SAFETY CULTURE

Safety Culture Within the Anne Arundel County Fire Department

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CERTIFICATION STATEMENT

I hereby certify that this paper constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions, or writings of another.

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Abstract

The research problem was the department had never analyzed its safety culture, a component believed to have a significant impact on firefighter safety. The purpose was to reduce the risk of injuries and death to firefighters. Research questions included:

1. Why study safety culture?

2. What components should be analyzed?

3. Given those components, what is the safety culture?

4. What should be done to enhance it and maintain it for the future?

Descriptive research methods included surveys to all fire department members. Results indicated a 64% positive response to all survey statements. Recommended improvements included: a clear message regarding safety, improvements in communication techniques, instituting the right and responsibility of everyone to report safety problems, enhanced leadership skills, better internal marketing related to safety, and enhanced training.

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Safety Culture in the Anne Arundel County Fire Department

Throughout the history of the Anne Arundel County Fire Department there have been 15 line of duty deaths. Since the County's Risk Management Department began tracking injuries in the mid-1970s', there have been over 7,300 reported firefighter injuries with incurred costs exceeding $21 million dollars (D. Goins, personal communications, July 12, 2006).   In 1998, the fire department established a Health and Safety Division consisting of a Division Chief and a Lieutenant. Over the years, a number of Health/Safety Programs have been established, and between 2003 and 2005, a 30% reduction in injuries was experienced.   However, while the severity of injuries continues to be down, their frequency is on the rise. In fact, the number of injuries in 2006 has nearly returned to the levels experienced in 2003. In addition, vehicle collisions have not been reduced and field observations by Safety Officers indicate unsafe acts continue to occur.

The research problem was the department had taken significant actions to address the technical aspects of reducing the risks of firefighter injuries and death, however, there had never been an assessment of the safety culture, a component believed to have a significant impact. The purpose of this research was to provide the administrators of the Anne Arundel County Fire Department with a sense of the safety culture within their organization and to offer suggestions for improving and maintaining it for the future, thus reducing the risk of firefighter injury and death.

Descriptive research was used to study the present situation and formulate a basis for a correct course of action. Research questions included the following:

1. Why study the safety culture within the Anne Arundel County Fire Department?

2. What components should be analyzed to gain an understanding of the safety culture within the department?

3. Given those components, what is an assessment of the safety culture within the department and, is it consistent with the department's rate of injuries?

4. Given this assessment, what should be done to enhance the safety culture within the department and maintain it for the future?

Background and Significance

Throughout the history of the Anne Arundel County Fire Department there have been fifteen line of duty deaths. The last five were related to cardiac issues and occurred between 1986 and 1996. Ms. Donna Goins, Insurance Services Manager for Anne Arundel County, who began collecting Worker Compensation reports in 1977, reported that the fire department has been involved in 3,875 collisions and 7,346 work related injuries.   The total direct costs of injuries have been $21,527,121. Incurred costs for collisions have equaled $1,648,719, for a grand total of $23,175,840. (D. Goins, personal communications, July 12, 2006).   She believes that the indirect costs often exceed direct costs by a factor of 8-12, thus the actual costs for these incidents over the last 29 years have been somewhere between $185 and $278 million.

According to the latest annual report of firefighter fatalities in the United States published by the National Fire Protection Association, the number of on-duty firefighter fatalities across the country is not improving (National Fire Protection Association [NFPA], 2005). Fatalities during the 1990's averaged approximately 97 per year. Since 2000, the annual average has risen to 102 deaths per year. This is occurring in spite of continued declines in the number of deaths at structure fires. Their report includes steps needed to reduce the annual loss of life in the fire service. Examples include implementing standards on fire apparatus driver qualifications,

vehicle operations training, driver requirements, vehicle maintenance, use of personal vehicles, obeying traffic laws, use of seat belts, controlling speed as well as various safety and health initiatives addressing firefighter health/fitness.

Anne Arundel County, Maryland has a population that approaches 500,000 and covers 534 miles of shoreline along the Chesapeake Bay. The Anne Arundel County Fire Department's 30 fire stations and support facilities are staffed by more than 1,400 career and volunteer personnel who provide emergency medical services, fire suppression, inspections, investigations, hazmat responses, special operations, communications, training and related functions with an annual budget of $81 million. The number of annual dispatched calls exceeds 73,000.

Over the years, the Anne Arundel County Fire Department has taken steps to enhance safety and reduce the overall number and severity of injuries and vehicle collisions. In 1998, it established a separate Health/Safety Division staffed by a Division Chief and a Lieutenant who report directly to the Fire Chief. Since then, many of the recommendations described by the National Fire Protection Association have been addressed. In 1998, the Department completed its first self-assessment of the National Fire Protection Association's (NFPA) Standard 1500, Standard on Fire Department Occupational Safety and Health. While the initial assessment found the Department was only 41% compliant, improvements were made and today, the compliance approaches 85% (Williams, 2003). Various Health/Safety Programs were established through cooperative efforts between the firefighters' union, the volunteer firefighters' association, and the fire officers' association. Examples of some of the Health/Safety Programs developed include: Apparatus Safety, Back Safety Workgroup, Emergency Procedures, Fall Protection, Guidance for Non-Essential, Non-Emergency Outside Activities, Health/Safety Audits, Health/Safety Bulletin Boards, Incident Scene Safety Officer, Infection Control, Injury

Review Board, Occupational Health/Safety Workgroup, Personal Protective Equipment, Risk Management Plan, Rehabilitation, Reporting Health/Safety Concerns, Respiratory Protection, Smoking in an Enclosed Workspace, Vehicle Collision Review Board, Wellness/Fitness, and Workplace Violence Prevention Program. Another unique program was a "Hot/Cold" Response Policy which defined calls where emergency vehicles would respond "Hot" (with lights/sirens) and those that would respond "Cold" (without lights and sirens). Response data, citizen input and other issues were considered in the development of this policy which is intended to reduce the risk of injured firefighters and citizens in vehicle collisions. The department participated in the National "Stand-Down for Firefighter Safety" in 2005 and 2006. This is a program organized by the International Association of Fire Chiefs and numerous cooperating fire service organizations where fire departments throughout the country suspend all non-emergency activity and focus entirely on firefighter safety. The highlight of our department's efforts has been a video presentation written and produced by the Health and Safety Division with a message from the Fire Chief which was broadcast to each of our 30 fire stations over the local cable channel network. Following the video presentation, training was conducted as well as an opportunity to provide feedback to the Fire Chief on safety issues. One of the most important suggestions in 2005 was to enhance the department's Wellness/Fitness Program. As a result, a new Wellness/Fitness Workgroup was formed consisting of various employee/member groups. The workgroup has applied for a federal grant and is currently busy developing a new program designed to enhance firefighter health and wellness. As a result of many of these efforts, the department was awarded with the National Fallen Firefighters "Seal of Excellence Award" for efforts to promote firefighter life safety within the Anne Arundel County Fire Department as well as nationally.

In May 2004, during the Firefighter Life Safety Summit, sponsored by the National Fallen Firefighters Foundation, 16 initiatives were established to help reduce the number of firefighter deaths by 25 % within five years and 50% within 10 years. The first initiative related to improving the culture within the fire service. In fact, this seemed to be the most fundamental issue among all participants (Firefighter Life Safety Summit, 2004).

The Anne Arundel County Fire Department has addressed many technical issues related to changing and enhancing safety within the fire service, but the concept of measuring or changing culture had never specifically been addressed. Based upon the number of pro-active steps already taken and the fact that unsafe practices continue, the risk of injuries, deaths and vehicle collisions will likely continue as long as all options, including the study of the departments' safety culture are not considered.

The problem of an inadequate understanding of the Anne Arundel County Fire Department's safety culture relates to two operational objectives established by the United States Fire Administration. First, it promotes within the fire service community a comprehensive, multi-hazard risk reduction plan to reduce the number of injuries and deaths to firefighters. Ultimately, this reduces risks to citizens as well. Second, it helps to address an emerging issue as identified by the Firefighter Life Safety Summit to reduce the number of firefighter deaths by establishing a mechanism to measure and act upon fire department culture.

Literature Review

The literature review was organized around the project's four research questions. The first question asked why study the safety culture within the Anne Arundel County Fire Department. The literature review identified a significant amount of information relevant to this question. Okray and Lubnau (2004) reported on the high number of firefighter tragedies that are

attributed to human error. As a result, they stress the importance of addressing not only the technical side of the job, but the behavioral one as well. Heifetz and Linsky (2002) speak to the need to recognize the difference between a technical change and adaptive challenge. The development of safety procedures are recognized as more technical in nature, while changes in safety culture are seen as an adaptive challenge. Manuele (2003), concludes that safety is culture-driven. He studied reports from Bayer, Air Products and Chemicals, Intel, Johnson & Johnson and Dupont. In each, he saw a consistent pattern that indicated the safety of organizations is consistent with its culture. Lack (2002) reports there is overwhelming evidence demonstrating that culture impacts the level of safety performance that will be achieved. He also reports that perception surveys are gaining in popularity. Once management has the knowledge of what the employee perceives to be true, it has the influence and power to address and correct any problematic issues. Lack (2002) continues and reports on three other independent studies that demonstrate positive organizational attitudes toward safety are directly linked with objective injury data. They include one by Zohar in 2000, another by Barling Loghlin and Kelloway (currently in press) and one by Parker, Axtell and Turner in 2001. Flin, Mearns, O'Connor, Bryden (2000) report that there has been a move away from what they call "lagging indicators" such as lost time data to "leading indicators" such as measurements of the safety climate. They say that the shift in focus is due to the fact that organizational factors rather than purely technical systems are the prime causes of accidents. Peterson (1996) discusses the effect that culture will have on an organization's safety results and mentions that the concept of culture became popular in the early 1980's due to the book entitled "In Search of Excellence" by Peters and Waterman. However, he says that in 1967, Dr. Rensis Likert wrote "The Human Organization" where he described the various styles of organizations and how it affected their bottom line. In fact, he

