	Package of roller bandages, 2.54 cm
3	Triangular bandages
12	Large safety pins
1	Plastic eye shields
1 package	Flexible metallic splints
1 pair	Scissors
1	Basket stretcher

Quantity	Equipment/Supply Name (Schedule 1)
1	Treatment record book
2	CPR pocket valve masks
6	Sterile bandages, 10.2 cm
5	Bandage compresses, 15.24 cm
5	Sterile gauze bandages, 91.4 cm
1	Elastic bandage, 7.5 cm x 15 cm
10	Roller bandages, 5.1 cm x 5.5. m
1	Roll of adhesive tape, 2.5 cm x 2.3 m
3	Crepe bandages, 7.6 cm long
2 boxes of 6	Antiseptic towelettes
12	Sterile pads, 5.08 cm
1	Nail brush
1	Tweezers
3	Blankets

3) The Medic or the person in charge of a first aid facility shall maintain a record of each check completed of the supplies listed in section 2 above.

In addition to the items required under *Schedule 1* of the *NUNAVUT Safety Act and Regulations*, the following items shall be kept at a first aid facility referred to in section 8.48 of the Act and Regulations:

Table 21: Schedule 2 of the NUNAVUT Safety Act and Regulations

Quantity	Equipment/Supply Name (Schedule 2)
3	Chemical cold packs
5	Envelopes of skin closures, 0.6 cm x 7.5 cm
48	Gauze pads, 7.62 cm
2	Rolls of adhesive tape, 2.5 cm x 2.3 m
6	Crepe bandages, 7.6 cm
1	Antiseptic soap, 50 mL
1	Glass eye dropper
2	Plastic eye shields
1 pair	Thin nose sliver forceps
2 packages	Flexible metallic splints
1	Small kidney basin
1 set	Adjustable cervical collars
1	Plywood spine board with handholds (2 sides levelled), 44 cm x 1.8 m x 2 cm
7	Heavy Velcro straps to secure injured person, 5 cm x 1.8 m
2 sets	Splints each including: 2 splints, 1 cm x 10 cm x 1 m plywood notched and 2.5 cm padding 1 splints, 1 cm x 10 cm x 1.5 m plywood notched and 2.5 cm padding
1	Portable oxygen therapy unit (may be kept in a separate container from the other supplies)
1	Pocket mask with a one-way valve (may accompany the portable oxygen therapy unit)
1	Oropharyngeal airway kit (may accompany the portable oxygen therapy unit)

Quantity	Equipment/Supply Name (Schedule 2)
1	Manually operated self-inflating bag-valve mask unit with an oxygen reservoir (may accompany the portable oxygen therapy unit)
1	Bed
1	Bedpan
6	Sterile pads, 7.6 cm
6	Bandage compresses, 5.08 cm
6	Abdominal pads, 30.48 cm
2	Esmarch bandages, 7.62 cm
1	Eyewash solution, 50 mL
1	Glass footed eye bath cup
12	Tongue depressors
1	Burn trauma kit

Where the time for the stabilization treatment of an injured person may be longer than two hours, unless circumstances of the injury dictate otherwise, suitable arrangements will be made to ensure the comfort and treatment of the injured patient.

Schedule 3 of the *NWT NUNAVUT Safety Act and Regulations* states:

Where the time for surface transportation of a person from a site to the nearest hospital is 20 minutes or less, the owner shall provide a first aid facility that is provided with the first aid equipment and supplies that meet the requirements of *Schedule 3.* As such, Delta will have a first aid facility that is equipped and supplied with the following items:

Table 22: Schedule 3 of the NUNAVUT Safety Act and Regulations

Quantity	Equipment/Supply Name (Schedule 3)
In addition to the items required under Schedule 1, for the purposes of section 8.50 of the NUNAVUT Safety Act and Regulations, the following items shall be kept in a container which can readily be taken to the scene of an injury.	
1 set	Adjustable cervical collars
1 set	Splints each including: 2 splints, 1 cm x 10 cm x 1 m plywood notched and 2.5 cm padding. 1 splints, 1 cm x 10 cm x 1.5 m plywood notched and 2.5 cm padding.
1	Portable oxygen therapy unit (may be kept in a separate container from the other supplies).
1	Oropharyngeal airway kit (may accompany the portable oxygen therapy unit).
1	Manually operated self-inflating bag-valve mask unit with an oxygen reservoir (may accompany the portable oxygen therapy unit).
1	Treatment record book.

