



# ENVIRONMENTAL HEALTH AND SAFETY SERVICE

## Ammonia Contingency plan

Location: Sports Complex  
801 King Edward Avenue

June 2004

**THIS CONTINGENCY PLAN HAS BEEN PREPARED BY**

**JOHN LOOP, ENVIRONMENTAL HEALTH AND SAFETY SERVICE**

**AND**

**MARIE-FRANCE MALO, PHYSICAL RESOURCES SERVICE**

**REVIEWED BY**

**MIKE HISTED, ENVIRONMENTAL HEALTH AND SAFETY SERVICE.**

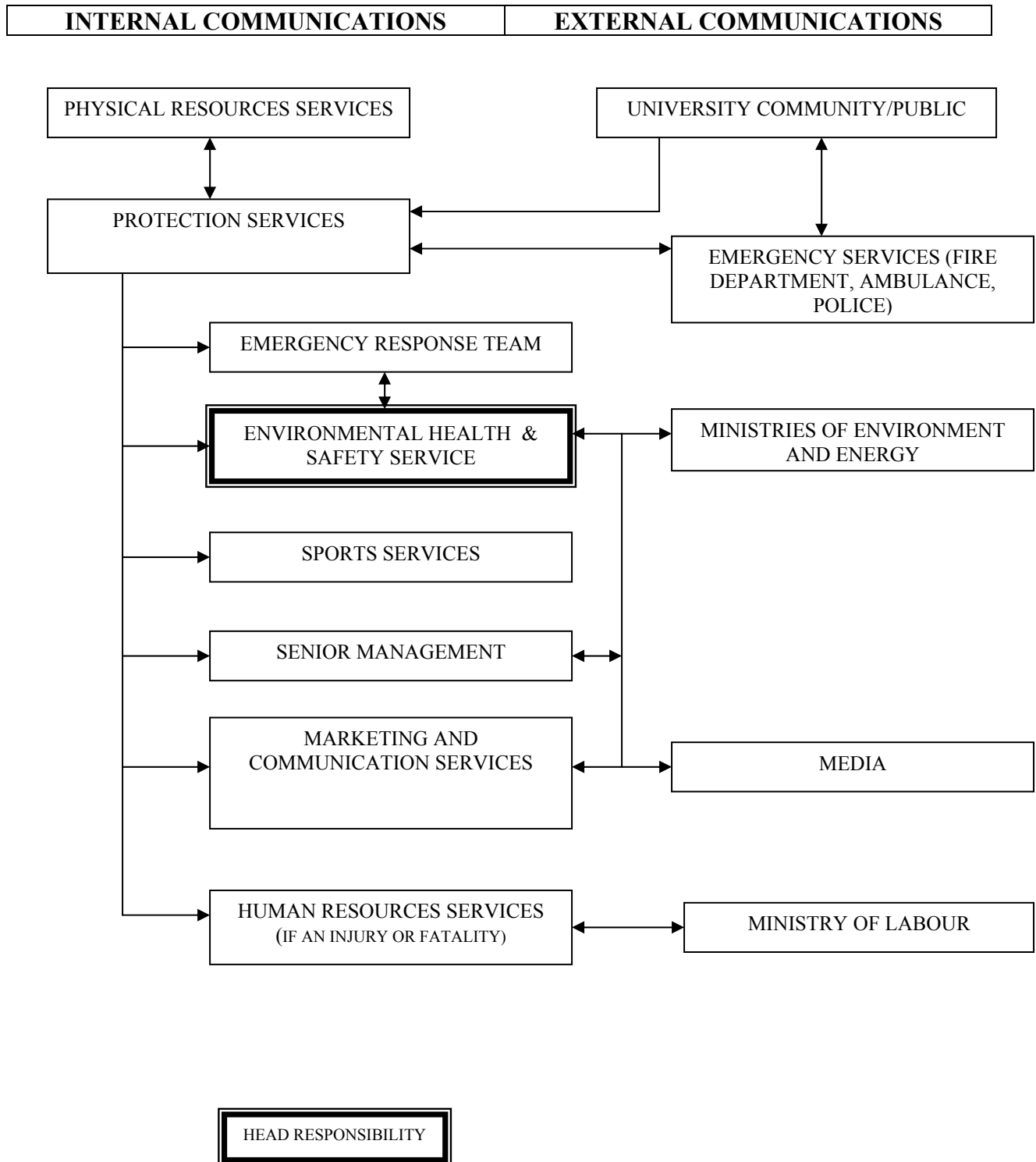
**THIS PLAN IS AN ACTIVE DOCUMENT, IT IS MEANT TO BE READ AND REVIEWED ON A PERIODIC BASIS. SUGGESTIONS AND MODIFICATIONS SHOULD BE ADDRESSED TO PHYSICAL RESOURCES ENVIRONMENTAL HEALTH AND SAFETY OFFICER, MARIE-FRANCE MALO (MARIE-FRANCE.MALO@UOTTAWA.CA).**

