1.0 Purpose

1.1 To provide workers with the properties and characteristics of LNG so that work can be performed in a safe manner.
1.2 This SWP only applies to the Yukon Energy Whitehorse Gas Generating (WG0) facility.

2.0 LNG properties

2.1 Liquefied natural gas (LNG) is natural gas that is cooled to approx. -160°C (–260°F) to form a cryogenic liquid.
2.2 LNG is comprised of 4 main components:
   • **Methane; 83% - 99%**
   • Ethane; 1% -13%
   • Propane; 0.1% - 3%
   • Butane; 0.2% - 1%
2.3 LNG occupies 1/600th it’s volume in the liquid state.
2.4 LNG has an expansion rate of 600:1 (liquid to vapour).
2.5 LNG is odourless, colourless, non-corrosive, and non-toxic.
2.6 LNG is lighter than air.
2.7 LNG is not flammable in the liquid state.
2.8 LNG release results in evapouration and formation of a visible vapour cloud.
2.9 Ignition temperature for LNG vapour is approx. 537°C (1000°F).
2.10 Flame temperature of LNG vapour fire is approx. 1370°C (2500°F).
2.11 LNG vapour is non-toxic; but is an asphyxiate.
2.12 As LNG vapour concentrations rise, the lower flammable limit (LFL) of 5% (see section 3.0) will be reached long before the dangers of oxygen deprivations are present.
3.0 LNG flammability

3.1 LNG (in the liquid state) is not flammable.

3.2 LNG vapour is flammable when mixed with air. The flammable range for LNG is 5%; lower flammable limit (LFL) to 15%; upper flammable limit (UFL).

3.3 Keep ignition sources away from LNG and LNG vapour.

4.0 LNG hazards & release

4.1 Potential hazards –
- Contact with LNG
- Contact with LNG equipment/piping; cold surfaces
- LNG (vapour) release
- High pressure

Potential injuries or damage -
- (Cold) burns and frostbite.
- Skin adhesion and frostbite.
- Breathing discomfort; frostbite; asphyxiation.
- Fire or explosion.
- Bodily injury

4.2 When LNG is released on land or water, it vapourizes quickly and leaves no residue.

4.3 A release to land or water will result in a visible vapour cloud.

4.4 LNG evaporates 5 times faster on water.

4.5 Vapour cloud size and shape depend on wind speed.
4.6 Hazard control

4.6.1 Primary Containment – Accomplished by employing good engineering practices and using suitable materials for storage tanks.

4.6.2 Secondary Containment – Use of containment area that is designed to exceed the volume of a single storage tank.

4.6.3 Safeguard Systems – Minimize the uncontrolled release of LNG and mitigate the effects of a release.

4.6.4 Separation – LNG facility located a safe distance from industrial sites, communities and other public areas.

4.6.5 These 4 conditions, combined with adequate PPE, industry standards and guidelines, good engineering practices, and regulatory compliance are vital to maintain strong LNG industry safety performance.

5.0 Reference documents

- YEC SWP-100; LNG – General Site Rules
- YEC SWP-103; LNG – Personal Protective Equipment
- YEC SWP-107; LNG – First Aid Measures
- YEC Whitehorse Spill Response Plan
- FortisBC LNG SDS
- NFPA 59-A; Production, Storage, and Handling of Liquefied Natural Gas (LNG)
- CSA Z276-13; Liquefied natural gas (LNG) - Production, storage, and handling