At a mine site:

a) All persons engaged in supervision
b) All persons engaged in mine rescue
c) All persons who are members of fire response teams

d) One-fifth of the total number of the employees underground, and
e) One-tenth of the total number of employees on the surface

Shall be trained in first aid and hold a current and valid certificate at least equivalent to the St. John Ambulance Standard First Aid certificate, and shall be trained in cardiac pulmonary resuscitation or to such other level as may be agreed to by the chief inspector of the mine site.

First Aid Supplies Inventory Form

All first aid equipment, supplies and facilities shall be kept clean, dry and ready for use. All equipment and supplies listed in the tables below shall be checked weekly and maintained or replenished as necessary. This will be documented in the forms provided herein. If any deficiencies are noted, the medic or person in charge of the first aid facility shall place an order to replenish the supplies and equipment.

H-4.1: Inventory Form for Schedule 1 of NU Mines Act

Quantity	Equipment/Supply Name (Schedule 1)	Deficiencies Noted (place checkmark if there are no deficiencies)	Assess Date and Name of Assessor
Other than the *basket stretcher* and the *blankets*, the following items shall be kept in a container that can be readily be taken to the scene of an injury:			
1	Current edition of the manual *First Aid-Safety Oriented*		
5 pairs	Latex gloves		
200	Adhesive bandages, assorted sizes		
1	Sterile bandage compress, 10.2 cm		
4	Bandage compresses, 20.32 cm		
1 package of 12	Sterile burn dressings		
6	Sterile gauze eye pads		
1 package	Package of roller bandages, 2.54 cm		
3	Triangular bandages		
12	Large safety pins		
1	Plastic eye shields		
1 package	Flexible metallic splints		
1 pair	Scissors		
1	Basket stretcher		
1	Treatment record book		
2	CPR pocket valve masks		
6	Sterile bandages, 10.2 cm		
5	Bandage compresses, 15.24 cm		
5	Sterile gauze bandages, 91.4 cm		
1	Elastic bandage, 7.5 cm x 15 cm		
10	Roller bandages, 5.1 cm x 5.5. m		
1	Roll of adhesive tape, 2.5 cm x 2.3 m		
3	Crepe bandages, 7.6 cm long		
2 boxes of 6	Antiseptic towelettes		
12	Sterile pads, 5.08 cm		
1	Nail brush		
1	Tweezers		
3	Blankets		
Site Location: **(i.e.: Medical Accommodation)**			

H-4.2: Inventory Form for Schedule 2 of NWT Mines Act

Quantity	Equipment/Supply Name	Deficiencies Noted (place checkmark if there are no deficiencies)	Assessment Date and Name of Assessor
3	Chemical cold packs		
5	Envelopes of skin closures, 0.6 cm x 7.5 cm		
48	Gauze pads, 7.62 cm		
2	Rolls of adhesive tape, 2.5 cm x 2.3 m		
6	Crepe bandages, 7.6 cm		
1	Antiseptic soap, 50 mL		
1	Glass eye dropper		
2	Plastic eye shields		
1 pair	Thin nose sliver forceps		
2 packs	Flexible metallic splints		
1	Small kidney basin		
1 set	Adjustable cervical collars		
1	Plywood spine board with handholds (2 sides levelled), 44 cm x 1.8 m x 2 cm		
7	Heavy Velcro straps to secure injured person, 5 cm x 1.8 m		
2 sets	Splints each including: 2 splints, 1 cm x 10 cm x 1 m plywood notched and 2.5 cm padding 1 splints, 1 cm x 10 cm x 1.5 m plywood notched and 2.5 cm padding		
1	Portable oxygen therapy unit (may be kept in a separate container from the other supplies)		
1	Pocket mask with a one-way valve (may accompany the portable oxygen therapy unit)		
1	Oropharyngeal airway kit (may accompany the portable oxygen therapy unit)		
1	Manually operated self-inflating bag-valve mask unit with an oxygen reservoir (may accompany the portable oxygen therapy unit)		
1	Bed		
1	Bedpan		
6	Sterile pads, 7.6 cm		
6	Bandage compresses, 5.08 cm		
6	Abdominal pads, 30.48 cm		
2	Esmarch bandages, 7.62 cm		
1	Eyewash solution, 50 mL		
1	Glass footed eye bath cup		
12	Tongue depressors		
1	Burn trauma kit		

