

**MAXIMIZING THE EFFECTIVENESS OF
RESIDENTIAL SMOKE DETECTORS THROUGH
A FREE COMMUNITY SMOKE DETECTOR PROGRAM**

STRATEGIC MANAGEMENT OF CHANGE

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ABSTRACT

This research project evaluated the factors that impact the success of smoke detectors in providing early warning for occupants of residential fires so that evacuation can be accomplished and lives saved. The problem was that fire death in residential occupancies in the United States remains one of the highest among all industrialized nations. The purpose of this applied research paper was to determine to what extent are the residential communities of Moraga and Orinda protected by smoke detectors and whether the Moraga-Orinda Fire Protection District (District, MOFD) can improve the level of protection.

The research employed was both evaluative and action. The research was evaluative through the utilization of a community survey, the results of which were compared to national statistics and trends.

The research was action research in that the information gathered was applied in a real-world context through the implementation of a smoke detector program.

The research questions to be answered were:

1. Are there citizen groups that need smoke detectors, and how does the District identify them?
2. Are smoke detectors within the District optimally utilized through sufficient number, proper location and in operational working order?
3. How can the District effectively and economically implement a smoke detector installation program?

The principal procedure utilized a survey to determine the age, location, testing and replacement of smoke detectors within the communities of Moraga and Orinda. The survey was sent via a Fire District newsletter. The data collected was utilized to identify and address specific smoke detector deficiencies in the communities.

The results indicated that citizens were not placing enough priority on smoke detectors in sleeping areas nor replacing smoke detectors after their 10-year life cycle.

It was recommended to emphasize installation of smoke detectors in sleeping areas and replacement of old smoke detectors through a free community smoke detector program. Special emphasis was to be placed on the elderly and very young portions of the community population.

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INTRODUCTION

The problem is that fire death in residential occupancies in the United States remains one of the highest among all industrialized nations. In 1972 the United States averaged 57.1 fire deaths per million people, compared with 29.2 in Canada, 18.1 in the United Kingdom, and 14.0 in Japan (Munger, 1999). In 1970, relatively inexpensive battery operated smoke detectors became available. In 1995, 93 % of all homes were reported to have at least one smoke detector (Braden, 1999). With the availability of residential smoke detectors, there has been a pronounced drop in deaths for all countries. However, the United States still remains one of the highest, with only Hungary significantly greater. In 1992, the United States still had a residential fire fatality rate of 19.5 per million people (Munger, 1999).

Headlines in newspapers across the nation serve as tragic reminders of this national issue. Six occupants in a townhouse died on Christmas Day in 1998. There was no smoke detector in the basement where the fire had started and it is questionable as to whether the other smoke detectors in the house were in working operation. An infant died in January of 1999 even though there was a smoke detector located in the hallway, just outside the sleeping area. The door to the infant's room where the fire originated was closed and no smoke detector was located inside (Culp, 1999).

The purpose of this applied research project is to determine to what extent are the residential communities of Moraga and Orinda protected by smoke detectors and whether the Moraga-Orinda Fire Protection District (District) can improve the level of protection.

In this study the evaluative and action research methodology were used to answer the following questions:

4. Are there citizen groups that need smoke detectors, and how does the District identify them?
5. Are smoke detectors within the District optimally utilized through sufficient number, proper location and in operational working order?
6. How can the District effectively and economically implement a smoke detector installation program?

BACKGROUND AND SIGNIFICANCE

In December of 2000, the Moraga-Orinda Fire Protection District responded to a significant fire in the early morning hours where five occupants barely escaped with their lives. It was determined that no smoke detector was located in the area of origin (the garage), that the smoke detector directly adjacent to garage in the habitable area of the house had been disconnected, and that it was questionable as to whether any of the smoke detectors in the upstairs living areas had worked as they should have.

Prior to that, in 1998 an elderly woman lost her life in a fire where the nearest smoke detector was located directly outside the sleeping area. The fire started in the sleeping area and the bedroom door was closed.

The Moraga-Orinda Fire District (MOFD) was formed on July 1, 1997 when over 80% of the voters of Moraga and Orinda established a single comprehensive Fire District. A five-member Board elected by the residents governs the Fire District. The Fire District provides services for all emergencies including residential and commercial fire, medical emergencies, wildfires and other hazardous conditions. The service area is

approximately 63 square miles and has a population base of 34,000. The vast majority of building occupancy consists of residential (98%).

