

RECORD OF REVISIONS

Rev	Date	Description	POC	RM
0	9/17/14	Initial issue.	Ari Ben Swartz, <i>ES-EPD</i>	Larry Goen, <i>ES-DO</i>

Contact the Standards POC for upkeep, interpretation, and variance issues.

Chapter 17	<u>Pressure Safety POC and Committee</u>
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Code and Regulation Application

This attachment contains paraphrased code and regulation scope summaries with discussion of how these mandates shall be applied at LANL.¹

¹ Many of these mandates and their adoption by LANL are listed in [SD100](#), *Integrated Safety Management System Description Document with embedded 10 CFR 851 Worker Safety and Health Program*.

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<p>B31.1 Power Piping</p> <p>Power piping systems include but are not limited to steam, water, oil, gas, and air services. This Code covers boiler external piping and non-boiler external piping for power boilers and high temperature, high pressure water boilers in which: steam or vapor is generated at a pressure of more than 15 psig [100 kPa (gage)]; and high temperature water is generated at pressures exceeding 160 psig [1,103 kPag] and/or temperatures exceeding 250°F (120°C).</p> <p>This Code does not apply to building heating and distribution steam and condensate piping designed for 15 psig [100 kPag] or less, or hot water heating systems designed for 30 psig [200 kPag] or less.</p>	<p>pressure vessels, heat exchangers, pumps, meters, and other such equipment including internal piping and connections for piping except as limited by para. 423.2.4(b) (c) piping designed for internal pressures (1) at or below 15 psi (1 bar) gage pressure regardless of temperature(2) above 15 psi (1 bar) gage pressure if design temperature is below minus 20°F (-30°C) or above 250°F (120°C)</p>
<p>B31.2 Fuel Gas Piping</p> <p>LANL does not follow this code. This code has been withdrawn and replaced by NFPA 54, <i>National Fuel Gas Code</i>. The authority having jurisdiction of NFPA 54 is the DOE/LANL Fire Marshal.</p>	<p>B31.5 Refrigeration Piping and Heat Transfer Components</p> <p>This Code prescribes requirements for the materials, design, fabrication, assembly, erection, test, and inspection of refrigerant, heat transfer components, and secondary coolant piping for temperatures as low as -320°F (-196°C), whether erected on the premises or factory assembled, except as specifically excluded in the following paragraphs.</p> <p>This Code shall not apply to any of the following: (a) any self-contained or unit systems subject to the requirements of Underwriters Laboratories or other nationally recognized testing laboratory (b) water piping, other than where water is used as a secondary coolant or refrigerant (c) piping designed for external or internal gage pressure not exceeding 15 psi (105 kPa) regardless of size (d) pressure vessels, compressors, or pumps, but does include all connecting refrigerant and secondary coolant piping starting at the first joint adjacent to such apparatus</p>
<p>B31.3 Process Piping</p> <p>Pressure greater than 15 psig or if the fluid is flammable, toxic, or damaging to human tissues as defined in ASME B31.3 300.2 or the design temperature is outside the range of -29°C (-20°F) through 186°C (366°F). Toxic is defined as a category M fluid. Category M fluids are identified in ESM Chapter 17 Att. II-4.</p>	<p>B31.8 Gas Transmission and Distribution Piping Systems</p> <p>Note: These systems are also be required to meet DOE O 460.1 Packaging and Transportation Safety requiring 49 CFR 190-193, 195, and 199</p>
<p>B31.4 Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids</p> <p>LANL does not apply this code because there are no known systems that are within the scope of the code.</p> <p>This Code prescribes requirements for the design, materials, construction, assembly, inspection, and testing of piping transporting liquids such as crude oil, condensate, natural gasoline, natural gas liquids, liquefied petroleum gas, carbon dioxide, liquid alcohol, liquid anhydrous ammonia, and liquid petroleum products between producers' lease facilities, tank farms, natural gas processing plants, refineries, stations, ammonia plants, terminals (marine, rail, and truck), and other delivery and receiving points.</p> <p>This Code does not apply to (a) auxiliary piping, such as water, air, steam, lubricating oil, gas, and fuel (b)</p>	<p>802.1 Scope</p> <p>(a) This Code covers the design, fabrication, installation, inspection, and testing of pipeline facilities used for the transportation of gas. This Code also covers safety aspects of the operation and maintenance of those facilities. (See Appendix Q for scope diagrams.) This Code is concerned only with certain safety aspects of liquefied petroleum gases when they are vaporized and used as gaseous fuels. All of the requirements of NFPA 58 and NFPA 59 and of this Code concerning design, construction, and operation and maintenance of piping facilities shall apply to piping systems handling butane, propane, or</p>

mixtures of these gases.

