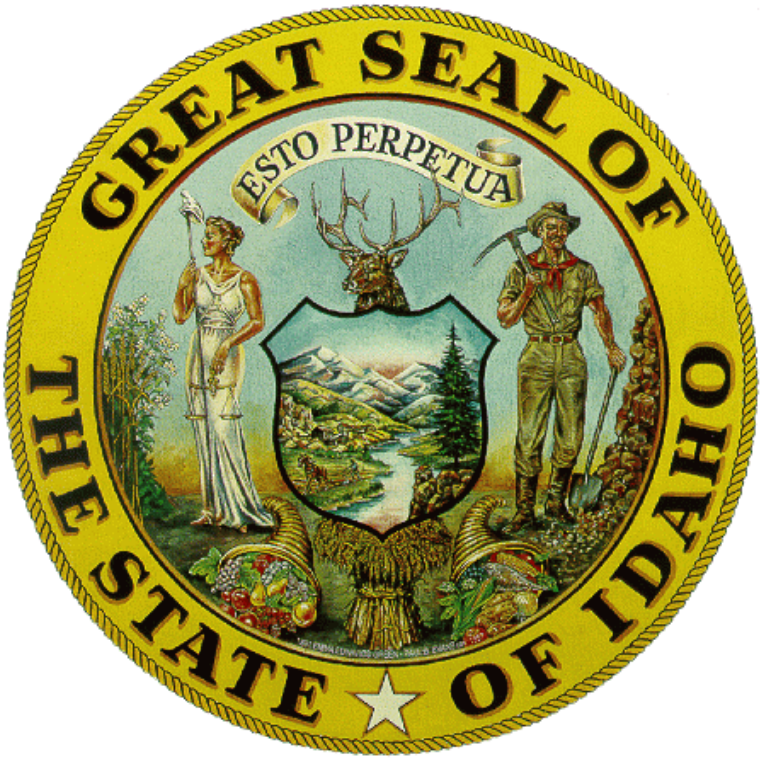
DIVISION OF BUILDING SAFETY

IDAHO HEATING, VENTILATION AND AIR CONDITIONING BOARD VIDEOCONFERENCE MEETING

MAY 16, 2012



IDAHO HEATING, VENTILATION AND AIR CONDITIONING BOARD

Agenda Item No. 01 **Agenda**

PRESENTER: Dan Brizee, Chairman

OBJECTIVE: Approve the agenda for the May 16, 2012 Idaho HVAC Board videoconference meeting.

ACTION: Consent

BACKGROUND:

PROCEDURAL HISTORY:

ATTACHMENTS: May 16, 2012 Idaho HVAC Board meeting tentative agenda

TENTATIVE AGENDA

NOTICE OF PUBLIC MEETING

IDAHO HEATING, VENTILATION AND
AIR CONDITIONING BOARD
VIDEOCONFERENCE MEETING

Division of Building Safety
1090 East Watertower Street, Suite 150, Meridian, Idaho
1250 Ironwood Drive, Suite 220, Coeur d'Alene, Idaho
2055 Garrett Way, Building 1, Suite 4, Pocatello, Idaho
dbs.idaho.gov – (208) 332-7137

Wednesday, May 16, 2012
9:30 a.m. – 3:30 p.m. (MT)

(Note: Meeting Time is 8:30 a.m. PT)

9:30 a.m. **CALL TO ORDER** – Dan Brizee, Chairman

- Roll Call & Introductions
- Open Forum

CONSENT AGENDA

1. Approval of the May 16, 2012 Agenda
2. Approval of the February 15, 2012 Board Meeting Minutes

PUBLIC HEARING

3. Negotiated Rulemaking Process – Patrick Grace
4. Public Testimony – Adopt and Amend 2012 International Mechanical Code, International Fuel Gas Code, and Parts V and VI of the International Residential Code

ACTION AGENDA

5. Continuing Education – Jerry Peterson
6. Adoption of 2009 IRC Chapter 1--Alternative Materials and Methods – Jerry Peterson
7. Adoption of 2009 IRC Chapter 3--Carbon Monoxide Monitors – Jerry Peterson
8. Adoption of 2009 IRC Chapter 10--Solid Fuel – Jerry Peterson

INFORMATIONAL AGENDA

9. Pressure Testing of ABS/PVC Venting – Jerry Peterson

10. Definition of Plumbing System--Liquid and Fuel Gas Piping – Gilbert Pond

Noon - 1:00 p.m. **LUNCH BREAK** *(If needed)*

11. HVAC Program Manager Report – Jerry Peterson

12. Operational Report – Steve Keys

13. Administrator Report
    a. Financial Report – C. Kelly Pearce and Dave Decker
    b. Administrator – C. Kelly Pearce

3:30 p.m. **ADJOURN**

All times, other than beginning, are approximate and are scheduled according to Mountain Time (MT), unless otherwise noted. Agenda items may shift depending on Board preference. 05/10/12r

IDAHO HEATING, VENTILATION AND AIR CONDITIONING BOARD

Agenda Item No. 02 **Minutes**

PRESENTER: Dan Brizee, Chairman

OBJECTIVE: Approve the minutes from the February 15, 2012 Idaho HVAC Board meeting.

ACTION: Consent

BACKGROUND:

PROCEDURAL HISTORY:

ATTACHMENTS: February 15, 2012 Idaho HVAC Board meeting draft minutes

IDAHO HEATING, VENTILATION AND AIR CONDITIONING BOARD
VIDEOCONFERENCE MEETING

Wednesday – February 15, 2012 – 9:30 a.m. (MT)

Division of Building Safety
1090 East Watertower Street, Suite 150, Meridian, Idaho
1250 Ironwood Drive, Suite 220, Coeur d'Alene, Idaho
2055 Garrett Way, Building 2, Suite 7, Pocatello, Idaho

*DRAFT MINUTES OF THE FEBRUARY 15, 2012 MEETING

NOTE: The following report is not intended to be a verbatim transcript of the discussions at the meeting, but is intended to record the significant features of those discussions.

Chairman Dan Brizee called the meeting to order at 9:33 a.m. (MT).

Board Members Present:	**DBS Staff Members Present:**
Dan Brizee, Chairman	C. Kelly Pearce, Administrator
Ted Sermon, Vice-Chairman	Steve Keys, Deputy Administrator, Operations
Jon Laux	Janice Foster, Deputy Administrator, Administration
Bruce Graham	Patrick Grace, Deputy Attorney General
Tim LaMott	Jerry Peterson, HVAC Program Manager
Bill Carter	Rod Freligh, Regional Manager, Region 1
Russ Goyen	Chris Jensen, Regional Manager, Region 3
	Dave Decker, Financial Specialist
	Renee Bryant, Administrative Assistant 2/Board Secretary

- **Open Forum**

  ABS and PVC Flue Piping--Code Amendments – Justin Goodwin, city of Moscow representative, suggested when the HVAC Board starts to consider the amendment of the International Fuel Gas Code (IFGC) for testing of plastic ABS and PVC flue pipes, it also amend the International Residential Code (IRC) to reflect the same language.

  This topic was discussed further under item six "Pressure Testing for ABS/PVC Venting".

  DBS HVAC Inspector Layoff and Inspections – Darin Jones, Priest River Heating, brought forth a concern that with the recent layoff of the state HVAC inspector in his area, the plumbing inspector now providing the coverage does not have enough experience in the HVAC trade.

  The role of the HVAC Board is to provide safety to the citizens of Idaho; not resolve DBS personnel issues. It was recommended future Division matters should be addressed through the following lines of protocol: Regional manager, program manager, deputy administrator, and administrator.

- **Approval of February 15, 2012 Agenda**

  MOTION: Bill Carter made a motion to approve the agenda as presented. Ted Sermon seconded. All in favor, motion carried.

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- **Approval of October 19, 2011 Board Meeting Minutes**
  MOTION: Ted Sermon made a motion to approve the minutes as written. Jon Laux seconded. All in favor, motion carried.

- **Square Footage Fee Structure/Woodstove-Fireplace Installation**
  John Rupert, specialty hearth contractor, was not present at the meeting; therefore, the topic "Square Footage Fee Structure/Woodstove-Fireplace Installation" was not discussed.

- **Continuing Education**
  A draft rule on continuing education requirements for HVAC contractors and journeymen was included in the Board packet.

  Background on the Electrical and Plumbing Boards' continuing education requirements was provided. For the 2012 legislative session, the Electrical Board put forth a proposal designed to cover the costs DBS incurs to review the qualifications of instructors and content of courses. The rule was approved by the Senate Commerce Committee; however, rejected by the House Business Subcommittee.

  DBS receives hundreds of continuing education course and instructor applications. Although in support of continuing education, the Division is reluctant to take on a process that requires the approval of curriculum and instructors without a means of funding.

  Russ Goyen recommended item (a) of the proposed rule be amended to reflect the eight (8) hours of continuing education be code related only. This would eliminate course/instructor applications from industry related companies who want to sell their products. Code related training is useful throughout the state as everyone is subject to the code no matter what products they use. This would also allow DBS, in cooperation with the Board, to designate which courses should be offered.

  Chairman Brizee requested the topic "Continuing Education" be placed as an action item on the May 16, 2012 Idaho HVAC Board meeting agenda.

  With licenses in several states, Bill Carter offered to forward their continuing education requirements to Jerry Peterson.

  ACTION: The topic "Continuing Education" will be placed on the May 16, 2012 agenda as an action item.

  ACTION: Bill Carter will forward to Jerry Peterson the requirements for continuing education from the states where he has a license.

- **Code Adoption Process**
  Jerry Peterson recommended the Board consider the adoption of the 2012 code; beginning the process at the February 2013 Board meeting. The adoption process is lengthy; however, with the Board's support the code could possibly become effective July 1, 2014 for the state and January 1, 2015 for local jurisdictions.

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It was suggested the Idaho Building Code and HVAC Boards coordinate the adoption of the 2012 codes since the HVAC industry uses the mechanical and fuel gas provision in the IRC for residential installations.

The Idaho Building Code Board's extensive code adoption/amendment process was explained. Chairman Brizee agreed with the process and asked Jerry Peterson to move forward with the procedure.

MOTION: Russ Goyen made a motion that the HVAC Board communicate with the Idaho Building Code Board; asking the Idaho Building Code Board to consider the adoption of the 2012 codes at its April 2012 Board meeting. Ted Sermon seconded.

The topic "Code Adoption Process" is an informational item only. Russ Goyen and Ted Sermon withdrew the motion and second respectively.

ACTION: Jerry Peterson will bring a plan with regard to code adoption to the May 16, 2012 Board meeting.

ACTION: DBS will place a Notice of Rulemaking on its website, and notify the Idaho Building Code Board of the HVAC Board's intent to move forward with the adoption of the 2012 codes.

- **Pressure Testing for ABS/PVC Venting**

Jerry Peterson meets monthly with local jurisdictions to discuss HVAC-related concerns. One safety concern is the installation/repair of ABS/PVC vents located within the conditioned space of residences which are covered up without proper testing/certification.

The Board agreed in order to prove a vent system is sound, all vents, to include supply and return, need to be consistently and routinely tested.

To lower the risk of CO poisoning as a result of improperly installed venting of appliances, Jerry Peterson offered to provide scenarios to the Board that would require testing.

ACTION: For the May 2012 Board meeting, Jerry Peterson will bring situations to the Board that require venting.

- **HVAC Program Manager Report**

Journeyman Exam – The journeyman test will be updated with the 2009 code by the end of March 2012.

Code Adoption--Sections 5 and 6 – Sections five (5) and six (6) of the IRC are the only sections currently adopted by the HVAC Board. When the Board begins the conversation on code adoption, Jerry Peterson will bring forth additional requirements in the IRC that pertain to the HVAC trade.

Training – For 2012, Jerry Peterson has tentatively been approved to provide a minimum of 50 code update and energy code classes to HVAC companies at their shops throughout the state of Idaho. The course will be one-hour in length and include: video, audio, live interviews, and 10-15 minute question/answer session.

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- **Operational Report**

  HVAC Program--Layoffs and Inspections – The HVAC program, with the completion of the recent layoffs/realignment of inspection areas, is operating on an equilibrium between revenues and expenses. DBS has received very few complaints with regard to extended response time for inspections.

  House Bill 467 – This legislation is related to solid fuel burning appliances. At the introduction print hearing, one committee member voiced concerns with regard to the impact on the installation of wood and pellet stoves.

  Docket 07-0701-1101 – The proposed rule, clarifying HVAC contractors and specialty contractors must obtain a compliance bond; not performance bond, and compliance bonds to be effective the entire duration of the licensing period, has been reviewed and approved.

  Docket 07-0701-1102 – The proposed rule, to eliminate the requirements related to the location and protection of the gas piping, regulators, and meters, has been reviewed and approved.

  Definition of Plumbing System--Liquid and Fuel Gas Piping – The topic "Definition of Plumbing System -- Liquid and Fuel Gas Piping" has been placed on the tentative agenda for discussion at the February 23, 2012 Idaho Plumbing Board meeting.

  Prior to the approval of the HVAC program and statutes in 2004, the plumbing industry installed steam piping, chilled water piping, and heating and water piping. The Idaho Plumbing Board would like to re-establish their ability, within the scope of a plumbing license, to continue to provide those services.

  ACTION: DBS will schedule a meeting with board members from the HVAC and Plumbing Boards to discuss the topic "Definition of Plumbing System -- Liquid and Fuel Gas Piping".

- **Administrator Report**

  Financial – With recent layoffs, there has been an increase in the relationship of revenue to expenditures.

  Personnel – In 2007, the Division was authorized 152 full-time positions. As of today, there are 101 employees working for DBS.

  Plumbing/HVAC Inspectors – All the Division's plumbing inspectors are now certified as HVAC inspectors. In January 2012, three inspectors, solely HVAC, were laid off. Their responsibilities will be absorbed by certified plumbing/HVAC inspectors.

  Wind Farms – The assembly of wind farms across the state of Idaho has become a source of revenue for DBS.

  Training – Jerry Peterson explained the types of classes DBS has taught and will teach to state and local jurisdiction inspectors and HVAC industry.

  Areva – Representatives for Areva anticipate it will be at least one year before construction will begin on the Eagle Rock uranium enrichment facility near Idaho Falls.

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Hoku – Arrangements have been made with the Chinese government to take care of Idaho Power; moving forward with the polysilicon plant in Pocatello.

Electrical Bus Manufacturer Plant – The Chinese continue to negotiate with regard to the electrical bus plant. It has been reported the plant will be built between the cities of Nampa and Meridian.

City of Meridian Contract – With a substantial increase of growth in Meridian, the contract between the city of Meridian and DBS, to provide electrical inspections, continues to go well.

North Idaho Projects – The following projects are forthcoming or under construction in northern Idaho: Low income apartments in the city of Coeur d'Alene; medical facility, transportation facility, and truck stop for the Coeur d'Alene Tribe; and 14,000 sq. ft. expansion to casino south of Lewiston for the Nez Perce Tribe.

East Idaho Projects – The following projects are forthcoming or under construction in eastern Idaho: Waste water treatment facility, casino/hotel complex with recreational facility to include aquatic center, RV park, and 9-hole golf course in Fort Hall for the Shoshone/Bannock Tribe.

- **New/Old Business**
  There was no new/old business to discuss.

- **Executive Session**
  An executive session was not required.

MOTION: Ted Sermon made a motion to adjourn the meeting. Chairman Brizee accepted the motion and adjourned the meeting at 12:05 p.m. (MT).

