

S. & T. GROUP

SAFETY PROCEDURES

AND

HANDBOOK

2007-2008

S. & T GROUP

SAFETY POLICY

The safety policy of S. & T. Group states that every person has the responsibility to create and maintain the safest possible work environment.

Our Safety Handbook indicates the organizational structure used to satisfy the safety policy and explains each person's function and contribution.

We will succeed by understanding, accepting, and executing our safety obligations in a consistent fashion.

Secretary/Treasurer

President

Date

Safety Standards and Procedures

Introduction

The standards contained in this manual cannot be compromised. All S. & T. employees are obligated to maintain these standards of safety.

The procedures contained in this manual are the best-known way of achieving company safety standards. The usual format requires the supervisor to inform his crew of his safety expectations and to follow up so that the standard is satisfied. If the supervisor or manager is aware of a more convenient, more effective procedure, it may be used; the standards must be achieved.

The procedures are useful as guides in the supervisors' weekly safety meetings and as a reference in unfamiliar circumstances.

S. & T. Group

S. & T. SAFETY POLICY AND HANDBOOK

Section 1	<u>Access Structures</u>	
	Ladders	AX 01
	Scaffolds	AX 02
	Ramps, Runways, Platforms	AX 03
	Suspended Scaffolds	AX 04
Section 2	<u>Accident Reporting</u>	
	Accident Definitions	AIR 01
	Accident Investigations	AIR 02
	Fleet Vehicles – Accidents	AIR 03
Section 3	<u>Compressed Gases</u>	
	General Information	CG 01
	Welding	CG 02
	Cutting	CG 03
	Dismantling Equipment	CG 04
	Defective Equipment	CG 05
	Backfires and Flashbacks	CG 06
	Welding and Cutting on Containers	CG 07
	Safe Handling	CG 08
	Cylinder Storage	CG 09
	Temporary Heat	TH 01
	Storage and Handling of Propane	TH 02
	Propane Barbecues	TH 03
	Recreational Vehicles	TH 04
Section 4	<u>Electric Arc Process</u>	
	Equipment	EA 01
	Restrictions	EA 02
	Safety Checklist	EA 03
	Eye and Face Protection	EA 04
Section 5	<u>First Aid</u>	
	Training	FA 01
	Facilities	FA 02
	Kits – Contents	FA 03
	Kits – In Vehicles	FA 04

Section 6	<u>Forklifts</u>	
	Operator Qualifications	FL 01
	General Safety Rules	FL 02
	Operator's Daily Checks	FL 03
	Propane Fuel (LPG)	FL 04
	Batteries	FL 05
	Maintenance	FL 06
Section 7	<u>Forms & Falsework</u>	
	Design	FL 01
Section 8	<u>Hand Tools</u>	
	Wrenches	HT 01
	Hand Saws	HT 02
	Hacksaws	HT 03
	Non-Sparking	HT 04
	Striking Tools	HT 05
	Vises	HT 06
	Pipe Tools	HT 07
	Hammers	HT 08
Section 9	<u>Operating Engineers</u>	
	Qualifications	OE 01
	Restrictions	OE 02
	Maintenance	OE 03
	Crane Suspended Work Platforms	OE 04
	Overhead Cranes	OE 05
	Aerial Work Platforms	OE 06
Section 10	<u>Power Hand Tools</u>	
	Basic Electrical Safety	POW 01
	Drills	POW 02
	Circular Saws	POW 03
	Explosive Actuated Fastening Tools	POW 04
	Air Powered	POW 05
	Portable Grinders	POW 06
	Bench and Pedestal Grinders	POW 07
	Wheel Mounting of Portable Grinders	POW 08
Section 11	<u>Personal Protective Equipment</u>	
	Safety Footwear	PPE 01
	Safety Hats	PPE 02
	Eye Protection	PPE 03
	Hand Protection	PPE 04

	Hearing Protection	PPE 05
	Fall Arrest Devices	PPE 06
	Fall Arrest Devices Defined	PPE 07
	Safety Equipment Checklist	PPE 08
	Visitors' Safety and Health	PPE 09
	Abrasive Blasting	PPE 10
	Fire Prevention	PPE 11
	Fire Extinguishers	PPE 12
	Lock-Out Procedures	PPE 13
	Confined Space Program	PPE 14
	Smoke Free Ontario Act	PPE 15
Section 12	<u>Rigging Safety</u>	
	Wire Rope Inspection	RIG 01
	Chain for Hoisting	RIG 02
	Slings and Hitches	RIG 03
	Nylon Web Slings – Inspection/Maintenance	RIG 04
	Hand Operated Chain Hoists	RIG 05
	Hoists and Winches – Anchorage	RIG 06
Section 13	<u>Safety Talks</u>	
	Supervisors	ST 01
	Managers	ST 02
	Safety Department	ST 03
Section 14	<u>Transportation</u>	
	Trucks – Loading and Unloading	TR 01
	Trucks – Daily Inspection	TR 02
	Fleet Vehicles – Maintenance and Inspection	TR 03
	Transportation of Dangerous Goods	TR 04
	Lead Acid Batteries – Boosting	TR 05
	Company Vehicles	TR 06
	Safety Belt Use Policy	TR 07
Section 15	<u>Workplace Hazardous Material Information System (WHMIS)</u>	
	Training Requirements	WHMIS 01
	Welding and Cutting – Fumes	WHMIS 02
	Internal Combustion Engines – Fumes	WHMIS 03
	Internal Combustion Engines – Ventilation	WHMIS 04
	Guide to Designated Substances	WHMIS 05
	Asbestos – Designated Substance	WHMIS 06
	Designated Substances – Procedure Format	WHMIS 07
	Working in Confined Spaces	WHMIS 08
	Sanitation	WHMIS 09
	Noise	WHMIS 10
	Radiation – General and Terms	WHMIS 11

Radiation – X-Rays	WHMIS 12
PCBs – General Information	WHMIS 13
PCBs – Personal Protective Equipment	WHMIS 14
PCBs – Waste Storage	WHMIS 15

Section 16 Work Surfaces

Scrap Removal	WS 01
Illumination	WS 02
Floor Openings	WS 03
Wall Openings	WS 04
Excavations	WS 05
Roofs	WS 06

Source Material List

Responsibilities

1. Senior Management

Senior Management will monitor the organization's progress in satisfying our safety policy through periodic status reports by the Head Office Safety Committee.

2. Department/Project Manager

Managers will assume control of accident prevention activities within their areas of command. Consistent with our company philosophy on management discretion, each manager may exercise expedient means to satisfy our safety policy.

Managers will assure that all S. & T employees, and others under their direction and control, have the necessary training and instructions for performing their assignments safely.

3. Superintendents

The project superintendents, or most senior S. & T. supervisor on site is responsible for safety audits of the workplace. The purpose of these audits is to discover hazardous conditions on site and rectify them in accordance with the Occupational Health and Safety Act and Regulations.

The superintendent will ensure that the Site Safety Program is developed and maintained.

4. Foremen

Foremen are responsible to provide and enforce the use of all necessary personal protective equipment within their crew.

Foremen will monitor the crew's operations for hazardous conditions on a continuous basis. Most hazards can be eliminated or guarded spontaneously; however, more complex hazards shall be referred to the superintendent promptly for resolution.

5. All Employees

We shall abide by the regulations under the Occupational Health and Safety Act, and consider these laws a minimum requirement. Additional precautions are occasionally advisable.

Hazardous conditions are often our own creation. Eliminate hazards in work areas as the work progresses and report more complex hazards to your immediate supervisor.

Site Safety Program

The intent of the Site Safety Program is to enable all site employees to conform to the S. & T. Group Safety Policy.

The Site Safety Program contains the following elements, in order of priority:

1. Elimination of Hazards
2. Barriers Around Hazards
3. Warnings of Hazards
4. Safety Training to Deal with Hazards
5. Cautious Acceptance of Hazards

1. Elimination of Hazards

It is most effective to remove the hazard entirely from the workplace (i.e. to de-energize high voltage power lines that are in close proximity to workers).

2. Barriers Around Hazards

Where it is not practical to eliminate the hazard, physical barriers such as guardrails, personal protective equipment, etc. permit us to work in the presence of a hazard without exposure to the danger.

3. Warnings of Hazards

The process in a plant may involve chemicals or agents to which people cannot be exposed safely. Warnings such as "DO NOT ENTER". "DO NOT REMOVE THIS COVER", etc., can be ignored or overlooked but are still an important part of the safety program *WHEN USED IN CONJUNCTION WITH BARRIERS AND SAFETY TRAINING.*

4. Safety Training to Deal with Hazards

When barriers such as personal protective equipment are used, safety training is essential to ensure proper fit and application. Due to forgetfulness, misunderstanding, and other mistakes, safety training must be reinforced frequently.

5. Cautious Acceptance of Hazards

There may be occasions when a known hazard cannot be removed or adequately guarded. An example is an electrician working with live apparatus critical to the plant process. The utmost care and planning is paramount in such cases. Only the most experienced tradesmen are permitted to work in these rare circumstances.

S. & T. GROUP
SAFETY HANDBOOK
FOR
SUPERVISORS

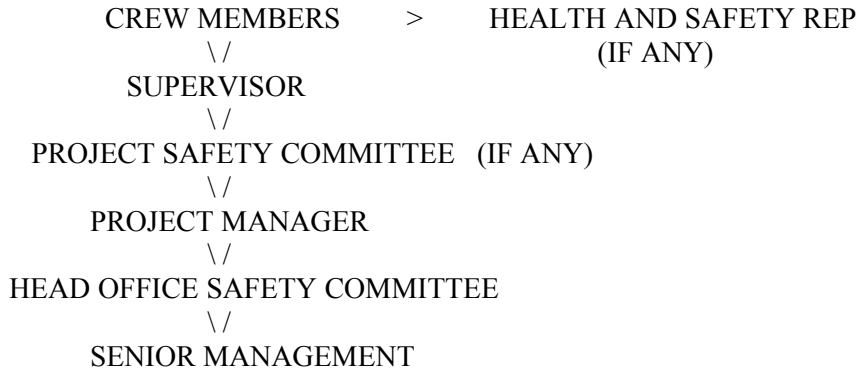
Introduction

This manual will help you understand and comply with the safety requirements of this company. As a supervisor, you have assumed specific legal responsibilities under the Occupational Health and Safety Act and its regulations.

All S. & T. employees shall abide by the pertinent safety laws and any additional precautions imposed by their supervisor. The brochure entitled, "EMPLOYEE SAFETY INFORMATION" contains strict rules and conditions of employment and is to be distributed to all employees by the supervisor. These rules should be discussed in crew safety meetings to eliminate the chance of misunderstanding or misinterpretation.

Organizational Structure

The chain of communications regarding safety and health issues works this way:



The sooner we can resolve the safety issues, the better. In most cases the immediate supervisor can make the appropriate changes in conditions or work methods to ensure safety. More complex problems can be referred along the chain of communication until satisfaction is possible.

All supervisors are encouraged to deal with valid safety and health concerns promptly and successfully.

Crew Safety Talks

The Site Safety Program cannot succeed without frequent, effective Crew Safety Talks. These informal conversations are the opportunity for your crew members to voice their concerns about health and safety. Cultivate this source of information.

These talks are also an opportunity for the supervisor to seek co-operation on eliminating hazards and to relate the causes of any injury/close call that has occurred. Several short talks are more effective than a single speech. Use them at your discretion, but plan your presentation in advance.

Periodic safety bulletins will be provided by the Head Office Safety Committee for discussion with your crew members.

Accident Reporting

If one of your crew members suffers an injury at work, it is the supervisor's responsibility to administer/arrange for First Aid Treatment.

If medical treatment is required, it is the supervisor's responsibility to provide transportation of the injured employee to the nearest medical facility.

To permit payment of the treating physician's account, the S. & T. "*Injury Treatment Memo*" must be presented to the medical facility. Promote modified duties for the injured employee if normal duties cannot be resumed.

The treatment of the injured employee is your first priority; however, immediate steps must be taken to prevent a recurrence of the same accident. Deputize a crew member to take control of organizing preventative measures or do so yourself. The only thing worse than an accident is a repeat of the same accident.

The procedure found on S. & T.'s "Supervisory Injury Report" is eight simple steps to fulfilling your legal responsibilities in the event of a work-related injury.

Personal Protective Equipment

Because of ever changing conditions on a construction site, there is no easy way to prescribe protective equipment to a particular operation. The supervisor has the obligation to assess the potential danger involved in an operation and provide the suitable protective equipment to his crew members.

All employees are expected to provide green-patch safety boots and wear them as the safety laws demand.

Where the hazard cannot be eliminated or effectively guarded, the supervisor shall provide whatever protective equipment is appropriate.

S. & T. invests heavily in top quality protective equipment. The supervisor shall insure the proper use of such devices.

Conclusion

The S. & T. Group Safety policy states that every person has the responsibility to create and maintain the safest possible work environment. We recognize that the supervisor is the key to a successful safety program and offer complete support in the execution of the S. & T. safety policy.

INJURY TREATMENT MEMO

S. & T. GROUP

158 Sackville Road, Sault Ste. Marie, Ontario P6B 4T6

Date of Injury

Mr. / Mrs. Last Name First Name

Home Address

Employee's Ailment/Injury _____

DOCTOR:

Please submit your account to WCB for payment.
To assist in maintaining our employee's income, please indicate suitable activities:

- _____ Normal Duties
- _____ Answer Telephone
- _____ Clerical Work
- _____ Light Cleanup
- _____ Drive Vehicle
- _____ Assist Co-Worker Occasionally
- _____ Do Safety Survey of Project
- _____ Repair Tools/Paint

Light duty required for ___ days.

If the employee is medically unable to handle the above he may be absent for ___ days.

Thank you.

Description of ailment / injury

Treating Physician
(please print)

Physician's Signature

Hospital / Clinic

Date

SUPERVISORY INJURY REPORT

S. & T. GROUP

158 Sackville Road, Sault Ste. Marie, Ontario P6B 4T6

- Procedure:*
1. Employee reports work related ailment/injury
 2. Administer first aid if capable
 3. Transport employee to medical aid if needed
 4. Give Doctor injury treatment memo(fill in top section)
 5. Investigate cause of injury
 6. Eliminate/guard cause of injury
 7. Complete this form
 8. Submit this form and Injury Treatment Memo to Head Office *IMMEDIATELY*

1.	EMPLOYEE'S NAME	
2.	OCCUPATION	UNION LOCAL NO.
3.	LOCATION OF WORK	
4.	DESCRIPTION OF INJURY	
5.	DATE OF INJURY	TIME
6.	DATE REPORTED TO YOU	TIME
7.	WHO TRANSPORTED EMPLOYEE FOR TREATMENT?	
8.	WHAT CAUSED AILMENT?	

Use sketch if helpful to indicate exact location, work in progress:
(Give dimensions, measurements: be specific)



9. Injury Cause:
- Weight of material/equipment _____
 - Distance of fall _____
 - Working surface _____
 - Weather conditions _____
 - Tools involved _____
 - Recurrence of prior injury _____
 - Employee inexperience _____
 - Tripping hazard _____
 - Protective equipment used _____
 - Other _____

10. Give names of *Eyewitnesses* to accident.
 (attach signed statements for all lost time injuries)

11. Was this accident preventable? Yes ___ No ___

If yes, how?

11. Supervisor's name (please print)

Supervisor's signature

_____ Date _____

Procedure Title: Specific Safety Ladders Polices & Procedure

Purpose:

To establish a policy to assure maximum operator safety, thus minimizing the possibility of injury as a result of improper use of a ladder.

Discussion:

Use proper ladders. Never climb or stand on any makeshift devices such as chairs, barrels, drum, boxes, etc. Use approved equipment only. Safe use of ladders requires careful attention to all details of maintenance and use.

Policy:

To assure the safety of all personnel and to use ladders properly.

Procedure:

- Check the condition and strength. Ladders with broken rungs, split side rails, worn or broken safety feet should not be used. Unsafe ladders should be returned to SHOP for disposal.
- Always place a ladder at least $\frac{1}{4}$ of its length away from the base of the structure to be mounted and not more than one third ($\frac{1}{3}$). The ladder must be placed on a firm surface.
- Ladders longer than 12 feet should be carried by two men. When carrying short ladders, raise the front end to prevent striking someone in front of you or coming around a corner.
- Nothing should be carried in either hand when climbing up or down a ladder. Materials should be hoisted separately or carried attached to your belt.
- One person should be on a ladder at one time
- Always face the ladder when ascending or descending
- Clean muddy or otherwise slippery soles of shoes before mounting the ladders
- Do not attempt to reach more than an arm's length in any direction from the ladder.
Move the ladder
- When a job is finished, the ladder should be returned to the ladder racks or storage area.
- When workers on ladders could be endangered by ground traffic, a guard should be stationed and signs posted to direct people away from the area.

- Never stand on top rung of ladder. Ladder should extend 3 rungs over the top of a roof or platform that is to be climbed on.
- A ladder is to be placed on a firm footing and secured against slipping, either by tying the ladder at the top or by having a person hold the bottom of the ladder to prevent slippage
- Metal and wire bound ladders should not be used where there is a possibility of contact with electrical conductors
- Fully extend ladders should overlap no less than 3 rungs at full extension

- Never use only one foot on ladder

Stepladders

- Standing or working on or above the 2nd step from the top of a stepladder is forbidden. Use a longer stepladder
- Never use a step ladder as a straight ladder- always open the legs fully and lock the braces.
- Do not use the pail shelf as a step

12. Scaffolds shall be erected level and plumb by means of screw jacks and base plates. Where ground deflection is possible, compaction is required followed by use of mud sills.
13. Screw jacks and base plates in #12 above may be replaced by manufacturer supplied casters/wheels whose brakes will be applied at all times except when being moved.
14. Running scaffold requiring anchorage due to its height shall be tied into the structure every 30 feet horizontally.
15. Access to the scaffold platform shall be by properly sized ladder.
16. Rolling scaffolds shall not be moved with personnel on board unless they are securely tied off by means of standard fall-arrest devices.
17. Most manufactured tubular scaffolding with standard planking is rated for a capacity of 2,500 pounds uniformly distributed and 600 pounds concentrated center point loading.
18. Masonry units (bricks, blocks) are to be distributed evenly over the working platform of the scaffolds.

Procedure Title: Access Structures – Ramps, Runways and Platforms

Standard: Temporary structures used for access shall be constructed, installed and used so that an injury is unlikely to result.

Procedure:

1. The supervisor, or his designate, is responsible for the installation and maintenance of safe temporary access structures.
2. In general, a ramp, runway or platform must be able to support 50 psf (2.4 kilonewtons) and be at least 18 inches (46 cm) wide. This is roughly equivalent to 2 scaffold planks spanning no more than 8 feet (2.4m).
3. Maximum gradient of slope = 1:3
Ramps that are not nearly horizontal need 1” by 2” (19 by 38 mm) cleats spaced at 18” (46 cm) securely nailed to the walking surface.
4. Where there is danger from falling materials, a ramp, runway or platform shall be covered by a canopy of adequate strength.
5. Platforms have the same safety requirements as scaffold platforms (see AX 02).
6. If it is not possible to fall a vertical distance of 8 feet (2.4 m) or into water from a ramp, runway or platform, guardrails shall be erected. (Guardrails are 46” high with a midrail and capable of supporting a lateral force of 200 pounds) OSHA Reg. 58(2).
7. If a wheelbarrow or other similar conveyance is used on a ramp, runway or platform AND it is possible to fall 4 feet (1.2 m) guardrails shall be erected. OSHA Reg. 58(3)

Procedure title: Access Structures – Suspended Scaffolds

Standard: Temporary structures used for access shall be constructed, installed and used so that an injury is unlikely to result.