In January of 1999, the District adopted a five-year strategic plan. The mission of the District is to provide the highest level of emergency and non-emergency service in response to the needs of the communities it serves (MOFD Five-Year Strategic Plan). A portion of the strategic plan addresses the goal for improved public education and fire prevention activities. Maximizing the potential for life safety by ensuring that every household having a properly working smoke detector on every habitable floor and in every sleeping area of the household was viewed by the Board of Directors as a mechanism to help achieve that goal.

This applied research project seeks to address issues regarding smoke detector usage with greater specificity (location, testing, replacement, occupant age) and implement an effective smoke detector program for the Moraga-Orinda Fire District.

The Executive Fire Officer Program course on the Strategic Management of Change directly relates to this project. Changing the behavior and attitudes of the citizens of the community with respect to fire prevention and safety is critical to the ultimate success of the District's goals. Firefighter's who will be involved in the implementation of a smoke detector program that requires them to go out into the community and physically install smoke detectors and teach fire safety will require an adaptive change to there regular routine for this program to achieve a high level of success.

LITERATURE REVIEW

Americans are proud of the fact that the United States leads the world with its virtues in democracy, human rights and economic development. We see ourselves as number one and unabashedly stand tall with nationalistic good feelings. Unfortunately, the United States also leads the developed nations in fire deaths. In 1972 the United States had 57.1 fire deaths per million people (Munger, 1999).

The catalog of statistics found in literature review drives home the importance of residential smoke detectors. In 1972 less than 5% of the homes in the United States had smoke detectors. In 1994, 93% of the homes had at least one smoke detector installed. The correlating statistical data showed that during this same period the number of fire deaths in the United States were cut in half (Cote, 1997). This dramatic improvement in fire deaths is encouraging. It also raises a question as to why the number of fire deaths is not lower, given the significant increase from 5% to 93% in smoke detector usage.

The majority of all U.S. fire deaths occur in the home. In 1995, 79% of all fire deaths occurred in the home. This amounted to 91% of all fire deaths that occurred in buildings. 83% of the 3640 home fire deaths that occurred in 1995 were in one and two family dwellings (Cote, 1997).

Of those 3640 fire deaths, 59% of them occurred in homes without any smoke detectors present at all (Aherns, 1998).

In the homes that did have smoke detectors, one-third of them were found to be non-operational primarily due to dead or missing batteries (Cote, 1997). In a smoke detector operability study conducted in 1992 by the Consumer Product Safety Commission (CPSC), 28 % of households with smoke detectors were found inoperable

(Smith, 1993). This supports the data compiled by the National Fire Protection Association (Cote, 1997).

Age of the smoke detector is another factor that may lead to non-operability due to dust, dirt, grease and insect infestation. As smoke detectors get older they also lose their sensitivity to fire related warnings. Experts in the industry have now concluded that smoke detectors that are more than 10 years old should be replaced. A detector that has been in place for more than 10 years, it is estimated, will have gone through more than 3.5 million air testing cycles. It is also estimated that nationally, millions of detectors in households have reached their useful life cycle and are in need of replacement (Braden, 1999). Ahern (1998) found that approximately 50% of smoke detectors collected in a national study as inoperable were more than 10 years old. The National Fire Protection Association (NFPA) recommends that smoke detectors older than 10 years should be replaced (Cote, 1997).

Testing of smoke detectors is an important factor in determining operability. Braden (1999) noted that the NFPA estimated that over a 30-year period, a detector that has never been tested might have the equivalency of 17.5 years of non-protection. For this same 30-year period, if the detector had been tested one time per year than it is estimated that the non-protected period of time would have been 10 months. Even further, if the detector had been tested every 2 weeks, there would have been only one month of non-protection over that same 30-year period of time. This analysis supports the frequent testing of smoke detectors to ensure operability.

The strategic location of the smoke detector will play an important part for early detection. The NFPA, in 1978 required that in new construction one smoke detector

shall be located on every floor of a residential occupancy. In 1993, the NFPA in the NFPA 72, National Fire Alarm Code further required that a smoke detector be installed in every sleeping area of new construction (Braden, 1999). The 1992 Consumer Product Safety Commission (CPSC) survey found that 26% of households with smoke detectors did not meet the requirement of a smoke detector located on every level of the residence (Smith, 1993).

