Statement of SEA-3, Inc. Regarding LPG
Railcar Offloading/Drying/Chilling and Storage Process

SEA-3 has been safely receiving and offloading propane from railcars at its Newington, NH facility since 1975. The offloading, refrigeration, storage and distribution of LPG arriving at SEA-3's facility are governed by established procedures set forth in SEA-3's Standard Operating Procedures Manual. Relevant portions of SEA-3's Standard Operating Procedures Manual are attached to this Statement as an aid to the Committee in understanding SEA-3's railcar offloading process and how its equipment operates. SEA-3's procedures manual will be updated to govern the operation of the proposed improvements, which are described below:

1. LPG is transported to the Facility by Pan Am Railways ("Pan Am") in DOT 112 railcars. Each rail car has a capacity of 33,000 gallons. To receive railcars, SEA-3 personnel open the rail gate in the security fence to allow Pan Am Railways to bring in the railcars and position them at the rail unloading berths located on the rail sidings within SEA-3's security perimeter. The existing rail siding contains 3 berths and the proposed rail siding will contain 5 berths.

2. After the rail cars are positioned and Pan Am's locomotive leaves the facility, SEA-3 personnel place metal blocks known as "chocks" on the railcar wheels to immobilize them and prevent movement during the unloading process. SEA-3 personnel then place signs indicating "Tankcar Connected" at the entrance to the rail siding, per Federal Railroad Administration safety regulations, and close the gate, securing the perimeter.

3. Following receipt of the railcars, SEA-3 personnel visually inspect the railcars for safety defects, physical damage and other condition issues. This inspection includes an examination of the railcar valves, all of which are located on the top of the railcar underneath a protective weather hood or dome, which hinges open. Each railcar has two (2) liquid eduction valves for the transmission of LPG, one (1) vapor valve for the transmission of vapor, one (1) sample valve for taking product samples and one (1) safety relief valve.

4. As part of the railcar inspection, SEA-3 personnel record each railcar's serial number, safety relief valve test dates, tank pressure test dates, inbound seal number and temperature and pressure readings. This information is recorded on SEA-3's Railcar Unloading Checklist, a copy of which is attached. Any discrepancies resulting from the inspection are immediately reported to the facility's main control room and no further unloading action is taken until the discrepancy is investigated and resolved.

5. Upon satisfactory completion of the initial railcar inspection, SEA-3 personnel attach emergency shut off valves to each railcar's liquid eduction and vapor valves. The

emergency shut off valves can be manually operated as well as automatically operated from the rail berth platform and from the facility's main control room, which monitors the rail unloading process on closed circuit television.

6. Upon connecting the emergency shut off valves to the liquid eduction and vapor valves, the unloading hoses are attached to the emergency shut off valves. The unloading hoses are approximately five feet (5') in length and are constructed from corrugated stainless steel. The opposite ends of the unloading hoses are fastened to fixed transmission pipelines constructed of rigid steel.

7. Upon connection of the emergency shut off valves and unloading hoses, SEA-3 personnel take a reading from the railcar's outage tube and perform a sniff test for the presence of odorant and record the results on the Railcar Unloading Checklist. If warranted, further product testing is performed. The product temperature and pressure is then recorded.

8. Upon satisfactory completion of all inspections and tests, the unloading process begins by opening the liquid eduction and vapor valves, checking for leaks, and then opening the liquid and vapor hose valves and other system valves, forming an open circuit leading from the railcars to the three (3) 90,000 gallon ambient storage tanks, to the two (2) unloading compressors and back to the railcars. The circuit contains a vapor separator between the ambient storage tanks and unloading compressors which prevents LPG from reaching the unloading compressors once introduced into the ambient storage tanks.

9. Upon opening the circuit, SEA-3 personnel turn on the unloading compressors. The unloading compressors draw vapor from the ambient storage tanks and pump it at pressure into the railcars through the vapor valves. This action increases the pressure inside the railcars and decreases pressure in the ambient storage tanks, creating a pressure differential. When the pressure differential reaches approximately 10 – 15 psig, LPG begins flowing out of the railcars and into the storage tanks.

10. Throughout the unloading operation, SEA-3 personnel visually inspect the railcars for any sign of leakage. If any leaks or other problems are detected, the operation is immediately shut down. In addition to human monitoring, temperature and pressure monitors are attached to each piece of equipment utilized in the operation. If any reading falls outside of the accepted parameters, alarms sound at the equipment and in the main control room, all unloading equipment is either shutdown automatically or manually and all valves are automatically closed. The unloading process is also monitored by gas and fire detection systems described below which also have the ability to shut down the unloading process in the event an unsafe condition is detected.

11. Once the railcars are empty, the compressors are shut down, all of the valves are closed and the unloading hoses are drained and then disconnected. After final temperature and pressure readings are taken from the railcars, the dome covers are closed.

12. Once the offloading process is complete and the LPG is stored in the ambient storage tanks, it can be sent through a steel pipe transmission line to the facility's existing day storage tank for immediate distribution via the existing truck loading rack or it can go through a refrigeration process in preparation for long term storage in the facility's existing refrigerated storage tanks.

13. LPG that will be sent to the existing day tank for immediate distribution via the existing truck loading rack is odorized by the facility's existing Odorant Injection System. This system is designed and calibrated to inject ethyl mercaptan at a rate of 1.5#/10,000 gallons of propane through one of two odorant pumps, which supply odorant to the individual truck loading stations or "skids" at a pressure of 250 psig. The Accuload computerized truck loading system controls the operation of individual solenoid injectors at each skid, which inject the correct amount of odorant based on actual propane flow. The system totals this amount and prints it on the truck's bill of lading at the completion of loading. The loading computer tracks total odorant consumption and total propane flow to confirm the proper injection ratio.

14. LPG that will be refrigerated for long term storage is pumped from the ambient storage tanks and pressurized to 200 psig, then sent at a rate of 350 gpm to one of two molecular sieve drying towers, to remove moisture from the product. The drying towers contain calcium oxide as a desiccant or drying agent. The drying towers work in tandem, with one tower on-line and the other off-line. As LPG passes through the on-line tower, the desiccant removes moisture from the product. As this occurs, the off-line tower is reconditioned by having heated, dry propane vapor blown through it. The heated, dry propane vapor collects the moisture in the tower and as the vapor exits the drying tower it is run through a condenser which removes the moisture from the vapor. The dried propane vapor is then returned to a Gastech Indirect Oil Bath Heater where it is further dried and heated and then cycled back through the off-line tower to continue the drying process. After a specified time period, the newly dried tower is brought on-line and the tower that had been in use is taken off-line to begin the drying process.

15. As the dried LPG exits the drying towers, it flows through a rigid steel transmission pipe to the chilling or refrigeration units located inside the machinery building. Here, the product temperature is reduced from ambient to minus 44 degrees Fahrenheit by running it through a propylene cascade refrigeration cycle. In this system, ambient LPG is cooled as it passes thru two separate heat exchangers. As the ambient LPG passes through the tube side of the heat exchangers, it causes the propylene refrigerant, located on the shell

side of the heat exchangers, to vaporize. This vaporization consumes the propylene's latent heat causing it to self-refrigerate. The refrigerated propylene then chills the LPG through the heat exchange medium. The propylene vapor produced through vaporization is piped to the proposed condenser cooling unit located outside of the proposed new machinery building, where it is condensed back into liquid and returned to the refrigeration process. The flow rate of the LPG entering the refrigeration system is controlled by an inlet control loop which can vary the flow anywhere from zero to 92,300 lb. /hr. As with all of SEA-3's equipment, this system will incorporate an automatic system safety shutdown should any reading fall outside of designated parameters or safety specifications.

16. Once refrigerated in the proposed machinery building, the LPG flows at approximately 40 psig through a steel transmission pipeline along the existing pipe rack assembly to the two existing refrigerated storage tanks for storage. From the refrigerated storage tanks, LPG can be sent through existing transmission pipelines and loaded onto vessels or barges or it can be transferred to the existing day tank for distribution through the existing truck loading rack.

17. SEA-3 personnel are physically present at all times during the unloading and refrigeration processes, which are also remotely monitored from the facility's main control room.

