



1901 North Moore Street • P.O. Box 9245 • Arlington, Virginia 22209 • 703/525-9565

June 27, 1994

The Honorable Ann Brown
Chairman
Consumer Product Safety Commission
4930 East West Highway
Bethesda, Maryland 20814

Re: Staff Option Package on
Gas-Fired Water Heaters

Dear Chairman Brown:

Thank you for agreeing to meet with us today concerning the staff's Option Package for Gas-Fired Water Heaters and Ignition of Flammable Vapors. Staff has recommended that the Commission institute a rulemaking proceeding to develop a performance standard for new gas-fired water heaters to address the risk of flammable vapors ignition. Before you vote on the staff recommendation, the Gas Appliance Manufacturers Association (GAMA) wants to be sure you are aware of ongoing water heater industry activities to address this risk. We also want you to understand that a technical solution to eliminate ignition of flammable vapors by gas-fired water heaters is not as simple as staff may have led you to believe.

In a letter dated June 14, 1994 (copy attached), we complained to the Commission's Executive Director, Bert Cottine, that the staff Options Package does not give the Commissioners an up-to-date account of what the water heater industry has been doing to address this issue. Our letter describes an ongoing joint effort to test a new burner and the planned development of a test protocol for measuring compliance with any new performance standard in this area. We asked the Executive Director to provide a copy of our letter to each Commissioner in advance of the Commission's meeting on June 22. For reasons we do not know, this was not done. We regret that the Commissioners did not have this information in time for discussion at the June 22 meeting.

The water heater industry continues to believe that the best way to reduce death and injuries from ignition of flammable vapors

/Continued . . .





1901 North Moore Street • P.O. Box 9245 • Arlington, Virginia 22209 • 703/525-9565

June 27, 1994

The Honorable Ann Brown
Chairman
Consumer Product Safety Commission
4330 East West Highway
Bethesda, Maryland 20814

Re: Staff Option Package on
Gas-Fired Water Heaters

Dear Chairman Brown:

Thank you for agreeing to meet with us today concerning the staff's Option Package for Gas-Fired Water Heaters and Ignition of Flammable Vapors. Staff has recommended that the Commission institute a rulemaking proceeding to develop a performance standard for new gas-fired water heaters to address the risk of flammable vapors ignition. Before you vote on the staff recommendation, the Gas Appliance Manufacturers Association (GAMA) wants to be sure you are aware of ongoing water heater industry activities to address this risk. We also want you to understand that a technical solution to eliminate ignition of flammable vapors by gas-fired water heaters is not as simple as staff may have led you to believe.

In a letter dated June 14, 1994 (copy attached), we complained to the Commission's Executive Director, Bert Cottine, that the staff Options Package does not give the Commissioners an up-to-date account of what the water heater industry has been doing to address this issue. Our letter describes an ongoing joint effort to test a new burner and the planned development of a test protocol for measuring compliance with any new performance standard in this area. We asked the Executive Director to provide a copy of our letter to each Commissioner in advance of the Commission's meeting on June 22. For reasons we do not know, this was not done. We regret that the Commissioners did not have this information in time for discussion at the June 22 meeting.

The water heater industry continues to believe that the best way to reduce death and injuries from ignition of flammable vapors

/Continued . . .



3 is to educate the public on the dangers of storing and using
4 gasoline and other flammable liquids indoors. The real problem
is not gas water heaters, but consumer misuse of gasoline and
other flammable liquids. The Commission should recognize that a
gas water heater is only one of many possible ignition sources
in the home. Incident data will show ignition of flammable
vapors by gas dryers, electric washers, refrigerators and other
appliances in addition to gas water heaters.

Nevertheless, as reflected in our June 14 letter, the water
heater industry has been investigating whether practical water
heater design changes are possible to reduce the incidence of
ignition of flammable vapors in the home. These efforts began
before the industry became aware that the Commission staff was
preparing an options package for the Commission, and they will
continue whether or not the Commission commences a rulemaking
proceeding in this area. Issuance of an ANPR is not needed to
provide an impetus for industry action; the impetus is already
there.

5 Considering the ongoing industry activities that may support the
development of a voluntary standard, it is premature for the
Commission to commence a rulemaking proceeding at this stage.
The Commission has not been given adequate information to
propose a practical, effective performance standard or technical
6 solution for preventing ignition of flammable vapors by gas
water heaters. The water heater industry itself does not yet
have a technical solution.

In its Options Package and draft ANPR, Commission staff claims
to have found a "simple" solution to prevent gas water heaters
from igniting flammable vapors, i. e. encircling the water
heater with a 14" high sheet metal dam that is then taped to the
floor (see Options Package at pages 8, 16 and 91). In his
6 presentation to the Commission on June 22, the staff project
manager, Joseph Fandey, seemed less confident about this
supposed solution, calling it merely "a demonstration of
principle," and conceding that Commission staff "have not done
the live fire work that would be necessary to say this is
definitely a way to go." What happened to make Mr. Fandey
become less certain of this solution? The morning of the
June 22 briefing, Mr. Fandey learned that, in two "live fire"
tests of the proposed 14" high dam by International Approval
Services, gasoline vapors were ignited by the water heater in 30
seconds in one test and in 3¹/₂ minutes in the other test.

7 The 14" high dam proposed by Commission staff is not the
"simple" solution that the Options Package may have led the
Commission to believe. Moreover, Commission staff appears not
to have considered the possibility that the dam could increase

the risk of carbon monoxide production, a potential hazard to consumers the Commission certainly would want to avoid.