developed a way to assess climate with a forced choice questionnaire where he measured employee's perception in ten areas. Later, he correlated these results with various other benchmarks such as profitability, growth, etc. with high correlations. Erickson (2006) reports that as long as people concentrate on the safety program, there only will be short-term fixes because the symptoms, not the causes of the safety experience are all that are being addressed. She says that conducting assessment surveys can reveal results that might lead to a safer workplace. Lack (2002) reports that safety professionals are becoming increasingly aware that psychology must be studied as the next step to achieve an injury-free workplace. His "person-based" approach applies surveys, interviews to find out how individuals feel about situations, conditions, etc. He also describes his "Culture Iceberg." The visible part, as he calls it, includes values, symbols, rituals, etc. which translate into policies and procedures. The larger invisible part consisting of norms and assumptions is the real driver in organizational behavior. He believes if you focus only on the visible and ignore the invisible, like the Titanic, you will crash. Carroll (2002) who studied the safety culture of one department within a nuclear power plant was inspired to begin his study by regulators of this industry who were insisting that plants find their own problems. As he began to prepare their safety survey, he realized that the very act of conducting a survey constitutes an intervention in itself and sends a signal about the importance of the safety culture. Geller (2001) discusses achieving a "total safety culture" which he believes can be achieved by addressing the three sides of his safety triad – environment, behavior and person. To accomplish this, he recommends four phases of implementation, the first of which is to assess the current safety culture. The term Safety Culture was discussed by International Atomic Energy Agency (1996) following their investigation into the nuclear reactor accident at Chernobyl. Their report clearly indicated that the lack of a "safety culture" was an

underlying cause. Peterson (1996) has summarized many common attributes to catastrophes including Three Mile Island, Chernobyl, the Challenger space shuttle, and the Bhopal chemical plant. The eleven attributes included: (a) diffuse responsibilities with rigid communications channels; (b) mindset that success is routine; (c) rule compliance and the belief that this is enough to assure safety; (d) team player emphasis where dissent is not allowed; (e) experience from other facilities not processed; (f) lessons learned disregarded; (g) safety analysis and responses subordinate to other performance goals; (h) emergency procedures; plans, training and regular drills lacking; (i) design and operating features allowed to persist although recognized as hazardous; (j) project and risk management techniques available but not used; and (k) organization with undefined responsibilities and authorities for recognizing safety matters. Unfortunately, as author reviewed this list of eleven attributes, some seem to be applicable to the Anne Arundel County Fire Department and the fire service in general. Following the loss of the Space Shuttle Columbia on February 1, 2003, an investigation board found that NASA's history and culture contributed as much to the Columbia accident as any technical failure (Behavioral Science Technology, 2004). Their first task was to conduct an assessment of their culture. Cooper (2000) suggests that many industries around the world are showing increased interest in the concept of safety culture as a means to reducing the risk of large-scale disasters. The concept of "high-reliability organizations" discussed by Weick and Sutcliffe (2001) is used to help understand how different organizations manage accident risk. High-reliability organizations are those that are very successful at reducing risks associated with hazardous operations. Some of their characteristics include the encouragement of error reporting, near miss reporting, the encouragement of skepticism, and the frequent assessment of overall safety health of the

organization. Each seems to relate to safety climate. In summary, the literature review offers a substantial amount of information regarding the need to study safety culture.

The second question asked what components should be analyzed to gain an understanding of the safety culture within the Anne Arundel County Fire Department. To understand what to measure, one must first understand the definition of safety culture. A review of literature found that the terms safety culture and safety climate were often differentiated. Cooper (2000) defines safety culture as part of the overall culture of the organization as opposed to the safety climate which only includes the attitudes and perceptions of the employees. Behavioral Science Technology (2004) describes it as "the way we do things here."   Johnson (n.d.) describes a "Total Safety Culture", where employees not only feel responsible for their own safety, but feel responsible for their peers' safety, and the organizational culture supports them. A review of safety culture by Gadd and Collins (2002) indicates that management is a key influence in an organization's safety culture. And, employee's perceptions of management's attitudes and behaviors towards safety and related issues are the most useful measurement of an organization's safety climate. For the purposes of this research paper, the author has used the term safety culture, but the intention is to measure the attitudes and perception of its members, a process referred to by some as safety climate.

The literature review indicated that a large number of organizations have studied their safety culture/climate and have identified specific components to measure it. Windham (2005) was the only example of safety culture research within the fire service that could be located. He developed a questionnaire consisting of 26 forced choice questions. Examples of questions relate to risk management, communications, safety policies, voicing concerns, etc.

Flin, Mearns O'Connor and Bryden (2000) analyzed 18 published safety climate surveys and three themes appeared in two-thirds of the questionnaires. They included: (a) management; (b) safety systems; and (c) risk. Two other themes were found in a third, namely competence and work pressure. Gadd and Collins (2002) cite two additional reviews of multiple surveys. Their first was one by Guldenmund who found the most frequently measured dimensions related to management, risk, safety arrangements, procedures, training and work pressure. Next, they reference a study by Dedobbeler and Beland who reviewed 10 safety climate instruments and argued that only two factors, management commitment and worker involvement had been replicated across studies. Wiegmann, Zhang, Thaden, Sharm and Mitchell (2002) analyzed a number of studies on safety culture and found key features including: (a) organizational commitment; (b) management involvement; (c) employee empowerment; (d) reward systems; (e) and reporting systems. Peterson (1996) lists 10 items originally identified by Likert which defined organizational climate. They include: (a) confidence and trust; (b) interest in subordinate's future; (c) understanding of and the desire to help overcome problems; (d) training; (e) teaching subordinates how to solve problems rather than giving them the answer; (f) giving support by making available required resources; (g) communications; (h) seeking out and attempting to use ideas and opinions; (i) approachability; and (j) crediting and recognizing accomplishments. Peterson's (1996) individual research indicates the following areas impact a positive safety culture: (a) management's credibility; (b) support for safety; (b) recognition for performance; and (c) attitudes towards safety and stress. Johnson (n.d.) discusses a "Total Safety Culture" endorsed by the Department of Energy and indicates that a positive safety culture relates to eight core components consisting of: (a) worker involvement; (b) management commitment to safety; (c) personal accountability; (d) performance management; (e) co worker

support; (f) training, equipment and physical environment; (g) organizational commitment; and (h) job satisfaction. In a study of the Health Safety and Environmental Culture conducted in Norway by Hoivic and Bye (2004), five dimensions were studied including: (a) behavior; (b) attitude; (c) interaction; (d) physical conditions; and (e) procedures. Glad and Collins (2002) reference a study by Pidgeon and O'Lery that suggest that a good safety culture consists of four factors: (a) senior management commitment to safety; (b) realistic and flexible practices for handling both well-defined and ill-defined hazards; (c) continuous organizational learning through practices such as feedback systems; and (d) a care and concern for hazards which is shared across the workforce. A research report by Human Engineering (2005) developed a program to measure their safety culture in UK rail companies. Their study showed indicators of their culture consisted of (a) leadership; (b) two-way communications; (c) employee involvement; (d) learning culture; and (e) attitude towards blame. The U.S. Nuclear Regulatory Commission (1998) conducted a Safety Culture and Climate Survey consisting of the following areas: (a) work organization; (b) operating effectiveness; (c) management leadership; (d) supervision; (e) working relationships; (f) employee involvement; (g) communication; (h) training and development; (i) future of NRC; (j) job satisfaction; (k) employee commitment; (l) NRC mission; (m) NRC image; (n) organizational change; and (o) NRC safety commitment. Under a contract for the US Dept of Health and Human Services, Sorra and Nieva (2004) developed a Hospital Survey on Patient Safety Culture. Their purpose was to provide a tool useful for assessing the safety culture of a hospital as a whole or for specific units within a hospital. Seven unit-level aspects of safety culture measured included: (a) supervisor/manager expectations and actions promoting safety; (b) organizational learning; (c) teamwork within units; (d) communication openness; (e) feedback and communication about error; (f) non-

punitive response to error; and (g) staffing. Safemap conducted a Safety Culture of the Australian Minerals Industry (1999). This document provides information on the theory of culture surveys, the safety culture project and the results. Its purpose was to identify strategic strengths and opportunities of the minerals industry's safety culture and to provide recommendations on specific actions, initiatives or systems based on the results of the survey. It included 41 factors arranged in eight categories. The categories consisted of: (a) organization; (b) management; (c) supervision; (d) management process; (e) safety systems; and (f) job, team and individual factors. Their web site, www.safemap.com provides this tool on line as a commercial program to measure safety culture. Jacobson (2005) discusses efforts by the Nuclear Regulatory Commission to more fully address safety culture. They used a wide range of sources including the Institute for Nuclear Power Operations, nuclear and other industry sources, the International Atomic Energy Agency, the nuclear regulators from other countries, academia, and safety culture knowledge and experience from the NRC staff which led to the development of the following categories: (a) safety policies; (b) accountability and incentive programs; (c) adequate resources; (d) organizational change management; (e) willingness to raise concerns; (f) problem identification and resolution; and (g) learning environment. Woolfson (2002) who studied the safety culture in Lithuanian Enterprises attempted to answer a number of questions including: (a) what are main problems employees face regarding their work conditions; (b) what is their consultation or cooperation between employees and employers; (c) do safety committees meet; (d) are employees informed about safety committee; and (e) what are main fears employees have regarding their working lives. Huntsman (2005) says the components of a positive safety culture consists of eight core elements: (a) worker involvement; (b) management commitment to safety; (c) personal accountability; (d) performance management; (e) coworker support; (f)

training, equipment and physical environment; (g) organizational commitment; and (h) job satisfaction.

Gadd and Collins (2002) cite a study of UK manufacturing industry that found the main influence on employee's commitment to safety was how workers perceived management's actions for safety. Cooper (2000) suggests that the status of various safety workgroups affects perceptions of the safety climate. Flin, Mears, O'connor and Bryden (2000) suggested that the balance between pressure for production and for safety is recognized as a key component of the safety climate. Gellert (2001) suggests that an essential component of a total safety culture is interpersonal trust and caring. Lack (2002) suggests that research indicates there is a correlation between safety performance and how well an organization manages its social aspects such as communication and cooperation. There are a number of on-line questionnaires available which indicate specific questions some are using to measure safety climate. Ciavarelli and Crowson (2004) developed at 61 item Command Safety Assessment Survey Questionnaire. It can be viewed at http://avsafety.nps.navy.mil/safesurv.htm. Another one they developed is utilized at Embry-Riddle Aeronautical University. One established by the United States Department of Health and Human Services (n.d.) and is available at http://www.ahrq.gov/qual/hospculture/hospform.pdf. It includes 42 different questions relating to the health care environment and is sub-divided into sections relating to individual work units, supervision, communications and reports of mistakes. Sherry (2004) developed a survey for Fedex which available at: http://www.du.edu\~psherry/fedexsafety.htm. It is a 23 item survey that includes areas such as management, communications, suggestions, production/verses safety, mistakes, feedback, etc. Two important final points included one by Wiegmann, Zhang, Thaden, Sharm and Mitchell (2002) who indicate that safety climate can be only seen as an indicator of

the organization's culture as perceived by its employees at a given point in time; secondly, Erickson (2006) makes an important point that for a survey to be valid, the questions must be based upon scientific research. In other words, the questions must accurately measure the concepts they are intending to measure. In summary, there are many opinions regarding the items to be included in a safety climate survey, and the presence of many samples, clearly impacted the survey this author utilized.