Procedure:

1. The supervisor, or his designate, is responsible for the installation and maintenance of safe temporary access structures.
2. In general, a suspended scaffold, including a bosun's chair, must be capable of supporting at least 4 times the applied load without falling.
3. For swing stages:
 - counterweights securely fastened to the outrigger beams.
 - Where possible, the outrigger beams should be tied to an anchor of adequate capacity swing stage hangers can be 6-18 inches (15-45 cm) from the ends of the platform.
 - Swing stages should be rented from a reputable supplier and the supervisor shall ensure that the users are familiar with the safe operation of its components.
4. Fall protection: each person on the suspended scaffold must have his own independent means of fall arrest as defined in PPE 07.
5. Without exception, a fall arrest system used on any suspended scaffold must include a full body harness.
6. Where suspended scaffold has more than one platform and has a total weight of more than 525 kg. (1160#)
 - a) design drawings by P. Eng. Including signature and seal.
 - b) Erection to be in accordance with drawing.
 - c) P. Eng. To inspect the scaffold prior to use and state in writing that it is erected according to the drawings.
 - d) Design drawings are to be kept on site by the constructor.

Procedure Title: Accident Definitions

Standard: Supervisors shall report all accidents affecting one of his crew members to the S. & T. Safety Department immediately.

Procedure: These are all to be considered accidents:

1. Incident:
 - *no personal injury
 - *no damage
 - *a “close call”
 - *not to be ignored – prevent recurrence
 - *verbal report adequate

2. Property damage:
 - *unexpected damage to materials, equipment or property
 - *includes existing utilities/services
 - *includes vehicles/tools
 - *verbal report to Safety Department adequate

3. First Aid Case:
 - *employee is given first Aid treatment
 - *employee returns to work immediately
 - *log occurrence in “Injury Treatment Record” sheet

4. Medical Aid Case:
 - *employee is given medical treatment by a professional medical person
 - *returns to work the same day
 - *use “Supervisory Injury Report” form
 - *doctor to complete and return “Injury Treatment Memo”

5. Modified Duties Case
 - *employee is given medical treatment by a medical professional
 - *returns to work same day to do alternate work-not his normal job
 - *use “Supervisory Injury Report” form
 - *doctor to complete and return “Injury Treatment Memo”
 - *only very severe injuries would be lost time claims

7. Supervisors shall submit all reports immediately to the S. & T. Safety Department.
8. The Safety Department shall discuss all accidents with the relevant manager and senior management.
9. The Safety Department shall complete and submit all necessary documents.

Procedure Title: Accident Investigation

Standard: Supervisors have the responsibility of investigating accidents affecting his crew members and reporting the pertinent details to the S. & T. Safety Department.

- Purpose:*
1. To establish the cause(s) of accidents so that appropriate changes can be made to prevent a recurrence.
 2. To enable the Safety Department to complete and submit the necessary documents.
 3. To satisfy legal requirements under the Occupational Health and Safety Act.

Procedure:

1. When an accident is reported or becomes known to the supervisor, he shall attend to the needs of the injured person, if any, and make certain that it is safe for work to continue. If a recurrence is probable, change the circumstances on the project to allow safe continuance of the work.
2. By asking the employees involved in the accident and examining the physical conditions surrounding the place of accident, the supervisor can usually get a clear picture of what happened.
3. If details are vague or conflicting, the supervisor is not expected to judge the merits of differing statements. Investigation is the collection of facts and statements for submission to those responsible for WCB payments, insurance claims, etc.
4. If it appears that there may be multiple causes for an accident, attack as many causes as practical to make a recurrence unlikely.
5. The greatest means available to the supervisor in the prevention of an accident is gaining the co-operation of his crew members.
6. All accidents should be explained to crew members by the supervisor as soon after the investigation is completed.

Procedure Title: Fleet Vehicles – In Case of an Accident

Standard: In case of accident involving any S. & T. vehicle, the driver of the S. & T. vehicle shall provide the required information to the Safety Department as soon as possible.

Procedure: The required information is:

1. Name and drivers license numbers of all involved.
2. Vehicle license plate numbers and description of vehicles involved.
3. Names and addresses of witnesses.
4. Names of all occupants.
5. Details of the accident.
6. Draw a sketch.

In general, the following is advisable in case of a traffic accident involving you:

1. Stop immediately. Keep calm.
2. Warn oncoming traffic.
3. Help the injured. Call a doctor or ambulance if necessary.
4. Police must be notified if damage exceeds \$700.00 or if any personal injury results.
5. Do not make any admission of blame for the accident.

<i>Procedure Title:</i>	Compressed Gases
<i>Standard:</i>	All personnel involved in the use of compressed gases shall be familiar with their characteristics and the necessary safety precautions.
<i>Procedure:</i>	The supervisor shall discuss the following general characteristics in crew safety meetings:
1. Acetylene	This highly flammable hydrocarbon fuel combines with oxygen to produce industry's hottest flame (5900 degrees Fahrenheit – 3255 degrees Celcius). The danger of explosion is high because the gas is very unstable. Acetylene cylinders are packed with a porous material saturated with acetone to make storage, transportation and usage safe. Never use acetylene above 15 psig. or with copper and copper alloys.
2. MAPP	Methylacetylene-propadiene can replace acetylene for most operations. MAPP is very stable and has a very strong odour. MAPP can be used safely at higher pressures than acetylene.
3. Hydrogen	The lightest gas known, is highly flammable and burns with an almost invisible blue flame. Hydrogen and oxygen combine to produce a cooler flame (400 degrees Fahrenheit – 2200 degrees Celcius) than acetylene; so it is suitable for brazing aluminum, magnesium and in welding lead.
4. Oxygen	The most important gas in the world. Oxygen is non-flammable but nothing can burn without it. 21% oxygen supports normal combustion. Pure oxygen can cause spontaneous combustion when combined with grease or oil. Never use oxygen as a substitute for compressed air to operate pneumatic tools.
5. Argon, Helium, Nitrogen, Carbon Dioxide	Good ventilation is required when using any gas. These gases in high concentration cause asphyxiation. Apart from the hazard of rupturing cylinders, these gases are non-hazardous, on-flammable and inactive.

- Procedure Title: Compressed Gas Welding
- Standard: All personnel involved in the use of compressed gas for welding shall be familiar with their characteristics and the necessary safety precautions.
- Procedure: The supervisor shall discuss the following general characteristics in crew safety meetings.
1. Locate cylinders away from sources of excessive heat or physical damage. They should be secured upright in a cylinder truck or against a firm support.
 2. Slightly open (“crack”) and then close immediately the cylinder valves (except for hydrogen gas) to blow out dust and foreign matter that could restrict the gas flow or damage the regulator system.

Stand to one side of the cylinder when doing this.
 3. Attach the oxygen and fuel gas regulators to their respective cylinders. Screw the nuts tightly with the proper wrench. Never force poorly fitting connections.
 4. Make sure the pressure adjusting knobs or screws on the regulators are released.
 5. Connect the green hose to the oxygen regulator and the red hose to the fuel gas regulator.
 6. Connect the hoses to the torch—green hose to the oxygen inlet and red hose to the fuel gas inlet.
 7. Connect mixer and welding tip (or tip assembly) to torch handle.
 8. Open the oxygen cylinder valve slowly and completely.
 9. Open the fuel gas cylinder not more that one full turn.
 10. Open the oxygen torch valve and turn the pressure adjusting screw on the oxygen regulator to the desired pressure. Continue the oxygen purge for approximately ten seconds for each hundred feet of hose. Close oxygen torch valve.
 11. Open the fuel gas torch valve, turn the pressure adjusting screw on the fuel gas regulator to the desired pressure and continue purging for ten seconds for each hundred feet of hose. Close the fuel gas torch valve.
 12. To light the torch, open the fuel gas torch valve ½ turn and immediately light the tip with a spark lighter. DO NOT USE MATCHES. Open the fuel torch valve further until the flame is free of soot.
 13. Open the torch oxygen valve and adjust until a neutral flame results.
 14. To weld, wear snug fitting goggles with properly coloured and designed lenses.

Procedure Title: Compressed Gas Cutting

Standard: All personnel involved in the use of compressed gases for cutting shall be familiar with their characteristics and the necessary safety precautions.

Procedure: The supervisor shall discuss the following in crew safety meetings:

The procedure for setting up to use cutting torches or cutting attachments is identical to procedure CG 02 EXCEPT that when adjusting the oxygen regulator pressure (Step#10) both the torch oxygen valve and the cutting oxygen valve must be open.

Procedure Title: Compressed Gases - Dismantling Equipment

Standard: All personnel involved in the use of compressed gases shall be familiar with safe dismantling procedures.

Procedure: The supervisor shall discuss the following in crew safety meetings:

1. Close the torch oxygen valve.
2. Close the torch fuel gas valve.
3. Close the fuel gas cylinder valve.
4. Close the oxygen cylinder valve.
5. Open the torch fuel gas valve and bleed the fuel gas line. Release the fuel gas regulator knob.
6. Close the torch fuel gas valve.
7. Open the torch oxygen valve and bleed the oxygen line. Release the oxygen regulator knob.
8. Close the torch oxygen valve.
9. Regulators and torches can now be disconnected or, if the shutdown is temporary, the torch line can be hung in a safe place.

Procedure Title: Compressed Gases – Defective Equipment

Standard: All compressed gas equipment shall be free of defect when in use.

Procedure:

1. Compressed gas equipment shall be inspected for defects prior to use.
2. Damaged, leaking torches, regulators, hose and accessories must be taken out of service.
3. Repairs may be made by authorized personnel or replacements shall be supplied by the supervisor.
4. Keep equipment clean using oil free rags.
5. Never oil any regulators or cylinder valve because of the likelihood of explosion/fire.

Procedure Title: Backfires and Flashbacks

Standard: Backflow check valves shall be installed in both hoses to prevent flashbacks.

Procedure:

1. Backfires
 - when flame burns back into tip
 - accompanied by loud popping sound
 - caused by touching tip to work
 - caused by insufficient gas pressure

2. Flashbacks
 - when flame burns back into torch
 - accompanied by loud hissing sound
 - can be very dangerous
 - if flashback occurs:
 - i) turn off oxygen torch valve immediately
 - ii) turn off fuel gas torch valve
 - iii) turn off oxygen cylinder valve
 - iv) turn off fuel gas cylinder valve
 - v) thoroughly inspect the torch regulators and hoses

 - sometimes caused by incorrect gas pressure
 - sometimes caused by incorrect tip
 - check manufacturer's recommendations

Important - Repeated flashbacks indicate serious problems in the equipment. Eliminate the problems prior to reusing.

Procedure Title: Welding and Cutting on Containers

Standard: Containers having held combustible or flammable materials shall be thoroughly cleaned prior to welding or cutting on them.

Procedure: Supervisors and welders must use the following guidelines as minimum precautions:

1. Where previous contents of a vessel are not soluble in water, use hot chemical solutions (i.e. caustic soda) and steam.
2. For steam cleaning, first fill container to about a quarter of its capacity with hot soda ash solution (one pound to a gallon of water). Then drain and close all openings except drain and filling vents. Cracks of damaged sections are sealed with wet asbestos, wood, flour putty, etc.

Low pressure steam is blown through a $\frac{3}{4}$ " hose with non-sparking nozzle (brass or bronze) electrically connected to the container.

Procedure Title: Compressed Gases – Safe Handling

Standard: All personnel involved in the use of compressed (liquid) oxygen and nitrogen shall be familiar with their characteristics and the necessary safety precautions.

Procedure: Supervisors shall discuss the following in crew safety talks:

1. Oxygen, nitrogen, argon and other elements normally exist as gas. When compressed into a liquid form they have ultra – cold temperatures:

	<u>*F</u>	<u>*C</u>
Carbon dioxide	-109	-78
Xenon	-163	-108
Krypton	-244	-153
Oxygen	-297	-183
Argon	-303	-186
Nitrogen	-320	-196
Neon	-411	-246
Hydrogen	-423	-253
Helium	-452	-269

2. A small volume of liquid gas evaporates to several hundred times this volume as a gas. Containers of liquid oxygen or liquid nitrogen must not be sealed. Explosion may result.
3. Warning signs must indicate the presence of liquid oxygen – prohibiting flames, heat, and smoking. If combustibles are accidentally impregnated with liquid oxygen, they should be allowed to “air” for at least one hour in open air.
4. Liquid oxygen, if accidentally spilled on asphalt, may cause an explosion spontaneously.
5. Because of the potential for oxygen displacement, leading to asphyxiation, proper ventilation is the major precaution to take with liquid nitrogen.
6. Evaporating liquid oxygen in a confined space or building will cause oil or grease to burn spontaneously.
7. Contact with the skin causes a reaction similar to a burn.
8. The term “cryogenic” refers to very cold liquid gases.

Procedure Title: Compressed Gases – Cylinder Storage

Standard: Compressed gas cylinders shall be stored so that no damage may occur.

Procedure: Supervisors shall store compressed gases this way:

1. Store oxygen and fuel cylinders at least 20 feet (6m) apart.
2. If #1 is not practical, separate oxygen and fuel gas cylinders by means of a one hour fire-resistant wall 5 feet high (1.5m).
3. Store oxygen and fuel gas cylinders on a fireproof surface outside.
4. Keep cylinders away from:
 - open flames
 - electric arcs
 - molten slag
 - sparks
 - exposure to sun(cylinders are not designed for temperatures above 54°C (130°F))
5. Keep cylinders at least 20 feet (6m) from flammable materials:
 - paint
 - oil
 - solvents
6. Identify storage areas. Clearly post “NO SMOKING”.
7. Secure all cylinders upright.
8. Keep full and empty cylinders separated.
9. Close valves of empty cylinders and fit screw caps. Mark empties “MT” with chalk.
10. Do not accept unmarked cylinders. All cylinders must have a WHMIS label.
11. Provide adequate fire extinguishers within 30 feet of cylinder storage areas.
12. Post signs to prohibit parking within 30 feet of a cylinder storage area.

Procedure Title: Temporary Heat

Standard: Temporary heat shall be arranged so that no danger of uncontrolled fire exists.

Procedure:

1. Combustibles such as tarpaulins, wood and flammable liquids will be positioned no closer than 10 feet. If combustibles are in the direct flow of heat, no closer than 20 feet.
2. Safety features on the heaters must be operating properly.
3. Heaters cannot be set on combustible materials and must be protected from damage due to overturning.
4. The temptation is great to locate heaters near a means of access/egress because fresh air is available for combustion. It is against the law to restrict access/egress with a portable heater.
5. Fuel lines must be guarded to prevent accidental damage.
6. When heaters are operating continuously, an attendant is required to ensure safe conditions.
7. A viable means of extinguishing a fire must be readily available.

Procedure Title: Storage and Handling of Propane

Standard: Propane shall be stored and handled to eliminate the possibility of damage to cylinders.

Procedure:

1. Oxygen and fuel cylinders shall be stored separately in well-ventilated areas away from excessive heat and physical hazards.
2. When moving propane cylinders, the valve protective collar should not be used as a means of attachment to a hoist hook.
3. Never use a sling to move cylinders, only a secure container.
4. Cylinders must be upright and securely tied to an immovable anchor point.
5. Cylinders should be stored in definitely assigned places away from elevators, stairs or walkways.
6. Avoid placing cylinders in an area where stray electricity or accidental arcing could occur.
7. Check for and eliminate any gas leaks at cylinder valves, regulators, and connections. Soapy water is generally used—not a flame.
8. Leaking cylinders should be taken outdoors and clearly tagged. Return the cylinder to the supplier when completely empty; it is illegal to ship a leaking cylinder.
9. The cylinder valve should be opened slowly. Stand to one side when opening valve.
10. Cylinder valves should be closed at all times except when propane is actually being used.
11. Mark empty cylinders “MT” with chalk.
12. Propane is odourless so an additive smelling like “rotten cabbage” is introduced to help detect leaks.

Procedure Title: Propane Barbecues

Standard: For the protection of family and home, all personnel involved in the use of propane barbecues shall be familiar with the necessary precautions.

Procedure: Supervisors are requested to discuss the following in a timely fashion in crew safety meetings:

1. Make sure the burner ports are free of rust and dirt and that the burner orifice is clear.
2. Check that the hose is in good condition. A cracked hose can send out a jet of propane which, if ignited, could result in a flame several feet high.
3. Keep barbecues at least 10 feet from combustible surfaces such as a wooden fence, roof, overhang, low hanging trees.
4. When lighting the barbecue, have the ignitor already burning and the lid open before turning on propane.
5. Never move the barbecue when it is lit.
6. Turn off both the appliances and the cylinder valve at the conclusion of each use.
7. Do not store propane tanks indoors or near building openings. Propane is heavier than air and will settle into depressions waiting for trouble.
8. Barbecues have been known to cause severe burns to children, inexperienced users, and those wearing loose clothing.
9. When lit, the barbecues should not be unattended. Because of carbon monoxide production during combustion, the barbecue should not be used in an enclosed area.

Symptoms of carbon monoxide poisoning are:

- headache
- weakness/dizziness
- clumsiness
- watering/stinging eyes

If any of these symptoms occur, get fresh air immediately.

Procedure Title: Propane and Recreational Vehicles

Standard: Personnel involved in the use of propane and recreational vehicles should be aware of propane characteristics and the safety precautions related to the equipment.

Procedure: The supervisor is requested to provide a copy of this procedure to crew members and/or discuss it in timely fashion in crew safety meetings.

1. Propane equipment is found in a wide variety of recreational vehicles such as:
 - travel trailers
 - motorized homes
 - slide-in campers
 - chassis-mounted campers
 - tent trailers
 - sport vans
2. Relief valves and regulating equipment must be simulated to ensure any leaks dissipate outside the passenger compartment of the vehicle.
3. Rear mounted cylinders and roof mounted cylinders are neither safe nor acceptable.
4. Supply lines can be CGA certified flexible hose of 24-30 inches in length from the regulator to either a metal pipe or copper tube supply line to properly supported by brackets, hangers, or clips at intervals not greater than 4 feet. Rubber grommets are required to prevent wear.
5. All propane appliances should be certified by one of the following:
 - Canadian Gas Association
 - Canadian Standards Association
 - Underwriter's Laboratories of Canada
6. Units must be installed or removed by a certified propane fitter.
7. After a long period of no usage, or at least once a year, inspect the equipment for signs of wear and tear, leaks, or other damage.

Procedure Title: Electric Arc Process Equipment

Standard: All personnel involved in the use of electric arc process equipment shall be familiar with its characteristics and necessary safety precautions.

