United States General Accounting Office

GAO

Report to Congressional Committees

July 2001

CHEMICAL SAFETY

Status of Changes to the National Fire Protection Association Code for Propane

GAO-01-709

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GAO
Accountability * Integrity * Reliability

United States General Accounting Office
Washington, DC 20548

July 6, 2001

The Honorable Harry Reid
Chairman
The Honorable Robert C. Smith
Ranking Minority Member
Committee on Environment and Public Works
United States Senate

The Honorable W.J. "Billy" Tauzin
Chairman
The Honorable John D. Dingell
Ranking Minority Member
Committee on Energy and Commerce
House of Representatives

Liquefied petroleum gas (propane) has thousands of applications in homes, farms, and workplaces and is widely available in the United States. While propane can be stored and handled safely, serious propane-related accidents have resulted in loss of life and property. At times, the efforts of local emergency personnel to respond to such accidents have been impeded by lack of hazard and safety information. The Clean Air Act Amendments of 1990 addressed the prevention of such accidents and the provision of information to emergency response personnel.[1] The amendments required the Environmental Protection Agency (EPA) to list at least 100 substances that, if accidentally released into the environment, would pose the greatest risk of causing death, injury, or serious adverse effects to human health or the environment. Under the amendments, facilities handling quantities of any of these substances above certain threshold amounts are required to develop and submit a risk management plan to EPA. Risk management plans are to include (1) a hazard assessment that includes a 5-year accident history by substance by site and an evaluation of worst-case accidental releases; (2) a prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and (3) a response program that includes emergency health care, employee training measures, and procedures for informing the public and local agencies responsible for responding to

[1]P.L. 101-549, 104 Stat. 2399, sec. 112(r) (codified at 42 U.S.C. 7412(r)).

accidental releases. In 1994, EPA issued the list of substances, which included propane.

The National Propane Gas Association (NPGA)[2] subsequently objected to the placement of propane on the list and told the Congress that sufficient voluntary safety standards for propane already existed in the Code for Liquefied Petroleum Gas, published by the National Fire Protection Association (NFPA).[3] NFPA's code, which has existed since 1940, is the primary standard used in the United States for propane safety. The code has been revised numerous times to reflect changes in the industry; in the past decade, it has generally been updated every 3 years. States and municipalities may choose to adopt the code into law. In April 2001, NFPA published the 2001 version of the code.

In 1999, the Chemical Safety Information, Site Security and Fuels Regulatory Relief Act[4] resulted in exemption for most propane facilities from the requirement to submit risk management plans to EPA.[5] The act mandated that GAO report, within 2 years, on the status of revisions to the NFPA code regarding information for emergency personnel about the potential effects of accidental releases of propane to surrounding areas (off-site effects). As agreed with your offices, this report describes (1) relevant revisions to the 1998 version of the code that were published in the 2001 version, as well as the process used to revise the code; (2) the views of key stakeholders about whether the 2001 version of the code provides local emergency response personnel with sufficient information

[2]NPGA is the national trade association for the propane gas industry. It represents approximately 3,500 companies involved in the industry worldwide, including producers, wholesalers, transporters, and retailers of propane gas, as well as manufacturers and distributors of associated appliances and equipment.

[3]NFPA, an independent nonprofit organization, sponsors a technical committee composed of representatives from the government, the propane industry, educational institutions, insurance companies, fire associations, and other organizations to review the code and develop by consensus any revisions it believes are needed.

[4]P.L. 106-40, 113 Stat. 207 (1999).

[5]The act prohibited EPA from listing a flammable substance used as a fuel or held for sale as a fuel at a retail facility solely because of its explosive or flammable properties, unless a fire or explosion caused by the substance would result in acute adverse health effects from human exposure to the substance. As a result, EPA created a regulatory exclusion for propane when used as a fuel or held for sale at a retail facility. But propane remains on the list when used for other purposes.

to prepare for and respond to emergencies involving propane; and (3) the status of state and local government adoption of the 2001 code.