The third question asked, given those components, what is an assessment of the safety culture within the Anne Arundel County Fire Department, and is it consistent with the department's rate of injuries. The literature review indicated a number of organizations have assessed their safety culture. Carroll's (2002) assessment at a nuclear power plant indicated that the safety culture of the engineering group was healthy. This was based upon their definition of a safety culture where employees give high priority to safety issues; take personal responsibility; bring issues to management's attention; and that management responds appropriately. However, communications between managers was perceived as being weak; there was a fear of being blamed for mistakes; and positive reinforcement for safe behaviors was lacking.

The U.S. Nuclear Regulatory Commission (1998) conducted a Safety Culture and Climate Survey and their results indicated that many employees believe there is a fear of making a mistake; communicating problems result in a "shoot-the-messenger" syndrome; employees are experiencing increased work loads; additional training is needed; and communications can be difficult. Overall, the average favorable response with regard to Safety Commitment was 44%. Safemap conducted a Safety Culture of the Australian Minerals Industry (1999) and found very positive responses were recorded at manager levels, but considerably lower at operational levels. Some of their identified weaknesses included: low levels of management credibility, high levels

of job stress, loss of safety committee credibility. Examples of threats included: increasing

punitive legislation; new safety approaches will place new demands upon skills; limited

"alignment" between manager, supervisor and operator groups. According to Wert (2003),

safety culture characteristics that are frequently missing within a nuclear power plant include: (a)

maintaining a questioning attitude; (b) reward for reporting and fixing safety problems; (c)

emphasis on individual accountability; (d) clear mission, vision and values; (e) sound

management qualifications and training. Behavioral Science Technology (2004), who completed

an Assessment and Plan for Organizational Culture change at NASA reported the overall

percentile for the safety climate was 78, upward communications 62, and approaching others

about safety 98.   The lowest ranking area was organizational support which received a rating of

46. In research conducted at the Naval Postgraduate School, Ciavarelli and Crowson (2004)

showed more positive ratings from senior personnel. Gaba, Singer, Sinaiko, Bown, Ciavarelli

(2003) compared results of a safety climate survey from a Naval Survey to healthcare

respondents. A survey containing a subset of 23 similar questions was used. Overall the

problematic response rate was 5.6% for naval aviators, compared to 17.5% for hospital

personnel. In high hazard areas such as emergency departments or emergency rooms, the

problematic response was 20.9%.   Woolfson (2002) conducted research to assess employee

attitudes related to issues of safety culture and health in Lithuania. Examples of some of these

results include the following: (a) health and safety was not seen as a priority by many on the

workforce; (b) employees were satisfied with the amount of information they received on health

and safety; (c) approximately half of the employees feel management listens to safety concerns;

(d) having a job was more important than concern over health and safety; (e) paying for

hazardous work was a legitimate way of compensating employees for danger to health and

safety; (f) greater cooperation between management and employees regarding safety and health is desired; (g) in general employees feel their managers encourage safe working; and (h) about 2/3 of employees did not feel that their employer puts safety before profits. Connelly and Powers (2001) reported on a safety climate survey developed to evaluate the corporate safety climate of the U.S. Army Medical Department. There, the overall system wide response was positive, yet error reporting was an area of concern. A survey by the Berkley Lab Communications Department (2005) indicated that the senior management is committed to safety and workers feel they are working in a safe environment. Some areas for improvement included the need to do a better job at communicating lessons learned, and investigating accidents without blaming the worker. Research by Windham (2005), who was the only one that could be located that related specifically to a fire department indicated that positive safety cultures exist within the organizations he studied. In summary, literature suggests a number of organizations have completed an assessment of their safety culture. However, none were located that specifically compared their findings to member injury rates. Available literature impacted the research relating to the overall findings. Many of the assessments indicated the culture was positive, yet others gave a percentage of positive response. Seeing both approaches, this author decided upon including a percentage of positive response. This approach seemed to be more quantitative and more useful when comparing the research of others.

The last question asked, given this assessment, what should be done to enhance the safety culture within the Anne Arundel County Fire Department and maintain it for the future. Lack (2002) concluded that the best method to achieve an injury-free workplace requires an integration of what he calls behavior-based and person-based approaches. Person based approaches include: surveys, interviews, group discussions on how individuals feel about

situations, etc. Behavior starts with an identification of inappropriate behavior and then designing and implementing programs designed to decrease the behavior causing the problem. He provides an example combining both. When we teach, coach or counsel we are essentially using person-based behavior. When we recognize and correct or punish others for what they have done, we are operating from a behavior-based perspective. The overall goal in this combination approach is to change behavior directly in such a way that the resultant attitude is positive. He believes this should be done by following four steps: (a) define the target behavior to increase or decrease; (b) observe the target behavior; (c) intervene to change the target behavior in desired directions; and (d) test the impact of the intervention procedure by continuing to observe and record the target behavior during the intervention program. Lack (2002) quotes John Seeley Brown, Vice President, Xerox Parc that "Instead of pouring knowledge into people's heads, you need to help them grind a new set of eyeglasses so they can see the world in a new way." That involves challenging the implicit assumptions that have shaped the way people have historically looked at things." Lack (2002) also says if culture is to change, a specific set of circumstances must exist. They include: (a) an urgent need to change and it must be communicated; (b) resources and capabilities to change must exist; and (c) an action plan to guide the transition from old to new must be developed. Carroll (2002) reported on studies of safety culture in the nuclear power industry. There, the project revealed that safety was not understood consistently, communications was not always effective and supervisors were placed in weak positions without resources. He makes an important point that the results were difficult to interpret. As a result, the raw data was analyzed through additional interviews and group discussions. For instance, when people responded that they were worried about being blamed for mistakes, it wasn't clear whether there was a blaming culture, a worrying culture or simply too

many mistakes. Follow-up interpretation was necessary to help define the root of the issue. Examples of final recommendations from Carroll's study included: strengthening the supervisory role, enlarging the safety culture concept to include all work, and enhancing accountability without inappropriate consequences. Communication strategies were enhanced by: (a) senior management addressing issues, communicating decisions, results and expectations; (b) individual departments were involved in process decisions through stand down meetings; (c) resultant tasks were assigned and tracked; and (d) communications highlighting the work was accomplished to reinforce willingness to raise concerns, offer good ideas basic to a sound safety culture. Gellert (2001) suggests that to improve safety culture, you must build a trusting environment. This is done through good communications, active listening, candor, consistency, commitment and consensus. The Department of Energy's Total Safety Culture recommends behavior-based observation and feedback. Under this program, employees periodically observe each other and give one-on-one coaching regarding safety related behaviors. Data is collected and analyzed to identify areas needing special attention. It is then discussed by work teams to develop strategies. Soon, safety coaching becomes an inherent function of the culture. Safemap who conducted a Safety Culture of the Australian Minerals Industry (1999) provided a number of recommendations in their report to enhance their safety culture. Examples included: (a) deficiencies at the supervisor levels to be reviewed including whether training is sufficient; (b) job stress to be investigated; (c) risk awareness training to be conducted; (d) role of safety committee to be reviewed and benchmarked against other industries; and (e) safety staff to receive further accreditation. According to Wert (2003), the role of the leader in shaping culture includes the following: (a) defining the culture; (b) define and clarify the change; (c) ensure employees have necessary training; (d) showing genuine care and concern; (e) present a

consistent management philosophy; (f) manage value conflicts; (g) keep promises; (h) frequently write about the organization's culture; (i) show trust through delegation of work; and (j) promote good communications.   The Assessment and Plan for Organizational Culture change at NASA by Behavioral Science Technology (2004) included a recommended plan to implement a desired culture change. Their guiding principle was based upon the fact that they cannot create a rule for every situation. Instead, they must be able to rely on individuals making independent judgment based upon principles that were well understood and embraced by members of their organization. Leaders drive the culture change through their behavior. Some of the specific recommendations included: (a) planning meetings with leadership to reaffirm agency values, etc; (b) confidential coaching designed to help each leader understand their strengths and developmental needs; (c) integrate plans into existing activities; (d) develop team effectiveness training and advanced safety leadership assessment centers; (e) implement a feedback system where key leadership behaviors promote open and honest communications that promotes dissenting opinions. Woolfson (2002) conducted research to assess employee attitudes related to issues of safety culture and health in Lithuania. Some of the recommendations following their safety culture assessment included: (a) implement a process to monitor the effectiveness of existing safety committee system; (b) develop wider stakeholder involvement; (c) develop a forum to disseminate a "best practice"; (d) establish a user friendly web site with safety and health information; (e) a national program to raise awareness of good safety and health at work; and (f) creation of a policy and research body at the national level to monitor and improve employment conditions.   While not as the result of a Safety Culture Survey, Shelly and Cole (2004) specifically discuss this in an article within Fire Engineering. They believe it is critical to develop a "culture of safety" to prevent line of duty injuries and deaths. They provide the

following suggestions to assist in developing a culture of safety: (a) discuss safety regularly; (b) promote a safety topic of the month; (c) create a safety quiz show; (d) provide a daily safety message; (e) put "safe" in SOP; (f) create a safety suggestion program; (g) prepare for injuries even at training; (h) report and follow up with near miss reports; (i) post safety tips on paystubs and computer screen savers; (j) focus on your people; and (k) encourage employee/firefighter ownership in the safety program. After their survey, the Berkley Lab Communications Department (2005) recommended: (a) injury reports should not have negative repercussions; (b) communications of lessons learned needs improvement; (c) management needs to give feedback to employees on safety performance; and (d) work areas to be inspected for safety issues. Windham (2005) who was the only one to complete research within the fire service had these recommendations as a result of his research: (a) expectations should be communicated with regard to safety and all personnel should be held accountable; (b) policies and practices should be examined; (c) risk management should be examined and all personnel should be held accountable to the specifics of the risk management process; (d) peer fitness trainer program should continue; (e) union officials should be consulted to implement a fitness evaluation process; and (f) work should continue to make a cultural change within the fire department.

In summary, the results of the literature review provided ample information to determine the recommendations that others have made with regard to improving safety culture. It impacted the author's research efforts with regard to how recommendations were made. As a result, group discussions were held at various fire stations with individuals who completed the survey to help interpret raw data and provide specific recommendations.