8 The staff Options Package discusses elevation of gas-fired water heaters 18 inches off the floor as another effective way to prevent ignition of flammable vapors. At the June 22 briefing, Mr. Fandey cited a decreasing incidence of fires caused by water heaters in garages in California and Oregon in the years since 18" elevation of water heaters in garages has been mandated in these states as evidence that elevation of water heaters is an effective way to prevent ignition of flammable vapors. However, fire incidence data for California and Oregon shows a declining incidence of flammable vapors ignition by water heaters in all areas of the home, including areas where there is no requirement to elevate the water heater. Thus, the data is at best inconclusive about the effects of the requirement to elevate water heaters in garages.

In tests conducted by Arthur D. Little, Inc. elevation of the water heater 18 inches often did not prevent ignition of gasoline vapors under a variety of test conditions. A copy of the Arthur D. Little study is being provided to you.

9 In its draft ANPR, Commission staff disparages the Arthur D. Little study as not particularly useful, and at the June 22 briefing, Mr. Fandey dismissed the study as "really done in contemplation of litigation rather than in an attempt to find a solution." To us, this shows an unreasonable bias on the part of Commission staff. The Arthur D. Little study is the most methodical, fully documented testing of the effects of water heater elevation on flammable vapor ignition ever conducted. Neither Commission staff nor Ed Downing, the Louisiana attorney on whom Commission staff relies so much, has produced any study nearly as thorough and substantiated as the Arthur D. Little study. For example, Commission staff's own testing in this area consisted of apparently only two tests using instrumentation to simulate actual water heater operation. The Arthur D. Little study involved 40 "live fire" tests.

10 In its draft ANPR, Commission staff condemns the Arthur D. Little study for using 2-gallon gasoline spills and unreasonably high floor temperatures up to 123°F (allegedly to increase the rate of gasoline vaporization). During his June 22 presentation to the Commission, Mr. Fandey also criticized Arthur D. Little for moving a dummy figure in the room so fast that it created unrealistic turbulence of the gasoline vapors. These comments ignore the variety of conditions under which water heaters ignited gasoline vapors in the Arthur D. Little study, and again demonstrate an unreasonable bias on the part of Commission staff.

/Continued . . .

132

In the Arthur D. Little tests of water heaters installed on an 18" stand, fires did occur with gasoline spills of 2 gallons, but fires also occurred with gasoline spills of $\frac{1}{2}$ gallon, 1 gallon, and $1\frac{1}{2}$ gallons when there was movement in the room. The movement in the room was not exaggerated, as Mr. Fandey contended at the June 22 briefing. The human cutout used on the moving sled was a child size flat board having no arms or moving parts. We believe that the more complex movements of real people would produce greater vapor dispersion than the dispersion created by the dummy form used in the tests.

Also, in the testing of water heaters installed on an 18" stand, the occurrence of fires was not dependent on the floor temperature. Fires occurred with floor temperatures of 45°F, 54°F, 60°F, 72°F, 81°F, 87°F, and 114°F, for example. This refutes Commission staff's assertion that overheated floors were used in the Arthur D. Little tests to enhance gasoline evaporation. For a concise summary of the results of the tests, we refer the Commission to amended Tables 9 and 10 in the Arthur D. Little report we are providing.

12 Finally, GAMA takes very seriously statements made by Mr. Fandey at the June 22 briefing that GAMA has not shown a willingness to cooperate with Commission staff and has not exhibited good faith in dealing with Commission staff. We do not believe that these claims are supported by the record. In October 1992, at the very beginning of Arthur D. Little's work for GAMA in this area, GAMA and Arthur D. Little representatives met with Mr. Fandey, William Rowe and Elizabeth Leland and briefed them on our plans for incident data collection and analysis. We asked for Commission staff support of this effort. In February 1993, Arthur D. Little presented the results of its incident data collection and analysis in a meeting with Mr. Fandey and Al Martin of Commission staff at GAMA's offices. At this same meeting, the Arthur D. Little representatives presented a draft of the methodology they planned to use to test the potential of water heater elevation to prevent ignition of flammable vapors. In May 1993, Mr. Martin observed a full day of testing by Arthur D. Little at International Approval Services laboratories in Cleveland. In December 1993, Larry Mulligan of Commission staff spent two days at Arthur D. Little in Cambridge learning to use Arthur D. Little's vapor dispersion model so that it could be applied to Commission staff's own testing. On all of these occasions, constructive suggestions from Commission staff were welcome.

In conclusion, we do not believe that the staff has made a persuasive case that a rulemaking proceeding is needed to force the water heater industry to examine possible technical solutions to prevent ignition of flammable vapors by gas-fired

/Continued . . .

water heaters. Such efforts are already underway, but a technical solution has not yet been found. As discussed above, the Commission itself does not have a practical, proven technical fix it can recommend. The Commission should continue to rely on voluntary efforts by the industry. GAMA will make a good faith effort to keep Commission staff apprised of ongoing developments and to provide opportunities for Commission staff to participate in the process.

Thank you again for your consideration of our views and comments.

