



**Health, Safety & Environment
Handbook**

for

**Employees, Contractors & Site
Representatives**

2013/2014

24 Hour Tangle Creek Emergency Number:

1-403-648-4900

Tangle Creek Energy Ltd.

Name: _____

Home Phone: _____

Emergency Contact: _____

Doctor's Name: _____

(Optional)

Doctor's Phone #: _____

(Optional)

IMPORTANT NUMBERS

- | | | |
|-----------------------|---|--------------|
| 1. OPX Consulting Inc | # | 403-234-8853 |
| 2. _____ | # | _____ |
| 3. _____ | # | _____ |
| 4. _____ | # | _____ |
| 5. _____ | # | _____ |
| 6. _____ | # | _____ |
| 7. _____ | # | _____ |
| 8. _____ | # | _____ |

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1.0 INTRODUCTION

CHECKLIST
At your Work Site, have you made sure you have:
<input type="checkbox"/> Conducted a Pre-Job Safety Meeting?
<input type="checkbox"/> Obtained the necessary Work Permit or Work Clearance?
<input type="checkbox"/> Identified and documented any Work Site hazards, including fire and explosion hazards?
<input type="checkbox"/> Familiarized yourself with the safety measures required when monitoring or working in a sour area?
<input type="checkbox"/> Conducted your Operations in an environmentally responsible manner?
<input type="checkbox"/> Arrangements are in place to handle any emergencies or injuries that may occur?
<input type="checkbox"/> Investigated and reported any Incidents?
<input type="checkbox"/> Kept your Work Site clean and orderly?
<input type="checkbox"/> Met T.D.G. and WHMIS requirements?

This handbook contains the basic health, safety and environmental regulations, and Work Practices common to all locations operated by Tangle Creek Energy Ltd. (*hereinafter* known as Tangle Creek). These regulations and practices apply to all types of Operations including seismic, drilling, well servicing, construction, and production operating. It is supplemented by more extensive, site-specific manuals and regulations, which are available on site. This manual is not intended to supersede existing governing bodies' rules and regulations. In the event of a conflict, obtain clarification with your Supervisor.

This handbook gives all Employees and Contractors the basic safety knowledge required upon arrival at Tangle Creek operated sites. **A review of sections 1.0 through 6.0 can be considered a basic initial safety orientation to Tangle Creek Work Sites, along with appropriate parts of sections 7.0 and 8.0, and must be completed prior to your first time working at a Tangle Creek site. The orientation must be documented by signing the acknowledgement form located at the back of this book and given to a Tangle Creek Representative.**

This safety handbook is based on existing health and safety legislation and accepted safety practices. You will be responsible for working within its confines and may be accountable for violations of legislated rules.

Workers are reminded that they have the right to refuse to perform a job that they believe to be unsafe. No worker should perform any task or job that would put that worker or any other worker in a situation where they are likely to be injured. When the worker has made the decision to refuse to perform dangerous work, he/she shall immediately notify the employer or Supervisor, explaining reasons for the decision. The Employer or Supervisor shall investigate the situation and take appropriate action to correct the danger.

DISCLAIMER

The information and data contained in this document has been set forth to be the best knowledge, information and belief of OPX Consulting Inc.

Although every effort has been made to confirm all such information and data is factual, complete and accurate, OPX Consulting Inc. makes no guarantees or warranties whatsoever, whether expressed or implied, with respect to such information or data and accepts no responsibility for any loss or damage sustained by the use of this information.

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2.0 Policy on Health, Safety and the Environment



Corporate Health, Safety and Environment Policy

Tangle Creek Energy Ltd. is committed to protecting the health and safety of our employees, contractors and the public. We are also firmly committed to conducting our operations in a diligent manner designed to minimize any adverse impacts on our environment.

Tangle Creek will fulfill these commitments through the development and implementation of an effective health, safety and environment program. This program will integrate health, safety and environmental considerations into all of Tangle Creek's operations by:

- Providing and maintaining a safe work environment with proper policies; procedures, standards, training, equipment and emergency response procedures in accordance to all government regulations and industry practices;

- Providing appropriate health, safety and environmental training;

- Developing programs and practices to minimize health, safety and environmental problems;

- Ensuring timely and effective response and follow-up to incidents resulting from our operations;

- Remaining sensitive to public concerns;

- Communication with the public affected by our operations and;

- Establishing health, safety and environmental goals and regularly reviewing and improving on these goals.

All management, employees, contractors, subcontractors and suppliers engaged on behalf of Tangle Creek are responsible for following all the health, safety and environmental procedures as required and participate in pertinent safety and environmental training.

By fulfilling our safety and environmental responsibilities, everyone who works for Tangle Creek will share in the benefits of a safe work environment.

For further detail on our Policy on Health, Safety and Environment, refer to the Tangle Creek Employee Manual or talk to the Operations Manager to whom you report.

A stylized signature of Glenn Gradeen, consisting of a series of connected loops and lines.

Glenn Gradeen , P. Eng.
President & CEO

A stylized signature of Greg Kondro, featuring a prominent 'G' and 'K'.

Greg Kondro. P. Eng
VP Production

Signed: June, 2011

Alcohol and Drug Policy

Tangle Creek Energy Ltd. is committed to protecting the health and safety of all individuals affected by our activities as well as the communities in which we work. We recognize that the use of illicit drugs and the inappropriate use of alcohol and medication can adversely affect job performance, the work environment and the safety of our employees, contractors and the public.

This policy relates to all management, employees and contractors when they are engaged in Tangle Creek's business, working on or off Tangle Creek's premises. Tangle Creek's contractors are expected to develop and enforce Alcohol and Drug policies that are consistent with this policy.

The following are expressly prohibited while on Tangle Creek's business or Tangle Creek premises:

- The use possession, distribution, offer for sale of illicit drugs or illicit drug paraphernalia;
- The unauthorized use, possession, distribution, offering for sale of alcoholic beverages;
- The possession of prescribed medication not authorized or specifically prescribed for personal use;
- Reporting for duty impaired by any of the foregoing substances.

Investigation procedures that may be utilized in support of this Policy include:

- Pre- assignment testing if in safety sensitive situations;
- Reasonable cause testing;
- Post-incident testing;
- Reasonable searches of Tangle Creek's grounds;
- Impaired driving investigations.

If an individual has a problem with drug or alcohol abuse:

- Assistance is available through Tangle Creek's employee Assistance Program. This is a completely confidential resource.
- You may be eligible for a medical leave of absence in order to obtain treatment. You should not, in any event, work when you are impaired from performing your work safely.
- You should be aware that Tangle Creek retains the right to require an individual to obtain treatment from a rehabilitation program as a condition of continued employment.

Disciplinary action up to and including termination will be taken for violations of this policy.



Glenn Gradeen, P.Eng
President & CEO

Signed: June, 2011



Greg Kondro, P. Eng.
VP Production



Harassment and Violence Workplace Policy

Tangle Creek Energy Ltd. will not tolerate unlawful workplace conduct, including discrimination, intimidation/harassment or violence. Tangle Creek is dedicated to maintaining a positive workplace where everyone adheres to relevant human rights legislation and acts ethically, honestly and treats colleagues with dignity, fairness, and respect.

This policy applies to management, employees, and contractors of Tangle Creek. This policy further applies to interactions on or off Tangle Creek premises and includes formal and informal company social gatherings, conferences and client-related events. This policy is not intended to constrain reasonable and appropriate consensual social interactions. Harassment whether or not it is intentional or directed toward a specific person, includes unwanted physical verbal, written, electronic, graphic or non-verbal behavior that results in intimidation hostility or violence or contributes to an offensive workplace.

Any incident or complaint involving alleged harassment or threatened/actual violence should be reported promptly to either any member of the Board of Directors or any Officer of Tangle Creek. Any incident or complaint will be treated sensitively, promptly and in confidence, to the extent practical; and investigated thoroughly.

Tangle Creek will attempt resolution; however, if you engage in any violence or harassment in the workplace, or threaten violence in the workplace, you will be removed from the premises and may be subject to disciplinary action, immediate termination of employment, and criminal penalties. Filing a known false complaint or retaliation against complaints is not tolerated and will be subject to disciplinary action, also including termination. No talk of violence or joking about violence in the workplace will be tolerated.

In order to ensure a safe environment for everyone, we strictly enforce the following:

Desks, cabinets, telephones and computers are company property. Tangle Creek reserves the right to search these areas or view email and data stored on your computer.

Any conversations overheard during monitoring for quality control, or private messages retrieved, that can be deemed threatening to other individuals can and will be used as a basis for disciplinary action or termination of employment.

For further detail on our Policy on Workplace Violence & harassment, refer to Tangle Creek's Employee Manual or talk to the Operations Manager to whom you Report

Glenn Gradeen, P.Eng
President & CEO

Greg Kondro, P. Eng.
VP Production

Signed: June, 2011

3.0 DEFINITION OF TERMS

The following definitions are used within this handbook to ensure common understanding among the users of the General Safety Guidelines.

Tangle Creek Energy Ltd.— is an oil and gas exploration and development company operating primarily in Western Canada.

Tangle Creek Representative —means the person designated by Tangle Creek to supervise work activities at a work site.

Blanket Work Permit — means a special Work Permit that may be issued for up to one year for on-going tasks where specific procedural guidelines have been established and agreed to by the contractor.

Cold Work — means any work where no danger exists from ignition but where other potential hazards exist or are suspected such as toxic fumes, dusts, vapors, chemicals, steam, high pressure air, water or electricity.

Competent Worker — means a person whose knowledge, training and experience qualify him/her to perform the work properly and safely without continual supervision.

Confined Space Entry — means a restricted space which may become hazardous to a worker entering it because of: an atmosphere that is or may be injurious by reason of oxygen deficiency or enrichment, flammability, explosivity or toxicity; a condition or changing set of circumstances within the space that presents a potential for injury or illness; or has the potential or inherent characteristics of any activity which can produce adverse or harmful consequences within the space. Any type of work inside tanks, vessels, towers, or any spaces with restricted ingress or egress that are being entered for the purpose of construction, inspection or for performance of maintenance work where a hazardous environment may develop.

Consultant — means individual or firm hired by Tangle Creek solely to give advice with respect to the planning of specified tasks.

Contractor —means a business firm, partnership or unincorporated proprietorship hired by Tangle Creek to perform a specific task or service.

Controlling Hazardous Energy — means to isolate all energy sources from equipment or components of that equipment, to dissipate any residual energy in a system or component, and to secure the isolation by an energy isolating device operated by a key or other similar process, and the locking device is attached to the equipment's energy isolating device(s).

Explosive Atmosphere — means an atmosphere that contains a substance in a mixture with air, under atmospheric conditions and at a concentration between the substance's lower explosive limit (LEL) and upper explosive limit (UEL), and that is capable of producing destructive effects including death or injury.

Ground Disturbance — activities such as excavating, digging, trenching, plowing, drilling, tunneling, augering, backfilling, blasting, topsoil stripping, land leveling, clearing and grading would all be considered ground disturbances.

Harmful Substance – means a substance that, because of its properties, application, or presence, creates or could create a danger, including a chemical or biological hazard, to the health and safety of a worker exposed to it.

Hazard – means any situation, condition or thing that may be dangerous to the safety and health of a worker. A hazard has the potential to cause an injury, illness or loss.

Hazardous Energy – means electrical, mechanical, hydraulic, pneumatic, chemical, thermal, nuclear, gravitational, or any other form of energy that could cause injury due to unintended motion, energizing or start-up or release of such stored or residual energy in machinery, equipment, piping, pipelines, or process systems.

Hazardous Location/Area – means a place where fire or explosion hazards may exist due to flammable gases, vapours, flammable or combustible liquids, dust, ignitable fibres or flyings as described in the Canadian Electrical Code.

Hot Work – means any work where a source of ignition may be present in areas where combustible materials may or do exist. This includes welding, burning, Hot Tapping, sand blasting, introduction of a combustion engine or device and the use of open flame or sparking devices. **Hydrogen**

Sulfide (H₂S) – means a deadly gas commonly found in sour gas and oil fields. Small amounts in the air have a rotten egg smell but higher

amounts will temporarily deaden the sense of smell.

