

City of Coquitlam

Anhydrous Ammonia Exposure Control Plan

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Anhydrous Ammonia Exposure Control Plan

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1.0 DEFINITIONS

Anhydrous Ammonia	Ammonia gas that has been compressed into a pure liquefied form for use in refrigeration systems.
Cartridge	A filter used in conjunction with a full face respirator that can be used by workers involved in ammonia plant maintenance or entry when ammonia concentration is greater than 0ppm and less than 300ppm.
Controlled Leak	A release of gas which occurs while maintenance work is being done where the source of the release is immediately known and can be quickly remedied or corrected.
IDLH	Immediately Dangerous to Life and Health.
NH₃	The chemical formula for ammonia.
PPM	Parts Per Million.
PPE	Personal Protective Equipment (boots, gloves, respirator, glasses, etc.)
Qualified Personnel	Personnel knowledgeable of the work, the hazards involved and the means to control the hazards by reason of education, training, experience or a combination thereof.
Uncontrolled Leak	A release of gas where the immediate cause of the leak is unknown, or when maintenance work is being done a release of gas occurs of a nature that cannot be quickly remedied, corrected, or controlled.
WHMIS	Workplace Hazardous Materials Information System.

2.0 SCOPE

This Ammonia program forms part of the City of Coquitlam's Health and Safety Program and complies with the requirements of WorkSafeBC and the Occupational Health and Safety Regulations (OHSR). This program is specifically designed to be used at the Poirier Sports & Leisure Complex which is the location of the city's curling and ice rinks:

The purpose of this Program is to satisfy the OHSR regarding toxic process gasses (Sections 6.116 – 6.132) and also satisfy the requirements of an exposure control plan detailed in section 5.54 of the OHSR. Compliance with these regulations will enable The City of Coquitlam to protect employees from the potential hazards of working with or around anhydrous ammonia.

3.0 HEALTH AND SAFETY STATEMENT AND PURPOSE

The City of Coquitlam is committed to providing a healthy and safe working environment for all of its employees. To achieve this goal, the City demonstrates a strong commitment to safety by making it a priority in all of the City's daily operations.

The success of the City's Health and Safety Program is based on the equal commitment of management and employees. This can be accomplished through awareness, leadership, cooperation and participation. To this end, the City strongly supports the Joint Health and Safety Committee and invites input from all employees regarding workplace safety.

4.0 RESPONSIBILITIES

4.1 GENERAL RESPONSIBILITIES

Employer	Will review this program on a regular basis and ensure it is implemented and remains compliant.
Supervisor	Will ensure all workers are trained, have appropriate personal protective equipment (PPE) and comply with these procedures.
Worker	Is responsible to follow all procedures, maintain their PPE and wear it according to procedures.

4.2 EVACUATION ROLES & RESPONSIBILITIES

Arena Maintenance Supervisor / Arena Maintenance Worker / Arena and Building Service Worker

These are workers who have received formal ammonia training and are primarily responsible for responding to alarms. At least two qualified and properly trained workers must respond to alarms and perform these roles during an **EMERGENCY**:

- Respond to alarm and follow procedures for leak investigation.
- When ammonia concentration exceeds 300 ppm, contact Coquitlam Fire Department (CFD), other Emergency Response Agencies (Fraser Valley Refrigeration, Brenntag) and the front desk receptionist (during business hours).
- Determine direction of wind and whether or not mustering station needs to be moved (It must be upwind of the ammonia storage room).

- Liaise with CFD and city management reps as they arrive and debrief on situation. If possible, provide a floor plan of the facility.
- Perform any roles that the CFD asks of you and await the decision on re-entry or facility closure.
- The Arena Maintenance worker must attempt to contact the Arena Maintenance Supervisor before ordering an evacuation during times when the general public is in the building.

Front Desk Reception

During Business hours, the receptionist at the front desk of the Poirier Sports & Leisure Complex will be contacted by the Arena Maintenance Supervisor/ Worker with the news of a pending evacuation. The receptionist will then perform the following tasks:

- Contact a Facility Supervisor to coordinate the evacuation.
- Call 911 and request the presence of the Coquitlam Fire Department if they haven't already been called.
- Pull the nearest pull station if the alarm has not yet been deployed.
- Contact the City of Coquitlam staff members on the emergency call list.
- Follow the directions of the facility manager coordinating the evacuation.
- Evacuate to the Muster Station when tasks are completed.

Facilities Supervisor

One of nine Supervisors for the Sports & Leisure Complex that will be called upon to coordinate a full or partial building evacuation during business hours, with duties including:

- Assignment of building areas to staff for sweeping and evacuation.
- Recording of any injured, disabled persons located in stairwells or areas of refuge.
- Ensuring consistent messaging to public both indoors and at the muster station.
- Report any missing, or injured/disabled persons to the Coquitlam Fire Department (CFD).