Statistical data indicates that age of the household occupant is correlated to home fire deaths and is an important consideration when designing a smoke detector program. For people greater than age 65 the fire death rate is two and one-half times greater than the national average. It is three times greater for those 75 years and older, and four times greater for those who are older than age 85. Pre-school children are two and one-third times greater at risk than the national average (Munger, 1999).

The literature indicates that properly operating smoke detectors strategically located on every floor, immediately outside sleeping area, and inside every sleeping area will maximize the potential for saving human life. The greatest at-risk groups in residential fire deaths tend to be the elderly and the very young population. These groups would benefit the most from a residential smoke detector program.

PROCEDURES

Definition of Terms

Area of Origin. A term used by fire investigators, as a result of their investigation, that determines the location of where a fire originates.

Consumer Product Safety Commission (CPSC). A federal commission, the CPSC's Fire and Thermal Burn Program encompasses the investigation of injury patterns, data collection, research, and the promulgation and enforcement of mandatory standards, with respect to consumer products (NFPA, 1997).

National Fire Protection Association (NFPA). A nonprofit voluntary membership organization, founded in 1896, that is a clearinghouse for information on fire prevention, firefighting procedures, and the methods of fire protection (NFPA, 1997).

Smoke Detectors. The decomposition of materials by heat produces changes in the surrounding environment. These changes in the environment represent a condition that can be monitored by a detection device known as a smoke detector. A variation or change in the environment results in detection and generates a signal or noise (Munger, 1999).

Research Methodology

The desired outcome of this research was to compare data on the effectiveness of smoke detectors nationally with data collected locally for the communities of Moraga and Orinda in order to improve the potential for life safety in early detection through a smoke detector program. The research was evaluative in that a survey was performed through a semi-annual mail out newsletter. The purpose of the survey was to determine the

presence of smoke detectors in residential structures and their operability, age and location.

A residential smoke detector survey was developed (Appendix A) and sent to every household (13,000) through out the communities of Moraga and Orinda. The survey asked the following questions:

1. What are the ages of the adults living in your household?
2. List the number of children, under the age of 18, in your household?
3. Do you have smoke detectors in your house?
4. Do you have smoke detectors on every habitable floor of your house?
5. Do you have smoke detectors immediately outside sleeping areas?
6. Do you have smoke detectors in every sleeping area?
7. How often do you test your smoke detector?
8. How often do you change the batteries in your smoke detector?
9. When was the last time you replaced your smoke detector?

The homeowner was requested to fill out the survey and either mail it to the address provided or drop it by the nearest fire station. In both the fire chief's comments and the fire marshals comments of the newsletter, emphasis was placed on the survey, testing of smoke detectors and the announcement that the fire district was starting a residential smoke detector program.

The research was action research in that a free, smoke detector replacement program was developed for implementation in the Moraga-Orinda Fire Protection District. The information that was gathered from the surveys was applied in a real world context by identifying areas of program need or deficiency within our community.

The smoke detector program itself was initiated at the same time as the survey was being developed. Through the fire prevention and public education committees of the Fire District an overall program outline was developed, emphasizing the goals, objectives and procedures to be followed. The goal of the smoke detector program is to prevent the loss of life from residential fires throughout the Moraga-Orinda Fire District by providing free smoke detectors and installation of smoke detectors. (Appendix B)

An emphasis on customer service was designed into the program to maximize outreach to the community so that the program goal could be achieved. Utilizing fire engine companies that were out in the field, our fire reserve program participants, and no charge to the citizens were components integrated into the smoke detector program.

Those participating in the program included on-duty fire engine companies and the reserves from the District's Fire Reserve Program. Training was required prior to implementation. Advance questions were submitted by the participants of the program so that a question and answer sheet could be presented at the time that training was provided by the Fire Marshal. (Appendix C) The Fire Marshal then conducted 3-hour training sessions with each of the engine companies and reserve program participants.

Request forms for use by the public were designed so that organization and tracking could be facilitated. The request forms were placed in each of the fire stations and in each of the fire engines. A citizen walking into the fire station can fill out a form and initiate a request for a smoke detector, an engine company out in the field can do the same, or a phone call into the administrative offices can have a request initiated. Upon completion of the work, the form is turned into the fire prevention office for data collection and tracking of program success. (Appendix D)

Financing of the program was done through a combination of private donations and allocation of Fire District funds. Pacific Bell Pioneers, a non-profit group comprised of Pacific Bell employees, donated 50 smoke detectors. The Fire District allocated \$500 towards start up of the program. As each homeowner is serviced, a card and envelope is left, so that a donation can be made without the pressure of verbal solicitation.