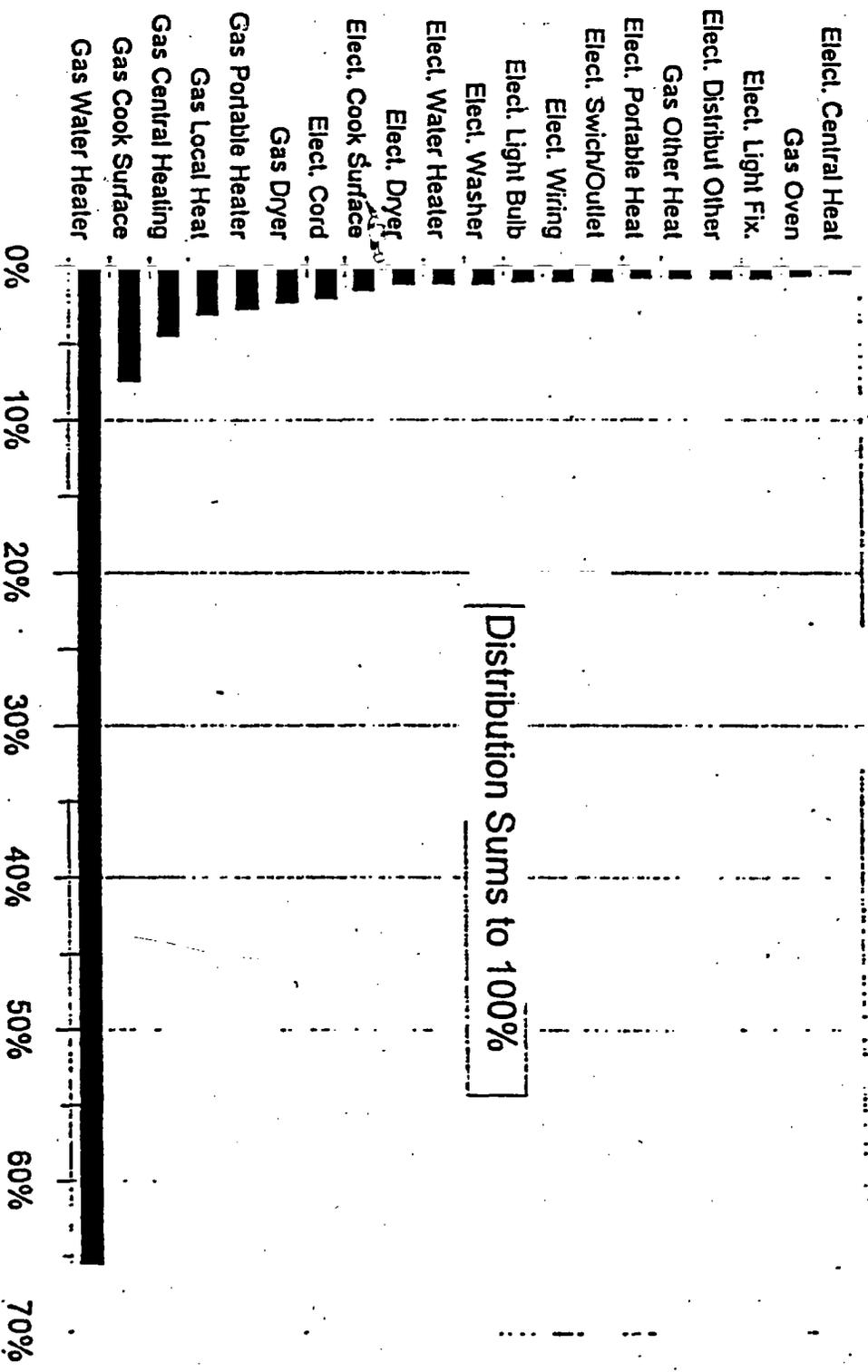
Sincerely,



C. Reuben Autery
President

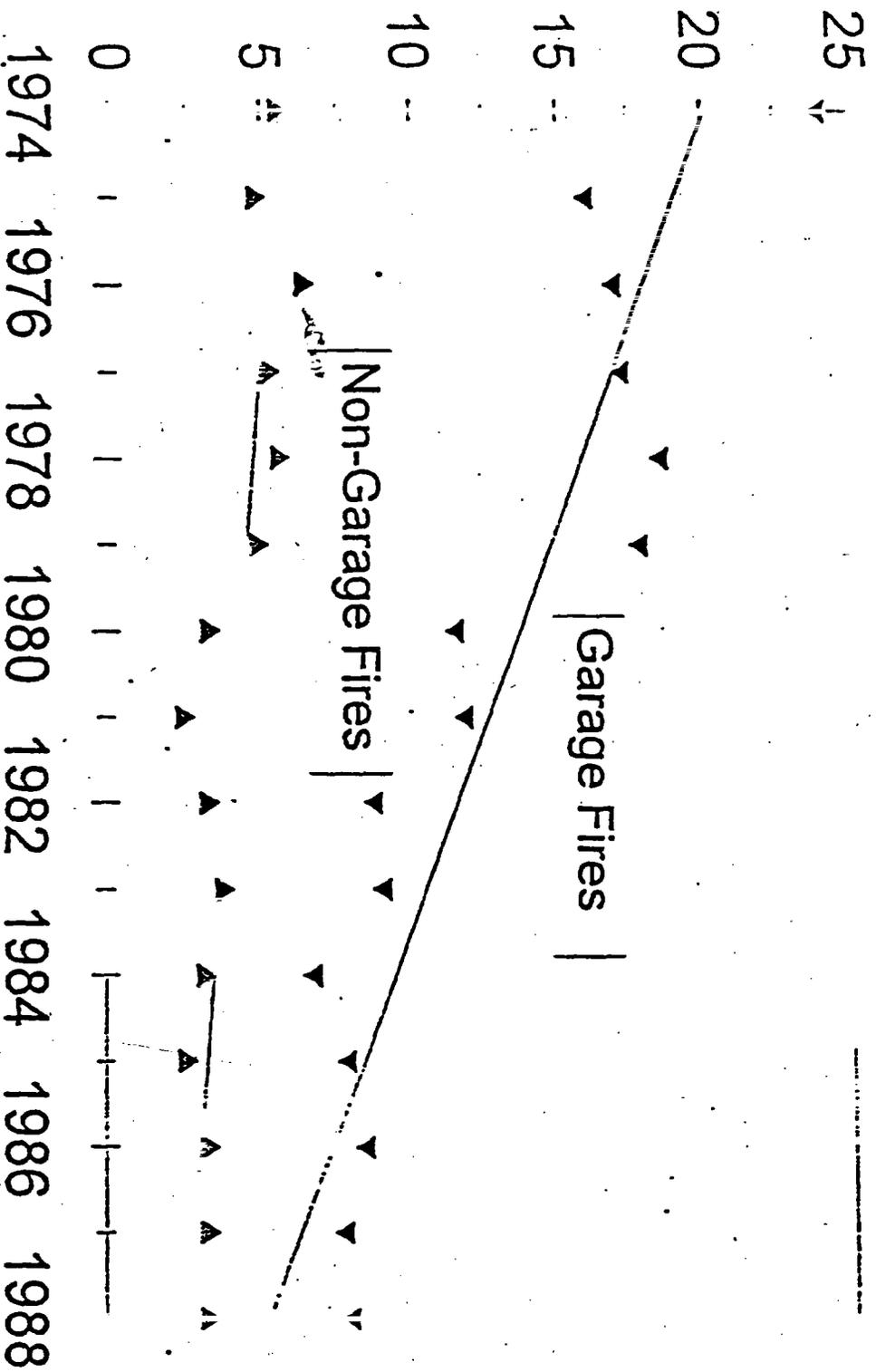
CRA/ljb
Attachment

FIGURE 1: TOP TWENTY APPLIANCES IGNITING GASOLINE VAPORS IN DWELLINGS, 1991



SOURCE: U.S. CONSUMER PRODUCT SAFETY COMMISSION AND THE U.S. FIRE ADMINISTRATION

FIGURE 2: CALIFORNIA GAS WATER HEATER
FIRES INVOLVING GASOLINE



SOURCE: ARTHUR D. LITTLE INC. "FLAMMABLE VAPOR HAZARDS IGNITION
STUDY, TASK 1 REPORT", TABLE 5.

D



U.S. CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, D.C. 20207

July 7, 1994

Mr. C. Reuben Autery
President
Gas Appliance Manufacturers Association
1901 North Moore Street
Arlington, VA 22209

Re: Water Heater Ignition of Flammable Vapors

Dear Mr. Autery:

Thank you for bringing to the Commission's attention information about recent efforts by the industry to address the risks posed by water heater ignition of flammable vapors. The Commission staff is reviewing the information you provided by letters to Bert Cottine, Executive Director, (June 14, 1994) and to Chairman Ann Brown, (June 27, 1994).

We appreciate your offer to keep the Commission staff appraised of ongoing developments and to provide opportunities to participate in the process. In order to give the Commission a complete evaluation of the current circumstances, we will need additional information about industry's ongoing and planned activities regarding water heaters igniting flammable vapors. Thus, please provide test protocols (with justification for test conditions), schedules, and draft and final reports of studies or tests to evaluate possible means to address the ignition of flammable vapors by gas-fired water heaters. For example, staff requests this information about the following tests and activities:

1. *Flammable Vapor Ignition Study, Task 2: Analytical Modeling and Experimental Testing*; Arthur D. Little, July 15, 1993;
2. Testing to evaluate the potential of the Bowin Designs Pty., Ltd., burner to reduce gas-fired water heater ignition of flammable vapors;
3. Testing by International Approval Services to evaluate the potential utility of a sheet metal barrier to prevent flammable vapor ignition of flammable vapors;
4. Efforts sponsored by the Gas Research Institute or others to develop performance test methods to evaluate water heater design resistance to ignition of flammable vapors.

