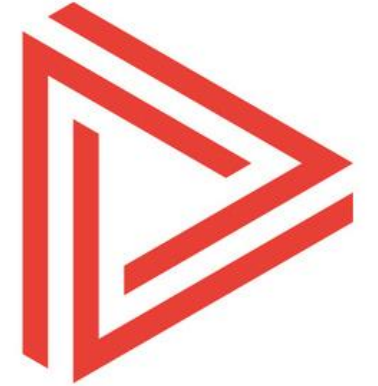




When a Routine Task Creates an Explosive Atmosphere

A learning-focused safety moment based on a laboratory incident.



What Happened

Safety Moment

Incident overview

An explosive atmosphere was unintentionally created while handling an NGL (Natural Gas Liquids) sample cylinder.

- An NGL sample cylinder was being prepared for shipment to another laboratory.
- The site and receiving laboratory used different fittings, requiring the technician to replace the cylinder connection.
- During this activity, the cylinder began leaking.
- The leaking contents were liquid hydrocarbons.
- The liquid was allowed to drain into a floor drain.
- The vapour from the liquids in the drain made their way back into the laboratory space.
- A workshop/office within the building was being used for cylinder handling activities.
- The technician opened a door to increase ventilation and believed the liquid draining away removed the hazard.
- A flammable atmosphere formed and subsequently ignited.

The technician understood the liquid was going down the drain but did not recognise that the liquid would rapidly vaporise and create a much larger flammable vapour cloud.

The Outcome

- Blast and structural damage, including broken windows
- There was no ongoing fire after the available fuel was consumed (fuel was consumed in milliseconds)
- No one was injured as the 2 technicians were not in the lab at the time



 When a hydrocarbon release finds an ignition source

A release, incomplete control of the atmosphere and an ignition source came together.



A liquid hydrocarbon release, inadequate understanding of vapour generation, and the presence of ignition sources combined to create the conditions for an explosion.



When a hydrocarbon release finds an ignition source

NGL sample cylinder handling



Hydrocarbon source: leaking cylinder and fitting

- The leak occurred while replacing a fitting required for transfer between different laboratory systems.
- The need to routinely manipulate fittings was not challenged or eliminated.
- Standardised fittings or suitable adapters could have removed the need for this activity altogether.
- The technician did not recognise that NGL would rapidly vaporise and create a flammable atmosphere.
- Opening a door was assumed to control the hazard, but ventilation effectiveness was never verified.
- The area was left while the release continued.

A control is only effective when people understand the hazard it is intended to control



When a hydrocarbon release finds an ignition source



1

Original condition

A workshop/office within the laboratory building was not originally intended for routine hydrocarbon sample cylinder handling.

2

Change introduced

Cylinder handling and draining activities involving hydrocarbon samples began to be undertaken in this room.

3

Gap

The change was not fully assessed for:

- Potential release of flammable hydrocarbons
- Ventilation requirements and HVAC capability
- Appropriate gas detection
- Emergency response arrangements
- Suitability of nearby equipment and ignition sources
- Technician understanding of leak scenarios



Potential ignition source: domestic refrigerator

When introducing new activities into an existing workspace, assess both the hazards being introduced and whether existing controls remain suitable.



When a hydrocarbon release finds an ignition source



Control the release, the atmosphere and ignition sources

Apply the hierarchy of control and verify the controls are working.

STOP THE RELEASE

- Eliminate the need for unnecessary fitting changes through standardisation or adapters.
- Stop work and escalate if sample cylinders leak during handling.
- Ensure workers understand the behaviour of released NGL samples.

USE A SUITABLE LOCATION

- Handle hydrocarbon sample cylinders only in areas assessed for that activity.
- Verify ventilation and HVAC systems are suitable for credible release scenarios.
- Consider gas detection and emergency arrangements.

CONTROL IGNITION

- Identify potential ignition sources within the work environment.
- Recognise that laboratories commonly contain many potential ignition sources.
- Ensure risk controls are designed around the activity being undertaken.

MANAGE CHANGE

- Review any change in room use, activities, materials handled or operating practices.
- Verify that controls remain suitable when hazardous substances are introduced into new areas..

Safe facilities alone are not enough. People must understand the hazards of the materials they are handling and how releases behave.



When a hydrocarbon release finds an ignition source

Could this happen here?

Safety Moment

Discuss

1

Where could a flammable substance release occur in our work area?

2

How would we respond safely to a leaking cylinder?

3

What equipment in the area could act as an ignition source?

4

How would we confirm the work area and it's controls are suitable for the activity?



When a hydrocarbon release finds an ignition source



Verification of learnings shared and feedback

Safety Moment

To ensure this learning leads to meaningful improvement, follow the Plan Do Check Act process and provide your feedback to Step Change in Safety.

Plan

Review the learning and assess how it applies to your organisation, work area or tasks.

Identify any risks, gaps, or required changes to current procedures.

Do

Implement necessary actions - communicate changes, update procedures, and ensure everyone affected understands their responsibility.

Act

Make any needed adjustments based on what you've learned.

Share lessons with your team, document improvements and feedback to Step Change in Safety.

Check

Monitor the effectiveness of the changes. Observe work practices, gather feedback, and verify that the learnings have been understood and applied correctly.

Share your learnings and feedback.
Your proactive engagement helps create a safer workplace for everyone.



Feedback Form

Link to [Resource Feedback Form](#)



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