Results in Brief

The 2001 version of the NFPA code strengthens provisions of previous versions regarding information on the off-site effects of accidental propane releases in four ways. First, the 2001 version of the code provides that facilities' fire safety planning should include consideration of the safety of emergency personnel, workers, and the public. The 1998 version provided for consideration of the safety of only emergency personnel. Second, the revised code provides that facilities with more than 4,000 gallons of propane on site evaluate their potential fire hazards and safety procedures and document them in a written fire safety analysis. While the 1998 version required the fire safety analysis for some facilities, it was not required to be in writing. Third, the 2001 version requires all propane facilities that meet the 4,000-gallon criterion to prepare fire safety analyses. In contrast, the 1998 version required only new (and not existing) facilities meeting that criterion to prepare fire safety analyses. Fourth, the 2001 version contains general guidance in an appendix recommending that propane facilities make their fire safety analyses available to local emergency response personnel to help them plan for and respond to propane accidents. The 1998 version did not contain this guidance. To encourage revisions to the code, EPA participated in NFPA's consensus-based process.

The nine key stakeholder representatives we contacted who indicated they were sufficiently familiar with the 2001 version of the code to comment on it said that the new code would make available more information to local emergency response personnel.[6] These stakeholders included the International Fire Marshals Association, the International Association of Fire Chiefs, the International Association of Fire Fighters, the National Volunteer Fire Council, the Working Group on Community-Right-to-Know,[7]

[6]We contacted 18 key stakeholders, of which 9 provided comments. Representatives who did not comment said either that their organizations had not prepared an opinion on the code changes or that they were not sufficiently knowledgeable about the changes to comment.

[7]The Working Group on Community Right-to-Know is a public interest group dedicated to improving the public's right to know about environmental and public health concerns.

an Iowa local emergency planning committee,[8] NFPA, NPGA, and EPA. All but one of these stakeholders—NPGA—stated that additional changes to the code or to the process for revising the code should be considered during the next revision process. The stakeholders had differing views on what specific changes should be made. Examples of possible changes included standardizing the fire safety analysis; requiring that fire safety analyses be shared with local emergency personnel, rather than simply providing guidance on this subject in the appendix to the code; and accelerating NFPA's process for revising the code.

With available information, it is not possible to determine comprehensively the status of state and local government adoption of the 2001 version of the code because the code may be adopted in several ways. First, a state may adopt a version of the code into its law through a legislative or administrative process. Second, a state may enact legislation that requires all municipalities within the state to adopt a version of the code. Third, even if a state takes no action to adopt a version of the code, individual municipalities within a state may do so. As a result, to determine the exact extent to which the code has been adopted would require an extensive search of the laws and regulations of each state and municipality. We did not perform this search but instead relied on information provided by NPGA. According to the NPGA information, as of April 16, 2001, 25 states had adopted the 1998 version of the code, and the remaining 25 states had adopted earlier versions. NPGA did not have any information on municipalities' adoption of the code. An NFPA representative estimated that between 5 and 10 states will have adopted the 2001 code by the end of calendar year 2001.

We provided a draft of this of this report to EPA and NFPA, both of which agreed with the report's findings.

[8]Local emergency planning committees were established following the passage of the Emergency Planning and Community Right-to-Know Act in 1986, which placed upon state and local governments additional planning and preparedness requirements for emergencies involving the release or spill of hazardous materials. These committees are appointed by state emergency response commissions.

Revised Code Strengthens Previous Provisions

The 2001 version of the code, effective February 9, 2001, and published April 4, 2001, strengthens the provisions in prior versions regarding off-site effects of accidental propane releases in four ways, including providing additional guidance about making information available to local emergency response personnel. EPA worked through NFPA's consensus-based approach to ensure that the code revisions addressed providing information to local emergency response personnel about the off-site effects of accidental propane releases.

Code Expands Provisions and Guidance for Fire Safety Analysis

The 1998 version of the code explained that preplanning should be coordinated with local emergency response personnel and that the planning should consider the safety of the emergency personnel. The 1998 version also required fire protection for newly built facilities with more than 4,000 gallons of propane on site. The code stated that such protection would be determined through a fire safety analysis—that is, an evaluation of a facility's fire hazards and safety procedures. Finally, an appendix to the code explained that a fire safety analysis includes various elements, one of which addresses the off-site effects of accidental releases of propane.[9] Specifically, the appendix indicated that the fire safety analysis addresses the "exposure to or from other properties, population density, and congestion within the site." There was no requirement for the fire safety analysis to be in writing.