(b) This Code does not apply to

(1) design and manufacture of pressure vessels covered by the BPV Code¹

(2) piping with metal temperatures above 450°F (232°C) or below -20°F (-29°C) (for low temperature considerations, see para. 812.)

(3) piping beyond the outlet of the customer’s meter set assembly (refer to ANSI Z223.1/NFPA 54.)

(4) piping in oil refineries or natural gasoline extraction plants, gas treating plant piping other than the main gas stream piping in dehydration, and all other processing plants installed as part of a gas transmission system, gas manufacturing plants, industrial plants, or mines (See other applicable sections of the ASME Code for Pressure Piping, B31.)

(5) vent piping to operate at substantially atmospheric pressures for waste gases of any kind

(6) wellhead assemblies, including control valves, flow lines between wellhead and trap or separator, offshore platform production facility piping, or casing and tubing in gas or oil wells (For offshore platform production facility piping, see API RP 14E.)

(7) the design and manufacture of proprietary items of equipment, apparatus, or instruments

(8) the design and manufacture of heat exchangers (refer to appropriate TEMA² standard.)

(9) liquid petroleum transportation piping systems (refer to ASME B31.4.)

(10) liquid slurry transportation piping systems (refer to ASME B31.11.)

(11) carbon dioxide transportation piping systems

(12) liquefied natural gas piping systems (refer to NFPA 59A and ASME B31.3.)

(13) cryogenic piping systems

¹ BPV Code references here and elsewhere in this Code are to the ASME Boiler and Pressure Vessel Code.

² Tubular Exchanger Manufacturers Association, 25 North Broadway, Tarrytown, NY 10591.

B31.8S Managing System Integrity of Gas Pipelines

This Code applies to onshore pipeline systems constructed with ferrous materials and that transport gas. The principles and processes embodied in integrity management are applicable to all pipeline systems.

This Code is specifically designed to provide the operator (as defined in section 13) with the information necessary to develop and implement an effective integrity management program utilizing proven industry practices and processes. The processes and approaches within this Code are applicable to the entire pipeline system.

B31.9 Building Services Piping

This Code Section has rules for the piping in industrial, institutional, commercial, and public buildings, and multi-unit residences, which does not require the range of sizes, pressures, and temperatures covered in B31.1.

(a) Services. This Code applies to the following building services, except as excluded in para. 900.1.3: (1) water and antifreeze solutions for heating and cooling (2) condensing water (3) steam or other condensate (4) other nontoxic liquids (5) steam (6) vacuum (7) compressed air (8) other nontoxic, nonflammable gases (9) combustible liquids including fuel oil

(b) Boiler External Piping. The scope of this Code includes boiler external piping within the following limits: (1) for steam boilers, 15 psig (103 kPag) max; (2) for water heating units, 160 psig (1,103 kPag) max and 250°F (121°C) max. Boiler external piping above these pressure or temperature limits is within the scope of ASME B31.1.

(c) Material and Size Limits. Piping systems of the following materials are within the scope of this Code, through the indicated maximum size (and wall thickness if noted): (1) carbon steel: NPS 48 (DN 1,200) and 0.50 in. (12.7 mm) wall (2) stainless steel: NPS 24 (DN 600) and 0.50 in. (12.7 mm) wall (3) aluminum: NPS 12 (DN 300) (4) brass and copper: NPS 12 (DN 300) and 12.125 in. (308 mm) O.D. for copper tubing (5) thermoplastics: NPS 24 (DN 600) (6) ductile iron: NPS 48 (DN 1,200) (7) reinforced thermosetting resin: 24 in. (600 mm) nominal Other