Mr. C. Reuben Antery
Page 2

Once the Commission staff has reviewed the information you provide, we plan to request a meeting with the appropriate parties to answer any questions we may have.

Mr. Donald W. Switzer of the Directorate for Engineering Sciences has been assigned responsibility for the technical evaluation and is your contact for technical matters on this issue. Mr. Switzer can be reached at (301) 504-0508, ext. 1303.

Currently, this matter is pending before the Commission and it is therefore important to proceed as quickly as possible to gather your additional information for our review.

Sincerely,

Ronald L. Medford

Ronald L. Medford,
Acting Assistant Executive Director
for Hazard Identification and Reduction

100-100



1901 North Moore Street • P.O. Box 9245 • Arlington, Virginia 22209 • 703/525-9565

July 28, 1994

Mr. Ronald L. Medford
Acting Assistant Executive Director
for Hazard Identification and Reduction
U.S. Consumer Product Safety Commission
4330 East West Highway
Bethesda, Maryland 20814

Re: Water Heater Ignition
of Flammable Vapors
(Your Letter of July 7, 1994)

Dear Mr. Medford:

In response to your July 7, 1994, letter, the Gas Appliance Manufacturers Association (GAMA) is pleased to provide the following information regarding water heater industry activities to address ignition of flammable vapors by gas-fired water heaters. In your letter, you first request information about the July 15, 1993, Arthur D. Little (ADL) report, "Flammable Vapor Ignition Study, Task 2: Analytical Modeling and Experimental Testing." For your background information, in February 1993, ADL representatives briefed Joseph Fandey and Al Martin on the methodology to be used to conduct the testing; in May 1993, Mr. Martin observed a full day of testing; and on July 15, 1993, Mr. Fandey received two copies of the final report (additional copy enclosed).

GAMA would be happy to have ADL representatives again brief CPSC staff, at our expense, on the test methodology and on the test results. Both subjects could be covered in a single briefing or in two separate briefings, as you see fit. Please let me know at your earliest convenience what date(s) would be acceptable to you and other CPSC staff for the briefing(s).