18. In addition to on-site and remote visual and automatic monitoring of the unloading and refrigeration processes, all processing areas are continuously monitored by gas and fire detection systems.

19. The fire detection system consists of Infra-red Ultra-violet ("IRUV") flame detection monitors. Upon detecting any open flame, the fire detection system automatically shuts down all operations and systems and closes all isolation valves. The system also automatically starts the fire water booster pump, activating a high pressure deluge firewater sprinkler suppression system, and automatically sounds alarms in the main control room and at the Newington, NH Fire Department.

20. The gas detection system monitors the air for the presence of gas vapors. If activated, the gas detection system automatically sends an alarm to the Main Control Room. The operator on duty in the Main Control Room will take appropriate action, up to and including shutting down all systems and notifying the Newington Fire Department. The Main Control Room is manned by an operator 24 hours a day, 365 days a year.

21. Prior to completion of our expansion project we will complete an operating procedure for the system containing startup, operational and safety procedures similar to the existing attached procedures.

22. All employees will be thoroughly trained in the proper operational and safety procedures of the system prior to startup, in accordance with our attached Safety Practices.

23. The existing facility was originally constructed in 1975 and complies with API 610, API 2510, and NFPA 58 standards; the improvements will be built to these same standards.

24. The facility is covered under EPA's Risk Management Plan (RMP) and OSHA's Process Hazard Analysis (PHA) programs.

25. The facility is also covered under USCG/Home Land Security requirements of our Facility Security Plan (FSP). The project upgrades will be adapted into the plan.

26. I have been employed in the liquefied gas industry for over 45 years. My career began in the United States Navy where I was involved in the production and distribution of liquid oxygen and nitrogen. From there I was employed for 4 years by Distrigas Corporation, which imported and distributed Liquefied Natural Gas in Everett, MA. Since 1975, I have been employed by SEA-3, Inc., which owns and operates two 560,000 barrel fully refrigerated propane import/export storage facilities located in Newington, NH and Tampa, FL. I have been heavily involved in the construction, startup and operation of both terminals. SEA-3, Inc. can receive propane by ships, barges and railcars. It can similarly load out railcars, tank trucks, vessels and barges.

27. I reside in Portsmouth, New Hampshire and my professional education and qualifications are as follows:

Personal Qualifications, Committees & Training

- United States Navy Liquid Oxygen and Nitrogen School Graduate.
- Wentworth Institute Boston, MA Associate Degree Machine Design Engineering.
- Northeastern University Lincoln College, Engineering Course Work, Boston, MA
- Ansul Fire Training School Graduate.
- Texas A & M University Industrial Firefighting School Graduate
- Past Member Executive Committee - Propane Gas Association of New England.
- Past Chairman - Propane Gas Association of New England.
- Past Chairman - Propane Gas Association of New England Emergency Response Committee.
- National Propane Gas Association Emergency Response Curriculum Development

Task Force Member for the Propane Emergencies Program.

- Massachusetts Firefighting Academy LPG Emergency Response Training Course Instructor.
- Massachusetts Firefighting Academy LNG/LPG Firefighting Course, Developer of Curriculum and Training Equipment
- NFPA Principal Committee Member on the Liquefied Petroleum Gas Code (NFPA 58).

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Data/Desktop/Site Evaluation Committee/Railcar Unloading System

A

PRE-CHECK AND VALVE POSITIONING

A. Proper procedures shall be used and safety equipment worn at all times.

B. Proper valve positioning for this procedure shall be per the valve listing at the end of this section.

Modifications and special situations may require differences to this procedure or the valve positions.

C. Reference Interlock Schedule and vendor manuals for automatic shutdowns and safety devices incorporated in this system.

1. UV Detection at the Rail Loading gives a Transfer & Loading Shutdown. U V Detection at TK-01/02 activates the Transfer & Loading and Dock Shutdowns (dock shutdown valves designated by an *).

HCV-040	- Close	RP-026-01	- Close
* RB-021	- Close	RP-026-02	- Close
RB-050	- Close	*TK-02 Internal Valve	- Close
RB-050A	- Close	*RP-187	- Close
*RB-152	- Close	*RP-188	- Close
RB-153	- Close		
*RP-002	- Close	Transfer pumps	- Stop
*RP-007	- Close	*Vapor blower	- Stop
RP-007-01	- Close	Warm pumps	- Stop
RP-007-02	- Close	Truck skids	- Stop
RP-016A	- Close	Rail skids	- Shutdown
*RP-017-01	- Close	Unload compressors	- Shutdown
*RP-017-02	- Close	Fire water pump	- Start
RB-172	- Close	External siren and strobe light	
RP-710	- Close	Newington Fire Department Alarm (Ring-in)	

Reference Interlock Schedule for variations in valve closures

CAUTION: U V Detection at the Rail Loading area, Truck Loading Bays, Day Tank and TK-01/02 activates the Transfer & Loading and Dock Shutdowns closing RB-153. Depending on the emergency or other situation, it will be necessary to open RB-150 or shutdown the refrigeration equipment.

U V Detection at TK-01/02 closes the TK-02 Internal Valve.

Transfer & Loading Shutdown at the Rail Loading area starts the fire water booster pump. The deluge monitor nozzles at the rail area must be manually directed to the problem area. When the system activates and depending on the problem, it may be advisable to shut down one or more of the nozzles as a water conservation method.

Note: Position switches for RB-050 and RP-050A must be energized, with the valves in the full open position, for the system to function.

Position switches for RB-026-01and RP-026-02 must be energized, with the valves in the full open position, for the system to function.

2. Safety & system shutdowns incorporated on each skid

3. C V detection (Warning and Danger) activates: Flare system shutdown, sump pump shutdown
4. Day Tank LSH-017
5. RB-172 - Close

EMERGENCY SHUTDOWN STATIONS (ESD)

The railcar loading/unloading emergency shutdown buttons are located at the bottom of each stairway. At skid "A" there is also a reset button.

When the emergency shutdown system is activated, either automatically or manually, the air supply solenoid valve, reference figure 6, closes and dumps the system air, allowing the ESV'S to close. Electrical power is secured to the skids and the unloading compressors. The Emergency Control Panel Transfer & Loading shutdown will also cause the solenoid valve to dump the system air.

Before resetting the system, return all the air supply and product valves to their normal shutdown position. To reset the system the reset button at skid "A" must be depressed.

PROCEDURE

Reference Consequence of Deviations From Operating Limits, Cause and Correction section, page 5, that are examples of deviations or upset conditions from this procedure.

A. Line up the Ondyne moisture analyzer to sample the rail car unloading line. The analyzer will give an alarm if the product has a dew point of less than -10 degrees F. During the unloading operation, periodically monitor the reading. If the alarm sounds or if there is any concern about moisture, perform a Freeze Valve Test. If the test fails, advise the control room and do not unload the car. Perform a freeze valve test on all the other cars on the siding.

B. Proceed to the rail area, place the "Tankcar Connected" signs on the tracks and open all appropriate personnel and vehicle gates.

C. Carefully check the car(s) for any leaks or damage. If any discrepancies are found, report them to the control room and do not unload the rail car until the extent of the damage and/or product loss can be determined.

D. Using the tankcar unloading forms, record the rail car information as applicable. Tank car test dates are performance oriented and are determined by the tank car manufacturer. Test dates as determined by the manufacturer will be stenciled on the railcar. Railcars may be unloaded with expired expiration dates. Notify the shipper in this instance.

E. Key off the cold pumps and energize the skid using the on/off permissive power button on the Control Room Truck and Rail Car Loading Panel. Close the unloading compressor circuit breakers.

F. Close the railcar loading line block valve RV-097 and open the cross-connect valve RB-401.

G. The purpose of the vapor heater is to vaporize any liquid that has condensed or carried over into the vapor separator from the fuel gas header before it can enter the compressors. The procedure for operating the vapor tank heater is as follows: Turn the vapor tank power switch to the "ON" position. Adjust the thermostat located to the left of the vapor tank power switch to 60^0 F. The vapor tank heater will cycle on and off, as the thermostat requires. In cold weather, leave the vapor tank heater power switch on the "ON" position as necessary.