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<p>materials may be used as noted in Chapter III.</p> <p>(d) Pressure Limits. Piping systems with working pressures not in excess of the following limits are within the scope of this Code:</p> <p>(1) steam and condensate: 150 psig (1,034 kPag)</p> <p>(2) liquids: 350 psig (2,413 kPag)</p> <p>(3) vacuum: 1 atm external pressure</p> <p>(4) compressed air and gas: 150 psig (1,034 kPag)</p> <p>(e) Temperature Limits. Piping systems with working temperatures not in excess of the following limits are within the scope of this Code: (1) steam and condensate: 366°F (186°C); (2) other gases and vapors: 200°F (93°C) ; (3) other nonflammable liquids: 250°F (121°C). The minimum temperature for all services is 0°F (-18°C).</p> <p>900.1.3 Exclusions. This Code does not apply to economizers, heaters, pumps, tanks, heat exchangers, and equipment covered by the ASME Boiler and Pressure Vessel (BPV) Code.</p>
<p>B31.11 Slurry Transportation Piping Systems</p> <p>LANL does not apply this code because there are no know systems that are within the scope of the code.</p>
<p>Rules for this Code section have been developed considering the needs for applications, which include piping transporting aqueous slurries between plants and terminals and within terminals, pumping and regulating stations.</p> <p>This Code does not apply to piping designed for internal pressures at or below 15 psig regardless of temperature or above 15 psig if the temperature is below -20°F (-30°C) or above 250°F (120°C).</p>
<p>B31.12 Hydrogen Piping and Pipelines</p> <p>IP (industrial piping) Rules for this Part have been developed for hydrogen service included in petroleum refineries, refueling stations, chemical plants, power generation plants, semiconductor plants, cryogenic plants, hydrogen fuel appliances, and related facilities.</p> <p>PL (pipelines) excludes the following: (a) design and manufacture of pressure vessels covered by the ASME Boiler and Pressure Vessel Code; (b) pipeline systems with temperatures above 450°F or below -80°F; (c) pipeline systems with pressures above</p>

<p>3000 psig; (d) pipeline systems with a moisture content greater than 20 ppm (dew point at 1 atm p -67°F); (e) pipeline systems with a hydrogen content less than 10% by volume.</p>
<p>B31.G Manual for Determining Remaining Strength of Corroded Pipelines</p> <p>This document is intended solely for the purpose of providing guidance in the evaluation of metal loss in pressurized pipelines and piping systems. It is applicable to all pipelines and piping systems within the scope of the transportation pipeline codes that are part of ASME B31 Code for Pressure Piping, namely: ASME B31.4, Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids; ASME B31.8, Gas Transmission and Distribution Piping Systems; ASME B31.11, Slurry Transportation Piping Systems; and ASME B31.12, Hydrogen Piping and Pipelines, Part PL. Where the term <i>pipeline</i> is used, it may also be read to apply to piping or pipe conforming to the acceptable applications and within the technical limitations discussed below.</p>
<p>49 CFR Part 192 Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards</p> <p>Note: These systems are also be required to B31.8</p>
<p>This part prescribes minimum safety requirements for pipeline facilities and the transportation of gas, including pipeline facilities and the transportation of gas within the limits of the outer continental shelf.</p> <p>(b) This part does not apply to offshore gathering of gas in State waters; pipelines on the Outer Continental Shelf (OCS); onshore gathering of gas through a pipeline that operates at less than 0 psig, through a pipeline that is not a regulated onshore gathering line, and within inlets of the Gulf of Mexico; any petroleum gas or petroleum gas/air mixtures only pipeline to fewer than 10 customers, if no portion of the system is located in a public place; or a single customer, if the system is located entirely on the customer's premises (no matter if a portion of the system is located in a public place).</p>