Procedures

The procedures utilized to address this research project consisted of seven steps. The first step involved a detailed examination of literature. This began with a web search of the National Fire Academy's Learning Research Center (LRC). Keyword searches included: safety culture, culture, and attitude. Later, keyword searches were done through the scholar research option included on the Google website. In addition, two textbooks were utilized. One entitled "Crew Resource Management for the Fire Service" (Okray and Lubnau 2004) was read in its entirety and was very valuable; and another was "Managing the Unexpected" by (Weick and Sutcliffe 2001).

The second step was to conduct research into the history of firefighter injuries on a local and national level. Local information was obtained by reviewing data made available to the author from the Anne Arundel County Risk Management's data base. Various reports were generated to determine the frequency of injuries reported at each fire station and by other variables such as assignment and rank. In addition, a review of minutes from the Anne Arundel County Fire Department's Injury Review Board minutes was completed as well as a review of Incident Scene Safety Officer Reports. Nation-wide data regarding firefighter deaths and injuries was obtained from the National Fire Protection Association's web site www.nfpa.org and the United States Fire Administration's web site www.usfa.org. This step was intended to help address the first question related to the need to study the issue of safety culture within the fire service.

The third step helped identify the components that should be analyzed to gain an understanding of the safety culture within the Anne Arundel County Fire Department. The procedure, which ultimately helped answer the second research question involved studying in a

greater detail the numerous safety culture surveys located during the literature review. Specifically, research was conducted to determine common themes, formats and individual questions. A portion of the procedure changed somewhat due to past research identified during the literature review. There, Gaba, Singer, Sinaiko and Ciabarelli (2003) compared results of a safety climate survey between naval aviators and the health care industry. Their survey contained 22 common statements. While not originally intended to be a part of this research, the author believed it would be interesting to see how a fire department's safety culture would compare with that of the naval aviators and the healthcare industry. Thus, the procedures involved a request to these authors to seek permission to utilize the same 22 questions. However, it was not the intention that these questions be the only ones included. Also, it had been the author's intention to divide the survey into multiple parts. A section that included forced choice answers, a second section that helped identify the effectiveness of safety programs, and a third section that would include open-ended questions. Again, other than the 22 common statements that the author desired to use from the study indicated above, the determination of others would come from more complete research of existing surveys. In addition, before distribution, a sample survey was given to several individuals to help determine the length of time required for its completion. The author's goal was to have individuals complete the survey in no more than approximately 15 minutes. This would place some limit on the length of each section that was desired. A limitation of this portion of the procedures is that the survey statements or questions were not scientifically "validated" for the Anne Arundel County Fire Department or any other fire service organization. Ideally, prior to the distribution, the survey questions would have been given to subject matter experts to help determine if the questions actually helped assess the culture within the fire service.

The fourth step defined the survey group and the mechanism for distributing and collecting the survey forms. It was the author's intention to include every member of the Anne Arundel County Fire Department. This would encompass recruits at the fire academy as well as all career and volunteer personnel assigned to field and staff positions. This included 804 career and 621 volunteers for a total of 1,425 personnel. A letter written by the Fire Chief was attached to the survey indicating that all personnel were expected to participate. The distribution of the survey intentionally corresponded to the National Firefighter Safety Stand Down Activities that began on June 21, 2006. All personnel were directed to complete and forward their surveys by June 30, 2006.

The fifth step established a method to compile the results from the large number of surveys. The author explored the use of standard answer sheets that could be scanned, however, this method was dismissed due to associated costs. In addition, the use of an on-line survey was considered, but, again, it involved an unbudgeted expense. The author decided to use an Excel spreadsheet that he could develop without any outside expense. However, a disadvantage is that each survey had to be entered manually. A limitation of this step was the potential for error, however, steps were taken to minimize them as the author entered each one himself.

The sixth step which identified a means to analyze the raw data helped assess the safety culture within the Anne Arundel County Fire Department and determine if it is consistent with its rate of injuries. This process would answer the third research question. It consisted of several processes. First, within the forced choice question of the survey, the response to each statement was summarized as positive or negative. A positive response was the sum of the percentage of respondents who agreed or strongly agreed. Conversely, a negative response was the sum of the percentage of respondents who disagreed or strongly disagreed. There were several negatively

worded questions where this process was reversed. This technique seemed to be common among most surveys identified in the literature review. To compare the 22 responses included in the research completed by Gaba, Singer, Sinaiko, Brown and Ciavarelli (2003) for the Navy and Healthcare environments, a separate listing was established. Here, a negative response was termed a "problematic response." This was done to keep consistent with the earlier research and to make it easier for the author to compare the safety culture within the Anne Arundel County Fire Department to these other industries. To determine if the assessment of safety culture was consistent with the department's injury rate, separate calculations were done. The injury rate was determined by the dividing the number of injuries per fire station by the total number of members assigned. Then, these figures were compared to the overall positive response to the forced-choice section of the questionnaire. The next section of the questionnaire included the respondents' perception of the effectiveness of the department's health/safety programs. Calculations were provided in the Excel spread sheet which would give an overall average, as well as one for each fire station or work location. Lastly, the open-ended questions were summarized.   The intention was to place various responses into categories and measure the percentage of each type of response.

The seventh step helped address the last research question, given the assessment, what should be done to enhance the safety culture within the Anne Arundel County Fire Department. This process included meetings with the author and various groups within the department. The purpose of the meetings was to help interpret the raw data and establish recommendations. The first group to analyze the data was the Anne Arundel County Fire Department's Health/Safety Workgroup. This was followed by visits to eight fire stations throughout the County and each shift of battalion officers. While not everyone in the department was solicited to help provide

recommendations, a clear limitation, this did give the opportunity to get a representative view from a wide array of personnel.

Results

The first question asked why study the safety culture within the Anne Arundel County Fire Department? As described in the background and significance, the department had taken significant action to develop policies and procedures to address risks associated throughout many of its activities and had been recognized for those efforts with various awards.   Additional research within Anne Arundel County's Risk Management database indicated that between 2003 and 2005, the number of incidents resulting in lost time went from 70 to 49, a reduction of 30%. Days lost from work went from 1,498 to 1,122, a reduction of 25%. OSHA reportable injuries went from 86 to 65, a reduction of 24%, and strains and sprains went from 99 to 84, a 15% reduction.   However, Worker Compensation claims for the first six months of 2006 total 117, which is up from 103 during the same time period in 2005. Thus, a slight increase in the frequency of injuries has occurred. A review of injuries from July 1, 2005 through June 30, 2006 indicate their numbers are still significant. For instance, 224 Worker Compensation claims were submitted for injuries during this time frame with total incurred costs of $780,279, resulting in 1062 lost days from work.   Research also indicated that significant hazards still exist. For instance, research into departmental safety officer response reports for 2006 indicated that 50% of them document unsafe activities. A review of meeting minutes from the departmental Injury Review Board indicates that a significant number of preventable injuries continue to occur. Research seems to clearly indicate that injuries continue to be at a significant level, despite the implementation of various health/safety policies designed to comply with various national standards. This, coupled with research discovered during the literature review that speaks to the

need to address issues beyond the technical nature of implementing policies provides numerous reasons and evidence to suggest that the Anne Arundel County Fire Department should study its safety culture.

The second question asked, what components should be analyzed to gain an understanding of the safety culture within the Anne Arundel County Fire Department? The overall format for the safety culture survey included 4 sections. This was based upon the format of others and their tendency to focus on several themes. The first section included demographic information. This allowed the author to analyze various factors and their impact on the safety culture. The next section included forced choice questions, followed by an assessment of the fire department's safety programs and 4 open-ended questions. The format for the forced choice section of the survey was based upon earlier work by Likert (Peterson, 1996). Likert invented a way to measure organizational climate with a forced choice questionnaire. In this format, respondents are asked to choose one of the following responses for each statement: (a) strongly disagree; (b) disagree; (c) neutral; (d) agree; (e) strongly agree; or (f) not applicable or don't know. For positively worded questions responses of agree or strongly agree constitute a positive response, while disagree or strongly disagree constitute a negative or problematic response. Most all sample surveys located within the literature review used this same general format, thus that method was adopted for this research as well. Permission was requested and granted from Gaba, Singer, Sinaiko, Brown and Ciavarelli (2003), authors of an earlier survey that compared the response of 22 items between naval aviators and the health care industry. Thus, these became a significant part of the forced choice section. Ideas for the remaining 17 additional forced choice statements came from either common themes identified after a detailed analysis of numerous other surveys including one by Windham (2005), who initiated the only safety culture

survey located that was designed for a fire department. The second portion of the survey asked respondents to indicate their perception of the effectiveness of each component of the department's Health/Safety Program. The author used a rating system that ranged from one to five. One was excellent, while a five was very poor. The last section contained four open ended questions. The specific questions selected were based upon recommendations of Mr. Ciabarelli (2003) or from the general themes in other sample surveys. The questions included: (a) the most hazardous activity I perform is; (b) the most significant action the department can take to improve safety is; (c) do you have any other comments about safety; (d) can you think of a way to improve this particular survey. A blank copy of the actual survey mechanism used appears in Appendix A. Afterwards, several individuals completed the survey to determine the approximate time it would take to complete it. This indicated that the time to complete the survey was approximately 10-15 minutes which was within the 15 minute limit set by the author. This information provided the components and framework necessary to analyze the safety culture within the Anne Arundel County Fire Department.

The third question asked, given those components, what is an assessment of the safety culture within the Anne Arundel County Fire Department and is it consistent with the department's rate of injuries. A total of 1,425 surveys were distributed and 651 were returned, reflecting an overall return rate of 45%. Of the 804 career personnel, 573 were returned, a 71% rate of return. Of the 621 volunteer members, only 50 were returned, an 8% rate of return. The first portion of the survey included forced choice statements. For each statement, possible responses included: (a) strongly disagree; (b) disagree; (c) neutral; (d) agree; (e) strongly agree; or (f) don't know. A positive response was defined as one where the respondents agreed or strongly agreed. A negative response was defined as one where the respondents disagreed or

strongly disagreed. The only exceptions were two negatively worded questions and they were adjusted so that in those cases a negative response was calculated as a positive response. Respondents to this section yielded 62.7% positive responses and 14.3% negative responses. Statement 26 (my department would rather lose a building rather than unnecessarily risk my personal safety) yielded the highest percentage of positive responses (91.6%). Statement 14 (violations of safety procedures are rare) yielded the lowest positive response (34.4%). A summary for each individual statement is included in Appendix B.