# TABLE OF CONTENTS

<b>EMERGENCY FLOW CHART .....</b>	<b>ii</b>
<b>EMERGENCY LIST OF CONTACTS.....</b>	<b>iii</b>
<b>1.0 INTRODUCTION .....</b>	<b>1</b>
<b>1.1 PURPOSE .....</b>	<b>1</b>
<b>1.2 POLICY .....</b>	<b>1</b>
<b>1.3 PLAN DEVELOPMENT.....</b>	<b>1</b>
<b>2.0 NATURE OF AMMONIA.....</b>	<b>2</b>
<b>3.0 SITE DESCRIPTION AND RISKS.....</b>	<b>3</b>
<b>3.1 GENERAL .....</b>	<b>3</b>
<b>3.2 AMMONIA ALARM SYSTEM.....</b>	<b>3</b>
<b>3.3 RISKS .....</b>	<b>4</b>
<b>3.4 FIRST AID MEASURES.....</b>	<b>5</b>
<b>4.0 DISCHARGE DETECTED DURING REGULAR INSPECTIONS AND MAINTENANCE ACTIVITIES (LOW LEVEL ALARM).....</b>	<b>6</b>
<b>4.1 RESPONSIBILITIES .....</b>	<b>6</b>
<b>5.0 EMERGENCY RESPONSE - MAJOR DISCHARGE (HIGH LEVEL ALARM)...</b>	<b>7</b>
<b>5.1 RESPONSIBILITIES .....</b>	<b>7</b>
<b>6.0 RESTORATION .....</b>	<b>9</b>
<b>7.0 MAINTENANCE OF THE AMMONIA CONTINGENCY PLAN .....</b>	<b>10</b>
<b>APPENDIX 1 - EVACUATION ZONE</b>	
<b>APPENDIX 2 - SITE PLAN</b>	
<b>APPENDIX 3 - MATERIAL SAFETY DATA SHEET</b>	
<b>APPENDIX 4 - DEFINITION: CRITICAL INJURY</b>	

# EMERGENCY FLOW CHART

(The extent of activation will depend on the severity of the situation.)