CAUTION: Always check the vapor separator for liquid prior to starting the compressors.

H. Open the unloading compressor suction and discharge valves, adjust the compressor two way valves for proper flow direction.

I. Position the rail car mode selector switch and open the rail area cross-connect valve(s) for the skid(s) in use, reference Figure 1.

J. Remove the rail car valve plugs and install the N-560 ESV's and the liquid and vapor unloading hoses. Connect the operating air lines and open the ESV'S using the three way air valve. To insure proper operation, open the ESV valves prior to opening the rail car dome valves, reference Figure 1.

Caution: DO NOT attempt to raise the outage tube until after the N-560 ESV valves are in place and the unloading hoses connected.

K. Raise the outage tube on the rail car and record the reading. Perform a Sniff Test for odorization and record the results. If there is any question (of odorization) after the Sniff Test, perform a Stain Tube Test. If the product does not pass either test, notify the control room and or management; do not unload the car until other tests can be run. Insert the thermometer into the well and record the product temperature and pressure.

L. If appropriate, use the Dragur test instrument or litmus paper to spot check the tank cars for concentrations of ammonia, propylene, butane, etc. If any are found, report it to the control room and do not unload the car until more information is available.

M. Slowly open the rail car dome valves to avoid closing the tank car excess flow valves. Check for leaks.

CAUTION: The rail car liquid and vapor valves MUST be in the fully open position to insure the proper operation of the rail car internal excess flow valves. The excess flow valves are of the "Ball/Slug" type and have a design closure rate of 325 gpm. Therefore a small hose leak WILL NOT cause the valve to close.

If it is necessary to throttle the product flow, it is imperative that the 3" block valves at the top of the stairways be used.

N. Slowly open the liquid and vapor hose valves, then open the 3" liquid line block valve at the top of the stairway. You should have liquid flow due to differential pressure.

O. Check unloading compressors for liquid in the trap, check the oil level etc. and depress the start button. Open the fuel gas by-pass valve RB-704 at the day tank. When the differential pressure between the rail car and the day tank is great enough, liquid will begin to flow.

P. Make periodic checks for leaks and ensure that the excess flow valves have not closed. Do not exceed a differential pressure of 70 psig across the compressors.

NOTE: If the excess flow valves close, close the rail car eduction valves and wait for the ESV' to open. The differential pressure across the excess flow valves must equalize before the valve will open.

Q. As the unloading proceeds, continually check the car(s) for any signs of leaks or problems. If any leaks are or problems develop, immediately shutdown the operation and notify the control room. If the situation is correctable, an attempt should be made to do so and the operation restarted. If the situation is not readily correctable, discontinue the operation. Close the 6" liquid line block valve and the railcar dome valves. Leave the ESV and hoses connected until the car can be looked at.

When the unloading operation is interrupted or shutdown, or if the operator must leave the rail area, close all tankcar dome, ESV and bypass valves. Open the drain valve on the liquid hose(s) and bleed off the pressure to the V & R header.

R. Pump down the fuel gas header to 20 psig and shutdown the unloading compressors. (Winter Operations)

S. When conditions indicate that the rail car is empty (sound and vibration of unloading hose), crack open the rail car sample valve to be sure it is empty.

T. When all rail cars are empty, close cross connect valve RB-401, close the fuel gas header by-pass valve RB-704 and using the last car, pump the header down to approximately 20 psig and secure compressors. (Winter Operations)

U. Close the rail car liquid eduction valves "TOOL TIGHT" and vent the hoses to the V & R header. Close the hose valves, disconnect the hoses, remove the ESV's and replace the valve plugs on the rail car. Store outage tube and replace cover.

V. Allow the tank car to vent to approximately 10 psig (Only if required) thru the vapor hose to the V & R header. When complete, close tankcar and hose valves "TOOL TIGHT", remove the vapor hose and the ESV's. Replace valve plugs and tighten "TOOL TIGHT". Remove thermometer and record temperature and pressure of the tankcar. Replace temperature well cap and sample valve plug and tighten "TOOL TIGHT".

W. Close the dome cover, store platforms, and check for properly placard the car (1075) remove "tankcar connected" signs. Close the cross-connect valves. **Ensure RV-097 is cracked open to relieve line pressure.**

CAUTION: All valve plugs and caps MUST be tightened **"TOOL TIGHT".**

DAY TANK FILLING VOLUME

A. The day tank shall never be filled beyond the maximum permitted liquid volume, as a percent of total water capacity, Reference NFPA 58 Table 4-4.2.2(b).

CONSEQUENCE OF DEVIATIONS FROM OPERATING LIMITS, CAUSE AND CORRECTION

Deviation: Excessive flow device "slugs"

Consequence of Deviations: Slugging the excessive flow device will stop the propane flow from the railcar and allow pressure to build.

Correction or Avoidance of Deviation: Each rail car has a excessive flow device on the liquid eduction lines. If these slug the flow stops and the operator will have to close the manual shut off valve, allow the device to equalize and open and then restart flow by throttling the manual shut off valve.

Deviation: Liquid in the suction to the unloading compressors

Consequence of Deviations: The compressor liquid level switch will activate and shut down the compressor which will result in the propane flow being reduced or stopped.

Correction or Avoidance of Deviation: Liquid is prevented from forming in the suction line by the operator keeping the suction pressure below the saturation pressure for the ambient temperature the piping is exposed to. A heated collection pot is located in the suction piping to prevent this problem.

Deviation: Improper valve lineup on rail pumps

Consequence of Deviations: The rail pump would run dry and cause a failure of the mechanical seal and/or damage to the pump.

Correction or Avoidance of Deviation: The valve lineup is checked before any rail operations are started and again before any equipment is started.

SYSTEM OPERATING VALVE POSITION

Number	Position	Size (in.)	P&I Drawing
RV - 132	Close	6	1
RB - 186	Open	2	1
RB - 186A	Open	2	1
RB - 704A	Open	2	1
RB - 704B	Closed	2	1
RB - 704	Open	2	1
PRV - 703	Auto	2	1
RB - 717	Open	6	7
RV - 131	Close	6	7
RB - 718	Close	2	7
RB - 719	Close	2	7
RB - 720	Close	2	7
RB - 721	Close	2	7
RX - 722	Position	1	7
RX - 723	Position	1	7
RB - 128	Open	2	7

RB - 146	Close	2		7
RB - 146A	Close	2		7
All Drains	Close	1		
RB - 113	Close	3		7
RB - 178	Close	3		7
RB - 123	Open	3		7
RB - 716	Open	3		7
RB - 101	Close	4		7
RV - 109	Close	6		7
RV - 115	Close	6		7
RV - 089	Open	8		7
RV - 097	Close	8		2
RB - 401	Open	3		2
RB - 068	Closed	2		1
RV - 048	Open	8		1
RB - 616	Closed	1		7
RX - 716	Open	6		7
RB - 122	Open	3		7
RB - 124	Open	3		7