The response to this section was also analyzed by several other parameters. The first area was by rank. Chief Officers had a 68.1% positive response and a 14.2% negative response. Station Officers (Captain/Lieutenants), had a 63.0% positive response and a 15.6% negative response. Firefighters had a 63.5% positive response and a 13.9% negative response. Paramedics had a 61.2% positive response and a 16.9% negative response. Data was also analyzed regarding career or volunteer members. Career employees had a positive response of 62.0% and a negative response of 14.5%, compared with volunteer members who had a 73.6% positive response and a 9.7% negative response. When sorted by Operational Battalions, the percentage of positive responses ranged from 64.5% to 59.5%, and the percentage of negative responses ranged from 17.0% to 11.5%. When sorted by fire stations, the percentage of positive response ranged from a high of 78.4% positive response to a low of 48.5% positive response. Negative responses for each station ranged from a high of 38.2% to a low of 4.7%.

The next section of the survey asked respondents to indicate their perception of the effectiveness of Health/Safety Operational Procedures was measured. Each was measured on a scale of one to five, where one equaled excellent and five equaled poor. Of the 27 individual programs, the average response was 2.3. The most poorly perceived programs were the Vehicle

Collision Review Board and Wellness/Fitness. The program perceived to be most effective was the Emergency Procedures Section which includes policies regarding rapid intervention, mayday, emergency evacuation, etc. A summary of the perception survey of all health and safety operational procedures appears in Appendix C.

The last section of the survey included open-ended questions. The first question asked for the most hazardous activity individuals perform. There were a total of 535 responses. Answers that were repeated 20 or more times included: fireground activities (112); driving (111); operations on roadways (76); lifting (38); staffing shortages (30); medical incidents (31); and infectious disease exposures (26).

The second question asked for the most significant action the department could take to improve safety. There were 427 responses. Those that were repeated more than 40 times included: increase staffing (117); training/education (64); health/fitness (52); and improved and enforced safety procedures (41).

The third question asked for any other comment regarding safety. There were 192 responses. Responses repeated more than 10 times included: safety should be our highest priority (23); improved attitude toward safety (23); increased staffing (19); doing well with current program (17); and implement fitness program (11).

The last question asked for suggestions to improve the survey. There were 122 responses. Responses repeated more than 10 times included: shorten (15); ask for true, not leading questions (13); and make it anonymous (12).

While not originally included as a research question, the author was able to compare the safety climate in the Anne Arundel County Fire Department to earlier surveys completed for Naval Aviators, Health Care Providers and High-Hazard Health Care Providers. Twenty-two of

the 40 forced choice statements were common ones to each of these surveys. The comparison was made by comparing each industry's "problematic response." This was defined as the sum of the respondents who disagreed or strongly disagreed with each statement. The Anne Arundel County Fire Department had one (1) statement with a lower problematic response than the other three industries. This particular statement related to the perception that an individual is given adequate resources to do their jobs. In six (6) instances, the AAFD had more of a problematic response than either of the industries. These six problematic statement areas include (1) communications; (2) reporting unsafe behaviors/conditions; (3) incidence of safety violations; (4) degree leadership monitors proficiency standards to ensure firefighters are qualified to function; (5) perception that department has a reputation for high-quality performance; and (6) perception that the department is genuinely concerned about safety. Fifteen were somewhere between the naval aviators and the health care industry. A complete comparison of each of the 22 statements appears in Appendix D.

The second part of this question asked if the results of an assessment of the safety culture were consistent with the frequency of injuries within the department. The number of injuries per fire station was calculated by dividing the total number of members assigned by the number of injuries reported at that fire station. Comparisons between injury rate and safety culture for the fire stations experiencing the highest injury rates appear in Table #1. Comparisons between injury rate and safety culture for the fire stations experiencing the lowest injury rates appear in Table #2. Referring to Table #1, it can be seen that Station 3 had an injury rate of .65, the poorest rank (30 out of a total of 30 fire stations), yet they had a 61.8% positive response to the forced-choice section of the safety culture survey, which ranked them 17th out of 30. Conversely, Table #2 indicates that Station 6 had an injury rate of 0, the best injury rate (1 out of

a total of 30 fire stations), yet the percentage of their positive responses in the forced-choice section of the survey was 53.5% which ranked them 24th out of 30.

Table 1

Injury Rate/Positive Safety Culture Comparison (Stations with highest injury rates)

Station	Injury Rate	Injury Rank Out of 30	Percentage of Positive Responses	# Positive Responses Rank Out of 30
3	.65	30	61.8%	17
27	.60	29	56.3%	21
17	.53	28	65.1%	10
30	.50	27	62.3%	14
12	.44	26	54.5%	22

Table 2

Injury Rate/Positive Safety Culture Comparison (Stations with lowest injury rates)

Station	Injury Rate	Injury Rank Out of 30	Percentage of Positive Responses	# Positive Responses Rank Out of 30
6	0	1	53.5%	24
4	.06	2	59.8%	18
21	.06	3	66.9%	7
19	.07	4	62.0%	15
2	.11	5	56.9%	19

The last question asked, given this assessment, what should be done to enhance the safety culture within the department and maintain it for the future. The author visited eight different fire stations throughout the department and met with each shift of battalion officers. The visits included a total of over 50 personnel. The meetings were intended to be an opportunity to share the raw data provided in the survey and have the individuals help interpret the results and make recommendations for improvement. The discussion focused on the statements receiving the lowest percentages of positive responses and general discussion on the other components of the survey.

The first problematic statement was violations of safety operating procedures are rare (Statement #14). This received a 34.4% positive response, the lowest ranking of all statements. Discussion on this statement revealed that some individuals do not see themselves as violating a safety procedure if it is minor in nature. They believe some safety procedures are not realistic. Some believe safety violations occur because of the need to a "need do something now mentality." Some indicated that this mentality is inherent in the type of individual that the fire service attracts. Additional education was suggested by some. Others suggested that some are reluctant to follow procedures because identified safety problems have not been corrected. For example, some related that they were being forced to use exhaust removal systems, but when they are broken, repairs were not made. As a result, many view compliance with other safety rules as unimportant by administration. Some cited examples when supervisors do not adhere to safety policies which, in turn encourages subordinates to do the same. Lack of crew integrity was cited. It was thought that if crews work regularly together, teamwork will be enhanced and that would reduce the violation of safety procedures. Because of the transient nature of crews, it was suggested that personnel don't look out for each other as much as they would if they were

part of a crew that worked together on a permanent basis. Lastly, some supervisors admitted that they simply needed to increase their enforcement of safety rules.

The next statement was lack of experienced personnel has adversely affected my station/assignment to operate safely (Statement #19). This received only a 35% positive response. Discussion here related to an influx of new recruits, pump operators and officers who are perceived as not being fully prepared to assume their positions. Many believe this is due, at least in part, to the hiring of adequate personnel to staff a 4th shift of personnel. Specific concerns were related to situations where rookie fire recruits and rookie pump operators had been assigned to work together. Many perceive testing, especially pump operator testing as inadequate because of a limited driving skills portion. Some expressed concern that most training appears to occur after someone is promoted, rather than before. Others commented on the speed with which fire recruits are expected to move from a basic Emergency Medical Technician to an Emergency Medical Technician – Intermediate, a more advanced level. The speed that this is done limits experience and the perception of safety. Some blame a recruitment program that seems to consider those with previous experience and no experience as equal candidates. Recommendations to address this statement included a clearly defined succession plan to replace retiring personnel, a re-evaluation of the recruitment program, a mentoring program for new recruits, an officer's candidate school for new officers, tests that reflect the knowledge, skills and abilities for pump operators, and on-going training for all personnel.

Good communication flows up and down the chain of command (Statement #37) was the next statement. Its percentage of positive responses was only a 36.7%. Discussion focused on specific examples of issues where personnel felt uninformed and their fear of repercussions for making suggestions. Several examples of instances where they felt uninformed include the

transition to the 4th shift, the use of quints in the department, and the status of repairs to exhaust removal systems.   Many commented that poor communication results in numerous rumors and distrust towards the administration. Among their recommendations, were enhanced leadership and communication skills, more station visits by members of the senior staff, opportunities to come to open forums and hear about current events within the department, electronic bulletin boards and electronic suggestion boxes.

The next statement was leadership reacts well to unexpected changes to its plans (Statement 32). Here, the positive response was 37.1%. Discussion revealed that individuals believe that many of the department's plans are reactionary, although some indicated this may not be correct.   One example is the upcoming 4th shift of personnel. Many are concerned about the impact of this on their station. Implementation plans are not well known among station personnel. Another example is the high frequency of medical calls. Many reported that there are times when there are not any medical units available, but there doesn't appear to be a plan to address this problem. Others related concerns about a lack of experienced paramedics and pump operators. Recommendations included better communications of existing plans and the establishment of ones that do not exist.

The Health/Safety Division is well respected was the next statement and received only a 41.9% positive response (Statement #39). Discussion on this statement was varied. Some expressed that the individuals who replied negatively to this statement were ones who did not comply with safety rules.   Others thought that the negative perception was related to the discipline process that can result from vehicle collisions, a process not actually under the control of the Health/Safety Division. Others thought that it was due to the perception that the Health and Safety Division does not directly benefit the firefighter. Instead, they exist only to comply

with external regulations and reduce the costs of injuries. Recommendations relate to improving the marketing of the division.

Leadership closely monitors proficiency and current standards to ensure firefighters are qualified to function was the next statement (Statement #8). It received a 47.8% positive response. This statement and discussion relates to earlier ones. Discussion included concerns that new recruits may not be properly prepared to act on their own when being released. This was mentioned by numerous personnel as it relates to the transition from a fire recruit to an Emergency Medical Technician - Intermediate. Others discussed that there is inconsistency in the training classes for the Emergency Medical Technician - Intermediate. Additional discussion related to pump operators and their skill levels. Some concerns related to the inability of some to function on a variety of relatively routine calls such as chimney fires, tarpot fires, etc. One recommendation was to establish a mentor program where newly trained or promoted individuals are assigned a specific person before being released to operate independently. Training classes should be consistent. A more extensive pump operator's training program was also recommended that is specifically designed around the required knowledge, skills and abilities. Another recommendation was a library of standard lesson plans established by the training academy on a variety of topics that could serve as a daily training program.

The next statement was that co-workers are willing to report safety violations, unsafe behaviors or hazardous conditions (Statement #12). It received a 54.3% positive response. Individuals believe some issues are reported, but little or no action follows to address the problem. One specific example related to exhaust removal systems.   This relates back to some of the specific concerns and recommendations for Statement #14, violations of safety operating procedures are rare. Enhanced leadership skills which encourage the reporting of violations or

unsafe behaviors was recommended as a means to address this concern. This is specifically addressed and included as a major principle in "Crew Resource Management" (Okray and Lubnau, 2004).