The 2001 version of the code explains that fire safety planning should include consideration of the safety of not only emergency personnel, but also workers and the public. The 2001 code also requires all facilities with more than 4,000 gallons of propane on site, not just newly built facilities, to prepare a written fire safety analysis within 3 years of the effective date of this code. In addition, the appendix to the revised code now recommends that propane facilities meeting the 4,000-gallon criterion make their fire safety analyses available to local emergency response personnel. Specifically, the appendix explains that a fire safety analysis includes "if necessary, a designated time period for review of the fire safety analysis with local emergency response agencies to ensure preplanning and emergency response plans for the installation are

[9]The appendix is not part of the requirements of the code but is included for informational purposes only. The appendix contains explanatory material, numbered to correspond with the applicable text of the code.

current." (See app. I of this report for more information on the contents of the code.)

EPA Led Efforts to Ensure the Code Addressed Providing Information to Local Emergency Responders

According to NFPA officials, in anticipation of the passage of the Chemical Safety Information, Site Security and Fuels Regulatory Relief Act, which would result in the exemption of most propane facilities from the requirement to prepare risk management plans, officials from EPA's Chemical Emergency Preparedness and Prevention Office contacted NFPA to learn how to become involved in the process to revise the NFPA code for liquefied petroleum gas. Two EPA employees applied to serve on the NFPA Technical Committee on Liquefied Petroleum Gas, one as a principal member and one as an alternate. NFPA approved the applications at its July 1999 meeting.

The EPA employee who had applied to serve as a principal member submitted four proposals for changes by July 1, 1999, the closing date for submitting proposals for changing the 1998 version of the code. These proposals included instituting requirements that (1) propane facilities develop some elements of risk management plans and share the information with local emergency personnel; (2) propane facilities provide local emergency personnel with information on any incident in the previous 5 years that resulted in or could have resulted in a catastrophic release of liquefied petroleum gas; (3) propane facilities develop and use written operating procedures for all phases of facility operation, prepare and implement an equipment maintenance program, self-audit their compliance with the code every 3 years, investigate any accidents that occur, correct the causes of any accidents, write a report on each accident, and provide accident reports to local emergency officials; and (4) facility operators undergo refresher training at least every 3 years. No other organization submitted proposals regarding providing information about the off-site effects of accidental releases of propane to local emergency responders.

According to NFPA, all EPA proposals were discussed during the committee debate. Some of the proposals submitted by EPA resulted in changes to the fire safety analysis, as noted earlier, as well as in additional changes affecting training and facilities operations and maintenance. Other EPA proposals were rejected, including the ones calling for developing elements of risk management plans, 5-year accident histories, accident investigations, and 3-year compliance audits. (See app. I of this report for more detailed information on the NFPA code revision process.)

Stakeholders Said the New Code Makes Available More Information to Emergency Personnel, but Many Saw Need for More Changes

The nine key stakeholder representatives we contacted who said they were knowledgeable about the changes being made to the code told us that the 2001 code would make more information available to local emergency personnel in order to prepare for and respond to emergencies. All but one—NPGA—told us that more changes should be considered during the next code revision process. Representatives of NPGA said that the code should meet the needs of the local emergency personnel and that no further changes to the code would be needed. Opinions of the other eight stakeholders varied as to what additional changes were needed. Although we contacted 18 different organizations and government agencies, representatives of only 9 commented on the 2001 version of the code.[10]

Three organizations' representatives suggested additional changes intended to standardize the fire safety analysis.

- The representative from the National Volunteer Fire Council stated that the changes made to the code might not go far enough to ensure that the proper information is provided to emergency personnel. However, he also said that the emergency personnel might not use the information they receive to plan for an accidental leak or fire. This representative would make further changes to the code to require facilities to design the fire safety analysis as a standardized emergency action plan. He went on to say that facilities should update this emergency action plan every 3 years, or whenever significant changes occur at the facility.

