



MODULE 2

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Module 2: Maintenance of LPG Station

- List all laws and ordinances that govern the upkeep and repair of filling station equipment.
- Keep track of, identify, and address fuel quality problems.
- Describe the timing, procedures, and record-keeping requirements related to executing an LPG fuelling station safety review.

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SAFETY LAWS AND ORDINANCES OBSERVED IN AN LPG FILLING STATION

LPG Depot

Risks associated with the storage of gasoline include fire and explosion hazards, environmental harm, and human health issues.

Control Strategy

- Observance of the legal criteria outlined in the 1979 S.I. Regulations for Dangerous Substances (Retail and Private Petroleum Stores). 311 of 1979 and, where necessary, any pertinent laws that follow industry best practises.
- Make sure all employees are properly trained (retain training records)
- Storage tanks and dispensing pumps are properly cared for and observed
- Use of appropriate wet stock management techniques
- Use the necessary warning and hazard signs to identify dangerous areas and to restrict all potential ignition sources.

A Vehicle's Motion

There is a lot of automobile and other vehicle movement on the forecourt that can result in an unintentional collision with objects, persons, or other cars.

Control Measures

- Create a safe traffic management strategy, such as a one-way system for entering and leaving the forecourt.
- Post signs with clear instructions or warnings outlining the traffic control measures.

- Ensure there are enough dedicated parking spaces nearby the store and away from the gas stations.
- Tanks of gasoline and storage areas for liquefied petroleum gas (LPG) should have mechanical protection.

Hazardous Materials

In the car wash and for ordinary cleaning, some supplies and chemicals can be dangerous. Respiratory issues, rashes, or chemical burns may result from their use, unintentional spills, or leakage.

Control Techniques

- Keep all potentially harmful chemicals in their original packaging.
- Consult the hazard data sheets provided by manufacturers to learn more about any compounds that are used and stored on the premises.
- Provide staff with training and the necessary protective gear

Handling Manually

Moving LPG cylinders, removing access covers from storage tanks, and situating huge cleaning solution containers could all result in back pain or muscle strains.

Control Techniques

- Eliminate any manual labour that is not necessary.
- Teach your personnel safe lifting procedures.

- Provide the necessary tools, such as keys for opening manhole covers.
- Use a cart or goods with castors wherever feasible to avoid lifting anything that is too heavy.

Stumbles, Falls, and Slips

In the winter, the forecourt's snow and ice might put people at risk of falling or being hit by vehicles that are skidding. Spills of oil and fuel on the forecourt might cause slide hazards.

Control Techniques

- During freezing conditions, supplies of industrial salt blended with fine gravel should be maintained on hand and dispersed on the forecourt. They should also be utilised right away to soak up and clean up any fuel or oil spills.
- Staff members should receive training on how to handle minor fuel spills.

Electricity

Accidents are typically caused by misused or improperly maintained equipment, and operating equipment outside in a damp environment (such as commercial vacuums and vehicle washes) increases the risk of electric shock.

Control Techniques

- Every three years, an experienced electrician must certify electrical installations.
- All outdoor-used electrical equipment must be properly insulated and supplied through a circuit protected.
- All electrical switchgear that regulates machines must be clearly marked and always within reach.

- Considering the intricacy of the moving parts, make sure the electrical installation used for mechanical vehicle washes is appropriate for a wet environment and has sufficient protection from mechanical damage.
- Mechanical vehicle washes should be equipped with an easy-to-find emergency stop button.

Fire Threats

Exits that are blocked, for example by stock or a build-up of packing, can make it difficult to leave and can even start fires.

Control Techniques

- Keep all fire exits and escape routes open, and conduct routine inspections to make sure this is the case.
- Regular trash removal (remember sand used for cleaning or containing petrol spills will be flammable and should be disposed of safely, by a hazardous waste disposal company if necessary)

Assaults Against Staff

Staff members may be at danger for assault if items or money are stolen.