The last statement receiving considerable discussion was that peer influence is effective at discouraging violations of safety operating procedures or safety rules (Statement #13). Here, the positive response was 58.7%. Many respondents indicated that peer influence is generally less effective with new, younger personnel of the department. Also, they view new personnel as less willing to be effective team players. They believe this may be due to the increased use of personnel, called "rovers" who move from assignment to assignment to fill in for those on leave, etc. They also believe it may simply be a factor of younger personnel, who they believe are more inclined to function independently as opposed to working as a team. Recommendations included efforts to reduce reliance on "rovers", and more emphasis/training on teamwork. Again, "Crew Resource Management" (Okray and Lubnau, 2004) was included as a recommendation, as one of its guiding principles is emphasis on teamwork.

The next portion of the discussion focused on the components of the Health/Safety Programs. In general, many do not seem to clearly understand the purpose of the individual programs. Some perceive them as rules for the sake of rules. The one discussed most frequently was the Vehicle Collision Review Board. Discussion revealed that the negative perceptions exist due to the discipline that is issued by senior staff as a result of the board's "preventable" or "non-preventable" findings. Many seem to think that the board finds all collisions "preventable" and very few are "non-preventable." In addition, any positive benefit of the board may have such as addressing overall issues that may cause collisions are not well publicized. Recommendations included better marketing of the board's purpose and findings as well as an opportunity for a

driver to acknowledge preventability and negate the necessity of appearing before the board. With regard to all health/safety policies, it was recommended that their purpose be made clear and, whenever possible, a summary which is easy to read precede the detailed portion of the document.

The last portion of the survey included open-ended questions. Discussion in this area included issues related to staffing, training, safety while operating in prisons, and highway safety. Recommendations included the communication of a current plan to enhance staffing within the department that is based upon the receipt of a grant. The staffing plan should communicate how the lack of qualified pump operators and paramedics will be addressed. Recommendations related to training included a detailed study of all knowledge, skills and abilities required for all personnel, and assurance that training is adequate for new and incumbent personnel. Particular emphasis seemed to be directed to the need for consistent Emergency Medical Technician - Intermediate training, appropriate pump operator assessments, an Officer's Candidate School that ensures personnel are prepared to assume their position before they assume those duties. Recommendations related to prisons and highway safety involve greater cooperation with state and local law enforcement agencies.

<div align="center">Discussion</div>

As indicated in the literature review, safety culture surveys within the fire service have been extremely limited. The only other similar study was done by Windham (2005) with the Woodlands Fire Department in The Woodlands, Texas. There, it was concluded that 74% of the respondents surveyed were positive, 9% were negative. This compares with 62.7% positive response and 14.3% negative response during this survey. However, some difference would be expected since neither survey was the same. Windham (2005) used 26 survey statements, while

this author's survey included 40 statements, a perception survey of health and safety procedures and an open-ended question section. While several forced choice statements on both surveys were similar, information was not available to determine how both departments rated themselves on those individual questions.

Research by Gaba, Singer, Sinaiko and Ciabarelli (2003) was used to compare the safety culture among naval aviators, health care providers and high hazard health care providers (emergency room staff) to that of the Anne Arundel County Fire Department. The results indicated that the culture was predominately between that of the naval aviators and the health care industry. If one considers that Naval Aviators operate in a strict military organization, fire departments are paramilitary and the health-care environment is private, it might not be surprising that fire department responses would be in the middle. This was an interesting comparison and it appears to be the first attempt to do this.

Carroll's (2002) assessment of safety culture at a nuclear power plant indicated that the safety culture of the engineering group is healthy. However, communications between managers was perceived as being weak. Also, fear of being blamed for mistakes and a lack of positive reinforcement for safe behaviors. This author's research indicated that communications within the Anne Arundel County Fire Department received a low percentage of positive responses and that individuals feared being blamed for mistakes. Two similar findings.

In the Nuclear Regulatory Commission's Safety Culture and Climate survey (1998), some areas of their difficulty include: many employees say there is a fear of making a mistake, communicating problems results in a "shoot-the-messenger" syndrome, employees are experiencing increased work loads, additional training is needed, and communications can be difficult. Overall, the average favorable response with regard to Safety Commitment was 44%.

This overall response is much less than the 62.7% identified within the Anne Arundel County Fire Department. However, many of the same issues appear such as communications, and the fear of making a mistake.

A Safety Culture Survey Report by Safemap of the Austrailian Minerals Industry (1999) found very positive responses were recorded at manager levels, but considerably lower at operational levels. Some of their weaknesses identified included: low levels of management credibility, high levels of job stress, loss of safety committee credibility. This research found only a slight difference between managers (chief officers) and firefighters or station officers. Chief Officers had a positive response 68.1%, and firefighters and station officers had a 63% positive response.   However, issues of management credibility and health/safety division credibility were also among the statements with the lower percentage of positive perceptions.

The Assessment and Plan for Organizational Culture change at NASA by Behavioral Science Technology (2004) measured their culture on a five point scale. Raw scores in all areas ranged from 3.60 to 4.09. The overall percentile for the safety climate was 78%. This was slightly more than the 62.7% positive responses in the Anne Arundel County Fire Department.

The author was pleased with the response to several statements within the forced-choice section of the survey. Only 4% believe that the department is not genuinely concerned about safety, only 1% do not believe that more is being done now than in the past to promote safety, and only 1% do not believe the department would rather lose a building rather than unnecessarily risk our firefighters lives. Having reviewed the results of other surveys, it was not surprising to see a need for communications improvement. This seems to be a common problem among many industries. In addition, it was not surprising to see lower ratings on the statement related to the lack of experienced personnel. This may be due, at least in part because of the large number of

personnel the department is currently hiring to expand from 3 shifts to 4 shifts of personnel beginning in January 2007. The overall percentage of positive responses of 62.7% is lower than expected, as were several of the lower rated statements including those related to fear of repercussions for reporting safety concerns, violations of safety procedures and the perception of the health/safety division. It was also disappointing to see the response from volunteer firefighters to be very low, only 8% of the total force. Future surveys should include strategies for improving this response rate.

It was surprising that the difference in the percentage of positive responses was so small among various ranks of personnel. With the exception of volunteer firefighters, who actually had the highest percentage of positive perception, all others were within 7 percentage points of one another. Conversely, the range of percentage of positive responses for each individual fire station spanned 29.9 percentage points from a high of 78.4% to a low of 48.5%.

It was also surprising not to see a more direct correlation between the rate of injuries and the percentage of positive responses on the survey. Earlier research clearly indicates that injuries are greater in organizations where the culture does not support safety. As indicated in the results, Station 3 had the poorest injury rate, yet had a 61.8% positive response to the forced-choice section of the safety culture survey. This ranked them 17th out of 30 stations. Since a review of literature suggested that injury rate often corresponds to the culture within an organization, one might expect their percentage of positive responses to rank them closer to the bottom. Instead, they were near the middle. Conversely, Station 6 had the best injury record, yet their positive response to the forced-choice section was 53.5%. This ranked them 24th out of 30 stations. Again, one would expect their percentage of positive responses to rank them closer to the top. There are several reasons why this research may not have supported the research in the

literature review. First, there are many ways to define the injury rate. This author analyzed the number of Worker Compensation claims at each fire station. It could have been expanded to also study the number of OSHA reportable injuries at each station, the number of lost days from work, or the average cost per injury. Future studies could include a wider scope of analysis. A second reason could be due to the vast degree the Anne Arundel County Fire Department utilizes personnel to offset leave and overtime. This method requires personnel from stations that exceed their minimum staffing to be detailed to other stations. Sometimes the detail is to adjacent stations, while at other times, it is to a more distant one in another battalion. The resultant diversity makes it difficult to correlate injury rate to safety culture. If assignments rarely changed, the correlation may be easier to detect.

Clearly, the research supports the need to improve the safety culture within the Anne Arundel County Fire Department. While some portions of the safety culture survey were rated in a positive fashion, others were not; and, more importantly, preventable injuries and unnecessary exposure to risk continues to occur. It should be noted that this need to improve the safety culture is not isolated to Anne Arundel County as it has also been identified nationally. In May 2004, during the Firefighter Life Safety Summit, sponsored by the National Fallen Firefighters Foundation, 16 initiatives were established to help reduce the number of firefighter deaths by 25% within five years and 50% within 10 years. The first initiative related to improving the safety culture within the fire service. In fact, this seemed to be the most fundamental issue among all participants (Firefighter Life Safety Summit, 2004).

The ultimate change of culture within an organization is to recognize the change as adaptive rather than technical. This need is made clear in Leadership on the Line (Heifetz and Linsky, 2002). Actually, this may explain why the safety culture is not where it should be. The

implementation of various health/safety programs is technical in nature and does not consider the organizational changes necessary to truly make them effective.

Recommendations

Based upon the results, it is apparent that a positive safety culture exists within the Anne Arundel County Fire Department. However, areas needing improvement have been identified and a strategic plan should be established to address areas perceived to require corrective action. Long and short term goals should be established that identify specific tasks and time tables for implementation. Summarized below are recommendations for improving and maintaining the safety culture for the future, thus reducing the risk of firefighter injury and death.

First, a clear message regarding the importance of safety should be established. This importance needs to be made clear by the Fire Chief who emphasizes that the safety of the firefighter must be of the highest priority. As emphasized in "Crew Resource Management" (Okray and Lubnau, 2004), the overall goal must be that "Everyone Must Go Home Safely." All other tasks and functions must be secondary to this overriding goal. This should be regardless of the perceived urgency of the emergency. This may be the most difficult recommendation to achieve as many firefighters believe it is their duty and responsibility to risk themselves for others. While firefighting can be dangerous, a willingness to expose oneself to risks when there is no clear benefit cannot be tolerated. The importance upon the firefighter's safety must be championed at every level.

Next, communications should be enhanced within the Department. Along with enhanced communications should come enhanced trust that will make the transition to accepting the overall goal. This should begin with basic communication training for personnel at every level in the department. The communications techniques identified in "Crew Resource Management"

(Okray and Lubnau, 2004) could serve as the basis for this training. Afterwards, opportunities to provide communications throughout the department should be provided. Examples include open forums with the Fire Chief, and station visits by senior staff. Discussions should include the status of departmental strategic goals and current programs to address those goals, as well as an opportunity for questions. Some areas of immediate concern that should be included in these discussions are funding a grant to enhance staffing, 4th shift implementation, succession planning in general, perception of limited qualified paramedics and pump operators, and prison safety. An electronic bulletin board or electronic suggestion box should also be considered. Division/Battalion staff meetings should occur on a regular basis to gather station commanders and disseminate information, dispel rumors and provide an opportunity for questions.

