Plymouth Attachment A

Recognized and Generally Accepted Good Engineering Practices

Industry standards of care for distributors of propane and compressed gases include, among others:

State Fire Code

- Connecticut State Fire Prevention Code is based on National Fire Protection Association ("NFPA") codes, with Connecticut amendments. See Chapter 2 for list of incorporated NFPA codes and Chapter 69, Liquefied Petroleum Gases and Liquified Natural Gases. The 2022 Connecticut State Fire Prevention Code incorporates the following versions of NFPA codes relevant to this matter: NFPA 1 (2021); NFPA 58 (2020); NFPA 55 (2020); NFPA 400 (2019); NFPA 30 (2021).

NFPA Codes

- NFPA Code 58, *the Liquid Petroleum Gas Code* ("NFPA 58")
- NFPA 30, *the Flammable and Combustible Liquids Code* ("NFPA 30")

American Society of Mechanical Engineers Standards ("ASME")

- ASME Scheme for Identification of Piping Systems 13.1

Some of the above standards are consistently relied upon by propane experts and are often incorporated into state building, mechanical, and fire codes.

The chart below cites to the standards of care that were in effect in early 2023, when the EPA inspection occurred, or to earlier versions that are incorporated by reference into the Connecticut Fire Code. The portions of these standards cited here have not substantively changed since 2015 when the large propane tank was installed at this facility.

Condition Number	Area of Concern	Examples of RAGAGEP
1	Propane piping throughout the facility was not labeled as to its flow direction and was not consistently labeled as to its contents.	ASME A13.1-2015, §§ 3.1–3.5.
2	Shutoff buttons in multiple locations had conflicting or ambiguous signage: a "Propane Emergency Shut-off: Push to Close" sign was posted at a button, but the same sign was also posted a few feet away on a control panel for the nitrogen system (where there was no button and which had an additional "Emergency Shut Off" sign), making it unclear what equipment was the true emergency shut-off; the sign most visible to operators on side A1 of the truck filling station says "Transport 3 Shutdown" on a box that is also labeled "Operational Shut-off Valve," although there is no button; the corresponding location on side A2 has a button by the sign "Operational Shut-off Valve," but it is unclear whether this button or the ones labeled "Emergency Shut Off" (which are out of view of the operators) should be used; an unlabeled shut-down button was present at the top of one of the Tank Unloading Towers, while a nearby button had two different labels ("Operational Shutoff Valve" and "Rail Tower Shutdown").	NFPA 58-2020, §§ 6.13.5 ("Emergency remote shutdown stations shall be identified by a sign, visible from the point of transfer, incorporating the words "Propane – Container Liquid Valve Emergency Shutoff" in block letters of not less than 2 in. (51 mm) in height on a background of contrasting color to the letters."); 6.14.12.1 ("Each emergency shutoff valve shall have at least one clearly identified and easily accessible manually operated remote emergency shutoff device; 6.29.4.3 ("Emergency controls shall be conspicuously marked, and the controls shall be located so as to be readily accessible in emergencies.) NFPA 1-2021, § 69.3.10.12.1 ("Each emergency shutoff valve shall have at least one clearly identified and easily accessible manually operated remote emergency shutoff device")

Condition Number	Area of Concern	Examples of RAGAGEP
3	Inadequate grounding in multiple areas creating hazard in event of a leak: grounding cable Tank Unloading Tower T2 at terminated at the tank unloading tower and the tower was not obviously grounded; other grounding wires were connected to piping supports; and grounding wires at T2 and the terminal were visibly damaged.	NFPA 58 does not generally require grounding and bonding on LP-gas systems, on the assumption that they are closed systems of piping and equipment. However, grounding and bonding at filling stations is the norm at LP-gas facilities. The Plymouth Facility's Fire Safety Analysis attested to adherence to the Electrical Code, which does require grounding. NFPA 70 (2023), §§ 250.4 (A) (outlining general grounding and bonding requirements); 250.8(A) (Grounding conductors, grounding electrode conductors, and bonding jumpers shall be connected by listed pressure connectors, terminal bars, exothermic welding process, machine screw-type fasteners, thread-forming machine screws, connections part of a listed assembly, or other means.); 501.30 ("wiring and equipment in Class 1, Division 1 and 2 locations shall be grounded as specified in Article 250 and in accordance with the requirements of 501.30(A) and (B).")
4	Bulk propane tanks are not labeled with NFPA diamonds and unique identifiers from multiple approaches, to be able to distinguish between them.	NFPA 1-2021, § 60.5.1.8.2.1(3) (requiring NFPA 704 hazard identification signs at entrances to locations where hazardous materials are stored, dispensed, and used, and on stationary aboveground containers) NFPA 704-2017
5	Evidence of corrosion at certain points indicates that corrosion protection paint was not applied to portions of propane piping at and supports.	NFPA 58-2020, §§ 6.11.3.12 ("The portion of aboveground piping in contact with a support or a corrosion-causing substance shall be protected against corrosion."); 6.19.1 ("All materials and equipment installed above ground shall be of corrosion-resistant material or shall be coated or protected to minimize exterior corrosion.") NFPA 30-2021, § 27.6.4 ("Aboveground piping systems that are subject to external corrosion shall be suitably protected.")

Condition Number	Area of Concern	Examples of RAGAGEP
6	No hose safety management program to ensure ongoing integrity of the propane transfer hoses, as four hoses in the truck unloading area were marked with June 2019 inspection dates, which exceeds the requirement to pressure test hoses in LP service annually	NAHAD Handbook for the Design and Specification of Hose Assemblies (2015) §§ 12.5 (recommending a hose fitting and maintenance inspection program based on past history and manufacturer's recommendations for the frequency of visual inspections and functional tests or, in the absence of such information, before each shift or at least once a day), 2.4.5 (referencing the use of UL 21 and UL 569 hoses for LP Gas) NFPA 58-2020, § 15.6.2.1 (requiring that, at bulk plants, hose assemblies be inspected as specified in § 7.2.4 and replaced, repaired, or continued in service based on the results of the inspection. In turn, § 7.2.4 requires, among other things, annual inspections.)