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<p>NFPA 54 National Fuel Gas Code</p> <p>Note: NFPA systems are not required to meet ESME Chapter 17 and are presented here only for information to the reader to help clarify which codes apply to the different portions of natural gas systems.</p>	<p>types that are not connected to a fixed fuel piping system</p> <p>(2) Installation of farm appliances and equipment such as brooders, dehydrators, dryers, and irrigation equipment</p> <p>(3) Raw material (feedstock) applications except for piping to special atmosphere generators</p> <p>(4) Oxygen–fuel gas cutting and welding systems</p> <p>(5) Industrial gas applications using such gases as acetylene and acetylenic compounds, hydrogen, ammonia, carbon monoxide, oxygen, and nitrogen</p> <p>(6) Petroleum refineries, pipeline compressor or pumping stations, loading terminals, compounding plants, refinery tank farms, and natural gas processing plants</p> <p>(7) Large integrated chemical plants or portions of such plants where flammable or combustible liquids or gases are produced by chemical reactions or used in chemical reactions</p> <p>(8) LP-Gas installations at utility gas plants</p> <p>(9) Liquefied natural gas (LNG) installations</p> <p>(10) Fuel gas piping in electric utility power plants</p> <p>(11) Proprietary items of equipment, apparatus, or instruments such as gas generating sets, compressors, and calorimeters</p> <p>(12) LP-Gas equipment for vaporization, gas mixing, and gas manufacturing</p> <p>(13) LP-Gas piping for buildings under construction or renovations that is not to become part of the permanent building piping system -- that is, temporary fixed piping for building heat</p> <p>(14) Installation of LP-Gas systems for railroad switch heating</p> <p>(15) Installation of LP-Gas and compressed natural gas (CNG) systems on vehicles</p> <p>(16) Gas piping, meters, gas pressure regulators, and other appurtenances used by the serving gas supplier in distribution of gas, other than undiluted LP-Gas</p> <p>(17) Building design and construction, except as</p>
<p>1.1 Scope.</p> <p>1.1.1 Applicability.</p> <p>1.1.1.1 This code is a safety code that shall apply to the installation of fuel gas piping systems, appliances, equipment, and related accessories as shown in 1.1.1.1(A) through 1.1.1.1(D).</p> <p>(A) Coverage of piping systems shall extend from the point of delivery to the appliance connections. For other than undiluted liquefied petroleum gas (LP-Gas) systems, the point of delivery shall be considered to be the outlet of the service meter assembly or the outlet of the service regulator or service shutoff valve where no meter is provided. For undiluted LP-Gas, the point of delivery shall be considered to be the outlet of the final pressure regulator, exclusive of line gas regulators, in the system.</p> <p>(B) The maximum operating pressure shall be 125 psi (862 kPa).</p> <p><i>Exception No. 1: Piping systems for gas–air mixtures within the flammable range are limited to a maximum pressure of 10 psi (69 kPa).</i></p> <p><i>Exception No. 2: LP-Gas piping systems are limited to 20 psi</i></p> <p><i>(140 kPa), except as provided in 5.5.2.</i></p> <p>(C) Requirements for piping systems shall include design, materials, components, fabrication, assembly, installation, testing, inspection, operation, and maintenance.</p> <p>(D) Requirements for appliances, equipment, and related accessories shall include installation, combustion, and ventilation air and venting.</p> <p>1.1.1.2 This code shall not apply to the following items (reference standards for some of which appear in Annex M):</p> <p>(1) Portable LP-Gas appliances and equipment of all</p>	

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specified herein

(18) Fuel gas systems on recreational vehicles manufactured in accordance with NFPA 1192, *Standard on Recreational Vehicles*

(19) Fuel gas systems using hydrogen as a fuel

(20) Construction of appliances

1.1.2 Other Standards. In applying this code, reference shall also be made to the manufacturers' instructions and the serving gas supplier regulations.

1.2 Purpose. (Reserved)

1.3 Retroactivity. Unless otherwise stated, the provisions of this code shall not be applied retroactively to existing systems that were in compliance with the provisions of the code in effect at the time of installation.

1.4 Equivalency. The provisions of this code are not intended to prevent the use of any material, method of construction, or installation procedure not specifically prescribed by this code, provided any such alternative is acceptable to the authority having jurisdiction (*see 3.2.2*). The authority having jurisdiction shall require that sufficient evidence be submitted to substantiate any claims made regarding the safety of such alternatives.

1.5 Enforcement. This code shall be administered and enforced by the authority having jurisdiction designated by the governing authority.