

August 2021

## AMMONIA REFRIGERATION SYSTEM SECONDARY COOLANT ANALYSIS

Information Paper IP-BPV-2021-08-01

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## 1. SCOPE

This document is applicable to all **Ammonia** refrigeration systems that are subject to *The Boiler and Pressure Vessel Regulations* and employ a secondary coolant in their evaporator or condenser or any other part of the system as a means of transferring heat.

## 2. DEFINITION

Secondary coolant is defined as: any slurry used for the transmission of heat without a change of state to vapour, sometimes referred to as brine.

Examples of a secondary coolant include, but are not limited to:

- Non-refrigerant side of indirect cooling systems
- Non-refrigerant side of fluid-cooled condensers
- Non-refrigerant side of heat reclaim systems
- Any similar application of similar nature

## 3. NOT WITHIN THE SCOPE OF THIS PAPER

This paper does not apply to any refrigeration system that does not utilize Ammonia as a refrigerant.

## 4. BACKGROUND

The purpose of this paper is to reduce the risk of injury to people and damage to property as a result of an accidental leak from a refrigeration system, specifically the systems utilizing Ammonia as the refrigerant. Accidental Ammonia leaks, from any pressurized system, have the potential to cause injury or even death to any person in the immediate vicinity and surrounding area.

It is important that the secondary coolant (brine) in an indirect Ammonia system be tested periodically for the presence of Ammonia. The presence of Ammonia in the secondary coolant is an indication that there may be an internal leak in the heat exchanger (e.g., chiller) from the Ammonia refrigerant side to the secondary coolant side of the heat exchanger.

It is critical that any indication of an Ammonia leak is detected at the earliest possible opportunity and that corrective action is taken immediately.

## 5. SECONDARY COOLANT ANALYSIS REQUIREMENTS

In addition to the existing requirements under The Boiler and Pressure Vessel Regulations, and all adopted codes, the owner of a refrigeration plant covered within the scope of this Information Paper must comply with the following requirements:

### 5.1. Monitoring

The owner of an Ammonia refrigeration system shall, no less than twice per year, conduct an analysis of the secondary coolant for the purpose of:

- Meeting the requirements of CSA B52, Paragraph 8.4.2 (j)
- Monitoring Ammonia levels in the secondary coolant
- Monitoring corrosion inhibitor in the secondary coolant
- Monitoring Iron content in the secondary coolant (visible and dissolved)

### 5.2. *Testing Method*

The testing method utilized should be appropriate for the type of secondary coolant in use and be capable of detecting the presence of Ammonia in the secondary coolant in parts per million (ppm). The report of the test results shall specify the method and testing standard used and report the value of Ammonia concentration in ppm. The testing method must be an industry accepted method.

### 5.3. *Ammonia Testing*

If Ammonia is detected in the secondary coolant or there is a change to the residual level, the condition must be reported to TSASK as soon as possible. The report should be submitted via email to [info@tsask.ca](mailto:info@tsask.ca) or mail to the address above in the header.

### 5.4. *Records*

All secondary coolant analysis records, regardless of test results, must be retained and made available to TSASK upon request.

### 5.5. *Additional Requirements*

In addition to testing the secondary coolant for the presence of Ammonia, the owner shall also monitor and ensure there are no other indications of Ammonia leaking into the secondary coolant. Some examples of other possible indicators include but are not limited to: unexpected increase in pressure of the secondary coolant system beyond the normal operating range, or detection of a leak during pressure testing of the heat exchanger.

The owner shall take immediate action to correct any Ammonia leak that is detected in the refrigeration system and take necessary steps to prevent the reoccurrence of an Ammonia leak. This includes shutting the refrigeration system down if necessary.

The owner shall comply with an inspector's request to conduct additional testing of a secondary coolant at any time.

## 6. RESOURCES

- To report an incident please visit: <https://www.tsask.ca/>
- Fernie BC accident report: [https://www.technicalsaftybc.ca/sites/default/files/2018-07/FaultTrees/TSBC\\_257671\\_InvestigationReport\\_v14\\_online.pdf](https://www.technicalsaftybc.ca/sites/default/files/2018-07/FaultTrees/TSBC_257671_InvestigationReport_v14_online.pdf)
- TSBC Ammonia Awareness course (no cost): <https://www.technicalsaftybc.ca/ammonia-safety-awareness-program>

## 7. REFERENCES

TSBC Safety Order No: SO-BP 2021-01

## 8. QUESTIONS REGARDING THIS INFORMATION PAPER OR YOUR SECONDARY COOLANT ANALYSIS REPORT

For additional information or if there are any further questions or concerns, please contact TSASK:

- Email: [info@tsask.ca](mailto:info@tsask.ca)
- Phone: 866-530-8599. Please ask to speak to the Manager, Boiler and Pressure Vessel Safety Services; or
- Visit the TSASK website at [www.tsask.ca](http://www.tsask.ca) for more information.