Procedure: The supervisor shall discuss the following general safety precautions in crew safety meetings:

1. All equipment used in the process must be CSA approved.
2. For safety and convenience, electrical supply lines to welding machines should be controlled from individual cut-off switches.
3. Keep equipment and accessories safe from damage and in perfect running order.
4. Set up welding operations in a dry location, free from puddles of water or wet ground.
5. Cables should not have repairs made any closer than 10 feet from the electrode holder.
6. Cables should be placed so that tripping hazards are not created.
7. Loose connections at the machine, in the electrode holder or at the ground clamp will cause loss of power, make for poor welds, and might even cause arcing sufficient to set off a fire.
8. Electrodes shall be removed from the holder when the equipment is left unattended.
9. The power supply to welding machines shall be shut off when work is stopped or when equipment must be moved.
10. Overloading welding machines or forcing cables to carry currents beyond the rated capacity causes overheating and reduces service life.
11. Daily checks of equipment for loose or corroded connections, cable damage, dirty or defective jaws of electrode holders and ground clamps shall be conducted by the welder.
12. The total radiant energy (rays) produced by MIG welding can be as much as twice that from coated electrodes at equivalent welding parameters.
13. Shades #12 and #14 have suitable optical density, transmit less light and less infra-red, ultra-violet and violet rays; so, should be used in MIG or TIG welding.

14. Ultra-violet rays can cause skin burning, tanning and “arc eyes”. Skin exposed for only 10 seconds will develop a “burn”. Dermatitis is not unusual when skin is repeatedly exposed to ultra-violet rays.
15. Wear cuffless trousers to eliminate the danger of spatter and sparks being trapped.
16. Flash goggles are recommended to be worn under helmets and face shields.
17. To protect others in the area, proper screening and shielding of the welding operations is the supervisor’s responsibility.
18. Dark woolen clothing or leather is recommended.
19. Keep work areas uncluttered and organized.
20. The supervisor shall (in order of preference):
 - i) eliminate the accumulation of fumes
 - ii) provide adequate ventilation
 - iii) provide adequate respirators
21. Other than routine adjustment, leave repairs of electrical equipment to experienced electricians.
22. Gasoline driven equipment must be operated only where the engine fumes can be ventilated outdoors. Carbon monoxide is potentially fatal.
23. Never switch the polarity with an electric welder in operation. Idle the machine or switch it off for the change.
24. Be sure the branch circuit, main disconnect switch or primary input circuit fuses are removed before attempting any inspection or work on the inside of a welding machine.

*Place the ON-OFF POWER switch on the welding machine in the OFF position does not remove voltage from the power terminals inside the machine.

- Procedure Title: Electric Arc Process – Restrictions
- Standard: Electric arc process equipment will not be used where people may be endangered.
- Procedure: Supervisors shall discuss in crew safety meetings and enforce compliance:
1. No welding shall be done in any areas where there may be flammable materials, explosive gases or vapours without authorization from supervisor.
 2. No welding is to be done in any tank, pipeline, compartment or container which has contained flammable material until it has been purged, cleaned, and proven to be free of explosive vapours.
 3. Do not allow welding current to pass through:
 - crane cables or slings
 - oxygen, acetylene, or other compressed gas cylinders
 - tanks or storage containers used for flammable liquids
 - pipes carrying compressed air, steam, gases or flammable liquids
 - conduits, chains, metal handrails or ladders
 4. Only qualified welders shall weld scaffold bracket clips, ear plates, erection nuts and lifting lugs.

Procedure Title: Electric arc Process – Checklist

Standard: Personnel involved in the use of electric arc process equipment shall not create hazards for themselves or others.

Procedure: Welders shall observe the following safety precautions.

1. Have a solid footing and remember that peripheral vision is diminished by welding shield.
2. Store electrode holders where they cannot contact people, fuels, or compressed gas cylinders.
3. Remove all electrodes from holders and disconnect the machine from power source when welding is stopped for any period of time such as breaks, etc.
4. Burn electrodes to no less than 1 ½” – 2” (38 – 50mm) in length. Burning them shorter damages the electrode holder.
5. Keep electrodes and holder dry. If exposed to water or steam, dry thoroughly prior to use.
6. Place electrode stubs in a container to prevent slips and falls.
7. Utilize air currents to direct fumes away from you.
8. Shield yourself and passerby from stray radiation and flashes.
9. Guard or mark with chalk “HOT” any completed work.
10. Chip slag so that debris flies away from your body.
11. Wear gloves when changing electrodes.
12. Do not weld near degreasing operations because of the formation of hazardous gases.

Procedure Title: Electric Arc Process – Eye and Face Protection

Standard: Personnel involved in the use of electric arc process equipment shall be trained by the supervisor in the proper protective equipment needed for eye and face protection.

Procedure: The supervisor shall discuss the following in crew safety meetings.

1. The arc welding lens assembly consists of 3 parts:
 - i.) Outside: clear plastic or tempered glass
 - ii.) Center: shade lens – filter
 - iii.) Inside: clear lens MUST be plastic
2. Use gaskets provided with helmets or goggles.
3. Wear arc welding helmets for all welding or cutting operations.
4. Do not use gas welding goggles for arc welding.
5. Wear side-shielded safety glasses at all times, even under welding helmets.
6. The supervisor may replace side-shielded safety glasses with equivalent protection.
7. Replace pitted or cracked lenses.
8. Replace loose or damaged helmets; invisible and dangerous light rays (ultraviolet) can enter undetected.
9. Contact lens users should prevent dust from entering eyes. Severe discomfort or eye damage results from particles lodging behind contact lenses.
10. Selection of shade numbers:

<u>Welding Operation</u>	<u>Suggested Shade Number</u>
Torch Soldering	2
Torch Brazing	3 or 4
Oxygen cutting	
Under 1" (25mm)	3 or 4
1" to 6" (25mm to 150mm)	4 or 5
over 6" (150mm)	5 or 6
Gas Welding	
Under 1/8" (3.2mm)	4 or 5
1/8" – 1/2" (3.2 to 12.7mm)	5 or 6
over 1/2" (12.7mm)	6 or 8

<u>Welding Operation</u>	<u>Suggested Shade Number</u>
Shielded Metal – Arc Welding	
3/32” - 5/32” (2.5 to 4mm) electrodes	10
5/32” - 1/4” (4 to 6.4mm) electrodes	12
Over 1/4” (6.4mm) electrodes	14
Gas Tungsten – Arc Welding	
Under 50A	10
50A – 150A	12
150A – 500A	14
Gas Metal – Arc Welding	
60A – 160A	11
160A – 250A	12
250A – 500A	14
Carbon Arc Welding	14

11. Ensure sturdy, opaque or translucent (not clear) screens are erected to protect passersby.
12. Screens should have a space of at least 20” (50cm) at the bottom to permit ventilation.

Procedure Title: First Aid Training

Standard: At least one qualified First Aider shall be present on each project or at each workplace.

Procedure: A qualified First Aider is defined as:

1. The holder of a valid St. John Ambulance First Aid Certificate or its equivalent.
2. A person working in the immediate vicinity of the First Aid facilities.
3. The name of the qualified First Aider shall be posted at the First Aid facilities.
4. The qualified First Aider does not have to be a S. & T. employee; however, he/she must be continually available to S. & T. employees.

Procedure Title: First Aid Facilities

Standard: First Aid facilities shall conform to Workers' Compensation Board Regulation 950.

Procedure: The supervisor shall obtain and provide First Aid facilities as follows:

1. Less than 5 workers - S. & T. Small First Aid Kit
2. 5 – 15 workers - S. & T. Large First Aid Kit
3. 15 – 200 workers - S. & T. complete First Aid Program
4. Where equivalent First Aid facilities are present and available to S. & T. employees at the workplace from another contractor or the client, the supervisor need not duplicate the facilities.

Procedure Title: First Aid Kit Definitions

Standard: First Aid Kits will be restocked as needed at least once each week.

Procedure: Stock required:

1. S. & T. Small First Aid Kit
 - 1 card safety pins
 - 12 adhesive dressings
 - 4 sterile gauze pads 3" by 3"
 - 2 rolls of gauze bandage 2" wide
 - 2 field dressings 4" by 4"
 - 1 triangular bandage

2. S. & T. Large First Aid Kit
 - all of #1 above doubled in quantity plus:
 - 4 more sterile gauze pads 3" by 3"
 - 4 rolls gauze bandage 4" wide
 - 4sterile surgical pads
 - 4 more triangular bandages
 - 2 rolls of splint padding
 - 1 roll-up splint

3. S. & T. Complete First Aid Program
 - all of #2 above doubled in quantity plus:
 - one stretcher
 - 2 blankets
 - splints assorted sizes
 - one stainless steel basin

Procedure Title: First Aid Kits in Vehicles

Standard: Supervisors using a company vehicle to transport employees shall carry a S. & T. Small First Aid Kit.

Procedure:

1. See FA 03
2. Any S. & T. employee using a company vehicle may be provided with a A. & T. Small First Aid Kit after the successful completion of St. John Ambulance Standard First Aid training or its equivalent.

Procedure Title: Forklifts – Operator Qualifications

Standard: Forklift trucks are to be operated by experienced workers who are trained, certified, or licenced as professional operators.

Procedure:

1. The supervisor shall ascertain whether existing forklift operators have the necessary experience and training to operate safely.
2. Those who need training shall be given S. & T. approved training sessions as arranged by the Safety Department.
3. A certified card/letter shall be issued by the training agency.
4. Only those personnel with certification card/letter may operate forklifts.
5. The supervisor may waive Item#4 above if he is satisfied that the operator does not require training because he has sufficient knowledge and experience to operate safely.

Procedure Title: Forklifts – General Safety Rules

Standard: The supervisor shall discuss general safety rules with assigned forklift operators.

Procedure:

1. Inspect forklift daily using checklist found in FL 03 – Forklift Safety Checklist. Report all malfunctions to the supervisor. Do not operate an unsafe forklift.
2. Do not permit riders on any forklift.
3. Ensure that battery retainers, fuel tanks and gas caps are secure before starting or moving a forklift.
4. Observe and obey the capacity of the forklift.
5. Sound horn before moving forklift when other people in area may not be able to see movement.
6. Place forks as far as possible under load. Drive with load against heel of rack with mast tilted back.
7. Space forks properly to balance and support load.
8. Do not move loads that are poorly piled or stacked.
9. Carry load as low as possible.
10. Match speed to driving surfaces, load and workplace conditions.
11. Travel in reverse when load obstructs frontal vision.
12. Keep arms, head and legs inside the confines of the forklift.
13. Watch for overhead obstructions.
14. Operate smoothly and slowly.
15. People have the right of way. Hitting pedestrians is inexcusable.
16. Keep right in aisle ways.
17. Do not pass a forklift travelling in the same direction.
18. Install mirrors and/or stop signs at busy doorways, passageways and work areas.

19. Park forklift with controls in neutral, brakes applied and forks on the ground with the motor switch off.
20. do not allow anyone to stand, walk or work under elevated forks.
21. Use only S. & T. approved personnel platform securely fastened to the forks to elevate anyone. If over 8 feet up, personnel must tie off to an independent anchor point.

Procedure Title: Forklifts – Operator’s Daily Checklist

Standard: Operators of forklifts shall make a daily inspection of his machine prior to use.

Procedure: If any of the following components are defective, the operator shall immediately inform his supervisor.

1. Inspect general condition of forklift for cleanliness and loose parts.

2. Visual pre-start-up check.

-fire extinguisher, present and charged

LPG, Gas, Diesel

-engine oil level
-fuel level
-radiator water level

Electric

-electrolyte level
-battery plug connections

-any missing or loose bolts, nuts, guards, chains, hydraulic hose reels
-wheels, tires
-chain anchor pins
-fluid leaks: damp spots or drips
-battery: cables, electrolyte, cell levels, hold downs
-hoses secure not rubbing
-horn, lights (if applicable)

3. Operation pre-use check.

Test all moving parts:

-footbrake – unit stops smoothly
-parking brake – should hold against slight acceleration
-clutch/gearshift
-noises
-steering – smooth movement
-lift mechanism – run through full hoist
-tilt mechanism – run through full tilt
-leaks – check cylinders and hoses

Report any defects to supervisor. Do not operate a defective forklift.

- Procedure Title: Forklifts – Batteries
- Standard: Personnel involved in the use of forklifts shall be familiar with batteries’ characteristics and the necessary safety precautions.
- Procedure: Supervisors shall include the following in crew safety talks:
1. batteries contain: sulphuric acid
electrolytes
water
hydrogen and oxygen gas
 2. Batteries should be charged in an isolated, ventilated area equipped with an eye wash and safety shower.
 3. Handling battery acid:
 - wear tight fitting eye protection, gloves and coveralls
 - pour acid into water; never pour anything into acid
 - do not use metallic containers or funnels for acid
 - splashes destroy most materials
 - flush eyes for at least 15 minutes with eye wash if splashed
 - *GO TO DOCTOR*** to be sure no permanent damage has occurred
 - neutralize spills with baking soda
 - rinse with clean water
 - do not store acid near heat or sunlight
 4. Exploding batteries:
 - Isolate batteries from sparks, flame or any source of ignition
 - shield eyes
 - do not break live circuits at battery
 5. Charging batteries:
 - unplug the charger before attaching or removing clamp connections
 - attach proper clamp to proper terminal (usually red + and black -)
 - follow correct procedure (see TR 06)
 6. Servicing batteries:
 - check for worn cables, loose connections, corrosion, cracked cases/covers, loose hold downs or deformed terminal posts
 - replace worn parts
 - tighten cable clamps with suitable wrench
 - use a cable puller to remove clamps
 - remove corrosion
 - clean terminals with tapered brush
 - use a battery carrier to lift a battery
 - do not overfill cells

Procedure Title: Forklifts – Maintenance

Standard: Forklift maintenance shall be performed by duly qualified mechanics with the necessary safety precautions in mind.

Procedure:

1. Disconnect all batteries and propane before any work is done.
2. Clean up spilled oil or hydraulic fluid immediately.
3. Block forklift securely when removing wheels.
4. Support forklift hood in upright position or remove.
5. On LPG forklifts:
 - shut off fuel valve
 - run engine until it stops
 - disconnect tank from hose
6. Check the operator's daily checklist for unreported defects.
7. Test by magnetic particle the main mast welds and forks annually.
8. Replace hoses, couplings, fittings and connections according to manufacturer's recommendations.
9. Do not work beneath unsupported forks.

Procedure Title: Forms and Falsework – Design

Standard: Forms, falsework and re-shoring shall be designed by a Professional Engineer.

Procedure: The constructor shall obtain and keep on the project the design for forms, falsework and re-shoring.

1. The design of forms, falsework and re-shoring shall be done in accordance with Regulations 87-92 of the Occupational health and Safety Act 1991.
2. these structures shall be erected according to the design drawings.
3. The S. & T. Superintendent will keep on site a copy of the design drawings for any civil work under his direction.

Procedure Title: Hand Tools - Wrenches

Standard: Supervisors shall include safety precaution on the use and care of wrenches in weekly safety talks.

Procedure:

1. With the correct jaw size and grip, a wrench does not slip.
2. Face an adjustable wrench forward. Pull with moveable jaw toward you. Pushing on a wrench is not recommended due to slippage problems.
3. Store wrenches in a tool box, rack or tool belt.
4. AVOID the following unsafe practices:
 - using a pipe wrench on nuts or bolts
 - using a wrench on moving machinery
 - using pliers instead of a wrench
 - using a makeshift wrench
 - using worn wrenches
 - inserting a shim in a wrench for better fit
 - striking with a hammer to gain more force
 - increasing leverage by adding sleeve additions
5. Use eye protection and protective gloves with wrenches.

Procedure Title: Hand Tools – Hand Saws

Standard: Supervisors shall include safety precautions on the use and care of hand saws in weekly safety talks.

Procedure:

1. Select a saw of proper shape and size for stock being cut.
2. Choose a saw handle that keeps wrist in a natural position in the horizontal plane.
3. Check the stock being cut for nails, knots and other features that may damage or buckle the saw.
4. Start the cut carefully to prevent blade from jumping. Pull upward until blade bites.
5. Apply pressure on down stroke only.
6. Use rip saws at 60° to horizontal. Use cross cut saws at 45° to horizontal.
7. Support long stock in vise, clamp or with helper.
8. Keep teeth and blades properly set, sharpened and tightened.
9. Protect saw teeth when not in use.
10. Use eye protection with handsaws.

Procedure Title: Hand Tools – Hacksaws

Standard: Supervisors shall include safety precautions on the use and care of hacksaws in weekly safety talks.

Procedure:

1. Select correct blade for material being cut.
2. Secure blade with teeth facing forward.
3. Keep blade rigid and frame properly aligned.
4. Use strong steady strokes directed away from you.
5. Use entire length of blade in each cutting stroke.
6. Use light machine oil on the blade to keep it from overheating and breaking.
7. Cut hard materials more slowly than soft materials.
8. Clamp thin flat pieces.
9. Keep two hands on the hacksaw and adopt a solid stance.
10. Use eye protection and protective gloves with hacksaws.

Procedure Title: Hand Tools – Non-Sparking

Standard: Where isolation, ventilation and purging of flammable atmospheres are inadequate to ensure a safe area, non-sparking tools shall be used.

Procedure:

1. Non-sparking or spark resistant tools are made of light metals such as brass, bronze, stainless steel, aluminum, beryllium, titanium, magnesium and copper.
2. Remember that all metals are capable of producing a spark, but those listed above can only do so in ideal circumstances. The hazard is reduced but not eliminated entirely.
3. These hazards remain, even with non-sparking tools:
 - ignition by friction or impact
 - ignition by chemically generated spark
4. Non-sparking tools cannot be certified as safe because of the surfaces they may strike, which then produce a spark.
5. It is possible to certify an electric motor for work in hazardous locations. These motors are almost 100% unable to ignite an explosive atmosphere.

Procedure Title: Hand Tools – Striking Tools

Standard: Supervisors shall include safety precautions on the use of striking tools in weekly safety talks.

Procedure:

1. Striking tools may be cold chisels, punches or drift pins.
2. Hold the chisel, for shearing and chipping, at an angle allowing the level of the cutting edge to lie flat against the shearing plane.
3. Punch and chisel holders are available to prevent accidentally striking the holding hand.
4. Discard tools which are bent, cracked or chipped.
5. Redress burred or mushroomed heads.
6. Redress the cutting edge to its original shape. Grind to a slightly convex cutting edge.
7. Avoid the following unsafe practices:
 - applying too much pressure to the head when grinding a chisel (the heat generated can remove the temper; immerse the chisel in cold water periodically when grinding).
 - using cold chisels for cutting or splitting stone or concrete
 - using a chisel as a drift or punch
 - holding a chisel while someone else strikes it (use tongs or holder)
8. Wear eye protection when striking a chisel, punch or drift pin.

Procedure Title: Hand Tools – Vises

Standard: Supervisors shall include safety precautions on the use of vises in weekly safety talks.

Procedure:

1. Attach a vise securely. Place bolts in all holes in the vise. Use lock washers under the nuts.
2. If the jaw of the vise projects slightly beyond the edge of the workbench, long work can be accommodated.
3. Keep the work as close as possible to the jaws to reduce vibration.
4. Support long work rather than putting extra strain on the vise.
5. Clean and oil all moving parts.
6. Use jaw liners if the work may be damaged or marred.
7. Avoid these unsafe practices:
 - cutting into the jaws
 - using a handle extension for extra leverage
 - using the jaws as an anvil
 - hammering to tighten the handle
 - welding or brazing a vise
8. Use eye protection suitable to the hazard.