# EMERGENCY LIST OF CONTACTS

Revised June 18, 2004

<i>NAME</i>	<i>CELLULAR or PAGER #</i>	<i>562-5800 EXTENSION #</i>	<i>HOME #</i>
<b>PROTECTION SERVICES</b>		<b>562-5411</b>	
Claude Giroux, Assistant-Director	791-5210 (cell)	5609	684-3343
Marc Denis, Fire Prevention Coordinator IF UNAVAILABLE	850-9871 (cell)	6091	824-7349
Robert Fritz, Investigation/Prevention Coordinator IF UNAVAILABLE	859-5280 (cell)	6654	833-9148
Hubert Reiter, Director	791-5097 (cell)	5977	841-8327
<b>EMERGENCY RESPONSE TEAM</b>			
Activated by Protection Services		5411	
<b>ENVIRONMENTAL HEALTH AND SAFETY SERVICE</b>			
John Loop, EHS Officer IF UNAVAILABLE	782-9096 (pager)	3055	730-1426
Mike Histed, Director	782-9227 (pager)	5273	741-1660
<b>PHYSICAL RESOURCES SERVICE</b>			
Maintenance Control Centre AND		2222	
Mario Boileau, Ammonia coordinator IF UNAVAILABLE	866-6584 (cell)	6584	446-6905
Raymond Mainville, Assistant Director IF UNAVAILABLE		6586	830-6957
Mario Bouchard, Director	799-9845 (cell)	5713	684-0443
<b>SPORTS SERVICES</b>			
Denis Gigoux, Resources Coordinator and assistant to the director IF UNAVAILABLE	291-3748 (cell)	4335	834-2314
Normand Champagne, Sport complex Manager IF UNAVAILABLE	782-9272 (pager)	6333	241-3320
Luc G�lineau, Director		4336	561-2697
<b>MARKETING AND COMMUNICATIONS SERVICE</b>			
Lyse Huot, Director IF UNAVAILABLE Assistant director - Vacant	327-1010 (cell)	3150	827-1964
<b>HUMAN RESOURCES SERVICE</b>			
C�line Cl�ment, OHS Officer IF UNAVAILABLE	760-9796 (day) (pager)	3052	827-8907
Lise Griffith, OH Disability and Leave IF UNAVAILABLE		1472	837-7315
Louise Pag�-Valin, Assistant Vice-Rector, Human Resources		5936	827-1598
<b>SENIOR MANAGEMENT</b>			
Pierre-Yves Boucher, Secretary of the University		5950/5833	737-5748



## **AMMONIA CONTINGENCY PLAN**

### **1.0 INTRODUCTION**

#### **1.1 PURPOSE**

The purpose of the University of Ottawa Ammonia Contingency Plan is to protect the lives and health of the University and community by responding to any incidents in a safe and timely manner. This is achieved by:

1. defining the responsibilities of those concerned depending on the severity of a situation.
2. documenting emergency response procedures to be followed should a discharge from the ammonia refrigeration system at the sport complex actually occur, in accordance with policy 72;

#### **1.2 POLICY**

Subsection 1(h) of the University's Environmental Policy (No. 72) requires that we:

*Implement, maintain and regularly update contingency plans for dealing with accidental discharges so that effective remedial action takes place as soon as possible to minimize adverse effects*

With regards to the sport complex, this policy translates into the following specific objectives:

1. assure an organized and effective response to an ammonia discharge;
2. safeguard the employees, students and the public in the event of an emergency;
3. ensure continuity of academic and administrative functions until normal capability is restored; and
4. protect the environment in the event of discharge.

#### **1.3 PLAN DEVELOPMENT**

The Ammonia Contingency Plan has been developed by the Environmental Health and Safety Service in cooperation with the various services and committees involved. A working group made up of representatives from Protection, Physical Resources, Human Resources, the Emergency Response Teams (Main campus and Guindon Hall), Marketing and Communication, has been set up to oversee the preparation of related plans as well as a University Contingency Plan. The latter will incorporate existing and related emergency response procedures.

In this document, a discharge is defined as the loss of any substance to the environment which is capable of causing adverse health, or ecological effects on soil, water or in the air. Such a discharge would be covered under the Ontario Environmental Protection Act and must be reported immediately.

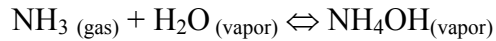
The objective of this plan is then to provide procedures to ensure that effective actions will be

taken to minimize harmful health effects to the University and surrounding residential community, as well as avert serious environmental damages. Emphasis will be placed on the following:

- 1) Alerting and Communication Procedures;
- 2) Control Procedures;
- 3) Restoration and Reporting.