Concentrations of H₂S over .02% can cause unconsciousness in a few minutes and unless the victim is removed from the area, death will follow very quickly.

Incident – means an event that caused or had a reasonable potential of causing an injury, property damage or environmental release.

Manufacturer's Specifications – means the written specifications, instructions or recommendations, if any, of the manufacturer of equipment, which describe the manner in which the equipment is to be erected, installed, assembled, started, operated, used, handled, stored, stopped, adjusted, maintained, repaired, or dismantled and includes manufacturer's instruction, operating or maintenance manual or drawings for that equipment.

MSDS (Material Safety Data Sheet) – an information sheet containing health and safety information on the handling and storage of a product.

Prime Contractor – Every Work Site must have a Prime Contractor if there are two or more employers at that site. The owner of the site is considered the Prime Contractor unless an agreement is in place for some other individual or Contractor to assume the role. The responsibility of the Prime Contractor is to ensure, as far as reasonably practicable, that all health and safety regulations are complied with.

Purging – means the method by which contaminants such as hydrocarbons or H₂S are displaced from a vessel, equipment, tanks, and any interconnecting piping or pipelines.

Restricted Space – means an enclosed or partially enclosed space that is not designed or intended for continuous human occupancy with a restricted means of entry or exit and may become hazardous to a worker entering it because of its design, construction, location or atmosphere; the work activities, materials or substances in it; provision of first aid, evacuation, rescue or other emergency response service is compromised or of other hazards relating to it.

Snubbing – means the act of moving tubulars into or out a wellbore when pressure is contained in the well though the use of stripping components or closed blowout preventers (BOPs) and mechanical force is required to move the tubing in order to overcome hydraulic force exerted on the tubular in the wellbore.

Sub-Contractor – An individual or company hired to perform all or part of the work contracted to someone else.

T.D.G. – means the Federal Transportation of Dangerous Goods regulations and corresponding Provincial Regulations governing the handling, offering for transport and transporting of dangerous goods by all modes of transport.

Unsafe Act – means a violation of an accepted safe procedure, which could cause the occurrence of an Incident.

Unsafe Condition – means any condition that exposes workers to a physical, chemical, electrical high energy, etc. hazard that may adversely affect their health or safety.

WHMIS – means the Workplace Hazardous Material Information System. WHMIS is a hazard communication system designed to ensure that all workers have information on hazardous materials including labeling, Material Safety Data Sheets (MSDS) and training.

Work Clearance – means a type of Work Permit where complete control of a Work Site is turned over to a third party. The receiver of a Work Clearance is then responsible for issuing other Work Permits that may be required.

Work Permit – means a written record issued by a Tangle Creek Representative in charge of a Work Site, which authorizes a worker and/or work crew to safely do a specific job at the Work Site and identifies the hazards associated with the work and/or Work Site and procedures for controlling the hazards.

Work Practices – means the procedures for carrying out specific tasks which, when followed, will ensure that workers exposure to hazardous situations, substances and physical agents is controlled by the way the work is carried out.

Work Site – means any location where a worker is engaged in any Operations, including seismic, drilling, well servicing, construction and production operating and includes vehicles or equipment used at the Work Site.

4.0 EMERGENCIES

Communications systems must be tested and local emergency phone numbers confirmed and posted prior to starting work on a new project. **At a minimum, there must be one vehicle on site with a communication device such as a cellular phone or mobile radio.**

In the event of an emergency, all work affected by the emergency must be stopped immediately. Your initial **response actions to an emergency** are:

- **Evacuate**
 - Get away from the hazard and direct others to safe areas.
- **Sound the Alarm**
 - Alert other personnel.
- **Call for Help**
 - Notify your Supervisor.
- **Assess Hazards**
 - Resist the urge to rush in.
 - Ensure your actions/intentions are known by others.
- **Initiate Rescue Operations – only when safe to do so**
 - Don personal protective equipment.
 - Rescue victim to safe area.
 - Revive victim.
 - Administer first aid, maintain on-going care.
 - Confirm emergency services have been dispatched.
- **Secure the Area**
 - Control entry to hazardous areas.
- **REMEMBER – Life Safety is the #1 priority!** Protection of equipment is the last priority and then only if it can be accomplished safely.

4.1 Response to Alarms

Most production facilities have established a set of emergency signals to indicate and deal with process upsets, fire conditions, H₂S or other gas releases. The exact sound or light signals will be explained to you upon arrival at the facility. If you are uncertain of the appropriate response action, ask a Tangle Creek Representative.

4.2 Injuries

If you or your co-workers suffer any work-related personal injuries, apply first aid and if needed, obtain medical aid. Know your first aid certificate holders and the location of first aid supplies. Report all injuries.

5.0 RESPONSIBILITIES OF EMPLOYEES AND CONTRACTORS

5.1 Individual Responsibilities and Duties

All Workers have the following responsibilities:

- a) Present yourself physically and mentally fit at the start of each working shift, capable of performing your duties safely and efficiently. Report to your Supervisor any physical or mental circumstances such as an illness or fatigue, which may impede you from safely completing your assigned tasks.
- b) Perform your functions as efficiently as possible while giving due regard to the safety of yourself, your co-workers and the public.
- c) Report defects in any equipment or substandard conditions that could endanger the health and safety of personnel or downgrade the efficiency of Operations.
- d) Co-operate with others during normal and emergency conditions.
- e) Workers will ensure that cranial and facial hair is worn at a length that will not obstruct vision, snag in moving parts or if applicable, prevent the worker from utilizing a breathing apparatus or mechanical resuscitator in a toxic or oxygen deficient environment.
- f) Ensure they wear clothing that fits close to the body and do not wear dangling jewelry (i.e. necklaces, wristwatches, bracelets) when working near moving parts of machinery or electrically energized equipment.
- g) Absolutely NO SMOKING allowed on any location regardless of Hot Permit issued, except for designated areas. Strike anywhere matches and single action lighters are not permitted.
- h) If you are taking medication prescribed by a physician that could impair your judgment, report this to a Tangle Creek Representative so that, if necessary, your duties could be adjusted accordingly.
- i) If you are in possession of, or under the influence of, alcohol, illegal or mind altering drugs, you will not be Permitted to enter or be allowed to remain on a Tangle Creek Work Site
- j) Firearms or explosives are not permitted on a Tangle Creek operated property unless required by job responsibilities (flare pistol, seismic work).
- k) Practical jokes, wrestling and other forms of horseplay are prohibited on Tangle Creek premises.
- l) Tangle Creek prohibits all types of harassment and violence in the workplace. Harassment, including harassment based on characteristics specified in human rights legislation, such as sex, race, national origin, religion, disability and age is illegal and will not be tolerated and a may result in disciplinary action. Actual or threatened violence is strictly prohibited. Incidents of this nature are to be reported to Tangle Creek management.
- m) Before handling chemicals review the applicable Data Sheets, as per the WHMIS legislation, which are available through a Tangle Creek Representative.
- n) All Workers responsible for transporting dangerous goods and handling hazardous materials or wastes shall have the necessary T.D.G./WHMIS training and, when applicable, possess a valid certificate. Ensure the

necessary Permits and manifests are completed, and ensure necessary labeling; placarding and documentation are in place.

- o) Report all accidents and incidents including close calls, workplace violence and environmental Incidents (spills and releases) to your Supervisor or a Tangle Creek Representative immediately.

5.2 Contractor Requirements

- a) Before Contractors or Consultants are hired by TANGLE CREEK or issued work orders or contracts, they must present a current account and proof of being fully covered by the applicable Provincial Workers Compensation Act. Contractors and/or Consultants must also present proof of appropriate liability and insurance coverage.
- b) All tools, personal safety equipment, proper clothing, etc. are to be supplied by the Contractor and must be suitable for the work at hand and in good condition. This may include gas detection equipment or specialization equipment.
- c) Contractors must ensure that their workers are trained in the safe operation of the equipment the worker is required to operate.
- d) Any work done by TANGLE CREEK Representatives, which may affect Contractors, will be reported to the Contractor through a Work Permit or Work Clearance before any Work Procedures to ensure the safety of all.
- e) The Contractor is fully responsible for implementing and maintaining a Safety Program that meets all relevant, federal and provincial, regulatory requirements. It is the responsibility of the Contractor to take all the precautions for the safety of his Employees, Subcontractors and the public while performing work on a Tangle Creek Work Site.
- f) It is the Contractor's responsibility to enforce all policies and procedures outlined in this booklet. It is also their responsibility to inform all their Employees and Subcontractors of these procedures.
- g) Contractors shall provide first aid and transportation for treatment of any sick or injured Employee in accordance with applicable Provincial Occupational Health and Safety and/or Workers' Compensation Board Regulations, or make arrangements with a Tangle Creek Representative for such requirements.

5.3 Personal Protective Equipment (PPE)

Employees and Contractors are responsible for ensuring that all work activities are carried out in accordance with these PPE requirements.

Failure to comply with these requirements will result in disciplinary action being taken.

- a) Hard hats are to be worn at all times when on a Work Site.
- b) Hearing protection and applicable eye, face or body protection shall be worn where an immediate hazard exists.
- c) Appropriate safety footwear, meeting the requirements of the Canadian Standards Association, must be worn at all times.
- d) Additional personal protective equipment for protection of hands, face, feet and head shall be worn as required by job hazards.
- e) Workers wearing contact lenses in operational areas must inform Tangle Creek Supervisor so that appropriate eye safety controls can be established. Contact lens hazards include dust, jarring, and chemical exposure.

- f) A worker wearing contact lenses must not be exposed to an environment where electric arc welding is being performed.
- g) This clothing policy applies to permanent and temporary Employees as well as contract personnel and visitors. **Site specific PPE requirements are to be dictated by the control measures indicated on a completed Hazard Assessment and Identification.**

Clothing standards for all personnel will be as follows:

LEVEL I Applies to personnel at a location who are not directly involved with any Operations and who have constant supervision. There must be no activities being carried out at the location which may result in a hydrocarbon release.

Personnel in this category are not required to wear fire retardant outerwear. However, they are not permitted to wear fusible fabrics such as nylon or other synthetic, static generating materials. Acceptable clothing is made from cotton, wool or leather. Short-sleeved shirts and shorts are not considered acceptable. Examples of someone in this category would be individuals taken on a tour of a facility or truckers delivering items to a non-hazardous Work Site.

LEVEL II Applies to personnel who are in attendance or working at a Hazardous location and/or directly involved in supervision, drilling, servicing, construction, operation, maintenance or repair of wells and facilities at that location.

Personnel in this category shall wear acceptable fire retardant outerwear at all times. They must refrain from wearing fusible fabrics, such as nylon or other synthetic static generating material as inner wear. Long pants and long-sleeve shirts under fire retardant outerwear provide an additional layer of insulation with increased protection in the event of a fire and therefore should be worn. In cases of high ambient temperatures this may not be practical, and under these circumstances shorts and short sleeve shirts are permissible as inner wear.

5.4 Prime Contractor Responsibilities

The Prime Contractor is responsible for:

- Control of the designated work area;
- Making workers aware of their responsibilities;
- Making sure that all relevant regulations are followed; and,
- Coordinating the work of the various employers on site.

Know who the Prime Contractor is at your Work Site. In most cases, Tangle Creek takes on the role of Prime Contractor and has a Representative on location at the Work Site. In specific cases, a Contractor may take on this responsibility.

6.0 WORK SITE REQUIREMENTS

6.1 Hazard Assessments

A hazard can be any situation where there is the potential to injure people, damage property, or the environment. The Hazard Assessment is included as part of the Work Permit or JSA (Job Safety Analysis) system.

Some key questions that need to be asked for every job:

- Have existing or potential hazards been identified?
- Have affected workers been involved in the assessment and control of the identified hazards?
- Is your hazard assessment documented?

OH&S regulations require a hazard assessment of a Worksite to identify any existing or potential hazards before work begins, when new work process are introduced, when work processes or operations change and before the construction of significant additions or alterations to a work site. Once identified, these hazards must be eliminated. Any hazards that cannot be eliminated must be controlled:

- First by engineering controls;
- Then by administrative controls such as Work Procedures;
- Lastly by using personal protective equipment.