Control Techniques

- Think about using pay windows at night, closed-circuit television, panic alarms, and other security measures.

Air Compressed Systems

The two biggest concerns are misuse of this equipment and excessive tyre inflation.

Control Techniques

- To ensure regular observation, place the air system where the store attendant can see it.
- Show precise instructions for using the air system, such as that the driver should verify the proper tyre pressures.
- Teach employees how to use the equipment safely.

FUEL QUALITY PROBLEMS

How to Keep Track Fuel Quality

The octane rating of a fuel is frequently used by consumers as their main indicator of both its value and quality. The condition and capabilities of the fuelling system equipment as well as less well-known features of fuel quality, such as additives in fuel, also offer value to consumers. Customers may prefer one station's fuel over another if they are aware of the advantages of additives and rigorous fuelling system maintenance procedures.

How is the amount of detergent additives in gasoline determined at gas stations?

To prevent the accumulation of engine deposits, the U.S. Environmental Protection Agency (EPA) establishes the minimum level of cleaning detergent additives for all octane categories.

To maintain performance and prevent engine damage, several automobile manufacturers recommend a significantly higher level of detergent than this one (EPA regulations are created to control air quality, not promote engine performance or longevity).

The "Top Tier" detergent fuel programme, a proprietary standard that demands for higher quantities of detergents and reduced metallic content than the EPA norm, was established by automakers and engine manufacturers in 2004. Marketers of fuel who want to offer Top Tier gasoline or diesel voluntarily sign up for the Top Tier programme and pay a fee to become a Top Tier fuel supplier that is recognised by the programme.

How can customers determine whether a station carries Top Tier fuel?

The Top Tier emblem must be prominently displayed at stations that have been given permission to sell Top Tier fuel. On toptiergas.com, you may find a list of authorised retail companies that offer Top Tier fuel.

What other station procedures affect the quality of the fuel?

A number of in-tank factors, including high water levels, excessive particulate, and fuel that has undergone phase separation, have a significant impact on fuel quality. Strong maintenance and monitoring procedures at stations help shield customers from these harmful problems with fuel quality. Drivers can avoid dispensing low-quality fuel by performing routine tank inspections and changing the filters in their fuel dispensers at the recommended intervals.

How to Identify Fuel Quality

90% or more of the time, LPG (also known as commercial propane) comprises propane and fewer than 10% butane.

Typical requirements are:

- At 70°F, the vapour pressure is 124 psig, at 100°F, 192 psig, and at 130°F, 286 psig.
- Specific gravity at 60°F is 0.509.
- At 1 bar, the first boiling point is -51F.

- -46F at 1 bar for the dew point
- Specific heat: 2.462 kJ/kg at 15.6C; 0.588 Btu/lb at 60F
- 2.4 vol% gas in air is the lower limit of flammability.
- 9.6 vol% gas in air is the maximum allowable flammability.
- Latent heat of vaporisation: 430.3 kJ/kg; 185 Btu/lb
- Gross heating value (liquid): 50,125 kJ/kg; 21,550 Btu/lb
- 2,560 Btu/ft³ and 9,538 kJ/m³ are the gross heating values (gas).

The term "propane quality" describes the variations in the proportions of propylene, butanes, and ethane during the refinement and processing of propane. Varied refineries and regions of the country have slightly different propane compositions. One sort of propane isn't necessarily better than another because different grades have diverse uses.

Three different grades of commercial propane are produced by refineries, each of which is processed from the same basic materials but has a different consistency and use. Each grade of propane is stored separately after being processed according to the refinery's specifications.

Commercial propane grades are defined by Standard 1835 by the American Society for Testing and Materials, which may be found at ASTM D1835. The various propane grades are as follows:

Propane HD5

The most often used grade of propane distributed in the US for home use is HD5, also known as "consumer-grade" propane and "special-duty propane." Additionally, it is the best propane that the general public can buy, and it is advised for use as a fuel for internal combustion engines with moderate to high engine severity. Strong blue flames produced by higher-quality propane can be used to identify it.