Facility Operations Manager

The Facility Operations Manager will be notified of any facility evacuation and will arrive on site to perform the following roles:

- Ensure that the facility is secure and not permit workers or members of the public to re-enter the facility unless it is deemed safe to do so by the CFD.
- Supervise the clean-up.
- Arrange assistance and first aid for workers if required.
- Ensure that the incident is reported immediately to the Occupational Health & Safety Advisor and Senior Management.
- Conduct an incident investigation and report findings.
- Respond to any media requests

Coquitlam Fire Department (CFD)

During the incident, CFD will:

- Respond and upon arrival, the CFD is in charge of the scene and all staff members and managers. Everyone will report to and follow the directions of the CFD.
- CFD will leave the scene with a responsible person, will not participate in clean-up of the incident and will not participate in cleanup of hazardous materials in particular. If required, the hazardous waste clean-up contractor should be contacted by the Facility Operations Manager.

5.0 RISK IDENTIFICATION & ASSESSMENT

The following job descriptions have been identified as having risk of exposure to ammonia in excess of 50% of the established exposure limit:

- Arena Maintenance Supervisor
- Arena Maintenance Worker
- Arena and Building Service Worker

The previously mentioned job descriptions were assessed by the Safety and Training Coordinator and some were found to have moderate and high risk levels. Controls were administered to mitigate the risks and bring the hazard level down to a low and acceptable level. Table 1 (below) represents the summary of a post-control hazard assessment for the job descriptions identified above. Controls used to mitigate the risks of exposure can be found throughout this document.

These controls include but are not limited to:

- Construction of ammonia plant and sealed shafts containing ammonia lines
- Alarm system that constantly monitors ammonia concentration
- Worker education & training
- Written safe work procedures for ammonia plant tasks
- Emergency facilities and first aid availability
- Use of personal protective equipment
- Emergency response & evacuation procedures
- Incident Investigation and Exposure Control Plan review

Table 1: Post Control Hazard Assessment (1=Lowest; 8=Highest)

Job Description	Hazard Scores (1-8)			Risk Level
	Probability of an incident	Frequency of Exposure	Severity	
Arena Maintenance Supervisor	3	5	3	(45) Low
Arena Maintenance Worker	3	6	3	(54) Low
Arena and Building Service Worker	3	6	3	(54) Low

6.0 AMMONIA PROPERTIES / HAZARDS

6.1 AMMONIA – WHAT IS IT?

Ammonia is a colorless gas made up of Hydrogen and Nitrogen ions (NH₃). It can easily be turned into a liquid through a cooling process or when placed under pressure.

Several characteristics of ammonia include:

- Extremely reactive with strong oxidizers such as chlorine, bromine, iodine, calcium, gold, mercury, silver and hypochlorite bleach. The mixture would be explosive in nature.
- Very irritating to the eyes, nose and other parts of the respiratory tract which makes it easy to detect at low concentrations in the air.
- Although ammonia itself has a low fire rating, the presence of oil or other combustibles increases its fire rating.
- Ammonia gas is lighter than air, so it tends to collect in higher areas like ceilings.
- Ammonia is corrosive and can cause chemical burns all over the body. It also corrodes most alloys, rubbers and plastics.

For more information on the characteristics and chemical properties of anhydrous ammonia, refer to its Safety Data Sheet (SDS), in the appendices of this document.

6.2 EXPOSURE LIMITS AND HEALTH EFFECTS

Table 2: Ammonia Exposure Limits

Exposure Limit (parts per million)	Description of Exposure Limit
25 ppm	Maximum allowable concentration averaged over an 8 hour period
35 ppm	Maximum allowable short-term (15 minutes) exposure limit
300 ppm or more	Immediately dangerous to life and health (IDLH) concentration. The concentration at which a person without appropriate respiratory protection could be fatally injured or could suffer irreversible or incapacitating health effects.

Table 3: Toxic Effects of Ammonia

Ammonia Concentration (parts per million)	Effect
2 to 55 ppm	Range of odor threshold *
70 ppm	Stinging or burning of eyes, nose and throat; headache, watering eyes, sneezing, coughing
300 ppm	Severe irritation of eyes, nose and respiratory tract; difficulty breathing, possible burning in lungs (IDLH level)
2000 ppm or more	Can be fatal after a few breaths

**Note: This does not apply to workers who routinely work with ammonia, as they are often desensitized to the smell of ammonia and are unable to detect it.*

7.0 EDUCATION & TRAINING

7.1 WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS)

A WHMIS Program ensures that those who work near ammonia are trained in the general hazards of chemicals and know how to obtain the necessary information to safely manage chemicals that they may encounter in the workplace. A competency test on the topics covered in the WHMIS training is administered to all participants.