The Fire District's legal counsel reviewed the program and recommended that a hold harmless form be utilized to protect the Fire District from any potential liability.

(Appendix E)

Assumptions and Limitations

In sending out the surveys to all homeowners it was assumed that a large enough cross-sectional group of citizens would respond so that reliable baseline data could be obtained.

Given the affordability, popularity and education regarding the need for smoke detectors over the last 2 to 3 decades it is assumed that the public is aware of the importance of having working smoke detectors in their homes. While confidentiality was maintained in collecting data, a homeowner could potentially be reluctant to present information that might indicate some sense of negligence on their part with respect to home fire safety. If this were true, the need for working smoke detectors in the community could potentially be understated.

Due to time constraints in getting the survey to publication through the Fire District newsletter, specific questions regarding pre-school age children were not included. The insight that pre-school children are 2 1/3 times more likely to die in a residential house fire than the national average was discovered in the literature review

after the survey had been sent out (Hall, 1998). This limitation precluded the Fire District from obtaining valuable information that would have been useful in identifying potential smoke detector program needs. A follow up survey to all pre-schools in the Moraga and Orinda areas will help to identify such a need.

RESULTS

Research Question One. Out of the over 13,000 surveys mailed out to residents there were 140 responses, or approximately 1.08%. Of those returning surveys 61% were over 65 years of age, 22% between the age of 56 and 65, 9 % between the age of 46 and 55, 8% between the age of 36 and 45. (Approximately 50% of the households in the 36-45 age group had one of the two listed adults under age 35. To eliminate double counting, these people were included with the 36 to 45 age groups for the smoke detector survey. There were a total of 6 adults under the age of 35.)

All of the households in the 36 to 45 age group had at least one child in the household; 3 households had one child, 6 households had two children and 2 households had three children. In the 46 to 55 age group, 6 households had no children, 4 households had one child and 3 households had two children. The 56 to 65 age group had 27 households with no children, 2 households with one child and 1 household with two children. The over 65 age group had 85 households with no children and 1 household with one child. As one would expect, as the age groups got older, the number of children in households decreased.

Only two households in the entire survey failed to have a single smoke detector in the house. These were found in the over 65 age group. All other age groups had at least one smoke detector located in the house. This accounted for 2.3% of the over 65 age group and 1.4% of the total survey population. The percentages for Moraga and Orinda survey residents having at least one smoke detector located in the house (98.6%) were higher than the national average of 93%.

The survey results did not identify specific needs of one group over another with respect to any of the survey criteria. Based on the literature review, the age groups of 65 and older and pre-school tend to have higher death rates in residential fires than other population groups. Factors, other than those addressed in the survey would need to be examined to gain an understanding of this statistic.

Research Question Two. With respect to the appropriate number of smoke detectors and their location, the following Table 1 illustrates the comparison of age groups with the criteria of smoke detector location.

Table 1 Smoke Detector Location Based on Age Groups

| Smoke Detector Location | Age 36–45 | | Age 46–55 | | Age 56–65 | | Age > 65 | | Totals | |
|---|-----------|----|-----------|----|-----------|----|----------|----|--------|----|
| | YES | NO | YES | NO | YES | NO | YES | NO | YES | NO |
| Smoke Detectors on every habitable floor? | 11 | 0 | 11 | 0 | 28 | 2 | 80 | 6 | 130 | 8 |
| Smoke Detectors immediately outside sleeping areas? | 10 | 1 | 13 | 0 | 29 | 1 | 80 | 6 | 132 | 8 |
| Smoke Detectors in every sleeping area? | 7 | 4 | 6 | 7 | 15 | 15 | 42 | 44 | 70 | 70 |

The most significant result is illustrated in the category of smoke detectors located in the sleeping areas. In the over 65 age group, 51% of those surveyed did not have

smoke detectors located in the sleeping areas of the residence. Similar results were found in the other age groups: 50% for the 56 to 65 age group, 54% for the 46 to 55 age group and 36% for the 36 to 45 age group.

The other smoke detector location criteria for every habitable floor and immediately outside sleeping areas resulted in higher percentages of compliance: ranging for 93% up to 100%.

Table 2 below, was compiled to demonstrate the relationship of the testing of smoke detectors, changing batteries, and replacing older smoke detectors to the probability of proper operation.

