

**Liquefied Petroleum Gas Facility
Written Fire Safety Analysis
For**

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INTRODUCTION

The National Fire Protection Association's LP Gas Code (NFPA 58), 2017 edition, has been adopted by the Missouri Propane Safety Commission. Within NFPA 58, Section 6 requires that a Written Fire Safety Analysis (WFSA) be completed for all LP gas installations that use ASME containers with an aggregate capacity of more than 4,000 gallons (water capacity). Manifolder tanks meet this threshold if the aggregate volume exceeds 4,000 gallons.

The section also requires planning with local emergency agencies, such as fire and police departments, for the effective control of inadvertent product release or fire. This planning should consider the safety of emergency personnel, workers and the public.

The WFSA provides owners and operators of affected facilities with a self-audit tool that they can use to determine facility safety and enhance the effectiveness of local emergency responders. If serious hazards are identified during the assessment, special protection as allowed by NFPA 58 may be needed.

CONDUCTING THE WFSA

Your assessment must be prepared by a person approved by the Missouri Propane Safety Commission who has relevant experience and knowledge of industry practices. As a general rule, the Commission authorizes the owner or operator to prepare the WFSA. The exception is for an engineered facility, such as one that incorporates refrigerated storage, automated fuel standby (either industrial or utility) or pipeline terminals. These assessments must be prepared, stamped and signed by a professional engineer. Also, note that all storage tanks utilized by public utility companies as defined in RSMo 323 are regulated by the Missouri Public Service Commission.

There are five elements addressed in the WFSA:

1. Evaluation of the total product control system and its effectiveness;
2. Analysis of hazards within the facility, including congestion or other local conditions;
3. Assessment of exposure to and from other properties, populations and activities;
4. Determination of the probable effectiveness of local fire departments based on water supply, response time and training; and
5. Evaluation of the application of water by hose streams or other methods of effective control of leakage, fire or other exposures.

An authorized representative of your local fire department also must fill out Section X of the WFSA. This handbook will serve as a checklist for most Missouri LP gas facilities which fall under the WFSA requirement. In conducting your assessment, it might also be helpful to also consult NFPA's Pamphlets 58 and 54 along with the Missouri Propane Safety Commission "blue book" (2CSR 90) which contains applicable state laws and regulations.

WRITTEN FIRE SAFETY ANALYSIS CHECKLIST

SECTION 1 Facility Information	
1. Facility Name:	
2. Physical Address:	
3. County:	
4. Mailing Address:	
5. City:	Zip Code:
6. Latitude:	Longitude:
7. Daytime Telephone:	
8. Emergency Telephone:	
9. Facility Fax Number:	
10. Email:	
11. Facility Owner/Manager	
12. Type of Facility: <input type="checkbox"/> Commercial <input type="checkbox"/> Industrial <input type="checkbox"/> Bulk plant <input type="checkbox"/> Other	
13. Propane is received by (check all that apply): <input type="checkbox"/> Transport <input type="checkbox"/> Bulk truck <input type="checkbox"/> Pipeline <input type="checkbox"/> Rail tanker	
14. Propane is distributed from facility by (check all that apply):	
<input type="checkbox"/> Vapor pipeline <input type="checkbox"/> Liquid pipeline <input type="checkbox"/> Transport <input type="checkbox"/> Bulk truck <input type="checkbox"/> Rail tanker <input type="checkbox"/> Cylinders by truck <input type="checkbox"/> Other _____	
15. Number of vehicle gates in/out of facility:	
16. Number of pedestrian gates in/out of facility:	
17. Is the facility normally staffed?	
18. If so, what are the normal hours?	
19. Facility Environment: <input type="checkbox"/> Rural <input type="checkbox"/> Suburban <input type="checkbox"/> City/Commercial Industrial <input type="checkbox"/> City/Suburban residential	
20. Type of roads to Facility: <input type="checkbox"/> Private drive <input type="checkbox"/> County road <input type="checkbox"/> State highway <input type="checkbox"/> Interstate highway	
21. Road Construction: <input type="checkbox"/> Asphalt <input type="checkbox"/> Concrete <input type="checkbox"/> Gravel <input type="checkbox"/> Dirt	