7.2 QUALIFIED PERSONNEL TRAINING

A reference to “qualified personnel” is made throughout this document with regards to City of Coquitlam staff that are permitted to enter the ammonia plant and perform routine maintenance on the ice refrigeration system. The following job descriptions are considered to be qualified personnel, providing that they have completed the training in Table 4 below:

- Arena Maintenance Supervisor (*Minimum: Refrigeration Operators' Certificate**)
- Arena Maintenance Worker (*Minimum: Refrigeration Operators' Certificate*)
- Arena and Building Service Worker (*Minimum: Ice Facility Operator Certificate*)
- Employee with Refrigeration Safety Awareness Officer Certification – Limited access and responsibility. Primary role is to initiate emergency response procedures if necessary during the period of time when no individual with an Ice Facility Operator Certificate or Refrigeration Operators' Certificate is on site.

All above certifications have an expiration date of two years. Any individual with an expired ticket will be deemed unqualified.

**Note: Refrigeration Operators' Certificate is formally known as Class 5 Engineer.*

Table 4: Training

Training Topic	Frequency	Course Facilitator
Ammonia Exposure Control Plan	Annual	Facilities Management Coordinator/Supervisor
Respiratory Protection & Fit Testing	Annual	Safety and Training Coordinator

8.0 ICE REFRIGERATION SYSTEM / AMMONIA PLANT

8.1 AMMONIA STORAGE

Three thousand pounds of liquefied ammonia is stored inside the plant in sealed storage tanks. The refrigeration system is a closed system that continuously uses and reuses the ammonia inside the tanks. Staff are not required to add or remove ammonia at any time. Any correction to ammonia levels is not routine and will be performed by either Brenntag, or Fraser Valley Refrigeration personnel.

Key points regarding ammonia storage include:

- Never apply heat to ammonia storage tanks or valves as rupture could occur
- The temperature of storage containers must never reach 50 degrees Celsius.
- Do not store bleach anywhere inside the ammonia plant
- Do not block access to emergency equipment and doors in the storage area

For more information regarding the storage of ammonia, refer to Ammonia in Refrigeration Systems, WorkSafeBC, 2006 edition.

8.2 AMMONIA ALARMS

The following are characteristics of the ammonia alarms located at the Poirier Sports & Leisure Complex:

- A **visible and digitally displayed** alarm located immediately outside of the ammonia plant room activates when the ammonia concentration in the ammonia room reaches 25 ppm (low alarm). The display flashes and a strobe light is activated
- An **audible, visible and digitally displayed** alarm activates when the ammonia concentration in the ammonia plant room reaches 300 ppm (high alarm). Audible alarms can be heard inside and outside of the ammonia plant, while the display located immediately outside of the ammonia plant visually flashes and a strobe light is activated.
- In addition to these on site indicators of an alarm, an emergency email is automatically sent out to the following people when a high alarm is triggered:
 - Arena Maintenance Supervisor
 - Facility Management Coordinators
 - Facility Operations Manager

The alarm systems is calibrated annually (minimum) and tested monthly, as outlined in the manufacturer's instructions.

8.3 ALARM RESPONSE

Only Qualified Personnel are to respond to ammonia alarms. If a possible ammonia leak is indicated on the ammonia gauge (concentration higher than 1ppm) and the indicated level is below 300 ppm, qualified personnel are to follow the detailed leak control procedure (Alarm / Leak Response & Investigation) in the Appendices of this document (a copy is also placed near the

ammonia plant entry door). If the ammonia concentration on the alarm monitor is above 300 ppm, commence Evacuation Procedures which can be found in the Ammonia Leak Response flow chart in the Appendices of this document (a copy will also be kept beside the ammonia concentration gauge). **If a high alarm or a system shutdown is required, all qualified and affected personnel must be notified.**

8.4 WORKING ALONE

There must be a check in system to ensure the continued well-being of workers who are working alone or isolated. Entry of the ammonia room during an alarm state (concentration is between 25ppm –299ppm), or entry to drain the ammonia oil pots is only permitted with a minimum of 2 staff members involved, with one person being a standby to call for assistance if necessary. Entry to the ammonia room in a non-alarm state (less than 25ppm) and not for the purpose of draining the oil pots or investigating a leak requires the entrant to inform a co-worker of the estimated duration of the entry and subsequent contact with that co-worker upon exit.

In the event that the co-worker is not contacted within the given time frame, the co-worker will investigate and contact the appropriate emergency response agencies if necessary.

In situations where a co-worker is not available, workers must follow the procedures outlined in the City of Coquitlam Working Alone Program.