## 2.0 NATURE OF AMMONIA

Ammonia (NH<sub>3</sub>) is a colourless gas, with a penetrating, pungent, and suffocating odour. It easily dissolves in water to form a caustic solution called ammonium hydroxide (NH<sub>4</sub>OH), sometimes referred to as aqueous ammonia. Ammonia has a vapour density less than air and will rise when released, but it will readily react with moisture in the air, become heavier and fall i.e.



The table below describes some chemical characteristics of ammonia and ammonium hydroxide. About 80% of the ammonia produced is used in fertilizers and it is found in many household and industrial-strength cleaning solutions. It is also used in the manufacture of other chemicals, and as a refrigerant such as in the refrigeration system found in the sports complex.

Associated health risks are described in section 3.3.

PHYSICAL CHEMICAL PROPERTIES	AMMONIA	AQUEOUS AMMONIA
<b>Odour Threshold</b>	1-15 ppm	2-50 ppm
<b>pH</b>	11.6	14
<b>Vapour density</b>	0.5967 of air density (air=1)	n/a
<b>Colour and odour</b>	colourless pungent odour	very pungent, choking
<b>Physical state</b>	gas	liquid
<b>TWA-TLV:</b>	25 ppm	25 ppm
<b>STEL:</b>	35 ppm	35 ppm
<b>IDLH:</b>	300 ppm	300 ppm
<b>UEL:</b>	25% in air	n/a
<b>LEL:</b>	16% in air	n/a

TLV-TWA (Threshold Limit Value-Time Weighted Average): the concentration for a normal 8 hour workday and a 40 hour work week, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect.

STEL (Short Term Exposure Limit): the maximum concentration to which someone can safely be exposed for a period of up to 15 minutes - with a maximum of four periods per day.

IDLH (Immediately Dangerous to Life and Health): concentrations that upon exposure are likely to result in death or immediate or delayed permanent adverse health effects.

UEL (Upper Explosion Limit): the highest concentration of a vapour or gas which will explode, ignite or burn in the presence of an ignition source. Mixtures above this limit are too rich to burn.

LEL (Lower Explosion Limit): the lowest concentration of a vapour or gas which will explode, ignite or burn in the presence of an ignition source. Mixtures below this limit are too rich to burn.

### **3.0 SITE DESCRIPTION AND RISKS**

#### **3.1 GENERAL**

The ammonia system is located in the compressor room (C 107A) between the two ice rinks. The ice rink no.1 is parallel to King Edward avenue and the second one is parallel to Mann avenue. Only the first one will be in operation all year round and the second one will be closed between April 15 and August 31.

The ammonia refrigeration system and associated piping and equipment is located in the ammonia compressor room which is accessed through the corridor C 103 located on the south west ground floor. The refrigerant system has four compressor units, which are regularly maintained. The system contains 980 lbs. of anhydrous ammonia (NH<sub>3</sub>).

#### **3.2 AMMONIA ALARM SYSTEM**

The compressor room is equipped with a micro monitoring system, called a gas sensor transmitter, for detection of ammonia leakage. The sensing element is mounted directly over the compressor on the electric chase that crosses the room. The ammonia alarm system is directly linked to the Physical Resources Service (PRS) Maintenance Control Centre at the Power Plant located at 720 King Edward Avenue. All signals from the ammonia alarm system will alert the Shift Engineer at this location.

If an ammonia smell is detected outside the sport complex, emergency phones (6 phones per level(4) = 24), located on each level of the indoor parking lot of the sport complex, can be used to inform Protection Services who will then report the incident to the Maintenance Control Centre at the power plant. The Fire Department will be contacted afterward, if needed, by the Control Centre.

The system has two stages of alarm:

1- The first stage (low level) alarm will activate a red indicator light (in the compressor room) when the ammonia concentration reaches 25 ppm. This alarm is a warning for maintenance shift engineer to check the operation of the system. It will also ring at the power plant.

2- The second (high level) stage alarm will be an audible alarm when the ammonia concentration reaches 300 ppm. The alarm will be heard in the immediate area of the compressor.