Table 2 Smoke Detector Testing and Replacement Based on Age Groups

| | Age 36-45 | Age 46-55 | Age 56-65 | Age>65 | Totals |
|--|-----------|-----------|-----------|--------|--------|
| Smoke Detectors-How often tested? | | | | | |
| <input type="checkbox"/> Once a month | 2 | 0 | 2 | 8 | 12 |
| <input type="checkbox"/> Once every six months | 3 | 4 | 8 | 23 | 38 |
| <input type="checkbox"/> Once a year | 4 | 5 | 7 | 24 | 40 |
| <input type="checkbox"/> Less than once a year | 0 | 0 | 6 | 15 | 21 |
| <input type="checkbox"/> Do not test smoke detectors | 1 | 4 | 7 | 17 | 29 |
| How often are batteries changed? | | | | | |
| <input type="checkbox"/> Every six months | 2 | 0 | 5 | 7 | 14 |
| <input type="checkbox"/> Once a year | 5 | 7 | 14 | 43 | 69 |
| <input type="checkbox"/> Less than once a year | 1 | 2 | 5 | 14 | 22 |
| <input type="checkbox"/> Hard-wired system | 0 | 4 | 8 | 16 | 28 |
| Last time smoke detector replaced? | | | | | |
| <input type="checkbox"/> Less than five years | 7 | 7 | 10 | 33 | 57 |
| <input type="checkbox"/> Five to ten years | 1 | 2 | 8 | 24 | 35 |
| <input type="checkbox"/> More than ten years | 0 | 0 | 3 | 9 | 12 |
| <input type="checkbox"/> Never | 2 | 4 | 9 | 22 | 37 |

As a community, Moraga-Orinda citizens test their smoke detectors once a month, 9% of the time, 27% of the community tests once every 6 months, 29% test once a year, 15% test less than once a year, and 20% do not test their smoke detectors.

Batteries to smoke detectors are changed every 6 months by 10% of the community, once a year by 52% of the community, less than once a year by 17% of the community, and 21 % of the community had hard wired systems.

Smoke detectors were replaced in less than five years by 41% of the community, five to ten years by 25% of the community, more than ten years by 9% of the community, and never by 26% of the community.

Research Question Three. Since the inception of the Moraga-Orinda Fire District Smoke Detector Program on October 1, 2000, 98 smoke detectors have been installed and 6 batteries have been changed. The following Table 3 shows the breakdown of those installations with respect to replacement of old detectors and location of new detectors.

Table 3 Smoke Detector Program Results

| Type of Activity | Number |
|---------------------------------------|--------|
| Smoke Detector Replacement > 10 years | 45 |
| New-Outside Sleeping Area | 15 |
| New-Inside Sleeping Area | 31 |
| New-Every Habitable Floor | 7 |
| Battery Replacement | 6 |

DISCUSSION

Research Question One. From a broad perspective the community fairs very well in comparison to the national standard in having at least one smoke detector in the household. 98.6% of the survey population were found to have at least one smoke detector compared with the 1995 national data that indicated that 93% of the population of the United States had at least one smoke detector. Of the groups identified in Moraga and Orinda, only the over 65 group did not have 100%. Only two out of eighty-six people in that group did not have at least one smoke detector. They also happen to be the largest group that turned in the surveys. The other groups were significantly smaller to the extent that a high level of confidence cannot be made to conclude that the entire population of the community in those age groups would have the same results.

The literature identified specific factors that contribute to the operational effectiveness of smoke detectors. These factors dealt with location, testing, checking batteries and age of the smoke detector.

The data collected through the use of the residential surveys indicates that to varying degrees all of the age groups (36-45,46-55,56-65, and >65) require smoke detectors when considering these factors. The most significant finding came with the question regarding whether smoke detectors were located in every sleeping area. All age groups from 46 on up had at least 50% who did not have smoke detectors in the sleeping areas. The 36 to 45 age group had a 36% deficiency that was significantly higher than the other location questions. Location of smoke detectors in sleeping areas should be a focus of all age groups.

In response to the other questions that were asked in the survey, no group distinguished itself from the others with any dramatic differences in response to the questions. This could lead one to conclude that the various age groups behaviors are similar with respect to fire safety in the home and it is the physical attributes that each age category represents that may play a part in successfully escaping from a house fire.

The literature would support this assumption given the significantly higher death rates among those greater than 65 and in the pre-school age groups. This would place a greater level of priority in these age groups to maximize early warning through properly operating smoke detectors to ensure that enough time is available to exit a burning residential structure.