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One of the cleanest-burning fossil fuels on the market right now is HD5 propane fuel. It's also one of the most effective, giving consumers a wonderful cost-effective option. This may also be the reason why it is the only kind of propane that other nations will import.

Propane HD10 Grade

Propylene content is allowed to be 10% in HD10 propane, which is mostly utilised in California. The greater propylene percentage could be a problem for engines by causing parts to cling together while running. Otherwise, HD10 performs flawlessly with appliances that run on propane.

Industrial Propane

HD10 and commercial propane, both of which fall short of requirements for vehicle usage, are interchangeable but have distinct standards for gas and propylene content. It is only deemed appropriate for low-severity internal combustion engine applications by the American Society for Testing and Materials.

Only enough commercial-grade propane is needed to maintain a flame. A flame may create a variety of colours since the product is likely to include a wide range of gases. Commercial propane is used in refineries to process chemicals for a range of industries.

LPG Fuelling Station Safety Review

From the point of manufacturing through the whole distribution chain to the point of use and safe disposal of the combustion by-products, LPG is potentially dangerous. Understanding LPG behaviour and controlling it are key to maintaining safety.

Every uncontrolled leak is a dangerous event that needs to be handled right away. Just as natural LPG is a characteristic odour is typically added to make it noticeable since it is odourless and unseen. Secondly, even the smallest leak can be found and dealt with appropriately. LPG is heavier than air, so it could take some time to find a subterranean or low-level leak. Consumers should get safety information, and once informed, they should take appropriate precautions in use and handling.

LPG refers to a variety of goods that have many characteristics but also differ in ways that compromise safety. Containers for LPG should be clearly marked as such. Safety depends on good appliance and installation standards.

Fundamental Safety Rules

- The main safety issue with LPG is flammability, but it's not the only one. The numerous risks from production to consumption are addressed by good safety practices.
- The word "LPG" includes a number of items that, while connected, have significant physical differences. If more than one LPG type or grade is handled separately should be distinct from one another and separated. Everything should adhere to specifications, particularly with regard to the maximum allowed vapour pressure.
- Large LPG installations shouldn't be built close to sensitive or populous areas. Populations should be kept to a minimum in areas where major LPG installations have been authorised. Due consideration should be given while planning or reviewing proposals for the location of LPG facilities. The dangers posed by the hazards caused and those risks both inside and outside the institution. Encroaching populations in established towns and cities frequently require additional regulations and large LPG installations require caution.

- At LPG plants, whether large or small, space and separation distances are essential to safety. Every type and size of location needs to be evaluated, then observed.
- LPG industry participants should actively encourage a safety culture within their own organisations/companies and at the sectoral level.
- Competent individuals should provide formal training for those involved in LPG operations both for routine tasks and in case of an emergency. Plan for emergencies at LPG facilities, and reaction plans that are appropriate for the risks and hazards they pose. These consist of suitable handling techniques to prevent harm.
- LPG that is intended for fuel use needs to be sufficiently odorized before entering the distribution system. Since LPG must be odourless, suitable alternative safety precautions should be used.
- It's never a good idea to let LPG cylinders and tanks fill up with liquid. Weather patterns will affect the amount of ullage space necessary, however it is customary to fill to about 80% of the water holding capacity of the craft. In certain situations, over-fill devices may need to supply protection. Tanks and cylinders should only be filled when a qualified professional is present.
- When transporting LPG in quantities more than a particular amount, it must be clearly recognised using categorization codes and pertinent cautionary signals.