9.0 PERSONAL PROTECTIVE EQUIPMENT

9.1 RESPIRATOR

A full face dual canister air purifying respirator is required when ammonia concentrations are greater than 0ppm. The full face respirator must be equipped with gas cartridges that protect the worker against ammonia exposure. The worker must be clean shaven while wearing a respirator and been fit tested within the last year. Workers shall follow the procedures that they have been trained on regarding respirator use and care.

When respirator cartridges are removed from their packaging, they must be labeled with the date of opening. The cartridges are to be disposed of and replaced at a minimum of every three months, pending the usage frequency and ammonia exposure concentration. If at any time the user finds the cartridges cause difficulty in breathing (i.e. clogged), or smells the chemical through the respirator, the cartridges must be disposed of immediately.

If the concentration is at 0ppm, workers may enter the plant without donning a respirator. If the concentration is above 300ppm, workers are **not** to enter the plant.

9.2 HAND / FOOT / BODY PROTECTION

Due to the corrosive effects of ammonia it is necessary during some tasks to cover up skin that may be exposed. This may include boots, gloves and coveralls. The individual Safe Work Procedures in this document will outline the protection required for each task. It is important to

note, that clothes must not be contaminated with grease, lubricants or cleaners as they can react violently with ammonia gas causing severe burns.

9.3 EYE PROTECTION

When eye protection is required for certain tasks (see Safe Work Procedures), it will be achieved with the use of the full face respirator. It is very important that contact lenses are **not** worn whenever entering or working in the ammonia plant.

10.0 EMERGENCY RESPONSE

10.1 EMERGENCY CONTACT LIST

A list of emergency contact numbers for qualified ammonia plant entrants, managers and other key personnel will be kept current. The list will be provided to City of Coquitlam arena staff, Health & Safety Manager and Safety & Training Coordinator. It will be posted in prominent locations as a resource for staff on site.

In an emergency event, the following people must be called immediately:

- **Coquitlam Fire Department** - 911
- **Arena Maintenance Supervisor** – 604-927-6036
- **Facilities Management Coordinator** – 604-927-6063
- **Facility Operations Manager** – 604-927-6055
- **Health and Safety Manager** – 604-927-3068
- **Safety Authority** – 1-866-566-7233
- **Fraser Valley Refrigeration** – 604-835-9825

10.2 EMERGENCY EQUIPMENT AND FIRST AID KITS

The Poirier Sports & Leisure Complex has an emergency shower and eye wash station inside the pre-entry room. The shower/eyewash has been plumbed with tempered water to avoid the increased severity of exposures that cold water can cause.

First aid kits are available at several locations in the complex.

10.3 AMMONIA LEAK EMERGENCY

An ammonia leak is considered an emergency when the concentration in the ammonia plant reaches 300ppm. As previously stated, the audible alarm will engage when the ammonia concentration reaches 300ppm. Qualified personnel are to be contacted immediately to address the situation.

Important Notes:

- **DO NOT open the doors leading from the pre-entry room to the skating rink lobby.**
- **DO NOT attempt rescue of any employees / members of the public that are unconscious in ammonia contaminated area. The Coquitlam Fire Department (CFD) will handle this.**

Key Evacuation Steps:

1. Call 911, advise that there is an ammonia leak at the facility, provide the address and ask for Coquitlam Fire Department (CFD) to respond.
2. **(OMIT if outside business hours)** Contact the front desk and let them know of the emergency and that an evacuation needs to occur. Front desk will contact a facility supervisor to lead the evacuation and safely remove all public from the building.
3. Call the Facility Operations Manager and provide information on the emergency and the names of the other staff members called.
4. The facility supervisor will utilize staff on site to facilitate the building evacuation during business hours ensuring that the following tasks are accomplished:
 - a. Lifeguard staff clear pools and change rooms
 - b. Arena staff clear all ice surfaces and change rooms
 - c. All other public areas are evacuated by designated facility staff
 - d. All staff not involved in facilitating the evacuation will remove themselves from the building and assemble at the muster station
5. During non-business hours, whomever discovers the leak must ensure that any other workers leave the building immediately
6. Determine the direction of the wind ASAP and if the muster/marshalling station is downwind of the ammonia room, then a new location upwind of the ammonia room for mustering must be chosen.
7. Await arrival of CFD and City management representatives. Any information about the leak and the site should be passed along to the CFD.
8. The CFD will determine when it is safe to allow re-entry into the building.

11.0 FIRST AID & HEALTH MONITORING

Artificial Respiration and CPR are only to be administered by trained personnel.

11.1 INHALATION TREATMENT

Ensure that the concentration in the ammonia room is below 300ppm and you are wearing your full face respirator. Move victim to fresh air. Give artificial respiration **ONLY** if breathing has stopped. Give CPR if there is no breathing and no pulse. Oxygen to be administered by trained personnel. **Obtain medical attention immediately.**

11.2 EYE CONTACT TREATMENT

If liquid or gaseous ammonia contacts the eyes, the employee needs to be removed from the contaminated area and continuously flush eyes with tempered water for 20 minutes. The eye wash station is located directly outside of the ammonia room in the pre-entry room. Ensure that the eyes are held open and there is direct contact between the water and eyes.