Research Question Two. Approximately 93% of the community had smoke detectors located on every habitable floor and just outside the sleeping areas of the house. This is significantly better than the national average of 74% found in the 1993 survey conducted by the NFPA (Cote, 1997).

While it is a standard for new construction that smoke detectors be located in every sleeping area for new construction (NFPA 72), no such standard exists for retrofitting existing residential occupancies. This is an area that a smoke detector program can have a dramatic impact, supported by the results of the Moraga-Orinda survey. There, 50% of the respondents failed to have smoke detectors located in the sleeping areas.

Smoke detectors are not tested often enough in the communities of Moraga and Orinda. Only 9% of the survey respondents tested their smoke detectors once a month. If residents did test once a month, then according to comparable time frames under

Bradens' research, during the ten-year life cycle of the smoke detector there would be approximately 3 weeks of non-protection (Braden, 1999). Testing the smoke detector once a year, which 29% of the community indicates does results in about 3 ½ months of non-protection over the 10-year life span of the smoke detector. 20% of the community has never tested its smoke detectors providing the equivalency of 5.8 years of non-protection. As one can observe, there is a vast difference between even testing once a year to never testing at all.

The NFPA recommends the replacement of smoke detector batteries once every six months. There are numerous public education announcements that instruct homeowners to change their batteries when they change their clocks for daylight savings time. This coincides with the 6-month recommended replacement cycle. The citizens of the Fire District communities do not report a high compliance rate in this activity either. Approximately 10% of the citizens change their batteries every 6 months. An additional 52% do change their batteries once a year. If these same people would improve their replacement rate to the 6-month recommendation, then 62% of the community would meet the goal. Given that 21% of the respondents had hard-wired systems, relying on batteries for backup as opposed to primary activation, then nearly 70% of the community would be able to meet the 6-month battery replacement goal.

Approximately 66% of the survey respondents currently replace their smoke detectors within ten years. This meets the NFPA recommendation of every 10 years for smoke detector replacement (Cote, 1997). Citizens fared much better in this category than in either testing or battery replacement. There are however, 26% of the households that require smoke detector replacement. Considering that 50% of all smoke detectors

that are inoperable are more than 10 years old, this is still a critical area to be addressed through the smoke detector program (Ahern).

Research Question Three. The Moraga-Orinda Fire Protection District's smoke detector program was jump started with a donation from Pacific Bell employees of 50 smoke detectors and funding from the District's operational budget in the amount of \$500. The District was able to purchase 200 smoke detectors and installation equipment. Within the first three months a total of 98 smoke detectors have been installed in the community. With respect to location, the vast majority of the installations have occurred in sleeping areas (31), compared to 15 outside the sleeping area, and 7 on every habitable floor. Given that 35% of the survey population have waited more than 10 years or have never replaced their smoke detectors, it is not surprising to observe that 45 smoke detectors were installed to replace the older smoke detectors.

There has been a positive response from the community in supporting the smoke detector program. A simple card is left with the occupant informing them of the address of the District and the name of the special account for smoke detectors should they desire to send a donation. Firefighters do not verbally solicit donations, not only to comply with ethical and legal standards, but also to not create uncomfortable feelings by the firefighters or public. As a result, the District has received more than \$200 in donations that are placed in a special account set up in the financial structure of the District for the smoke detector program. Should this not support the program until the next fiscal year, the District has planned contingency funds available to continue the program.

RECOMMENDATIONS

The Moraga-Orinda Fire District has seen initial success of the smoke detector program. Both the surveys and the initial installations have shown that specific attention should be placed on aging smoke detectors and ensuring that smoke detectors are placed in the sleeping areas of the house. This information should be communicated to the engine companies and reserves out in the field implementing the program through memos and follow up training.

Starting the smoke detector program at the same time that survey data was being collected had positive and negative results. Assumptions that there would be an immediate need for smoke detectors was proven correct through the installation of 98 detectors in the community. These families would otherwise have been waiting dormant for improved protection had the District not done this and had waited until a survey had been completed.

The downside of this was that valuable data for pre-school children was missed in the data collection. As a follow up, the District will be sending out surveys to all of the pre-schools in the area requesting that families complete the information for our data collection. Additionally, as part of the public education program, through the pre-schools, the District will focus its outreach to this group so that installations will be done in these family households.