You also requested information about testing to evaluate the ability of a new burner designed and patented by Bowin Designs Pty., Ltd. to prevent water heater ignition of flammable vapors. That testing is being conducted by ADL at a test facility located at the American Gas Association Laboratories (A.G.A.L.) in Cleveland, Ohio. The testing will determine the effectiveness of the Bowin burner in preventing ignition of flammable vapors without compromising other safety and energy efficiency performance requirements of gas-fired water heaters.

/Continued . . .



Page 2 of 3

Mr. Ronald L. Medford

July 28, 1994

ADL has informed GAMA that it expects to complete and report on the testing of the Bowin burner on a representative sample of 8 gas-fired water heaters by September 15, 1994.

Enclosed for your information are copies of two basic documents describing what is involved in the testing of the Bowin burner. The first document is a contract dated May 20, 1994, between GAMA and Bowin Designs Pty, Ltd. pursuant to which Bowin (1) agrees to have Gas Consultants Inc. fit the Bowin burner (to the applicable water heater manufacturer's satisfaction) on 8 representative gas-fired water heaters; and (2) agrees to ship the retrofitted water heaters to A.G.A.L. for testing by ADL. The second document, which is a contract dated June 8, 1994, between GAMA and ADL, describes the testing to be conducted by ADL on the water heaters retrofitted with the Bowin burner (see "Statement of Work").

In your letter, you also ask for information about testing by International Approval Services (A.G.A.L.) to evaluate the potential utility of a sheet metal collar around a gas-fired water heater to prevent ignition of flammable vapors. In this regard, please find enclosed a white paper and video tape describing this testing. These materials have been provided by Mr. Richard J. Schulte, Senior Vice President, A.G.A.L.

The last specific subject on which you have requested information is a Gas Research Institute (GRI)-sponsored project to develop performance test methods to evaluate water heater design resistance to ignition of flammable vapors. Enclosed is a copy of a February 14, 1994, proposal from ADL to GRI to develop a "Flammable Vapors Screening Protocol for Gas-Fired Water Heaters," for use in screening new gas-fired water heater designs for susceptibility to ignition of flammable vapors.

GAMA understands that GRI is ready to contract with ADL to develop such a screening protocol once GRI and ADL have received indemnification agreements from water heater manufacturers. GRI and ADL are seeking assurances that water heater manufacturers will defend and indemnify them should they be named as additional defendants in a product liability lawsuit alleging a faulty water heater design based on use of the screening protocol. A draft model indemnification agreement is now being reviewed by water heater manufacturers and, when approved, will be submitted for review and approval by respective legal counsel for GRI and ADL. Once the model agreement has been approved by GRI and ADL, individual agreements between manufacturers and ADL and between manufacturers and GRI will be signed. Resolution of the indemnification issue and signing of indemnification agreements could take a few more weeks. We will keep you informed of progress on this issue.

/Continued . . .

140

Page 3 of 3

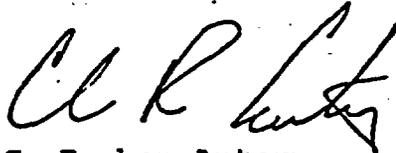
Mr. Ronald L. Medford

July 28, 1994

During our visits with the members of the Commission late last month, we were asked if we had any information concerning the effectiveness of the GAMA Water Heater Division's Consumer Safety Awareness Campaign. As you know, a principal purpose of this campaign has been to educate consumers about the proper storage and use of gasoline. The other focus of the campaign is on prevention of hot water scald injuries. We are separately submitting to Chairman Brown, Commissioner Jones-Smith and Commissioner Gall a July 15, 1994, Follow-Up Report on the results of the Campaign prepared by Loran Nordgren & Company. This report summarizes the results of the Campaign for the period January 1 thru June 30, 1994.

GAMA is pleased to assist CPSC staff in understanding what the water heater industry has been doing to address the ignition of flammable vapors issue. We think the industry has been moving aggressively in this area, and we look forward to CPSC support of the industry's efforts.

Very truly yours,



C. Reuben Autery
President

CRA:gjr-1
Enclosures

F

1000



1901 North Moore Street • P.O. Box 9245 • Arlington, Virginia 22209 • 703/525-9565

August 1, 1994

Mr. Donald W. Switzer
Project Manager, Fire/Gas
Voluntary Standards
4330 East West Highway
Bethesda, Maryland 20207

Dear Mr. Switzer:

The following is in response to your request for information detailed in your July 26, 1994 letter.

QUESTION 1. What was the purpose of Task 1 and Task 2 of the Arthur D. Little Flammable Vapor Hazards Ignition Study?

ANSWER: The purpose of the Phase I study was to investigate and characterize the extent of the flammable vapor hazard. Task 1 collected and analyzed incident reported and data bases. We also contacted everyone involved whom we could find who might have useful information or informed opinions. The result was the conclusion that the hazard was serious enough for the industry to respond to and investigate in more detail. Task 1 also identified scenarios which represented the vast majority of the cases to set the stage for experimental investigation in Task 2.

In Task 2, we conducted a comprehensive, well documented, controlled experimental investigation of the character of spills and ignitions, including a close look at the effect of water heater elevation. Over 35 tests were run in three room sizes with varying spill quantities, room temperatures and with/without movement. We concluded that ignition is likely to occur in certain scenarios; that water heater elevation may delay but not eliminate the possibility of ignition; and that temperature is a factor but is not as important as motion, room size or spill amount. We also strongly suggested that additional work be done to validate these conclusions due to the variability and uncertainty associated with investigating situations of this nature.

/Continued . . .



Page 2

Mr. Donald W. Switzer

August 1, 1994

QUESTION 2. Is this work viewed by GAMA as suitable for development of a standards test method?