SECTION II Facility Storage Container Information			
1. Number of Storage Tanks:			
2. Capacity in Water Gallons:			
Tank 1	Tank 2	Tank 3	Tank 4
Tank 5	Tank 6	Tank 7	Tank 8
3. Working Pressure:			
Tank 1	Tank 2	Tank 3	Tank 4
Tank 5	Tank 6	Tank 7	Tank 8

4. Do all tanks have attached/legible data plates?			
Tank 1	Tank 2	Tank 3	Tank 4
Tank 5	Tank 6	Tank 7	Tank 8
5. Tank serial number			
Tank 1	Tank 2	Tank 3	Tank 4
Tank 5	Tank 6	Tank 7	Tank 8
6. Tank manufacturer			
Tank 1	Tank 2	Tank 3	Tank 4
Tank 5	Tank 6	Tank 7	Tank 8
7. Date of manufacture			
Tank 1	Tank 2	Tank 3	Tank 4
Tank 5	Tank 6	Tank 7	Tank 8
8. Date(s) installed			
Tank 1	Tank 2	Tank 3	Tank 4
Tank 5	Tank 6	Tank 7	Tank 8
9. Are tanks ASME constructed?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
10. Are tanks manufactured for LP use?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
11. Are container shells in good condition?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
12. Is corrosion present on shell?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
13. Are containers properly painted?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
14. Are product ID placards displayed?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
15. Are tanks located in flood plain?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
If yes, are tanks properly anchored?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
16. Are tanks level?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
17. If facility has more than one tank, are the tanks connected?			
		<input type="checkbox"/> Yes	<input type="checkbox"/> No
If yes, are tank tops level with each other?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
18. Do containers conform to setbacks?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
19. Container support and conditions (footings/foundations?)			
Concrete	<input type="checkbox"/> Acceptable	<input type="checkbox"/> Unacceptable	
Concrete/steel	<input type="checkbox"/> Acceptable	<input type="checkbox"/> Unacceptable	
Steel skid	<input type="checkbox"/> Acceptable	<input type="checkbox"/> Unacceptable	
Tank insulated at support	<input type="checkbox"/> Acceptable	<input type="checkbox"/> Unacceptable	

SECTION III Container Product Control		
1. Liquid gauging device	<input type="checkbox"/> Yes	<input type="checkbox"/> No
2. Pressure gauge	<input type="checkbox"/> Yes	<input type="checkbox"/> No
3. Required shut-off valves	<input type="checkbox"/> Yes	<input type="checkbox"/> No
4. Required excess flow valves	<input type="checkbox"/> Yes	<input type="checkbox"/> No
5. Required back-check valves	<input type="checkbox"/> Yes	<input type="checkbox"/> No
6. Relief valves		
Adequate capacity	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Proper sized vent stacks	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Rain caps installed?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

SECTION IV Piping and Hose Systems		
1. Is piping safe and suitable for LP service, including design pressure, approved by manufacturer for such service and acceptable to the authority having jurisdiction?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
2. Is each section that can be isolated by valves equipped with a hydrostatic relief valve?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
3. Do piping materials conform to NFPA specifications?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
4. Do pipe fittings conform to NFPA specifications including designed working pressure?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
5. Do all valves, other than container valves, also meet NFPA specifications; are they suitable for the system application including working pressure?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
6. Does the system contain a sufficient number, size and placement of excess flow valves and/or back-check valves to adequately protect the system?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
7. Is the loading/unloading portion of the piping system adequately protected by properly sized and adequately placed bulkheads or other protection?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
8. Are emergency shutoff valves installed in the appropriate vapor and liquid locations?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
9. Is all above-ground piping properly supported and adequately protected from physical damage?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
10. Is underground piping buried at a proper depth, protected with backfill and provided with adequate corrosion protection?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