Procedure Title: Hand Tools – Pipe Tools

Standard: Supervisors shall include safety precautions on pipe tools in weekly safety talks.

Procedure:

1. Select a pipe wrench with sufficient capacity and leverage to do the job safely.
2. Use a pipe wrench to turn or hold a pipe. Using a pipe wrench to bend or lift a pipe shortens its useful life.
3. Take the bite of a pipe wrench near the middle of the jaws.
4. Adjust the wrench grip to maintain a gap between the back of the hook jaw and the pipe. This concentrates the pressure at the jaw teeth, producing the maximum gripping force.
5. Keep the pipe wrench clean and safe.
6. Face a pipe wrench forward. Turn wrench so pressure is against heel jaw.
7. Pull on the pipe wrench using a solid stance.
8. Avoid the following unsafe practices:
 - using the pipe wrench as a hammer
 - striking a pipe wrench with a hammer
 - using a pipe wrench on nuts or bolts
 - using a handle extender pipe to increase leverage
9. Pipe cutters, reamers, threaders:
 - replace pipe cutter wheels when nicked or damaged
 - use a 3 or 4 wheeled cutter if there is not enough space to swing the single wheel around the pipe.
 - choose the suitable cutting wheel
 - thin wheel for ordinary steel pipe
 - stout wheel for cast iron
 - other wheels for cutting stainless steel, plastic etc.
 - select the proper hole diameter and correct size to tap a hole
 - use lubricant with metals other than cast iron

DO NOT

- permit chips to clog flutes; chips prevent the tap from turning
- attempt to thread hardened steel as this can chip the die
- thread any rod or other cylindrical object that is larger in diameter than the major diameter of the die thread
- use a spiral reamer on a rotating pipe; the reamer may snag and cause serious injury

10. Use eye protection at all times using pipe tools.

Procedure Title: Hand Tools – Hammers

Standard: Supervisors shall include safety precautions on the use of hammers in weekly safety talks.

Procedure:

1. Select hammers according to their intended use. Misuse can cause the striking face to chip.
2. Choose a hammer with a striking face diameter 1” larger than the tool being struck.
3. Strike the surface squarely.
4. AVOID the following unsafe practices:
 - using hammer with a loose or damaged handle
 - using a hammer head that is cracked, dented, chipped or mushroomed
 - welding, grinding or heat treating a hammer head
 - striking with one side or cheek of a hammer
 - striking one hammer with another hammer
5. Wear eye protection when using a hammer.

- Procedure Title: Operating Engineers – Qualifications
- Standard: Personnel involved in operating mobile hoisting equipment shall be qualified, knowledgeable and experienced in all phases of hoisting operations.
- Procedure: The supervisor shall ensure that the following conditions are satisfied:
1. Qualification required to operate mobile hoisting equipment is defined as Certificate of Qualification “Hoisting Engineer – Mobile Crane Operator” issued by Ministry of Skills Development, Ontario.
 2. The Operating Engineer shall be completely familiar with the manufacturer’s recommendations regarding the safe, efficient operating practices for the equipment.
 3. The Operating Engineer shall complete formal upgrading training courses as required by the supervisor.
 4. The Operating Engineer has the ultimate responsibility for the safe and proper use of the hoisting equipment and rigging apparatus.

Procedure Title: Operating Engineers – Restrictions

Standard: Operating Engineers shall restrict the use of hoisting equipment to operations which will not result in accident/or injury.

Procedure: The supervisor shall discuss the following restrictions in crew safety meetings:

1. No part of a hoisting machine will be brought within the limits of approach to high voltage power lines.

The limit of approach is the length of the boom if power exceeds 750 volts.

If a signal man is present, the limits of approach are:

<u>Voltage</u>	<u>Limits of Approach</u>
750 – 150,000 volts	10 feet (3m)
150,001 – 250,000 volts	15 feet (4.5m)
more than 250,00 volts	20 feet (6m)

- Encroachment into the limits of approach is unacceptable.

2. Restriction #1 does not apply in the following circumstances:
 - the power line is de-energized
 - The work is being performed in accordance with the procedures approved by the Electrical Utilities Safety Association of Ontario or Ontario Hydro.
3. Outriggers shall be fully extended and set with level solid positioning prior to taking a lift. Studies prove that more than 55% of crane failures are due to improperly set outriggers.
4. Restriction #3 does not apply if manufacturer permits lifts “on rubber” or pick and carry operation.
5. Cranes shall be shut down where windy conditions make it impossible to control the movement of loads.
6. Operators must remain at the controls when loads are suspended.
7. Exceeding the load chart capacity of a crane is unacceptable.
8. The supervisor shall issue Operating Engineers with a copy of Mobile Crane Today, D.H. Campbell, B.A.Sc., P.Eng. 1988, which shall remain on the crane at all times for reference.

9. Operating Engineers shall abide by the procedures contained in Mobile Craning Today.
 - If in doubt as to the safety of a lift, seek clarification prior to taking the lift.
10. Operating Engineers shall not take signals from more than one person at a time - except – stop. If signals are confusing or incorrectly given, the Operating Engineer shall not make assumptions but shall have the load landed and the faulty signal man replaced.
11. it is in the operator's interest to receive correct signals and he should, therefore, accept the responsibility of requesting training for those who need it, or simply do the training himself.
12. If a load is rigged unsafely or improperly, the operator shall instruct the ground man how to do the rigging properly.
13. When the Operating Engineer's qualifications, knowledge and experience identify conditions that compromise the safety of people, equipment or materials, the conditions must be corrected prior to taking the lift.

- Procedure Title: Operating Engineers – Maintenance
- Standard: Mobile hoisting equipment shall be maintained in perfect running order when in use.
- Procedure: The Operating Engineer shall satisfy the maintenance standard in the following ways:
1. A maintenance log book shall be kept current and up to date indicating:
 - date of inspection
 - signature and name of inspector
 - signature and name of supervisor
 - any defects detected and action taken
 - any modifications, replacements, repairs made
 - the date of modifications, replacements, repairs made
 2. Other than routine adjustments, that are up to the operator, duly qualified heavy equipment mechanics shall make modifications, replacements, and repairs to hoisting equipment.
 3. The Operating Engineer shall use his discretion, based on his qualifications, knowledge and experience, as to whether a mechanical defect is of a minor nature (to be repaired when convenient) or of a major nature (causing shutdown of the crane).
 4. The manufacturer’s recommendations regarding lubrication, inspection of components and wire rope assemblies, and mechanical fitness shall be completely satisfied and duly recorded in the log book.
 5. The circumstances of “close call” or near accidents shall be reported by the Operating Engineer to the supervisor so that preventative measures can be taken.
 6. Preventative maintenance is scheduled to suit production requirements and the manufacturer’s recommendations. “Down time” is imposed by failure to anticipate maintenance requirements.

Procedure Title: Crane Suspended Work Platforms

Standard: The crane operator shall not hoist personnel unless the legal requirements have been satisfied.

Exception: In the event of an emergency requiring the crane operator to hoist personnel in an illegal fashion, he may do so with all reasonable precautions.

Procedure:

1. To hoist a personnel in a work platform, a professional engineer must design and stamp the drawing of such a platform.
2. The stamped drawing must be submitted to the Ministry of Labour for approval.
3. A copy of the approved drawing must be kept in Head Office and at the pertinent workplace.
4. Workers on the platform must have their own independent means of fall arrest as follows:
 - i) a CSA approved safety belt or harness
 - ii) a 5/8" nylon (or stronger) rope as a lanyard
 - iii) a mechanical rope grabbing device
 - iv) a vertical lifeline of 5/8" polypropylene or stronger rope
5. The lifeline shall run from the ground up to the person in the platform, through his rope grabbing device, up to a snatch block secured to the boom head section, back down to the ground.
6. When the platform is at the working height, the lifeline shall be secured to a solid anchorage point on the ground.
7. There can be no overhead structure on the platform -- no slings to the corners from the hook point.
8. A suitable pipe welded to the centre of the platform floor shall serve as a hook point.
9. Means of attachment at hookpoint shall be a rated shackle with its pin in the crane hook.
10. The crane used in this service must not have a live boom. It must have controlled lowering (power down). The free fall option cannot be used in this service.
11. With hydraulic, telescopic booms, it may be required that an "anti-two-blocking" device be installed.

Some guidelines that are normally acceptable to the Ministry of Labour:

1. Calculate the weight of the empty platform and its rated capacity; mark the weight and capacity permanently on the side of the platform.
2. Use a safety factor of 10 in the overall design.
3. The gross load of the loaded platform should not exceed 50% of the crane's rated capacity at the radius.
4. If visual (hand) signals are not adequate, Provide radio communications between the airborne personnel and the crane operator.
5. The perimeter of the platform should be guarded by a railing 46" high with a midrail fabricated from the schedule 40 pipe 1-1/4" in diameter.
6. Tag lines from diagonally opposite corners should be used to control rotation.
7. Any adverse weather conditions such as wind, electrical storm or heavy rain will preclude the use of suspended platforms of this type.

Procedure Title: Overhead Cranes

Standard: Overhead cranes of all types shall be operated by personnel qualified by their knowledge, training and experience to do so without endangering personnel equipment or materials.

Procedure:

1. Overhead cranes include:
 - electric wire rope hoists
 - electric chain hoists
 - pendant cranes
2. Electric wire rope and electric chain hoists may be suspended from a fixed point or trolley.
3. The trolley may be motorized but very often the hoist is moved by tugging gently on the pendant. The units can only move along a fixed straight line (beam).
4. Pendant cranes trolley along a bridge (east-west) which travels on rails (north-south). They usually have two or more parts of line.
5. The checklist on the following page shall be followed.

SHOP CRANE CHECKLIST

- Know and obey the safe load limit
- Ensure that controls work properly
- Check pendant control cable for cuts or wear
- Check hoist cables for fraying, kinking or crushing
- Look at hoist drum for proper alignment and stacking
- Inspect hook for cracks, bending or distortion
- Ensure that safety latch is operating
- Follow manufacturer's recommendations
- Position hoist directly over load
- Between lifts, check that wire rope properly seats on the drum
- Clear the intended path of travel of people and obstructions
- Check brakes for excessive drift
- Keep out from under load
- Operate smoothly
- Raise the load ONLY HIGH ENOUGH to clear obstructions
- Do not leave a suspended load unattended
- Train unqualified personnel with an empty hook
- Never use the hoist chain as a sling
- Be sure limit switches are properly set and working

Procedure Title: Aerial Work Platforms

Standard: Personnel involved in the operation of aerial work platforms shall be duly qualified.

Aerial work platforms consisting of a boom truck or crane with man-basket pinned to the boom shall be operated by qualified personnel. See OE 01, Operating Engineers – Qualifications.

Aerial work platforms of the type JLG, manlift, scissor lift and similar self-operated lifts may be operated by qualified personnel who are not Operating Engineers.

Procedure:

1. Set lift up on firm, solid ground.
2. If equipped with outriggers or stabilizers, they must be set prior to raising the basket.
3. Bubble level indicators are recommended to ensure a level set up.
4. A boom supported working platform shall be equipped with a tilt alarm or warning device to warn that the base is out of level by 5° or more in any direction. OHS REG 87(3)
5. When an aerial platform height exceeds three meters above the set up surface and a man is in the platform, it shall be moved only if:
 - the surface is reasonably smooth and level
 - AND
 - each worker is protected from falling by a safety belt secured to a fixed supportOHSA Reg. 87(4)
6. “Scissor lift” type platform units shall have a guard against a shearing hazard to workers. OHSA Reg. 87(I)
7. Platforms shall not be used to raise material other than small parts and hand tools. No rigging from the platform or boom.
8. To travel from one work location to another, it is safer to lower the platform or retract the boom.

9. Boom truck/basket combinations must not be driven with personnel in the basket.
10. A daily inspection of all structural and mechanical components shall be conducted by the authorized operator prior to use.

Procedure Title: Powered Hand Tools – Basic Electrical Safety

Standard: Power cords shall be in “as new” condition and grounded effectively.

Procedure: Foreman shall inspect the following defects and repair or replace the cord immediately. Discuss unsafe practices in weekly crew safety meetings.

1. Open front plugs are not permitted. Replace with dead front plugs.
2. Light duty cords are not permitted. Replace with heavy duty power cords.
3. Power cords should not be tied in knots which can cause short circuits.
4. Worn or damaged outer jackets should be taped and replaced when practical.
5. Eliminate “octopus” connections.
6. Broken three-prong plugs should be replaced. Check that the third prong is properly grounded.
7. Keep power cords out of water and protect them from cutting due to traffic passing over by using conduit or placing planks along side them.
8. At temporary service panels, a tie bar is recommended so that cords will not be damaged when pulled out from a distance.
9. With all electrical appliances or tools, disconnect from the power source prior to making adjustments.
10. If tools are not double insulated, the power cord must provide effective grounding.
11. Switches should not be bypassed by connecting and disconnecting the power cord.
12. Test tools regularly for grounding with a continuity tester or a GFCI.
13. Suspending power cords over aisles, work areas and walkways is a good way to eliminate tripping hazards.
14. Do not clean electric tools with flammable or toxic solvents.

15. In damp locations or outdoors, a ground fault circuit interrupter (GFCI) must be used unless the tools are double insulated.
16. Wear and tear is accelerated by carrying tools by the power cord.
17. Agents such as heat, water, oil and chemicals can damage the insulation on cords and tools.
18. Do not wear gloves, loose clothing or jewelry while using revolving power tools.
19. When a tool or cord is defective, tag the item as such prior to sending it into the tool crib for repair. If repairs are not possible on site, take the item out of service.

Procedure Title: Powered Hand Tools – Drills

Standard: All personnel involved in the use of electric drills shall be familiar with their characteristics and the necessary safety precautions.

Procedure: Supervisors shall discuss the following in crew safety meetings:

1. Safety glasses required. When drilling overhead, tight-fitting goggles are required.
2. Keep drill vents clear to maintain adequate ventilation.
3. Use sharp drill bits.
4. Keep cords clear of the cutting area.
5. Disconnect power supply prior to changing or adjusting bit or attachments.
6. Tighten the chuck securely and remove the chuck key before starting drill.
7. Some things to avoid:
 - bent drill bits
 - exceeding manufacturer's capacities
 - high speed steel (HSS) without cooling or lubricant
 - reaching under stock being drilled
8. Use auxiliary handle for larger work or continuous operation.
9. For continuous work in concrete or wood, a nuisance dust mask is recommended.
10. The circular or rotating motion (torque) in tools such as drills can be transferred to your hands if the bit becomes lodged in the work. Severe strains have resulted from a sudden twist.
11. The power switch or trigger should be "fail safe" so that it cannot be locked n. Watch for "coasting" or idling motion.
12. Use a tool to clean up or deburr. Many hand and finger injuries result from the temptation to sweep away cuttings without skin protection.
13. Use a vise or clamp to hold small work.

14. Inspect tool at least daily before start-up. Look for loose or damaged parts, adequate lighting, lubrication and material that could vibrate into your work area.
15. Store the drill in a safe, secure area so that it will not grow legs.

Procedure Title: Powered Hand Tools – Circular Saws

Standard: All personnel involved in the use of circular saws shall be familiar with their characteristics and the necessary safety precautions.

Procedure: Supervisors shall discuss the following in crew safety meetings:

1. When using “skill saws” the following eye protection shall be used:
 - side shielded safety glasses and full face shield
 - OR
 - tight fitting goggles
2. In confined areas (i.e. indoors), a nuisance dust mask shall be worn.
3. Use a sharp blade designed for the work.
4. Check the retracting lower guard blade frequently to make sure it works freely.
5. Allow saw to attain full speed prior to cutting.
6. Allow retracting lower blade guard to return to its seat before laying saw down.
7. Disconnect power supply prior to making adjustments or changing a blade.
8. Keep all cords clear of cutting area.
9. For safety, use two hands to control the saw; one on trigger switch and the other on front knob handle.
10. Keep motor free of sawdust and chip accumulation.
11. Allow the blade to cut at high speed rather than forcing it. The few seconds saved by forcing a cut are not worth the premature wear out of the saw.
12. Secure the work being cut to avoid movement.
13. Some things to avoid:
 - fixing or holding open the retracting blade guard
 - placing hand below work being cut
 - over tightening the blade locking nut
 - twisting the saw to change direction or check cut

14. Always check work to be cut for nails or foreign objects.
15. Do not carry the saw with finger on the trigger and power connected.
16. When ripping stock, use a wedge and guide that is clamped to the work.
17. Store the tool in a secure area to prevent damage or theft.
18. Do not use a circular saw above shoulder height.

Procedure: Powered Hand Tools – Explosive Actuated Fastening Tools

Standard: Personnel involved in the use of explosive actuated fastening tools shall be familiar with their characteristics and the necessary safety precautions.

Procedure: The supervisor shall discuss the following in crew safety meetings:

1. Operators of explosive actuated fastening tools shall be instructed in their proper and safe use.
2. This training shall be given by the manufacturer or his authorized and qualified agent.
3. The qualification card shall be carried by the operator at all times the tool is used by the operator.
4. The following protective equipment is required by the operator at all times:
 - hard hat
 - safety glasses and face shield
 - hearing protection
5. Do not permit bystanders in the immediate vicinity of the work.
6. Care and servicing of tools:
 - CLEAN and maintain in accordance with manufacturer's instructions
 - CHECK tool prior to each use
 - REMOVE defective tools from service
 - STORE tools and cartridges in a locked container
7. Use of tools:
 - use at 90° to work surface
 - CHECK the chamber to ensure barrel is clean and free of obstruction
 - do not use in presence of flammable or explosive vapours
 - do not place hand in front end (muzzle) of loaded tool
8. Use of projectile:
 - use only studs or nails provided by manufacturer of tool
 - ENSURE that base material can hold the projectile
 - LOAD tool immediately before use
 - don't leave tool unattended
 - if base material hardness is unknown, use a hand hammer to drive the projectile as a test

9. Use of cartridges:
- use cartridges recommended by tool manufacturer
 - cartridges are colour-coded for strength
 - make trial fixing with weakest cartridge
 - hold the tool in fixing position at least 15 seconds when tool misfires
 - unload misfired cartridge with extractor tool and deposit into water
 - do not carry unfired cartridges in pockets
 - do not discard unfired cartridges carelessly

- Procedure Title: Powered Hand Tools – Air Powered
- Standard: Personnel involved in the use of air powered hand tools shall be familiar with their characteristics and the necessary safety precautions.
- Procedure: Supervisors shall discuss the following in crew safety meetings:
1. Air powered tools include:
 - nailing and stapling guns
 - grinders
 - drills
 - jack hammers
 - chipping hammers
 - riveting hammers
 - impact wrenches
 2. Air hoses
 - prevent tripping hazards created by hose
 - hose connections must fit properly and be secured by wire or chain
 - install quick disconnects of a pressure release type rather than disengage type; attach the male connector to the tool, not the hose
 - check regularly for cuts, bulges, abrasions; replace if defective
 - turn off air pressure when tool not in use
 - blow out air line prior to use
 3. Air pressure rating of air supply hoses must be at least 150 psig (1035 kPa) or 150% of the maximum pressure produced in the system, whichever is higher.
 4. Operation:
 - post warning signs and shields if others may be affected by flying chips, dust and noise
 - support heavy tools to gain safe control of the tool
 - exercise care to protect hands, feet and body in case tool slips
 5. Air cleaning:
 - cleaning with compressed air is dangerous
 - use pressure below 30 psi (207 kPa) at nozzle
 - blowing debris from clothing using compressed air is forbidden

- Procedure Title: Powered Hand Tools – Portable Grinders
- Standard: Personnel involved in the use of portable grinders shall be familiar with their characteristics and the necessary safety precautions.
- Procedure: Supervisors shall discuss the following in crew safety meetings:
1. An abrasive wheel can break, causing serious injury.
 2. Clean and service grinders according to manufacturer's recommendations.
 3. Grinders should not operate when unattended. "Deadman" or constant pressure switches are required.
 4. The following protection is required at all times when using a grinder:
 - side-shielded safety glasses and face shields
 - or tight-fitting goggles
 - metatarsal safety boots are advisable
 - respiratory protection is advisable
 5. Wheel speed is related to safety. Excessive speeds cause vibration, rough operation, wheel break up and difficulty in controlling tool.
 6. Run newly mounted wheels for one minute before grinding.
 7. Inspect all wheels for cracks and defects prior to mounting.
 8. Store grinders where damage will be unlikely.
 9. Do not grind near flammable materials.
 10. Do not clamp portable grinders in a vise for grinding hand-held work.
 11. Do not force wheels onto a grinder or change mounting hole sizes.