The ammonia alarm system control panel is mounted directly on the refrigeration control panel inside the ammonia compressor room at 64 inches height and can be viewed through the door window. The control panel has three warning lights; their functions are briefly stated below:

<b>WARNING LIGHTS</b>	<b>FUNCTION WHEN ACTIVATED</b>
Alarm button	- Alarm system activated.
Sensor Fail	- Fault in system.
Warning	- Operational system check.

An emergency ammonia release valve and refrigeration equipment power shut-off switch are located in a locked red box mounted 8 feet up on the west wall, adjacent to the exterior compressor room door. In case of an emergency, the Fire Department and Physical Resources will deal with this system.

### **3.3 RISKS**

An event such as a major fire in proximity to the ammonia storage tank or a large discharge from the ammonia refrigeration system poses a serious health hazard to workers and occupants in the sport complex, the residential area, and the University community. Should a major event occur, the Ottawa Fire Department would decide on the need to activate the City of Ottawa Disaster Plan for an evacuation and activate the ammonia release valve. The map provided in Appendix 2, delineates, for example, an evacuation zone with a radius of 320 m to safeguard people who could be affected from a discharge from the ammonia refrigeration system.

The inhalation of the corrosive ammonia gas can cause irritation (possibly severe) and inflammation of the respiratory system, difficulty breathing, nausea, vomiting and chest pain. Either irritation and burns may occur after direct of skin contact with anhydrous ammonia, solutions or concentrated ammonia gas. Effects as a result of direct contact with ammonia with eyes may cause irritation and tearing to severe injury and blindness.

### 3.4 FIRST AID MEASURES

First aid assistance is to be provided as required depending on the situation. Refer to the Material Safety Data Sheet for anhydrous ammonia in Appendix 3 for further details.

<b>WHAT TO DO:</b>		
<b>IN CASE OF</b>	<b>FIRST ACTION</b>	<b>SECOND ACTION</b>
<b>Ammonia (ammonium hydroxide) on skin or in eyes</b>	<b>Immediately flush skin or eyes with running water for at least 20 minutes. Occasionally lift upper and lower lids of eyes.</b>	<b>Bring victim to a physician.</b>
<b>Strong Ammonia fumes inhaled</b>	<b>Get victim into fresh air.</b>	<b>Bring victim to a physician.</b>

Two gas masks - type canister GMD-N95 - are located on the wall, outside the vestibule which accesses the compressor room (room C 107), if needed. The equipment available is: a canister carrier harness, a breathing tube, a canister and a full face mask. An emergency shower and eye wash station is located in the vestibule.

Any person from the University community who requires medical assistance during the emergency needs to follow up with the Occupational Health, Disability and Leave Sector (Lise Griffith, ext. 1472, Human Resources Service) for further assessment and ensure proper documentation of their situation.

**4.0 DISCHARGE DETECTED DURING REGULAR INSPECTIONS AND MAINTENANCE ACTIVITIES**  
**(LOW LEVEL ALARM – 25 ppm)**

From September 1<sup>st</sup> to April 15<sup>th</sup>, both ice rinks are open. The Shift Engineer conducts visual inspections of the ammonia compressor room during an eight hour work shift, and completes a daily record report kept in this room. During the sport complex’s summer period (April 15- August 31) only one ice rink will be in operation but the visual inspections in the compressor room will still be done.

Refrigeration maintenance services at the University of Ottawa sports complex are provided by a specialized external contractor (AC Mechanical, Phone: 244-6336).