11. Are there provisions within the piping system to compensate for expansion, contraction, jarring and vibration?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
12. Do all flexible piping components comply?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
13. Are all hoses manufactured for LP use?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
14. Do all hoses have a design working pressure of 350 PSI?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
15. Are all hoses manufactured with a safety factor of 5:1?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
16. Are hoses continuously marked "LP Gas," "Propane," "350 PSI"?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
17. Is the manufacturer's name or trademark on the hose?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
18. Do hose assemblies have a design capability of at least 700 PSI?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
19. Do hoses and flexible connectors comply with NFPA?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
20. Are hydrostatic relief valves installed in sections of hose that can be isolated by valves?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

SECTION V Pumps and Compressors		
1. Are pumps designed for LP gas use and installed according to manufacturer's specifications?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
2. Are compressors designed for LP gas use and installed according to manufacturer's specifications?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
3. Are there means to limit suction pressure to within the design limits of the compressor?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
4. Are there means to prevent the entrance of liquid LP into the compressor suction?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

SECTION VI Vaporizers		
1. Type of vaporizer	<input type="checkbox"/> Direct fired	<input type="checkbox"/> Indirect fired
	<input type="checkbox"/> Electric	<input type="checkbox"/> Gas
	<input type="checkbox"/> Other _____	
2. Vaporizer manufacturer		
3. Vaporizer capacity		
4. Date of installation		

5. Is vaporizer installed according to manufacturer's specifications?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
6. Does vaporizer have a design working pressure of 250 PSI?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
7. Do vaporizer markings comply with NFPA 58?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

SECTION VII Assessing Plant Safety		
1. Is the facility protected by a 6-foot industrial-type fence with an appropriate number of gates?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
2. Are the gates locked while the facility is unattended?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
3. Does the storage area have a properly sized, fully charged and strategically placed fire extinguisher?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
4. Have plans been submitted and approved as required by the Missouri Propane Gas Commission (or previously, Department of Weights and Measures)?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
5. Date the plans were submitted	Date plans approved	
6. Are warning signs and placards posted as required?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
7. Are emergency telephone numbers posted in conspicuous locations?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
8. Does the product transfer location and operation comply with NFPA 58?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
9. Do all electrical wiring and components meet National Electric Code and NPGA requirements?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
10. Location of electric poles from storage (feet)		
11. Are electrical lines a minimum of six feet horizontal from LP gas containers?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
12. Are pumps equipped with an operating control or disconnect nearby?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
13. Are emergency shut-off valves equipped with remote cables or activating devices?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
14. If there is refined fuel storage on the property, is it located at a lower grade than the LP gas container?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
15. Are containers located at least 20 feet from aboveground tanks storing other Class I, II or III liquids?	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> Not applicable

16. All sources of ignition being removed or turned off while transfer operations, connections or disconnections are made or when LP is being vented?		
<input type="checkbox"/> Yes <input type="checkbox"/> No		
17. Does the system comply with NFPA regarding other ignition sources?		
<input type="checkbox"/> Yes <input type="checkbox"/> No		
18. Are hoses, valves, piping and fittings maintained in good condition and free from leaks?		
<input type="checkbox"/> Yes <input type="checkbox"/> No		
19. Exposures to facility	<input type="checkbox"/> Other fuel Storage	<input type="checkbox"/> Electrical lines/transformers/substations
	<input type="checkbox"/> Traffic/vehicles	<input type="checkbox"/> Other _____
20. Exposures from facility		
<input type="checkbox"/> Industrial facilities	<input type="checkbox"/> Commercial facilities	<input type="checkbox"/> Manufacturing
<input type="checkbox"/> Schools	<input type="checkbox"/> Other public/institutional buildings	
<input type="checkbox"/> Farm fields/crops	<input type="checkbox"/> Anhydrous/Ammonia	<input type="checkbox"/> Other fuel storage
21. Are storage containers protected from vehicular damage?		
<input type="checkbox"/> Yes <input type="checkbox"/> No		
22. Is adequate nighttime lighting provided if the facility normally operates other than daylight hours?		
<input type="checkbox"/> Yes <input type="checkbox"/> No		
23. Are combustible materials, weeds and tall grass kept at least 10 feet away from the storage area?		
<input type="checkbox"/> Yes <input type="checkbox"/> No		