Figure 1

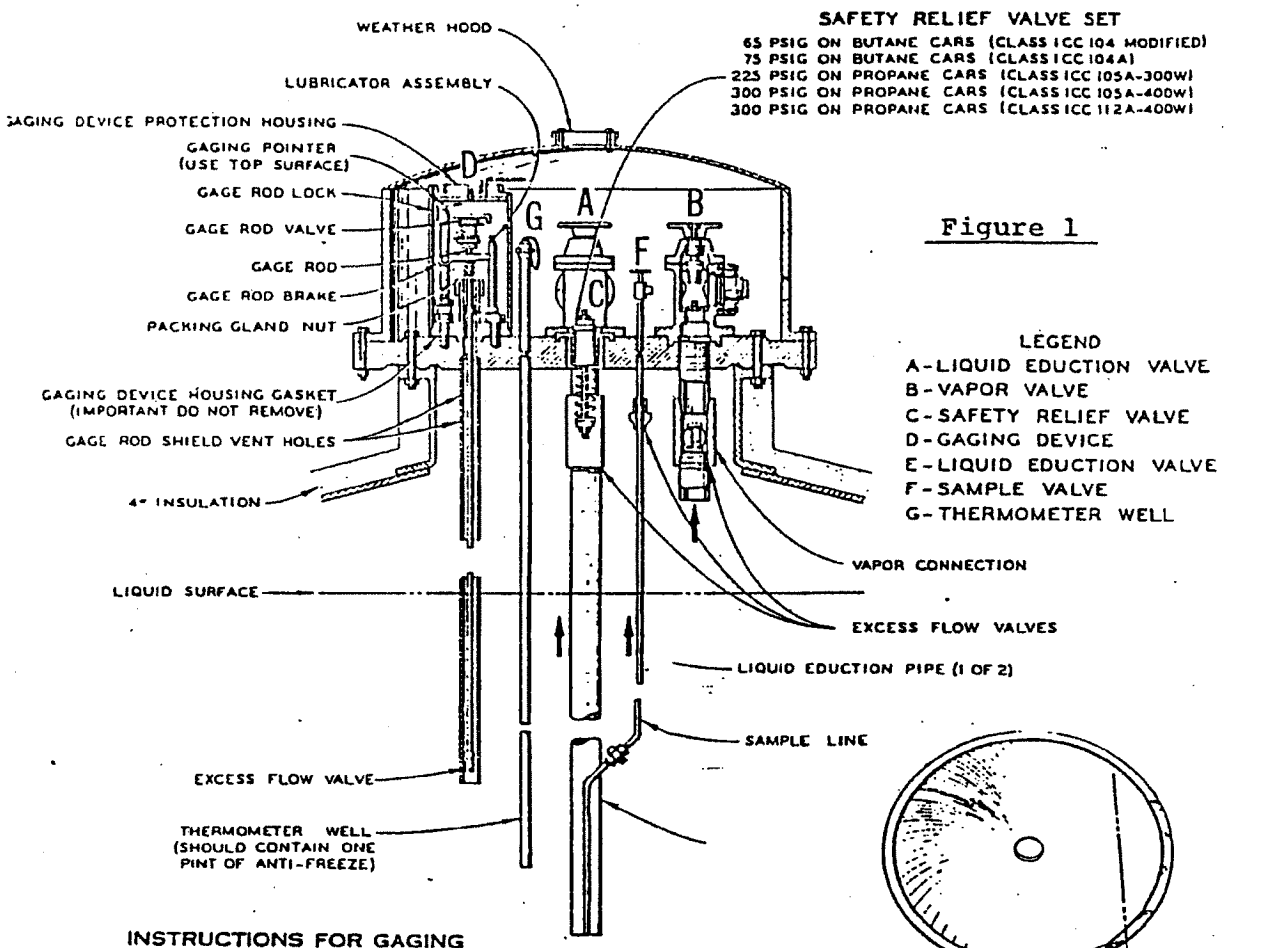


Figure 1

LEGEND
A - LIQUID EDUCTION VALVE
B - VAPOR VALVE
C - SAFETY RELIEF VALVE
D - GAGING DEVICE
E - LIQUID EDUCTION VALVE
F - SAMPLE VALVE
G - THERMOMETER WELL

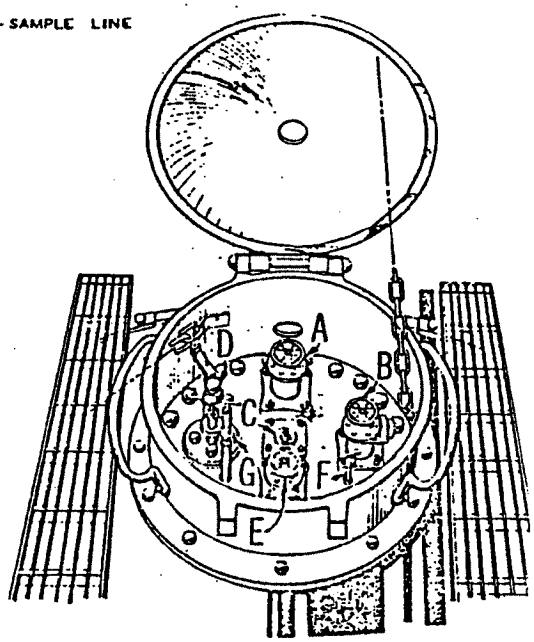
INSTRUCTIONS FOR GAGING

UNSCREW AND REMOVE GAGING DEVICE PROTECTION HOUSING. DEPRESS GAGE ROD AND FREE IT FROM GAGE ROD LOCK. IF EQUIPPED WITH GAGE ROD BRAKE, DEPRESS BRAKE TO RAISE GAGE ROD. LOOSEN PACKING GLAND NUT SLIGHTLY IF GAGE ROD DOES NOT MOVE EASILY. OPEN THE GAGE ROD VALVE TO PERMIT THE FLOW OF GAS OR LIQUID THIS MUST BE DONE SLOWLY TO PREVENT THE EXCESS FLOW VALVE FROM CLOSING. ADJUST GAGE ROD TO LIQUID LEVEL. READ OUTAGE INDICATED ON GAGE ROD OPPOSITE TOP SURFACE OF GAGING POINTER.

AFTER GAGING, CLOSE GAGE ROD VALVE, LOWER GAGE ROD, RESET GAGE ROD LOCK, TIGHTEN PACKING GLAND NUT FIRMLY WITH AN END WRENCH AND SCREW GAGING DEVICE PROTECTION HOUSING INTO PLACE.

NOTE: SOME LP-GAS TANK CARS ARE OF SLIGHTLY DIFFERENT CONSTRUCTION THAN THE ABOVE DRAWING. IF IN DOUBT AS TO CORRECT UNLOADING PROCEDURE, CONTACT PRODUCT SUPPLIER.

NOTE: ICC 112A-400W TANK CARS FOR PROPANE SERVICE ARE SIMILAR TO ICC 105A-400W EXCEPT DO NOT HAVE INSULATION



LP-GAS TANK CAR DOME FITTINGS

B

GENERAL

The purpose of this section is to summarize the safe handling, safety practices and fire fighting techniques involved in the storage and processing of liquefied petroleum gas (LPG).

SAFETY PROCEDURES

All persons who handle, store or process propane liquid or gas (LPG) should be familiar with its nature, characteristics and hazards. Due to the nature of the product handled, all safety practices and procedures shall be observed during system modifications, checkout, start-up and day to day operations.

Safety equipment consisting of water hoses, portable dry chemical extinguishers, fire fighting suits, safety gloves, fire blanket, combustible vapor/ultra-violet detection, combustible gas/oxygen analyzer and other safety equipment will be maintained and be accessible for immediate use.

Operations involving storage, handling or transferring of low or ambient temperature LPG should be performed by trained and qualified personnel.

Personnel involved in transferring propane liquid or gas shall wear suitable protective clothing, gloves and face shield. Safety precautions must be exercised during any operation in which personnel may come in contact with the product or with a metal surface cooled to a temperature below 10^{O} Fahrenheit; reference NPGA Publication #105-88 at the end of this section.

Care should be taken to prevent the accumulation of moisture or hydrates in lines, valves, or equipment that could cause pressure build-up. Avoid entrapment of propane liquid in confined sections of piping or vessels not protected by safety relief pressure valves.

Pipes and other equipment subject to low temperature product should be insulated, to the greatest degree practical, to avoid contact between personnel and bare metal. When insulation is removed it should be replaced as soon as possible. Reference NPGA Publication #103-79 at the end of this section.

To avoid damage due to thermal expansion of the liquid, propane tanks should be filled only to the prescribed limits. Propane should be maintained in the state and at the temperature for which the systems or tanks were designed.

PROTECTIVE EQUIPMENT

Personnel required to use protective or rescue equipment should be trained and qualified in the equipment's use as well as his/her capabilities and limitations.

Personnel should be familiar with proper methods of fitting, testing and maintaining protective equipment. Courses of instruction have been implemented to familiarize personnel with equipment and manufactures data on the equipment.

Protective equipment should not be removed while the user is in the hazardous area, nor should he enter the area without it.

No attempt should be made to use equipment for any purpose other than for which it was designed.

Poorly fitted equipment or in poor condition shall not be utilized. Torn or otherwise damaged protective clothing shall not be used. If protective clothing is torn or damaged while in the hazardous area, personnel should leave the area immediately.