DAN BRIZEE, CHAIRMAN HEATING, VENTILATION AND AIR CONDITIONING BOARD	C. KELLY PEARCE, ADMINISTRATOR DIVISION OF BUILDING SAFETY
DATE	DATE

***These DRAFT minutes are subject to possible correction and final approval by the Idaho HVAC Board. 04/18/12rb**

DRAFT

IDAHO HEATING, VENTILATION AND AIR CONDITIONING BOARD

Agenda Item 03 **Negotiated Rulemaking Process**

PRESENTER: Patrick Grace, Deputy Attorney General

OBJECTIVE: Inform the Board and industry of the new negotiated rulemaking procedure.

ACTION: Informational

BACKGROUND: Senate bill 1366, to amend the existing law to provide statutory procedures for negotiated rulemaking and to provide for notices of rulemaking to be placed on an agency's website, passed the 2012 legislature. Governor Otter signed the approved legislation on April 4, 2012.

PROCEDURAL HISTORY:

ATTACHMENTS: No documentation

IDAHO HEATING, VENTILATION AND AIR CONDITIONING BOARD

Agenda Item No. 04 Public Testimony to 2012 IMC, IFGC, & Parts V & VI of IRC

PRESENTER: Dan Brizee, Chairman

OBJECTIVE: Seek information and comments from the Board and industry with regard to the adoption and amendment of the 2012 International Mechanical Code, International Fuel Gas Code, and Parts V and VI of the International Residential Code.

ACTION: Informational

BACKGROUND:

PROCEDURAL HISTORY:

ATTACHMENTS: Proposed changes to the IRC and IFGC by Carol Alexander and Justin Goodwin with the City of Moscow.

Renee Bryant

From: Renee Bryant
Sent: Tuesday, April 24, 2012 4:32 PM
To: Kelly Pearce; Steve Keys; Patrick Grace; Jerry Peterson
Subject: FW: HVAC Code change proposal
Attachments: Carbon Monoxide Homeland Security.pdf; Carbon Monoxide CDC.pdf; Carbon Monoxide JAMA.pdf

FYI

Renee Bryant | Administrative Assistant, Board Support | Division of Building Safety | 1090 East Watertower Street, Suite 150 | Meridian, ID 83642 | W: 208.332.7137 | F: 208.332.4016| renee.bryant@dbs.idaho.gov | http://dbs.idaho.gov

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From: Carol Alexander [mailto:calexander@ci.moscow.id.us]
Sent: Tuesday, April 24, 2012 4:02 PM
To: Renee Bryant
Cc: Justin Goodwin; Charlie Allen ; Dan Hunter; Ed Wagner; Eric Adams; Jimmie Brown; John Smith; Kraig Stevenson; Robert Ankersmit; Teri Ottens, IDABO ; Tim Woodard
Subject: HVAC Code change proposal

Renee:

Here is a code[s] change proposal for the HVAC Board from the City of Moscow. The codes are: IRC and IFGC. Justin Goodwin will be speaking to the proposal at the next HVAC meeting on May 16th.

I used one sheet since the change proposed is exactly the same for each code except for the Section number which I have noted in the appropriate place.

Attached are the proposal submittal and supporting documentation mentioned in the proposal document.

Carol Alexander, CBO
Building Official
City of Moscow
221 E Second St
Moscow ID 83843
PH: 208-883-7012
FAX: 208-883-7033

1.

State of Idaho HVAC Board
2012 IMC, IFGC, and Parts V and VI of the IRC Change Submittal

Date: **April 25, 2012**

Proponent: City of Moscow, Idaho
(Jurisdiction, Chapter, Company, Association, Organization, etc.)

Name: Carol Alexander, Building Official; Justin Goodwin, Plumbing, Mechanical and Building Inspector

Address: **221 E Second Street** (Street) **Moscow** (City) **ID** (State) **83843** (Zip Code)

Email: **calexander@ci.moscow.id.us** Phone Number: **208-883-7022**

Specific code considered for adoption and amendment (IMC, IFGC, and Parts V and VI of the International Residential Code

Code:	**IFGC**	Section:	**503.4.1.2**	Page:	**85**
Also:	**IRC**		**G2427.4.1.2**		**583**

~~Change/or~~ Add a new paragraph to read as follows:

G2427.4.1.2 Testing. All plastic pipe located within a dwelling used for venting flue gases shall be tested at five (5) psi for fifteen (15) minutes.

Reason for change with supporting documentation:

The City of Moscow instituted this requirement on January 1, 2011 with the adoption of the 2009 I-Codes at the recommendation of the Moscow Building Code Advisory Committee. That committee is made up of architects, plumbers, developers, building contractors, electricians, materials suppliers, and HVAC contractors. The committee voted unanimously to implement this new section of IRC and IFGC.

The testing failure rate in new homes for the first six months of actual testing was over 50 percent. The failure rate in retro-fits was 75 percent and remains above 50 percent when older pipe is tested.

The number of deaths due to carbon monoxide appears to be highest in the residential category. Increasingly tight construction may have some bearing on that number. With the adoption of the 2009 IFGC and IRC, carbon monoxide detectors were a new requirement, due to several instances where multiple deaths occurred.

The average life-expectancy of a carbon monoxide detector is roughly 3-5 years. As the technology gets better that may improve. The added protection, validated by flue

testing, is a strong measure working with the CO detectors to assure life safety over the long term. Many contractors are choosing to install combination smoke and carbon monoxide detectors for cost savings.

The required testing under this new section will not increase the cost of construction. The testing can be performed at the mechanical rough-in inspection when the contractor is there for gas pipe testing.

Attached is documentation of the hazards of carbon monoxide, and the death rates ascribed to carbon monoxide.

ERR

CPSA 6 (b)(1) Cleared
No Mfrs/PrvtLblrs 11/21/98
Products Identified
Excepted by
Firms Notified,
Comments Processed.

United States
CONSUMER PRODUCT SAFETY COMMISSION
Washington, D.C. 20207

DEC 10 1997

MEMORANDUM

TO: Elizabeth Leland, EC
Project Manager, Carbon Monoxide Detection

Through: Mary Ann Danello, Ph.D. for MAD
Associate Executive Director for Epidemiology and Health Sciences

Susan Ahmed, Ph.D.
Director, Hazard Analysis Division

FROM: Kimberly Ault, EHHA K.A.

SUBJECT: Estimates of Non-fire Carbon Monoxide Poisoning Deaths and Injuries

Executive Summary

For more than a decade, the U.S. Consumer Product Safety Commission (CPSC) has been concerned about the number of accidental non-fire deaths attributed to carbon monoxide (CO) poisoning associated with the use of consumer products within the jurisdiction of CPSC. Between 1990 and 1994, the number of non-fire CO poisoning deaths associated with use of consumer products averaged about 230 per year. The total number of accidental non-fire CO poisoning deaths, including both deaths associated with consumer products and deaths associated with motor vehicle exhaust averaged annually about 580 between 1990 and 1994. The CO poisoning deaths attributed to motor vehicle exhaust accounted for about 60 percent of all accidental non-fire CO poisoning deaths. The remaining 40 percent of the deaths were associated with consumer products. Most of the non-fire consumer product-related CO poisoning deaths were associated with the use of heating systems. Other consumer products associated with these poisoning deaths included charcoal grills, gas water heaters!, camping equipment, and gas ranges and ovens.

On average, between 1992 and 1996, approximately 9,800 people were treated in hospital emergency rooms for non-fire CO poisoning injuries associated with consumer products, excluding incidents involving auto exhaust. The estimated poisonings treated in hospital emergency rooms have increased between 1992 and 1996. Some of the increase in reports of non-fatal CO poisonings could be attributed to increased awareness of CO poisoning by both consumers and the medical community. The presence of a CO detector in the marketplace and recent public educational efforts may have helped consumers recognize symptoms of CO poisoning and seek treatment at local hospitals.

4.

This report provides estimates of non-fire CO poisoning deaths and reported injuries associated with the use of non-vehicular consumer products for the latest years data are available and gives an overview of the problem of CO poisoning. Data from previous years have been reexamined to provide greater detail and to assure use of consistent methodology; thus estimates of non-fire consumer product-related CO poisoning deaths and injuries have changed from previous memoranda. Appendix 1 provides a detailed discussion of the changes.

Introduction

Carbon monoxide is a colorless, odorless, and poisonous gas that results from the incomplete combustion of fuels such as natural or liquid propane (LP) gas, oil, wood, coal, and other fuels. The health effects related to CO depend upon its concentration in air, the duration of exposure, and its concentration in blood, as well as each individual's general health. Carbon monoxide combines with hemoglobin (Hb) with an affinity about 250 times that of oxygen, forming carboxyhemoglobin (COHb) and interfering with oxygen transport, delivery, and utilization. Generally, there are no perceptible health effects or symptoms in healthy individuals at COHb levels of 10 percent. Symptoms at blood levels above 10 percent COHb include headache, fatigue, nausea, and cognitive impairment. Loss of consciousness, coma, and death can occur at COHb levels greater than 20 percent. At around 3 percent COHb, a decrease in time to onset of angina in exercising individuals with ischemic heart disease, electrocardiographic changes, and neurobehavioral effects in healthy individuals has been recorded (Long & Saltzman, 1995; Burton, 1996).

Some symptoms of CO poisoning may mimic common illnesses such as influenza or colds; thus there likely is a high incidence of initial misdiagnosis by physicians and victims (Long & Saltzman, 1995). Patients are frequently unaware of exposures, and health care providers are not always aware of the symptoms of CO poisoning. COHb formation is reversible, as are some clinical symptoms of CO poisoning. However, some delayed neurological sequelae that develop following severe poisonings with prolonged unconsciousness may not be reversible. Prompt medical attention is important to reduce the risk of permanent damage.

Any fuel-burning appliance can potentially be a source of fatal or near-fatal CO levels. Fuels, such as natural and LP gas, kerosene, oil, gasoline, coal, and wood can produce large amounts of CO when there is insufficient oxygen available for combustion. Consumer products that burn kerosene, oil, gasoline, coal or wood (such as wood stoves, oil boilers, and kerosene heaters) produce an irritating smoke that can alert the victim to a potentially hazardous situation. Other products, such as charcoal briquettes and pressed woodchip logs, produce relatively smokeless fues, even at times of inefficient combustion. Victims receive no obvious sensory warning that high CO levels are present. A different hazard scenario is present when gas appliances are not vented properly or are malfunctioning. Natural and LP gas burn more efficiently and cleanly compared with other forms of fuel. In circumstances of inadequate ventilation or defective exhaust pathways, natural and LP gas appliances may emit potentially lethal amounts of CO without any irritating fumes. Again, many victims may be unaware of a potential problem.

Non-fire Carbon Monoxide Poisoning Deaths

During 1994, the most recent year for which death certificate data are available, there were an estimated 223 non-fire CO poisoning deaths associated with the use of consumer products, excluding motor vehicles. Table 1 relates the distribution of non-fire CO poisoning deaths attributed to consumer products and the various fuel types involved. Of these 223 deaths, heating systems were involved in 177 of the fatal incidents. In many incidents, limited information was available about the type of fuel used. The estimates presented in the table below are based on reported information about the various types of fuels. Among the specified heating system fuel types, LP gas heating was associated with 35 deaths, natural gas heating was associated with 24 deaths, and unspecified gas heating systems were associated with'59 deaths. Other heating system fuel types reported included kerosene and oil (9) and coal and wood (6). Unspecified fuel type heating systems were reported in 44 of the fatal incidents. These 177 deaths associated with heating systems total almost 80 percent of all consumer product-related CO poisoning deaths reported in 1994. Other consumer products reported to have been involved in CO poisoning deaths were charcoal grills (15), camp cooking stoves and lanterns (12), gas ranges and ovens (9), and gas water heaters (7). Other appliances, such as propane refrigerators and fuel-powered tools, were reportedly associated with 3 deaths. Other deaths associated with fuel-powered, "motor/engine" type appliances, such as generators, pumps, lawn mowers, and snowblowers have been reported to CPSC, however estimates of these poisoning deaths are not available. (See Appendix 2.)

Table 1
Estimated Non-Fire Carbon Monoxide Poisoning Deaths
by Type of Consumer Product Reported, 1990 - 1994

Consumer Product	Average Percent	1990	1991	1992	1993	1994
Total Deaths	100%	243	250	211	214	223
Heating Systems	73%	176	186	139	152	177
Unspecified Gas Heating	19%	36	53	24	44	59
LP Gas Heating	15%	31	35	43	27	35
Natural Gas Heating	9%	10	34	22	14	24
Coal/Wood Heating	5%	29	8	9	7	6
Kerosene/Oil Heating	5%	13	17	6	10	9
Heating Systems, Not Specified	20%	57	39	35	50	44
Charcoal Grills	10%	21	25	27	27	15
Gas Water Heaters	5%	17	13	6	11	7
Camp Stoves, Lanterns	5%	13	10	17	10	12
Gas Ranges/ Ovens	5%	10	14	13	6	9
Other Appliances	2%	6	3	9	7	3

Source: U.S. Consumer Product Safety Commission / EHHA.
CPSC Death Certificate File, National Center for Health Statistics Mortality File, 1990 - 1994.

Notes: Detail may not add to total due to rounding.
The 1990 - 1993 estimates presented in this table have been revised. See Appendix 1 for explanation.

6.

Additionally, Table 1 shows the estimated number of deaths for 1990 to 1994. On average, the annual number of non-fire CO poisoning deaths for this period is approximately 230 (with a standard deviation of 17.6). The average annual estimated deaths have remained fairly constant from 1990 to 1994, with only small variations from year to year. A regression analysis did not show a significant decrease in the estimated total number of non-fire CO poisoning deaths during this period. However, a regression analysis showed a significant decrease in the estimated CO poisoning deaths between 1980 and 1994. Appendix 3 shows the estimated CO poisoning deaths between 1980 to 1994. (See note in Appendix 3 for p-value.) Table 1 also shows the average percentage of deaths by the various reported products. On average, about 70 percent of the deaths involved heating systems and 10 percent involved charcoal grills. The remaining deaths were associated with other consumer products including gas water heaters, camp stoves and lanterns, gas ranges/ovens, and other fuel-powered tools and appliances. Each of these products was associated with 5% or less of the five year average number of deaths.

Table 2 shows that, from 1990 to 1994, on average, children under 15 years of age accounted for about 8 percent of the deaths, and persons over 65 accounted for about 20 percent. Deaths among the other age groups ranged between 20 and 30 percent of the total number of CO poisoning deaths. On average about 70 percent of these victims were males and 30 percent were females. Most of the deaths (75%) occurred from October through March, the primary months when heating appliances are used.

Table 2
Estimated Non-Fire Carbon Monoxide Poisoning Deaths by Age of Victim, 1990 - 1994

Age	Average Percent	1990	1991	1992	1993	1994
Total	**100%**	243	250	211	214	223
Under 5	3%	9	9	6	7	10
5 - 14	5%	14	15	10	12	7
15-24	21%	51	50	45	40	50
25 -44	28%	71	72	56	64	55
45 - 64	22%	45	52	50	52	50
65 and over	21%	53	52	44	39	51

Source: U.S. Consumer Product Safety Commission / EHHA.
CPSC Death Certificate File, National Center for Health Statistics Mortality File, 1990 -1 994.

Table 3 shows that almost 80 percent of the fatal incidents involved only one person, but about 20 percent of the incidents involved two or more persons.