- Procedure Title: Powered Hand Tools – Bench and Pedestal Grinders
- Standard: Personnel involved in the use of bench and pedestal grinders shall be familiar with their characteristics and the necessary safety precautions.
- Procedure: Supervisors shall discuss the following in crew safety meetings:
1. Fasten bench and pedestal grinders securely.
 2. Adjust tool resets to within 1/8" (3mm) of wheels—when wheel is not moving.
 3. Maintain 1/4" (6mm) wheel exposer with a tongue guard or a moveable guard.
 4. Stand to one side of the grinder until operating speed is reached.
 5. Bring work into contact with the grinding wheel slowly and smoothly - -avoid bumping.
 6. Apply gradual pressure to allow the wheel to warm up slowly and evenly.
 7. To prevent grooving, move the work back and forth across the wheel.
 8. Match the abrasive quality of the wheel to the work.
 9. Dress wheels regularly. Do frequent light dressings rather than heavy dressings.
 10. Support dressing tool to apply leverage without undue effort. With revolving cutter dressing tools, use the lugs and anchors.
 11. Replace worn wheels when they cannot be dressed.
 12. Operating speeds relate to safety.
 13. Visually inspect the wheels for possible damage prior to mounting.
 14. Always wear eye and face protection when grinding.
 15. Hazards to avoid:
 - do not use a wheel that has been dropped
 - do not grind wood, plastic or non-iron metals on ordinary wheels
 - do not grind on the side of an ordinary wheel
 - do not leave grinding wheels standing in liquids; this causes balance problems

Procedure Title: Wheel Mounting of Portable Grinders

Standard: Personnel required to install wheels on portable grinders shall be trained by the supervisor in the correct and safe application of the tool.

Procedure:

1. Inspect the wheel and conduct a “ring test” prior to installation. “Ring test” means listening for a ringing sound when the wheel is suspended from hole by pin or finger and tapped gently with a non-metallic tool (i.e. screw driver handle)

“Ring test” does not apply to small wheels (less than 10 cm – 4 inches in diameter)

2. Do not use wheels that sound dead or cracked.
3. Select wheels according to manufacturer’s recommendation.
4. All abrasive wheels are fragile.

Thing to avoid:

- dropping a wheel
- piling other material on top of a wheel
- transporting without protective padding

5. Storage recommendations:
 - store on edge in racks
 - keep wheels away from excessive heat
 - keep dry
 - stack cylinder and straight cup wheels on the flat side on cardboard

Procedure Title: Safety Footwear

Standard: All personnel on a construction site or industrial area shall wear CSA approved heavy-duty foot protection.

Procedure: Acceptable safety footwear has the following characteristics:

1. A stitched-on green leather patch signifying CSA approved Heavy Duty.
2. Metatarsal protection is required where falling objects are likely to strike the top of the foot.
3. In wet conditions, rubber/waterproof CSA approved Heavy Duty safety footwear shall be provided by the supervisor.
4. Ankle support and protection is required, such as a boot provides. "Safety" running shoes or oxfords are not adequate.

- Procedure Title: Safety Hats
- Standard: All personnel on a construction site or industrial area shall wear appropriate head protection at all times.
- Procedure: Appropriate head protection is as follows:
1. On a construction site all personnel shall wear CSA approved Class "B" hard hat at all times.
 2. In an industrial area not designed as a construction site, all personnel shall wear a polyethylene bump cap.
 3. The supervisor shall provide the appropriate head protection.
 4. Where head protection is likely to be dislodged due to wind or working posture, the supervisor shall provide chin straps.
 5. Where temperatures drop below freezing, the supervisor shall provide stock-type dielectric liners for hard hats.
 6. Where the danger of hair entanglement in machinery exists, the supervisor shall provide a hair net.
 7. Head protection shall be replaced when the following defects occur:
 - cracks
 - gouges
 - holes
 - damage due to paint or chemicals
 8. For identification purposes, all S. & T. employees shall wear a blue hard hat, except supervisors who shall wear white.
 9. Metal hard hats are not allowed.

Procedure Title: Eye Protection

Standard: All personnel shall wear the appropriate eye protection required to prevent any eye injury.

Procedure: Eye protection shall be worn as follows:

1. Where experience indicates that flying particles or stray radiation are likely to be present, safety glasses with side shields shall be worn by all personnel at all times.
2. Where experience indicates that safety glasses with side shields are not adequate to prevent eye injuries, tight fitting goggles shall be worn.
3. Tight fitting goggles may be replaced by side-shielded safety glasses combined with a face shield in the following operations:
 - grinding
 - spray painting
 - cutting
 - chipping
4. For sandblasting operations, 100% cotton hoods with replaceable windows shall be worn.
5. Burning goggles are required for all gas welding and burning, number 3 shade density minimum anti-scratch protection.
6. Handling corrosive liquids requires tight fitting goggles without ventilation holes.
7. Handling molten metals requires side-shielded safety glasses combined with a full face shield.
8. Boosting batteries requires tight fitting goggles or side-shielded safety glasses combined with a full-face shield.

Procedure Title: Hand Protection

Standard: Hand protection suitable to the hazard shall be used.

Procedure: Hand protection shall be used as follows:

1. Skin damage due to solvents, chemicals and other agents shall be prevented by using the protective gloves or barrier cream required by the WHMIS Material Safety Data Sheet.
2. Dielectrically tested rubber gloves are required on all power line work and where there is possible contact with energized circuits.
3. Tool holders are required where the hazard of being struck with a driving force exists.
4. Tag lines are required to control loads. Keep hands clear of loads and sling pitch points. Do not wrap tag lines around hands.
5. Rings and other jewelry are prohibited when handling wire rope,
6. Sharp objects or hot metals.

Procedure Title: Hearing Protection

Standard: All personnel shall use appropriate hearing protection in noisy environments.

Procedure: Noisy environments are defined as:

1. An area where the noise level is too high to allow conversation.
2. An area where the noise level exceeds 85 dBa (when measured by a qualified technician).
3. Where the exposure to noise will exceed one hour, CSA approved ear plugs or CSA approved ear muffs shall be provided by the supervisor.

Procedure Title: Fall Arrest Devices

Standard: Where the possibility of injury due to falling exists, all personnel shall use a fall arrest device.

Procedure: Under the following circumstance, a fall arrest device is mandatory:

1. In the absence of guardrails, safety net, or travel restraint system where a worker may fall a distance of 10 feet.
2. In the absence of guardrails, safety net, or travel restraint system, where a worker may fall a vertical distance of 8 feet from a working platform such as a scaffold.
3. At all times on a swing stage, buson's chair, or any suspended scaffold – full body harness only.
4. Where a worker may fall any distance onto protruding objects or moving machinery.
5. Where a worker may fall into water and the hazard of drowning exists.
6. Where a worker may fall into or onto hazardous substances.

Procedure Title: Fall Arrest Devices Defined

Standard: The fall arrest device used must be so arranged that an injury will not result:

1. A worker shall not fall a vertical distance of more than 5 feet when using a fall arrest device.
2. A fall arrest device shall be secured to a solid anchor point.
3. A safety belt consists of:
 - a CSA approved belt
 - a lanyard of 5/8" polypropylene (or stronger) if no convenient anchor point is available
4. The CSA approved belt above may be substituted with a CSA approved parachute type harness.
5. Ropes/webbing must be arranged to avoid cutting and chafing.

Procedure:

1. A lifeline can be used by one worker at a time ONLY.
2. A mechanical rope-grabbing device should be used to connect the lanyard to the lifeline. Do not use the triple-sliding hitch for this purpose unless adequate training has been arranged. NO OTHER FORM OF CONNECTION IS PERMITTED.
3. Nylon web lanyards with shock-absorbing capabilities are recommended.
4. A fall arrest device shall be inspected prior to each use and at least once a day.
5. The belt's pivot point ("D" ring) shall be placed in the small of the back.
6. The supervisor may waive the above standard where:
 - a worker is proceeding to or from his work position
 - a worker is engaged in connecting structural members of a skeleton structure
7. The supervisor should not assume that all personnel are properly trained in the use of fall arrest devices. Proper training shall be provided by the supervisor.

Note: There are full body harnesses available and these are required on all suspended platforms.

Procedure Title: Safety Equipment Checklist

Standard: Reasonable quantities of the necessary safety equipment shall be available in the tool crib.

Procedure: Safety equipment issued by the tool crib includes:

1. Gloves – leather faced
 - gauntlet type for welders (leather)
 - neoprene – acids, oil, grease, solvents
2. Hard Hats – class”B” CSA blue – non-supervisory
 - class “B” white – supervisory
 - sock-type hard hat liners – blue
 - bump-caps – shop use
 - chin straps
3. Side-Shielded Safety Glasses – polycarbonate lenses
 - clear and tinted
 - neck straps
4. Coverall goggles – hooded ventilation (particles)
 - airtight monogoggles (chemicals)
5. Safety Footwear – green patch CSA heavy duty watertight
6. Hearing Protection – plugs and muffs CSA
7. Dust Masks – single use type
8. Organic Vapor Respirators – cartridge type
9. Compatible Cartridge for: paint spray, dust/mist, “all purpose”
10. Supplied Air Respirator – i.e. paint barn use
11. Face Shield Hood – i.e. sandblasting barn
12. Barricade Tape – “DANGER KEEP OUT”, “STAND CLEAR”, etc.

13. Burning Goggles – density number 4 and 5
14. welder’s Hoods – density number 10 and 12
15. Knee Pads
16. Danger Tags – “DO NOT USE”, “HIGH VOLTAGE”
17. Safety Belts/Lanyards – CSA
18. Full Face Shields
19. Sweat Bands
20. Fire Extinguishers
21. Polypropylene Rope – 16 mm (5/8”) diameter for lifelines
22. Mechanical Rope grabbing Device

Procedure Title: Visitors' Safety and Health

Standard: All personnel under the direction and control of S. & T. shall be protected from physical or chemical hazards.

Procedure:

1. Visitors to S. & T. shop, office, project or other workplace must register with the receptionist or other company official.
2. Visitors must use the personal protective equipment required in the work area, such as safety glasses, boots, hard hats and hearing protection.
3. If the visitor does not have the equipment required, it may be provided by S. & T.
4. Visitors shall be escorted by a company representative at all times. It is the responsibility of the employee visited to maintain control of his/her visitor.
5. Visitors must be informed of site emergency procedures and any potential exposure to health hazards.
6. Visitors are to keep private vehicles away from the work area.

- Procedure Title: Abrasive Blasting
- Standard: Personnel involved in the use of abrasive blasting equipment shall be familiar with its characteristics and the necessary safety precautions.
- Procedure: The supervisor shall include the following in weekly safety talks:
1. Abrasive blast cleaning – commonly called sandblasting – uses granular material to clean a surface.
 2. Granules are pulverized releasing a hazardous respirable dust into the air.
 3. Blasting painted surfaces containing lead and zinc primer may release hazardous zinc and/or chromates in respirable dust form.
 4. To control the hazardous dust, several options are available:
 - local exhaust ventilation
 - non-silica bearing blasting agents
 - dust suppression using water mist
 - rotate work assignments to reduce exposure
 - respiratory protective equipment
 5. Without exception, the following protective equipment must be used when sandblasting:
 - abrasive blasting hood with continuous airline respirators
 - leather jacket and trousers
 - protective gloves with gauntlets
 - green patch safety boots
 - ear plugs
 6. Blast machine shall be equipped with a remote control (dead man switch) that will enable operator to shut off the machine at the nozzle.

Procedure Title: Fire Prevention

Standard: Adequate fire prevention preparation shall be taken prior to commencing welding or cutting operations.

Procedure:

1. Supervisors shall check with the owner or management of the premises as to hot permits or procedures in place.
2. Combustibles are to be removed at least 30 feet from the work area.
3. If oxy-fuel gas process is to be used and all combustibles cannot be removed, protect them with wet asbestos and sheet metal. Soak wooden floors with water. Many fires have started by concealed sparks long after the operator has left the area.
4. If electric welding or cutting with the arc is to be used, do not wet down or use sheet metal. Use only dry asbestos sheets to sheathe combustibles.
5. Supervisors shall ensure that there are no flammable or explosive vapors or fumes present prior to commencing hot work.
6. When finished, completely check the area for hot metal or live sparks.
7. When combustibles were not removed and may have been momentarily uncovered, a "fire watcher" can be assigned to be sure of no accidental fire.
8. Keep handy a portable fire extinguisher and/or buckets of sand or water where fire may spread quickly.
9. For all hot work, locate the nearest fire alarm prior to commencing the operation.
10. No employee is to endanger himself by fighting a fire. Prevention is much safer and less costly.

Procedure Title: Fire Extinguishers

Standard: All personnel shall be familiar with the use of fire extinguishing equipment in the work area.

Procedure: Supervisors shall include the following in weekly safety talks:

1. These types of fire extinguishers are commonly found in construction areas:
Class A – water – for wood, paper, etc.
Class B – dry chemical – for flammable liquids
Class C – carbon dioxide – for electrical fires
Class D – freon automatic system
2. Placement of fire extinguishers:
 - i) Class A – one 2A extinguisher for every 3,00 square feet of building area
 - ii) Class B – one 10B extinguisher stored within 50 feet of more than 5 gallons of flammable liquid (including paint).
 - iii) Class C – one 10 pound CO2 extinguisher near major electrical installations
 - iv) Class D – freon systems for model rooms, computer areas, etc.
3. It is most common to place fire extinguishers just inside the entrance to a room or area.
4. Extinguishers of the Class B type shall be 20 – 50 feet from gasoline and diesel fueling areas.
5. Extinguishers shall be found within 50 feet of welding and burning operations.
6. One 5BC rated dry chemical extinguisher shall be found on gasoline driven equipment such as cranes, loaders, forklifts, welders, compressors and pick-up trucks.
7. Extinguishers shall be mounted no more than 5 feet above floor level in buildings with clear access and shall be clearly marked.
8. Fire extinguishers shall be inspected monthly.
9. Once an extinguisher is used or the pressure falls, it shall be recharged.

Procedure Title: Lock-out Procedures

Standard: Personnel assigned to work on operable equipment shall be supervised to ensure the use of proper and safe “tag, lock, and try” procedure.

Procedure:

1. Danger tags and locks shall be used to prohibit operation of a valve, switch, or piece of equipment ONLY when injury or property damage could result from the operation.
2. All tags shall be dated, signed and securely attached.
3. Tags are never to be reused but shall be destroyed immediately upon removal. No alterations to a tag can be made.
4. No device shall be operated with a lock or tag attached regardless of circumstances.
5. It is the responsibility of the supervisor to remove locks and tags in the presence of all affected personnel unless the crew members have been properly and completely trained in the procedure.
6. Any authorization removal or tampering with a lock or tag is subject to disciplinary action and possible criminal charges by the authorities. Attend to your own lock/tag and no one else's.
7. Electricians will place “multi-lock” devices if other trades are involved.
8. Locks and tags are not a substitute for the plant owner’s responsibility for breaking flanges, placing blanks, draining or otherwise decontaminating equipment or systems.
9. Lines containing hazardous chemicals, acid, volatile, liquids, high pressure steam and all electrical services require lock as well as tag.
10. Push button or butterfly controls may not be used for purposes of lock-out.
11. In most cases, each individual involved in the work must participate in the lock-out by placing his own lock and tag.

Procedure Title: Confined Space Program

Purpose

To identify confined spaces within the company, assess the hazards to which workers may be exposed and develop adequate plans to eliminate or control the hazards before any worker enters the confined space.

Scope _____

This program will provide procedures for the assessment of hazards to workers, the development of plans to eliminate or control the hazards, the use of an entry permit system and the training of workers who are affected by this program.

Policy Statement

S & T Group's workplace requires staff to perform a variety of tasks and operations in all forms of structures, including confined spaces. This program will address the procedure for confined spaces. S & T Group will take all reasonable measures to identify workplace hazards and unsafe conditions for confined space.

Responsibilities

- 4.1 S & T Group shall take adequate steps to control, administer or eliminate the potential hazards and to supervise the work in progress.
- 4.2 A person in charge of a job site will plan work such that they have analyzed the job for hazards and have developed or selected methods of doing work in such a way that the risk of injury is minimized. A person in charge of a job site will advise workers of potential hazards and precautions necessary to perform the assigned work in a safe manner. A person in charge of a job site will monitor the work for changes in conditions and remain in compliance with safety rules. If changes are noted that increases the risk to workers, the person in charge will make appropriate changes to the job plan.
- 4.3 Workers must work in compliance with the procedures established and in a manner that will not endanger themselves or a fellow worker. Changes in procedures, conditions or equipment must be reported to the supervisor.
- 4.4 Contractors / Sub Contractors must show proof of a confined space entry program, appropriate training and supervision before they will be permitted to work in a confined space. Contractors must follow S & T Group Confined Space Entry Program.

General

- 5.1 Entry into tanks, vessels, sewers, vaults and other confined spaces may be necessary under certain conditions. This entry may present a hazard to the worker assigned.
- 5.2 The hazards commonly encountered are:
 - a) Dangerous vapours, mists, dusts or fumes;
 - b) Lack of oxygen or excessive level of oxygen;

- c) Ionizing radiation;
- d) Fire and explosions;
- e) Electric Shock;
- f) Mechanical hazards, e.g., operation of process or associated equipment while a person is in the enclosure; and
- g) Extremes of temperatures and humidity or contact with hot objects.

Definitions

Adequate, when used in relation to a procedure, plan, material, device, object or thing, means that it is:

- a) sufficient for both its intended and its actual use, and
- b) sufficient to protect a worker from occupational illness or occupational injury.

