OPERATIONS & MAINTENANCE
(O&M)
FOR
PROPANE STORAGE FACILITIES

Reference: **National Fire Protection Association (NFPA) Pamphlet No. 58**
Liquefied Petroleum Gas Code, 2001, Chapter 11

Type of Facility: **Petroleum Propane Bulk Plant Facility**

Company:
Facility:
Street Address:
City, State, Zip:
Home Office:
Date:

MANAGEMENT CONTACT INFORMATION

Authorized Agents Name: _____

Title: _____

Phone Number: _____

Facility Phone Number: _____

LOCAL EMERGENCY RESPONDER CONTACT INFORMATION

Fire Department: _____

Phone Number: _____

Emergency Medical Responder: _____

Phone Number: _____

INTRODUCTION

This document was prepared to satisfy the requirements of National Fire Protection Association (NFPA) Pamphlet No. 58 Liquefied Petroleum Gas Code, 2001, Chapter 11.

This document contains:

- **Documentation of Operating and Maintenance Procedures**
- **Safety Information**

Continuing Requirements

Safety Information	**Must be updated whenever process changes occur.**
Operating Procedures	**Maintain written operating procedures. Update whenever process changes.**
Maintenance Procedures	**Maintain maintenance procedures. Documentation of most recent maintenance inspection must be retained.**

2001 NFPA 58

Chapter 11 Operations and Maintenance

11.1 Scope. This chapter includes requirements related to the operations and maintenance of bulk plant and industrial plant LP-Gas systems. New operations and maintenance requirements have been placed in this chapter. Operations and maintenance requirements that are located in other chapters of this code are not included here.

11.2 Operating Requirements.

11.2.1 *Operating Procedures*. Persons who operate LP-Gas bulk or industrial plant systems shall use written procedures for safely conducting activities associated with these duties. Equipment owners or operators shall ensure that the operating procedures are updated, if necessary, whenever a major change occurs and prior to startup of a changed system.

11.2.2 *Maintenance.* Owners or operators of LP-Gas bulk or industrial plant systems shall prepare and implement procedures to maintain the ongoing mechanical integrity of LP-Gas systems. Persons who perform maintenance on these LP-Gas systems should be trained in the hazards of the system and in the maintenance and testing procedures applicable to the installation. Any maintenance contractor should ensure that each contract maintenance employee is trained or supervised to perform the maintenance procedures.

Operating Procedures

Persons who operate LP-Gas bulk or industrial plant systems shall use written procedures for safely conducting activities associated with these duties.

Equipment owners or operators shall ensure that the operating procedures are updated, if necessary, whenever a major change occurs and prior to startup of a changed system.

OPERATING PROCEDURES REQUIREMENTS

Procedure Requirement		NPGA Certified Employee Training Program (CETP)		NPGA Bulletin	
(1)	***Initial Startup:***	**Distribution Systems Operations**	**"Preparing Propane Storage Containers for Installation."**		
		Distribution Systems Operations	**"Identifying Procedures Used to Pressure Test and Leak Check New Propane Distribution Systems."**	**403**	**Pressure Testing and Leak Checking LPG Piping Systems**
(2)	***Normal Operations***	**Basic Principles and Practices**	**Identifying features Common to Bulk Storage Containers**	**106**	**LPG Bulk Storage Safety Inspection Checklist**
		Basic Principles and Practices	**Delivering Propane Cylinders Using a Cylinder Delivery Vehicle**		
		Propane Delivery	**Delivering Propane Using a Bulk Delivery Vehicle**	**129**	**Recommended Procedures for Filling DOT, ICC, and ASME Containers**

Procedure Requirement		NPGA Certified Employee Training Program (CETP)		NPGA Bulletin	
(2)	***Cont.***	**Basic Principles and Practices**	**Delivering Propane to the Bulk Plant: Propane Transport Delivery Vehicles and Transport Vehicle Unloading Stations**		
		Basic Principles and Practices	**Delivering Propane to the Bulk Plant, Railroad Tank Cars and Railcar Unloading Stations**	**116**	**Tank Car Unloading Safety Check List and Return Procedures**
		Propane Delivery	**"Filling Cargo Tanks on Bulk Delivery Vehicles."**		
(3)	***Temporary Operations***	**Propane Delivery**	**Evacuating ASME Stationary Propane Storage Tanks**	**156**	**Evacuation Valve Operation Less than 2,000 GWC**
(4)	***Emergency Shutdown and Operation:***			**204**	**Handling Small Fires with a Portable Fire Extinguisher**
				207	**Developing Plant Emergency Response Procedures**