Site Location: **(i.e.: Medical Accommodation)**

H-4.3: Inventory Form for Schedule 3 of NWT Mines Act

Quantity	Equipment/Supply Name	Deficiencies Noted (place checkmark if there are no deficiencies)	Assessment Date and Name of Assessor
In addition to the items required under Schedule 1, for the purposes of section 8.50 of the NUNAVUT Safety Act and Regulations, the following items shall be kept in a container which can readily be taken to the scene of an injury.		(Place checkmark here if the below listed supplies are in a container)	
1 set	Adjustable cervical collars		
1 set	Splints each including: 2 splints, 1 cm x 10 cm x 1 m plywood notched and 2.5 cm padding. 1 splints, 1 cm x 10 cm x 1.5 m plywood notched and 2.5 cm padding.		
1	Portable oxygen therapy unit (may be kept in a separate container from the other supplies).		
1	Oropharyngeal airway kit (may accompany the portable oxygen therapy unit).		
1	Manually operated self-inflating bag-valve mask unit with an oxygen reservoir (may accompany the portable oxygen therapy unit).		
1	Treatment record book.		
Site Location: **(i.e.: Medical Accommodation)**			

H-5: Cold Weather Survival

Safety Gear

The following will be available in each work vehicle and ATV in case personnel are stranded in cold weather conditions when working in remote locations away from the main camp.

- ✓ 2-way radio;
- ✓ Sleeping bag;
- ✓ Gloves;
- ✓ Solar blanket or Wool blanket;
- ✓ Waterproof matches;
- ✓ 8 hour candles;
- ✓ 30 minute high-intensity light stick;
- ✓ Emergency body heat packs;
- ✓ Shovel;
- ✓ Axe;
- ✓ 100' nylon rope, and tow rope; and
- ✓ First aid kit;

Site Procedures

In the event that short term extreme cold temperatures (-40 °C) are experienced on-site, personnel shall be instructed to:

- ✓ Stay inside camp structures until weather warning is nullified by Site Supervisor;
- ✓ Check the heating oil level on the oil-fired heaters – if heating oil levels are low, notify Site Supervisor, or move to another heated structure;
- ✓ Ensure snow does not build up against the door of each camp structure – shovels to be used to remove snow build-up;

In the event of long-term extreme cold temperatures (-40 °C), the Site Supervisor shall call for a chartered plane or helicopter to retrieve crew from site, and site shall be evacuated.

H-6: Breakthrough through ice

Personnel should be aware of the following, to be properly aware and informed about what may happen during a breakthrough event.

a) Immediately upon submersion into ice water, the victim involuntarily intakes a sudden gasp of air, referred to as the cold gasp reflex. If the victims head is underwater when the gasp takes place, this will result in instant drowning.
b) The person will continue to hyperventilate for one to two minutes; this is normal and will subside.
c) The person will have good control of their hands and limbs for five to seven minutes. After that point, the victim will be unable to grasp onto ropes or reaching aids.

d) Humans will not become even mildly hypothermic for a full 15 minutes when submerged in cold water. If capable of floating or otherwise remaining on top of the water, humans will survive one hour or more in ice water.
e) The body naturally redirects warm blood from the hands and limbs to the inner core in an attempt to preserve heat. While this preserves the vital organs, it also deprives the victim of their ability to swim. The overwhelming majority of ice water victims die by drowning, not hypothermia.