Table 3
Number of Reported Deaths per Non-Fire Carbon Monoxide Poisoning Incident, 1990 - 1994

Number of People in Incident	Average Percent	1990	1991	1992	1993	1994
Total Incidents	**100%**	**127**	**128**	**123**	**120**	**123**
1	78%	101	95	90	96	102
2	17%	19	26	27	18	17
3	3%	1	4	3	6	2
4	1%	2	1	3	0	1
5 or more	1%	4	2	0	0	1

Source: U.S. Consumer Product Safety Commission / EHHA.
CPSC Death Certificate File, 1990 - 1994.
Note: Data in Table 3 do not add to totals presented in Table 1. Data presented in Table 3 are not estimated deaths, but instead reported deaths in the CPSC DCRT file. NCHS data does not contain enough detail to identify CO poisoning death incidents.

Table 4 shows that two-thirds of deaths occurred in homes, including mobile homes and garages. The remaining incidents occurredin locations such as sport or recreational areas, streets or highways, and other remote areas, where the victims were spending the night in automobiles or trucks and/or camping. In some of the "camping" incidents, the victims were burning charcoal inside automobiles and tents to keep warm. Many incidents occurred in sheds or other such out-buildings, in "make-shift" temporary shelters, in trucks with "caps", and campers or trailers. Some of the deaths involved victims who were staying at a work site overnight, using portable gas heaters to keep warm.

Table 4
Estimated Non-Fire Carbon Monoxide Poisoning Deaths by Location of Death 1990 - 1994

Location of Death	Average Percent	1990	1991	1992	1993	1994
Total	**100%**	243	250	211	214	223
Home	67%	166	175	120	147	161
Camper / Tent	13%	34	36	45	11	22
Auto	7%	14	15	14	17	15
Other	4%	6	13	9	10	12
Unknown	9%	23	11	24	29	13

Source: U.S. Consumer Product Safety Commission / EHHA.
CPSC Death Certificate File, National Center for Health Statistics Mortality File, 1990 - 1994.
Note: Detail may not add to total due to rounding.

Non-Fire Carbon Monoxide Non-Fatal Poisonings

Estimates of non-fatal poisonings from CO exposure are difficult to determine. Many victims do not seek medical attention or, when they do seek medical attention, may be misdiagnosed, since symptoms can be similar to those associated with colds and the flu. Carbon monoxide victims entering emergency rooms typically complain of fatigue, headache, nausea, dizziness, shortness of breath, chest pain, diarrhea, and other symptoms. In the ideal cases, the physician quickly recognizes the possibility of CO poisoning and the victim's COHb is measured as soon as possible after suspected CO exposure. However, in many cases the victim is misdiagnosed and recognition of CO poisoning is either delayed or does not occur.

In 1996, the latest year for which emergency room data are available, approximately 15,400 people were treated in hospital emergency rooms for suspected non-fire CO poisoning. Table 5 shows a distribution of these incidents by the kind of product reported to be associated in the incident. In 1996, heating systems, primarily furnaces and heaters, contributed to approximately 9,300 poisonings. Gas or LP gas heating appliances (3,300) and kerosene or oil heating systems (600) were the two types of heating systems that contributed to many of these poisonings. Coal or wood heating systems, including fireplaces and chimneys (400), and unspecified fuel-type heating systems (5,000) contributed to the remaining heating system-related poisonings. Other products reported as being involved in a CO poisoning incident included gas ranges and ovens (900), portable generators and pumps (700), grills (600), fuel-powered tools (500), gas clothes dryers (400), and gas water heaters (100). Often, gas ranges and ovens were inappropriately used for heating purposes. The portable generators and pumps were typically used to remove flood water from homes. Fuel-powered tools included floor waxers or buffers, power saws, welding equipment, snow blowers, lawn mowers, and lanterns.

The remaining 2,800 poisonings shown in Table 5 in the "No Product Specified" category were reported as incidents involving CO detectors without mention of a fuel-burning appliance and/or incidents where fuel storage tanks and pipes were reported as the product involved. Of these poisonings, 1,600 were reported as involving CO detectors without any source of CO mentioned. In about half of these CO detector incidents, the victims reported CO poisoning symptoms and the remaining half did not report any symptoms. In the incidents where no symptoms were reported, victims were often referred to the emergency room by the fire department or visited the hospital after repeated alarms from their CO detector. A CO detector is required to sound before any noticeable symptoms occur in healthy individuals. Therefore, some of the incidents can be attributed to asymptomatic people visiting the hospital emergency room after their CO detector sounded. Additionally, false positive or nuisance alarms triggered by low level CO exposures may have contributed to these incidents.

Table 5 also shows the estimated number of non-fatal CO poisonings for 1992 to 1996. The annual average number of non-fire CO poisonings for this period is 9,800 (with a standard deviation of 3,547). Table 5 also shows the average percentage of products reportedly contributing to the poisonings. Heating systems, primarily furnaces and heaters, contributed to over 70 percent of all poisonings. Where fuel type was specified, gas and/or LP gas heating appliances contributed to 27 percent, kerosene and /or oil heating systems contributed to 10 percent and coal and/or wood heating systems contributed to 4 percent. On average, gas ranges

and ovens contributed to 6 percent of the poisonings, grills contributed to 4 percent, and portable generators and pumps also contributed. to 4 percent. The remaining products, fuel-powered tools, gas water heaters, and gas clothes dryers each contributed 3 percent or less of the poisonings. The poisoning incidents where no fuel-burning product was reported contributed to 10 percent of the average total.

Table 5
Estimated Non-Fire Carbon Monoxide Poisonines by Type of Consumer Products Rieported, 1992 - 1996

Type of Product	Average Percent	1992	1993	1994	1995	1996
Total Non-Fatal Poisonings	100%	5,700	8,400	10,000	9,400	15,400
Heating Systems	71%	4,400	5,800	7,900	7,100	9,300
Gas / LP Heating	27%	2,100	1,900	3,100	2,600	3,300
Kerosene / Oil Heating	10%	900	600	1,400	1,200	600
Coal / Wood Heating	4%	100	0	600	800	400
Other Heating	1%	100	300	200	0	0
Heating Systems, Not Specified	29%	1,200	3,000	2,600	2,500	5,000
Gas Ranges / Ovens	6 %	100	500	600	900	900
Grills	4 %	400	700	0	100	600
Charcoal Grills	3 %	300	700	0	0	300
Other Grills	1%	100	0	0	100	300
Portable Generators and Pumps	4 %	300	400	500	100	700
Fuel-Powered Tools	3 %	100	100	400	200	500
Gas Water Heaters	2 %	100	400	300	300	100
Gas Clothes Dryers	1%	0	0	100	0	400
No Product Specified	10%	500	600	400	800	2,800
Sample Size		119	192	230	235	334
Coefficient of Variation		0.19	0.17	0.18	0.16	0.18

Source: U.S. Consumer Product Safety Commission / EHHA.
National Electronic Injury Surveillance System, 1992 - 1996.

Notes: Detail may not add to total due to rounding.
The t-test p-values for testing differences between years are as follows: 1992- 1993 (0.0568), 1993- 1994 (0.4438), 1994-1995 (0.7232), and 19951996 (0.0241). A significant value is a value less than 0.025 for a 95% confidence test.
The 1992 - 1995 estimates presented in this table have been revised. See Appendix 1 for explanation.

The estimated'poisonings have increased from 5,700 in 1992 to 15,400 in 1996. Some of the increase in the non-fatal CO poisonings could be attributed to increased awareness of CO poisoning by both consumers and the medical community. The presence of a CO detector in the marketplace and recent public information efforts by CPSC and other organizations may have helped consumers recognize symptoms of CO poisoning and seek treatment at local hospitals. CO detectors may have contributed to the increased injury estimates due to false positive alarms resulting from oversensitive CO detectors. Table 5 shows the coefficient of variation of each yearly estimate.

To determine whether the number of poisonings is increasing or decreasing from one year to the next, a t-test which compares means and takes account of covariances between years was done. This test detects non random differences in the estimates. The test showed a significant increase between 1995 and 1996, but not for any other successive year pairs. (See note below Table 5 for p-values.) Thus, the fluctuation between 1995 and 1996 in the estimated number of reported non-fatal CO poisonings is not what is to be expected from random variation from year to year. There is evidence of a true increase in the estimated number of reported non-fatal CO poisonings from 1995 to 1996. However, it is unclear what proportion of the increase is due to a true increase in the actual number of medically confirmed non-fatal CO poisonings versus an increase in the reporting of unconfirmed CO exposures.

Table 6 shows that, from 1992 to 1996, on average children under 5 years of age accounted for about 15 percent of the non-fatal CO poisonings and persons over 6 5 accounted for less than 10 percent. Non-fatal CO poisonings among the other age groups ranged between 10 and 30 percent of the total number of CO poisonings.

Table 6
Estimated Non-fire Carbon Monoxide Poisonings by Age of Victim, 1992 - 1996

Age	Average Percent	1992	1993	1994	1995	1996
Total	**100%**	5,700	8,400	**10,000**	**9,400**	**15,400**
Under 5	15%	500	1,400	1,500	1,500	2,200
5 - 14	21%	900	1,500	1,800	2,000	4,000
15-24	13%	900	900	1,400	1,400	2,000
25 - 44	30%	1,800	2,200	3,000	3,300	4,400
45 - 64	13%	700	1,500	1,600	800	2,000
65 and over	7%	700	900	700	400	800

Source: U.S. Consumer Product Safety Commission / EHHA.
National Electronic Injury Surveillance System, 1992 - 1996.
Note: Detail may not add to total due to rounding.

Table 7 shows that most victims of non-fatal CO poisonings were examined or treated in the hospital emergency room and then released. Less than 10 percent of the poisonings required admission for hospitalization.

Table 7
Estimated Non-Fire Carbon Mouoxide Poisonings by Disposition of Victim, 1992 - 1996

Disposition	Average Percent	1992	1993	1994	1995	1996
Total	**100%**	**5,700**	**8,400**	**10,000**	**9,400**	**15,400**
Treated & Released	**90%**	**4,200**	**7,200**	**9,500**	**9,200**	**15,100**
Hospitalized	**9%**	**1,300**	**1,200**	**500**	**200**	**300**
DOA	**0%**	**100**	**0**	**0**		**0**
Unknown	0%	100	0	*	*	100

Source: U.S. Consumer Product Safety Commission / EHHA.
National Electronic Injury Surveillance System, 1992 - 1996.
Note: The asterisk denotes that the estimate is less than 50. Detail may not add to total due to rounding.

Table 8 shows the distribution of the number of persons injured in each CO poisoning incident. Fifty-five percent of the incidents involved only one person, 21 percent of the incidents involved two persons, 13 percent involved three persons, 6 percent involved four persons, and the remaining 5 percent involved more than five persons.

Table 8
Number of Persons Injured Per Non-Fatal Carbon Monoxide Poisoning Incident, 1992 - 1996

Number of People in Incident	Average Percent	1992	1993	1994	1995	1996
Total Incidents	**100%**	68	**108**	**119**	**122**	**168**
1	55%	44	64	60	67	86
2	21%	10	25	29	21	38
3	13%	10	9	16	17	24
4	6%	1	6	7	12	9
5 or more	5%	3	4	7	5	11

Source: U.S. Consumer Product Safety Commission / EHHA.
National Electronic Injury Surveillance System, 1992 - 1996.

Discussion

About two-thirds of all consumer product-related non-fire CO poisoning deaths and injuries were associated with some type of heating system. Each of the CO poisoning hazard scenarios reflects either product malfunction resulting in high CO emissions and/or some failure to adequately remove CO from the living or recreational environment. Most of the deaths and injuries likely resulted from one of the following hazard scenarios: unvented products operated in closed spaces without adequate ventilation, faulty installations, long-term use accompanied by neglected maintenance, or inappropriate use of products for heating purposes. To prevent CO poisoning incidents, consumers need to make sure their appliances are properly installed, maintained, and used. Additionally, consumers should install a CO detector that meets requirements of the Underwriters Laboratories (UL) standard 2034 or the International Approval Services (IAS) 6-96 standard.

Appendix 1
Methodology

Non-fire Carbon Monoxide Deaths

All death certificates filed in the U.S. are compiled by the National Center for Health Statistics (NCHS) into multiple cause of mortality data files. The mortality data files contain demographic and geographic information as well as the International Classification of Diseases codes for the underlying cause of death and up to 20 contributing conditions. The data are compiled in accordance with the World Health Organization instructions, which request that member nations classify causes of death by the current Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death. The International Classification of Diseases, Ninth Revision was implemented in 1979 and was in effect between 1990 and 1994, the years for which data are presented in this report.

The following methodology was used to determine non-fire CO poisoning deaths associated with the use of consumer products. The first step in the estimation process is searching the NCHS data for the following external cause of death codes (Ecodes):

867.0 (Accidental poisoning by gas distributed by pipeline),
868.0 (Accidental poisoning by liquidified petroleum distributed in mobile containers),
868.1 (Accidental poisoning by other and unspecified utility gas),
868.3 (CO from incomplete combustion of other domestic fuels).

These deaths were combined for the total known non-fire CO poisoning death count (n_1), excluding motor vehicle exhaust. The deaths of unknown origin are found in the Ecodes 868.8 (CO from other sources) and 868.9 (Unspecified CO). A relative proportion (n_2) of these unknown deaths was added to the known death count. The proportion was based on a ratio of the known count (n_1) to the known count (n_1) plus the death count for motor vehicle exhaust (n_3). (The death count for motor vehicle exhaust is found in Ecode 868.2). The ratio was then applied to the unknown CO poisoning deaths (n_2). The adjusted total count of CO poisoning deaths is the sum of the total known CO poisoning deaths count plus the proportion of CO poisoning deaths of unknown origin. $[N = n_1 + ((n_1 / (n_1 + n_3)) * n_2)]$ This total is used to weight the death counts from the CPSC Death Certificate File. The table below shows the above computations for the 1990 - 1994 estimates.

Accidental Non-Fire Carbon Monoxide Poisonine Deaths bv Ecode

Adiusted E code Totals	Year				
	19'90	1991	1992	1993	1994
867.0	42	26	30	19	35
868.0	69	63	67	73	85
868.1	20	24	17	16	16
868.2	377	369	316	335	359
868.3	11.1	138	98	105	87
Total Accidental CO Deaths	620	619	527	549	582
Consumer Product Total	243	250	**211**	**214**	223

Source: National Center for Health Statistics Mortality File, 1990 - 19'94.
Note: Detail may not add to total due to rounding.

13.

The next step in the process is to search the CPSC's Death Certificate File for the same Ecodes as used above (867.0, 868.0, 868.1, 868.3, 868.8 and 868.9). Each death certificate was reviewed and assigned a code based on the product and type of fuel involved, whenever possible. The incidents were grouped. into the following fuel categories: unspecified gas, LP gas, natural gas, coal, wood, kerosene, oil, and unspecified. The heating systems category combined wall heaters and furnaces, floor furnaces, boilers, space heaters, heating stoves, and other miscellaneous heating systems. In order to project a national estimate of CO poisoning deaths from the CPSC death certificate file, product-specific percentages were applied to the NCHS estimate previously derived in step one. The result is an estimate of non-fire CO poisoning deaths associated with the use of consumer products. The table below shows the weighting factors used for the 1990 - 1994 estimates.