Approved retrieval system is a combination of devices designed to remove an unconscious victim from a confined space without the need for the rescuer to enter the space. It usually consists of a full body harness, a rescue rope and a tripod with retrieval device or RBD. The system shall be approved by the JHSC.

Attendant is an individual that is stationed outside and near the entrance to the confined space, but does not enter the confined space. They are responsible for monitoring the safety of, providing assistance to and summoning a rescue response for the workers inside the confined space.

Competent, only employees with adequate knowledge, training and experience shall be deemed competent by their supervisor to perform an assessment, create a plan and hold a permit for a confined space.

Legislation

7.1 Entry into confined spaces is covered by Section 221 of the Construction Regulation and Section 119 of the Industrial Regulations and Reg. 632/05 of the OHSA.

7.2 Definition of a Confined Space, as per the OHSA is:

A fully or partially enclosed space,

- a) that is not both designed and constructed for continuous human occupancy, and (See Annex C)
- b) in which atmospheric hazards may occur because of its construction, location or contents or because of work that is done in it. O. Reg. 632/05, s.1 (See Annex D)

7.3 Reg. 632/05, s.5 of the OHSA states that:

- b) If the employer's workplace includes a confined space that workers may enter to perform work, the employer shall ensure that a written program for the confined space is developed and maintained in accordance with this Regulation before a worker enters the confined space. O. Reg. 632/05, s. 5 (1),
- c) The program may apply to one or more confined spaces. O. Reg. 632/05, s. 5 (2),
- d) The program shall be developed and maintained in consultation with the joint health and safety committee or the health and safety representative, if any. O. Reg. 632/05, s. 5 (3).
- e) The program shall be adequate and shall provide for,
 - (i) a method for recognizing each confined space to which the program applies;
 - (ii) a method for assessing the hazards to which workers may be exposed, in accordance with section 6;
 - (iii) a method for the development of one or more plans, in accordance with section 7;
 - (iv) a method for general training of workers, in accordance with section 8; and
 - (v) an entry permit system that sets out the measures and procedures to be followed when work is to be performed in a confined space to which the program applies. O. Reg. 632/05, s. 5 (4).
- f) The employer shall provide a copy of the program to the joint health and safety committee or the health and safety representative, if any. O. Reg. 632/05, s. 5 (5).
- g) The employer shall ensure that a copy of the program is available to,
 - (i) any other employer of workers who perform work to which the program relates; and
 - (ii) Every worker who performs work to which the program relates, if the workplace has no joint health and safety committee or health and safety representative. O. Reg. 632/05, s. 5 (6)

Recognition

All employees that may be required to perform work in or near a confined space shall be trained in confined space identification.

Assessing Hazards

- a) Every employee will receive general training on identification of hazards in a confined space.

- b) Only those employees that are deemed competent will perform and record a hazard assessment.
- c) A hazard assessment shall be completed before a confined space is entered and reviewed as necessary for the period that the Entry permit is valid.
- d) The hazard assessment record will be part of the Entry Permit.

Developing Plans

- a) Before any worker enters a confined space, an adequate written plan, including procedures for the control of hazards identified in the assessment, shall be developed and implemented.
- b) Only those employees that are deemed competent will develop, implement and record a Plan.
- c) The Plan will be part of the Entry Permit.
- d) The Plan portion of the Entry Permit will be laid out as a template to ensure that all provisions for a plan under the regulations are met.

Entry Permit

A separate Entry Permit shall be completed each time a confined space is to be entered. The Entry Permit shall only be completed and accepted by a worker who has been deemed competent in confined space assessment and entry planning.

Training

12.1 Types of Training

Supervisors and workers shall receive general training in the proper methods of confined space entry, testing, working procedures and rescue.

Workers shall receive plan-specific training when an assessment and relevant plan have been developed for the confined space that is to be entered before it is entered. Training shall be given by the competent person who will be accepting the Entry Permit.

12.2 General Training

Shall cover the following topics as a minimum:

- a) Definitions of terms regarding confined spaces.
- b) Applicable sections of the OHSA and S&T Group Policy.
- c) Recognition of confined spaces.
- d) The actual or potential hazards to be encountered on entry into any confined spaces.
- e) The proper procedures and safety equipment required for entry into such spaces.
- f) Responsibilities of the Permit Holder.

- g) Responsibilities of the workgroup members.
- h) Responsibilities of the attendant.
- i) Entry Permits and Co-ordination documents (Annexes A and B).
- j) Inspection and use of apparatus used in confined spaces.
- k) Atmospheric testing equipment and methods.
- l) Health effects such as headaches, dizziness, irritations or other ill effects caused by poor air quality.
- m) Ventilation and methods for controlling hazards.
- n) The proper procedure for emergency rescue.
- o) Methods of communication.
- p) Record keeping.

12.3 Plan-Specific Training

Workers shall be informed of:

- a) The actual and potential hazards to be encountered upon entry into the confined space.
- b) The proper procedures and safety equipment required for entry into the confined space.
- c) The proper procedure for communication between entrants, attendants and emergency help.
- d) The rescue plan.
- e) Their duties within the work group.

12.4 Air Testing

- a) Before entry into a confined space, air testing by a trained and competent person shall be carried out. Records of air tests will be recorded on the confined space entry permit.
- b) As a part of their training, workers and supervisors shall be alerted to the health effects such as headaches, dizziness, irritations or other ill effects caused by poor air quality. They shall be instructed to stop work when any of these effects or unusual operating conditions is present.
- c) If continuous monitoring is used, test results shall be recorded at least hourly.

12.5 Ventilation

- a) In the context of entries into confined spaces, the aims of ventilation are twofold:
 - i) To lower concentrations of contaminants below the hazard level.
 - ii) To provide the air necessary for normal breathing requirements.
 - iii) To adjust the temperature in the space.

- b) In order to achieve the intended purpose of ventilation, a mechanical means will be used to achieve complete mixing and the mechanism of ventilation will be continuous if there is any suspicion of hazardous concentration of gases, vapours, mists, fumes, dust, oxygen deficiency or extreme temperature.
- c) The type of ventilation may be of importance depending on the hazardous material being vented. The types of mechanical ventilation are:
 - i) Supply Ventilation - the movement of fresh air into the confined space thus displacing contaminated air
 - ii) Exhaust Ventilation - the removal of contaminated air from the confined space so that fresh air finds its way into the space through any available openings.

12.6 Fire and Explosion

- a) If there is a possibility of fire and explosion, all sources of ignition in the area shall be eliminated.
- b) Cylinders of oxygen or other gases used for welding and cutting shall not be taken into a confined space. This does not apply to Self-Contained Breathing Apparatus (SCBA).

12.7 Communication

When a confined space is to be entered, the attendant shall:

- a) Be in constant communication with the worker(s) in the confined space. In most cases simple voice communication will be sufficient. If, as a result of the type of confined space, i.e. size, depth or the surrounding noise levels, enhanced communications may be required. Suitable arrangements shall be implemented prior to the worker(s) entering into the confined space.
- b) Have a method to summon an emergency response.

12.8 Personal Protective Equipment

Proper personal protective equipment depends upon the nature of the exposure. This may range from chemical goggles, hard-hats, gloves and safety shoes to complete body covering. If there is likely to be exposure to a toxic substance or a lack of oxygen, suitable breathing apparatus shall be provided. Respirators are not suitable for this. Personal protective equipment is not a substitute for proper ventilation.

12.9 Rescue Equipment

- a) A safety harness shall be worn by persons entering confined spaces where:
 - i) dangerous gases, vapours, mists, fumes, dusts, oxygen deficiency or extremes of temperature are likely to be present;
 - ii) respiratory protection is necessary;
 - iii) rescue may be difficult;

- b) Where no additional hazard is created through its use, a rescue rope shall be attached to the harness. The free end of the lifeline attached to the harness should be secured outside the enclosed space. It shall be under the control of the attendant.
- c) An approved retrieval system shall be readily available at the worksite.

Note: The six essentials of Rescue:

- i) Rescue from outside - if possible
- ii) Enter to rescue only if sufficient equipment and personnel are on site
- iii) Always assume presence of immediate dangers to life, health, atmosphere
- iv) Only use SCBA or special air pack with escape bottle
- v) Never use same air (or atmosphere) as casualty, unless certain the atmosphere did not create the event
- vi) Safety Harness and Lifeline in addition to PPE

Maintenance of Air Testing Equipment

- 13.1 A trained and competent worker shall conduct maintenance.
- 13.2 As a minimum, maintenance shall be in accordance with the manufacturer's recommendations.
- 13.3 All maintenance procedures and testing shall be recorded by equipment name and serial number.
- 13.4 An expiry/retest decal shall be affixed to the equipment.

Records

- 14.1 Confined Space Entry
 - a) Records must be kept of all test results and entered on the Entry Permit.
 - b) Entry Permits, Co-ordination documents and any other documents pertaining to a confined space shall be retained for the longer of:
 - i) One year after the document is created.
 - ii) The period that is necessary to ensure that at least the two most recent records of each kind that relate to a particular confined space are retained.
 - c) Records shall be filed at the work centre location of the department responsible for the particular confined space.
 - d) Records shall be accessible to workers.
- 14.2 Maintenance Records - Confined Space Equipment
 - a) Records must be kept of all maintenance, tests, repairs, etc. for the life of the equipment.

- b) A decal or similar device labelled “Do not use after ____ “ shall be affixed to confined space equipment to indicate when it needs to be re-inspected.

14.3 Other Hazardous Conditions

- a) Other hazardous conditions, i.e. debris, poor maintenance, etc. shall be recorded on the Confined Space Entry Permit. These conditions shall be inspected for corrective action by the department supervisors.

Procedure Title: Smoke-Free Ontario Act

PPE 15

Purpose:

To make aware that as of May 31, 2006, smoking is prohibited in all enclosed workplaces and enclosed public places across Ontario

Discussion:

The act prohibits smoking in enclosed workplaces and enclosed public places in order to protect workers and the public from hazards of second hand smoke.

Policy:

An enclosed public place means any enclosed area of building or structure to which the public has access, including retail shops, indoor shopping malls, restaurants, bars, places of entertainment, casinos, bingo, and billiard halls, taxicabs and limousines.

Procedure:

- Smoking is also banned in work vehicles
- The government of Ontario will carry out inspections and investigate complaints in workplaces to enforce the act. Any individual convicted of an offence under this act could be subject to a maximum fine of \$100,000. any corporation convicted of an offence under this section of the act could be subject to a maximum fine of \$300,000.

Procedure Title: Wire Rope Inspection

Standard: All wire rope in continuous service shall be observed during normal operation and visually inspected on a weekly basis.

Procedure: The following defects seriously question the wire rope safety and are reason to remove the wire rope from service:

1. Broken wires
 - 6 randomly distributed broken wires in one rope lay
 - 3 or more broken wires in one strand
 - one or more broken wires at end fitting
2. Worn or Abraded wires
 - if wear exceeds 1/3 rope diameter
 - look for shiny flat areas
3. Reduction in Diameter
 - normal wear reduces diameter

Wire Rope Normal Size	Maximum Reduction in Diameter
up to 3/4"	3/64"
7/8" to 1 1/8"	1/16"
1 1/4" to 1 1/2"	3/32"

4. Stretch
 - if lay is visibly lengthened
 - compare to new sling/wire rope
 - caused by overloading
5. Corrosion
 - exterior rust, pitting, discoloration
 - interior damage is hidden
 - corrosion as bas end of attachment

6. Kinking
 - permanent bend/dog-leg
 - caused by faulty handling
7. Bird-Caging
 - permanent “see-through” distortion
 - caused by sudden release of tension
 - never returns to original shape
8. Core Protrusion
 - isolated increase in diameter
 - caused by core slippage
9. Bulges
 - isolated increase in diameter
 - caused by core slippage
10. Poor Lubrication
 - if grooves are packed with hard grease or dirt
 - if possible, clean grooves and relubricate
 - results in internal friction and wear
11. Fittings
 - distorted hooks, rings, sleeves, thimbles
 - discard if wear exceeds 10% of any dimension from new
 - discard if hook opening has increased by 10% from new
12. Unbalanced wear
13. Heat damage, torch burns, Electric arc strikes
14. Anti-rotating wire rope
 - flex rope near ear and listen for clicking noise of broken interior wires

*Note: if any of the above defects are present, the wire rope/fitting shall be removed from service.

- Procedure Title: Chain for Hoisting
- Standard: Chain used for hoisting shall be observed during normal operation and visually inspected on a weekly basis.
- Procedure: the following defects seriously question the chain safety and are reason to remove the chain from service:
1. Stretch
 - measurable lengthening of links
 - stretched links will have an hourglass shape
 - stretched links tend to bind on each other
 - check for leg length by hanging sling
 - if stretch exceeds 3% replace the chain
 - new chain should be recorded to use as a future standard
 2. Link Wear
 - using calipers measure diameter at point of maximum wear
 - maximum wear is normally at a crack, gouge, chip or cut
 - if reduction in diameter is more than 10% replace the chain
 - look for wear at bearing surface
 3. Shock Loading
 - if chain is given a shock load, inspect carefully for cracks
 - when chains fail due to shock loading, flying debris acts like a bullet
 4. Improper Use
 - around sharp corners or edges with no softeners
 - dragging chain from under loads
 - hoisting when links are locked
 - avoid dropping chain from heights
 - do not hammer links to straighten them
 - shorten a chain by using a shortening clutch—NO OTHER METHOD IS ACCEPTABLE.

Procedure Title: Slings and Hitches

Standard: Personnel involved in the use of chain, fibre rope, wire rope or nylon web slings shall be familiar with their characteristics and the necessary safety precautions.

Procedure: The following are acceptable practices:

1. Safe working loads are reduced as legs are spread. When the angle formed by the spreader leg and the horizontal is 45°, the safe working load is reduced by ¼.
2. When a choker hitch is used, the safe working load is reduced by ¼.
3. If a three-legged sling is used, the sling size selected should be based on a two-legged sling (the third leg does not carry its share of the load).
4. If a four-legged sling is used, the two diagonally opposite legs take most of the load. The remaining two only balance; therefore, select sling size based on a two-legged sling.
5. Hoisting chains must be alloy steel stamped on links with a T or 8. No other chain is acceptable for hoisting purposes.
6. A good rule of thumb formula to calculate the safe working load of chain is diameter x diameter x 19 = safe working load in tons. (Diameter is the diameter of stock used to make links.)

i.e. $D^2 \times 19 = \text{SWL (tons)}$
 $\frac{1}{2}$ " chain
 $\frac{1}{2} \times \frac{1}{2} \times 19 = 4.75 \text{ tons}$

Actual manufacturer's SWL is 9, 600 pounds

7. A good rule of thumb formula for wire rope safe working load is diameter x diameter 8 = safe working load in tons.

i.e. $D^2 \times 8 = \text{SWL (tons)}$
 $\frac{3}{4}$ " wire rope
 $\frac{3}{4} \times \frac{3}{4} \times 8 = 4.5 \text{ tons (9, 600 pounds)}$

Actual manufacturer's SWL chart is 10, 200 pounds.

8. A good rule of thumb formula for fibre rope safe working loads are:

Manila – number of eighths in diameter x itself x 20 = SWL (pounds)

i.e. $\frac{3}{4}$ “ manila

$$6 \times 6 \times 20 = 720 \text{ pounds}$$

$$\text{Chart SWL} = 1,080 \text{ pounds}$$

Polypropylene – number of eighths in diameter x itself x 40 = SWL(pounds)

i.e. $\frac{3}{4}$ ” polypropylene

$$6 \times 6 \times 40 = 1,440 \text{ pounds}$$

$$\text{Chart SWL} = 1,700 \text{ pounds}$$

Nylon – number of eighths in diameter x itself x 60 = SWL(pounds)

i.e. $\frac{3}{4}$ ” nylon

$$6 \times 6 \times 60 = 2,160 \text{ pounds}$$

$$\text{Chart SWL} = 2,800 \text{ pounds}$$

9. A good Rule of Thumb formula for nylon web safe working load is .8 ton (1,600 pounds) per inch of webbing.

i.e. 8” nylon web

$$.8 \times 8 = 6.4 \text{ tons (12,800 pounds)}$$

many manufacturers chart SWL = 12,000 pounds

10. A Rule of Thumb formula is never as accurate as manufacturer’s specifications, but can serve as a quick guideline. The above Rules of Thumb observe a 5 to 1 safety factor on new material on a straight pull.

- Procedure Title: Nylon Web Slings – Inspection/Maintenance
- Standard: Personnel involved in the use of nylon web slings shall be familiar with their characteristics and the necessary safety precautions.
- Procedure: The following defects seriously question the nylon web safety and are reason to remove the web from service:
1. Nylon web slings that are cut, torn, frayed, burned or otherwise worn are no longer trustworthy. It is not possible to calculate the strength left in damaged slings.
 2. Chemical action, heat, sunlight, and acid fumes discolour the nylon and indicate a loss in strength.
 3. When stitching is broken, the sling will not take the load evenly, but will put greater stress on the remaining stitching.
 4. Holes in the web where fibres are separated are cause for replacement.

*Note: To prevent the above damage, sleeves or edge guards should be used. These protect the lifting capability of the sling and when cut or damaged are easily replaced.

Wide sling angles cause the outside edge of the sling to tear.

Procedure Title: Hand Operated Chain Hoists

Standard: Personnel involved in the use of chain hoists shall be familiar with their characteristics and the necessary safety precautions.

Procedure: Supervisors shall include the following in weekly safety talks:

1. Manually operated chain hoists may be:
 - i) spur-gearless endless chain operated
 - ii) worm-gearless (screw-gearless) endless chain operated
 - iii) differential endless chain operated
 - iv) lever operated
2. The chain on these tools is a special case hardened product. It is not marked as alloy chain with a T or 8.
3. Never choke the hoist chain. If a link is distorted, it may jam the mechanism.
4. Generally, endless chain hoists are used for hoisting and lever operated hoists are used for both vertical and horizontal pulls.
5. Endless chain hoists are operated from below and the operator can control the load. They are not provided with a control for free-chain operation and the hook is raised or lowered by pulling the operating chain.
6. Worm-gearless and differential hoists have sufficient internal friction to prevent "running away" when lowering loads.
7. Spur-gearless hoists are usually provided with a load brake in the mechanism.
8. Lever operated hoists are used extensively in construction and maintenance. Capacities vary from $\frac{3}{4}$ ton to 6 ton and they are available in a load-brake (friction disc) or a ratchet-and-pawl design.
9. Ratchet-and-pawl types require very little attention; operation is not affected by oil or grease.
10. Ratchet hoists are unsuitable where smooth operation is required and in tight quarters.
11. When using a ratchet hoist, the load is held by the hand lever during lifting and lowering and, if accidentally released, the lever will swing back forceful.

12. Accidental release of the lever may result in self-ratcheting until the load bottoms.
13. The load-brake type depends on frictional resistance of the brake discs. The brakes must be dry and free from oil and grease. Hoists must be kept clean and dry at all times.
14. When the hoist is in the lower made and is very lightly loaded, it is possible for it to release the load out of control if a build up of dirt and grease inside the case hs been permitted.
15. Hoists in regular service should be dismantled, inspected and overhauled by a competent person at least once a year.