ANSWER: The Phase I work sets the stage for development of a test method, or protocol. The analysis in Task 1 led to the development of an initial test plan which was used in Task 2 to investigate the factors leading to ignition. Phase I was not intended to investigate solutions in any comprehensive way or to establish a statistically valid protocol to assess design options or other means to reduce the ignition hazard. The latter goal is the intent of the GRI sponsored work just beginning. However, the Phase I findings have been instrumental in planning the new work.

QUESTION 3. Why were Task 2 tests run with the floor temperature higher than the ambient room temperature?

ANSWER: In general, we were investigating the effect of room and floor temperature on ignition potential as part of the detailed experimental investigation. Also, our earlier analysis of incidents had shown that a large number occur in the summer months and in the Southern states.

The main method we had to heat the test room was by heating the floor which had a combination of electric wires and hot water tubes underneath. Control was therefore somewhat imprecise leading to differences in floor and room temperatures. Average numbers were reported. (Also, note that there were a few errors in the Tables corrected in a subsequent letter to GAMA). The floor temperatures was not usually higher than the room temperature as implied by CPSC staff's proposal; floor temperatures were significantly higher than room temperatures in well less than half of the tests. Also, temperature was ultimately found to have only a secondary effect on vapor generation/transport and ignition.

QUESTION 4. Why was the floor heated in some of the Task 2 tests?

ANSWER: See response to Question 3.

/Continued . . .

143

QUESTION 5. Why were some of the tests in Task 2 terminated more quickly than others? In some cases the tests continued for as long as 4 hours (#24) without a fire, and in other cases the tests were terminated in less than 1 hour (#20).

ANSWER: Test time was determined by observing the amount of time required to generate and transport the flammable vapor to the vicinity of the water heater, which was determined by the test variables, such as room size, spill amount, movement, etc. The Flame Ionization Detector (FLD) was used to monitor flammable concentration. When readings from the device indicated that ignition could no longer occur (i.e., concentrations stabilized below the LEL or rose and fell below the LEL without ignition) the test was terminated.

QUESTION 6. When does GAMA estimate that work on the proposed Development of Flammable Vapor Screening Protocol for Gas-Fired Water Heaters will begin?

ANSWER: Provided there are no more snags in the indemnification agreement between water heater manufacturers, ADL and the Gas Research Institute (GRI), work should begin by September 1, 1994

QUESTION 7. Please provide a graphic depicting all the steps, and the anticipated beginning and completion dates of each step, from initiation of the proposed Development of a Flammable Vapor Screening Protocol for Gas-Fired Water Heaters to publication and implementation of performance requirements to address this hazard.

ANSWER: See attached graph which also has supplemental notes on ANSI standards revision process attached.

QUESTION 8. What provisions will GAMA and the industry provide to allow CPSC staff to participate in the standards development program?

ANSWER: GAMA will recommend to GRI that Donald W. Switzer be appointed as a member of the GRI Technical Advisory Group (TAG), which will meet regularly throughout the duration of the project and provide input into its direction.

Page 4
Mr. Donald W. Switzer
August 1, 1994

QUESTION 9. If the Bowin burner testing indicates that it will prevent water heater ignition of flammable vapors, how long does GAMA estimate it will take to bring water heaters using this technology to market?

ANSWER: This is a question that only GAMA members will be able to answer in the future. Considerable time and effort will be required to determine that the design (1) does not ignite flammable vapors; (2) still satisfies all safety and efficiency requirements; and (3) is a producible product. It must be remembered that, should the design prove feasible, 100 percent of all gas water heater models available will have to be redesigned to accommodate the new burner. Each model will then have to be tested for safety, first by the manufacturer, and then by a third party testing agency. After production has started, each model will then have to be retested to verify its efficiency rating to comply with Federal standards. Currently there are about 579 different water heater models available. The cost involved in such a change will be extremely large, and because of limited manpower and laboratory facilities, a significant amount of time will be required. Some limited number of models could be made available in the "near-term" after a revised standard is finalized; however, it will require considerably more time before all models could be redesigned, certified and produced to comply with the revised standard.

You can be assured that if their project determines that the Bowin burner design works, is safe and producible, it will be brought to the market as fast as possible.

QUESTION 10. Is GAMA aware of any other technological fixes being examined to address the problem of flammable vapor ignition?

ANSWER: There is no technology being actively examined under the auspice of GAMA; however, we plan to evaluate all other known technological fixes as part of the GRI project to develop a test protocol.

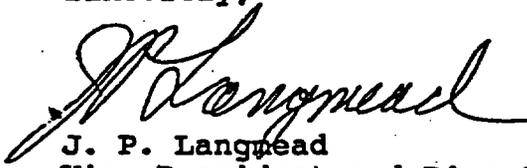
/Continued . . .

145

Page 5
Mr. Donald W. Switzer
August 1, 1994

Don, your letter suggested a briefing by ADL on this subject 3 weeks after the full information package is available to CPSC. I will be on vacation until August 26. Can we schedule our briefing for August 30? I will work towards that date until I hear from you. If CPSC Staff has further questions, please do not hesitate to contact me.

Sincerely,



J. P. Langnead
Vice President and Director
Technical Services

JPL/ljb
Attachment

NOTES ON ANSI STANDARDS REVISION PROCESS (ANSI Z21.10.1):

Task 15: Z21/CGA Joint Subcommittee on Standards for Gas-Fired Water Heaters - Review and Comment Process

Once the joint subcommittee adopts the proposed revisions to ANSI Z21.10.1 for distribution for review and comment at its next scheduled meeting, this process should only take about 6 months to complete. The review and comment process culminates at the subcommittee's next meeting, at which the subcommittee reconsiders the proposal in light of comments received. If the subcommittee can resolve negative comments without making substantive revisions to the proposal, the subcommittee will recommend the proposed revisions to the parent Z21 Committee. However, if comments received on the review and comment text require the subcommittee to make further substantive revisions to the proposed text, such changes would have to be re-distributed for another review and comment period, followed by another subcommittee meeting to reconsider the modified proposals in light of comments received. This aspect could effectively drive this process into a 1 year time-frame, which is easy to assume given the nature and impact of such a proposal.