Self-Rescue Techniques (not vehicle mounted)

a) Immediately upon entering the water, relax and control breathing. Your clothing will provide some measure of buoyancy.
b) Turn and swim back in the direction you initially traveled from; the distance to that ice is known and was capable of supporting your weight up to the area you broke through.
c) Swim as quickly as possible to the ice edge; your clothing will begin absorbing water, making swimming and extracting from the ice more difficult.
d) If carrying ice picks, use them. The time and effort to recover these tools from your clothing, and while your hands still have dexterity are worthwhile.
e) Raise your feet horizontal with the ice, begin kicking hard and pull yourself onto the ice. Maintain a horizontal position when moving onto and across the ice to distribute your weight.
f) The ice edge may be weakened due to the wave action of your submersion, you may continue breaking through the edge for several feet. Continue working in the same direction; do not move to a different area.
g) If unable to extract yourself from the water, hold onto the edge and stop moving. Allow your clothing to freeze onto the ice to ensure you stay in place, allowing rescuers an opportunity to reach you.
h) Once out of the water, roll or crawl until you are sure you are on solid ice.
i) Immediately get into a heated vehicle or shelter.
j) Remove wet clothing.
k) Immediately report the incident and request medical support.

Extraction Drills from Vehicles

a) Do not panic. Although every situation is unique, the majority of vehicles that break through ice either float for several seconds to minutes or become partially hung up on ice. Floatation times vary according the vehicle type, degree of air tightness and cargo.
b) Exit the vehicle as quickly as possible. Do not wait for the vehicle to stop moving or fill up with water.
c) If the doors cannot be opened, exit through the side window. If necessary, kick out the windshield and exit.

If the Vehicle is Hung Up or Floating

a) If possible, avoid becoming wet. If able to step directly onto ice, immediately adopt a horizontal position and crawl, log roll or slide away from the vehicle.

b) If unable to step directly onto the ice, enter the water slowly, and control your breathing.
c) Move away from the vehicle quickly. Large objects that sink do not create suction; however, the creation of massive air bubbles created by sinking vehicles temporarily destroys water tension, making floatation in the immediate area difficult or impossible.
d) Follow self-rescue techniques described above.

<u>If Vehicle Cab is submerged</u>

a) Do not panic. A rushed, uncontrolled effort to exit the cab is your greatest danger.

    - Be prepared to have extremely limited to no vision underwater; and
    - The vehicle is likely to roll in any direction and sink upside down.

b) Grasp the door handle and orient yourself to the front of the vehicle before undoing your seat belt.
c) If the vehicle is rolling, you will float towards the surface as soon as you undo your seat belt. This means you may be floating towards the floor or corner of your cab. Remain oriented; your exit might be below you.
d) Carry out the following drill:
    - Keep one hand on the door handle or opened window;
    - Orient your head and body forward in the cab;
    - With your other hand, undo your seat belt;
    - Immediately turn 90 degrees to the open door or window and exit;
    - Kick hard to the surface; and
    - Grab and hold onto any floating debris.
e) Carry out your self-rescue drills as described above

All personnel to be recovered from the icy water are to be treated with first aid immediately, and transported to the nearest treatment facility.

<u>Assisted Rescue</u>

Upon discovery of a breakthrough, rescue personnel shall proceed with extreme caution. A quick assessment shall be conducted, to assess a) if a person is underwater; b) extent of the breakthrough; and c) safe distance from the breakthrough. If a person is underwater, rescue personnel shall never dive into the water to perform a rescue. Such shall only be done by qualified diving personnel with appropriate cold-climate diving gear. The procedure is as follows:

<u>Coherent victim floating in water:</u>

a) Tie a loop in the nylon rope, and throw towards the person floating in the water; and
b) Pull victim to safety from a safe distance from the ice breakthrough.

Incoherent or unconscious victim floating in water:

a) Supervisory personnel trained in ice rescue dons ice rescue dry suit;
b) Ice rescue sled is tied off with a long rope, to a truck or ski-doo;
c) Ice rescuer to walk ice sled to the vicinity of the breakthrough;
d) Ice rescuer pulls victim onto ice sled;
e) Support personnel pull in the ice sled, to assist ice rescuer and victim to safety.