Procedure Title: Hoists and Winches – Anchorage

Standard: Personnel involved in the use of hoists and winches shall be familiar with their characteristics and the necessary safety precautions.

Procedure:

1. Anchorage points should be located as close to perpendicular support as possible.
2. Columns are generally not designed to withstand significant lateral forces. Because the member is already in compression, the effect of a small deflection is amplified and the column could buckle.
3. Load beams near column or other vertical support points to minimize bending. If the beam is an I section, it may be necessary to weld stiffeners to the web to withstand the additional shear force applied.
4. With open web steel joints, anchor load to the top chord. Only very light loads may be suspended from the bottom chord.
5. On suspended pipe, use nylon web sling on pipe to distribute stress and protect finish. Determine capacity of pipe hangers from catalogue and ensure hanger anchors at least as strong.
6. Expansion anchors in concrete depend on:
 - compressive strength of concrete
 - anchor diameter
 - depth of anchor embedment
 - centre to centre spacing and edge distance
7. Beam clamps are very secure anchors if used correctly:
 - clamps should never be used on flange widths outside the specified range
 - most are designed for use at 90° to the flange
 - flanges that are wide and thin are subject to bending
 - the rating marked on the clamp does not necessarily apply to the beam
8. Slings using the double-wrap basket hitch is a preferred anchorage. Avoid sharp angles on the legs and always insert softeners at sharp bends.
9. Lugs welded to a beam or column must be compatible with the member in metallic composition. The appropriate welding rod must also be used.
10. Lugs should be welded to the centre line of the flange in line with the web. Avoid side loading a lug.

Procedure Title: Safety Talks – Supervisors

Standard: Supervisors shall conduct safety meetings with crew members once each week.

Procedure: Safety meetings shall have the following characteristics:

1. The supervisor will lead a discussion of actual or potential hazards involved in the current operation.
2. For expediency, the supervisor will prepare a brief script of the topic under discussion prior to the safety meeting.
3. Each attendee will sign the script indicating his participation.
4. The supervisor will transmit a copy of the signed script to the Head Office Safety Committee.
5. Safety Bulletins provided by the Head Office Safety Committee may be used as scripts for safety meetings.
6. The purpose of safety meetings shall be to place accident prevention foremost in the minds of the attendees.

Procedure Title: Safety Talks - Managers

Standard: Manager shall ensure that weekly safety talks are conducted by supervisors and that records are forwarded to the S. & T. Safety Department.

Procedure:

1. Topics of discussion should be provided to supervisors.
2. Duration and timing of weekly meetings should be varied according to circumstances and scheduling considerations. One five minute talk each week is more beneficial than long meetings less frequently.
3. S. & T. Safety Bulletins are a good example of what to say in weekly safety talks.
4. Supervisors satisfying the standard for safety talks will be eligible for a worthwhile award.
5. The purpose of the safety talk is to place accident prevention foremost in the minds of the attendees.

Procedure Title: Safety Talks – Safety Department

Standard: The Safety Department shall ensure that the necessary health and safety information is available.

Procedure:

1. Be available to assist supervisors unaccustomed to giving safety talks.
2. Keep current documents regarding Occupational Health and Safety legislation, industry standards, WHMIS data sheets and educational programs available.
3. Respond to managers' request for training programs for any segment of the workforce.
4. Arrange certification programs with outside agencies where required i.e. forklift training, First Aid, transportation of dangerous goods.

Procedure Title: Trucks – Loading and Unloading

Standard: The driver of a truck shall ensure that the load is loaded, transported, and unloaded in a manner that will not cause harm to people, equipment, or materials.

Procedure: The supervisor shall discuss the following precautions in crew safety meetings:

1. All vehicles carrying loads shall have their load properly secured.
2. Loads which project beyond the length of the vehicle shall be marked with a red flag or a light.
3. Personnel shall leave the cab of a truck while it is being loaded or unloaded.
4. No person shall mount or dismount a moving vehicle or piece of heavy equipment.
5. No material or equipment to be moved by crane, forklift, or similar device shall be stored under or near energized electrical equipment.

Procedure Title: Trucks – Daily Inspection

Standard: All trucks shall be maintained in safe working order.

Procedure: The truck driver shall conduct a daily circle check of his vehicle prior to initial use, inspecting the following items:

1. All light and licence plates
2. Engine oil level
3. Radiator coolant level
4. Tie rods
5. Tires and lug nuts
6. Any oil leaks
7. Transmission oil level
8. Fuel tank level and condition
9. Ride cylinders (struts)
10. Parking brake
11. Drive line
12. Steering cylinder
13. Air tanks *
14. Windows and mirrors
15. Fire Extinguisher
16. Hydraulic tank levels *
17. Horn
18. Windshield wipers/washer fluid
19. Braking system

*if applicable

*Note: If any of the above items are not up to standard, the deficiency shall be reported to a duly qualified mechanic who shall determine whether the truck is safe or whether the repair is urgently required.

Procedure Title: Fleet Vehicles – Maintenance and Inspection of Trucks

Standard: S. & T. trucks shall be free of mechanical defects when in use.

Procedure:

1. Regular inspection of S. & T. trucks shall be done by the operator or other qualified personnel:
 - all lights
 - tires
 - fluid leaks/levels
 - horn
 - emergency brake
 - clean windows, good wipers/washer
2. It is the operator's responsibility to arrange for preventative maintenance:
 - oil and filter changes
 - lubrication
 - tightening of components
 - engine tune-ups
 - brake jobs
 - tire rotation/replacement
 - replacement of specific engine hoses
 - radiator maintenance
 - spring service for air conditioner
3. It is the operator's responsibility to arrange for demand maintenance:
 - Light bulbs
 - springs/suspension
 - window glass
 - wiper blades
 - wiring
 - gauges
 - tires
 - engine, transmission
 - battery
 - universal joints
4. Crisis maintenance, or vehicle broken down on the road, is also the operator's responsibility. Coaxing a "limping" vehicle home for more convenient maintenance is not advisable.

5. A general policy for maintenance of S. & T. trucks requires the operator to discuss costly maintenance requirements with the Equipment Manager in advance.
6. It is clearly contrary to the company safety policy to operate a vehicle in an unsafe condition.

- Procedure Title: Transportation of Dangerous Goods
- Standard: Vehicles transporting dangerous goods shall be placarded in accordance with the Transportation of Dangerous Goods Act and Regulations (Transport Canada).
- Procedure: The person offering dangerous goods for transportation from one location to another by road in S. & T. owned or leased vehicles shall:
1. Determine the quantity of dangerous goods.
 2. Use the following guidelines:
 - 500 kilograms in total weight of dangerous goods
 - 5 or more cylinders of compressed gas
 3. For a mixed load (of any weight) of dangerous goods, use the red “Danger” placard.
 4. To avoid the necessity for extensive training, it is preferred that the quantities above not be exceeded.

- Procedure Title: Lead Acid Batteries – Boosting
- Standard: Personnel involved in the boosting of lead acid batteries shall be familiar with their characteristics and the necessary safety precautions.
- Procedure: Supervisors shall discuss the following in crew safety meetings:
1. The chemical reaction in lead acid batteries produces hydrogen gas which is the most explosive gas known.
 2. To prevent the possibility of a spark when boosting, follow this procedure:
 - i)connect booster cable to positive terminal of dead battery
 - ii)connect same booster cable to positive terminal of live battery
 - iii)connect other booster cable to negative terminal of live battery
 - iv)connect last clamp to metallic ground below dead battery

*Note: In the unlikely event of a spark at step (iv), no chance of explosion exists because hydrogen gas rises in the air.
 3. Do not attempt to boost a frozen battery.
 4. Always wear safety glasses and a face shield when boosting batteries.
 5. If any sparks are produced during the connection of terminals, a mistake was made that could have resulted in skin burns, blindness or worse.

Procedure Title: Company Vehicles

Purpose:

To ensure that all company vehicles are only used for the purpose of work related jobs. They are not to be used after hours, or for personal time.

Discussion:

Vehicles are a privilege, not a right. Use care, courtesy and common sense. These vehicles are to be driven with care and responsibility, and to display professionalism when dealing with customers.

Policy:

If vehicles are used for anything other than company related work, consequences will follow, as well as possible removal of vehicle.

Procedure:

- Seat belts **MUST** be worn while driving the vehicle in accordance with provincial law and company training that has been provided. Anyone found tampering with the seat belt operation will be disciplined. This is not optional!
- Operators must back into parking space
- Vehicle to be kept locked at all times
- Interior and exterior housekeeping of vehicle must be maintained
- Inform the office immediately of any mechanical, warranty and or safety concerns
- Operators will be responsible for careless damage to the vehicle they are driving and any property damage.
- Speeding and seat belts tickets are obviously the operator's responsibility. Our insurer monitors driving records. They have the right to refuse to insure high-risk drivers
- Parking tickets will be evaluated on an individual basis. Park within the guidelines.
- Accidents must be reported immediately to your supervisor
- Three (3) incidents and vehicle privileges will be revoked

Procedure Title: Safety Belt Use Policy

Purpose:

To establish a policy to assure maximum operator and passenger safety, thus minimizing the possibility of death or injury as a result of motor vehicle crashes. This policy will apply to all personnel operating or riding in Company vehicles.

Discussion:

Research clearly indicates that the use of safety belts has a significant effect in reducing the number of deaths and the severity of injuries resulting from traffic crashes. The use of safety restraints reduces the risk of death and serious injury.

Policy:

To assure the safety of all personnel, safety belts shall be worn by drivers and passengers in all vehicles owned, leased or rented by the company at all times. This also applies to the operation of privately owned or other vehicles while working.

Procedure:

- Company personnel shall use the safety belts installed by the vehicle Manufacturer, properly adjusted and securely fastened, when operating or riding in any vehicle so equipped.
- Lab belts shall be properly secured in those vehicles equipped with automatic safety belt systems that require the lap portion of the belt be manually secured
- The driver of the vehicle is responsible for insuring compliance by all occupants of the vehicle they are operating. Approved child safety restraints shall be used for all children of age, size, weight for which such restraints are prescribed by law
- No person shall operate a company vehicle in which any safety belt in the driver's seating position is inoperable. No person shall be transported in a seating position in which the safety restraint is inoperable.
- No person shall modify, remove, deactivate, or otherwise tamper with the vehicle's safety belts except for vehicle maintenance and repair and not without express authorization of the company.
- Personnel who discover an inoperable restraint system shall report the defect to the appropriate supervisor. Prompt action will be taken to replace or repair the system
- Any person(s) being transported in company vehicle(s) are required to be secured in the vehicle by a safety belt in all seating positions for which safety belts are provided by the vehicle manufacturer.
-

Driver and/or Passenger Negligence:

If negligence of noncompliance with the requirements of this order is displayed, appropriate corrective or disciplinary action shall be initiated by company authorities up to or including discharge.

Procedure Title: WHMIS – Training Requirements

Standard: All S. & T. employees shall obtain WHMIS training that is approved by the employer.

Procedure: Supervisors shall ensure that the following arrangements are made:

1. At the time of hiring, as for evidence of WHMIS training, such as a qualification card or letter.
2. If no training has been given, briefly explain WHMIS labels and identify products likely to be encountered.
3. As soon as practical, arrange for S. & T. WHMIS training course for those untrained.
4. If suitable to the circumstances, WHMIS training from an approved agency (such as CSAO, local union, etc.) may be substituted for S. & T. training.
5. Periodic reminders about WHMIS products used on the project shall be given in crew safety talks.

- Procedure Title: Fumes Resulting from Welding and Cutting Operations
- Standard: All personnel exposed to hazardous fumes resulting from welding and cutting operations shall take the precautions necessary for protection of health.
- Procedure: Supervisors shall discuss the following in crew safety meetings:
1. Welding could be dangerous without the right protective equipment. Metal Fume Fever (alias Zinc Chills) is a common problem, but has no lasting effects.
 2. Fumes are tiny particles of metal oxide formed when metal vapors cool and can be seen as smoke. These metal oxide particles are small enough to be inhaled easily and can affect vital organs such as the brain, heart, kidneys, liver and spleen. Dust presents the same hazard.
 3. The following chart is a general summary of fumes resulting from welding and cutting operations.

<u>Fume</u>	<u>Source</u>	<u>Potential Health Hazard</u>
Cadmium Oxide	Cadmium coatings	Lung and kidney effects, Pulmonary edema (fluid in the Lungs)
Chromium	Alloy in stainless steel	CRVI suspected carcinogen high alloy steel
Copper Fume	Copper alloys and electrodes	Irritant, fume fever
Flouride	Fluxes on low hydrogen electrodes	Kidney and bone effects (with high exposure)
Iron Oxide	Ferrous alloys and consumables	Respiratory irritant in high concentrations
Lead	Brass, bronze, tern Plate, galvanized steel	Systemic poisoning
Magnesium Oxide	Aluminum or magnesium Alloys	Fume fever
Manganese	Hard facing alloys	Nervous system disorder

Nickel	Stainless steel	Dermatitis, respiratory Irritant
Zinc Oxide	Galvanized coatings	Fume fever

4. The gases of concern to welders are:

- carbon monoxide
- carbon dioxide
- oxides of nitrogen

Ultra violet light from the arc forms ozone and phosgene gas. Resulting conditions are irritation of the nose, throat, and lungs. Fresh air supply is needed.

5. In tanks, welding operations can displace oxygen with gaseous by-products leading to asphyxiation. Ventilation is called for.
6. Using the shortest practical arc length cuts down the amount of fume and ultra-violet light. Keeping the electrode and work as close as possible to 90° reduces fumes considerably.
7. A general principle for health protection points to the installation of ventilation and fume extraction equipment. Diluting contaminants to safe levels is the next efficient means of control.
8. If the measures in #7 above are not possible, the welder should use a NIOSH approved respirator.
9. In the case of lack of sufficient oxygen or concentration of toxic gases inside a tank, large pipeline, or their enclosed space, self-contained breathing apparatus will be needed.

- Procedure Title: Internal Combustion Engines – Fumes
- Standard: When internal combustion engines are located in a confined area, the supervisor shall ensure that air quality is maintained at a healthy level.
- Procedure: The supervisor shall discuss the following in crew safety meetings:
1. Fumes caused by internal combustion are:
 - carbon monoxide – deadly in high concentrations
 - carbon dioxide – displaces oxygen in poorly ventilated areas
 - hydrocarbons – irritants
 2. Most of the fumes from internal combustion rise and accumulate against the top or ceiling of the enclosure.
 3. Without taking air samples with complicated “sniffers”, the only indication of a high concentration of fumes is human reaction.
 4. If the odour of internal combustion is noticeable, it should be reported to the supervisor.
 5. Carbon monoxide poisoning has these symptoms:
 - headaches
 - tightness across the forehead and temples
 - weariness, weakness, dizziness
 - nausea
 - loss of muscle control
 - watering, stinging eyes
- If any of these symptoms develop, get air immediately.

- Procedure Title: Internal Combustion – Ventilation
- Standard: When internal combustion engines are exhausted into a confined work area, the supervisor shall ensure that air quality is maintained at a healthy level.
- Procedure: In order of priority, the supervisor shall take these precautions when internal combustion engine fumes accumulate in the work area:
1. (Best) Fit a non-flammable flexible hose to the exhaust pipe of the engine taking fumes well away from the work area, preferably outdoors.
 2. (Good) Provide fans or blowers where the workers are located to disperse the exhaust fumes and replace fumes with relatively fresh air.
 3. (when 1 & 2 are not practical) Provide suitable respirators to the workers.

Procedure Title: Guide to Designated Substances

Standard: Managers shall be aware of the existence of designated substances in the workplace and shall ensure compliance with pertinent regulations.

Procedure: Supervisory staff shall receive appropriate training and information as follows:

1. Definition of Designated Substances

Designated Substances are defined biological, chemical or physical agents in the workplace known to have adverse effects on human health and safety. These substances have legal status and are attached to legal exposure limits.

2. At date of issue, the following substances are legally designated as “controlled”:

-lead	-isocyanates
-mercury	-silica
-asbestos	-benzene
-vinyl chloride	-acrylonitrile
-coke oven emissions	

3. Future designated substances are expected:

-noise	-styrene
-arsenic	-nickel
-formaldehyde	-coal tar
-cadmium	-heat
-chromium	-cold
-ethylene oxide	

4. For exposure to any of the presently designated substances, a procedure shall be requested by the manager. The Safety Department shall provide this procedure.

5. For exposure to any of the future designated substances, a procedure shall be requested by the manager. The Safety Department shall provide this procedure.

6. Exposure means:

- inhaled
- ingested
- absorbed
- injected

- Procedure Title: Asbestos – Designated Substance
- Standard: Any S. & T. employee required to remove, disturb, or install asbestos will be adequately trained.
- Procedure: Managers shall consider the following prior to undertaking work with asbestos:
1. Friable asbestos-containing material is designated as a legally controlled substance requiring considerable precautionary measures.
 2. Instruction and training required by law is extensive.
 3. Medical surveillance of employees exposed to friable asbestos is mandatory under law.
 4. Unexpected discovery of friable material required immediate notification to Construction Safety Branch of the Ministry of Labour. All work must stop.
 5. Likely locations of asbestos are:
 - deck fireproofing
 - pipe covering
 - AC valve insulation
 - gasket material
 - sprayed-on fireproofing
 - vinyl asbestos floor tile
 - asbestos roofing felts
 - joint filling compounds
 - asbestos boiler installations
 6. The owner of the premises containing asbestos is obligated to inform the contractor prior to the bid process.
 7. Legal definition of “owner” and unknown asbestos installations sometimes leave the contractor unwittingly liable and financially accountable for the safe procedures necessary.
 8. With specialty subcontractors available to do asbestos removal work, A. & T. involvement should be minimal in this area.
 9. Considering the high level of awareness of the workforce to asbestos exposure and the propensity of the Ministry of Labour to prosecute improper procedures, it is decidedly unwise to underestimate the importance of related regulations.

Procedure Title: Designated Substances – Procedure Format

Standard: Managers shall request from the Safety Department a written procedure when the workforce may be exposed to a designated substance.

Procedure: Written procedures shall include:

1. The name of the designated substance.
2. The known health hazard.
3. Engineering controls, work practices, hygiene practices and facilities to control work exposure to the substance.
4. Methods and procedures to monitor the concentration of the substance in the workplace air.
5. Workers' records of exposure to the substance:
 - worker's name
 - workers' date of birth
 - worker's occupation
 - respiratory equipment used
 - monitoring results
6. Workers' records must be maintained by the employer and be available upon request by each worker's physician.
7. When workers are exposed to designated substances, the employer shall pay for medical examinations and clinical tests as required by the Ontario Ministry of Labour.

Procedure Title: Working in Confined Spaces

Standard: The supervisor shall arrange for approved training of crew members required to work in a confined space.

A confined space is defined as:

-a place where entry and exit are limited by location, design and construction, and

-where dangerous equipment, activities or atmosphere may pose hazards to health and safety.