Protective equipment that seriously reduces vision, interferes with communications, or unduly reduces mobility or dexterity shall not be used.

DETECTION EQUIPMENT AND WARNING DEVICES

These procedures will ensure that the equipment will operate as designed. For more detailed information, consult the manufacturer's and industries' publications.

Detection equipment should be installed, maintained, adjusted, or repaired only by authorized and trained personnel.

Detection equipment should be used to evaluate conditions, which might be toxic, flammable, or explosive.

Detection equipment shall be maintained in a state in which readings will be dependable and accurate.

The manufacturers' recommendation or pertinent technical instructions shall be followed for installation, adjustment, calibration, maintenance and repair.

Inspection, calibrations, component replacement and accuracy checks shall be made at regularly specified intervals.

Personnel shall not hit, shake, drop, or handle detection equipment roughly.

Before use, care shall be taken to ensure that the equipment to be used has been calibrated and is suitable for detecting the conditions involved.

Warning systems and equipment are installed to alert personnel of a hazardous condition or that a hazardous condition may be eminent. Such systems and equipment should be tested on a preset schedule for adequacy and repaired immediately if defective.

Periodic training sessions and exercises shall be conducted to insure personnel are properly trained.

Personnel should take necessary corrective action when a warning signal is received.

SPILL CONTAINMENT

When propane liquid is released it rapidly vaporizes and starts mixing with the atmosphere to form three phases of mixtures. The first phase will be too rich to burn where the vapor is concentrated. The second phase starts when the concentration of propane gas and the surrounding atmosphere produce a mixture within the flammable limits. The flammable range of propane gas in air is approximately 2 to 9.5 percent by volume. Ignition of this gas produces immediate flame spread. The released vapor is only safe against ignition after it has passed beyond the first two conditions, and reaches the third phase in which it becomes too lean to burn.

If liquid or vapor escapes, the initial action should be to shut off the supply of product thereby keeping the amount escaping to a minimum.

Warning: If cold LPG (-42^{O} F) leaks on non-cryogenic material, that material may become brittle and fracture. An example of this would be a valve packing or flange leak allowing low temperature propane to come into contact with mild steel. The leak must be stopped or diverted from this material.

Once a liquid spill has occurred, try to prevent ignition of the vapors. Shut down all equipment and sources of ignition. The liquid, depending on conditions, will form a pool and vaporize rapidly. If possible, direct water fog into the vapor cloud to help dilute the vapor to a too lean to burn mixture and direct it away from sources of ignition.

While this is being done, check the area around the spill with a combustible gas indicator to monitor the extent and direction of travel of the gas air mixture. Should the hazardous area increase, additional sources of ignition may have to be eliminated.

Caution: The application of a water fog directly into a propane liquid puddle will promote more rapid boiling of the liquid, increasing the hazardous area.

In the event of fire, the action, which should be taken, is dependent upon the location, size, and source of fuel. If propane vapor is ignited, it is desirable to cut off the source of the fuel and allow it to burn itself out, provided the fire is not posing an immediate threat. Water spray should be applied to cool all structural steel, pressure vessels and piping as required to avoid the buildup of the intense heat. Small spills can be safely extinguished by smothering the fire using dry chemical extinguishers. Care should always be taken when putting out a fire. If the source of fuel is still present, there is always the possibility of sudden re-ignition.

FIRE FIGHTING PROCEDURES

In the event of a fire involving LP-Gas it is important to react quickly. The purpose of this article is to give some basic procedures and techniques involved in fire fighting and vapor control. For more detailed information consult manufacturers' and industry's publications concerned with this subject. Reference NPGA Publication #200-89 and 204-88 at the end of this section.

In all cases, notify the local fire department and evacuate all non-emergency personnel within 3,000 feet. All emergency personnel shall be outfitted with NFPA approved full fire fighting protective clothing (turnout gear).

In any LP-Gas fire the flames should not be extinguished unless the fuel supply can be turned off immediately. If the fire is extinguished and the supply of fuel is not turned off an explosion hazard much greater than the fire hazard may be created. Accordingly, fire fighters should be trained not to extinguish a flammable gas fire until a definite plan of control, extinguishment and fuel shut-off has been established and each man has been instructed on his part of the operation. During this period, water spray from either hose lines or fixed piping can be directed upon the surrounding equipment to prevent over-heating.

Where a tank is not involved in a fire, but subjected to excessive heat because of a fire close by, the best way to keep the tank pressure down is to cool it with a hose stream(s), recommend 500 gpm minimum for a 1,000 gallon tank or larger.

Use plenty of water on any part of a tank where there is flame impingement; recommend 500 gallons minimum for a 1,000 gallon tank or larger. This is necessary to keep hot spots from developing. Hot spots will weaken the tensile strength of the steel, which could lead to a Boiling Liquid Expanding Vapor Explosion (BLEVE).

That part of a tank, which does not contain liquid, will heat up more quickly than the liquid wetted surfaces. Direct the water to the upper part of the tank allowing it to run down the sides and ends.

ASME-API propane tanks are built for a working pressure of 250 pounds per square inch. They are hydrostatically tested to 500 pounds per square inch. They are fabricated with a safety factor of four. That means that as an unfired pressure vessel, the shell and heads will withstand an internal pressure of one thousand pounds per square inch. When a tank is involved in a fire the tensile strength goes down as the temperature of the steel goes up. Somewhere between 800 and 900^{O} F the safety factor of 1,000 pounds has gone down to 50%. At a thousand degrees it is down to 25%.

WATER IS THE ANSWER TO KEEPING THE PRESSURE DOWN, AND THE SAFETY FACTOR OF FOUR INTACT.

It is not good practice to put out a liquefied petroleum gas fire unless you are able to shut off or stop the source of the fuel. Extinguishing an LPG fire, without a means of shutting off the supply, can create a dangerous situation. Uncontrolled flammable gas will spread, requiring only a source of ignition to re-flash. When this happens the entire area involved in the vapor cloud will be involved in a fire. It is much better to keep the tank cool and let the gas burn itself out.

Up to this point, the importance of water has been stressed for controlling temperature and pressure in liquefied petroleum gas storage tanks involved in a fire. However, there will be areas where water is not available. Without water it is a case of considering possibilities, having a plan of action, and following through accordingly. One advantage of where there is no water, there is generally no high exposure risks to be considered.

No matter where or how it happens, there will always be spectators. Evacuate the area of all spectators. They are not a part of any risk involved. Size up the situation. If it is vapor that is burning the flame may burn outward with great force and if there is no flame impingement on the tank or other equipment chances are the fuel will be consumed without incident. Under the circumstances named, the tank is receiving heat by convection and radiation only. At the same time there is a cooling (refrigerating) process going on in the liquid because of the liquid changing state from liquid to vapor. As the liquid grows colder, the pressure is reduced. As the pressure goes down, the size of the flame will go down and less heat will be concentrated on the shell of the tank. On the other hand, if the tank is involved in flame from the burning vapor the internal pressure goes up rapidly due to the heating of the liquid. Liquefied petroleum gas tanks are equipped with safety relief valves to relieve excess internal pressure.

Normally the relief valves communicate with the vapor section of the tank but in the case of a truck accident, the tank could be far enough on its side for the relief valves to be in the liquid, and the outlet side of the valves could be buried in the pavement. Where the relief valves are buried there is little chance for the excess pressure, resulting from the fire, to relieve itself to the atmosphere. You can reasonably expect the tank to rupture, in as little as 10 minutes, if the fire continues. If the relief valves are in a position to vent to the atmosphere but will be discharging liquid instead of vapor their rated capacity, which is base on vapor, will be greatly impaired. Here again, you can reasonably expect the tank to rupture.

Where the tank is in a normal position, the relief valves will open and discharge vapor when the pressure reaches a pre-determined setting based on the working pressure of the tank. The relief valves will relieve pressure down to the limit of their capacity. Beyond that limit, if the pressure continues to go up, it could reach a point where the tank would rupture causing a Boiling Liquid Expanding Vapor Explosion (BLEVE). How much below the safety factor of one thousand pounds a rupture could occur will depend on the temperature of the unwetted surface of the steel shell.