Recognizing potential hazards and taking steps to control them is a major part of Tangle Creek's Safety Program. Tangle Creek will ensure that any contractor on the worksite is made aware of any existing or potential hazards that may affect the contractor's workers. Hazard assessments are included in Pre-job, and Work Permit/clearance documentation. This allows Supervisors and workers to review the job that is to be completed; the dangers associated with the task and the control measures that are to be used.

Types of Hazards:

- **Physical Hazards:** contact hazards that can cause injury such as cuts, burns, abrasions, strains, etc.
- **Chemical Hazards:** fumes, gases, aerosols, corrosives, alkalis, chemicals, solvents, sprays, heavy metals, poisons, pesticides, etc.
- **Environmental Hazards:** noise, heat, cold, weather, etc.
- **Biological Hazards:** hazards that can cause illness such as allergies, Hantavirus, etc.
- **Ergonomic Hazards:** cramped workspaces, improperly adjusted equipment, repetitive tasks, etc.
- **Psycho-social Hazards:** stress, fatigue, boredom, shift work, violence and harassment, substance abuse, etc.

A Tangle Creek Representative is assigned the responsibility of ensuring that hazard assessments take place and that they include workers in assessing, controlling and eliminating potential hazards.

6.2 First Aid Supplies and Services

A Tangle Creek Representative or Prime Contractor for the Worksite is responsible for ensuring that appropriate first aid supplies and services are located on their Worksites. As a minimum, these must be kept to the standard required by the applicable jurisdiction.

Determine if any first aid transportation vehicle or ambulance is required and where it should be positioned. The regulations allow, in some cases, to place a first aid transportation vehicle – suitable vehicle, emergency transport vehicle, or ambulance – at a strategic location from which it can support more than one Worksite.

- Determine the number and training level requirements for first aid attendants and confirm qualifications of these individuals and that they are situated in the most appropriate location(s).
- Determine the number and content requirements for first aid kits and any first aid stations. Confirm that supplies are situated in most appropriate locations.
- Ensure workers are aware of the locations of first aid supplies, services and transportation.
- Maintain confidentiality of first aid records.
- For more information on transportation requirements, number and training of first aiders and equipment standards refer to *Occupational Health and Safety – Act, Regulation and Code – Schedule 2 (Table 1 thru Table 7)*.

6.3 Meetings and Communication

Good communication is essential in maintaining safe Operations. Effective communication between Tangle Creek and its Contractors, as well as all levels of workers, is necessary to assist with the exchange of information. Before starting work in or on any Work Site, contact a Tangle Creek Representative to obtain a Work Permit and for specific instructions concerning the operating hazards and applicable safe Work Practices specific to the Work Site.

General Safety Meetings

Employers should hold regular safety meetings (Monthly) for the review of:

- Reports of current accidents or diseases, their causes and means of prevention, and
- Remedial action taken or required by reports of investigations and inspections, and
- Any other matters pertinent to health and safety.

Copies of recent meeting minutes and follow-up should be maintained at the Work Site.

The employer must ensure that a current paper or electronic copy of the specific Occupational Health and Safety Acts, Codes and Regulations (or OH&S Handbook) are readily available for reference by workers.

Pre-Job Safety Meetings

Supervisors are expected to conduct Pre-Job Safety Meetings to ensure all workers understand what work is to take place as well as any specific Work Permit conditions and precautions needed for work to proceed safely. Job hazards and sequencing of events should be reviewed, particularly when there are two or more activities at a Work Site, and adjusted as necessary to maintain Work Site safety.

These Pre-job Meetings should be documented and are a prerequisite to the commencement of any job. Tangle Creek Representatives reserve the right to review safety meeting minutes and attend general Pre-job Meetings at any Work Site.

6.4 Environment

Operating in an environmentally responsible manner and complying with the law is a priority for Tangle Creek. Employees and Contractors are responsible for meeting environmental guidelines.

Employees and Contractors are to ensure they do the following:

- a) Know and understand the environmental requirements for the job.
- b) Make sure that any required approvals are in place before starting work. The conditions of the approval must be followed.
- c) Make sure that hazardous materials and wastes are properly stored in accordance with applicable provincial regulations.
- d) Hazardous materials and wastes must be properly transported and disposed of in accordance with applicable provincial regulations. Take the necessary steps to prevent spills and control air emissions. Begin clean up of spills immediately. Ensure incidents are reported.
- e) Assess the area for any wildlife habitat and/or timing, constraints including creek crossings that may affect fish habitat.
- f) Where possible eliminate or reduce wastes, conserve energy and water.
- g) Be aware of local environmental or community issues and take the steps needed to deal with them.
- h) Make sure that vegetation control (herbicide application) is carried out by licensed applicators

If you have any questions regarding environmental issues including environmental approvals, spill clean up, or waste handling ask the Tangle Creek Representative.

6.5 Inspections and Audits

Health, Safety and Environment regulations require regular inspections of all places of employment including buildings, structures, grounds, excavations, tools, equipment, work methods and practices. Work Site inspections must be made at intervals that will prevent the development of unsafe working conditions. Any unsafe or harmful conditions found in the course of such inspections shall be remedied without delay.

Supervisors should be able to demonstrate their understanding of any specific inspection requirements for their industry and ensure these are included in their Work Practices. Inspections must be completed by Competent Workers. If available, industry standards and checklists for equipment inspection should be used by staff completing inspections.

Copies of recent inspection reports and follow-up should be maintained at the Work Site.

Tangle Creek Representatives reserve the right to review inspection reports and conduct inspections or audits of Work Sites.

6.6 Sour Service

Additional safety measures need to be taken at Work Sites containing “sour” levels of Hydrogen Sulfide. Sour wells and facilities must be posted with poisonous gas warning signs.

Further information on safety for sour areas is presented in Section 7 of this handbook.

6.7 Investigating and Reporting Incidents

It is your responsibility and duty as an Employee, Contractor or Contractor Employee to report Unsafe Acts and conditions, Incidents and environmental infractions.

All Incidents including non-compliance, vehicle incidents, injuries, work-related illnesses, property damage, and workplace violence must be reported to your Supervisor, the appropriate government agencies and Tangle Creek Representative as soon as possible (**within 24 hours**). Failure to report may impede and/or result in the loss of compensation. Hazards that have the potential for causing an Incident should also be reported to a Tangle Creek REPRESENTATIVE

6.8 WHMIS / T.D.G.

- Workers must be WHMIS trained, and if applicable T.D.G. trained to meet the required regulations.
- Review applicable data sheets before handling chemicals. You can obtain the data sheets from your Tangle Creek Representative.
- Complete all necessary Permits, manifests and labeling when transporting dangerous goods or wastes.
- If hazardous goods are being transported using “Exemption Permits” a current Permit must be in the vehicle.

7.0 CODES OF PRACTICE

The following “Codes of Practice” have been developed by Tangle Creek and outline the general requirements for all company Operations. These Codes include practical guidance on the requirements of the regulations applicable to the Work Site. It is the responsibility of each Supervisor to ensure that the necessary site-specific procedures for implementation of these Codes of Practice are in place.

7.1 ASBESTOS – Code of Practice

TYPES AND USES

Asbestos is the name given to a group of naturally occurring silicate mineral fibres. The three most common forms are:

- Chrysotile (White Asbestos) - Most common, Insulating pipes, boilers, furnaces
- Amosite (Brown Asbestos) - Sprayed coatings, Insulating (as above), In Cement Products
- Crocidolite (Blue Asbestos) - No longer used (was used very rarely in past)

USES INCLUDE

- Roof tiles, floor tiles, wallboard, brake shoes, clutch plates, gaskets

NOTE: Most insulation used before 1975 was asbestos or asbestos based.

HEALTH HAZARD

- Primary hazard of asbestos results from breathing asbestos fibres.
- Three principle diseases associated with asbestos are:
 - Asbestosis is a chronic lung disease resulting from prolonged exposure to asbestos dust. The fibres gradually cause the lungs to become scarred and stiff, resulting in increased breathing difficulty.
 - Lung Cancer may be caused by asbestos fibres in the lung. The exact way in which asbestos causes lung cancer is not fully known. The combination of smoking and inhaling asbestos fibres greatly increases the risk.
 - Mesothelioma is a rare but very malignant form of cancer affecting the lining of the chest or abdominal cavity.

IDENTIFICATION

Four step process (See Safety Program Manual for Detailed Procedures Section 7.1.1):

1. Visual Inspection
 - Check drawings and blueprints
 - Exposed asbestos may be soft or hard
 - Check under physical barriers: gyproc, plywood, metal sheeting, paint

NOTE: Asbestos that is encapsulated behind a barrier or sealed poses very little risk to the worker, unless it is disturbed.

2. Collect Sample(s)
 - o Identification coupons (samples) should be taken as deep as possible as other types of insulation may have been put over top of asbestos insulation.
 - o See Safety Program Manual for detailed procedure.
3. Sample Analysis
 - o Use only experienced specially equipped laboratories (contact the Calgary Office for the list).
4. Inventory
 - o Indicate on drawings and blueprints
 - o Establish an asbestos log book. Record areas, removal and disposal
 - o Identify area with placard:

CAUTION: INSULATION CONTAINS ASBESTOS FIBRES – DO NOT DISTURB or use label system similar to WHMIS Identification.

7.2 BENZENE – Code of Practice

Potential Hazards

Benzene and the associated compounds, Toluene, Ethylbenzene and Xylene (BTEX) have an anesthetic effect and primarily attack the central nervous system. Prolonged exposure to Benzene concentrations of 100 ppm will have adverse consequences.

Benzene is most commonly taken into the body through inhalation of vapour but can be taken in, to a far lesser extent, by absorption through the skin. Inhaled Benzene vapours are eliminated from the body by the lungs when the victim is taken into fresh air.

BTEX compounds are normally found as liquids in gas condensates and Crude Oil streams. If liquid hydrocarbon streams at gas plants show that concentrations of Benzene exceed the 0.1% level and are in the range of 0.5% to 1.5%, extra caution must be taken. Normally, condensate is stored and transported in a closed system of vessels, lines and pumps, but workers can be exposed when those systems are opened for maintenance. Benzene has also been found as a vapour at the vents of dehydrators at levels of 50 ppm, which can be a concern if there is prolonged exposure to those vapours.

Occupational Exposure Limits

The current Occupational Exposure Limit (OEL) for Benzene in:
Alberta – 0.5 ppm average for 8 hours, 2.5 ppm for 15 minutes.
BC - 0.5 ppm average for 8 hours, 2.5 ppm for 15 minutes

Benzene is a skin sensitizer, known carcinogen and an ALARA substance meaning that all exposures must be kept As Low As Reasonably Achievable.

Employer Responsibility

- Surveys will be conducted to identify all steams at facilities where Benzene is likely to be present at significant levels;

- All tasks and activities will be studied to determine where exposure to condensate could occur. This will include all routine jobs, such as process surveillance and sampling, as well as occasional tasks, such as routine preventative maintenance and component replacement;
- When tasks are identified where worker exposure could occur, procedures will be developed to control that exposure. This will involve the provision of suitable workplace ventilation and or use of appropriate personal protective equipment (PPE);
- Workers who may have to work in an area where exposure to Benzene containing streams could occur will be given training in controlling Benzene exposure; and
- Workers shall attend information sessions on the health hazards associated with Benzene and participate in training with required PPE.

Worker Responsibility

- Workers must be aware that respiratory protective equipment on its own will not fully protect a worker;
- Workers must be aware of which streams contain Benzene and the potential for exposure involved with specified tasks, and must follow all written and verbal instructions; and\
- These responsibilities are incumbent on contractors' employees as well as company employees.

Site Specific Procedures

- Each facility shall develop site-specific procedures to cover its own operations;
- These procedures must identify streams where Benzene is present, list routine operational or maintenance jobs involving those streams, and specify measures to be taken to prevent worker exposure; and
- The procedures must allow for action at 25% of the OEL or Critical Limit, to ensure that over exposure does not occur.

Caution: This program does not represent a complete guideline to the subject area; consult your supervisor before continuing.