- The representative from the Working Group on Community Right-to-Know said that the changes are a good start, but that they do not meet the needs of local emergency personnel for information about the off-site effects of accidental releases of propane. This representative would like to see further changes to the code to include requirements that (1) communities consider the safety of propane facilities planned for construction compared with facilities that handle alternative fuels; (2) communities have a role in planning for the safe placement of facilities; (3) propane

[10]Those who did not comment said either that their organizations had not prepared an opinion on the code changes or that they were not knowledgeable about the changes. Organizations that did not comment follow: the American Chemistry Council; the National Association of SARA Title III Program Officials; the International Association of Emergency Managers; local emergency planning committees in Louisiana, North Dakota, South Dakota, and Texas; the U.S. Chemical Safety and Hazard Investigation Board; and the U.S. Department of Transportation.

facilities develop site security measures; and (4) propane facilities develop worst-case scenarios, in a standardized fire safety analysis, for the effects on the people in the surrounding areas of accidental propane releases.

- The representative from the International Association of Fire Fighters wanted the information on what a fire safety analysis should include to appear in the code itself rather than in an appendix, as it does in the 2001 version of the code. That is, he wanted the contents of the analysis to be standardized and required in order to better meet the needs of local emergency personnel.

  Officials at two organizations suggested changes to the NFPA code revision process or to the process for dissemination of information.

- The representative from the International Association of Fire Chiefs said that, while the code is not perfect, it is one of the finest standards on fuels or chemicals in this country, and he believes that it meets the needs of the local emergency personnel. This representative's only suggestion for improvement was to accelerate the NFPA process for making changes to the code, which currently takes 2 years.

- The representative for a local emergency planning committee in Iowa said that the changes to the code were very good ones. He further said that the only additional changes he would like to see would be to ensure that all local emergency personnel be notified when changes to the code have occurred and that the emergency personnel have the right to review the facilities' fire safety analyses.

  Three other representatives expected to see further changes to the code but believed it was important to see the effects of the most recent revisions before deciding what additional changes should be made.

- The International Fire Marshals Association's representative said that the 2001 version of the code meets the needs of local emergency personnel, but he hopes that more changes about providing information to emergency personnel will be made over time.

- An NFPA representative said that the 2001 code is a significant change from the 1998 code and that technical committee members are anxious to make more changes to the code about providing information to local emergency personnel.

- The Director of the Chemical Emergency Preparedness and Prevention Office at EPA said the changes made to the code are a significant step toward providing information to local emergency response personnel concerning the off-site effects of propane accidents. He also said that EPA intends to continue to work with the NFPA committee to enhance the code's requirements and guidance for providing information to local emergency planners and responders.

Definitively Determining the Status of the Adoption of the Code Would Require Searching Laws and Regulations of States and Municipalities

It is not possible, given the information that was readily available, to determine the status of state and local government adoption of the 2001 version of the code because of the variety of ways in which the code may be adopted. A state may adopt the code into its law through legislation or an administrative process. A state may also enact legislation requiring all of its municipalities to adopt the code. Finally, individual municipalities within a state may adopt a version of the code while the state itself does not. As a result, definitively determining the extent to which the code has been adopted would require an extensive search of the laws and regulations of each state and municipality. We did not perform this search but instead relied on information provided by NPGA. According to this information, as of April 16, 2001, 25 states had adopted the 1998 version, and the remaining 25 states had adopted earlier versions (see table 1). An official of the NFPA technical committee estimated that between 5 and 10 states will have adopted the 2001 code by the end of calendar year 2001.

Table 1: NPGA Information on the Number and Percentage of States That Had Adopted Various Versions of the NFPA Liquefied Petroleum Gas Code as of April 16, 2001

	States that had adopted the code	
Code version	**Number**	**Percentage**
1998	25	50
1995	14	28
1992	5	10
1989	3	6
1986	1	2
1976	1	2
1972	1	2
Total	**50**	**100**

Note: This table presents information for the 50 states; NPGA did not have information available on territories' adoption of the code.

Source: NPGA data.

Agency Comments

We provided EPA and NFPA with a draft of this report for review and comment. The Director of EPA's Chemical Emergency Preparedness and Prevention Office and NFPA's Vice President for Codes and Standards Operations orally commented that the report fairly and accurately presented the information about the status of the changes to the code. Both organizations also provided technical comments that clarified information in the report; we incorporated these comments where appropriate.