It is also recommended that other groups that provide charitable donations such as Rotary, Lyons Club, and various auxiliaries be contacted and asked to support this valuable program.

Data is already in the process of being compiled into an access program so the District will be able to keep track of its progress with the smoke detector program. It is recommended that the Moraga-Orinda fire district seek 100% community compliance in all categories for the location, testing and replacement of smoke detectors. This goal will ensure maximum probability of early warning in residential structure fires and allow occupants to escape, helping to reduce the number of residential fire fatalities.

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Residential Smoke Detector Survey

1. What are the ages of the adults living in your household?
 Under age 35
 Age 36 to 45
 Age 46 to 55
 Age 56 to 65
 Over age 65
2. List the number of children, under the age of 18, in your household.
 None
 One
 Two
 Three
 Four or more
3. Do you have a smoke detector in your house?
 Yes
 No
4. Do you have smoke detectors on every habitable floor of your home?
 Yes
 No
5. Do you have smoke detectors immediately outside sleeping areas?
 Yes
 No
6. Do you have smoke detectors in every sleeping area?
 Yes
 No
7. How often do you test your smoke detector?
 Once a month
 Once every six months
 Once a year
 Less than once a year
 Do not test smoke detectors
8. How often do you change batteries in your smoke detector?
 Every six months
 Once a year
 Less than once a year
 Hard-wired system
9. When was the last time you replaced your smoke detector?
 Less than five years
 Five to ten years
 More than ten years
 Never

APPENDIX B

Moraga-Orinda Fire District SMOKE DETECTOR PLACEMENT PROGRAM

Goal:

To prevent the loss of life from residential fires throughout the Moraga-Orinda Fire District by providing free smoke detectors and installation of smoke detectors. The District will pay for the expense of the program.

Objective:

To enable all citizens the ability to have working smoke detectors in their home by:

- * Installing for free, smoke detectors that have been donated to the District.
- * Provide testing and replacement of smoke detector batteries.
- * Adequate protection with multiple detectors. (i.e. detectors on every level of a two story home.
- * Educating the public and providing guidelines for the placement and installation of smoke detectors.

Request Procedures:

Request for a smoke detector will be processed through the Fire District, Fire Prevention Division.

Upon receiving a request for a smoke detector, the Fire District will complete a “Smoke Detector Request Form”. This form includes the requesting party’s name, phone number, address, date and time they are available for the installation. This form will be assigned to an engine company for completion of the task.

Once the form is turned over to the engine company, the company officer will call the party to verify the date and time of the appointment and confirm someone will be home. This should be done within 24 hours of receiving the request.

*After two unsuccessful attempts to install the detector have been made within a 72 hour period, the project will be assigned to the on-duty reserves to complete the task.

When the engine company (or on-duty reserve firefighters) arrives at the residence, the company officer will have the owner complete the program’s needed documentation (forms sdp.1 and sdp.2), providing a copy to the owner and forwarding the Fire District copy to the Fire Prevention Division.

- If the engine company replaces batteries or smoke detector after responding to a call at the residence, please complete form sdp.1 and sdp.2
- If in the judgment of the company officer, checking of the detector(s) is not appropriate at that time, a program request form (sdp.1) may be filled out and returned to Fire Prevention for follow-up and/or scheduling.

APPENDIX C

The Moraga-Orinda Fire District Smoke Detector Placement Program

Questions & Answers

1. What is the goal of our program?
To prevent the loss of life from residential fire throughout the Moraga-Orinda Fire District by providing and installing free smoke detectors.
2. What are the objectives of the SDPP?
 - a. To install new smoke detectors
 - b. To provide testing and if necessary, replacement of smoke detectors
 - c. To provide adequate protection with multiple detectors if necessary
 - d. To educate the public on fire safety
3. What is adequate protection?
Current code requires a smoke detector at each level, in the hallway leading to bedrooms and in each bedroom. If someone is selling their home, detectors are only required in areas that the code required at the time the home was built. The Fire District believes adequate is the current code requirement
4. What if someone is doing work to his or her home, what is the smoke detector requirement?
If someone is doing home improvements and the amount of permitting is \$1000.00 or greater, smoke detectors are required in areas as required by current code; these detectors may be battery only.
5. How does someone get a detector?
Individuals wishing to have detectors installed through the SDPP need to call the Moraga-Orinda Fire Prevention Bureau at (925) 258-4525 and ask to be placed on the Smoke Detector Program list. Fire Prevention will fill out the necessary forms that will then be forwarded to the first responding station.
6. How long does the Station have to install the detectors once they receive the request?
Contact to the residence is needed within one shift. The request form needs to be returned to fire prevention at the time of completion.
7. Where are the tools for installing smoke detectors?
A smoke detector installation kit is kept at station 41 in the PubEd trailer and at station 45 in the engine room where the helium tank is kept. Smoke detectors, batteries, and tools are available in the box. Spare detectors will also be available at each station.