7.3 CONFINED SPACE ENTRY – Code of Practice

This Code of Practice is intended to provide assistance in the recognition, evaluation and control of potentially dangerous or unhealthy atmospheres in confined spaces that could lead to illness, injury, death or property loss.

Where confined space work is to be performed by workers, responsibility for safety, both at the time of entry and during the entire operation rests with the employer's On Site Supervisor. The work to be performed shall be under the direction of a competent Supervisor who is knowledgeable of the hazards that may be encountered, accident prevention requirements and rescue measures and methods required.

Purpose and Scope:

This Code of Practice provides general guidelines for Confined Space Entry procedures. Detailed site/job specific, procedures must be developed identifying key aspects of this task such as isolation points, lock-out requirements, venting procedure and site specific hazards.

Potential Hazards:

- H₂S gas
- Explosive atmosphere
- Physical hazards (mixers, trays, etc.)
- Chemical hazards (sludge, scale)
- Oxygen deficient atmosphere

Personal Protective Equipment (PPE) Requirements:

- SCBA/SABA
- H₂S monitor
- Explosive meter
- Fire retardant clothing
- Oxygen analyzer
- Safety harness and other rescue equipment
- Head, eye, face, hand, foot, and body protection as indicated by the hazards

Equipment Required:

- Blanks/blinds or equipment for other acceptable methods of isolation
- Water, steam or nitrogen where purging is necessary
- Vacuum truck
- Hand tools
- Catch pan
- Energy-isolating devices

Training:

- H₂S
- WHMIS
- Safety Orientation (ie: task, handbook, etc.)
- Confined space entry/rescue

Regulations and Standards:

- Tangle Creek General Safety Handbook
- Work Permit
- Applicable provincial OH&S regulations

Procedure/Action:**General:**

- Work Permits must be issued and discussed with the workers each day. Other topics to be discussed with workers include:
 - At operating facilities: any alarms that may occur and their meaning
 - MSDS sheets of any chemicals that may be encountered
 - The method of worker rescues must be planned and discussed prior to vessel entry. Additional safety equipment (e.g. Tripod) that may be necessary to effect a rescue must be in place before a Confined Space Entry occurs.
- Ensuring unauthorized personnel and vehicles are kept out of the area.
- Atmosphere testing should be carried out in enclosed areas and around the confined space (e.g. inside dikes around tanks).

- Ensure the atmosphere is continuously monitored if there is a potential for the atmosphere to change unpredictably after a worker has entered the confined space.
- Proper bonding and grounding procedures must be followed and explosion proof electrical equipment used where needed.
- No person shall walk on a tank roof unless there is a proper walkway or they are wearing a safety belt and line.

Preparation:

- The confined space must be depressurized and/or fluid levels pumped as low as possible.
- All inlet and outlet lines will be isolated by the use of blanks/blinds or an approved alternate method (listed in the CAPP Petroleum Industry guideline For Entry Into Confined Space) that provides an equal level of safety. Breathing apparatus may be necessary to perform these functions.
- All hazardous energy sources to the confined space shall be isolated and secured.
- Where purging is necessary to prevent the development of hazardous atmospheres in the confined space, then water, steam or nitrogen may be used. Caution must be exercised with any exhaust vapors.

Ventilation:

- The confined space will be thoroughly ventilated, preferably by a positive method of mechanical ventilation.
- If ventilation requires opening manways or clean out doors then a catch pan and possibly a vacuum truck should be available to control and take away the flow of liquids/sludge coming out of the confined space.
- Ventilation should continue throughout the project

Inerting

- The introduction of an unreactive gas such as nitrogen into a confined space may be required to displace all oxygen.
- Inerting may need to be considered where it is very difficult to control ignition sources in a confined space. The inerting creates an oxygen deficient atmosphere and workers entering this environment must be properly trained and equipped with self-contained breathing apparatus or supplied air breathing apparatus with escape bottle.
- Refer to Section 7 in the safety program manual for additional information on purging.

Initial Entry

- All atmospheres that have not been tested should be considered dangerous to life and health
- Initial testing for H₂S, LEL and oxygen can be taken in the exhaust air
- If the exhaust air is considered safe (above 19.5% oxygen, below 20% LEL and less than 10 ppm H₂S – CAPP guideline) a qualified worker wearing breathing apparatus and other appropriate PPE now enter to do further testing of all areas of the confined space.
- Disturbance of any sludge that is present in the confined space may result in the release of hydrocarbon gases. This may result in the

development of a toxic, flammable or an oxygen deficient atmosphere. All efforts should be made to remove the sludge prior to a confined space entry or when this is not possible, a breathing apparatus must be worn at all times.

Ensuing Entries:

- The work should be done as much as possible from the outside.
- If the atmosphere tests safe as stated above, workers wearing the appropriate PPE may enter the confined space. Caution must also be exercised to address any physical hazards (mixers, blades, etc.) in the space.
- Where an ignition source is to be introduced into the confined space, combustible gas testing must confirm that the atmosphere is and remains at 0% LEL (CAPP guideline).
- Monitoring should take place from time to time to ensure that a contaminant has not re-entered the space, if work is suspended for a significant period of time, or if Hot Work is to be carried out.
- A **stand-by/safety watch** must be in place at all times while a worker is in a confined space. This person must be **knowledgeable of the Confined Space Rescue Plan** and be in communication with the person in the confined space and also additional stand-by men if more than one worker is in the confined space.

Waste Disposal

- All waste generated during the cleaning process should be properly managed including characterization, classification, disposal and manifested. Consult the facility Waste Management Plan or contact a Tangle Creek Representative for further information.

Job Completion

- A thorough inspection must be conducted to ensure that no workers, tools or equipment have been left behind.
- Ensure all blanks/blinds or other insulating devices are removed and valves are returned to their correct positions. When returning the confined space back into service, caution must be exercised to avoid the possibility of an ignition source being introduced to a flammable atmosphere (nitrogen purge or controlled flow rate).
- Return the Work Permit to the responsible Supervisor.

7.4 Release of Harmful Substance – Code of Practice

Purpose

In accordance with regulatory agencies this Code of Practice is intended to provide guidance on the steps to be taken to prevent an uncontrolled release and, should such an event occur, the steps to mitigate its harmful effects.

Prevention

In order to prevent an uncontrolled release, the following procedures apply:

- The design of new facilities will comply with appropriate codes and accepted industry engineering practices;

- Equipment will be operated within the design limits as required by the manufacturer;
- Regular inspection of piping and vessels will be conducted to ensure equipment integrity;
- When building new facilities or maintaining or upgrading existing ones, suitable materials will be selected to contain the hazardous substances under the conditions of temperature, pressure, and corrosiveness normally expected;
- Workers will demonstrate competence in maintenance procedures and operation of equipment, prior to working independently; and
- Equipment will be maintained and not allowed to continue to operate outside its prescribed tolerances.

Controlled Release

There may be times in our operations when quantities of H₂S (or other hazardous substances) will be released during the course of normal operation and maintenance activities. These releases are considered controlled releases because they are anticipated and planned for. Systems and procedures shall be in place to control the amount released so that workers and the public are not at risk.

Many controlled releases must also be reported or approved.

Uncontrolled Release

Occasionally there are unplanned events in the movement or storage of substances. Where this occurs, company and contract personnel will:

- Protect people;
- Take action to control the effect on the environment;
- Not enter the area where the release has occurred unless equipped with appropriate personal protection;
- Initiate controlled shut down of affected equipment when failure to do that would present greater risks;
- Isolate and contain the release;
- Document and report all occurrences in a proper manner to the appropriate authorities; and
- Investigate the occurrence to determine root cause, so as to prevent future occurrences.

7.5 Selection, Maintenance and Use of Respiratory Protective Equipment – Code of Practice

This is a summary of the Code of Practice providing guidelines on proper selection of Task-Specific Respiratory Protective Equipment, training requirements for use of same including fit testing and basic medical assessment, and proper care, maintenance, and storage of equipment.

Appropriate Selection and Use

The hazard you may encounter will determine the type of respiratory protective equipment that you must wear. If you are in a situation immediately dangerous to life or health (IDLH) or an oxygen-deficient atmosphere, you must use either positive pressure self-contained breath apparatus (SCBA) or supplied air breathing apparatus (SABA) with an escape provision.

For non-IDLH atmospheres containing gas/vapour or particulate contaminants above the allowable provincial occupational exposure limits, the appropriate cartridge, filter or combination, and type of respirator (disposable, half, full, powered air-purifying) must be worn.

Note: Respiratory equipment is not adequate protection in explosive atmospheres. Ventilate the area first to reduce the risk of fire/explosion.

Some common petroleum industry hazards and the most appropriate equipment for that hazard are as follows:

Hazard	Type of Protection Recommended
Ammonia	SCBA or SABA
Asbestos	P100 or HEPA filter (asbestos approved), Powered Air Purifying Respirator (PAPR), full or half mask respirator
Biological (low levels)	P100 or HEPA (ie: sewage lagoons, Hanta Virus)
Chemical Fumes	Chemical Cartridge (specific to components of chemical involved) or SCBA
Chlorine	SCBA or SABA
Heavy Metals	P100 filter and metal-specific cartridge combination
Hydrogen Sulfide (H ₂ S)	SCBA or SABA
Hydrocarbon Vapours (Painting)	Combination P100 filter/organic chemical cartridge
Hydrocarbon Vapours (General)	Chemical cartridge (organic vapours), protection against low level concentration hydrocarbons (ie: benzene)
Nuisance Dusts	P100 or HEPA filter (disposable)
Nuisance Odours	Chemical Cartridge (typically organic, disposable)
Oxygen Deficiency	SCBA or SABA
Radioactive (NORM)	P100 filter (disposable, preferably half or full face mask)
Sandblasting (major task)	Total body-encapsulated suit with SCBA or SABA
Silica	P100 or HEPA filter (disposable, preferably half mask)

Fit Testing Requirements

Workers who are or may be required to wear respiratory protection equipment must be clean-shaven where the face-piece meets the skin, to ensure an effective facial seal.

Workers who are or may be required to wear respiratory protection equipment must be able to ensure an effective seal with the device by passing a documented qualitative or quantitative respirator fit test. A test

should be conducted upon first use, and at least annually thereafter. Discussion of basic medical criteria must be discussed at this time.

Every time a respirator is used, both a negative and positive pressure fit test must be conducted to ensure a seal is achieved.

Training

In addition to fit testing, a competent trainer must give proper instruction on the use and care of their respiratory protective equipment, including protection factors, duration limits, inspection criteria, potential limitations, and procedures for emergency response to all workers who may use respiratory protective equipment.

Supervisors must receive the same training as Employees and monitor the selection, care and use of all respiratory protection equipment.

Cleaning, Inspection and Storage

- All respirators should be cleaned and disinfected after each use and stored in a clean, sealable container.
- Respiratory equipment should be inspected before and after each use.
- Cylinders should be checked for condition and hydrostatic test date.
- Breath air units should be turned on for 20 minutes every week to reduce contaminant building-up and tested semi-annually by an accredited laboratory.

7.6 Sour Service

Application and Scope:

A facility is considered sour where levels exceed 10 ppm H₂S.

Occupational Health and Safety Regulations require:

Detection: To determine the level of H₂S in a work area, either a continuous or personnel monitor is to be used. In addition, oil and gas warning signs are to be posted at all wells and facilities when the potential H₂S content is 10 ppm or greater. (Note: wells and facilities with a H₂S content of less than 10 ppm must have a flammable gas/liquid warning sign).

Training: Workers are to be provided H₂S training. Employers are required to develop and communicate safe work polices for sour Operations

Protection: When H₂S is present in an area, either an approval supplied air or self-contained breathing apparatus must be worn when OH&S maximum time exposures are exceeded. In B.C., the ceiling exposure for any time period is 10 ppm. For other jurisdictions they are:

H₂S Concentrations	Maximum Time Exposure
10 ppm	8 hours
15 ppm	15 minutes / ceiling

Tangle Creek's safe work guideline for working in sour production areas is as follows:

1) *H₂S Monitoring*

H₂S detection must be used to monitor the work environment in areas where the potential of exposure can exceed maximum exposure limits as defined. Detection equipment can be either a continuous or personal monitor. Personal H₂S monitors must be worn as directed by Tangle Creek Representative and/or if it is a condition of the Work Permit. Known danger areas must be clearly posted in accordance with Occupational Health and Safety requirements.