We performed our work between October 2000 and June 2001 in accordance with generally accepted government auditing standards. A detailed description of our scope and methodology is contained in appendix II.

We are sending copies of this report to the Administrator of the Environmental Protection Agency; the Vice President for Codes and Standards Operations, National Fire Protection Association; appropriate congressional committees; and other interested parties. We will also make copies available to others upon request.

If you or your staff have any questions about this report, please call me at (202) 512-6111. Jeanne Barger and Linda Libician made key contributions to this report.

David G. Wood

David G. Wood
Director, Natural Resources and Environment

Appendix I: Contents of the NFPA Liquefied Petroleum Gas Code and the Code Revision Process

NFPA Code Contents

According to the National Propane Gas Association,[1] the National Fire Protection Association's (NFPA) liquefied petroleum gas codes for 1998 and 2001 apply to propane systems such as the following:

- Containers, piping, and associated equipment used to deliver LP-Gas to a building for use as a fuel gas.
- Highway transportation of LP-Gas.
- The design, construction, installation, and operation of marine terminals whose primary purpose is the receipt of propane for delivery to transporters, distributors, or users. The code does not apply to marine terminals associated with refineries or petrochemical or gas plants. The code also does not apply to marine terminals whose purpose is to deliver gas to marine vessels.
- The design, construction, installation, and operation of pipeline terminals that receive LP-Gas from pipelines under the jurisdiction of the U.S. Department of Transportation whose primary purpose is the receipt of LP-Gas for delivery to transporters, distributors, or users. Code coverage in these situations begins downstream of the last pipeline valve or tank manifold inlet.

The 1998 and 2001 versions of the code include the same chapters, except that the 2001 version contains an additional chapter on operations and maintenance. The 2001 version of the code contains the following chapters:

- Chapter 1—*General Provisions*—includes definitions, scope, and so on.
- Chapter 2—*LP-Gas Equipment and Appliances*—includes standards for tanks, cylinders, valves, piping, and appliances (that is, vaporizers).
- Chapter 3—*Installation of LP-Gas Systems*—includes guidelines for installing equipment in bulk plants, in cylinder filling stations, and on industrial and road vehicles.

[1]Propane Education and Research Council and NPGA, *Propane Emergencies* (summer 1999). According to an NPGA official, the information in this publication is also applicable to the 2001 code.

- Chapter 4—*LP-Gas Transfer*—includes guidelines for filling tanks and cylinders.

- Chapter 5—*Storage of Portable Containers Awaiting Use, Resale, or Exchange*—includes scope, general provisions, storage, and fire protection.

- Chapter 6—*Vehicular Transportation of LP-Gas*—includes scope, transportation modes, and parking and garaging vehicles.

- Chapter 7—*Buildings or Structures Housing LP-Gas Distribution Facilities*—includes scope and separate and attached structures.

- Chapter 8—*Engine Fuel Systems*—includes application, general purpose and industrial vehicles, engine installation, and garaging vehicles.

- Chapter 9—*Refrigerated Containers*—includes containers, impoundment, and locating above-ground containers.

- Chapter 10—*Marine Shipping and Receiving*—includes piers, pipelines, and actions prior to transfer.

- Chapter 11—*Operations and Maintenance*—includes scope and operating requirements.

- Chapter 12—*Pipe Tubing and Sizing Tables*—includes tables for sizing pipe and tubing.

- Chapter 13—*Referenced Publications*—includes documents referenced by the code that are considered part of the requirements of the code.

In addition, the 1998 and 2001 versions of the code also contain information and guidance in the following appendixes:

- Appendix A—*Explanatory Material*

- Appendix B—*Properties of LP-Gases*

- Appendix C—*Design, Construction, and Requalification of Department of Transportation Cylinders*

- Appendix D—*Design of American Society of Mechanical Engineers and American Petroleum Institute Containers*
- Appendix E—*Pressure Relief Devices*
- Appendix F—*Liquid Volume Tables, Computations, and Graphs*
- Appendix G—*Wall Thickness of Copper Tubing*
- Appendix H—*Procedure for Torch Fire and Hose Stream Testing of Thermal Insulating Systems for Propane Containers*
- Appendix I—*Container Spacing*
- Appendix J—*Referenced Publications*