Year	Consumer Product Total	CPSC Death Certificate Count	Weighting Factor
1994	223	151	1.48
1993	214	150	1.43
1992	211	165	1.28
1991	250	179	1.40
1990	243	170	1.43

Source: U.S. Consumer Product Safety Commission / EHHA.
National Center for Health Statistics Mortality File, CPSC Death Certificate File, 1990 - 1994.

Product-specific estimates of non-fire consumer product-related CO poisoning deaths have been revised using the above methodology. The methodology used previously in the 1990 - 1993 estimates combined product categories which resulted in inflated product-related CO poisoning death estimates. For example, camp stoves were combined with gas ranges and ovens, which inflated the number of deaths associated with gas ranges and ovens. Additionally, the process of allocation of unknown products among the known products categories inflated estimates of certain product-related CO poisoning deaths. When products were combined in the gas fuel category, detailed information about the type of fuel (natural gas or LP gas) used in the incident was lost in the combination. The new methodology presents the data with as much detail as possible.

In addition to the new methodology, CPSC reviewed the CO poisoning death certificate data and found supplemental information collected since the publication of the previous memos. The new methodology and updated data explain the noticeable changes in previous estimates.

Non-fire Carbon Monoxide Poisonings Treated in Hospital Emergency Rooms

The estimated number of CO non-fatal poisonings treated in hospital emergency rooms is based on the National Electronic Injury Surveillance System (NEISS). The NEISS is a probability sample of hospitals selected from the population of all hospitals with emergency rooms (ERs) in the U.S. and its territories. The hospitals in the sampling frame are stratified by size (number of emergency room visits) into four groups. The hospitals are organized geographically within strata; substrata. of equal number of hospitals are then formed, and a simple random sample of primary and. alternate hospitals is selected from each stratum. Injuries

associated with consumer products and recreational activities are collected on a daily basis via a computer from each participating hospital. Data in this report were based on a sample of 91 hospitals that provides approximately 3~00,000 product-related injury reports each year (McDonald, 1994). Because of the properties of a probability sample, the number of reported injuries is weighted to represent all similar injuries in the U.S. and its territories. In addition to this capability for making estimates for the entire population based on sample data, probability samples also permit computation of confidence intervals around the estimates. The confidence intervals are derived from the statistical variability associated with the sample or the sampling error (Kessler, 1995).

Product-specific estimates of non-fatal, non-fire, consumer product-related CO poisonings have been revised. The estimates provided in previous memoranda (Long, 1995; Long, 1996) excluded incidents where CO detectors were mentioned as the only consumer product involved and incidents where fuel storage tanks and pipes were reported as the products involved. In the memorandum that presented NEISS data from 1994 (Long, 1995), the estimated number of non-fire CO poisoning injury incidents was presented instead of the estimated number of non-fatal poisonings (injuries). An injury incident was defined as an incident where at least one person was treated in a hospital emergency room. The 1994 estimate presented in this memorandum is the estimated number of non-fatal poisonings (which is considerably higher than the injury incident estimate). Additionally, the NEISS data and supplemental information collected since the publication of the previous memos were reviewed and, as appropriate, added to the estimated number of non-fatal CO poisonings. These additional incidents explain the noticeable changes in previous estimates.

Appendix 2

In the NCHS data, the Ecode 868.2 is used for reporting non-fire CO deaths associated with motor vehicle (not in transit) exhaust and CO deaths associated with the use of farm tractors, gas engines, motor pumps, and any other type of combustion engine not in watercraft. CPSC does not routinely collect death certificates for Ecode 868.2, since most motor vehicles are not within the jurisdiction of CPSC; thus appropriate weighting factors (as discussed in Appendix 1) are not available to make estimates associated with these products. Based on the methodology described in Appendix 1, the five year average proportion of actual non-fire CO poisoning deaths reported to CPSC, relative to the NCHS national count, is about 72% of all consumer product-related non-fire CO poisoning deaths (or a weighting factor of 1.4). Appendix 1 shows the CPSC Death Certificate File counts and the associated weighting factors for available years. If this factor is applied to the counts below, the five year average estimate of non-fire CO poisoning deaths associated with generators and other motor-type products is 16. The table below shows the number of reported non-fire CO poisoning deaths associated with generators and other "motor/engine" appliances, such as pumps, lawn mowers, and snowblowers.

Non-Fire CO Poisoning Deaths Associated with Generators and Other Appliances

Appliance	1990	1991	1992	1993	199
Total	**18**	**8**	**7**	**13**	**11**
Generators	18	7	7	10	7
Other Products	0	1	0	3	4

Source: U.S. Consumer Product Safety Commission / EHHA.
CPSC Death Certificate File, 1990-1994.

16.

Appendix 3

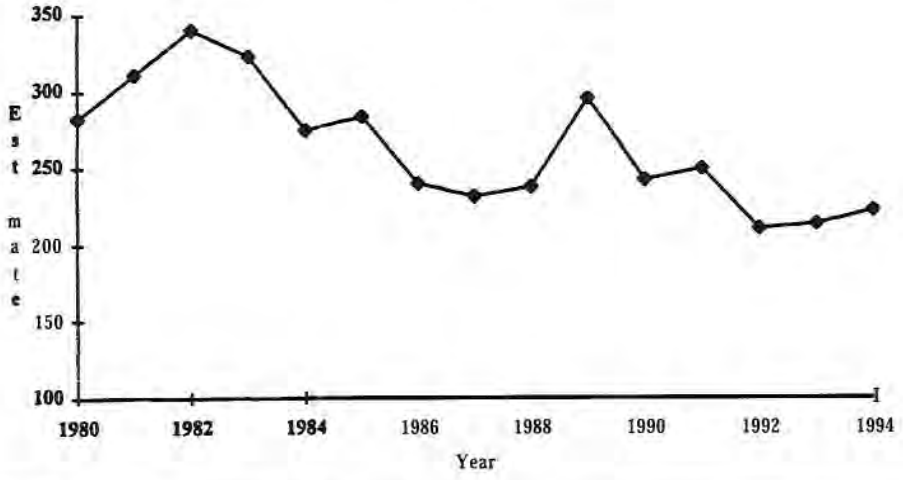
Estimated Non-Fire Carbon Monoxide Poisoning Deaths Associated with Consumer Products, 1980-1994

Year	Estimate
1994	223
1993	214
1992	211
1991	250
1990	243
1989	296
1988	238
1987	232
1986	240
1985	284
1984	275
1983	323
1982	340
1981	311
1980	282

Source: U.S. Consumer Product Safety Commission / EHHA.
CPSC Death Certificate File, National Center for Health Statistics Mortality File, 1980 - 1994.

Note: The p-value for the regression analysis F-test statistic was 0.0011. A significant value is a value less than 0.05 for a 95% confidence test.

Figure 1
Non-Fire CO Poisoning Deaths Associated with Consumer Products, 1980 - 1994



Source: U.S. Consumer Product Safety Commission / EHHA.
CPSC Death Certificate File, National Center for Health Statistics Mortality File, 1980 - 1994.

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18.

January 2009

Fact Sheet

Preventing Carbon Monoxide Poisoning

Information for Older Adults and Their Caregivers

Do you know that carbon monoxide (CO) is the most common cause of poisoning death in the United States? Unintentional CO poisonings are responsible for about 500 deaths and 15,000 visits to emergency rooms annually. Older adults over 65 years of age are especially vulnerable to unintentional CO poisoning due to their high frequency of pre-existing medical conditions.[1] While CO alarms can save lives, fewer than one third of American homes have them installed.[2]

What Is Carbon Monoxide (CO)?

CO is an odorless, colorless gas that can cause illness and death. It is produced whenever any fuel such as natural gas, propane, gasoline, oil, kerosene, wood or charcoal is burned. Devices that produce CO include cars, boats, gasoline engines, stoves and heating systems. CO from these sources can build up in enclosed or semi-enclosed spaces. When people inhale CO, the toxic gas enters the bloodstream and blocks oxygen from being absorbed into the body, which can damage tissues and result in death.[3]

What Are the Symptoms of CO Poisoning?

For most people, the first signs of exposure to low concentrations of CO include mild headache and breathlessness upon moderate exercise. Continued or acute exposure can lead to flu-like symptoms including more severe headaches, dizziness, tiredness, nausea, confusion, irritability, and impaired judgment, memory and coordination.[4] CO is called the "silent killer" because if these early signs are ignored, a person may lose consciousness and be unable to escape the danger.

You May Be Symptom Free and Still Exposed to Unsafe CO Levels

Breathing low concentrations of CO may not result in obvious symptoms of CO poisoning, yet exposure to low levels of CO can cause long-term health damage, even after the

Everyone is at risk of being poisoned by carbon monoxide exposure. Older adults with pre-existing conditions, such as chronic heart disease, anemia, or respiratory problems, are even more susceptible to the effects of this odorless, colorless gas.

19.

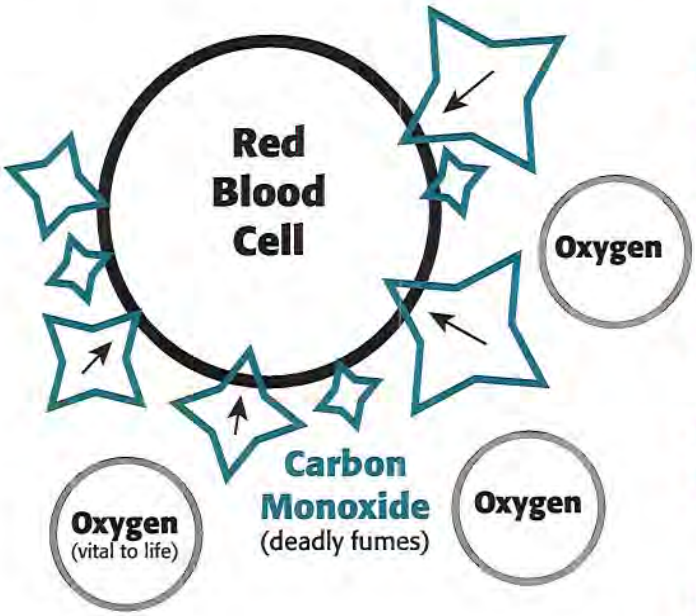
CO source is removed. These health effects include long-term neurological damage such as learning and memory impairments, emotional and personality effects, and sensory and motor disorders.[5]

Who Is at Risk from CO Poisoning?

People of all ages are at risk for CO poisoning. Persons living with chronic heart disease, anemia, or respiratory problems are more susceptible to its effects.[6] Older adults more frequently have these pre-existing conditions, which lower their tolerance and increase the risk of a fatal exposure.[7] CO poisoning can also be highly dangerous for unborn children, greatly increasing the risk of fetal death and developmental disorders.[8, 9]

More Common among Minorities

A study conducted in Washington State among minority populations showed that Hispanic populations had a four times greater risk and black populations had a three times greater risk than white populations for CO poisoning. The most common source of CO poisoning among those populations was burning charcoal briquettes. Approximately 66% of Hispanic victims and 40% of black victims became poisoned as a result of indoor burning of charcoal briquettes.[10]



If You Experience Symptoms You Think Could Be from CO Poisoning:

- Get fresh air immediately. Open doors and windows and turn off stoves, ovens, heaters and similar appliances and leave the house.
- Call a poison center immediately at 1-800-222-1222. The poison experts there will let you know if you need to seek further medical attention.

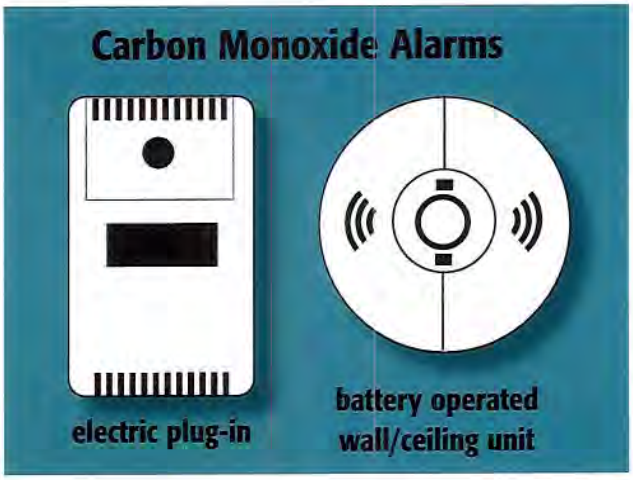
To Prevent CO Poisoning, Remember I CAN B:

- **I**nstall CO alarms near sleeping areas.
- **C**heck heating systems and fuel-burning appliances annually.
- **A**void the use of non-vented combustion appliances.
- **N**ever burn fuels indoors except in devices such as stoves or furnaces that are made for safe use.
- **B**e Attentive to possible symptoms of CO poisoning.

Other Tips for Preventing CO Poisoning:

- Keep gas appliances properly adjusted.
- Consider purchasing a vented space heater when replacing a non-vented one.
- Use proper fuel in kerosene space heaters.
- Install and use an exhaust fan vented to the outdoors over gas stoves.
- Open flues when using the fireplace.
- Choose properly-sized wood stoves that are certified to meet EPA emission standards. Ensure wood stove doors fit tightly.
- Have your heating system and chimney inspected and cleaned by a qualified technician annually.

- Make sure all interior fuel-burning appliances are in good condition and have proper ventilation.
- Never idle the car in the garage, even if the garage door is open to the outside.
- Use portable generators outside and far away from buildings. Never use portable generators on balconies or near doors, vents or windows. Never use portable generators near to where you sleep or your family sleeps.
- Never use a charcoal grill indoors, even in a fireplace.
- Propane heaters or heaters using other fuels placed in enclosed hunting and fishing shanties, should be vented to the outside.
- Never heat your home with a gas oven.



CO Alarms

Half of all unintentional CO poisoning deaths could be prevented with the use of CO alarms. Alarms should be Underwriters Laboratories (UL) approved and are generally available at local hardware stores.[11] The cost is minimal and in view of the possibility that it may save the lives of you and your family it is a bargain. Install a CO alarm on every floor of your home and within hearing range of each sleeping area. Carefully follow manufacturers' instructions for their placement, use, and maintenance. Unlike smoke alarms, CO alarms may expire after several years.

How to Tell the Difference between CO Poisoning and the Flu

Since many of the symptoms of CO poisoning are similar to those of the flu, you may not think that CO poisoning could be the cause. Symptoms could be the result of CO poisoning when:

- You feel better when you are away from your home.
- More than one person in the home gets sick at the same time (it usually takes several days for the flu to pass from person to person).
- Family members who are most affected spend the most time in the home.
- Symptoms occur or get worse shortly after turning on a fuel-burning device or running a vehicle in an attached garage.
- Indoor pets also appear ill, exhibiting symptoms such as drowsiness and lethargy (human flu viruses are not transmitted to pets).
- Generalized aching, low-grade fever, or swollen lymph nodes (these are typical of a cold or flu).[12]

Don't let buying a CO alarm lull you into a false sense of security. CO alarms should only be considered a back-up for proper use and maintenance of your fuel-burning appliances. CO alarms are not designed for low-level CO monitoring and there have been questions about whether CO alarm standards are protective enough, especially for sensitive groups such as older adults.[13]

Aging Adults and Environmental Health Issues

EPA's Aging Initiative is working to protect the health of older adults from environmental hazards through risk management and prevention strategies, education and research. For more information about EPA's Aging Initiative, visit **www.epa.gov/aging**

Printed copies of this fact sheet can be ordered at: **http://www.epa.gov/aging/resources/factsheets/order.htm**

Additional Resources

Your Local Poison Center

- **1-800-222-1222**
- Internet: **www.aapcc.org**

U.S. Environmental Protection Agency

Carbon Monoxide
http://www.epa.gov/iaq/co.html

CDC

Carbon Monoxide
http://www.cdc.gov/co/

Consumer Product Safety Commission

Home Heating Equipment Safety
www.cpsc.gov/cpscpub/pubs/heatpubs.html

Carbon Monoxide Alarms
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AGING Initiative
Protecting the Health of Older Americans

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Publication Number EPA 100-F-09-001

Exposing an Invisible Killer

A Factsheet on the Dangers of Carbon Monoxide

Each year in America, unintentional carbon monoxide (CO) poisoning claims more than 400 lives and sends another 20,000 people to hospital emergency rooms for treatment.