2) *Normal Routine Operations*

Normal Routine Operations in sour production areas may be performed by an Operator working alone subject to the following restrictions:

- a) When entering a sour location, Employees are to ensure that:
 - H₂S monitoring equipment is turned on and used at all times while on location.
 - Communication equipment is in good working order.
 - A breathing apparatus in working order with an adequate supply of air must be available.
- b) Caution should be taken before entering any building that does not have a permanent H₂S monitor. Ventilation may be required.
- c) Workers should not enter dike areas and tank gauging should only be done using external gauges unless breathing apparatus is worn.
- d) Site-specific operating procedures may be developed for completing a routine operation where sour product may be released but the potential for H₂S levels to exceed occupational exposure limits is known to be minimal. A back up man is not needed in these situations
- e) If an H₂S monitor alarms at any time while a worker is entering or working at a location, all workers are to immediately retreat to a safe area, and report conditions at the site to the appropriate Tangle Creek Representative.

3) *Operations Above Safe Exposure Limits*

- a) No Employees shall work alone in an area where the measured atmospheric H₂S levels exceed occupational exposure limits. The appropriate Tangle Creek Representative must be notified immediately and suitable precautions taken before work is continued.
- b) Under no circumstances is a worker to don a breathing apparatus and attempt to repair an uncontrolled release without a back up man present. The back up man must also be equipped with a breathing apparatus.
- c) When completing any operation and the release of gas is expected to expose the worker to H₂S levels that exceed the occupational exposure limits, a breathing apparatus is required. A back up man is required in these situations.
- d) For any job requiring the use of a breathing apparatus, the foreman or Supervisor will determine the required deployment of workers, taking into account the scope of the job, H₂S exposure levels and the availability of required safety equipment. A Work Procedure is required and will include the need for back up man.

8.0 WORK PROCEDURES

Field Production Staff including Contract Operators must understand the required job procedures before beginning a job. Where detailed Work Procedures are not provided in this handbook, reference is to be made to Tangle Creek's Safety Manual.

Contractors are expected to assign competent staff that can safely carry out the required tasks. A Competent Worker must supervise Contractor Employees that are unfamiliar with the required procedures.

The Work Regulation and Procedures in this handbook have been compiled as the result of long experience in the industry. All applicable Federal and Provincial Government Acts, Regulations, Laws and Codes shall be followed including licensing of applicable workers, inspection and certification and certification of equipment when required. Tangle Creek Representative may issue site-specific procedures to cope with current conditions as they arise.

8.1 Air Craft Safety Awareness

Purpose

To ensure employee and contractor personnel are not subjected to unnecessary risk during the use of charter or other aircraft, the following guidelines have been adopted from several insurance industry sources.

Standard Safety Briefing

The standard safety briefing shall consist of an oral briefing provided by a crew member or by audio-visual means, and includes the following information as applicable to the aircraft, equipment and operation:

- Embarking and disembarking procedures;
- No smoking in or around any aircraft;
- When, where, why, and how carry-on baggage is required to be stowed;
- The fastening, unfastening, tightening, and general use of safety belts or safety harnesses;
- The location of emergency exits, exit location signs, and how each exit operates;
- The location, purpose of, and advisability of reading the craft specific safety features card
- The requirement to obey crew instructions;
- The use, location, operation, and deployment, as applicable, of emergency equipment such as life rafts, life preservers, fire extinguisher, ELT (Emergency Locator Transponder), survival equipment, and first aid kit including means of access to any locked compartment;
- Where applicable, the method of egress from a wide body helicopter in the event of a roll-over incident; and
- Any special instructions related to emergency evacuation if the craft is configured with external devices.

Where no additional passengers have boarded the flight for subsequent take-offs on the same day the pre-take-off and after take-off briefing may be omitted provided a crew member has verified that all carry-on baggage is

properly stowed, safety belts or harnesses are properly fastened, and seat back and chair table are properly secured.

This guideline does not represent a complete guideline to the subject area; consult the pilot and/or your supervisor before continuing.

8.2 All Terrain Vehicles (ATV)

All Terrain Vehicle (ATV), snowmobile, and ARGO use has become an integral part of field activities. Insufficient knowledge is a primary factor in the increase of incidents. A Code of Practice has been established and is detailed in the Health Safety and Environment Manual regarding responsibilities, equipment specifications, training requirements, driving techniques and usage. In general all ATV riders must:

- Be competent in their ability to operate an ATV, meeting Manufacturer's Guidelines and/or take an approved ATV rider's course;
- Drive the ATV in accordance with local regulations;
- Possess a Valid Driver's License for insurance purposes;
- Wear the appropriate PPE, including helmet, work boots, gloves and safety glasses/face shield;
- Properly maintain their equipment including servicing and pre-ride inspection in accordance with Manufacturer's Guidelines.

When riding an ATV, all riders are expected to:

- Scan the area;
- Identify hazards;
- Predict what will happen;
- Decide what to do; and,
- Execute the decision.

If an ATV rider does not feel comfortable in their ability to complete a task, they should inform their Supervisor immediately.

8.3 Chemical and Biological Hazards and Harmful Substances

There are a variety of chemical hazards (ie: benzene, solvents, heavy metals, lead, diesel exhaust), biological hazards (ie: micro-organisms in sewage, toxic mould, hanta virus), and harmful substances (ie: asbestos, silica, nuisance dusts) that may be present on the work site.

Proper and documented work practices for handling, storage, transport, and disposal of these substances are required to minimize both worker and public exposure.

The route of exposure (inhalation, ingestion or skin absorption), duration of exposure (8 hours, short-term or long-term), and effect of more than one substance, all factor into the total affect on the worker. Airborne concentration measurements obtained by a competent worker should be related to allowable limits to determine potential impacts. Common hazards that require controls include:

8.3.1 Hanta Virus

Hanta Virus is a “flu-like” illness, which can be contracted from inhaling air contaminated from saliva, droppings and dried urine of rodents (ie: deer mice).

Avoid inhalation of contaminated air or direct contact with contaminated areas by:

- Ventilating closed buildings or areas before start of cleaning;
- Cleaning up droppings by first wetting down the area with a solution of five parts water to one part bleach. Do not use a broom or vacuum; use a damp rag for clean-ups;
- Disposing of dead animals and droppings in a twist-tied plastic bag using disposable rubber or plastic gloves.

Control rodent infestation by:

- Sealing holes that are larger than 0.5 cm around buildings;
- Clearing brush/grass from around foundations;
- Storing food in containers with tight lids;
- Elevating garbage cans or use well-fitting lids;
- Using spring-loaded mouse traps continuously in infested areas ; and
- Using rodenticide approved for exterior use in covered bait stations.

8.3.2 Sewage

Proper site drainage and storage of biological wastes is important for both health implications and reduction of environmental impacts. Septic tanks should be stored away from the primary “residence” area and be routinely cleaned out. Proper PPE should be worn during this process.

8.4 Communication Equipment

All electronic devices such as cell phones, pagers, and mobile phones must be intrinsically safe if they are to be used in a potentially explosive environment.

8.5 Critical Lift Procedure

The PIC (Person in charge) shall ensure that a step-by-step procedure is prepared for critical lifts. Although individual procedures are prepared for one-time critical lifts, general procedures may be employed to accomplish routine recurrent critical lifts, for example, a general procedure may be used to lift an item or series of similar items that are frequently lifted or repeatedly handled in the same manner. A critical lift procedure should contain the following, as applicable:

- Identify the items to be moved.
- Special precautions, if any (such as outrigger or track cribbing for mobile cranes).
- Weight of the item and total weight of the load (For mobile cranes, see the manufacturer’s instructions regarding components and attachments that must be considered as part of the load).
- Centre of gravity location.

- A list of each piece of equipment (e.g., crane, hoist, fork truck), accessory, and rigging component (e.g. slings, shackles, spreader bars, yokes) to be used for the lift. (This list shall identify each piece of equipment by type and rated capacity).

Designated checkpoints and holdpoints and estimated instrument readings, as relevant, so that job can progress.

8.6 Crown Savers

Scope and Purpose: This Work Procedure was developed to reflect Tangle Creek's policy that all contracted rigs have crown savers installed and regularly tested before operation of the rig is commenced.

Procedure

1. It is the Wellsite Supervisor's responsibility as a Representative of Tangle Creek to not approve the start of rig Operations until the crown saver has been function tested.
2. It is the rig Contractor's responsibility to supply, install, maintain and function test the crown saver in accordance with the equipment manufacturer's design and specifications.
3. Subsequent function testing of crown saver equipment must be carried out at appropriate times.

8.7 Driving Conduct

Driving Conduct is one of the highest risk activities for injury and property damage. In particular, driving on oilfield roads requires special safety precautions. The following guidelines have been developed in correspondence with provincial and local regulations.

Driving Guidelines

Vehicle Check

- Keep vehicles in proper operating condition
- Ensure loads are secure at all times
- Large units should have mud flaps in place and be checked for rocks between wheels
- Complete vehicle walk around

Before Starting

- Ensure proper signage and documentation is in place.

On The Road

- Wearing seat belts is mandatory
- Drive with headlights and taillights on at all times to increase visibility
- Obey all traffic signs and speed limits
- Stay on the right side of the road on corners, crest of hills and at intersections
- Slow down when merging
- Yield extra road surface to larger traffic
- Watch for following cars, and pull over to the side when safe to let faster traffic pass

- Do not use cell phones and field radios while driving. Pull off to a safe spot to answer or make calls.
- Always try to back into parking spots

Driving in Poor Conditions

- Reduce speed when driving in poor road or visibility conditions
- Do not pass in loose gravel, during poor visibility or slippery road conditions.

Licensing and Mechanical Inspection

- If a worker uses a personal vehicle for work purposes, an employer must ensure that the worker complies with the appropriate licensed driver requirements of Provincial legislation.
- The worker must ensure their vehicle is maintained in sound mechanical condition.

Refueling

- Workers must not smoke within 7.5 metres of a vehicle while it is being refueled.
- Vehicles must not be refueled if there is an ignition source within 7.5 metres of the vehicle.
- Workers must not dispense flammable fuels into the fuel tank of a motor vehicle while its engine is running unless it is otherwise permissible by the manufacturer or certified by a professional engineer.

Towing / Winching

- Workers shall never be between the winching / towing vehicle and the load being winched / towed
- Always wear leather gloves when handling the cable to avoid punctures from protruding strands of cable wire.
- Use hand over hand action. Never allow the winch line to slip through the hands
- When towing a vehicle be aware of the ground conditions (snow, ice, mud, etc.). Tire chains may be required.
- Slack should be taken up until the line is taut and then steady power should be applied to control both vehicles.
- Use a tow rope. Not a tow chain.

The attachment apparatus and process used to extract a stuck vehicle must not create a hazard as a result of shock loading from a running start.

Other Considerations

- **Logging Roads** – create additional hazards as they are subject to being narrow with large vehicular traffic. They are also often radio controlled which requires you to have appropriate communication.
- **Ice Roads** – present a unique set of driving conditions and hazards. These include cracks in the ice, the weight bearing capabilities of the ice and the characteristics of the ice when vehicles travel over it. Slower speed is absolutely essential when dealing with these hazards.

8.8 Fall Protection

A written Fall Protection Plan must be in place before work commences on any task where a fall of **3 metres** or more can occur and workers are not protected by guardrails.

A Fall Protection System must be used and the workers trained in that system when work is being done at a temporary or permanent work area at or above 3 metres (10 ft). This system may include:

- A fall arrest system;
- A travel arrest system;
- A safety net;
- A control zone.

Furthermore, any permanent work area above 1.2 metres must have guardrails.

Work or activities at height which incorporate a working line, safety line and a full body harness in combination with any other devices that allow a worker to ascend, descend and traverse to and from a work area under their own control is considered Industrial Rope Access Work.