Where an LPG tank is involved in fire, it is good practice whenever possible to stand clear of the heads. In the event of a Boiling Liquid Expanding Vapor Explosion (BLEVE), it is the heads that generally travel great distances while the shell has a tendency to flatten out. A BLEVE occurs when the internal pressure is greater than the steel shell can stand and it ruptures.

We have been talking about vapor. What about a liquid? A liquid leak will not lower the pressure in a tank by reason of a refrigeration process such as caused by expanding vapor. Broadly speaking, where conditions remain the same, the velocity flow of the liquid will continue at the same rate until all the liquid has been discharged. On a relative base, if the pressure goes up, the velocity flow goes up. If the pressure goes down, the velocity flow goes down.

The amount of heat concentrated on the tank determines the temperature of the liquid in the tank. The temperature determines the pressure and the pressure the velocity flow. Liquid will act in the same manner as vapor when burning except that for the same size break or opening, the fire will be larger, spread out further, and accelerate the same steps faster.

Remember, if an LP-Gas tank is exposed to fire, it can rupture violently within 10 minutes from the time flames first come in contact with the unwetted surface. Pieces of the tank have been propelled as far as 3,000 feet. The released gas on rupture will probably be ignited immediately, creating ground level flashes and fireballs several hundred feet in diameter.

When using dry chemical as an extinguishing agent escaping LP-Gas fires must be approached and extinguished from up-wind. The dry chemical stream is directed into the flowing gas at the break utilizing the velocity of the gas to carry the extinguishing agent out to the actual point of combustion. Attacking this type of fire at right angles will result in a complete waste of the extinguishing agent. Hold your dry chemical stream on the escaping fuel behind the point of combustion. Do not chase after the ball of fire. After extinguishment you and your extinguisher should remain close by and ready as "stand-by" protection against re-flash during the time persons are working to stop the flow of fuel. Cooling water from a hose stream is of great benefit in cooling down the metal in the area of the fire and helping to prevent re-flash. Remember that a 20-30 lb. dry chemical extinguisher will last approximately 20 seconds in use. Every extinguisher should be re-charged immediately after use. Partially filled extinguishers, for all practical purposes, are empty extinguishers. To refill the extinguisher, invert it and squeeze the nozzle to relieve all pressure and clear the agent from the container, hose and nozzle. After all the pressure is relieved, return your extinguisher to an upright position and transport it to your re-charge station.

When LP-Gas or liquid is escaping and has not been ignited, it is not a good policy to ignite it. By the time the fire department arrives, the gas has already spread out and there is no way of telling how far it has traveled or exactly where. Efforts should be directed at isolation sources of ignition in the immediate vicinity. One method for handling this type of incident is to dilute the gas/air mixture below the flammable limit with the use of water fog from a hose stream. Water fog has been found to be very effective and can also be used to direct the vapor away from sources of ignition.

An actual example: There was a 20,000-gallon tank located at a large manufacturing company near Los Angeles. The tanks manhole cover had about $^{2}/_{3}$ rds of its gasket blow out. Large amounts of propane vapor were escaping. Water fog was used to break up the gas and dilute it. It was calculated that at the height of the incident, 72,000 cubic feet of vapor were leaking to the atmosphere each hour.

With the use of water fog, the gas was so well dispersed and diluted that at 100 feet from the leak the firemen were unable to register a flammable mixture on their combustible gas indicator. Because of the difference in boiling points and vapor pressure of liquefied petroleum gases, it is vital to know what product of liquid is involved. Knowledge is always an advantage in the decision making process. If the incident involves a transport, the driver should be able to supply vital information i.e., type, quantify and MSDS of the product involved. If at a storage plant, there will generally be someone around connected with the business who can supply this same information. Either man could be of great help because of their knowledge of the product, system, or conditions at the time.

Remember that air movement can cause escaping gas to travel considerable distances along the ground, especially if released in liquid form. Liquid release is evidenced by a white fog or cloud as the cooling process, created by the liquid expansion to vapor, condenses the moisture in the air. In general, mixtures within the cloud are to rich to burn, at the edges of the cloud they are within the flammable range and at some distance from the cloud they will be to lean to burn. Vapor releases are usually invisible and remember not all LP-Gas in transit is odorized.

Caution: A Combustible Gas Indicator should always be use to determine the extent of the flammable range and gas travel.

Unodorized gas is sometimes transported between refineries and to places of business where the use of odor would not be acceptable for the process or purpose used. Trucks carrying unodorized gas are required to be labeled and marked "unodorized gas." Since you cannot smell the gas, the only method for detecting flammable mixtures in the area is with a combustible gas indicator.

Heavy sweating on icing of the tank is an indication that the liquid is going through a "refrigeration or self cooling process". As a hypothetical case, let us say that because of a broken fitting in the vapor area of the tank, large quantities of gas are escaping to the atmosphere. The pressure in the tank rapidly starts to decrease. The liquid "boils" to replace this vapor and in the process of changing state its temperature drops. As the temperature drops the pressure correspondingly drops. Soon a sweat line appears on the tank and finally a frost or ice ring. The liquid temperature inside the tank is now below 32^{O} F. The flame is still burning at the broken fitting but in a lazy manner due to the decreased pressure.

When a tank is this cold, with the pressure down, applying a stream of water to the tank is generally not a good practice. The water at this point would only tend to increase the pressure in the tank and therefore the velocity of the flame. The liquid in the tank is colder than the water. If there is no flame impingement on the tank, one method of control might be to let the flame burn and protect surrounding exposures.

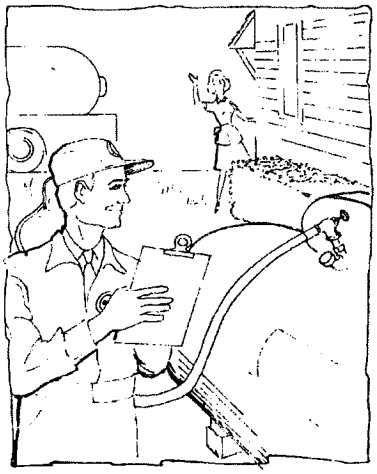
The flame could very easily be extinguished at this stage but, as previously mentioned, that would create a problem of uncontrolled gas leaking. As long as the fuel is being consumed there is no chance for a combustible mixture to accumulate. If the leaked can be stopped with a wooded plug remember that pressure will start to build immediately. Should the plug blow out because of the increase in pressure the escaping gas creates a second hazard. The amount of pressure that will build up will depend on the product and the temperature of the liquid. As an example, the vapor pressure of propane is 175.8 pounds pressure per square inch at 100^{O} F. Let us say the temperature at the time of the incident was 60^{O} F. The pressure of propane at 60^{O} F would be 92.4 pounds per square inch.

The questions to consider are: Will the plug hold at 92.4 pounds pressure per square inch with a fair margin of safety, and if the temperature goes up, will the plug hold at the higher pressure. Remember, as the temperature goes up, the pressure goes up. The height of the frost or icing on the tank will indicate the level of the liquid in the tank. The icing on the tank will be slightly higher than the level of the liquid in the tank.

It is important to remember that the figures used in this section are based on the pure propane. All industrial, commercial and residential product contains small amounts of other hydrocarbons, which will make small differences in its vapor pressure. From a fire-fighting standpoint and for all practical purposes this can be disregarded.

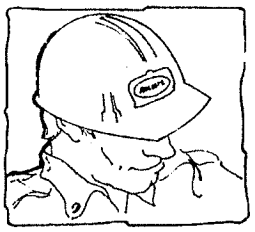
It would be almost impossible to write a set of rules that would cover every possible contingency but it is hoped that the amount of basic information contained herein will be of help to the members of the fire service and industry personnel.

KNOW AND PRACTICE THE TECHNIQUES OF FIRE CONTROL AND GAS DISPERSION CONTAINED IN THE NFPA FILM "HANDLING LP-GAS EMERGENCIES" AND OTHER INDUSTRY PUBLICATIONS BEFORE THE ACCIDENT OCCURS.



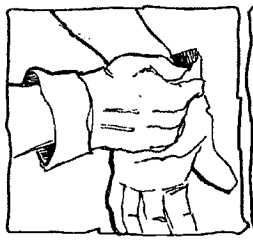
Neat uniforms increase customer confidence . . . build employee morale.