**NOTE: 1- This level of alarm is not an emergency response and does not activate the plan.**

**4.1 RESPONSIBILITIES**

RESPONSIBILITY	ACTION
1. Physical Resources Service	<ul style="list-style-type: none"> <li>- Inform Protection Services.</li> <li>- Ammonia coordinator oversees all operations of the ammonia refrigeration system (during week days).</li> <li>- Chief, Operating Engineer informs the Shift Engineer if major maintenance activities are required and duration of work to avoid any false alarm which may occur with a controlled discharge.</li> <li>- Shift Engineer or sector 3 mechanic turns on exhaust fan prior to entering the ammonia compressor room (if the fan is not already on).</li> <li>- Shift Engineer or sector 3 mechanic leaves the room and closes the door if any ammonia smell is detected.</li> <li>- Shift Engineer calls the Maintenance Control Centre to initiate routine remedial action.</li> <li>- Maintenance personnel uses personal protective equipment as required.</li> </ul>
2. Protection Services	- Be ready if situation worsens.
3. Sports Services	- NO ACTIONS or RESPONSIBILITIES

**5.0 EMERGENCY RESPONSE - MAJOR DISCHARGE  
(HIGH LEVEL ALARM – 300 ppm)**

This section describes the roles and responsibilities of key services which would be involved in responding to a major ammonia discharge from the sports complex. It is the responsibility of the Environmental Health and Safety Service and the Ottawa Fire Department to determine the severity of the incident and to initiate appropriate action in consultation with others concerned.

- It is important to follow these procedures and call the Fire Department.
- If situation becomes critical, the Fire Department will take charge of the response.
- In case of a fire in the compressor room, all occupants will be asked to leave the complex to a safe location (Sandy Hill Centre, park or other location) if wind conditions dictate. Fire alarm will activate automatically.

**5.1 RESPONSIBILITIES**

RESPONSIBILITY	ACTION
1. Protection Services	<ul style="list-style-type: none"> <li>- Activates the Ammonia Contingency Plan and evacuation.</li> <li>- Calls the Maintenance Control Centre (Physical Resources Service-5447) if an exterior call comes in.</li> <li>- Contacts ERT if additional assistance is required.</li> <li>- Controls any access to the sport complex, ensures crowd control, and moves occupants to a safe location; BUILDING OCCUPANTS: evacuation to north end of the building. SOCCER FIELD CROWD: put on stand by, no evacuation unless told to do so.</li> <li>- Close parking garage access.</li> <li>- Calls the Environmental Health and Safety Service. (See contact list).</li> <li>- Calls Marketing and Communication Service. (See contact list).</li> <li>- Calls Sports Services. (See contact list).</li> <li>- Calls Senior Management.</li> <li>- Calls the Human Resources Service, if an injury or a fatality involving an employee or student. (See appendix 4 for definition of critical injury).</li> <li>- Calls the supervisor of the injured employee. (The supervisor notifies Human Resources, completes an Accident, Incident or Occupational Disease Report).</li> <li>- Meets the fire department.</li> <li>- Activates the Emergency Operation Center.</li> <li>- Documents the emergency chronologically.</li> </ul>
2. Physical Resources Service	<ul style="list-style-type: none"> <li>- Shift Engineer <u>calls the Fire Department and Protection Services.</u></li> <li>- Shift Engineer records the emergency in the daily log book.</li> <li>- Ammonia Coordinator and mechanic sector 3 meet the fire department and provides technical assistance.</li> <li>- Ammonia Coordinator completes an Accident, Incident or Occupational Disease Report and sends it to the Human Resources Service, in case of injury or fatality.</li> </ul>

3. Sports Services	<ul style="list-style-type: none"> <li>- Initiate evacuation to north end of building (near Templeton street)</li> <li>- Contacts power plant and Protection Services to ensure actions have been taken.</li> </ul>
4. Environmental Health and Safety Service	<ul style="list-style-type: none"> <li>- Consults with Protection Services and Physical Resources Service regarding plan implementation and termination of emergency.</li> <li>- Provides assistance at the scene during an emergency.</li> <li>- Briefs Marketing and Communication Services.</li> <li>- Reports the incident to the Ministry of Environment.</li> </ul>
5. Senior Management	<ul style="list-style-type: none"> <li>- The Secretary of the University liaises with Marketing and Communication Services, Protection Services and other services as required.</li> <li>- The Administrative Committee determines in consultation with those concerned whether any building(s) need to be vacated, thus requiring alternate arrangements for academic and administrative functions.</li> </ul>
6. Marketing and Communication Services	<ul style="list-style-type: none"> <li>- Communicates with the Environmental Health and Safety Service, the Human Resources Service (if an injury or a fatality to keep abreast of the situation) and the family of the employee involved.</li> <li>- Liaises with Senior Management and the media to provide information.</li> </ul>
7. Human Resources Service (if an injury or a fatality)	<ul style="list-style-type: none"> <li>- Calls the Ministry of Labour.</li> <li>- Briefs Marketing and Communication Services.</li> <li>- Ensures completion of reports. Provides a copy of the Accident, Incident or Occupational Disease Report to the Environmental Health and Safety Service and contact the family of the employee involved.</li> </ul>
8. Emergency Response Team	<ul style="list-style-type: none"> <li>- Campus ERT provides logistical support to the fire department and Protection Services.</li> </ul>
9. Ottawa Fire Department	<ul style="list-style-type: none"> <li>- Liaises with Protection Services, the Environmental Health and Safety Service, and Physical Resources Service.</li> <li>- Assumes command in managing the emergency.</li> <li>- Activates the City of Ottawa Disaster Plan if required.</li> <li>- Operates the emergency ammonia release valve and activate refrigeration equipment power shut-off switch.</li> </ul>
10. Ottawa Police	<ul style="list-style-type: none"> <li>- Calls the family when there is an injury or a fatality involving a student or a member of the public.</li> </ul>

## 6.0 RESTORATION

This section describes any action that may be required to restore the sport complex and the academic and administrative functions.

<b>RESPONSIBILITY</b>	<b>ACTION</b>
1. Physical Resources Service	<ul style="list-style-type: none"><li>- Consults with the Environmental Health and Safety Service on restoration plans.</li><li>- Coordinates and supervises restoration of the sport complex, SITE and CBY. Work may be contracted, as required.</li></ul>
2. Environmental Health and Safety Service	<ul style="list-style-type: none"><li>- Coordinates investigation in consultation with those concerned.</li><li>- Conducts debriefing session to evaluate emergency response provided to those concerned.</li><li>- Provides reports to the Ministry of Environment as required.</li></ul>
3. Human Resources Service (if an injury or a fatality)	<ul style="list-style-type: none"><li>- Provides reports to the Ministry of Labour.</li><li>- Carries out assessments and follow ups.</li></ul>

## 7.0 MAINTENANCE OF THE AMMONIA CONTINGENCY PLAN

A review of the Ammonia Contingency Plan will be conducted to ensure contents are current.

<b>RESPONSIBILITY</b>	<b>ACTION</b>
1. Physical Resources Service (Environmental, Health and Safety Officer)	<ul style="list-style-type: none"><li>- Ensure the Ammonia Contingency Plan is displayed at the sport complex, the Maintenance Control Centre, and Protection Services.</li><li>- Ensures personnel and external contractors are familiar with the plan.</li><li>- Consults with the Environmental Health and Safety Service to solicit advice for changes, training and maintenance of the plan.</li></ul>
2. Environmental Health and Safety Service	<ul style="list-style-type: none"><li>- Reviews the Ammonia Contingency Plan annually in consultation with those concerned.</li><li>- Oversees the effective implementation of the Ammonia Contingency Plan.</li><li>- Liaises with the fire department.</li></ul>
3. Faculty of Science	<ul style="list-style-type: none"><li>- Ensures that the ERT maintains awareness of emergency response procedures.</li></ul>

## **APPENDIX 4 - DEFINITION: CRITICAL INJURY**

**Defined, OHSA, R.R.O 1990, Reg.834**

**Critically injured means an injury of a serious nature that,**

- a) places life in jeopardy;**
- b) produces unconsciousness;**
- c) results in substantial loss of blood;**
- d) involves the fracture of a leg or arm but not a finger or toe;**
- e) involves the amputation of a leg, arm, hand or foot but not a finger or toe;**
- f) consists of burns to a major portion of the body; or**
- g) causes the loss of sight in an eye.**