When working overhead, the areas below shall be roped off or other equivalent measures taken to protect workers at the Work Site. Signs reading “Danger – Workers Overhead” shall be conspicuously posted. If conditions justify a watchman, they shall be stationed within distance of voice communication.

If scaffolding or a temporary work platform can be damaged by powered mobile equipment or a vehicle contacting it, reasonable measures must be taken to protect the scaffolding or temporary work platform from being contacted.

All scaffolds and platforms must be constructed in accordance with applicable Provincial Occupational Health and Safety and/or Workers Compensation Board and Regulations.

8.9 Fire and Explosion Hazard Management

Working with flammable and combustible substances is a daily occurrence in the oil and gas industry. It is imperative that all workers ensure necessary precautions are taken to avoid accidental ignition and be aware of the following preventative requirements:

- No worker, other than competent worker responding to an emergency, can enter a work area if the atmosphere exceeds 20% of the LEL. Above this limit there is little room for error.
- Prior to any work being done in an area containing a flammable substance, testing may be necessary. When testing is required, it must be done before work begins and may be required at regular intervals to ensure Worksite safety.
- Smoking is not allowed in a work area where a flammable substance is stored, handled, processed or used.
- Workers must not use an open flame in a work area where a flammable substance is stored, handled, processed or used.

- Hot Work, that is any work in which a flame is used or sparks and other sources of ignition could be produced, require a Hot Work Permit. The Permit must specify precautions and procedures that will be used to ensure the work is completed safely.
- Portable fire extinguishers are not designed to fight large or spreading fires. Fire extinguishers are useful under certain conditions and extreme care should be taken when attempting to extinguish any fire.
- **Wherever an explosive atmosphere is possible, the use of cellular phones, two-way radios, or other non-intrinsically safe electrical equipment is not permitted without the permission of the site Supervisor.**

8.10 Flammable & Hazardous Liquids

Flammable and hazardous liquid containers and storage tanks shall be labeled or identified and located in a safe place away from any open flame, fire or engines in operation.

Where there is a potential for pressure build up or plastic container degradation, drums and small non-safety containers must not be left exposed to direct sunlight. Containers must be grounded when pouring flammable liquids in or out of them and containers must be of an approved type.

Metallic or conductive containers and vessels used for flammable and combustible liquids must be bonded to one another and electrically grounded when pouring to prevent sparks and accidental ignition.

Gasoline engines must be refueled only when engines are stopped. Safety cans must be used unless the tank is filled directly from the storage container via a piped system.

Smoking is not permitted near gasoline storage area(s). **A sign stating “No Smoking or Open Flame” must be posted at all storage areas.**

8.11 Ground Disturbance

The potential consequences to individual workers and Tangle Creek for accidents involving ground disturbance work are very serious and therefore the appropriate time and resources must be allocated to ensure that the work is carried out safely.

The following procedure should be followed in any ground disturbance operation (see definitions):

Responsibilities as Owners of Pipeline

1. Provide information to persons undertaking a ground disturbance and ensure compliance to IRP 17.
2. Referencing all available sources of information as far as reasonable and practical to determine the existence of all pipeline and underground utilities in the proposed Ground Disturbance work area.
3. Locate the pipeline and mark the surface location using a qualified line locator.
4. Carry out inspections that are necessary to keep the pipeline safe.
5. A Tangle Creek Representative must be at the Work Site until the pipeline or utility has been exposed.
6. Inspect the pipeline before backfilling.

7. Report any damage.

Supervision

1. A Designated Supervisor is responsible ensuring that the work is carried out safely. This includes determining the existence of underground facilities and their proper locating and exposure.
2. A Supervisor must ensure that proper markers are positioned around a ground disturbance to make workers aware.
3. The Supervisor must have specific experience and training to supervise ground disturbance activities.
4. The Supervisor must ensure that if workers are required to enter an excavation or trench that the confined space entry Code of Practice has been reviewed and applied if necessary. As a minimum, a means of exit and entry must be provided for workers that are within 8 metres of any excavation greater than 1.5 metres in depth.

Search and Notification

1. Records must be searched for buried facilities within 30 metres of the proposed ground disturbance.
2. Owners or the owner's designate of a facility within the search area are to be informed of the intent to create a ground disturbance and asked to confirm the location, type, and content (as applicable) of their facility.

Crossing Agreements and Approvals

1. Agreements are required if the ground disturbance is on a lease or right-of-way or within five metres of any facility.
2. The Crossing Agreement must be on site before starting the ground disturbance.

Locating Facilities

1. All facilities within the 30 metre search area should be located and marked by competent personnel.

Permits

1. A Site-Specific Ground Disturbance Record must be completed as part of the Work Permit for each crossing or disturbance within five metres of a located buried facility.

Pre-Job Safety Meeting

1. A Pre-Job Safety Meeting must be conducted.

Exposure

1. The facility owner may request to have a Representative on-site during the exposure.
2. All hand exposed zones must be exposed 1 metre on each side of the locate marks for a buried facility other than a high pressure pipeline. High pressure pipelines must be hand exposed within 5 metres on each side of the locate marks, unless the entire excavation is hydro-vac'd to 15 cm below the ground disturbance depth.
3. Mechanical equipment within 60 cm of a buried line should not be used.

4. If contact with a pipeline occurs that damages the pipe, all work must stop until the necessary go-ahead is received.
5. Any damage must be reported immediately to the owner of the facility.
6. It is the facility owner's responsibility to notify the appropriate government agencies.

Backfill

1. The line owner should inspect the crossings before and during burial.
2. A Backfill Inspection Form must be filled out.

Some other excellent sources of information and guidelines regarding ground disturbances are:

1. Underground Facilities published by the Alberta Construction Safety Association.
2. Safe Procedure for Pipeline & Utility Crossings booklet published by the Edmonton Area Pipeline and Utility Operators Committee.

8.12 Heaters and Open Flame Equipment

When lighting fired heaters and furnaces, face shields and gloves are to be worn.

Portable heaters are to be used only for the service for which it has been approved and adequate ventilation should be maintained in order to prevent a build up of exhaust gases. All flammables are to be removed from the immediate area.

Flame type equipment such as open flame space heaters (Herman Nelson) are to be used only in extenuating circumstances and then only in conjunction with a Tangle Creek "Hot Work Permit".

8.13 Hot Taps

A Hot Tap refers to any penetration into live piping or a pipeline where there is no existing fitting or when welding on pressurized pipeline or a pipeline. Welding on pressurized piping systems without taking the proper precautions is dangerous and can result in a major failure. Fatalities have occurred as a result of welding on pressurized pipeline.

If proper steps are not followed, it is possible for a Hot Tap to result in:

- Pipe failure caused by "burn through" during welding;
- Ignition and burning of the product inside the pipe;
- Damage to equipment downstream of the Hot Tap due to cuttings;
- Delayed failure of the weld due to hydrogen or stress corrosion cracking.

8.14 Hot Work Procedures

Scope and Purpose: The following special precautions are a minimum requirement to ensure that adequate precautions are taken when dealing with "Hot Work".

Definition: Hot Work is any work that produces a source of ignition.

Hazardous Location/Area: The area within a radius of **25 metres** of the Hot Work is considered a Hazardous Area and kept free of flammable

substances. Where this is not possible, competent Supervisory personnel must be in constant attendance and a Hot Work Permit issued.

Equipment Isolation: All equipment on which Hot Work is to be performed must be positively isolated from all possible sources of combustible, explosive or toxic material. *Positive Isolation* means blinding off, plugging or the complete removal and blanking off of interconnecting piping, vessels or sewers which may contain hazardous material.

Purging and Gas Testing: No equipment, vessel, line or any type of container which has contained a hazardous material shall be considered safe for Hot Work unless it has been purged, gas tested and inspected. Steaming is an excellent way to remove residual hydrocarbons.

Hot Work Precautions:

1. All combustible materials within 7.5 metres of the Hot Work must be suitably isolated or removed from the area.
2. When welding is carried out for the purpose of Hot Tapping on a pipeline, vessel or tank, the line shall be full of stock and have a positive flow, or in the case of vessels and tanks, they shall be filled with liquid to at least one metre above the point at which welding is to be carried out.
3. Oil surfaces and oil spills must be hosed down and sanded over (minimum depth – one inch). Oil soaked ground must be dug out and removed.
4. Testing must be carried out to determine that the atmosphere does not contain a flammable substance, in a mixture with air, in an amount exceeding 20 percent of that substance's LEL for gas or vapours or the minimum ignitable concentration for dust.
5. All trash and oil rags must be removed.
6. Particular attention is required for the danger of expansion of oil or gas in equipment (lines, vessels, etc.) immediately adjacent to the Hot Work.
7. Flammable solvents must not be used or be present in the area of Hot Work.
8. Fire blankets or appropriate fire retardant material shall be used when there is a danger of sparks being carried outside the work area. Fire blankets should be kept damp if spark impingement is intensive.
9. Valves cannot be accepted as leak proof. Bleeder valves on pumps, lines and vessels shall be plugged off when such pumps, line or vessel contains flammable fluids.

This is consistent with accepted practices that all bleeders are provided with plugs to prevent fire due to bleeder valves opening from vibration.

Fire Equipment:

1. All Fire Fighting Equipment provided at the job site shall be checked and readily available for the personnel performing the Hot Work and personnel shall be fully familiar with the operation of such equipment.
2. Portable extinguishers permanently located in the operating area must not be used as standby fire equipment for Hot Work.
3. Portable extinguishers shall be placed in an accessible position and not so close to the Hot Work that they become involved should a fire take place.

Ingress and Egress: Walkways, ladders, tank or tower manways and other approaches to the area must be accessible and free from obstacles that may obstruct personnel engaged in fire fighting or escape in case of fire.

Welders, Cylinders & Generators:

1. Welding machines, gas cylinders and generators must be located a safe distance from the Hot Work area, leaving easy access for removal in case of fire.
2. Welding machine ground wires must not be attached to any valves, fittings, machinery or other equipment in operation.
3. Welding cables must be in good condition and located clear of hot lines and equipment. Splices and joints in cables must be properly made and insulated.

8.15 Hydrate/Ice Plug Handling

Prevention

Prevention is the best method for “handling” hydrates. Hydrates can be prevented and should not be accepted as normal operating routine. It is more cost effective to have hydrate prevention program in place than to utilize remedial removal measures.

Hydrate/Ice Plug Removal

Hydrates and ice plugs pose a real threat to both people and equipment if not handled properly. If proper procedures are not used when removing hydrates very large forces may be created as hydrates begin to move which can result in serious injury to personnel and damage to equipment.

The following guidelines are intended to assist in developing site-specific procedures to safely remove solid hydrates.

1. The removal of a solid hydrate should be directly supervised by the foreman/field engineer or his trained designate.
2. A tailgate meeting to discuss safety considerations and procedures should be held with all involved prior to commencement of site activities.
3. In piping and pipelines, assume all hydrates are multiple plugs unless this can be proven otherwise.
4. Determine the location of the hydrate plug or plugs. Means available to accomplish this are:
 - a) Past experience with hydrates in the system
 - b) System geometry (may include low spots)
 - c) Other volumetric or sonic detection methods.
 - d) Piping or pipeline system design.
5. If a single hydrate is positively confirmed, simultaneously depressure both sides of the hydrate to the point at which the hydrate is formed, but not to zero.
6. If multiple hydrates are suspected, attempt to remove them without depressurizing. The objective is to decompose the hydrate without allowing moving which may create excessive forces. Means to accomplish this are:
 - a) Methanol squeeze. Do not create differential pressure more than 10% of normal operating pressure.

- b) Coiled tubing with methanol injection.
- c) Portable heaters
- d) Electrical impedance heating.

When all methods outlined above have been attempted or considered, and are unsuccessful, contact a Tangle Creek Representative.

8.16 Managing the Control of Hazardous Energy

Before maintenance work, inspection or testing begins on any machinery or equipment or powered mobile equipment, all sources of hazardous energy at the location must be isolated by activation of an energy-isolation device. The machinery or equipment must be rendered inoperative in a way that could result in accidental activation, movement of equipment or otherwise cause damage to a person, property or process. The equipment or machinery must be isolated and secured at the main source of energy or control device.