The U. S. Fire Administration (USFA) and the National Association of Home Builders (NAHB) would like you to know that there are simple steps you can take to protect yourself from deadly carbon monoxide fumes.

UNDERSTANDING THE RISK

WHAT IS CARBON MONOXIDE?

Carbon monoxide is an odorless, colorless and toxic gas. Because it is impossible to see, taste or smell the toxic fumes, CO can kill you before you are aware it is in your home. At lower levels of exposure, CO causes mild effects that are often mistaken for the flu. These symptoms include headaches, dizziness, disorientation, nausea and fatigue. The effects of CO exposure can vary greatly from person to person depending on age, overall health and the concentration and length of exposure.

WHERE DOES CARBON MONOXIDE COME FROM?

CO gas can come from several sources: gas-fired appliances, charcoal grills, wood-burning furnaces or fireplaces and motor vehicles.

WHO IS AT RISK?

Everyone is at risk for CO poisoning. Medical experts believe that unborn babies, infants, children, senior citizens and people with heart or lung problems are at even greater risk for CO poisoning.

WHAT ACTIONS DO I TAKE IF MY CARBON MONOXIDE ALARM GOES OFF?

What you need to do if your carbon monoxide alarm goes off depends on whether anyone is feeling ill or not.

IF NO ONE IS FEELING ILL:

1. Silence the alarm.
2. Turn off all appliances and sources of combustion (i.e. furnace and fireplace).
3. Ventilate the house with fresh air by opening doors and windows.
4. Call a qualified professional to investigate the source of the possible CO buildup.

IF ILLNESS IS A FACTOR:

1. Evacuate all occupants immediately.
2. Determine how many occupants are ill and determine their symptoms.
3. Call your local emergency number and when relaying information to the dispatcher, include the number of people feeling ill.
4. Do not re-enter the home without the approval of a fire department representative.
5. Call a qualified professional to repair the source of the CO.

PROTECT YOURSELF AND YOUR FAMILY FROM CO POISONING

- Install at least one carbon monoxide alarm with an audible warning signal evaluated by a nationally recognized laboratory, such as Underwriters Laboratories (UL), near the sleeping areas and outside individual bedrooms. Carbon monoxide alarms measure levels of CO over time and are designed to sound an alarm before an average, healthy adult would experience symptoms. It is very possible that you may not be experiencing symptoms when you hear the alarm. This does not mean that CO is not present.
- Have a qualified professional check all fuel burning appliances, furnaces, venting and chimney systems at least once a year.
- Never use your range or oven to help heat your home and never use a charcoal grill or hibachi in your home or garage.
- Never keep a car running in a garage. Even if the garage doors are open, normal circulation will not provide enough fresh air to reliably prevent a dangerous buildup of CO.
- When purchasing an existing home, have a qualified technician evaluate the integrity of the heating and cooking systems, as well as the sealed spaces between the garage and house. The presence of a carbon monoxide alarm in your home can save your life in the event of CO buildup.

For more information contact:
The U. S. Fire Administration
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Carbon Monoxide--Related Deaths --- United States, 1999--2004

Carbon monoxide (CO) is a colorless, odorless, tasteless toxic gas produced by incomplete combustion in fuel-burning devices such as motor vehicles, gas-powered furnaces, and portable generators (*1*). Persons with CO poisoning often overlook the symptoms (e.g., headache, nausea, dizziness, or confusion), and undetected exposure can be fatal (*1*). Unintentional CO exposure accounts for an estimated 15,000 emergency department visits and 500 unintentional deaths in the United States each year (*1*). The most recent state-level estimates of CO-related deaths were described in 1991 for the years 1979--1988 (*2*). Using the most recent mortality data available, this report updates national and state-specific unintentional, non--fire-related CO mortality rates and describes the demographic, seasonal, and geographic patterns for 1999--2004. During this period, an average of 439 persons died annually from unintentional, non--fire-related CO poisoning, and the national average annual death rate was 1.5 per million persons. However, rates varied by demographic subgroup, month of the year, and state. Rates were highest among adults aged ≥65 years, men, non-Hispanic whites, and non-Hispanic blacks. The average number of deaths was highest during January. Among the states, Nebraska had the highest reliable CO mortality rate. These findings indicate that improved population-based prevention measures, including educating the public about the dangers of CO exposure, are needed at the state and national levels.

Mortality rates were calculated from death certificate data obtained from the National Vital Statistics System (NVSS), using the record axis fields from the multiple cause-of-death files compiled by the National Center for Health Statistics (*3*). Records were searched for all deaths occurring among residents of 50 states and the District of Columbia during 1999--2004 that contained *International Classification of Diseases, Tenth Revision* (ICD-10) code T58 (toxic effect of CO) as a contributing cause of death. A case of unintentional CO-related death was defined as one for which both poisoning by accidental exposure to gases or vapors (code X47) and toxic effect of CO (code T58) were listed as causes of death. All records of deaths caused by intentional exposure, exposure of undetermined intent, or fire-related exposure to CO (codes X00--X09, X76, X97, Y26, and Y17) were excluded. Deaths that occurred among foreign residents in the United States and deaths among U.S. residents who died abroad also were excluded.

Crude and age-adjusted rates of unintentional, non--fire-related deaths from CO poisoning were calculated by age group, sex, and race/ethnicity for the period 1999--2004. To assess the seasonality of CO-related mortality, the average daily number of deaths was calculated by month for the period 1999--2004. The national Non-Notifiable Disease Surveillance System was used to identify states in which physicians, laboratories, or hospitals are mandated by law to report acute CO poisoning (*4*). In addition, age-adjusted CO death rates were calculated for each state for the period 1999--2004 (*5,6*).

24.

Populations at risk were defined using the U.S. intercensal population estimate for 1999, the U.S. Census 2000 population count, and population bridged-race estimates (*3*) for 2001--2004. Using the direct method, state mortality rates were age adjusted to the U.S. standard 2000 population (*3,5*). Rates based on small numbers of deaths (five or fewer) or with relative standard errors (RSEs) >50% were considered unreliable and were not included (*7*). Rates based on >20 deaths and with RSEs <30% were considered reliable. Rates based on six to 29 deaths and with RSEs from 30% to 50% should be interpreted with caution. Statistically significant differences between rates were inferred by comparing 95% confidence intervals.

During 1999--2004, CO poisoning was listed as a contributing cause of death on 16,447 death certificates in the United States. Of these, 16,400 (99.7%) deaths occurred among U.S. residents inside the United States, and 2,631 (16%) were classified as both unintentional and non--fire-related deaths. For the period 1999--2004, an average of 439 persons died annually from unintentional, non--fire-related CO poisoning (range: 400 in 1999 to 473 in 2003). The annual average age-adjusted death rate in the U.S. was 1.5 deaths per million persons (Table 1). Death rates were highest for adults aged ≥65 years and for men (Table 1). Age-adjusted death rates were higher for non-Hispanic blacks and non-Hispanic whites than for other subgroups; however, the difference between the rates for blacks and whites was not statistically significant (Table 1). The average daily number of CO-related deaths was greatest during the months of January (2.07 deaths) and December (1.97 deaths) and lowest during the months of July (0.67 deaths) and August (0.67 deaths). For the period 1999--2004, a total of 35 states had sufficient numbers of CO-related deaths to calculate reliable mortality rates (Table 2). The state with the highest reliable CO mortality rate was Nebraska, and the state with the lowest reliable rate was California. As of December 2007, reporting of acute CO poisoning by health-care providers was mandatory for 13 states; no clear pattern of differences in CO-related mortality was detected between states with mandatory reporting and those without.

Reported by: *M King, PhD, C Bailey, MS, National Center for Environmental Health, CDC.*

Editorial Note:

Consistent with previous studies (*1,2*), the results of this analysis indicate that men and adults aged ≥65 years were more likely to die from CO poisoning than other persons. The higher rate in men has been attributed to high-risk behaviors among men, such as working with fuel-burning tools or appliances. The higher rate among older persons has been attributed to the likelihood of older adults mistaking symptoms of CO poisoning for other conditions common among persons in this age group (e.g., influenza-like illnesses or fatigue. CO deaths were highest during colder months, likely because of increased use of gas-powered furnaces and use of alternative heating and power sources used during power outages, such as portable generators, charcoal briquettes, and propane stoves or grills (*1*). Similar to previous findings (*2*), the highest CO death rates tended to be among western (e.g., Alaska, Montana, and Wyoming) and midwestern (e.g., Nebraska and North Dakota) states, likely because of variations in weather and geography and state-by-state variations in prevalence of certain risk behaviors.

The findings in this report are subject to at least three limitations. First, carboxyhemoglobin measurements are not a routine part of autopsies, and postmortem measurements often are unreliable because carboxyhemoglobin concentrations produced by different analytic methods vary (*8*), which might have resulted in misclassification of CO-related deaths. In addition, receipt of mortality data often is delayed, and the data might lack the circumstantial and clinical detail that could provide information about the specific mechanisms of CO poisoning, which might have resulted in misclassification. Second, because the symptoms of CO poisoning are nonspecific and clinical recognition is challenging, certain cases might not be recognized, resulting in underestimates.

Finally, because ICD-10 coding has only one code specific to CO (T58), distinguishing between deaths caused by motor-vehicle exhaust and other CO-related deaths is not possible using the methods in this analysis.

Because persons are relying on CO alarms to prevent CO poisoning (*9*), additional research regarding their effectiveness is needed, including an evaluation of the cost effectiveness of CO alarms used in residences. As additional years of data become available, tracking of longitudinal trends in CO-related mortality should continue to guide public health measures aimed at preventing deaths from CO poisoning (*10*).

Exposure to CO can be prevented with basic precautions, including proper installation and maintenance of fuel-burning appliances (Box). CO detectors can alert occupants to accumulating gas and should be placed on every level of a home. Additional measures to educate the public regarding the dangers of CO are needed, particularly during the winter season. Additional surveillance that combines timely estimates of morbidity and mortality with situational information related to mechanisms of CO exposure (e.g., length of exposure, type of fuel-burning device involved, and behaviors or chain of events preceding exposure) could help target prevention measures and reduce CO poisonings.

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Table 1

26.

TABLE 1. Unintentional, non–fire-related deaths from carbon monoxide (CO) poisoning,* by age group, sex, and race/ethnicity — United States, 1999–2004

Characteristic	Total deaths No.	Total deaths (%)	6-year average annual crude rate†	6-year average annual rate†	(95% CI§)
Total	2,631	(100)	1.53	1.53	(1.47–1.59)
Age group (yrs)					
0–4	52	(2)	0.45	—	—
5–14	83	(3)	0.33	—	—
15–24	256	(10)	1.06	—	—
25–34	322	(12)	1.35	—	—
35–44	505	(19)	1.87	—	—
45–54	472	(18)	2.00	—	—
55–64	314	(12)	2.00	—	—
≥65	628	(24)	2.13	—	—
Sex					
Male	1,958	(74)	2.32	2.41	(2.30–2.52)
Female	673	(6)	0.77	0.74	(0.68–0.79)
Race/Ethnicity¶					
White, non-Hispanic	1,941	(74)	1.65	1.54	(1.48–1.61)
Black, non-Hispanic	305	(11)	1.46	1.64	(1.45–1.83)
Other, non-Hispanic	97	(4)	0.98	1.01	(0.80–1.22)
Hispanic	279	(11)	1.25	1.31	(1.14–1.48)

* Deaths coded with *International Classification of Disease, Tenth Revision* codes T58 and X47, excluding X00–X09, X76, X97, Y26, and Y17.
† Average age-adjusted rate per 1 million persons.
§ Confidence interval.
¶ Records in which ethnicity was unknown or missing were excluded from analysis (n = 9).

Return to top.

Table 2

27.

TABLE 2. Unintentional, non–fire-related deaths from carbon monoxide (CO) poisoning, by state — United States, 1999–2004*

State/Area	Total number of deaths	6-year average annual rate†	(95% CI¶)	Mandatory reporting of acute CO poisoning¶¶
U.S. total	**2,631**	**1.53**	**(1.39–1.68)**	—
Alabama	48	1.80	(0.76–3.58)	—
Alaska	20**	4.88	(0.82–15.53)	—
Arizona	55	1.73	(0.80–3.27)	—
Arkansas	32	1.99	(0.60–4.81)	Yes
California	115	0.57	(0.34–0.90)	—
Colorado	60	2.32	(0.85–5.03)	Yes
Connecticut	19**	0.85	(0.05–3.86)	Yes
Delaware	6**	1.21††	(0–16.38)	—
District of Columbia	—§§	—	—	—
Florida	137	1.27	(0.79–1.93)	—
Georgia	63	1.29	(0.59–2.44)	—
Hawaii	—§§	—	—	—
Idaho	21	2.75	(0.37–9.58)	—
Illinois	155	2.05	(1.33–3.03)	—
Indiana	91	2.48	(1.40–4.09)	Yes
Iowa	52	2.86	(1.18–5.78)	Yes
Kansas	35	2.16	(0.70–5.03)	—
Kentucky	68	2.74	(1.37–4.91)	—
Louisiana	29	1.10	(0.21–3.29)	Yes
Maine	8**	1.01††	(0–17.14)	—
Maryland	46	1.43	(0.58–2.92)	—
Massachusetts	14**	0.35	(0.03–1.42)	Yes
Michigan	128	2.13	(1.27–3.35)	Yes
Minnesota	73	2.39	(1.23–4.19)	—
Mississippi	16**	0.95	(0.06–4.28)	—
Missouri	95	2.77	(1.50–4.67)	Yes
Montana	23	4.16	(0.64–13.72)	—
Nebraska	45	4.32	(1.32–10.42)	—
Nevada	32	2.54	(0.77–6.16)	—
New Hampshire	—§§	—	—	—
New Jersey	49	0.93	(0.30–2.16)	Yes
New Mexico	33	3.07	(0.96–7.31)	Yes
New York	118	1.01	(0.61–1.58)	—
North Carolina	86	1.74	(0.95–2.93)	—
North Dakota	13**	3.20	(0.12–16.16)	—
Ohio	139	1.99	(1.27–2.99)	—
Oklahoma	35	1.72	(0.42–4.61)	—
Oregon	30	1.41	(0.46–3.30)	—
Pennsylvania	160	2.01	(1.31–2.94)	—
Rhode Island	8**	1.23††	(0–12.35)	—
South Carolina	28	1.14	(0.16–3.90)	—
South Dakota	6**	1.34 ††	(0–15.82)	—
Tennessee	50	1.43	(0.63–2.78)	—
Texas	148	1.23	(0.79–1.82)	—
Utah	19**	1.56	(0.16–6.03)	—
Vermont	8**	1.96 ††	(0–33.59)	—
Virginia	45	1.05	(0.41–2.20)	Yes
Washington	44	1.21	(0.46–2.59)	—
West Virginia	20**	1.74	(0.20–6.41)	—
Wisconsin	79	2.36	(1.19–4.18)	Yes
Wyoming	19**	6.19	(0.66–23.35)	—

* Data from National Center for Health Statistics multiple-cause-of-death files and the U.S. Census Bureau. Deaths coded with *International Classification of Disease, Tenth Revision* codes T58 and X47, excluding X00–X09, X76, X97, Y26, and Y17.