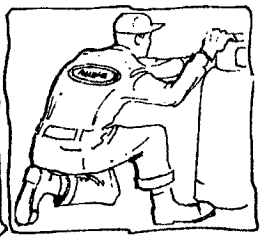
PROPER CLOTHING Promotes Safety



What to wear: Goggles, when flying particles may be present . . . A hard hat, for unloading cars, working in crawl spaces . . .

Raingear, for stormy days. Yellow or orange colors offer extra protection for night work. Strips of reflecting tape also are useful.





Heavy gloves, when working with gas hoses; prevent frost bite . . . Buttoned coveralls, ideal for a dirty job . . .

. . . PROPER CLOTHING will aid in safe operations, instill pride in the employee and give the customer confidence in the employee and the company he represents.

The use of quality uniforms in one of the medium to dark colors, will do much to promote pride in the employee and respect by the customer. In hazardous areas, long sleeved clothing should be considered. Providing a pair of coveralls of the same or contrasting color will aid the employee in maintaining a good appearance when the job for the day turns out to be a dirty one. Since zippers will jam at times, use of a button style coverall is recommended to insure quick removal in case of an accident or fire.

Different clothing has different qualities and the technology is constantly changing. Consult the clothing manufacturer for recommendations in your particular circumstance. Ask them to consider the safety of the employee, the likelihood that certain materials may generate a static spark, and that certain fabrics are not as fire resistant as other fabrics.

Safety glasses, goggles, or plastic shields must be used when inspecting relief valves, grinding, cleaning cylinders, sanding or similar work involving flying particles or possible high pressure product release.

Hard hats should be considered when working in ditches or in close quarters, such as crawl spaces, when unloading tank cars and any time there is danger of falling objects or low clearances.

Foot protection should be worn when a danger of foot injury exists.

Gloves, of course, are a must. They should be used at all times when filling cylinders by tank truck, or on the dock as well as by transport drivers when loading or unloading, and should be resistant to the action of liquid propane.

Bright yellow or orange raingear used in bad weather will aid in protecting the employee from the elements and make it easier to see him under poor lighting conditions. Proper storage of such gear will prolong its life and help keep it clean.

Good maintenance of the proper clothing is also necessary — soap and water costs so little. In most cases the customer's contact with the company is thru the employee. Their opinion of the company and employee alike is based on the impression the employee makes while performing his job. Let's be sure that impression is a good one.

"Let's Think Safety"

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Phone: 708/515-0600
Printed in U.S.A.

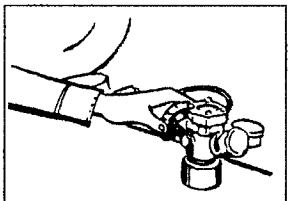
NPGA #202-93

After Accident Procedure

Steps to Take in the Event of An Accident Involving Propane

Any discussion of after accident procedures must, of course, be prefaced with the thought that prevention is the best cure. Prevention of accidents begins with a thorough understanding of the characteristics of propane, proper installations and equipment (in accordance with state and local regulations and requirements of NFPA 58, the *Standard for Storage and Handling of Liquefied Petroleum Gases*) and adequate preventive maintenance on all equipment. It further entails education and training of employees and education of customers in the safe handling of propane.

The following outline details the basic steps and actions to be taken in case of an accident involving propane.

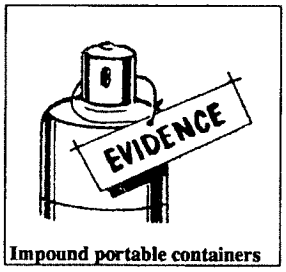


Shut off gas at the tank.

1. Shut off gas at the container. Record the date, time and container magnetic gauge reading (if so equipped). Containers without gauges should be weighed.
2. Notify the fire department and/or other appropriate regulatory authority.
3. Notify the gas supplier.
4. Notify the insurance carriers and work closely with your adjuster.

Notify: regulatory authority, insurance carrier, gas supplier.

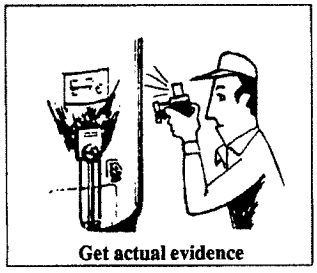
5. If the system contains below-grade piping, check the soil atmosphere along the route of such piping for the presence of any combustible vapors. Conduct tests of any adjacent confined spaces (manholes, vaults or buildings) for combustible vapors. If any combustible vapors are present, make the location safe by:
   a. Evacuating involved people to a safe location.
   b. Eliminating potential ignition sources.
   c. Requesting assistance from police and fire department personnel.
   d. Ventilating the area.
   e. Re-routing traffic.
   f. Maintaining surveillance until any unsafe conditions are corrected.



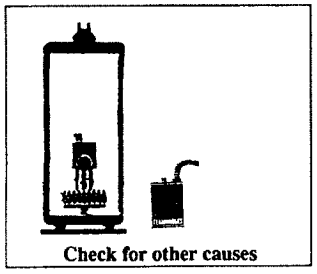
Impound portable containers

6. Sniff test the gas. If possible, obtain written statements on the presence of gas odor from the customer, fire chief, law enforcement officers and other neutral parties.
7. If a portable cylinder is involved, it should be impounded by a neutral party. If a bulk tank is involved, a liquid sample should

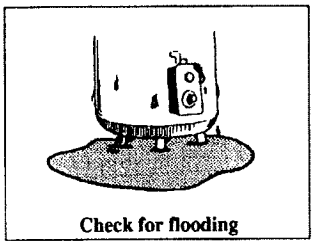
Get witnesses' statements



Get actual evidence



Check for other causes



Check for flooding

be obtained in a suitable container designed for that purpose and impounded. (See Bulletin #408, "Securing LP-Gas Samples in Sampling Containers".) A neutral party could be the fire marshal, sheriff or other law enforcement officer.

8. Obtain complete, signed and/or taped statements from all witnesses of the accident, if possible.

9. With the permission of the authority having jurisdiction, thoroughly check all propane equipment, including vents, to determine if there were any defects or substandard equipment or parts used in the installation.

10. After turning off the gas supply at the tank, note and list the position of valves and adjustment handles. Whether a particular appliance valve or control was in an open or closed position may determine contributory negligence. Check the position of air shutters.

11. Take photos or video where possible, not only of the equipment and appliances but also of surroundings. (See Bulletin #212, "Photographing Accident Scenes".)

12. Be sure that the appliances were designed for propane use. If the appliance was designed for another gas, was it designed to be converted to propane? If so, was it properly converted?

13. Check the scene of the accident for products or conditions that might have been a possible cause, such as:

    a. Combustible materials too close to appliances.

    b. Storage of flammable materials, such as gasoline, kerosene, etc. too close to appliances.

    c. Electrical equipment.

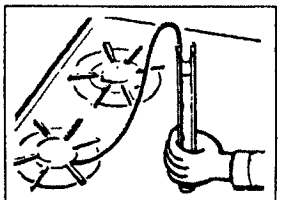
    d. Temporary heating equipment or portable appliances.

    e. "Do it yourself" jobs.

14. Check whether the appliance may have been altered or modified.

15. Check the appliance(s) for evidence of flooding or other damage.

16. A leak test of the system should be performed, if practical. If a leak is detected, it should be located and a photo of the leak location should be taken if possible.



Make manometer test if applicable

17. A manometer check should be performed, if possible, to determine if the regulator pressure was correct and whether the regulator was operating properly. Be sure to record both flow and lock-up pressure readings. Note and record the age of the regulator(s). Check the position and condition of the regulator vent(s).

18. Check company records to determine the service requests or service calls on appliances or system in the period preceding the accident.

Check the records

19. Where possible, compare the consumption record for the period immediately prior to the accident with normal consumption as shown by the records.

20. Determine who sold and installed the appliance(s). Also, determine the date of manufacture, date of installation and the manufacturer's name.

21. Check if the appliances were new or used when they were installed.

22. Contact the nearest local weather reporting station to obtain the temperatures, rainfall, wind direction and velocity for the date and time of the accident. Record this information in your accident file.