Energy-isolating procedures must be available to all workers and should be posted at appropriate locations.

The lock used must have a unique mark or identification that identifies who the lock is assigned to.

No work is to be performed until the equipment is tested and the worker is assured the equipment is inoperative.

Only the person who installed a lock may remove that lock. When that worker is not available, only a competent person designated by the Supervisor may so.

8.17 Noise Exposure

Exposure to high sound levels and/or sharp impact sounds for sustained periods, coupled by the effects of getting older can reduce or impair hearing levels. Noise is a recognized workplace hazard that must be assessed, eliminated or controlled. Area sound level measurements and noise dosimeters are taken at various workspaces to identify where noise levels exceed 85 dBA over an 8-hour work period.

If a Noise Hazard is identified, the first step is to engineer out the hazard (substitution, modification, isolation, and/or maintenance) by:

- Applying controls to limit time spent in hazard area; and,
- Training workers in the proper use of PPE (disposable ear plugs, re-useable ear muffs, and/or custom-made ear plugs for “noise-exposed workers”).

Audiometric hearing tests at sites with noise issues are to be administered by a certified third party. Testing will establish a baseline for all noise-exposed workers and ongoing testing will ensure there are no adverse health impacts.

Additionally, all new or renovated Worksites, new work processes, or new equipment brought into a workplace must achieve a noise level as low as reasonable practicable and preferably lower than 85 dBA.

8.18 Pigging Guidelines

Scope and Purpose:

Pigging Operations in oil and gas field Operations present a serious hazard. Due to each area or facility having individual pig trap design and operation, a site-specific practice must be developed. These guidelines will help to develop a safe procedure when pigging any pipeline for the removal of wax, other solid deposits and trapped fluids.

Development of Site Specific Practice

1. When developing a Site-Specific Practice, the following concerns must be addressed in all cases:
 - a. Is this a two-man job?
 - b. Are sour products expected?
 - c. Proper isolation and depressurizing.
 - d. Characteristics of the fluid to be pigged.
 - e. The hazard of potential plugging of the bleed-off valves.
 - f. Proper receiving and launching techniques stressing potential hydraulic shock.
 - g. Routine inspection of the cap, barrel and seals.
 - h. Individual marking or identification of pigs and logging with respect to launching and receiving times.
2. In a system requiring pigging, proper pipe internal diameter, full opening valves, long radius elbows and barred tees must be used during any piping modifications.
3. Where the receiver is vented to a proper drain or flare system, the barrel must be fully vented to atmosphere prior to opening the receiver or launcher.
4. Where the cap is not secured to the receiver or launcher, the Operator must position himself to ensure he is not in the line of trajectory of the pig or cap should unsuspected pressure be present when the cap is removed.
5. Where the cap is secured through a hinge arrangement, the Operator must be very careful of the swing of the cap should unexpected pressure be present.
6. Proper disposal methods must be used for recovered wax, other solids and fluids.

Sour Pigging Guidelines

1. If the H₂S content of the oil or gas expected is less than 10 ppm, pigging may be done without masks, or buddy system unless some special hazard is recognized by the Operator.
2. If the maximum H₂S content of the oil or gas expected is less than 15 ppm and the line size is 125 mm or less, the Operator may pig the line without using a mask but the buddy system must be used with the second man standing 15 metres upwind with mask equipment close by. The pigging should be done masked up if any special hazards are recognized.
3. If the maximum H₂S content of the oil or gas expected is greater than 15 ppm, or if the line size is greater than 125 mm with an H₂S content of 10 ppm or greater, the Operators shall use the buddy system and the

Operator performing the pigging shall be masked up. The second Operator shall be upwind 15 metres with mask equipment close by.

8.19 Purging

Purging is the practice of displacing the existing gas and/or fluid in a vessel, container or piping system with another gas and/or fluid. Purging is often used to remove toxic or explosive/flammable fluids and gases from a system before opening the system to atmosphere or prior to shipment of equipment. Alternately, before equipment start-up, air may be purged from equipment in preparation for it being put back into service.

A Site-Specific Purging Procedure must be developed for any purging operation other than routine Operations covered by the Task Competency Manual or other documented standard procedures. The Site-Specific procedure must identify the hazards associated with the task and the control methods utilized to address those hazards.

Possible Purge Mediums

Consideration should be given to the use of an inert purge medium. However, it is recognized that it is not always practical to use an inert purge medium for all Operations. Flammable purge mediums can be successfully used as long as special precautions and procedures are used.

8.20 Rig Inspections

Drilling rigs, service rigs or snubbing units must be inspected by a competent worker before the rig is placed into service and every 7th day on which it is used for as long as it is in service.

8.20.1 Rig Anchors

Scope and Purpose:

Rig derricks, masts or self contained subbing units are either designed to be free standing or to be secured with anchored guy lines. This Work Procedure was developed to reflect TANGLE CREEK's practice that all contracted rigs, with derricks that require anchored guy lines, have anchors installed and guy lines secured before operation of the rig is commenced.

Procedure

1. It is the Wellsite Supervisor's responsibility as a Representative of Tangle Creek to not approve the start of rig Operations until anchored guy lines have been installed.
2. It is the rig Contractor's responsibility to supply, install and test anchors, and attach guy lines in accordance with the rig manufacturer's design and specification.
3. The installation of rig anchors is a ground disturbance activity. It is the well site Supervisor's responsibility to check for the location of buried pipelines, electrical cables, etc. before anchors are installed. Refer to Ground Disturbance – Code of Practice.
4. Must have separate anchors for escape lines.

8.21 Safe Work Permits

Introduction

This Code of Practice has been developed to provide guidance on the use of Safe Work Permits at all TANGLE CREEK work sites. Each area is responsible for developing its own site-specific procedure for the use of Work Permits.

To be valuable, a Safe Work Permit must identify the work to be done, the hazards involved and the precautions to be taken. It determines that all hazards and precautions have been considered before work starts. It is an agreement between the issuer and the receiver that documents the conditions, preparations, precautions and limitations that must be clearly understood before work commences. The Permit may record the steps taken to prepare the equipment, building the area for the work, and the safety precautions, safety equipment or specific procedures that must be followed to enable the worker to safely complete the work.

Permit Requirements

The site-specific Safe Work Permit procedure should address how the Permit system is administered as well as when Safe Work Permits will be used. Consideration should be given to the following circumstances in determining when a Safe Work Permit is to be issued:

1. Potential for the product being contained to escape to atmosphere.
2. A safeguard has to be removed or disabled.
3. A safeguard requires repair or maintenance.
4. Working on rotating equipment that requires a lockout device.
5. Hazardous chemicals being handled.
6. Hot Work occurs (stand by person required).
7. Confined or restricted space entry occurs (stand by person required).
8. Vehicle entry where vehicles and/or portable rotating equipment are present outside of normal parking or traffic areas and/or are in the immediate vicinity of process equipment.
9. When lifting with equipment occurs.
10. Contractor involvement in the task.

Note: The stand-by person will be a qualified individual (Employee or Contractor) assigned to the task.

Special Precautions

Hot Work

A Safe Work Permit must be issued for any kind of Hot Work. This kind of work must be supervised at all times, by an individual acting in the capacity of a stand-by person and procedures have to be implemented to ensure continuous safe performance of the Hot Work. Atmospheric testing must be done and recorded on the Permit before any work commences. If the Hot Work is of a lengthy nature, the atmosphere must be continually monitored or re-tested periodically during the job and results recorded on the Permit. Hot Work must be immediately halted if gas testing or other common conditions indicate that the work may no longer be carried out safely.

Confined Space Entry

All Confined Space Entry work must also conform to TANGLE CREEK "Confined Space Entry Code of Practice" (7.3).

Communication

Permit issuers, job Supervisors and workers must all be aware of the tasks that are to be completed and the Safe Work Permit requirements. If the worker is to be working at more than one location, those locations must be listed on the Safe Work Permit. If there are so many locations that listing them is impractical and impossible, communication between the worker and the Permit issuer should be on going through the day.

Permit Responsibilities

Permits issued where more than one department is involved should be issued to the senior person who will be involved from the start to finish of the task at hand. He/She will be responsible for ensuring proper communication and safe Work Practices are followed. More than one Permit may be required, depending on the scope of the job.

Displaying Permits

A copy of an Active Permit is to be displayed in a conspicuous place. If this is not practical, it must be readily producible by the Permit Holder. A Safe Work Permit is valid for one working day, but if conditions are unchanged and communication occurs between the two concerned parties an extension on the Permit may be given. On each copy of the Permit the new date and/or times must be clearly indicated and initialed. No Expired Permits are to be displayed.

When the work has been completed, Permits are to be signed off and returned to the originator. If work is incomplete, it should be noted on the Permit when returned. Work Permits will be kept on file for a period of two years.

Blanket Work Permits

A Blanket Work Permit is a special Permit that may be issued for an extended period of time (up to one year). It is intended a Blanket Work Permit be issued for tasks carried out on an ongoing basis by Contractors (ex. Field hauling fluids) where specific procedural guidelines have been established and agreed to by the Contractor.

Work Clearances

A clearance may only be issued when "complete" control of a site is to be turned over to a worker. A Work Clearance may be issued for the total period of time that is required to complete the tasks at that site. The worker receiving the clearance is responsible for issuing Safe Work Permits at the affected site as may be required by this Code of Practice or the applicable government regulations. After the work covered under the Work Clearance has been completed the clearance must be signed off and returned to the issuer.

8.22 Tank Truck Loading Procedures for Sour and Flammable Fluids

- a) Observe all posted rules and regulations at the lease entrance.
- b) Tank trucks must be equipped with positive air intake shut offs.
- c) **Self-contained breathing apparatus must be used** when coupling or uncoupling load hoses where H₂S exceeds the OH&S exposure limits summarized in Section 7.2.
- d) Sour liquids will be transported in sealed trucks with no venting of sour vapours.
- e) External tank gauges are to be used to determine volume of fluid loaded. Thief hatches on production tanks are to remain closed as production tanks may be pressurized with sour gas.
- f) Lights on trucks are to be shut off prior to loading and unloading.
- g) Bonding/grounding cables are to be connected prior to loading and unloading.
- h) Emergency brakes are to be fully engaged.
- i) Servicing or maintenance on trucks while loading or unloading is prohibited.
- j) Drivers must remain outside their vehicles to monitor for leakage of hoses, pumps, lines, valves and tank truck levels to eliminate spills.

8.23 Trailers and Bunkhouses

All trailers and bunkhouses must be located at a safe distance from drilling rigs and operation equipment and must be positioned updrift of any fuel storage facilities. The hitches must be accessible so the trailer or bunkhouse can be readily moved in case of emergency. Electrical wiring and fixtures must meet the applicable Provincial Electrical Code. Smoke detectors and fire extinguishers shall be provided as required by the Provincial Fire Regulations.

8.23.1 Toilets & Washing Facilities

- Ensure signage is in place for potable and non-potable water; Potable water supplies should be maintained as per Manufacturer's Recommendations.
- Lunch room, change room, toilet, urinal, wash basin, hand cleaning facility, circular wash fountain or shower at a work site must be clean, sanitary and operational.

8.24 Trenching

Precautions

NO worker shall enter a trench with a depth of more than:

Alberta	1.5 metres
British Columbia	1.22 metres
Saskatchewan	1.22 metres
Manitoba	1.80 metres

Unless protected from any cave-in or sliding material by:

- Cutting back
- Shoring
- Or a combination of both of the above.

No two trenching projects are identical, therefore each project must be considered unique and the following completed:

- **Hazard assessment conducted;**
- Site-specific Work Procedure developed;
- Work Permit issued, both pre-trenching and trenching;
- Consider soil conditions prior to task;
- Follow all other Codes of Practice (Ground Disturbance, Confined Space Entry, Working Near Overhead Power Lines);
- Ensure any ground thawing is done using safe environmental practices;
- Ensure the area surrounding the ditch is safe;
- Review and follow applicable provincial regulation.

8.25 Vehicles, Mobile Equipment and Machinery

All authorized vehicles required in a Hazardous Location are to be listed on the Work Permit and only allowed on a Work Site after the Permit is obtained. All unauthorized vehicles will park in the designated areas only and will under no circumstances be allowed on a Work Site.