11.3 SKIN CONTACT TREATMENT

Liquid ammonia causes the moisture in the skin to freeze (almost instantly with higher concentrations). Skin should be continually flushed with tempered water. If a large area has been

exposed, do not remove clothing until you have thoroughly rinsed in the emergency shower. After rinsing, remove any contaminated clothing and obtain medical attention.

11.4 HEALTH MONITORING

WorkSafeBC and OSHA currently have no requirements for medical surveillance of ammonia exposure. Medical surveillance is intended to protect workers from developing occupational disease by detecting early biological indicators or adverse health effects at an early stage.

The effects of ammonia on humans are largely acute and victims of ammonia exposure in excess of exposure limits will often feel the effects immediately. Workers who may be exposed to levels of ammonia in excess of exposure limits are trained to seek medical aid following exposures, regardless of route of entry.

12.0 RECORD KEEPING & INVESTIGATION

12.1 RECORD KEEPING

Proper activity logbooks will be maintained regarding any ammonia issues. Detailed information will be entered into the logbook for any release large enough to set off the low ammonia alarm (greater than 25 ppm). Investigations are conducted for any release large enough to set off the high ammonia alarm (greater than 300ppm) and or if an evacuation is performed. See the section below for information on ammonia release reporting requirements. Any outstanding maintenance or supplier issues must be noted in the log book and receive follow up promptly.

12.2 INVESTIGATION & REPORTING

An 'incident' is an accident or other occurrence which resulted in or had the potential for causing an injury or occupational disease. If enough ammonia is released to set off the high alarm, the City of Coquitlam must conduct an investigation to discover the cause(s) of the incident. The investigation must also examine measures that will prevent similar incidents in the future. The City of Coquitlam must forward copies of the investigation report to the Health and Safety Committee.

Note: The City of Coquitlam must immediately notify WorkSafeBC of any major release of a toxic substance.

A major release of ammonia includes:

- A leak or spill resulting in at least one person receiving professional medical attention; or
- A leak or spill resulting in at least three people receiving first aid.

13.0 SAFE WORK PROCEDURES

High hazard job tasks require detailed safe work procedures to be developed and made available for staff performing these tasks. The following tasks have safe work procedures found in this document:

- 13.1 – Ammonia Plant Entry
- 13.2 – Draining Ammonia Plant Oil Pots
- 13.3 – Alarm / Leak Response & Investigation
- 13.4 – Emergency Plant Shut down
- 13.5 – Critical Emergency Components of Ammonia Plant

13.1 SAFE WORK PROCEDURE - AMMONIA PLANT ENTRY**PURPOSE**

The purpose of this Safe Work Procedure is to establish a consistent method for entering the Ammonia Plant which is also compliant with all applicable regulations and standards. Health & Safety of Ammonia Plant entrants is of the utmost importance and is the basis for the following procedure.

SCOPE

These procedures are applicable to all Ammonia Plant Entrants and are enforceable when the ammonia plant is in operation. This group includes, but is not limited to the following occupations:

- | | | |
|--------------------------------------|---------------------------------|----------------------------|
| - Arena Maintenance Workers | - Arena Maintenance Supervisor | - Electricians |
| - Arena and Building Service Workers | - Safety & Training Coordinator | - Contractors / Inspectors |
| | - Coquitlam Fire Department | |

Entry Requirements: Entrants **must** possess one of the following:

- Class 4 Power Engineering Certificate
- Refrigeration Operator's Certificate
- Ice Facility Operator's Certificate

Anyone without any one of the above certification must be accompanied by someone with this classification at all times.

PROCEDURES

1. Ensure that you satisfy the above entry requirements and are not wearing contact lenses.
2. Let your Supervisor, or Co-worker know that you are entering the Ammonia Plant.
3. View the ammonia concentration gauge located to the left of the door in the pre-entry room and ensure that the reading is less than 300ppm. **NO ENTRY WHEN LEVELS ARE ABOVE 300ppm.**
4. If the reading is at 0 ppm, an escape respirator (bite block respirator) must be obtained before entry.
5. If the reading is greater than 0ppm, obtain your personal full face respirator. You must have been fit tested within the last year and have no facial hair where the respirator seals against the skin of your face. Escape respirators may not be used in this circumstance.
6. Respirators are to be carried with you at all times and are to be put on when:
 - Concentration are greater than 0ppm
 - An audible / visual alarm is observed while in the Ammonia Plant (after respirator is donned, immediately evacuate the ammonia plant)
 - Minor fluctuations in ammonia concentration are being investigated
 - The strong smell of ammonia is encountered
7. Complete your work / plant logs, then inform your Supervisor or co-worker upon plant exit.