SECTION VIII Operations and Maintenance		
1. Are persons who operate LP gas bulk plant or industrial systems using written procedures for conducting activities associated with the job duties?		
<input type="checkbox"/> Yes <input type="checkbox"/> No		
2. Does the facility owner or operator ensure that the operating procedures are updated as necessary when major changes occur and prior to starting up an altered system?		
<input type="checkbox"/> Yes <input type="checkbox"/> No		
3. Has the owner or operator prepared and implemented procedures to maintain the mechanical integrity of the LP gas system?		
<input type="checkbox"/> Yes <input type="checkbox"/> No		
4. Are all persons who perform maintenance of the LP gas system trained in the hazards of the system and in the maintenance and testing procedures applicable to the installation?		
<input type="checkbox"/> Yes <input type="checkbox"/> No		
5. If there are maintenance contractors, do they ensure that their employees are trained and supervised in performing these procedures?		
<input type="checkbox"/> Yes <input type="checkbox"/> No		

SECTION IX Employee Training	
1. Are all persons who transport and handle LP gases properly trained?	<input type="checkbox"/> Yes <input type="checkbox"/> No
2. Are all persons who install, repair or service LP gas equipment trained?	<input type="checkbox"/> Yes <input type="checkbox"/> No
3. Type and interval of training employees are required to attend	<input type="checkbox"/> CETP or equivalent every three years <input type="checkbox"/> HazMat refresher every three years <input type="checkbox"/> Other _____
4. Are employees trained in bulk plant emergency procedures?	<input type="checkbox"/> Yes <input type="checkbox"/> No

SECTION X Fire Service information	(To be completed by the fire service)
1. Name of Fire Department	
2. Location of nearest fire station	
3. Telephone number	
4. Is the facility accessible for fire-fighting/emergency response?	<input type="checkbox"/> Yes <input type="checkbox"/> No
5. Location/distance of nearest fire hydrant/water supply	
6. Is water supply adequate to protect storage facility in case of fire?	<input type="checkbox"/> Yes <input type="checkbox"/> No
7. Type of water supply	<input type="checkbox"/> Municipal <input type="checkbox"/> Private Well <input type="checkbox"/> Other _____
8. Is foam/equipment available?	<input type="checkbox"/> Yes <input type="checkbox"/> No
9. Do fire service personnel have adequate training to respond to LP incidents?	<input type="checkbox"/> Yes <input type="checkbox"/> No
10. Does the fire department have after-hours access to this facility?	<input type="checkbox"/> Yes <input type="checkbox"/> No
11. Are fire personnel familiar with the facility?	<input type="checkbox"/> Yes <input type="checkbox"/> No
12. Name other fire services that could provide mutual aid of required and distance:	
Name	Distance
Name	Distance
Name	Distance
13. Type of fire equipment/capabilities available from other fire services	

Facility Operator Objectives
1. Be a good neighbor!
2. Give a plant tour to all local fire departments and emergency response personnel. Explain plant and equipment operation.
3. Properly maintain and inventory all equipment.
4. Protect plant from tampering, theft and vandalism.
5. Respond to neighbor complaints and concerns in a timely fashion.

6. Prominently display emergency contact numbers and ensure they are answered.

7. Never discharge more product than is necessary into the atmosphere; always away from potential ignition sources and upwind of neighbors.

8. Inform department of University of Missouri "Propane Emergencies" classes.

References

National Fire Protection Assn. Liquefied Petroleum Gas Code (NFPA 58) National Fire Protection Assn. National Fuels Gas Code (NFPA 54) Revised Statutes of the State of Missouri, Chapter 323, Liquefied Petroleum Gases Code of State Regulations, Title 2, Division 90, Chapter 10, LP Gases

SECTION XIV Comments

List any comments concerning this facility