All personnel to be recovered from the icy water are to be treated with first aid immediately, and transported to the nearest treatment facility.

Should a drowning occur, only certified divers shall be brought in to retrieve the victim.

H-7: Heat Stress Management Plan

Heat stress can lead to loss of fluids, fatigue, and may lead to heat-related illness, disability, and even death. Labourers on-site who are to perform physically demanding work may be prone to heat stress, and the following measures shall be taken to ensure that heat stress is avoided.

- ✓ Labour workers to be issued water bottles, so that workers can replenish fluids during the day's work;
- ✓ Workers to be instructed to take breaks in the shade, to avoid fatigue;
- ✓ Sun screen to be made available on-site for employees;
- ✓ Supervisors to monitor ambient temperature, and issue advisory to labour workers regarding the potential for heat stress during hot days; and
- ✓ Supervisors to reinforce causes and prevention of heat stress during daily safety meetings.

H-8: Material Safety Data Sheets (MSDS)

The MSDS's provide more product information than is found on the product label. These sheets have more detailed information about a substance's properties, its hazards, and how to prevent overexposure.

The MSDS's for controlled products at a work site are kept where they are easily accessible to employees. Employers may transfer the information from suppliers' MSDS's to their own standardized MSDS form. This is to make it easier for employees to find the information they require. If a municipality uses this practice, the MSDS's received from the supplier will remain on file so that employees can refer to them, if they desire.

There is no required format for the WHMIS MSDS's, but each of the nine required categories of information must be included. More detailed information in each category must also be included, if available.

The MSDS's must list all of the ingredients of a particular substance that are considered hazardous, along with their concentrations. These ingredients are included if:

- ✓ The most hazardous controlled product ingredients are listed if they make up more than 0.1% of the product.
- ✓ Other, less hazardous, controlled product ingredients are listed only if they make up more than 1% of the product.
- ✓ Ingredients that are included on the Ingredient Disclosure List (IDL) and that are present in the product in concentrations greater than the cut-off limits listed on the IDL.
- ✓ Ingredients that have not been tested for their toxic properties.
- ✓ Ingredients that the writer of the MSDS considers to be hazardous, even if they do not meet any of the first four conditions.

Preparation

- ✓ All employees who enter a project site have been instructed in and can demonstrate knowledge of WHMIS requirements.
- ✓ An inventory of and applicable MSDS's for products used is in place and is maintained at the site office.
- ✓ Employees who are or may be exposed to hazardous products on the work site are trained in the safe use and handling of the products.
- ✓ A current set of MSDS sheets is maintained and is readily available to all employees on all shifts. The MSDS's are current (within 3 years).
- ✓ A method of workplace labelling for products transferred to containers other than the original, is developed and implemented prior to the start of the project. All employees on the project are instructed in and are familiar with the workplace labelling system.

Handling and Use of Controlled Substances

- ✓ Prior to the use of any hazardous product, employees have reviewed the product label and the MSDS for the product to ensure knowledge of the safe use of the product.
- ✓ Products are used only for their original purposes and are used only according to the manufacturer's directions provided on the label and MSDS and as instructed by Safety Officer.
- ✓ Employees wear and use personal protection equipment (PPE) as determined by a review of the label and product MSDS.
- ✓ If a product is removed from original container and placed in another container, employees are responsible for obtaining and placing the appropriate workplace label on the new container.
- ✓ Workplace labels are to be obtained by the supplier.

Clean Up and Storage of Controlled Substances

- ✓ Should there be a spill or leak involving a hazardous product, employees involved shall immediately notify the Supervisor. Clean-up is done by knowledgeable personnel and is in accordance with the product label and MSDS.
- ✓ Empty hazardous materials containers are disposed of according to the product label or MSDS.
- ✓ All products are stored according to the requirements of the product label or MSDS.
- ✓ Special care is to be taken not to store incompatible products in proximity to each other.