28.

Return to top.

Box

BOX. Guidelines to prevent carbon monoxide (CO) exposure

Do

- Have heating systems, water heaters, and any other gas-, oil-, or coal-burning appliances serviced by a qualified technician every year.
- Install battery-operated CO detectors in homes, and check or replace batteries when changing the time on clocks each spring and fall. If a detector sounds, leave the home immediately and call 911.
- Seek medical attention promptly if CO poisoning is suspected and if feeling dizzy, light-headed, or nauseous.

Do not

- Use a generator, charcoal grill, camp stove, or other gasoline- or charcoal-burning device inside the home, basement, or garage or outside the home near a window.
- Run a car or truck inside a garage attached to a house, even if the door is left open.
- Burn anything in a stove or fireplace that is not vented.
- Heat a house with a gas oven.

SOURCE: CDC. Unintentional non–fire-related carbon monoxide exposures in the United States, 2001–2003. MMWR 2005;54:36–9.

Return to top.

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29.

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Morbidity and Mortality Weekly Report

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Carbon Monoxide–Related Deaths—United States, 1999-2004

KEYWORDS carbon monoxide, death, poisoning, united states

MMWR 2007;56:1309-1312

2 tables omitted

Carbon monoxide (CO) is a colorless, odorless, tasteless toxic gas produced by incomplete combustion in fuel-burning devices such as motor vehicles, gas-powered furnaces, and portable generators.[1] Persons with CO poisoning often overlook the symptoms (e.g., headache, nausea, dizziness, or confusion), and undetected exposure can be fatal.[1] Unintentional CO exposure accounts for an estimated 15,000 emergency department visits and 500 unintentional deaths in the United States each year.[1] The most recent state-level estimates of CO-related deaths were described in 1991 for the years 1979-1988.[2] Using the most recent mortality data available, this report updates national and state-specific unintentional, non–fire-related CO mortality rates and describes the demographic, seasonal, and geographic patterns for 1999-2004. During this period, an average of 439 persons died annually from unintentional, non–fire-related CO poisoning, and the national average annual death rate was 1.5 per million persons. However, rates varied by demographic subgroup, month of the year, and state. Rates were highest among adults aged ≥65 years, men, non-Hispanic whites, and non-Hispanic blacks. The average number of deaths was highest during January. Among the states, Nebraska had the highest reliable CO mortality rate. These findings indicate that improved population-based prevention measures, including educating the public about the dangers of CO exposure, are needed at the state and national levels.

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REPORTED BY:

M King, PhD, C Bailey, MS, National Center for Environmental Health, CDC

CDC EDITORIAL NOTE:

Consistent with previous studies,[1,2] the results of this analysis indicate that men and adults aged ≥65 years were more likely to die from CO poisoning than other persons. The higher rate in men has been attributed to high-risk behaviors among men, such as working with fuel-burning tools or appliances. The higher rate among older persons has been attributed to the likelihood of older adults mistaking symptoms of CO poisoning for other conditions common among persons in this age group (e.g., influenza-like illnesses or fatigue. CO deaths were highest during colder months, likely because of increased use of gas-powered furnaces and use of alternative heating and power sources used during power outages, such as portable generators, charcoal briquettes, and propane stoves or grills.[1] Similar to previous findings,[2] the highest CO death rates tended to be among western

31.

(e.g., Alaska, Montana, and Wyoming) and midwestern (e.g., Nebraska and North Dakota) states, likely because of variations in weather and geography and state-by-state variations in prevalence of certain risk behaviors.

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Exposure to CO can be prevented with basic precautions, including proper installation and maintenance of fuel-burning appliances (see sidebar). CO detectors can alert occupants to accumulating gas and should be placed on every level of a home. Additional measures to educate the public regarding the dangers of CO are needed, particularly during the winter season. Additional surveillance that combines timely estimates of morbidity and mortality with situational information related to mechanisms of CO exposure (e.g., length of exposure, type of fuel-burning device involved, and behaviors or chain of events preceding exposure) could help target prevention measures and reduce CO poisonings.

BOX. Guidelines to prevent carbon monoxide (CO) exposure

Do

- Have heating systems, water heaters, and any other gas-, oil-, or coal-burning appliances serviced by a qualified technician every year.
- Install battery-operated CO detectors in homes, and check or replace batteries when changing the time on clocks each spring and fall. If a detector sounds, leave the home immediately and call 911.
- Seek medical attention promptly if CO poisoning is suspected and if feeling dizzy, light-headed, or nauseous.

Do not

- Use a generator, charcoal grill, camp stove, or other gasoline- or charcoal-burning device inside the home, basement, or garage or outside the home near a window.
- Run a car or truck inside a garage attached to a house, even if the door is left open.
- Burn anything in a stove or fireplace that is not vented.
- Heat a house with a gas oven.

SOURCE: CDC. Unintentional non-fire-related carbon monoxide exposures in the United States, 2001–2003. *MMWR*. 2005;54:36–9.

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32.

From: Jimmie Brown [mailto:brownj@cityofnampa.us]
Sent: Friday, April 27, 2012 10:56 AM
To: Carol Alexander; Renee Bryant
Cc: Justin Goodwin; Charlie Allen ; Dan Hunter; Ed Wagner; Eric Adams; John Smith; Kraig Stevenson; Robert Ankersmit; Teri Ottens, IDABO ; Tim Woodard
Subject: RE: HVAC code change proposals

Carol,
I have read all of the information you supplied and find it to be well thought out, well documented and appropriate at this time. It is especially timely because we are now acknowledging the dangers of CO with the new requirements for detectors. I find the fail rate you discuss to be very troubling. I plan to incorporate these changes in our jurisdiction regardless of the outcome with the Mechanical Board. Thanks to you and your staff for the work you have put in on this issue. JBB

Jimmie B. Brown

Jimmie B. Brown, CBO
Building Official
City of Nampa, ID
411 3rd Street South
208-468-5443

From: Carol Alexander [mailto:calexander@ci.moscow.id.us]
Sent: Tuesday, April 24, 2012 4:06 PM
To: Renee Bryant (Renee.Bryant@dbs.idaho.gov)
Cc: Justin Goodwin; Charlie Allen ; Dan Hunter; Ed Wagner; Eric Adams; Jimmie Brown; John Smith; Kraig Stevenson; Robert Ankersmit; Teri Ottens, IDABO ; Tim Woodard
Subject: HVAC code change proposals

MY apologies, I sent the previous message without some of the attachments and the proposal.
They are attached herewith!

Mia culpa.

Carol Alexander, CBO
Building Official
City of Moscow
221 E Second St
Moscow ID 83843
PH: 208-883-7012
FAX: 208-883-7033

IDAHO HEATING, VENTILATION AND AIR CONDITIONING BOARD

Agenda Item No. 05 **Continuing Education**

PRESENTER: Jerry Peterson, HVAC Program Manager

OBJECTIVE: Create a continuing education (CE) program for the HVAC trade.

ACTION: Vote to accept, reject, or modify the proposed rule changes.

BACKGROUND: October 2011 – Board members expressed desire for CE to begin immediately. Suggestions were: CE & mechanical/fuel gas code updates be taught in-house; inspectors from various jurisdictions work together to create & present a code update class throughout the state, & classes be strictly voluntary for contractors.

February 2012 – A draft rule on CE requirements for HVAC contractors & journeymen was included in the packet. Background on the Electrical & Plumbing Boards' CE was provided. For the 2012 legislative session, the Electrical Board put forth a proposal designed to cover the costs DBS incurs to review the qualifications of instructors & content of courses. The rule was approved by the Senate Commerce Committee; however, rejected by the House Business Subcommittee.

Russ Goyen recommended item (a) of the proposed rule be amended to reflect the eight (8) hours of continuing education be code related only. This would eliminate course/instructor applications from industry related companies who want to sell their products. Code related training is useful throughout the state as everyone is subject to the code no matter what products they use. This would also allow DBS, in cooperation with the Board, to designate which courses should be offered.

Chairman Brizee requested the topic "Continuing Education" be placed as an action item on the May 16, 2012 Idaho HVAC Board meeting agenda. With licenses in several states, Bill Carter offered to forward their continuing education requirements to Jerry Peterson.

ATTACHMENTS: HVAC continuing education rule text

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a. Certificates that are not timely renewed will expire on the last day of the month in which the renewal is due. (4-6-05)

b. Revived certificates shall be issued in such a manner as to create a renewal date that coincides with the birth month of the applicant so as to create a staggered system of renewal. (4-6-05)

04. Continuing Education. The Idaho Heating, Ventilation, Air Conditioning Board will establish criteria for approval of instructors and courses of instruction, and instructors and courses of instruction shall be approved by the Division HVAC Program. Proof of completion of the continuing education requirements contained in this subsection must be submitted to the Division prior to, or concurrent with the application for licensure renewal by any licensee in order to renew a journeyman or contractor license. (4- -13)

a. Journeymen must complete eight (8) hours of continuing education for each three (3)-year license cycle, or every three (3) years for a licensee who renews annually. Of the required eight (8) hours, four (4) hours must be related to HVAC code updates and the other four (4) hours may be industry related training. (4- -13)

b. Contractors must complete sixteen (16) hours of continuing education for each three (3)-year license cycle, or every three (3) years for a licensee who renews annually. Hours accrued obtaining journeyman education may be applied toward this requirement whenever applicable (4- -13)

-- 019. (RESERVED).

IDAHO HEATING, VENTILATION AND AIR CONDITIONING BOARD

Agenda Item 06 Adoption of 2009 IRC Chapter 1--Alternative Materials & Methods

PRESENTER: Jerry Peterson, HVAC Program Manager

OBJECTIVE: Facilitate compliance and enforcement of solid fuel appliance installations as adopted by the 2012 legislature.

ACTION: Vote to accept, reject, or modify the proposed rule changes.

BACKGROUND:

PROCEDURAL HISTORY:

ATTACHMENTS: 2009 IRC Chapter 1 – R104.11 "Alternative materials, design and methods of construction and equipment" and R104.11.1 "Tests"

2009 International Residential Code – Chapter 1

R104.11 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. An alternative material, design or method of construction shall be *approved* where the *building official* finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code. Compliance with the specific performance-based provisions of the International Codes in lieu of specific requirements of this code shall also be permitted as an alternate.

R104.11.1 Tests. Whenever there is insufficient evidence of compliance with the provisions of this code, or evidence that a material or method does not conform to the requirements of this code, or in order to substantiate claims for alternative materials or methods, the *building official* shall have the authority to require tests as evidence of compliance to be made at no expense to the *jurisdiction*. Test methods shall be as specified in this code or by other recognized test standards. In the absence of recognized and accepted test methods, the *building official* shall approve the testing procedures. Tests shall be performed by an *approved* agency. Reports of such tests shall be retained by the *building official* for the period required for retention of public records.

IDAHO HEATING, VENTILATION AND AIR CONDITIONING BOARD

Agenda Item 07 Adoption of 2009 IRC Chapter 3--Carbon Monoxide Monitors

PRESENTER: Jerry Peterson, HVAC Program Manager

OBJECTIVE: This is a life safety issue.

ACTION: Vote to accept, reject, or modify the proposed rule changes.

BACKGROUND:

PROCEDURAL HISTORY:

ATTACHMENTS: 2009 IRC Chapter 3 – Section R315 – Carbon Monoxide Alarms

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2009 International Residential Code

SECTION R315
CARBON MONOXIDE ALARMS

R315.1 Carbon monoxide alarms. For new construction, an approved carbon monoxide alarm shall be installed outside of each separate sleeping area in the immediate vicinity of the bedrooms in *dwelling units* within which fuel-fired *appliances* are installed and in dwelling units that have attached garages.

R315.2 Where required in existing dwellings. Where work requiring a *permit* occurs in existing *dwellings* that have attached garages or in existing dwellings within which fuel-fired *appliances* exist, carbon monoxide alarms shall be provided in accordance with Section R315.1.

R315.3 Alarm requirements. Single station carbon monoxide alarms shall be listed as complying with UL 2034 and shall be installed in accordance with this code and the manufacturer's installation instructions.

IDAHO HEATING, VENTILATION AND AIR CONDITIONING BOARD

Agenda Item 08 **Adoption of 2009 IRC Chapter 10--Solid Fuel**

PRESENTER: Jerry Peterson, HVAC Program Manager

OBJECTIVE: Facilitate compliance and enforcement of solid fuel appliance installations as adopted by the 2012 legislature.

ACTION: Vote to accept, reject, or modify the proposed rule changes.

BACKGROUND:

PROCEDURAL HISTORY:

ATTACHMENTS: 2009 IRC Chapter 10 – Sections R1003, 1004, 1005 and 1006

2009 International Residential Code

Chapter 10 - SECTION R1003, 1004, 1005 & 1006

This is not an inclusive list, these are the items that I feel are relevant to the installation of Solid Fuel Burning Appliances as well as clarification on masonry chimneys and liners used for other fuel burning appliances currently regulated under the Idaho HVAC Licensing program

R1003.11 Flue lining (material). Masonry chimneys shall be lined. The lining material shall be appropriate for the type of *appliance* connected, according to the terms of the *appliance* listing and manufacturer's instructions.

R1003.11.1 Residential-type appliances (general). Flue lining systems shall comply with one of the following:
1. Clay flue lining complying with the requirements of ASTM C 315.
2. Listed chimney lining systems complying with UL 1777.
3. Factory-built chimneys or chimney units listed for installation within masonry chimneys.
4. Other *approved* materials that will resist corrosion, erosion, softening or cracking from flue gases and condensate at temperatures up to 1,800°F (982°C).

R1003.11.2 Flue linings for specific appliances. Flue linings other than these covered in Section R1003.11.1, intended for use with specific types of *appliances*, shall comply with Sections R1003.11.3 through R1003.11.6.

R1003.11.3 Gas appliances. Flue lining systems for gas *appliances* shall be in accordance with Chapter 24.

R1003.11.4 Pellet fuel-burning appliances. Flue lining and vent systems for use in masonry chimneys with pellet fuel-burning *appliances* shall be limited to the following:
1. Flue lining systems complying with Section R1003.11.1.
2. Pellet vents listed for installation within masonry chimneys. (See Section R1003.11.6 for marking.)

R1003.11.5 Oil-fired appliances approved for use with Type L vent.
Flue lining and vent systems for use in masonry chimneys with oil-fired *appliances approved* for use with Type L vent shall be limited to the following:
1. Flue lining systems complying with Section R1003.11.1.
2. Listed chimney liners complying with UL 641. (See Section R1003.11.6 for marking.)

R1003.11.6 Notice of usage. When a flue is relined with a material not complying with Section R1003.11.1, the chimney shall be plainly and permanently identified by a *label* attached to a wall, ceiling or other conspicuous location adjacent to where the connector enters the chimney. The *label* shall include the following message or equivalent language:
THIS CHIMNEY FLUE IS FOR USE ONLY WITH [TYPE OR CATEGORY OF *APPLIANCE*] *APPLIANCES* THAT BURN [TYPE OF FUEL]. DO NOT CONNECT OTHER TYPES OF *APPLIANCES*.