8. What if a renter wants a detector?
The SDPP is for homeowners only. If a renter does not have a detector, the Fire Prevention Division will obtain the necessary information to have the homeowner install the detector.
9. What forms does the resident need to fill out?
Have the resident sign a liability release form which are located in the toolbox.
10. Where do I install the detector(s)?
Detectors should be installed in hallways leading to a bedroom and on each level of the family living unit. Detectors may also be installed in each bedroom if wanted by the owner.
11. How are detectors installed?
 - a. Detectors are not to be placed in the dead air space of a room. This area is 4" along the ceiling from the corner and 4" down the wall and no further down the wall than 12".
 - b. In rooms with ceiling slopes greater than 1' in 8' horizontally, the detector shall be located at the high side of the room and spaced at or within 3' of the peak of the ceiling measured horizontally.
 - c. In rooms with open joists or beams, all ceiling mounted detectors shall be located On the bottom of such joists or beams.
12. What do I do after the detector is installed?
Leave the "Thank You" card with the owner along with the release of liability copy and return all forms to Fire Prevention.

APPENDIX D



Moraga-Orinda Smoke Detector Program Request Form

Date Placement Requested _____ (When Applicable) Referral to Fire Prevention after call

Date of Placement: _____ Station Providing: _____ / Shift: _____

Name: _____ Phone Number: _____

Address: _____

Reason at Residence:

- Fire Citizen Assist Misc. Alarm Medical Haz Mat

Smoke Detector Information:

Smoke detectors currently in home? Yes No

Locations: _____

Reasons for providing detectors:

- Replace existing (> 10 yrs old) Did not exist Battery replacement only

Location of Placement: _____

Additional Notes: _____

APPENDIX E

Moraga-Orinda Fire Protection District

Smoke Detector Give Away Program



**Agreement of Indemnity
Release of Liability and
Assumption of Risk**



I, _____, am a home owner/occupant of the premises known as _____, in the city/town of _____, California. I have requested that a representative of the Moraga-Orinda Fire District install a commercially purchased smoke detector in connection with the District’s Smoke Detector Give Away and Installation Program.

I acknowledge that this is a voluntary community service.

I understand that I could have installed a smoke detector myself or could have hired a contractor to do this work.

I understand and agree that it is my sole responsibility to maintain in a proper fashion the smoke detector after it has been installed, and to test the detector on a regular monthly basis.

I understand that the Moraga-Orinda Fire District elected officials, officers, employees and agents do not provide me with any warrantee regarding the suitability or fitness of the smoke detector that is installed. I have authorized the Moraga-Orinda Fire District to install a commercial smoke detector or a State Fire Marshal Approved and UL Listed smoke detector donated to the resident. Any claim of unfitness or defect in any detector is a matter that I would take up directly with the manufacturer or seller of the smoke detector.

On behalf of myself, my heirs, my personal representatives, my assigns, and any of my relatives, I agree to release, discharge and covenant not to sue the Moraga-Orinda Fire District elected officials, officers, employees, and agents, for all claims and liability arising out of the services performed related to the Moraga-Orinda Fire District Smoke Detector Program whether because of strict liability or ordinary negligence of the releasee, or any other participant which causes the undersigned injury, death, damage, or property damage. I hereby covenant to hold releasee harmless and indemnify releasee for any claim, judgment, or expense releasee may incur.

I understand that the installation of the smoke detector does not guarantee that it will work. I take full responsibility to see that the detector is in good working order. I understand that the detector does not guarantee that I will have sufficient warning to be able to avoid injury, death, or damage to me or my property.

I voluntarily assume all responsibilities for the suitability of the place where the detector has been installed and for ongoing maintenance of the detector, and for necessary upgrade which might be necessary in the future.

I assume any risk and do not expect that the Moraga-Orinda Fire District will notify me should this detector be found to be unsuitable for the purpose intended.

_____ Date

_____ Signature

Original – Fire Prevention

Copy – Homeowner