EXAMPLE OF CONFINED SPACE

COMMON HAZARDS

Chemical and Petrochemical Projects

-tanks, vessels, pipes, sumps, pits
-any area where escape may be delayed
-where atmosphere may become explosive, toxic or oxygen deficient

-toxic/explosive gas, vapour, fume
-physical hazard
-narrow passages
-chemical spills

Sewage Handling Systems

-settling tanks, sewers, manholes
pumping areas, digester

-toxic/explosive gas
i.e. hydrogen sulphide methane
-oxygen deficient atmosphere

Heavy Industrial Projects

-sumps, pits, roasters, digesters,
mixers, bins, flues, ducts, conveyors,
elevators, bag houses

-depending on process
-specific training is required

Water Treatment Plants

-settling tanks, holding tanks,
equipment and wells below floor level

-chlorine and fluoride gases
-methane

Procedure:

1. When a confined space cannot be purged of all chemical hazards due to the process or nature of the plant, and S. & T. employees may be required to enter the space, the S. & T. Safety Department shall be notified by the project manager.

2. The S. & T. Safety Department shall provide a specific plan if none exists in the owner's Health and Safety Program.

If the owner's Health and Safety Program procedure for entry into confined spaces is approved by the S. & T. Safety Department, it may be followed. If not approved, additional precautions will be provided..

3. The procedure for entry into confined spaces shall contain the following information:

A – Hazard Recognition

- physical hazards
- dangerous atmospheres

B – Hazard Evaluation

- potential and actual hazards
- monitoring methods

C – Hazard Controls

- fume extraction, suction ventilation
- respiratory protective equipment

D – Permits and Checklists

- assignment of responsibilities

E – Rescue Training

- lifelines/harness
- rehearsals

4. Where there is a change in regulations regarding entry into confined spaces, the S. & T. Safety Department shall arrange supervisory training courses to keep supervisors currently informed and capable of fulfilling their legal responsibilities.

Procedure Title: Sanitation

Standard: Adequate sanitation facilities shall be provided at all workplaces.

Procedure: The constructor shall ensure that adequate sanitation is available nearby for crew members.

1. At least one flush toilet shall be readily available for every fifteen workers. If not practical to provide flush toilets, contact Safety Department at Head Office.
2. Women and men shall have separate facilities as outlined in #1 above.
3. Facilities with clean water, soap and individual towels shall be available nearby on all projects. If no water is available, waterless soap is satisfactory.
4. Workers handling corrosives, poisons, or other WHMIS products are to be provided with clean water, soap, and individual towels.
5. A reasonable supply of drinking water shall be supplied for use by the crew (if desired).
6. Lunchrooms shall be kept in a clean, tidy condition.
7. Dispose of food scraps that may attract vermin.

Procedure Title: Noise

Standard: All personnel working in a noisy environment shall be familiar with its effects on the hearing system.

Procedure: Supervisors shall discuss the following (when noise is a concern) in weekly safety meetings:

1. Noise in excessive amounts is a known health hazard.
2. Exposure to excessive noise leads to permanent hearing loss in most cases.
3. Symptoms of excessive noise:
 - difficulty in making conversation
 - a ringing in the ears
 - muffled sounds after leaving noisy area

4. Noise Rating Scale:

DBA	Hours Per Day (with no protection)
Less than 85	8 (no protection needed)
90-95	2-4 (use ear plugs)
96-100	1-2 (use ear plugs)
101-105	½-1 (plugs or muffs)
106-110	¼-1/2 (plugs or muffs)
111-115	1/8-1/4 (use muffs only)

Noise over 115dBA is extremely harmful and causes acute pain. Ear plugs combined with ear muffs are needed.

5. Noise rating: (at operators position)

crawler loader	101-105
rubber tire loader	96-100
compressor(250 CFM)	101-105
compressor (250CFM)silenced	less than 85 dBA
compressor (900CFM)	106-110
compressor (900CFM)silenced	less than 85 dBA
cut-off saw 8" steel blade	90-95
radial saw 10" steel blade	90-95
hand grinder 6" stone	101-105

5. Noise rating: Cont'd

jackhammer 80 lb	96-100
chipping air hammer	106-110
metal cut-off saw 12" fibre	111-115
arc welding	96-100
automatic welding	96-100
explosive actuated tools	over 115
sandblasting	96-100
lumping jack	111-115
electric drill	85 or under
portable grinder	90-95

7. Some important facts:

- clean plugs or muffs do not cause ear infection; DIRTY ONES DO
- hearing protection makes it easier to converse in a noisy area
- dry cotton batten is no protection against noise
- wax impregnated cotton batten and ear plugs with metal inserts DO NOT WORK
- muffs are more effective than plugs
- plugs come loose if you talk or chew

Procedure Title: Radiation Hazard

Standard: All personnel involved in the use, storage, handling, transportation or disposal of radioactive substances, shall comply with the applicable regulations.

Procedure: Applicable regulations originate with the following authorities:

1. The Atomic Energy Control Board Regulations of Canada
2. Related Federal and Provincial Legislation
3. Regulations under the Workers' Compensation Board

General:

1. Equipment capable of producing ionizing or non-ionizing radiation shall be shielded.
2. Suitable protective clothing and equipment shall be provided and used to ensure that no one receives exposures in excess of recognized safe quantities.
3. Safe operating procedures for the protection of workers in radiation environments shall be developed in accordance with nation safety codes released by the Department of Nation Health and Welfare, Ottawa.

Radiation Terms

A – Ionizing Radiation

- i.e. x-rays
- penetrate the skin
- damages tissues and organs
- radioactive metals
- great danger to humans
- long-term effects

B – Non-Ionizing Radiation

- infrared and ultra-violet radiation
- microwaves
- visible light
- lasers
- burns are superficial

C – Acute Radiation Syndrome – occurs with ionizing radiation overexposure

Stage 1 – PRODOME STAGE

- nausea, vomiting, general sickness

Stage 2 – LATENT STAGE

- symptoms above disappear
- blood-forming organs are changing

Stage 3 – MANIFEST ILLNESS STAGE

- hair loss, hemorrhage, fever
- diarrhea, prostration, infection
- cardiovascular failure

Stage 4 – DEATH OR RECOVERY

- depends on individual tolerance

Procedure Title: Radiation – X-rays

Standard: The manager is responsible for the safe installation, use and removal of any radiographic equipment.

Procedure:

1. Transportation of Radioisotopes – requirements:
 - proper shielding of carrying containers
 - vehicles shall be marked according to the “Transportation of Dangerous Goods” Act
 - no radioisotopes can be left unattended except in transportation vehicles or designated storage areas; vehicle must be locked, keys removed and radiation signs prominently displayed.
 - personnel involved in the transportation of radioisotopes shall be provided with film badges
2. Barricades and Signs – requirements:
 - generally, barricades are to be erected so that radiation doses will not exceed 3.0 MR/hr. above background at any point of its perimeter
 - approved “Radiation Area” signs will be placed at probable entrance points
 - the wording or symbols on these signs will be in magenta or purple on a yellow background; a red blinker light will be placed in four sides of the radiation area and one as near as possible to the radioactive source
 - any personnel in the barricaded area shall wear film badges to the 3.0 MR/hr. maximum, all personnel likely to be exposed shall wear a film badge
3. Records – requirements:
 - a record of exposure including dates, levels and names must be kept in case of future health problems
 - if no personnel are exposed beyond 2.0MR/hr. at any time, this should be noted in the log

- Procedure Title: PCBs – General Information
- Standard: Personnel involved in the handling of PCBs shall be familiar with their characteristics and the necessary safety precautions.
- Procedure: The supervisor shall provide employees handling PCBs with the following general information and procedure WHMIS 13 prior to undertaking the work.

General Information:

1. PCB means polychlorinated biphenyls, manmade chemicals manufactured on a large scale from 1929 until 1977.
2. PCBs are very stable, non-corrosive, relatively non-flammable, insoluble in water and have low vapour pressure.
3. PCBs are excellent in insulating and thermal properties.
4. Common past uses:
 - carbonless copying paper
 - heat exchange fluids
 - hydraulic fluids
 - in electrical transformers and capacitors
5. “Askarel” is a generic term for PCBs used in electrical insulating liquids. Under arcing conditions, askarel produces a non-combustible hydrogen chloride gas* with lesser amounts of combustible gases.
6. Common Brand Names for PCBs:

Apirolio	inclor
Aroclor	inerteen
Asbestol	kanechlor
Chlophen	montar
Chlorextol	no-flamol
Chlorinol	phenochlor
Diaclor	pydraul HY
DK (decachlorodiaphenyl)	pyralene
Dykanol	pyranol
Elemex	pyroclor
Eucarel	saf-T kuhl
Fenclor	sovol
Hyvol	therminol FR HT

7. Health Effects of PCBs:

- enter human tissue by: inhalation, absorption or ingestion
- everyone is exposed to PCBs through the food chain
- there is no evidence that low levels of exposure to PCBs is harmful to health
- workplace exposure to PCBs has been virtually eliminated
- fires involving PCBs may produce fumes and dioxins which are toxic
- brief exposure to small amounts of PCBs are not a serious health concern
- it is not known whether PCBs are carcinogens (the scientific community is divided on the issue)

8. S. & T. is to treat PCBs as a health hazard until the issue is decided.

9. Identification of PCBs in Transformers:

- any transformer that was manufactured in North America with a conservator tank was not designed to use PCBs and probably contains mineral oil
- a transformer's nameplate, attached to the outside of the transformer casing, which has the designation O, ONS, ONAN, ONWF, or any label beginning with O, is filled with mineral oil
- a transformer's nameplate which has the designation beginning with L, such as LNaN, LNAF, LNWF etc. is filled with non-flammable or flame retardant liquid. Most of these L transformers, manufactured before 1979, are PCB transformers

10. Identification of PCBs in Capacitors:

- practically all liquid – dielectric AC power capacitors manufactured between 1930 and 1977 contain PCBs
- non-PCB capacitors manufactured after 1978 are often marked “NO PCBs”
- capacitors containing WEMCOL, FARADOL 100, DIELEKTRO II, or DPO do not contain PCBs; assume that all others do contain PCBs
- capacitors are usually hermetically sealed

11. Physical Characteristics of Askarel:

- | | |
|----------|------------------------------|
| Colour: | crystal clear to pale yellow |
| Density: | denser than water |
| Odour: | bitter smell |
| Texture: | somewhat slippery |
| Vapours: | invisible |

12. Environment Canada has developed a voluntary labelling system for PCB containers. These resemble a WHMIS label and have PCB in bold letters.

* HYDROGEN CHLORIDE GAS MAY THREATEN LIFE EVEN DURING SHORT-TERM EXPOSURE.

- Procedure Title: PCBs – Personal Protective Equipment
- Standard: All personnel involved in the handling of PCBs shall wear the prescribed personal protective equipment.
- Procedure: The following precautions are mandatory when handling PCBs:
1. Gloves: butyl rubber
(any of these) neoprene
nitrile rubber
polyvinyl alcohol (PVA)
viton
saranex
teflon

*NEVER WORK WITH BARE HANDS WHEN HANDLING PCBs.

7. If temperature exceeds 55°C (131°F) and there is the risk of vapour escaping into the air, use self-contained breathing apparatus (SCBA) or supplied air respirators.
8. If temperature does not exceed 55°C (131°F) and there is no risk of inhaling vapours (such as with hermetically sealed capacitors) no respiratory apparatus is required.
9. If temperature does not exceed 55°C (131°F) and there is the risk of vapours escaping into the air (such as with transformers, tanks etc.) use full face mask with organic vapour canisters.
10. When handling PCBs no smoking, eating or drinking before complete washing of hands and face.
11. Dispose of protective equipment by placing it in the same container as the PCB waste when operation is completed. **DO NOT ATTEMPT TO CLEAN PROTECTIVE EQUIPMENT FOR REUSE.**
12. If trichlorobenzene (a solvent) is present in the PCB apparatus, use a full face mask with organic vapour canisters.
13. If the possibility of PCB contact with body parts exists, wear coveralls composed of one of the materials listed under gloves. Rubber or PVA shoes or boot covers are recommended.
14. One Class C 10 pound CO₂ fire extinguisher shall be located within 10 feet of the work area when PCB facilities are being handled.

- Procedure Title: PCBs – Waste Storage
- Standard: Environment Canada’s publication, “Manual for the Management of Wastes Containing Polychlorinated Biphenyls (PCBs)” will be the reference document for the acceptable means of PCB waste storage.
- Procedure: Federal and provincial regulations (under Canadian Environmental Protection Act) place the responsibility for PCB waste storage on the owner/manager of the facility.
1. S. & T. is not authorized to transport PCB waste on public property or roadways.
 2. S. & T. is not authorized to attempt to destroy PCB waste.
 3. S. & T. is authorized to dismantle and move PCB facilities/waste to on-site storage areas.
 4. The responsibility for the safe storage of PCB waste is legally placed on our client.
 5. Prior to committing S. & T. to handling PCB and related apparatus, appropriate insurance coverage should be discussed with the Safety Department.

Procedure Title: Work Surfaces – Scrap Removal

Standard: Work surfaces shall be free of scrap and debris so that tripping hazards are eliminated.

Procedure: The supervisor shall assign duties on a rotating basis to keep up with the scrap removal:

1. Scrap bins shall be constructed of metal or other non-flammable materials.
2. Bins designated for waste saturated with oil, grease, turpentine or other flammables subject to spontaneous ignition shall have a lid.
3. Trash or scrap accumulation on working surfaces indicates the need for a container.
4. Supervisors shall arrange scrap clean-up on a regular basis—at least once each day.

Procedure Title: Work Surfaces – Illumination

Standard: Illumination in work areas shall be adequate to allow reading a printed page.

Procedure:

1. Accidents attributable to poor illumination are so common that good lighting will have a beneficial effect on the site safety program.
2. Poor quality illumination causing direct glare, reflected glare, dark shadows, and eye strain should be a prime concern.
3. Accidents are known to result from delayed eye adaptation when coming from bright surroundings into dark areas. Keep doorways and other entries clear of tripping hazards that are momentarily invisible upon entry.
4. Smoke, steam and other substances in the air should be ventilated to allow proper visibility.
5. Quality of work, quantity of production, and, most important, safety are all adversely affected by inadequate lighting.
6. Where the possibility of sudden darkness due to power interruption exists, the supervisor shall provide portable light to permit safe egress from the work area.
7. Temporary lights shall be fitted with bulb guards to prevent accidental breakage.
8. Florescent light tubes shall be stored in protective sleeves, never bare.
9. Always turn off lights prior to changing bulbs or tubes. Sudden surge of power while inserting bulbs or tubes can, and has caused explosive results.

Procedure Title: Work Surfaces – Floor Openings

Standard: Floor openings causes a hazard to workers shall be identified and guarded by the supervisor.

Procedure:

1. Floor openings (1” to 12”) through which materials may fall, but not persons, shall be securely covered.
2. Floor openings (larger than 12”) through which materials and persons may fall shall be covered with acceptable floor opening covers.
3. Acceptable floor opening covers are:
 - if in roadways, strong enough to support vehicular axles
 - if in aisles where personnel walk shall not project more than 1” above the walking surface
 - shall not be accidentally displaced
4. Stairway and ladderway floor openings shall be protected by standard railing (46” high with a midrail and capable of resisting a lateral force of 200 pounds).

Procedure Title: Work Surfaces – Wall Openings

Standard: Wall openings shall be guarded to prevent accidental falls.

Procedure:

1. Wall openings above or adjacent to dangerous equipment, chemical or acid tanks, degreasing units and similar hazards shall be guarded with standard railings (46" high with a midrail capable of resisting a lateral force of 200 pounds).
2. Open-sided floors or platforms allowing a fall of 2.4 meters (8 feet) shall be closed with standard railings (unless covered by section 1 above).
3. Stairsets having four or more risers shall have standard railings.
4. Window wall openings, standard railing may be replaced by grill work with openings not more than 8 inches, only if a lateral force of 200 pounds can be resisted.

Procedure Title: Excavations

Standard: Where personnel are required to enter an excavation, adequate precautions shall be taken to prevent injury.

Procedure: Adequate precautions are defined as:

1. Sloped walls at 45 degrees when deeper than 4 feet.
2. Free of water, fumes hazardous materials.
3. No material, tools or equipment within 2 feet of the edge of the excavation.
4. If room does not permit proper sloping, walls shall be supported by a support system approved by a professional engineer.
5. All excavations shall have safe access and egress by ladder when deeper than 4 feet.
6. When personnel are working in an excavation, an attendant must be nearby on the surface.
7. Barricades capable of preventing pedestrians falling into the excavation must be erected.

Procedure Title: Roofs

Standard: Roofers and other personnel will use fall protection when working within 2 metres of the perimeter of the roof.

Procedure:

1. A barrier will provide protection (see guardrail specifications) for workers within 2 metres of perimeter of roof.
2. If barriers are not practical, safety belts/harnesses must be used.

SOURCE MATERIALS

1. Occupational Health and Safety Act, Ontario Regulation 213/19
2. Rigging Handbook, copyright 1983, Ontario Hydro.
3. Rigging Manual, D E Dickie, P. Eng., CSAO 1975
4. Mobile Crane Manual, D E Dickie, P.Eng., CSAO 1982
5. Crane Handbook, D E Dickie, P.Eng., CSAO 1975
6. It's Smart to Be Safe, Canadian Liquid Air Std. 1977
7. Code for Safety in Electric and Gas Welding and Cutting Operations, C.S.A. W117.
8. Industrial Eye and Face Protectors, C.S.A. Z94.3-M88
9. Safe Handling of Compressed Gases in Containers, Compressed Gas Ass.
10. Cutting and welding Process, NFPA 51B
11. Oxygen – Fuel Gas Systems, AWS Z94.1, American welding Society
12. Safety in Welding and Cutting, Cutting and Welding NFPA 51
13. Recommended Practices for Gas Metal Arc Welding, C5.6 AWS
14. Preparation for Welding and Cutting Containers and Piping that Have Held Hazardous Substances, F4.1 American Welding Society
15. Hidden Hazards, WCBO and 3M Canada Inc.
16. Living Safely with Propane Appliances, Minister of Consumer and Commercial Relations, Ontario, 1987
17. Mobile Cranes Today, D H Campbell B A Sc., P.Eng. 1988
18. Loss Control Management, F Bird and R Loftus 1981
19. First Aid, St. John's Ambulance, Canada 1980
20. High Pressure Water Blasting, DS1 (CSAO)
21. The Selection of Eye Protection, DS2 (CSAO)
22. Heating with Propane and Kerosene, DS4 (CSAO)
23. Lead Acid Batteries, DS6 (CSAO)
24. Volatile Petroleum Fuels, DS 7 (CSAO)
25. Ladders, DS8 (CSAO)
26. Containers for Volatile Fuels and Solvents, DS13 (CSAO)
27. Hearing Protection, DS16 (CSAO)
28. Respiratory Protection, DS17 (CSAO)
29. Confined Spaces in Construction, DS 20 (CSAO)
30. Scaffolds, DS23 (CSAO)
31. Fundamentals of Occupational Health and Safety in Construction, DS24 (CSAO)
32. Powered Elevating Platforms, D525 (CSAO)
33. WHMIS in Construction, DS28 (CSAO)
34. Designated Substances in the Workplace RE: Asbestos: Ontario Ministry of Labour, 1987
35. Designated Substances in the Workplace General Guide: Ontario Ministry of Labour, 1985

