

LPG accidents: the Italian experience

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LPG RELEASE AT THE TRANSFER POINT DUE TO UNTIMELY OPENING OF THE TANKER VALVE

Sequence of Events



What happened

The worker carried out the **preliminary operations of the LPG transferring activity from tanker to storage tank**, including connection between the “liquid phase” valve of the tanker and the corresponding “liquid phase” loading/unloading arm.

The operator unexplainably opened the LPG “gas phase” valve of the tanker without having previously connected the corresponding “gas phase” loading arm of the transfer point as required by the Procedure.

The operator immediately **became aware of the wrong action by closing the valve** without preventing a LPG vapor release

Consequences

The instantaneous release of LPG, although limited, was such as to cause **cold burns on the operator's body and limbs**.

Lessons Learned



- 1) **Lack of training activities** in the proper application of the tanker **loading/unloading procedure**
 - Special training session with all transfer operators, including the worker partly responsible for the accident
- 2) **Untimely opening of the tanker bottom valve** in relation to the procedural sequence for the transfer activities – **Failure of the “gas phase” loading arm connection** with the corresponding tanker valve – **Unforeseen opening of the tanker “gas phase” valve** by the operator
 - Ensure and reiterate training for all personnel involved in the transfer operations
 - Supervision and spot verification
- 3) **No preventive corrective action of the driver**
 - Training by the drivers Employer with learning verification by the establishment Operator before accessing the transfer point, subject to the ban on access to the establishment

(From Operator analysis)



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LEAKAGE FROM THE SEAL OF LPG PUMP

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Sequence of Events



What happened

General alarm of the depot was activated by the presence of **gas in the area in front of LPG pumps** - Use of fire hoses for **approaching the leakage point and dispersing** the LPG cloud.

Sealing action with closing of all manual valves in suction and pressure of the pump – Activation of **fire fighting monitors to create a barrier** between pump/compressors area and offices – **Drainage operations** of the pump.

Leakage due to a failure of the pump seal, resulting in an evaluation to be carried out during the **revision of the pump (the last a few months ago)**.

Consequences

The gas leak was found only by the seal of the pump in the pumps/compressors area.

Lessons Learned



- 1) Lack of training activities** in the proper application of the **IEP**
 - Team intervention and emergency call to local fire brigade
 - Special simulation session on IEP, including the correct communication methods with external competent authorities
- 2) Maintenance and revision of the pump by a contractor,** which did not prevent the damage of the seal
 - Pump dismantled and subjected to remediation operations
 - Onsite technical assistance by contractor for damage repair and request for explanation on the accident
 - Contacts between Operator and contractors in order to review the supply of goods

(From Operator analysis)



LPG RELEASE AT THE TRANSFER POINT FOLLOWING THE OPENING OF THE PSV

Sequence of Events



What happened

During a **LPG tanker loading**, following the shutdown of the excess flow valve of the “gas phase” inside the tanker, **there was an increase in internal pressure up to 1.47 MPa**. It caused the **opening of the auxiliary PSV** on the tanker pipeline with LPG release.

The release time was **several minutes as the tanker bottom valve (Fisher) was defective**. The release ended due to the **PSV closing following the lowering of the tanker pressure**, made possible through the “gas circuit” of the depot that is connected in “liquid and gas phase” with the tanker.

Consequences

Release of **LPG** occurred in liquid phase with immediate **vaporization in a non-confined atmosphere**. The release did **not automatically activate the gas detectors** at the transfer point as the LPG vaporization occurred on the back of the tanker

Lessons Learned



- 1) **Failures and lacks of both operational and managerial nature** performed by personnel involved in: enable in advance the **entrance of the tanker** to the depot; **transfer operations**; emergency **team intervention**
 - Immediate removal of the vehicle and foreclosure to new access
 - Specific training for all internal and external personnel involved in the transfer operations: tanks suitability; loading / unloading tanker procedure; PPE wearing and LPG leakage interception
- 2) **Control and maintenance of the equipment: “tank side”** (bottom valves, PSV); **“plant side”** (loading/unloading arms)
 - Excess flow valve to ensure the return of “gas phase” to tanks
 - Complete closing of the tanker bottom valve (Fisher)
 - Correct setting of the PSV
 - Accessing the valve to exclude the circuit (back of the tanker)
- 3) **Failure to operate** automatic and manual **safety systems**
 - Installation of air system at all transfer points in order to control the closing of all LPG valves in case of emergency

(From Operator analysis)