- a) Internal combustion engines (gas or diesel) may not be operated in areas classified as hazardous by the Canadian Electrical Code unless atmosphere tests have been made that indicate that the work may be done safely. In particular, precautions should be taken within 2 metres of a wellhead and 3 metres of process equipment and buildings.

Procedures must be in place to ensure the continued safe performance of this “Hot Work”.

- b) Diesel engines that are to remain running within 25 metres of a potential gas release must be equipped with a positive air intake shut-off device unless continuous gas monitoring is in place.
- c) All vehicles on site must be in safe operating condition and operated in a safe and courteous manner.
- d) All mobile welding rigs must be equipped with proper fire extinguishers before entering the Work Site. All welders and helpers must know how and when to use such fire extinguishers.
- e) Where an Operator’s view of the direction of travel of powered mobile equipment is obstructed or restricted the equipment must be equipped with a warning device appropriate to the hazard. This could include an audible warning device, flashing lights, or an automatic stopping system.
- f) If it is impracticable to equip the powered mobile equipment with a warning device then the operator must ensure that the operator and other workers are protected from injury before moving the equipment by completing a visual inspection on foot of the area into which the equipment will move, following the directions of a traffic control or warning system, getting directions from a worker who has an unobstructed view of the area into which the equipment will move, or is stationed in a safe continuous view of the operator, ensuring all other workers are removed from the area into which the equipment will move.
- g) Any lawnmowers over 700 kg require engineered roll bars.
- h) No person shall operate any equipment or machinery unless the Operator has received the required training and is authorized to do so.
- i) Mobile equipment must have rollover structures, protective back up alarms and seat belts where required by safety regulations.

8.26 Wildlife Awareness

To ensure wildlife protection requirements are met, abide by the following:

- Plan and maintain sites in a manner that respects and preserves native wildlife to the greatest extent possible.
- Minimize disturbance to the native flora and fauna.
- Store potential food sources away from wildlife and in any animal resistant manner.
- Do not harass or feed wildlife in any way.
- Ensure all personnel are aware that with the exception of approved Wildlife Monitors, firearms are prohibited on work sites.

Understanding the basics of animal life will assist workers to remain safe and protected from animals. One of the primary ways to protect yourself from bears is avoidance. If you suspect bears are within your work area, it is best to the leave area. Scan the horizon on regular basis so you don't suddenly encounter a bear. If you sight a bear, report it to your supervisor immediately.

Bear Safety

- Make noise.
- Keep food and garbage triple sealed.
- Learn to identify bear signs like hair on trees, droppings, paw prints, etc.
- Take note of working in areas of berry bushes and water holes – extra vigilance is required.
- Do not use a walkman or personal stereo – must be able to hear all around.
- Carry a bear-scare device.

Other Wildlife concerns: cougar, moose, wolf, fox, coyotes, caribou, deer, ungulates, livestock, dogs, buffalo, etc.

8.27 Working Alone

Tangle Creek presently has various systems in place to control hazards associated with working alone or otherwise. These include Codes of Practice, standardized procedures, use of personal monitors and protective equipment, core safety training of staff, use of ticketed workers, task competency training, Emergency Response Plan training, and the ongoing casual and formal contact among workers during the day.

ROUTINE OPERATIONS WITH COMMUNICATIONS IN PLACE

Tangle Creek will ensure all operators working alone will be provided with an effective communication system consisting of radio communication, landline, cellular telephone communication or some other effective means of electronic communication that includes regular contact by Tangle Creek or a designate at intervals appropriate to the nature of the hazard associated with the operator's work.

If effective electronic communication is not practicable at a work site Tangle Creek will ensure that they or a designate visits the worker or the worker contacts Tangle Creek or a designate at intervals appropriate to the nature of the hazard associated with the workers work.

In areas where Tangle Creek has a contract operator who looks after another companies properties in the same area, Tangle Creek will maintain their call-out policy. Tangle Creek's approach will be to ensure good communication and concentrate on circumstances where the work location or timing reduces the ability to respond to an incident.

SPECIAL WORKING ALONE SITUATIONS

Special circumstances where the risks of working alone are increased would include such things as:

- Any task being completed in an area where communication is not reliable.
- Situations where workers work overtime or respond to call-outs and there is limited communication available.
- Travel into remote or other areas where the response time is significant in the event that worker does not check in at the end of the day.
- Travel in areas where incidental contact with other workers or the public is not likely to happen.
- Travel by snowmobile or all terrain vehicles increase the risk to the worker and possibly the communication system.

In these circumstances, a check-in procedure must be established that includes a set time interval before contact is made again. If contact is not made at the predetermined time, then the individual with whom contact was to be made, would attempt to make contact and failing that, initiate actions to locate the worker who failed to check in. This process must be documented – Safety Program Manual Section 8 Forms

8.28 Working Near Overhead Power Lines

Extreme caution must be used when working near Overhead Powerlines. Activities involving such things as high loads, excavation work, crane work or using gin-pole trucks, creates circumstances with the potential for injuries, fire and explosion or property damage. The following outlines requirements when working under or near powerlines and is consistent with both regulatory and utility company requirements.

The first two important steps that need to be taken are:

1. Notify the utility company and obtain any required crossing agreements;
2. Confirm the voltage and maintain the minimum clearance required by the power company

Typical clearances are:

Operating Voltage of Overhead Power Line Between Conductors	Safe Limit of Approach Distance for Persons and Equipment
0 – 750 V Insulated or polyethylene covered conductors (1)	300 mm
0 – 750 V Bare, uninsulated	1.0 m
Above 750 V Insulated conductors (1) (2)	1.0 m
750 V – 40 kV	3.0 m
69 kV, 72 kV	3.5 m
138 kV, 144 kV	4.0 m
230 kV, 260 kV	5.0 m
500 kV	7.0 m

9.0 CONCLUSION

Know the safety rules of your job and of your area. If you don't know how to do it safely, stop and find out. Tangle Creek Safety Program includes more detailed guidelines and information to assist with addressing safe operating requirements. If you have doubts concerning safe work place practices and procedures, consult a Tangle Creek Representative.

10.0 ACKNOWLEDGEMENT FORM INSTRUCTIONS

All Employees and Contractors on a Tangle Creek operated site must complete the HS&E Handbook Questionnaire and Acknowledgement Form found on the last four pages. The completed Questionnaire and Acknowledgement forms are to be returned to the designated Tangle Creek Supervisor.

NOTES

HS & E HANDBOOK REVIEW QUESTIONNAIRE

Name (please print): _____ Date: Company:

Tangle Creek is committed to protecting the health and safety of all workers on our sites. Part of this commitment is the expectation that all workers be familiar with and follow standard guidelines and procedures. The initial step to accomplish this is an orientation to our Health, Safety & Environment Handbook. This review checklist is intended to ensure that workers have the basic knowledge associated with the HS&E handbook.

Complete the following questions by either circling the correct answer or filling in the blank(s) if answers are not provided. It is acceptable to use the handbook to find the answers. Return the review checklist to your supervisor or **Tangle Creek** Representative.

- 1) Who is responsible for protecting the health and safety of people and preserving the quality of the environment:
 - a) employees
 - b) management
 - c) contractors
 - d) everyone

- 2) If asked to perform a task that you believe would put yourself or other workers at risk of injury you should:
 - a) carry on as usual
 - b) refuse to perform the task
 - c) be extra careful as you carry out the assigned task
 - d) ask someone else to do the job for you

- 3) What must you do if you refuse to perform a task because there is imminent danger:
 - a) leave the site immediately
 - b) go have coffee
 - c) notify the supervisor of your reasons
 - d) reconsider and carry on with the task

- 4) Which of the following shows the correct emergency response actions?
 - a) sound the alarm, protect equipment at all costs and then call for medical aid
 - b) get out, sound alarm, assess situation, assist others, call for medical aid, secure the area, and protect equipment only if it is safe to do so.
 - c) get out of the area and wait for someone to show up so you can tell them what happened
 - d) try to fix what went wrong so no one will find out about it.

- 5) You must present yourself for work:
 - a) physically fit
 - b) mentally fit
 - c) head and facial hair at a length that does not present a hazard
 - d) all of the above

- 6) Smoking is permitted:
- a) in designated areas only
 - b) where ever you want
 - c) outside of buildings only
 - d) beside vehicles only
- 7) You are not permitted to do which of the following at an “Tangle Creek ” work site:
- a) to be under the influence of or in possession of drugs or alcohol
 - b) to engage in practical jokes
 - c) harass other workers because of their race, sex, age or religion.
 - d) all of the above
- 8) It is the Contractor's responsibility to:
- a) provide all tools, safety equipment, proper clothing for their workers
 - b) enforce all policies and procedures outlined in the HSE handbook
 - c) take steps necessary to ensure the safety of your employees and sub-contractors
 - d) all of the above
- 9) Two items of PPE that must be worn at all times on “Tangle Creek ” locations are:
- a) face shields and leggings
 - b) hard hats and safety footwear
 - c) safety glasses and hearing protection
 - d) all of the above
- 10) At work sites where there is a possibility for hydrocarbon release, clothing requirements include:
- a) fire retardant clothing as the outside layer
 - b) natural fiber clothing such as wool or cotton as inner wear
 - c) nylon outerwear
 - d) both a & b
- 11) On any work site, before beginning any job or task:
- a) identify and document the hazards
 - b) identify and implement control measures for all the hazards
 - c) both a) and b)
 - d) ignore the low risk hazards
- 12) When entering a sour location, employees are to ensure that:
- a) H₂S monitoring equipment is turned on and used at all times while on location
 - b) communication equipment is in good working order
 - c) a breathing apparatus in working order and with an adequate supply of air must be available
 - d) all of the Above

13) A written fall protection plan must be in place before work commences on a task where there is a potential of a fall of more than:

- a) ½ metre
- b) 10 metres
- c) 20 metres
- d) 3 metres

14) A pre-job Safety Meeting is the expected manner of ensuring permit requirements are known and workers are aware of all activities, hazards and applicable work practices.

- a) true
- b) false

15) Before beginning any work at a “Tangle Creek ” location, you must determine if a work permit or work clearance is required.

- a) true
- b) false

16) A facility is considered sour at:

- a) 1 PPM H₂S or greater b) 10 PPM H₂S or greater
- c) 100 PPM H₂S or greater
- d) 1000 PPM H₂S or greater

17) How soon must an incident or event be reported to a “Tangle Creek” Supervisor?

- a) immediately
- b) as soon as practicable
- c) within a week
- d) at the end of the job

18) Good housekeeping is:

- a) only a minor issue
- b) good to do when you have the time
- c) mandatory

19) Before handling chemicals you should:

- a) review the MSDS sheet
- b) carefully breathe in the vapours to see if they are harmful
- c) make sure no one else is in the area
- d) move the chemicals outside

20) Driving incident are the leading cause of injury, fatalities and property damage in the oil and gas industry.

- a) true
- b) false

ACKNOWLEDGEMENT FORM

I, _____ hereby acknowledge and understand the Tangle Creek Health, Safety and Environment Handbook. I further acknowledge that I will comply with these safety requirements and ensure workers under my supervision understand the compliance requirements.

Signed _____

Print _____ Name

Company _____

Title _____

Date _____

Valid safety documentation, as applicable:

- WCB Coverage
- Liability Insurance
- H₂S Alive
- WHMIS
- TDG
- Standard First Aid

Other, ie: Wellsite Supervision, Ground Disturbance etc. (indicate below)

Tangle Creek Representative Acknowledgement

Signed _____

(Supervisor)

Print Name _____

IN CASE OF EMERGENCY

DON'T PANIC – BE CALM

If assistance is not available from a local Tangle Creek representative, help in responding to an emergency can be obtained by calling the following:

1-403-648-4900

(24 Hour Tangle Creek Emergency Call Down Number)

- 1. Give your name.**
- 2. Give your location.**
- 3. Give the nature of the emergency (fire, explosion or leak; number of workers involved; type of injury/injuries or other; please specify).**
- 4. Give the location of the emergency (site area, building or road)**
- 5. Ask if there are any instructions before hanging up.**

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