The third recommendation is the establishment of a code of conduct in which all personnel are given the right and obligation to report safety problems and contribute ideas on their safety to their supervisors. Supervisors should be expected to give the concerns and ideas serious consideration. This relates directly to the first recommendation where it must also be clear that every firefighter is responsible for safety. This goal ensures they are given the authority to protect the safety of every firefighter.

The fourth recommendation is to enhance the leadership and "followership" skills of all personnel. "Followership" is a term coined by Okray and Lubnau, authors of "Crew Resource Management" (2004) that emphasizes communications as well as to how to be an effective team member and respectfully fulfill their responsibility of protecting the safety of every firefighter. Training should be provided for all supervisors to address basic leadership skills that enhance trust, team building. The intention is to build on communication skills, enhance trust, and enhance training and team functionality, all of which appear to need improvement.

The fifth recommendation is to enhance the marketing of the Health/Safety Division. It appears that the Health/Safety Division has implemented numerous programs, most of which are perceived to be effective, however, their purpose is not well known. A campaign should be established where members begin to view the division as their Health/Safety advocate instead of one that establishes rules for sometimes unknown purposes. This can be accomplished by enhanced personnel involvement through Health/Safety Committees, station visits, and feedback. In addition, improvements to the Vehicle Collision Review Board should be considered. First, its purpose should be well publicized. Any positive benefit the board identifies that may address overall issues, that may cause collisions should be well publicized. Upon approval of the investigating Battalion Officer, there should be an opportunity for a driver to acknowledge preventability and negate the necessity of appearing before the board. Lastly, while specific policies must meet various regulatory guidelines that can make some of them lengthy, they should be as concise as possible. In more detailed policies, a summary should be provided that provides readers an overview.

The sixth recommendation relates to training activities. A complete analysis of knowledge, skills and abilities should be completed to ensure that appropriate training is conducted for all personnel.   Afterwards appropriate training programs should be evaluated to determine the need for changes. One specific recommendation is to re-establish an Officer's Candidate School. Another was the need for consistent Emergency Medical Technician - Intermediate training. Assessments for promotion should test for required knowledge, skills and abilities. The current perception is that the pump operator test does not do this. Scheduled Re-Training or other mechanisms should be in place to help ensure individuals maintain their required skill levels. After training, candidates for the position of firefighters, pump operators,

medical personnel and officers should enter a mentoring program that allows them to work side-by-side with an experienced personnel before being released to full, independent duty. Another recommendation is the establishment of a library of standard lesson plans maintained by the training academy on a variety of topics that could serve as a daily training program.

The seventh recommendation relates to follow-up. With any change in strategy, its effectiveness should be monitored. The use of the Safety Culture Survey should be enhanced based upon user feedback and utilized on a regular basis to measure the effectiveness of strategies to improve it.

The last recommendation is to broaden the scope of program. It is recommended that mechanisms to study the safety culture within the fire service be championed on a national basis. The mechanisms selected should include validated surveys specifically designed for the fire service. This could be pursued through the current "Everyone Goes Home" initiative sponsored by the National Fallen Firefighters Foundation. An automated on-line survey would allow any department across the country to measure its culture and compare it periodically to itself or other departments.

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Appendix A

ANNE ARUNDEL COUNTY FIRE DEPARTMENT
Safety Culture Survey

Rank: _____   Assignment: _____   ☐ Career ☐ Volunteer

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	N/A Don't Know
1. The department is genuinely concerned about safety.	☐	☐	☐	☐	☐	☐
2. Leadership provides a positive climate that promotes reasonably safe Fire/EMS operations.	☐	☐	☐	☐	☐	☐
3. The number of local and national firefighter deaths and injuries is unacceptable.	☐	☐	☐	☐	☐	☐
4. Firefighting has been made about as safe as it can be.	☐	☐	☐	☐	☐	☐
5. The department is doing more now to promote safety than in the past.	☐	☐	☐	☐	☐	☐
6. Leadership conducts adequate reviews and updates of safety standards and operating procedures.	☐	☐	☐	☐	☐	☐
7. The department has a defined process to set training goals and to review performance.	☐	☐	☐	☐	☐	☐
8. Leadership closely monitors proficiency and currency standards to ensure firefighters are qualified to function.	☐	☐	☐	☐	☐	☐
9. Leadership is actively involved in the safety program and management of safety matters.	☐	☐	☐	☐	☐	☐
10. Our Health/Safety Policies and Procedures are adequate in communicating standards needed for conducting safe operations.	☐	☐	☐	☐	☐	☐
11. Supervisors encourage reporting safety discrepancies without the fear of negative repercussions.	☐	☐	☐	☐	☐	☐
12. Co-Workers are willing to report safety violations, unsafe behaviors or hazardous conditions	☐	☐	☐	☐	☐	☐
13. Peer influence is effective at discouraging violations of standard operating procedures, or safety rules.	☐	☐	☐	☐	☐	☐
14. Violations of safety operating procedures are rare.	☐	☐	☐	☐	☐	☐
15. My department has a reputation for high-quality performance.	☐	☐	☐	☐	☐	☐
16. My supervisors closely monitor quality and correct any deviations from established quality standards.	☐	☐	☐	☐	☐	☐

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	N/A Don't Know
17. Supervisors permit cutting corners to get a job done.	☐	☐	☐	☐	☐	☐
18. I have sometimes felt too fatigued to do my job safely.	☐	☐	☐	☐	☐	☐
19. Lack of experienced personnel has adversely affected my station/assignment's ability to operate safely.	☐	☐	☐	☐	☐	☐
20. Safety decisions are made at the proper levels, by the most qualified people in my command.	☐	☐	☐	☐	☐	☐
21. Leadership takes the time to identify and assess risks associated with its Fire/EMS operations.	☐	☐	☐	☐	☐	☐
22. Supervisors do a good job managing risks associated with its operations.	☐	☐	☐	☐	☐	☐
23. I am provided adequate resources to accomplish my job.	☐	☐	☐	☐	☐	☐
24. Equipment and facilities are designed with safety in mind.	☐	☐	☐	☐	☐	☐
25. Operational Risk Management processes are incorporated into decision-making at all levels.	☐	☐	☐	☐	☐	☐
26. My department would rather lose a building than unnecessarily risk my personal safety.	☐	☐	☐	☐	☐	☐
27. My supervisor can be relied on to keep his/her word.	☐	☐	☐	☐	☐	☐
28. Leadership is successful in communicating its safety goals to unit personnel.	☐	☐	☐	☐	☐	☐
29. Leadership communicates the lessons learned from collision/injury investigations.	☐	☐	☐	☐	☐	☐
30. Mistakes have actually led to positive changes.	☐	☐	☐	☐	☐	☐
31. Leadership sets the example for compliance with standards.	☐	☐	☐	☐	☐	☐
32. Leadership reacts well to unexpected changes to its plans.	☐	☐	☐	☐	☐	☐
33. My supervisor does not hesitate to temporarily restrict individuals from functioning who are under high personal stress.	☐	☐	☐	☐	☐	☐
34. I am adequately trained to safely conduct all of my duties.	☐	☐	☐	☐	☐	☐
35. Morale and motivation at my station/assignment is high.	☐	☐	☐	☐	☐	☐
36. Leadership provides adequate safety backups to catch possible human errors during high-risk operations.	☐	☐	☐	☐	☐	☐
37. Good communications flow exists up and down the chain of command.	☐	☐	☐	☐	☐	☐

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	N/A Don't Know
38. Safety education and training are adequate in my command.	☐	☐	☐	☐	☐	☐
39. The Health/Safety Division is well-respected.	☐	☐	☐	☐	☐	☐
40. I am kept informed of important safety information.	☐	☐	☐	☐	☐	☐

Listed below are the individual Health/Safety Programs within OPM 4 (Health/Safety). Please rate each one with regard to your perception of its effectiveness. When assigning a rating, please consider the individual purpose of each individual program. Do not rate one program as it compares to another. For instance, don't rate the effectiveness or importance of Accountability as compared to Hazard Communications. Consider the purpose of each individual program and rate it against itself. Thank you!

PROGRAM TITLE	1 = Excellent, 5 = Very Poor					
	1	2	3	4	5	N/A Don't Know
Introduction (Message from Chief of Department)	☐	☐	☐	☐	☐	☐
Introduction (Risk Management)	☐	☐	☐	☐	☐	☐
Introduction (Health/Safety Division)	☐	☐	☐	☐	☐	☐
Introduction (Occupational Health/Safety Workgroup)	☐	☐	☐	☐	☐	☐
Introduction (Reporting Health/Safety Concerns)	☐	☐	☐	☐	☐	☐
Accountability	☐	☐	☐	☐	☐	☐
All Hands	☐	☐	☐	☐	☐	☐
Apparatus Safety	☐	☐	☐	☐	☐	☐
Emergency Procedures (Emergency Evacuation, MAYDAY, Rapid Intervention, Signal 13)	☐	☐	☐	☐	☐	☐
Fall Protection	☐	☐	☐	☐	☐	☐
Guidance for Non-Essential, Non-Emerg Activities	☐	☐	☐	☐	☐	☐
Hazard Communications	☐	☐	☐	☐	☐	☐
Health/Safety Audits	☐	☐	☐	☐	☐	☐
Health/Safety Bulletin Boards	☐	☐	☐	☐	☐	☐
Infection Control	☐	☐	☐	☐	☐	☐
Injury Review Board	☐	☐	☐	☐	☐	☐
Lockout and Tagout Procedures	☐	☐	☐	☐	☐	☐

Marine Operations Safety Guidelines	☐	☐	☐	☐	☐	☐
Personal Protective Equipment	☐	☐	☐	☐	☐	☐
Post Incident Analysis	☐	☐	☐	☐	☐	☐
Posting of Hazardous Areas	☐	☐	☐	☐	☐	☐
Rehabilitation	☐	☐	☐	☐	☐	☐
Respiratory Protection	☐	☐	☐	☐	☐	☐
Smoking in an Enclosed Workspace	☐	☐	☐	☐	☐	☐
Vehicle Collision Review Board	☐	☐	☐	☐	☐	☐
Wellness/Fitness	☐	☐	☐	☐	☐	☐
Workplace Violence Prevention Program	☐	☐	☐	☐	☐	☐

OPEN-ENDED QUESTIONS:

The most hazardous activity I perform is……...

The most significant action(s) the department can take to improve safety is/are……...

Do you have any further comments about safety?

Can you think of any way to improve this particular survey?