- **LPG storage, handling, distribution, and used appliances and equipment must be suitable for the intended use, properly installed, and maintained. Low-quality appliances, tools, and if necessary, regulations should exclude installations.**
- **Those in charge of servicing and installing appliances and other equipment shall be formally trained and should be proficient to a certain degree.**
- **It is preferable to fill cylinders intended for interior use with butane or butane-rich LPG mixes. Nevertheless, several nations do allow the usage of propane cylinders inside. Those cylinders alone should be kept indoors when in use. Where butane and propane are offered for sale as cylinders should be easily distinguishable and ideally fitted with various items. Outlet valves to prevent simple replacement or usage with natural gas appliances.**
- **Campaigns to raise consumer awareness of safety issues are crucial to the LPG safety principles, and they should highlight:**
 - **The relationship between gas, appliances, and equipment quality and safety.**
 - **The dangers connected to subpar installation standards and/or procedures.**
 - **The requirement for attention and, specifically, appropriate ventilation.**
 - **How to identify the odour of odourised LPG.**
 - **How to respond if gas is detected.**

Controlling Safety

The most senior management in any organisation should take ownership of safety and make sure that the necessary funding is available for the safety management programme.

Safety management should function inside a formal framework of policies and action plans and be knowledge-based.

Regular updates to safety programmes should be made based on systematic reviews and technological advancements.

The knowledge gained through accidents can be instructional and should be shared for the good of mankind.

Policy, Goals, Plans of Action, and Resources

- LPG industry participants should make their companies' safety policies public and communicate such policies' goals and action plans to their staff members and business associates. Companies will have different ways and formats for distributing safety policies, which may be partially influenced by local and national laws.
- Larger organisations need to define the job of managers at all levels in unambiguous, documented terms. It is important to define each person's roles and goals in relation to the safety programme.
- Without detailed action plans and the resources needed for implementation, safety policies lack credibility. The appropriate authorities should take this into consideration where licencing of LPG operations is necessary.

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Standards, Laws, Rules, and Codes

- **Laws serve as the foundation for regulations aimed at ensuring consumer and public safety. Although there may be a law explicitly adopted for LPG, the substance is occasionally included in larger laws.**
- **The safety control of hazardous substances, such as LPG, is necessary for the general good. In order to ensure that safety standards are well-founded, LPG industry participants should cooperate with governmental authorities by making their expertise available.**
- **The technological know-how of an established industry that continually strives to enhance its safety reputation and performance is embodied in the LPG standards and norms. Instead of spending the necessary time and effort creating or updating national standards, consideration should be given to adopting standards and regulations that have received international acceptance.**