Task 16: Z21 Committee Approval

Once the above subcommittee recommends the proposal to the parent Z21 Committee, the approval process should take about 6 months to complete, depending on the Committee's next regularly scheduled meeting. However, if the Z21 Committee receives an objection that it feels is of a technical nature that was not completely addressed by the subcommittee, the issue will be referred back to the subcommittee for consideration. This aspect could effectively prolong the Z21 Committee approval process for another 6-12 months, depending on the next scheduled meeting of the subcommittee to address the comments referred by the Z21 Committee.

Task 17: Process Revisions for ANSI Submittal

Once Z21 Committee approval takes place, the Z21 Administrative Secretariat (A.G.A.) prepares the proposal for submittal to ANSI for its 60-day public review period. The ANSI submittal package includes copies of the final text of the Z21-approved standards revision, plus all documentation of the Z21 Committee's approval process. Preparation of the submittal may take about 4 months, since

/Continued . . .

the Secretariat will be preparing many other Z21 standards revisions for ANSI submittal which were also approved by the Z21 Committee at its last meeting.

Task 18: ANSI Approval

Once the Z21 Secretariat submits the proposal to ANSI, it undergoes an ANSI 60-day public review period. If no appeals are made during this period, the Z21 Secretariat then formally submits the proposal to ANSI for approval by the ANSI Board of Standards Review (BSR), which meets periodically. This process should only take about 4 months (depending on the next BSR meeting). If an appeal to ANSI is received, the ANSI BSR approval process could be further extended another 4 months, due to the required BSR hearing process that must take place.

Task 19: Testing Agency Effective Date

The American Gas Association Laboratories usually assigns an 18 month effective date (from the time of ANSI approval) for Z21 standards revisions. This is to allow manufacturers the time to make the necessary design changes and to have their listed products certified by the testing agency to meet the revised standard. However, when standards revisions have greater design impacts on the industry as a whole, longer effective dates are usually considered and implemented.

Jan. 1, 1996 | Jul. 1, 1996 | Months | Mar., 1997

(1994) (1995) (1996) (1997)

Task 1: Cart Review
 Task 2: CPSC Prog Rev.
 Task 3: Ind & Govt Expect.
 Task 4: Fund Data for Test
 Task 5: Review MTD (w/CRP)

Experimental Design and Testing
 Task 6: Screening Exp.
 Task 7: Accelerated Test of WH
 Task 8: Select a Protocol

Protocol Development
 Task 9: Demo Probe Probe
 Task 10: Pol & Verif of Pre

Protocol Revision
 Task 11: PrepDoc For Pro
 Task 12: Final Protocol Rev

Industry Coordination and
 Project Management
 Task 13: Prog MGMT
 Task 14: Final Report

ANSI Standards Revision Process
 Task 15: Z39.90, Jahn Water
 Heater Subcommittee Review
 and Comment

Task 16: Z21 Committee Appr.
 Task 17: Process proposals for
 ANSI Standard

Task 18: ANSI Approval
 Task 19: Test Agency Eff Date

See Attached Notes



18 Months (Sep. 1, 1990) →

G



U.S. CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, D.C. 20207

August 17, 1994

Mr. Frank A. Stanonik
Associate Director of Technical Services
Gas Appliance Manufacturers Association
1901 North Moore Street
Arlington, VA 22209

Re: Water Heater Ignition of Flammable Vapors

Dear Mr. Stanonik:

Thank you for promptly providing information about ongoing industry activities to address the hazard posed by water heater ignition of flammable vapors.

The CPSC staff has a number of questions about the information you have provided. Attached is a list of our questions and concerns about the ongoing industry activities. CPSC staff plans to discuss these issues with industry at the August 30, 1994 meeting. Staff requests that industry representatives provide a written response prior to or at the meeting. This material will be used to assist the Commission in reaching a decision as to the need for rulemaking to address the hazard of water heater ignition of flammable vapors.

If you have any questions, or if I can be of assistance in any way, please call me on (301) 504-0508, ext. 1303.

Sincerely,

A handwritten signature in cursive script that reads "Donald W. Switzer".

Donald W. Switzer
Project Manager, Fire/Gas
Voluntary Standards

Attachment .

CPSC STAFF QUESTIONS AND CONCERNS
FOR DISCUSSION AT AUGUST 30, 1994 MEETING

GAMA Flammable Vapor Hazards Ignition Study: Bowin Burner Testing

1. How long will individual tests be run before the test is terminated? Will the only criteria for terminating the test be the vapor concentration falling below the LEL at the burner?
2. What will be the criteria for a successful test?
3. Which "critical ANSI Z21.10.1 tests" will be run?
4. Will the critical tests be run on all of the water heaters?
5. At what heights will the FID detectors sampling tube be located?
6. What is the rationale for the movement pattern chosen for the dummy?
7. How does the Bowin burner operate?
8. What changes must be made to a typical water heater to incorporate the Bowin burner? What are the major difficulties?
9. Approximately what cost will the Bowin burner add to gas-fired water heaters available to the consumer?
10. When will GAMA know if the Bowin burner design is manufacturable?
11. If the Bowin burner is manufacturable, when does GAMA expect products using the technology will be on the market?
12. What steps will a "typical" water heater manufacturer have to go through to redesign and manufacture an improved product using the Bowin burner?
13. What are the test conditions referred to in item 6 of the 5/20/94 agreement between GAMA and Bowin Designs Pty. Ltd.? The Confidential Disclosure Agreement, which was attached, does not contain the conditions.