R1003.12.1 Listed materials. *Listed* materials used as flue linings shall be installed in accordance with the terms of their listings and manufacturer's instructions.

R1003.12.2 Space around lining. The space surrounding a chimney lining system or vent installed within a masonry chimney shall not be used to vent any other *appliance*.
Exception: This shall not prevent the installation of a separate flue lining in accordance with the manufacturer's installation instructions.

R1003.13 Multiple flues. When two or more flues are located in the same chimney, masonry wythes shall be built between adjacent flue linings. The masonry wythes shall be at least 4 inches (102 mm) thick and bonded into the walls of the chimney.
Exception: When venting only one *appliance*, two flues may adjoin each other in the same chimney with only the flue lining separation between them. The joints of the adjacent flue linings shall be staggered at least 4 inches (102 mm).

R1003.14 Flue area (appliance). Chimney flues shall not be smaller in area than that of the area of the connector from the *appliance* [see Tables R1003.14(1) and R1003.14(2)]. The sizing of a chimney flue to which multiple *appliance* venting systems are connected shall be in accordance with Section M1805.3.

R1003.16 Inlet. Inlets to masonry chimneys shall enter from the side. Inlets shall have a thimble of fireclay, rigid refractory material or metal that will prevent the connector from pulling out of the inlet or from extending beyond the wall of the liner.

R1003.17 Masonry chimney cleanout openings. Cleanout openings shall be provided within 6 inches (152 mm) of the base of each flue within every masonry chimney. The upper edge of the cleanout shall be located at least 6 inches (152 mm) below the lowest chimney inlet opening. The height of the opening shall be at least 6 inches (152 mm). The cleanout shall be provided with a noncombustible cover.
Exception: Chimney flues serving masonry fireplaces where cleaning is possible through the fireplace opening.

R1003.18 Chimney clearances. Any portion of a masonry chimney located in the interior of the building or within the exterior wall of the building shall have a minimum air space clearance to combustibles of 2 inches (51 mm). Chimneys located entirely outside the exterior walls of the building, including chimneys that pass through the soffit or cornice, shall have a minimum air space clearance of 1 inch (25 mm). The air space shall not be filled, except to provide fire blocking in accordance with Section R1003.19.
Exceptions:
1. Masonry chimneys equipped with a chimney lining system listed and *labeled* for use in chimneys in contact with combustibles in accordance with UL 1777 and installed in accordance with the manufacturer's installation instructions are permitted to have combustible material in contact with their exterior surfaces.
2. When masonry chimneys are constructed as part of masonry or concrete walls, combustible materials shall not be in contact with the masonry or concrete wall less than 12 inches (305 mm) from the inside surface of the nearest flue lining.
3. Exposed combustible trim and the edges of sheathing materials, such as wood siding and flooring, shall be permitted to abut the masonry chimney side walls, in accordance with Figure R1003.18, provided such combustible trim or sheathing is a minimum of 12 inches (305 mm) from the inside surface of the nearest flue lining.

Combustible material and trim shall not overlap the corners of the chimney by more than 1 inch (25 mm).

R1003.19 Chimney fireblocking. All spaces between chimneys and floors and ceilings through which chimneys pass shall be fireblocked with noncombustible material securely fastened in place. The fireblocking of spaces between chimneys and wood joists, beams or headers shall be self-supporting or be placed on strips of metal or metal lath laid across the spaces between combustible material and the chimney.

SECTION R1004
FACTORY-BUILT FIREPLACES

R1004.1 General. Factory-built fireplaces shall be *listed* and *labeled* and shall be installed in accordance with the conditions of the *listing*. Factory-built fireplaces shall be tested in accordance with UL 127.

R1004.2 Hearth extensions. Hearth extensions of *approved* factory-built fireplaces shall be installed in accordance with the *listing* of the fireplace. The hearth extension shall be readily distinguishable from the surrounding floor area.

R1004.3 Decorative shrouds. Decorative shrouds shall not be installed at the termination of chimneys for factory-built fireplaces except where the shrouds are listed and *labeled* for use with the specific factory-built fireplace system and installed in accordance with the manufacturer's installation instructions.

R1004.4 Unvented gas log heaters. An unvented gas log heater shall not be installed in a factory-built fireplace unless the fireplace system has been specifically tested, *listed* and *labeled* for such use in accordance with UL 127.

SECTION R1005
FACTORY-BUILT CHIMNEYS

R1005.1 Listing. Factory-built chimneys shall be *listed* and *labeled* and shall be installed and terminated in accordance with the manufacturer's installation instructions.

R1005.2 Decorative shrouds. Decorative shrouds shall not be installed at the termination of factory-built chimneys except where the shrouds are *listed* and *labeled* for use with the specific factory-built chimney system and installed in accordance with the manufacturer's installation instructions.

R1005.3 Solid-fuel appliances. Factory-built chimneys installed in *dwelling units* with solid-fuel-burning *appliances* shall comply with the Type HT requirements of UL 103 and shall be marked "Type HT and "Residential Type and Building Heating *Appliance* Chimney."
Exception: Chimneys for use with open combustion chamber fireplaces shall comply with the requirements of UL103 and shall be marked "Residential Type and Building Heating *Appliance* Chimney." Chimneys for use with open combustion chamber *appliances* installed in buildings other than *dwelling units* shall comply with the requirements of UL 103 and shall be marked

"Building Heating *Appliance* Chimney" or "Residential Type and Building Heating *Appliance* Chimney."

R1005.4 Factory-built fireplaces. Chimneys for use with factory-built fireplaces shall comply with the requirements of UL 127.

R1005.5 Support. Where factory-built chimneys are supported by structural members, such as joists and rafters, those members shall be designed to support the additional load.

R1005.6 Medium-heat appliances. Factory-built chimneys for medium-heat *appliances* producing flue gases having a temperature above 1,000°F (538°C), measured at the entrance to the chimney shall comply with UL 959.

SECTION R1006
EXTERIOR AIR SUPPLY

R1006.1 Exterior air. Factory-built or masonry fireplaces covered in this chapter shall be equipped with an exterior air supply to assure proper fuel combustion unless the room is mechanically ventilated and controlled so that the indoor pressure is neutral or positive.

R1006.1.1 Factory-built fireplaces. Exterior *combustion air* ducts for factory-built fireplaces shall be a *listed* component of the fireplace and shall be installed according to the fireplace manufacturer's instructions.

R1006.2 Exterior air intake. The exterior air intake shall be capable of supplying all *combustion air* from the exterior of the *dwelling* or from spaces within the *dwelling* ventilated with outside air such as non mechanically ventilated crawl or *attic* spaces. The exterior air intake shall not be located within the garage or *basement* of the *dwelling* nor shall the air intake be located at an elevation higher than the firebox. The exterior air intake shall be covered with a corrosion-resistant screen of 1/4-inch (6 mm) mesh.

R1006.3 Clearance. Unlisted *combustion air* ducts shall be installed with a minimum 1-inch (25 mm) clearance to combustibles for all parts of the duct within 5 feet (1524 mm) of the duct outlet.

R1006.4 Passageway. The *combustion air* passageway shall be a minimum of 6 square inches (3870 mm2) and not more than 55 square inches (0.035 m2), except that *combustion air* systems for listed fireplaces shall be constructed according to the fireplace manufacturer's instructions.

R1006.5 Outlet. Locating the exterior air outlet in the back or sides of the firebox chamber or within 24 inches (610 mm) of the firebox opening on or near the floor is permitted. The outlet shall be closable and designed to prevent burning material from dropping into concealed combustible spaces.

IDAHO HEATING, VENTILATION AND AIR CONDITIONING BOARD

Agenda Item 09 Pressure Testing for ABS/PVC Venting

PRESENTER: Jerry Peterson, HVAC Program Manager

OBJECTIVE: Explore the viability of adding an IDAPA rule requiring pressure testing for ABS/PVC venting located in concealed locations within the conditioned space of residences.

ACTION: Informational

BACKGROUND: Energy codes and best practices are directing the HVAC industry to locate furnaces within the conditioned space of homes for energy efficiency reasons. This may increase the risk or number of incidents of CO poisoning as a result of improperly installed plastic venting of these appliances. Because a variety of techniques and products are used for venting and we have current issues as well as known legal cases in Idaho, it's appropriate to look at what other jurisdictions are doing to address concerns related to venting.

One safety concern is the installation/repair of ABS/PVC vents located within the conditioned space of residences which are covered up without proper testing/certification.

The Board agreed in order to prove a vent system is sound, all vents, to include supply and return, need to be consistently and routinely tested.

To lower the risk of CO poisoning as a result of improperly installed venting of appliances, Jerry Peterson offered to provide scenarios to the Board that would require testing.

ATTACHMENTS: No documentation

IDAHO HEATING, VENTILATION AND AIR CONDITIONING BOARD

Agenda Item 10 Definition of Plumbing System--Liquid & Fuel Gas Piping

PRESENTER: Gilbert Pond, Idaho Plumbing Board Member

OBJECTIVE: Clarifies plumbers are allowed to continue to do work they have historically performed.

ACTION: Informational

BACKGROUND: Prior to the approval of the HVAC program and statutes in 2004, the plumbing industry installed steam piping, chilled water piping, and heating and water piping. The Idaho Plumbing Board would like to re-establish their ability, within the scope of a plumbing license, to continue to provide those services.

DBS will schedule a meeting with board members from the HVAC and Plumbing Boards to discuss the topic "Definition of Plumbing System -- Liquid and Fuel Gas Piping".

ATTACHMENTS: Idaho Code § 54-5015. Exclusive jurisdiction of the state -- Restriction on requirement for additional licenses or fees -- Clarification of certification, licensing and permitting requirements

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§ 54-5015. Exclusive jurisdiction of the state -- Restriction on requirement for additional licenses or fees -- Clarification of certification, licensing and permitting requirements

(1) Only the administrator of the division of building safety of the state of Idaho is authorized and empowered to conduct examinations and to pass upon the qualifications of applicants, and to grant and issue certificates of competency and registration of apprentices to such applicants as are found to be qualified to engage in the trade, business, work or practice of heating, ventilation and air conditioning.

(2) No local jurisdiction shall have the authority to require additional certification or registration or to require payment of any fees in order for any HVAC contractor, specialty contractor, journeyman, specialty journeyman, apprentice, or specialty apprentice to engage in the heating, ventilation and air conditioning trade within the local jurisdiction or to issue certificates to persons certified or registered under the provisions of this chapter.

(3) Nothing in this chapter shall restrict a city or county from imposing stricter public safety rules, notwithstanding any provision of Idaho Code.

(4) A certificate issued pursuant to chapter 26, title 54, Idaho Code, or a license issued pursuant to chapter 10, title 54, Idaho Code, shall be acceptable for all HVAC installation work that falls within the scope of the certificate or license that has been issued. This will allow:

(a) Individuals holding a current HVAC or electrical license or a current plumbing certification to install electrical circuitry from the disconnecting means to a water heater and electrical connections to the water heater as long as the disconnect is in sight from the unit and the circuit from the disconnecting means to the water heater is no more than fifty (50) feet long;

(b) Individuals holding a current HVAC or electrical license to install:

(i) Electrical space heaters with no attached ductwork;

(ii) Electrical connections to HVAC equipment from the disconnecting means to the unit as long as the disconnect is in sight from the unit and the circuit from the disconnecting means to the HVAC equipment is no more than fifty (50) feet long; and

(iii) Ventilating fans, except ducted range hoods in residences;

(c) Individuals holding either an HVAC license or plumbing certification to install:

(i) Boilers that are not otherwise subject to inspection by the industrial commission or its authorized agent; and

(ii) Gas piping

(iii) Piping for hydronic systems; Piping for steam and hot water boiler systems

(d) HVAC licensees to install control wiring of twenty-four (24) volts or less for HVAC equipment of five (5) tons or less in capacity.

(5) Notwithstanding any other provision of this section, plumbing certificate holders are not authorized to install control wiring in HVAC equipment, regardless of voltage.

IDAHO HEATING, VENTILATION AND AIR CONDITIONING BOARD

Agenda Item No. 11 **HVAC Program Manager Report**

PRESENTER: Jerry Peterson, HVAC Program Manager

OBJECTIVE: Report on the recent activities of the HVAC program.

ACTION: Informational

BACKGROUND: This topic is addressed at all regularly scheduled Idaho HVAC Board meetings.

PROCEDURAL HISTORY:

ATTACHMENTS: No documentation

IDAHO HEATING, VENTILATION AND AIR CONDITIONING BOARD

Agenda Item No. 12 **Operational Report**

PRESENTER: Steve Keys, Deputy Administrator-Operations

OBJECTIVE: Provide an overview of the daily operations of the HVAC program and DBS.

ACTION: Informational

BACKGROUND: This topic is addressed at all regularly scheduled Idaho HVAC Board meetings.

PROCEDURAL HISTORY:

ATTACHMENTS: No documentation

IDAHO HEATING, VENTILATION AND AIR CONDITIONING BOARD

Agenda Item No. 13a **Financial Report**

PRESENTER: C. Kelly Pearce, Administrator and Dave Decker, Financial Specialist

OBJECTIVE: Review the Idaho HVAC Board's Financial Report.

ACTION: Informational

BACKGROUND: This topic is addressed at all regularly scheduled Idaho HVAC Board meetings.

