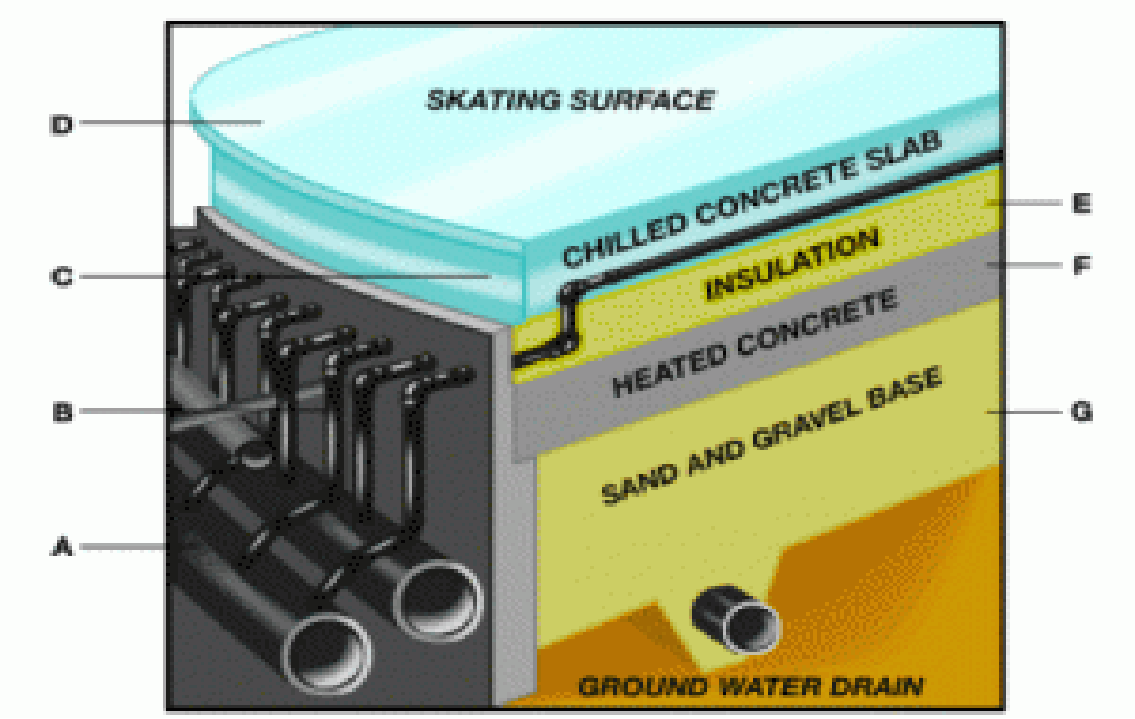
VILLAGE OF FRASER LAKE
AMMONIA USE AT THE CH FOOTE MEMORIAL ARENA:

Fact Sheet:

Facilities equipped with ammonia refrigeration systems are safe when properly designed and when their safety is assured by an operational security program.

Typically, 8 km (5 miles) of steel pipe wind under the concrete slab in the arena (A). These pipes remove heat from the concrete slab (C). Refrigeration chiller equipment cools brine water to -9°C (16°F) and provides cooling. The brine water's chemical properties keep it from freezing. To freeze the rink surface, the refrigeration system pumps chilled brine water through the pipes (B) embedded in the ice-bearing concrete slab (C). The ice-bearing slab sits between the skating surface (D) and a layer of insulation (E), which allows the ice to expand and contract as temperatures and time demand. The brine water helps maintain the ice-bearing slab's temperature just below 0°C (32°F) so that the water spread onto it can freeze. Beneath the layer of insulation, a heated concrete layer (F) keeps the ground below the rink from freezing and expanding; eliminating the potential for heaving and potential damage to the rink structure. The entire ice rink sits on a base layer of gravel and sand (G) which is equipped with a groundwater drain at the bottom. To defrost the skating surface, the brine water is heated and pumped through the ice-bearing concrete slab. This heats the under-layer of the ice, making it easier to break up and remove with front-end loaders.



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CH Foote Memorial arena has used an ammonia refrigeration plant to cool the Arena ice facility for many years. Upgrades to our cooling systems have incorporated the Curling Rink surface as well. The upgrade eliminated the potential Halocarbons and carbon dioxide from Freon that has fallen out of favour, in part, because of Freon's negative effect on the ozone layer.

Ammonia systems are safe when properly operated within their designed capabilities. Assurances for the facilities safe operation are monitored in part by Annual inspections from the Boiler Inspection branch and WorkSafeBC. Certified operators are required to keep a daily log of all operations so repairs can be made immediately as required.

Recent upgrades and facts about the Ammonia Refrigeration Plant.

- The facility stores approx. 45.5 Kg of liquid ammonia on-site and has a 180Kg capacity of operational refrigerant.
- Restricted access and an ammonia alarm system helps to ensure safety protocols are strictly followed.
- Ammonia levels are constantly monitored. A low or high-level leak is identified by a system that alerts the appropriate personnel.
- Ventilation from the sealed room is piped outside through a vent that exhausts 50 feet above ground. Ammonia is lighter than air, so any leak would dissipate into the air above 50 feet.
- The chiller, piping, ventilation, in floor heating/cooling to arena and ammonia alarms were replaced in 2008.
- New piping and monitoring to the Curling Rink Floor – 2015.
- Bump testing with a handheld ammonia detector and recording for operators – 2017.
- Upgraded Emergency Response Plans and Training for employees- 2017.
- Upgraded the Guard on the Plant Compressors – 2017.
- An upgraded three stage alarm system for inside of building has been installed to include flashing blue lights to alert the public of ammonia leaks. January 2018.
- WorkSafeBC inspection to insure preventive safety measures are appropriately working and in place.
- Ongoing monitoring of ammonia refrigeration plant and safety equipment by Certified Operators.
- Compliance reporting with Safety Authority and WorkSafeBC prevention Officers
- Use of qualified contractors to conduct and record annual maintenance and inspection of our Ammonia Refrigeration Plant and equipment.

An extensive preventative and routine maintenance Program is in place as part of the Refrigeration Maintenance Plan, which was most recently reviewed and updated in December 2017 to meet new safety requirements.

Regulation:

- Technical Safety BC (formerly BC Safety Authority) and WorkSafeBC regulate ammonia use in ice arenas in British Columbia. The Village of Fraser Lake system complies with both regulators.

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- WorkSafeBC's most recent reviewed of the Village of Fraser Lake's safety program and procedures was last reviewed in December 2017.

Staff Training:

- Qualified recreation facility maintenance staff complete safety training
- A qualified contractor (YETI Refrigeration) provides certified on-site training annually.
- Formal evacuation training with the Fraser Lake Fire Department will be implemented annually.

Vern Hilman
Director of Public Works
Village of Fraser Lake