Identification, Assessment, Quantification, and Mitigation of Hazards

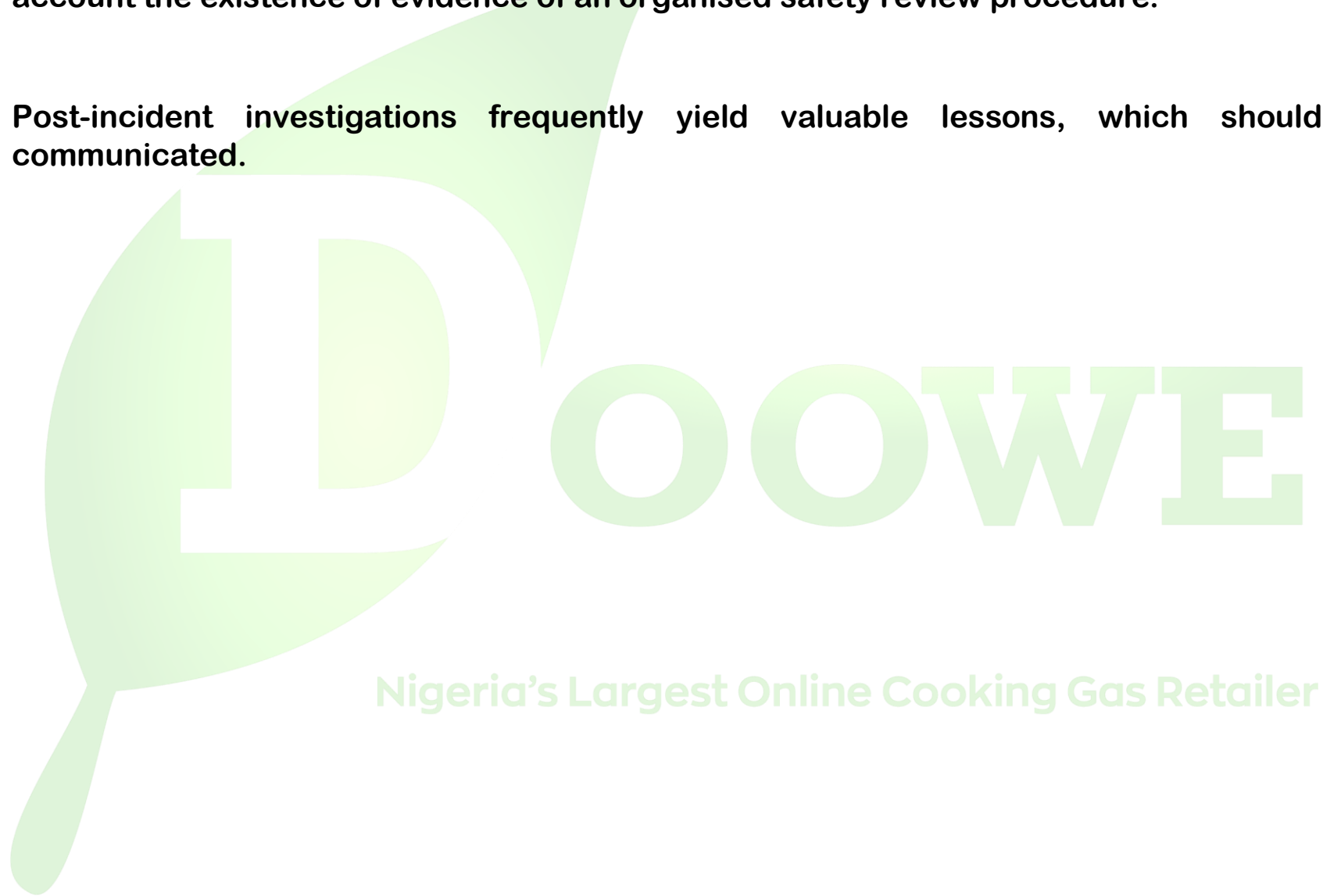
- **It is acknowledged that certain hazards are prevalent and unavoidable in a modern industrial society as part of fundamental demands and goals. This has sparked thoughts on risk tolerance and hazard evaluation.**
- **The LPG industry has taken the lead in identifying, evaluating, and quantifying LPG-related hazards by leveraging its knowledge to encourage a scientific approach by the authorities in charge of safety regulation.**

- There should be ongoing communication between national authorities and the LPG industry regarding dangers associated with LPG and potential risk-reduction strategies. Both sides should, wherever feasible, participate in both national and international dialogue for this reason.
- The LPG business and the government shouldn't only communicate during times of crisis. It is usually not a good idea to adopt or change safety laws right after a catastrophic event or incident.
- Prominent LPG industry players, including marketers and equipment and appliance manufacturers, continuously and constructively cooperate to improve technical standards, safety features, and processes. Regulatory agencies should support and promote hazard reduction by barring those who are unprepared from taking part in the process.

Systematic Evaluation and Reaction

- After releasing their safety policies and establishing their safety goals, suppliers and marketers should set up a system of evaluations to track their success in reaching those goals. The review ought to be a significant undertaking that gets the attention of senior management. A strategy for corrective action and safety improvement should be created and updated by businesses.
- The review should keep an eye on every link in the marketer's supply chain and offer advice to suppliers and installers of appliances and equipment.

- Where a licencing system is in place, the periodic re-licensing of LPG facilities shall take into account the existence of evidence of an organised safety review procedure.
- Post-incident investigations frequently yield valuable lessons, which should be communicated.



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