NFPA Code Revision Process

According to NFPA, the process for revising any of its existing codes and standards, including the liquefied petroleum gas code, involves the following steps:

- NFPA issues a call for proposals to amend the existing document.
- Technical committee meets to review proposals submitted by the public, develop its own proposals, and prepare its *Report on Proposals*.
- Technical committee votes on *Report on Proposals* by letter ballot. Each proposal item requires a two-thirds approval by the technical committee members. Lacking two-thirds approval, the proposal item is deleted from the report.
- The *Report on Proposals* is published for public review and comment.
- Technical committee meets to review, consider, and act on public comments received and prepare the *Report on Comments*.
- Technical committee votes on the *Report on Comments* by letter ballot. If two-thirds of the technical committee members approve, the comments are included in the *Report on Comments*. Lacking two-thirds approval, the comment is deleted from the report.

- The *Report on Comments* is published for public review.
- NFPA membership meets (annual or fall meeting) and acts on the committee report (*Report on Proposals* or *Report on Comments*). At this meeting, the association members may, subject to review by the NFPA Standards Council, adopt a report as published; adopt a report as amended, contingent upon subsequent approval by the technical committee; return a report to technical committee for further study; or return a portion of a report to the technical committee.
- If the report was amended, the technical committee votes on the amendments to the report approved at the NFPA annual or fall meeting.
- The public may appeal NFPA actions to the Standards Council within 20 days of the NFPA annual or fall meeting.
- Standards Council decides, on basis of all evidence, whether to issue the code as amended by the report or to take other action, including upholding any appeals.

Appendix II: Scope and Methodology

To describe the revisions to the code regarding information for emergency personnel about the potential effects of accidental releases of propane to surrounding areas, as well as the code revision process, we reviewed and compared the 1998 and 2001 versions of the code. We interviewed representatives from NFPA, including the Vice President for Codes and Standards Operations, the Assistant Vice President of Fire Protection Applications and Chemical Engineering, the Associate General Counsel, and the Secretary for the Technical Committee on Liquefied Petroleum Gas, and discussed with them their process for making changes to the code. We also interviewed officials from the Environmental Protection Agency's (EPA) Chemical Emergency Prevention and Preparedness Office about the proposals made to change the code and the final changes to the code.

To describe the views of key stakeholders about whether the revised code provides sufficient information to local emergency response personnel, we interviewed representatives of nine organizations who said they were knowledgeable about the code changes. These representatives were from the International Association of Fire Chiefs, the International Association of Fire Fighters, the International Fire Marshals Association, the National Volunteer Fire Council, the Working Group on Community Right-to-Know, the National Propane Gas Association (NPGA), EPA, NFPA, and a local emergency planning committee in Iowa. During our interviews with these stakeholders, which took place before the publication and dissemination of the 2001 version of the code, we asked similar questions of each organization about the information that likely will be made available to local emergency personnel because of the changes made to the code. We also asked for referrals to others who might be knowledgeable about the changes to the code and the availability of information to local emergency personnel. We also contacted representatives of nine other organizations who said that they could not comment about the code changes because either their organizations had not prepared an opinion on the code changes or because the representatives said they were not knowledgeable enough about the changes to comment. Those who did not comment were the American Chemistry Council (previously known as the Chemical Manufacturers Association), the National Association of SARA Title III Program Officials, the International Association of Emergency Managers, four local emergency planning committees, the U.S. Chemical Safety and Hazard Investigation Board, and the Department of Transportation.

To select the local emergency planning committees, we obtained a list from NPGA of the 1997 propane sales by state (the latest available data) and selected the five states with the highest propane sales per capita—

Iowa, Louisiana, North Dakota, South Dakota, and Texas. We obtained contacts for each of the local emergency planning committees in these states and randomly selected one planning committee for each state. When we contacted the planning committee, we asked to speak with the planning committee member who was most familiar with propane issues.

To describe the status of adoption of the 2001 version of the code, we obtained information from NFPA and NPGA on whether states had adopted the code and, if so, which version. We identified errors in these data, but no other comparable data were readily available. Therefore, we decided to use NPGA's data, which, according to both organizations, are more accurate than the data provided by NFPA.

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