Procedure Requirement		NPGA Certified Employee Training Program (CETP)		NPGA Bulletin	
(5)	***Normal* (Manual) *Shutdown:***	**Propane Delivery**	**Filling Portable Propane Storage Containers and Cargo Tanks on Bulk Delivery Vehicles**		
(6)	***Equipment Inspections***	**Propane Delivery**	**Inspecting and Maintaining Vehicles Used to Deliver Propane**		
	Maintenance			**106**	**LPG Bulk Storage Safety Inspection Checklist**

Maintenance Checklist

This checklist will be completed annually for the propane storage facilities and the most recent inspection will be kept on file. Additionally, the North Carolina Department of Agriculture, Standards Division performs annual inspections of propane bulk plant installations. Copies of the most recent State inspections will also be kept on file.

Maintenance Inspection Checklist and Tests for Propane Storage Facilities			
I	**Construction Code Compliance**	**Yes**	**No and Comment**
a)	Check manufacturer's data plate. Is it securely attached and legible?		
	For Each storage vessel?		
	On installations with vaporizers, for each vaporizer?		
b)	Is the tank constructed to a minimum 250 psi working pressure (with exceptions as noted in NFPA 58)?		
II	**Conditions of Container(s), Vaporizer(s) & Paint**	**Yes**	**No and Comment**
a)	Are aboveground containers properly painted and free of excessive corrosion?		
	Fixed Storage tanks?		
	On installations with vaporizers, the vaporizers?		
III	**Foundations**	**Yes**	**No and Comment**
a)	Are foundations in good condition?		
b)	Are footings free of settling, which might cause misalignment or piping strain?		
c)	Are containers and vaporizers free of corrosion at masonry contact area?		
d)	Are saddle pads in good condition?		
IV	**Tank Fittings**	**Yes**	**No and Comment**
a)	Are all unused openings plugged or capped?		
b)	Are all ACME (or other type) connectors in good condition with good gaskets and are they plugged or capped?		
c)	Are all fittings and hoses leak free?		

Maintenance Inspection Checklist and Tests for Propane Storage Facilities			
IV	**Tank Fittings (cont.)**	**Yes**	**No and Comment**
d)	Are all hoses marked "for LP-Gas service" with a pressure rating of 350 psig (see NPGA Bulletins # 107- 91 and #121-89)?		
e)	Are all hoses properly secured, protected, and in serviceable condition and are dust caps on delivery hoses when not in use?		
f)	Are all hoses free from cuts or abrasions that expose the reinforcing fabric and free from soft spots or bulges when under pressure and without kinks, dents or flat spots?		
V	**Gauges**	**Yes**	**No and Comment**
a)	Are pressure gauges in good condition and are they suitable for 250 psig service (such as 0-400 psig)?		
b)	Are thermometers in good condition?		
c)	On installations with vaporizers having temperature controls, are they in good condition and have they been tested in accordance with manufacturer's recommendations?		
d)	Are liquid level gauging devices approved for the service involved and in good condition?		
e)	On installations with vaporizers having level control devices, are they in good condition and have they been tested in accordance with manufacturer's recommendations?		
VI	**Pressure Relief Valves**	**Yes**	**No and Comment**
a)	Is the relief valve data legible?		
b)	Do relief valves or vent stacks have protective caps or closures to prevent entry of foreign matter?		
c)	Are weep holes for moisture drainage open and is gas impingement on the container avoided?		
d)	Does external visual inspection of the relief valve indicate no corrosion or obstruction?		
VII	**Emergency Shut-off Valves**	**Yes**	**No and Comment**
a)	Are valves in good condition and do they shutoff tightly?		
b)	Does the emergency shutoff control system function properly?		