It is important that these checks be performed immediately after an accident and that all physical evidence be retained. Oftentimes, necessary facts are lost because of a delay in performing the checks. In addition, clear and precise documentation is very important.

NPGA #204-88

How To Handle Small LP-Gas Fires With Portable Fire Extinguisher

In the event of a fire involving LP-gas, it is important to react quickly. The purpose of this bulletin is to discuss the use of portable fire extinguishers in the extinguishment of small LP-gas fires.

SHOULD FIRE BE EXTINGUISHED

In any LP-gas fire, flames should not be extinguished, unless by doing so, the fuel supply can be turned off. If the fire is extinguished and the supply of fuel is not turned off, an explosion hazard much greater than the fire hazard may be created. Accordingly, fire personnel should be trained not to extinguish a flammable gas fire until a definite plan of control extinguishment and fuel shut-off has been established and each person has been instructed on his part of the operation. During this period, water spray from either hand hose lines or fixed piping can be directed upon the equipment to prevent over-heating. See "How To Control LP-gas Leaks and Fires"-NPGA Safety Handbook.

ATTACK FIRE FROM UP-WIND

Fires created by ignition of escaping LP-gas must be contained from up-wind. The dry chemical stream is directed into the flowing gas at the point of escape, utilizing the velocity of the gas to carry the extinguishing agent out to the actual point of combustion. Attacking this type of fire at right angles will result in a complete waste of the extinguishing agent. Hold the dry chemical stream on the escaping fuel behind the point of combustion. Do not follow the ball of fire. After extinguishment, remain close by with extinguisher ready as "stand by" protection against re-ignition, while attempting to stop the flow of fuel. Remember that a 20-30 lb. dry chemical extinguisher will be exhausted in 15-20 seconds.

RECHARGE EXTINGUISHER IMMEDIATELY

Every extinguisher should be re-charged immediately after use. A partially filled extinguisher is very little better than an empty extinguisher. Do not return it to its normal location; instead, invert the extinguisher and squeeze the nozzle to relieve all pressure from the dry chemical container. After all the pressure is relieved, have the extinguisher recharged at a recharge station.

INSPECTIONS - REGULATIONS

All extinguishers must be visually inspected every thirty days and a durable record maintained. At least once a year, complete maintenance in accordance with the manufacturer's instructions must be performed and recorded. At 12-year intervals, a hydrostatic test on the extinguisher is required. See OSHA Regulations - General Industry and Safety Regulators -1910.57, Portable Fire Extinguishers for details.

This bulletin provides only a brief treatment of the operation and application of dry-chemical portable fire extinguishers. Consult your fire extinguisher manufacturer for additional information.

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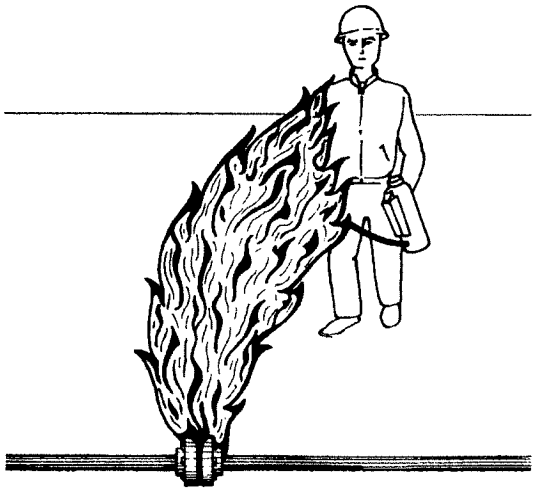
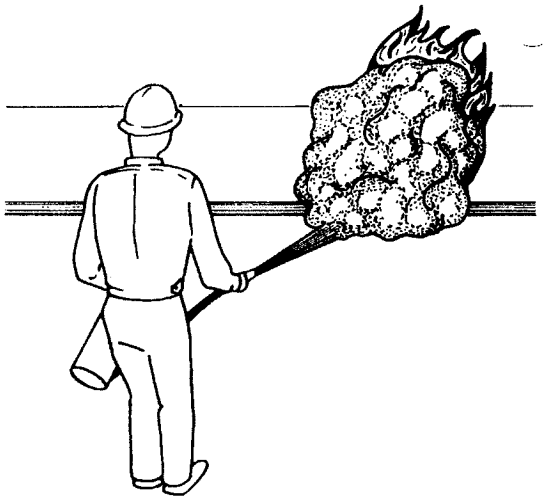
Printed in U.S.A.

There is a right and a wrong way to handle small LP-Gas fires.

NOTE: Never extinguish an LP-gas fire, unless by doing so, the fuel supply can be shut off immediately.

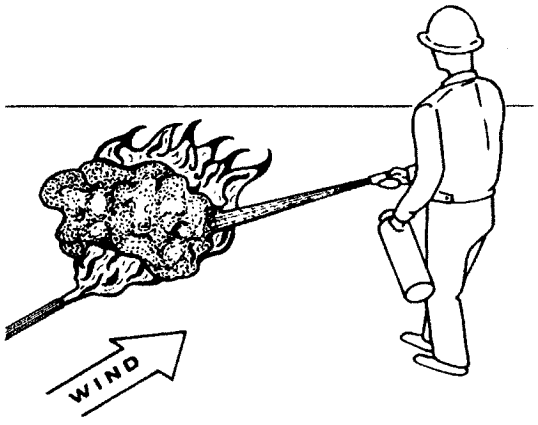


WRONG WAY-This firefighter faces the possibility of facial burns from radiant heat by approaching from down-wind and by failing to take advantage of the heat shielding effect of the fire-killing dry chemical.

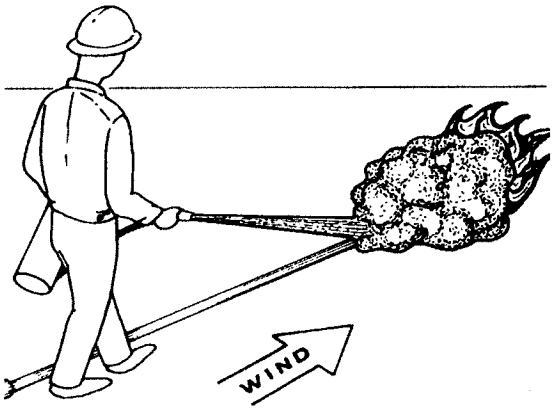


RIGHT WAY-Proper application of the dry chemical proves so effective in fighting a small propane fire that the firefighter is able to effectively extinguish the fire without feeling the heat.

Always approach the fire from upwind.



WRONG WAY-When dry chemical is shot into the center of fire, the fire continues to burn.



RIGHT WAY-Immediate extinguishment is achieved when dry chemical stream is directed at source of fuel through to the base of the fire.

C

RAILCAR UNLOADING CHECKLIST

RAILCAR #: _____ DATE SPOTTED: _____

SIDING LOCATION: AD BD CD AR BR CR

INSPECTED FOR PHYSICAL DAMAGE: _____

PROPERLY STENCILED "LIQUEFIED PETROLEUM GAS": _____

SAFETY VALVE TEST DATE: _____

TANK PRESSURE TEST DATE: _____

SEAL NUMBER INBOUND: _____

WATER TEST: Pass Fail ODORANT SNIFF TEST: Pass Fail

AMMONIA TEST: Pass Fail

START DATE: _____ TIME: _____

RAILCAR OUTAGE: _____ START TEMPERATURE: _____

START PRESSURE: _____ FINISH PRESSURE: _____

FINISH DATE: _____ TIME: _____

WATER CAPACITY: _____

OUTAGE GALLONS: _____

GROSS GALLONS: _____

TEMP FACTOR: _____

NET GALLONS: _____

ALL UNUSED VALVES AND PLUGS TIGHT: Y N

ALL VALVES CLOSED AND PLUGS TOOL TIGHT: Y N

CAR PROPERLY PLACARDED FOR RELEASE: Y N

CAR MADE READY FOR SHIPMENT FIRST CHECK: _____

CAR MADE READY FOR SHIPMENT SECOND CHECK: _____

SEAL NUMBER OUTBOUND: _____

REMARKS: