School SOP for Hydrogen Gas Detection in CSCB:

This SOP provides important information for CSCB Hydrogen gas users in relation to the Hydrogen Gas Detection Systems that are installed in the CSCB Building. Lab users intending to use Hydrogen gas for the first time must notify the Chief Technical Officer.

Safety Information:

All Lab users intending to use Hydrogen gas must consult the MSDS and the UCD Chemical Safety Manual

Hydrogen is a colourless, odourless, extremely flammable gas.

Hazards Identification:

- Burns with an invisible flame.
- High pressure gas.
- Can cause rapid suffocation.
- Extremely flammable.
- May form explosive mixtures in air.
- Immediate fire and explosion hazard exist when mixed with air at concentrations exceeding the lower flammability limit (LFL).
- High concentrations that can cause rapid suffocation are within flammable range and should not be entered.
- Avoid breathing gas.
- Self-contained breathing apparatus (SCBA) may be required.

General Information:

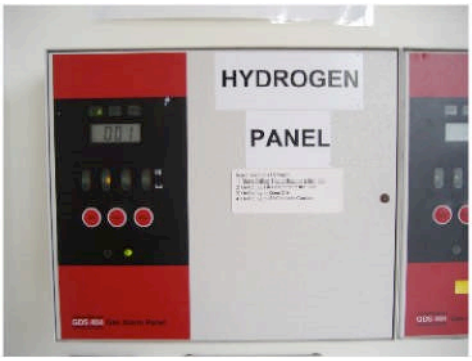

Figure 1. Hydrogen Detection Control Panel

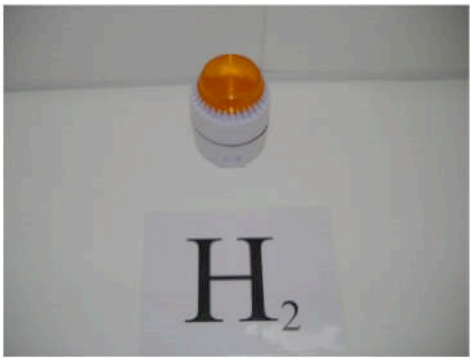

Figure 2. Hydrogen Detection Amber Strobe

- There are 3 separate Hydrogen Detection Systems in the CSCB, one on each floor 1, 2 and 3.
- The control panels are located outside the door to Labs: L1.12-1.17, L2.12-2.17 and L3.12-3.17 (see Figure 1).
- Each system is designed to detect the presence of hydrogen gas.
- The hydrogen alarm is connected to **AMBER coloured strobes/sirens** in each laboratory (see Figure 2) and instrument room and the siren is not as loud as a Fire alarm siren.
- The hydrogen alarm registers on the fire alarm panel but does not activate the audible fire alarm unless a very serious leak is detected.
- The systems on each floor are completely separate. Therefore, if an alarm is activated on one floor it is audible/visible only on that floor.
- The hydrogen alarm sounds if a level of above 10% LEL is detected by any one sensor.
- The locations of all sensors are clearly marked on each control panel.
- The system monitors the areas served by the hydrogen cylinder in the gas cylinder storage cupboard located on the corridor of each floor (1, 2 and 3).
- If a high level (20% LEL) of hydrogen gas is detected an automatic safety shut off valve located in each gas cylinder cupboard is triggered and the gas supply is shut off.
- There is a “Panic Button” located in each instrument room on each floor. When activated, this triggers the safety shut off valve, cutting off hydrogen supply from this point in the gas cylinder cupboard to the areas served by the hydrogen gas pipeline.
- The hydrogen gas pressure should never be increased above 5 bar.
- In the case of a leak occurring directly from a gas cylinder, the safety shut off valve cannot resolve this situation. In this case, the sensor located inside the gas cylinder cupboard (Sensor No. 4) will activate the full audible fire alarm and the building will be evacuated.

Procedure If You Intend To Use Hydrogen:

If it is the first time you intend to use Hydrogen gas please notify the Chief Technical Officer.

1) Turn on Hydrogen cylinder. You are now responsible for the Hydrogen gas supply on your floor. **Never increase the hydrogen gas pressure above 5 bar.**
2) Fill in relevant details in logbook at control panel.*
3) When finished using the Hydrogen gas, turn off the supply.
4) Remove your name from the board provided.

* If you are working out of hours or if you leave the lab while Hydrogen is turned on you must fill in your phone number in the logbook.

Procedure In The Event Of Alarm Activation:

When a hydrogen alarm sounds, the amber strobe in each laboratory and instrument room on the effected floor will flash and the siren will sound.

1) **Turn off the Hydrogen cylinder immediately.**
2) Open the windows on the corridor and open the doors to the lab.
3) Contact:

During Office hours contact	Out of Hours contact
(a) Safety Office ext. 2068 / 2070 (b) Yannick Ortin* ext. 2443	(a) UCD Emergency Line ext. 7999

4) Leave the area.
5) It is not necessary to evacuate the building unless the Fire alarm sounds.

*Mobile phone numbers are held by Science Services and First Response Room

Important

If the fire alarm sounds evacuate immediately and DO NOT open the gas cylinder cupboard.

Additional Information:

An alarm sounds if a level of 10% lel is detected by any one sensor. This is a warning that there is a hydrogen leak in the gasline. You can tell which sensor activated the alarm by looking at the Control Panel. There are 4 sensor lights (C1-C4) (see Figure 6.1). The system cycles through each sensor and gives a reading. This should be approximately zero% lel. The Sensor which activated the alarm will be denoted by a red light. If the level should rise to over 20% lel the safety shut off valve will be activated which shuts off supply to areas served by Sensors 1, 2 and 3. Therefore the situation is now safe if the alarm was caused by Sensor 1, 2 or 3. However, if the alarm was caused by Sensor 4 which is located in the gas cylinder cupboard the leak could possibly be directly from the cylinder. In this case, the system has been set to activate the full fire alarm if a level of 25% lel is detected.

Therefore, if you hear the fire alarm at any point, do not open the gas cylinder cupboard doors, evacuate immediately. For your information, the gas cylinder cupboard is vented.

IMPORTANT: NEVER RESET THE ALARM

("Reset" button in some cases simply mutes the alarm)

Sensor lights C1-