PROCEDURAL HISTORY:

ATTACHMENTS: Financial Report

Division of Building Safety

IDAHO HVAC BOARD FUND 0229-08
Fiscal Year 2012 Financial Statements
As of 3/31/2012

Statement of Revenues and Expenditures

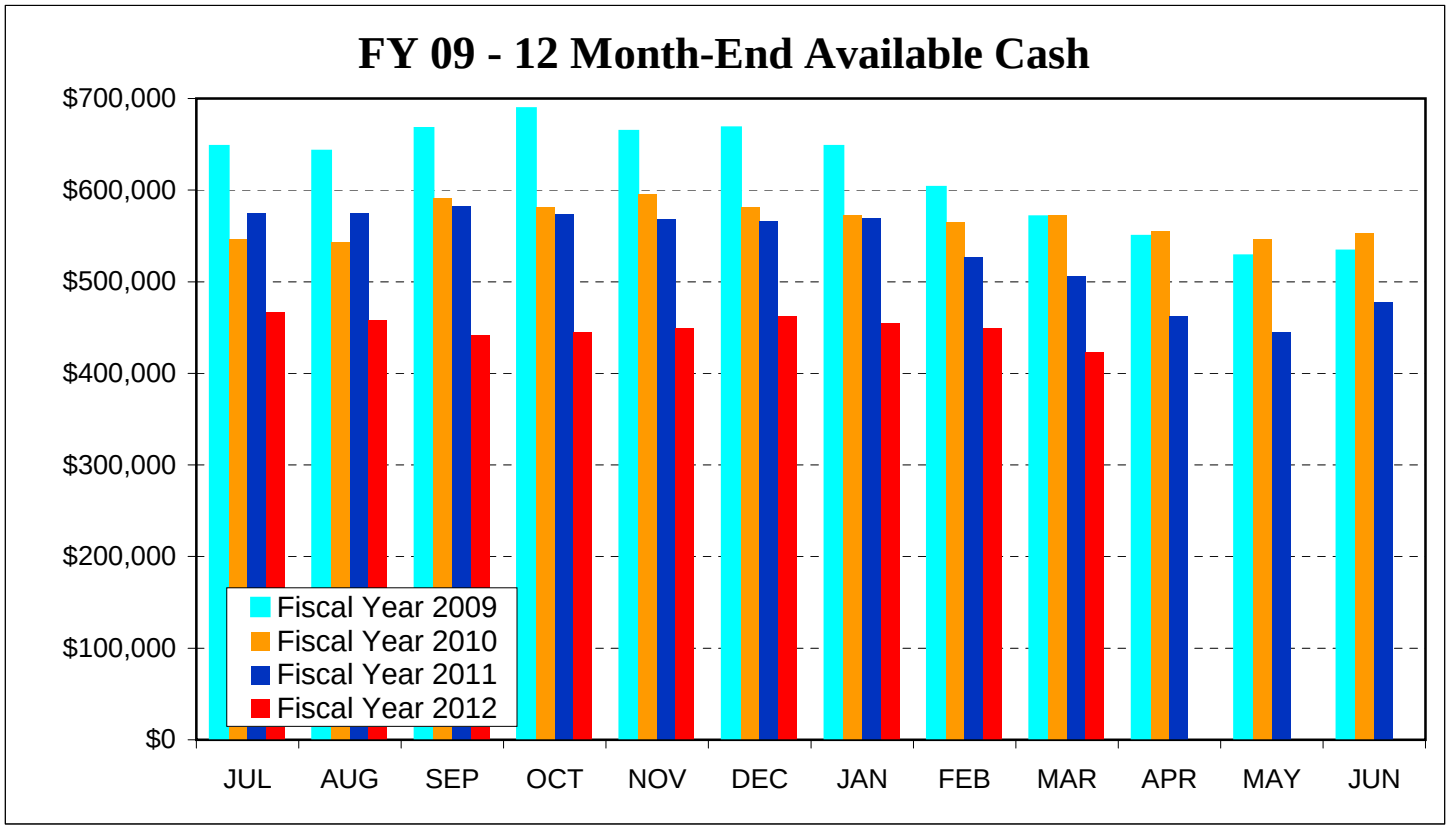
Class	Budget	Fiscal Year To Date	YTD as a % of Budget *	Remaining Budet	Projected for Remainder of Year	Projected Year End Totals	Projected Total as a % of Budget
Revenues:	$ 850,000	$ 608,309	71.6%	$ 241,691	$ 220,000	$ 828,309	97.4%
Expenditures							
Personnel:	$ 710,000	$ 499,429	70.3%	$ 210,571	$ 168,029	$ 667,458	94.0%
Operating:	$ 190,000	$ 156,583	82.4%	$ 33,417	$ 42,000	$ 198,583	104.5%
Capital:	$ 31,000	$ 981	3.2%	$ 30,019	$ 22,000	$ 22,981	74.1%
Total Expenditures	$ 931,000	$ 656,993	70.6%	$ 274,007	$ 232,029	$ 889,022	95.5%
Net for FY 2012	$ (81,000)	$ (48,684)			$ (12,029)	$ (60,713)	

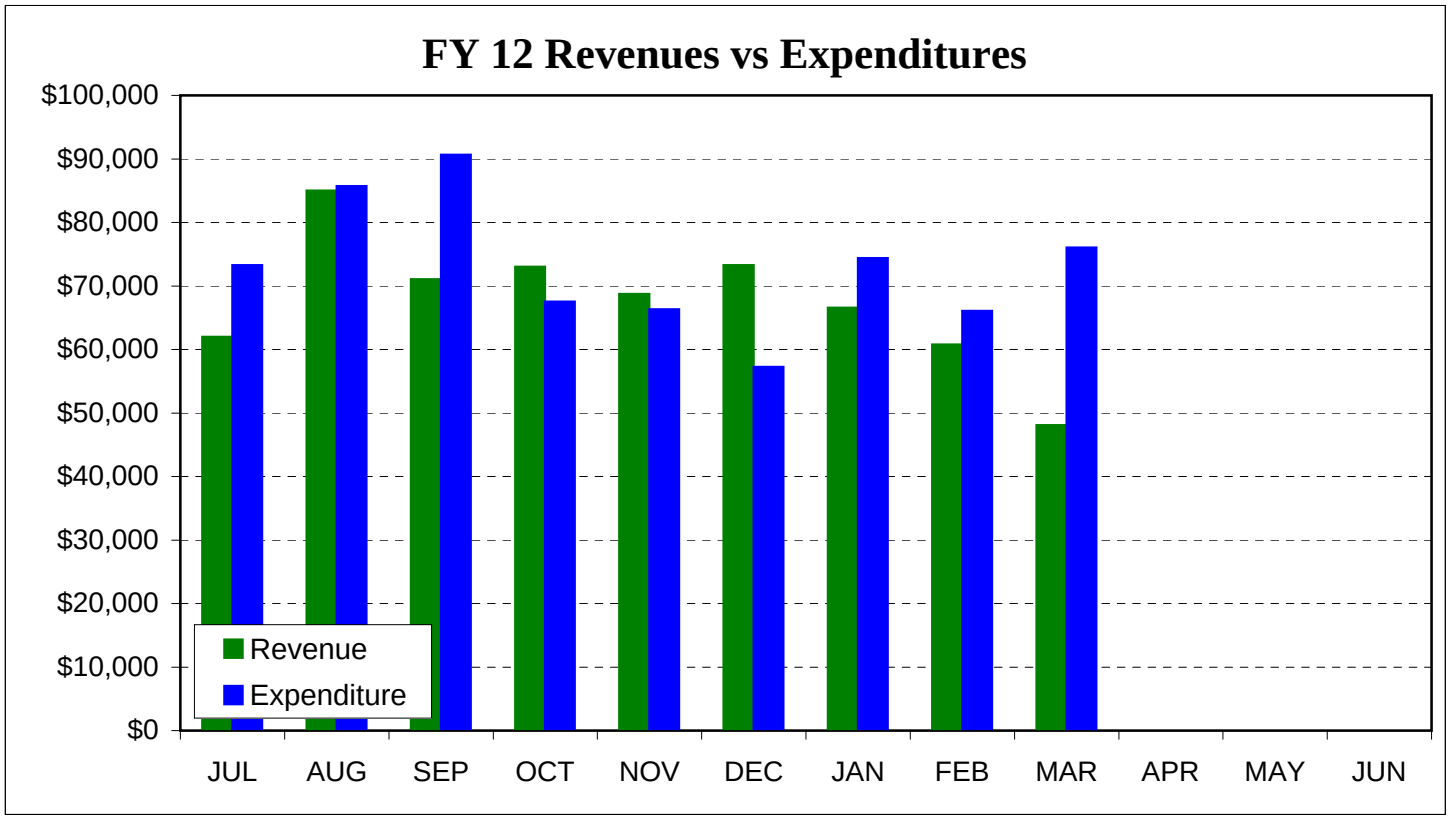
Statement of Cash Balance

Beginning Cash Available	Revenues	Expenditures and Encumbrances	Other Changes in Cash	Available Cash	Projected Change in Cash for Remainder of Year	Projected Year End Available Cash
$ 475,098	$ 608,309	$ (656,993)	$ (3,320)	$ 423,094	$ (12,029)	$ 411,065

Date Prepared: 4/23/2012

IDAHO HVAC BOARD FUND 0229-08

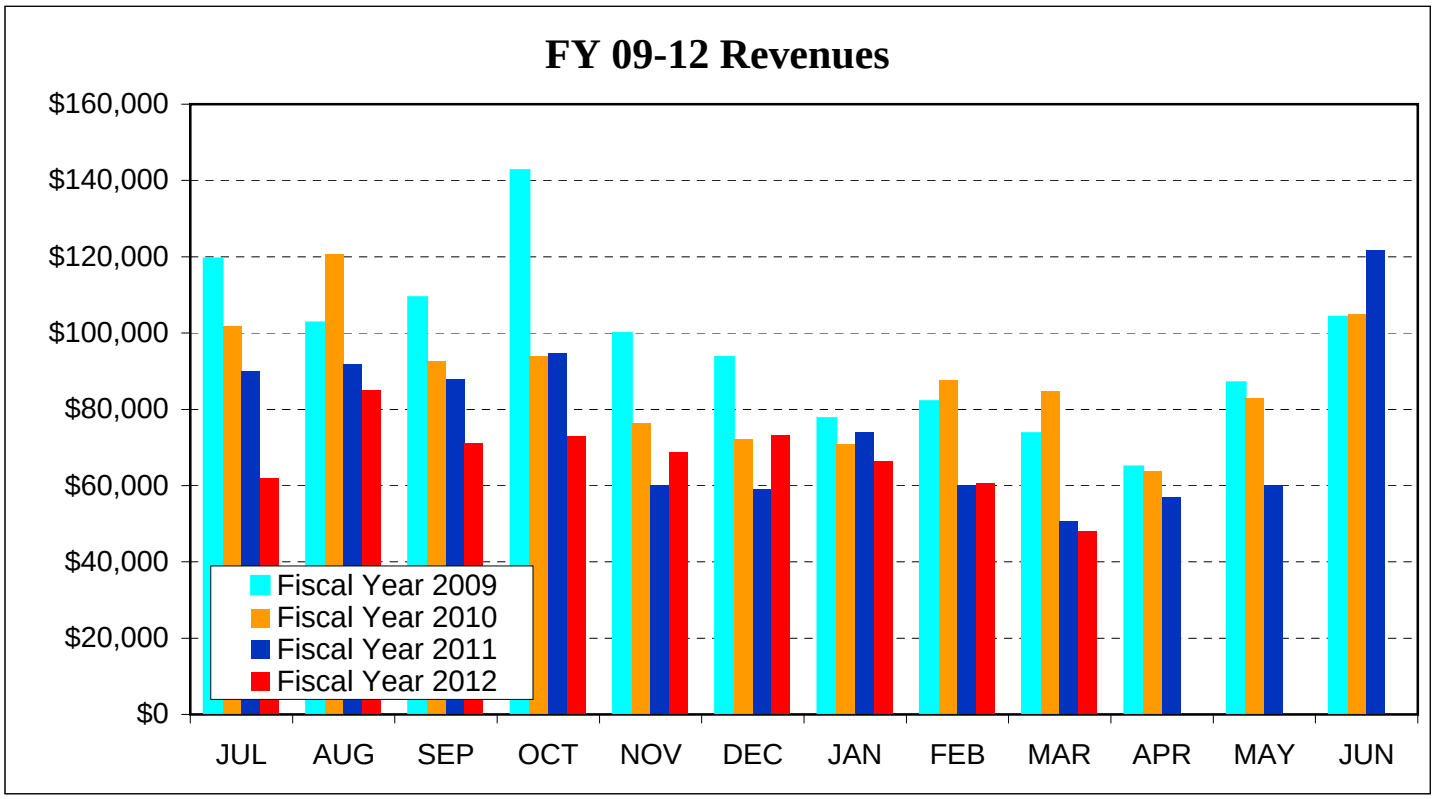


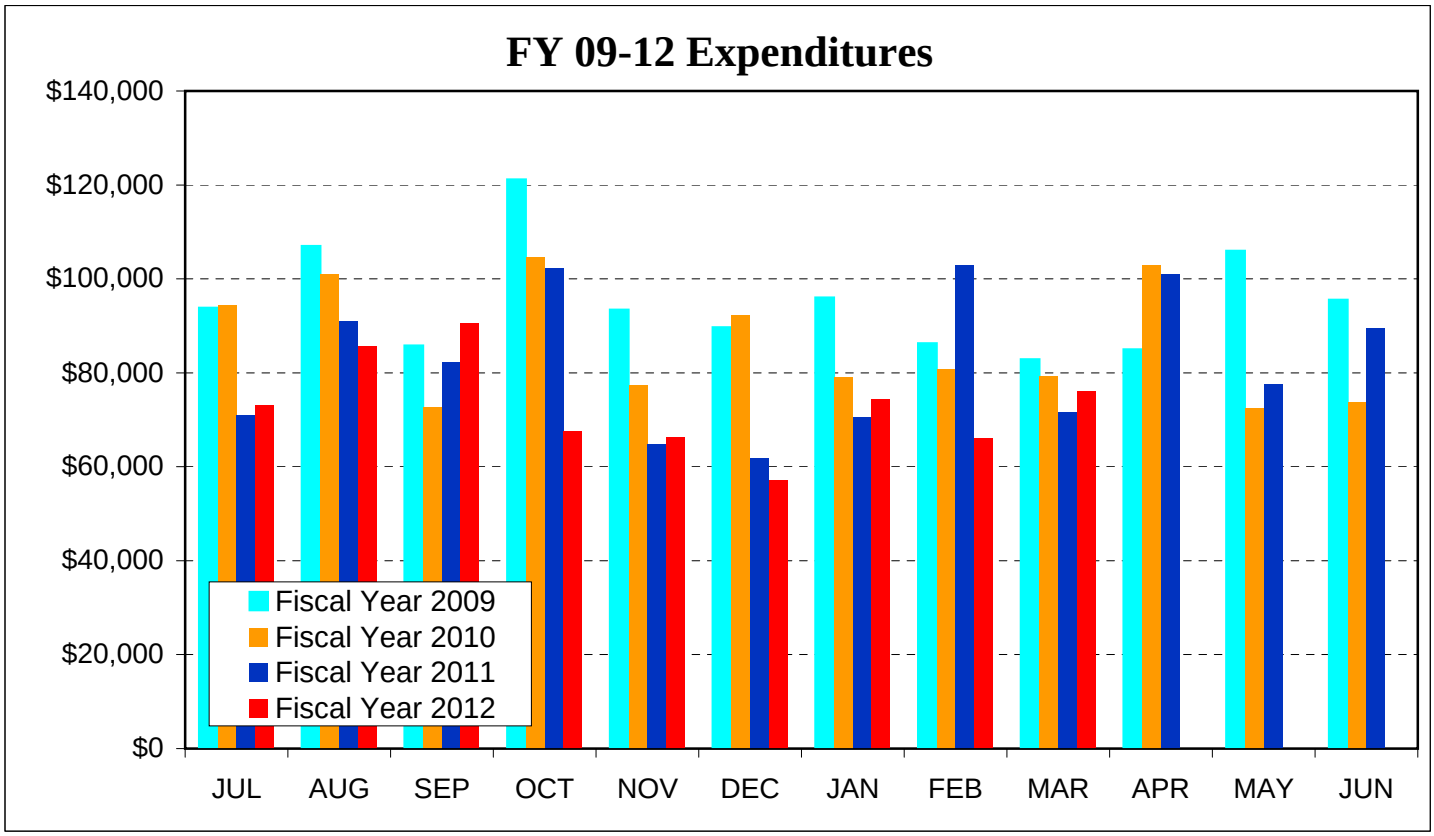


FUND 2298 As of March 31, 2012

Date Prepared: 4/23/2012

IDAHO HVAC BOARD FUND 0229-08





FUND 2298 As of March 31, 2012

IDAHO HEATING, VENTILATION AND AIR CONDITIONING BOARD

Agenda Item No. 13b **Administrator**

PRESENTER: C. Kelly Pearce, Administrator

OBJECTIVE: Provide an overview of the Division's current activities.

ACTION: Informational

BACKGROUND: This topic is addressed at all regularly scheduled Idaho HVAC Board meetings.

PROCEDURAL HISTORY:

ATTACHMENTS: No documentation