Letter to Donald Switzer

1. What information in the Task 1 results led GAMA and ADL to believe that floor temperature played a part in accidents? It seems to staff that the floor temperature will be cooler than air temperature in almost all real-world instances.

2. It is not clear to staff how the room temperature can be higher than the floor temperature if heating the floor was how the room was heated.
3. What was the air exchange rate in the rooms where the testing was performed?
4. What steps would a typical water heater manufacturer have to go through in order to develop a water heater that incorporates the Bowin burner?
5. How long would each step take?
6. Please provide a listing of residential gas-fired water heaters that are currently marketed which draw combustion air from the top of the appliance. Please provide a similar listing of water heaters that take combustion air from outside the room in which the appliance is installed. Please provide the market share for each design.
8. Please provide assembly drawings depicting major components of the appliances and how they are assembled.
9. What is the estimated average life of water heaters that draw combustion air from the top of the appliance or from outside the installation room? Is it different from conventional water heaters?
10. How many of each of these appliances are currently produced?
11. What is the retail price of each model produced?
12. The graphic provided showing the steps and schedule of the standards test method development shows the method development portion of the program being completed in approximately 10 months. It also estimates that it will take approximately 31 months for the standard to become effective. How can this process be accelerated? Are there alternatives to the full ANSI consensus process? Could International Approval Services (IAS) require products meet the requirements as soon as the subcommittee approves the test method?
13. GAMA has suggested that CPSC staff be appointed to the GRI Technical Advisory Group (TAG) for this project. Will GAMA allow CPSC staff to be present on site during critical phases of the testing?
14. Once the project is underway, how do the test staff communicate with the TAG, and how are TAG recommendations developed and communicated to the testers without slowing down the test program?
15. Does the TAG regularly review data and results from the testing? How often would that occur?

16. What assurances does GAMA provide that CPSC comments on the test program will be incorporated into the testing?
17. What organizations will be represented on the TAG?
18. GAMA states that there are 579 models of water heaters on the market. How is this number broken down? How many residential gas water heaters models are there? Of these models, how many are essentially duplicates? For example, Rheem sells what are essentially the same models under the names Rheem, Ruud, Marathon, and Sears. Are these being counted as one model or four models?

DEVELOPMENT OF A FLAMMABLE VAPORS SCREENING PROTOCOL FOR GAS-FIRED WATER HEATERS

1. On page 1-2, ADL states "However, this protocol is not intended to be a standard nor to address situations where the water heater has been misused, or has not been installed in accordance with manufacturer's recommendation or local building codes."

If this is not intended to be a standard, then how does GAMA expect to have the water heater subcommittee accept it as a proposed test method?

2. Task 3, "Establish industry and Government Expectations" - On page 4-3, under "Approach," ADL states that they are "particularly interested in learning how well the proposed program and the resulting protocol accommodates the possible solutions being evaluated and developed by the manufacturers and those solutions proposed by others. Information on possible solutions will be used to enhance the flexibility of the protocol, and where appropriate will be kept confidential."

Staff is concerned that ADL not tailor the test procedure to possible fixes. It is the staff's view that the test protocol must be absolutely technology blind. The incident data determine conditions that result in accidents. Pass/fail criteria should be developed based solely on the incident data. If any technological information is used to "enhance the flexibility" of the test method; it may hinder the ability of the method to fairly judge the suitability of other designs.

3. Task 4, "Preliminary Testing" - On page 4-4, the fourth bullet is "Flammable limit characteristics of various flammable vapors with the intent of identifying a substitute, non-flammable liquid."

Staff suggests that the test program be limited to gasoline vapors.

4. Task 6: Design and Conduct a Screening Experiment - If the test method is based on statistically designed case, consideration must be given to what portion of the accidents ADL is willing to accept. A different approach may be to establish a test condition certain to cause ignition. Staff is concerned that the proposed approach will unnecessarily delay the test program, and possibly leave a significant portion of the population unprotected.
5. Task 6: Design and Conduct a Screening Experiment - Why is water heater elevation included in Table 1: "Experimental Testing Tasks - Variables to be Considered?" The test method is being developed to certify the water heater design. The installation practices do not need to be considered.

If industry decides to include water heater elevation as a test variable, the height will need to be determined. There is bound to be a strong height effect that will need to be quantified. Furthermore, the relevant variable is the height from which combustion air is taken, not the height of the water heater.

CPSC staff believes that it is inappropriate to include water heater elevation in any of the test matrixes. The purpose of the test method is to design certify products, and not to depend upon elevated installation if the product is such that it is likely to be floor-mounted.

6. Task 7: Design and Conduct an Accelerated Test - Is modeling of time-to-ignition necessary? Please clarify how the data produced in this task will be used. If an acceptable time for resistance to vapor ignition is established based on incident data, then this task is not needed. In other words, if it is specified that a water heater must operate for one hour, for example, in an explosive atmosphere without igniting the vapor, then many of the variables will disappear. Size of spill, distance of spill, size of room, would all become irrelevant if the performance is specified based on accident data. Eliminating this Task would shorten the test period by 11 weeks.
7. CPSC engineering staff believes that there is a more direct and economical approach to design certify gas-fired water heaters' resistance to igniting flammable vapors. Staff believes that trying to model or mimic conditions in the field and adapting those standard conditions into a performance standard is overly expensive and time-consuming. With this approach, acceptable performance is based not on the product's design, but on "modeled" conditions that may or may not exist in the field.

What is needed is a quick way to ascertain whether a water heater will ignite vapors when vapors are present. One direct way to accomplish this is to generate a flammable