****NOTE - If the audible alarms engage at any point while in the ammonia room, this signifies that the concentration level has reached or surpassed 300 ppm and the plant needs to be evacuated. Once you have evacuated to the pre-entry room, review the ammonia concentration gauge and perform the required action(s) for the displayed concentration.**

13.2 SAFE WORK PROCEDURE – DRAINING AMMONIA PLANT OIL POTS**PURPOSE**

The purpose of this Safe Work Procedure is to establish a consistent method for draining the ammonia room oil pots. When draining the oil pots workers are exposed to levels of ammonia which may exceed 35ppm. This procedure needs to be followed to ensure that workers are protected from these elevated concentrations of ammonia.

SCOPE

These procedures are applicable to all Arena Maintenance Workers / Supervisors and Arena Building Service Workers (when supervised).

PROCEDURES

1. This task requires an additional person to accompany you into the ammonia plant. This person may place themselves anywhere between you and the exit door but must remain within sight and at a distance where conversation can take place.
2. Ensure that you meet the requirements for entry into the Ammonia Plant before entering.
3. Obtain an oil pot draining bucket from the storage room.
4. View the ammonia concentration gauge located to the left of the door in the pre-entry room and ensure that its reading is less than 300ppm. **NO ENTRY WHEN LEVELS ARE ABOVE 300ppm.**
5. Put on your butyl gloves and full face respirator. Perform a positive and negative pressure check to ensure the respirator has made a good seal with your face.
6. Turn the ventilation fan to a “HIGH” setting before entering the ammonia room.
7. Once in the ammonia room, let your partner know where you would like him to be.
8. Turn off the associated brine pump. Place the draining bucket beneath the chiller pot red needle valve and turn the valve in a counter-clockwise direction to open.
9. Use the dead man’s switch / valve on the oil pot to begin releasing the mixture into the bucket.
10. Drain the mixture slowly until spitting occurs (this signals that draining is complete) and then release the dead man switch.
11. Tighten up the needle valve by turning it in a clockwise direction, being careful not to spill any of the mixture. Allow oil to settle and record the amount of liquid drained.
12. After sealing bucket, transport the filled bucket to the storage room accessible from the outside on the North side of the building. Do not take off your Personal Protective Equipment until the transport procedure is complete.
*****NOTE – If the audible alarm engages at any point while in the ammonia room, this signifies that the concentration level has reached or surpassed 300 ppm and the plant needs to be evacuated. Once you have evacuated to the pre-entry room, review the ammonia concentration gauge and perform the required action(s) for the displayed concentration.***

13.3 SAFE WORK PROCEDURE – ALARM / LEAK RESPONSE & INVESTIGATION**PURPOSE**

The purpose of this Safe Work Procedure is to establish a consistent method for investigating minor leaks in the Ammonia Plant. The ammonia plant is only to be entered when the levels inside are under 300 ppm, so leak investigation may only be conducted for minor leaks.

SCOPE

These procedures are applicable to all Arena Maintenance Workers / Supervisors and Arena and Building Service Workers.

PROCEDURES

1. This task requires an additional person to accompany you into the ammonia plant. This person must have their full face respirator on for the duration of this task and position themselves near the entrance to the ammonia plant with the door open. This person must maintain visual contact throughout leak investigation and be able to monitor the ammonia concentration gauge.
2. Ensure that you and your stand by person meet the requirements for entry into the Ammonia Plant before entering.
3. View the ammonia concentration gauge located to the left of the door in the pre-entry room and if the concentration is below 300ppm you may don your full face respirator and enter the ammonia room with the intent of locating the leak.
4. Enter the ammonia room and ensure that your partner remains near the open door.
5. Begin the investigation by slowly walking around the Ammonia room and perform a quick visual inspection in an attempt to identify the general area of the leak.
6. Once the general area is identified, return to the pre-entry room and obtain a sulphur stick.
7. Light the sulphur stick outside the ammonia room and return to the general area of the leak. Hold the stick at different locations to better pinpoint the location of the leak. If ammonia is present, large amounts of white smoke will appear.
8. If the leak is found it should be isolated and stopped if possible by shutting valves on either side of the leak and turning the compressors off at the electrical panel. Contact Fraser Valley Refrigeration at 604-835-9825 to perform the repairs or if the source of the leak can't be determined. If the leak causes the concentration in the ammonia room to reach 300ppm at any time, evacuation procedures must be implemented.

13.4 SAFE WORK PROCEDURE – EMERGENCY PLANT SHUTDOWN

PURPOSE

The purpose of this Safe Work Procedure is to establish a consistent method for shutting down the ammonia plant in the event of an emergency. If the concentration is below 300ppm, you may enter the ammonia plant room and physically close the King valve which stops the flow of ammonia through the system. If the concentration is above 300ppm, then shut down must be performed from the pre-entry room directly outside of the ammonia plant room.

PROCEDURES

Uncontrollable leak under 300ppm	Uncontrollable leak over 300ppm
<ul style="list-style-type: none"> Ensure that exhaust fan is on high setting 	<ul style="list-style-type: none"> Close all doors leading to the ammonia plant
<ul style="list-style-type: none"> Entrant & stand by person must be wearing full face respirator 	<ul style="list-style-type: none"> Depress Emergency stop button in pre-entry room and ensure exhaust fan stops
<ul style="list-style-type: none"> Enter ammonia plant and close the King Valve 	<ul style="list-style-type: none"> Commence evacuation procedures
<ul style="list-style-type: none"> Immediately exit plant closing door behind you 	
<ul style="list-style-type: none"> Monitor Plant on Direct Digital Control terminal in pre-entry room as it will take time for all ammonia to return to the receiver 	
<ul style="list-style-type: none"> If at any point the concentration reaches 300ppm, commence evacuation procedures 	
<ul style="list-style-type: none"> Call Fraser Valley Refrigeration at 604-835-9825 to respond and repair cause of leak 	

13.5 SAFE WORK PROCEDURE – CRITICAL EMERGENCY COMPONENTS OF AMMONIA PLANT**PURPOSE**

To identify and explain the functions of two plant components that can be used in an emergency to mitigate risk and assist in controlling the hazards associated with a serious ammonia leak (concentration greater than 300ppm) or fire.

CRITICAL COMPONENT #1 – EMERGENCY REMOTE SHUT OFF

Location:	Inside the ammonia pre-entry room, to the right of the door leading to the plant at shoulder height.
Description:	2" red, round emergency stop button clearly identified by label
Functions:	When this button is depressed it stops any machinery which is controlled by electrical power. This will cause the fans to stop running, the compressors will stop (which stops the flow of ammonia through the system) and solenoids will close causing the bulk of the ammonia to remain inside the chillers.
When to be used:	When the concentration in the ammonia room exceeds 300 ppm. This shut off is used in conjunction with emergency evacuation procedures and the assistance of emergency response teams.

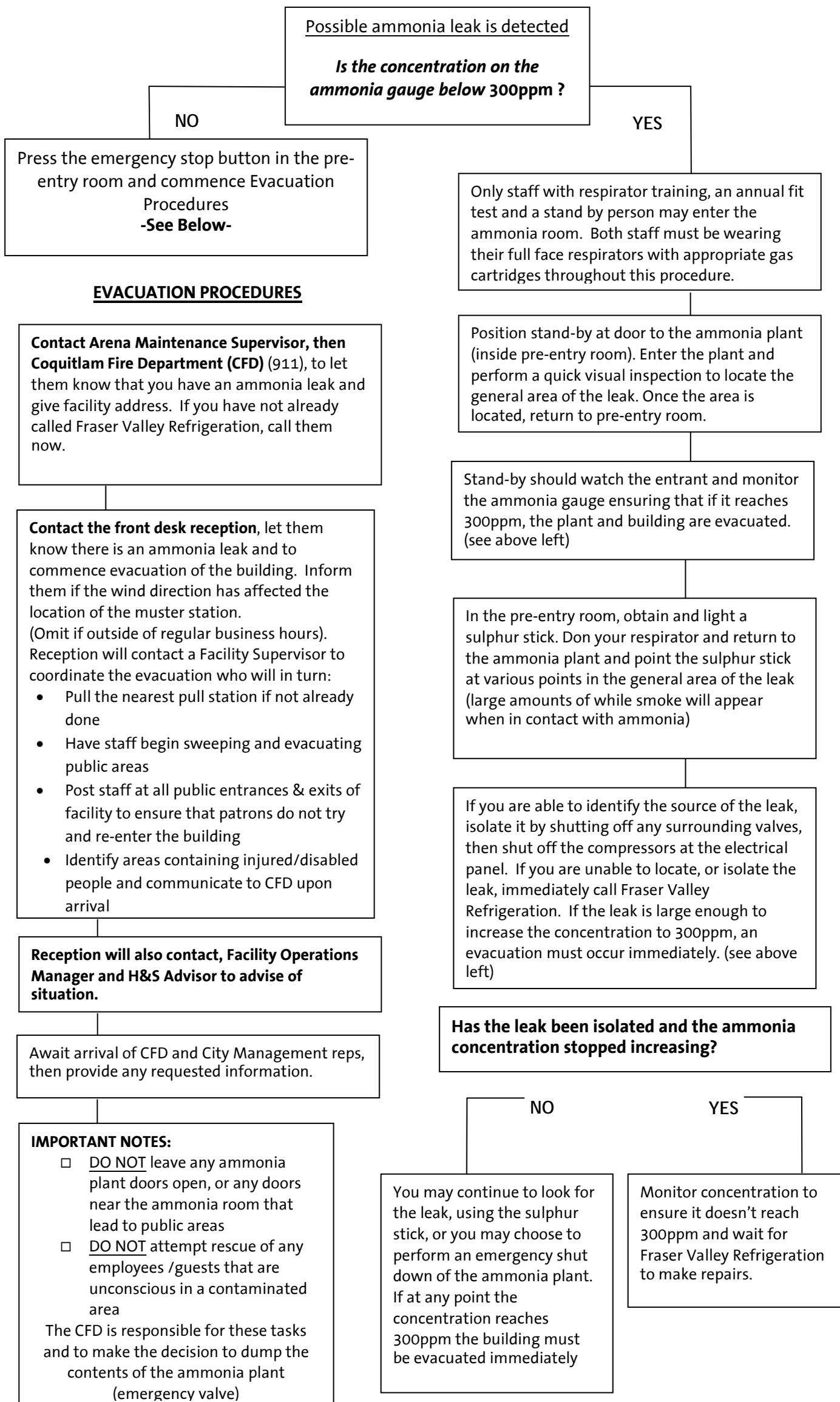
CRITICAL COMPONENT #2 – AMMONIA PLANT DUMP VALVE