Appendix B

ANNE ARUNDEL COUNTY FIRE DEPARTMENT

Safety Culture Survey
2006

Survey Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	N/A/Don't Know	Positive Response	Negative Response
1. The department is genuinely concerned about safety.	0.5%	4.0%	6.7%	38.9%	48.7%	1.3%	87.6%	4.4%
2. Leadership provides a positive climate that promotes reasonably safe Fire/EMS operations.	0.9%	6.2%	14.6%	52.1%	27.1%	0.5%	79.2%	7.1%
3. The number of local and national firefighter deaths is unacceptable.	0.8%	1.4%	9.7%	32.2%	57.1%	0.8%	89.4%	2.2%
4. Firefighting has been made about as safe as it can be.	5.3%	31.3%	27.3%	26.5%	9.8%	1.7%	36.6%	36.3%
5. The department is doing more now to promote safety than in the past.	0.3%	1.0%	8.6%	48.4%	34.1%	10.0%	82.5%	1.3%
6. Leadership conducts adequate reviews and updates of safety standards and operating procedures.	0.3%	4.3%	19.8%	53.7%	17.9%	6.5%	71.6%	4.6%
7. The department has a defined process to set training goals and to review performance.	1.1%	9.2%	21.7%	51.3%	13.3%	6.0%	64.6%	10.3%
8. Leadership closely monitors proficiency and currency standards to ensure firefighters are qualified to function.	4.2%	21.7%	24.6%	37.9%	9.8%	3.8%	47.8%	25.9%
9. Leadership is actively involved in the safety program and management of safety matters.	0.3%	4.3%	21.3%	57.0%	16.8%	2.9%	73.8%	4.6%
10. Our Health/Safety policies and Procedures are adequate in communicating standards needed for conducting safe Ops.	0.3%	5.4%	21.1%	56.7%	17.6%	1.6%	74.3%	5.7%

Survey Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	N/A/Don't Know	Positive Response	Negative Response
11. Supervisors encourage reporting safety discrepancies without the fear of negative repercussions.	3.7%	14.4%	23.2%	38.7%	19.2%	3.3%	57.9%	18.2%
12. Co-workers are willing to report safety violations, unsafe behaviors or hazardous conditions.	2.3%	15.9%	25.7%	43.7%	10.6%	4.3%	54.3%	18.2%
13. Peer influence is effective at discouraging violations of standard operating procedures, or safety rules.	1.5%	12.4%	26.8%	45.6%	13.2%	3.3%	58.7%	13.9%
14. Violations of safety operating procedures are rare.	3.2%	28.4%	29.5%	30.0%	4.4%	7.0%	34.4%	31.7%
15. My department has a reputation for high-quality performance.	3.4%	11.9%	21.1%	42.9%	19.4%	3.3%	62.2%	15.3%
16. My supervisors closely monitor quality and correct any deviations from established quality standards.	1.1%	5.7%	19.2%	56.0%	18.4%	2.1%	74.4%	6.8%
17. Supervisors permit cutting corners to get a job done.	15.3%	47.3%	24.9%	10.2%	2.5%	1.7%	62.7%	12.7%
18. I have sometimes felt too fatigued to do my job safely.	9.3%	36.3%	20.2%	26.0%	7.8%	1.3%	45.6%	33.8%
19. Lack of experienced personnel has adversely affected my station/assignment to operate safely.	5.8%	29.2%	24.9%	24.1%	11.7%	5.9%	35.0%	35.9%
20. Safety decisions are made at the proper levels, by the most qualified people in my command.	3.6%	13.8%	31.3%	39.5%	9.0%	4.9%	48.6%	17.4%
21. Leadership takes the time to identify and assess risks associated with its Fire/EMS operations.	0.9%	9.4%	21.0%	54.0%	13.3%	4.3%	67.3%	10.3%
22. Supervisors do a good job managing risks associated with its operations.	0.3%	6.2%	17.6%	61.4%	13.8%	3.0%	75.2%	6.5%
23. I am provided with adequate resources to accomplish my job.	5.3%	14.4%	14.6%	48.7%	18.1%	0.3%	66.8%	19.8%
24. Equipment and facilities are designed with safety in mind.	4.8%	11.4%	22.9%	47.5%	14.1%	1.6%	61.6%	16.2%

Survey Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	N/A/Don't Know	Positive Response	Negative Response
25. Operational risk management processes are incorporated into decision-making at all levels.	1.4%	7.0%	26.0%	47.0%	9.8%	10.5%	56.8%	8.4%
26. My department would rather lose a building than unnecessarily risk my personal safety.	0.5%	1.3%	7.3%	39.0%	52.5%	1.7%	91.6%	1.7%
27. My supervisor can be relied on to keep his/her word.	1.4%	2.1%	13.8%	43.3%	37.1%	4.0%	80.5%	3.5%
28. Leadership is successful in communicating its safety goals to unit personnel.	0.5%	4.9%	17.1%	60.8%	18.6%	0.6%	79.4%	5.4%
29. Leadership communicates the lessons learned from collision/injury investigations.	2.5%	11.0%	19.8%	50.8%	15.4%	3.2%	66.2%	13.4%
30. Mistakes have actually led to positive changes.	1.4%	6.2%	16.0%	58.1%	16.7%	4.1%	74.8%	7.6%
31. Leadership sets the example for compliance with standards.	2.6%	12.2%	26.8%	47.6%	11.0%	1.9%	58.6%	14.9%
32. Leadership reacts well to unexpected changes to its plans.	6.7%	19.0%	34.4%	30.5%	6.7%	5.1%	37.1%	25.7%
33. My supervisor does not hesitate to temporarily restrict individuals from functioning who are under high personal stress.	2.7%	14.3%	26.5%	29.0%	8.6%	19.2%	37.6%	17.0%
34. I am adequately trained to safely conduct all of my duties.	0.9%	6.2%	9.8%	56.5%	27.9%	1.0%	84.4%	7.1%
35. Morale and motivation at my station/assignment is high.	9.3%	12.7%	20.6%	36.0%	20.0%	1.9%	56.0%	22.0%
36. Leadership provides adequate safety backups to catch possible human errors during high-risk operations.	0.3%	8.4%	29.2%	46.7%	10.8%	6.7%	57.5%	8.7%
37. Good communications flow exists up and down the chain of command.	12.3%	23.3%	26.7%	29.2%	7.5%	2.7%	36.7%	35.6%
38. Safety education and training are adequate in my command.	1.6%	9.2%	26.2%	50.6%	11.4%	2.9%	62.1%	10.8%
39. The Health/Safely Division is well-respected.	5.9%	19.2%	28.3%	31.0%	11.0%	6.5%	41.9%	25.1%

Survey Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	N/A/Don't Know	Positive Response	Negative Response
40. I am kept informed of important safety information.	1.4%	3.8%	19.8%	55.6%	20.3%	1.4%	75.9%	5.2%
						AVERAGE:	62.7%	14.3%

Appendix C
Health and Safety Programs
Perception of Effectiveness (1 = Excellent, 5 = Poor)

PROGRAM TITLE	RATING
Introduction (Message from Chief of the Department)	2.3
Introduction (Risk Management)	2.4
Introduction (Health and Safety Division)	2.3
Introduction (Health and Safety Workgroup)	2.4
Introduction (Reporting Health/Safety Concerns)	2.4
Accountability	2.2
All Hands	2.2
Apparatus Safety	2.3
Emergency Procedures	2.1
Fall Protection	2.4
Guidance for Outside, Non-Emergency Activities	2.4
Hazard Communications	2.4
Health and Safety Audits	2.5
Health and Safety Bulletin Board	2.3
Infection Control	2.3
Injury Review Board	2.6
Lockout/Tag Out	2.4
Marine Operations	2.4
Personal Protective Equipment	2.1
Post Incident Analysis	2.5
Posting of Hazardous Areas	2.4
Rehabilitation	2.3
Respiratory Protection	2.1
Smoking in an enclosed Workspace	2.2
Vehicle Collision Review Board	3.0
Wellness/Fitness	3.0
Workplace Violence	2.5
AVERAGE	2.3

Appendix D

Comparison of Anne Arundel County Fire Department to other Industries in Selected Areas

	Percentage of Problematic Responses			
	AA Co. FD	Naval Aviators	All Hospital	High-Hazard Health Care
23. I am provided adequate resources to accomplish my job. (#1)	19.5%	29.5	33.7	36.7
19. Lack of experienced personnel has adversely affected my station's ability to operate safely. (#2)	35.3%	18.5	55.1	59.4
37. Within my command, good communications flows up and down. (#3)	35.2%	10.8	19.0	21.6
33. My supervisor does not hesitate to temp.restrict individuals from functioning who are under high personal stress. (#4)	16.9%	7.8	37.1	45.4
32. Leadership reacts well to unexpected changes to its plans. (#5)	25.2%	7.4	26.8	34.8
13. Peer influence is effective at discouraging violations of standard operating procedures or safety rules. (#6)	13.6%	5.6	17.2	17.7
16. My supervisors closely monitor quality and correct any deviations from established quality standards (#7)	6.7%	5.5	13.8	17.0
7. The department has a defined process to set training goals and to review performance. (#8)	10.0%	5.1	16.0	16.8
12. Co-workers are willing to report safety violations, unsafe behaviors or hazardous conditions (#9)	17.8%	4.2	10.4	13.5
14. Violations of safety operating procedures are rare. (#10)	30.9%	4.0	13.3	13.2
20. Safety decisions are made at the proper levels, by the most qualified people in my command.(#11)	17.1%	4.0	18.5	22.2
8. Leadership closely monitors proficiency and currency standards to ensure firefighters are qualified to function. (#12)	25.5%	3.3	17.3	21.0
31. Leadership sets the example for compliance with standards. (#13)	14.6%	3.0	12.3	15.7
2. Leadership provides a positive climate that promotes reasonably safe Fire/EMS Operations (#14)	7.0%	2.7	16.1	21.6
36. Leadership provides adequate safety backups to catch possible human errors during high-risk operations. (#15)	8.6%	2.7	23.7	31.5
15. My department has a reputation for high-quality performance. (#16)	15.1%	2.4	5.5	4.9
34. I am adequately trained to safely conduct all of my duties. (#17)	7.0%	2.2	11.3	12.9
6. Leadership conducts adequate reviews and updates of safety standards and operating procedures. (#18)	4.5%	2.1	14.9	18.3
28. Leadership is successful in communicating its safety goals to unit personnel. (#19)	5.3%	2.0	16.6	18.9
22. Supervisors do a good job managing risks associated with its operations. (#21)	6.4%	1.9	8.5	11.8

	Percentage of Problematic Responses			
	AA Co. FD	Naval Aviators	All Hospital	High-Hazard Health Care
21, Leadership takes the time to identify and assess risks associated with its Fire/EMS Operations (#22)	10.0%	1.6	10.1	12.5
1. The department is genuinely concerned about safety. (#23)	4.4%	1.2	1.9	2.6