Maintenance Inspection Checklist and Tests for Propane Storage Facilities			
VII	**Emergency Shut-off Valves (cont.)**	**Yes**	**No and Comment**
c)	Are the remote shutoff controls installed in an accessible area away from the transfer area?		
d)	Are the shutoff controls clearly identified?		
e)	On installations with vaporizers having automatic shutoff controls, are they accessible, identified and been tested according to manufacturer's recommendations?		
f)	Are the emergency shutoff valves and manual transfer valves on your loading or unloading stations protected from pull away damage in any direction?		
VIII	**Presence of Combustibles**	**Yes**	**No and Comment**
a)	Is the area within 10 ft. of the container(s) and vaporizers free of weeds, long grass, rags, paper, wood or other combustible debris?		
IX	**Piping**	**Yes**	**No and Comment**
a)	Are connections labeled "liquid" or "vapor", or color-coded?		
b)	Is piping supported and protected from vehicular traffic when necessary?		
c)	Are there visible signs of exterior corrosion?		
X	**Valves (for Fixed Storage Tanks and Vaporizers)**	**Yes**	**No and Comment**
a)	Are valves in good working order?		
b)	Do seats shut off tightly?		
c)	Is packing free of leaks?		
d)	Are necessary valve handles available at the valve location?		
XI	**Hydrostatic Relief Valves (for Fixed Storage Tanks and Vaporizers)**	**Yes**	**No and Comment**
a)	Are valves in working order & not leaking?		
b)	Are the valves fitted with protective caps or pointing in a downward direction?		
XII	**Transfer Areas**	**Yes**	**No and Comment**
a)	Are hoses in good condition and free of deterioration, wear, and blisters? See NPGA Bulletin #114 "Guide to Hose Inspection."		
b)	Are hose couplings properly attached and fully seated on the hose?		

Maintenance Inspection Checklist and Tests for Propane Storage Facilities			
XII	**Transfer Areas (cont.)**	**Yes**	**No and Comment**
c)	Are hose couplings worn or damaged?		
d)	Are coupling gaskets in good condition?		
e)	Is ACME wrenches available?		.
f)	Are emergency shutoff valves (ESV) closing when remote station is activated?		
g)	Is ESV remote actuation identified with a sign?		
h)	Have your fire extinguishers been tested and/or serviced?		
i)	Is adequate transfer hose storage available?		
j)	Are bulkheads located at least 10 feet from the fixed storage tank(s)? If not, are means available to prevent trucks from parking within 10 feet of tanks while loading?		
XIII	**Pumps and Compressors**	**Yes**	**No and Comment**
a)	Are pumps equipped with a by-pass valve where required?		
b)	Is the by-pass valve functioning properly?		
c)	Are drive belts or couplings protected by suitable guards?		
d)	Is the compressor crank case oil at the proper level?		
XIV	**Electrical Equipment**	**Yes**	**No and Comment**
a)	Do all switches, etc. function properly?		
b)	Are all housings explosion-proof as required by NFPA 58?		.

These Maintenance items were last reviewed or inspected by: Name (signature)	**Date:**

SAFETY INFORMATION

Propane is a gas at normal temperatures and pressures. It is liquefied by storing it in a closed container at pressures higher than its equilibrium vapor pressure. There is a direct relationship between ambient temperature and the pressure inside the storage container. As the ambient temperature increases, the pressure of the container increases proportionately. According to NFPA 58, 2001 Edition, Table B-1.2.(a), commercial propane when heated to a temperature of 105° F will produce a pressure of 233 pounds per square inch, absolute (psia). NFPA 58, 2001 Edition, Table 2.2.2.2 sets the current minimum design pressure for an ASME tank at 250 pounds per square inch, gauge (psig). This design allows for a maximum vapor pressure of 215 psig at 100° F. The discharge piping for pumps and compressors and vapor piping should have a minimum working pressure set in accordance with NFPA 58, 2001 Edition, Table 2.4.4.1. The steel used in design of the storage tank and piping determines the minimum temperatures. Liquid propane (if released at atmospheric pressure) can refrigerate steel pipes and tanks down to temperatures of -44° F.

Another property of propane in its liquid form is its ability for the liquid to greatly expand when heated. Therefore, G.S. 119 sets the maximum filling capacity of large tanks of 85% to avoid overfilling.

Modern propane bulk plant installations utilize several engineered safety features to minimize the risks associated with propane. These include:

- **Break-away piping at loading and unloading stations;**
- **Excess flow valves at liquid and vapor inlets/outlets;**
- **Check valves and emergency shutoff valves in loading and unloading liquid and vapor lines;**
- **Emergency shutoff systems;**
- **Pressure relief valves;**
- **Hydrostatic relief valves.**
- **Automatic activation of Emergency Shut Off Valves (ESV), in the event of a pull away in any direction.**

CONTACTS

National Fire Protection Association (NFPA) ..... (800) 344-3555

National Propane Gas Association (NPGA)..... (630) 515-0600

North Carolina Department of Agriculture and Consumer Standards (NCDA & CS)……..(919) 733-3313

North Carolina Propane Gas Association (NCPGA) ..... (919) 787-8485

North Carolina Petroleum Marketers Association. ..... (919) 782-4411 (NCPMA)