Location:	Accessible via extension ladder from the north parking lot. The valve is located on the northern most exterior wall of the facility, 12-15 ft high.
Description:	Contained in a red recessed box with a breakable glass front
Functions:	This valve when opened will drain all of the ammonia contained in the receiver. The ammonia will flow out of a painted red stack on the north side of the roof and disburse into the atmosphere.
When to be used:	This valve is only to be used by the Coquitlam Fire Department in the event of a building fire which has the possibility of entering the ammonia plant and causing a severe explosion. It is critical that the Fire Department be aware of wind direction prior to using this valve as neighborhood notification of this event must occur.

AMMONIA PLANT ORIENTATION CHECKLIST

SECTION A: EMPLOYEE INFORMATION					
Job Title:		<input type="checkbox"/> New Worker	<input type="checkbox"/> Annual Review		
Employee Name: (Print Clearly)					
Certification:	<input type="checkbox"/> Refrigeration Safety Awareness Officer	<input type="checkbox"/> Class 4 Power Engineer or Refrigeration Operator	<input type="checkbox"/> Ice Facility Operator		
Supervisor Name: (Print Clearly)					
SECTION B: MAJOR COMPONENTS <i>(Identify Location and Explain Function in System)</i>					
Component	Employee Initials	Supervisor Initials			
Evaporator (Chiller)					
Receiver					
Compressor(s)					
Expansion Valve					
Condenser / Cooling Tower					
King Valve					
Fire Box					
Brine Pumps					
Gas Detection System					
SECTION C: PROCEDURES <i>(The Following Procedures Must Be Communicated to All Entrants)</i>					
Procedure	Employee Initials	Supervisor Initials	Procedure	Employee Initials	Supervisor Initials
Ammonia Plant Entry			Shut Down		
Building Evacuation			Logbook Use		
Emergency Shut Down			Alarm System Use		
Safety Data Sheet (SDS) System Review					
<i>The Following Procedures Must Be Communicated to Arena Maintenance Workers</i>					
Procedure	Employee's Initials	Supervisor Initials	Procedure	Employee Initials	Supervisor Initials
Draining Ammonia Plant Oil Pots			Alarm / Leak Response and Investigation		
SECTION D: EMPLOYEE AND SUPERVISOR ACKNOWLEDGEMENT					
Employee Signature:		Date:			
Supervisor Signature:		Date:			

AMMONIA LEAK RESPONSE FLOW CHART



AMMONIA PLANT ORIENTATION FORM FOR CONTRACTORS

Contractor Company Name: _____

Contractor Worker Name: _____

I have received an orientation of the Ammonia Plant at Poirier Sports and Leisure Complex from _____ on _____
(Coquitlam Arena Staff Name) (Date: MM/DD/YY)

By signing below, I accept that I have received and reviewed the City of Coquitlam's Anhydrous Ammonia Exposure Control Plan (ECP).

I understand that I must have a thorough knowledge of, and abide by, the safety standards and practices outlined in the WorkSafeBC Occupational Health & Safety Regulation and the ECP. Furthermore, I acknowledge that performing my tasks in a safe manner is a condition of my contract with the City of Coquitlam.

Contractor Worker

Signature: _____ **Date:** _____

Arena Maintenance

Supervisor Signature: _____ **Date:** _____