

Running Head: IMPACT OF THE 2 X 4 WORK SCHEDULE AND CONSECUTIVE

Executive Development

Impact of the 2 x 4 Work Schedule and Consecutive Shifts Worked on Firefighter Safety

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December 2005

Abstract

The purpose of this research was to determine if firefighter/paramedic in line of duty accidents and injuries have a direct or indirect correlation to the consecutive number of shifts on duty.

Descriptive research methodology was used to answer the following questions: 1) What in line of duty accidents have occurred in other similar size fire departments with similar shift work schedules, and on what numbered consecutive shift did the accident occur?; 2) What in line of duty accidents have occurred in the NFD, and on what numbered consecutive 24 hour shift?; and 3) What factors contribute to the injury of firefighter/paramedics working shift schedules? The recommendations suggest monitoring firefighter accidents, injuries, and illness by number of consecutive hours worked.

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Introduction

Since the Engine Company burn-over and firefighter fatality of 2003, the Novato Fire Protection District (NFD) has re-examined its philosophy and training policies as it relates to firefighter safety. The problem is that no examination has been done to determine what direct or indirect correlation of the number of consecutive shifts worked as it relates to NFD firefighter safety.

The purpose of this research is to determine if NFD firefighter/paramedic in line of duty accidents and injuries have a direct or indirect correlation to the consecutive number of shifts on duty. Descriptive research methodology was used to answer the following questions:

1. What in line of duty accidents have occurred in other similar size fire departments with similar shift work schedules, and on what numbered consecutive shift did the accident occur?
2. What in line of duty accidents have occurred in the NFD, and on what numbered consecutive 24 hour shift?
3. What factors contribute to the injury of firefighter/paramedics working shift schedules?

Background and Significance

The NFD is an independent special district governed by a 5 member Board of Directors established in 1926. The Fire District is located in the northern most boundaries of Marin County, California approximately 30 miles north of the San Francisco Bay Area. There are 73 full time career suppression personnel and 14 staff administrative positions (9 of which are safety). The District provides all risk service to approximately 62,000 residents covering an area

of approximately 71 square miles. The District is bisected by two major highways Highway 101 and Highway 37, has water on two edges of the north and east district boundaries.

The NFD has 5 fire stations providing 23 career suppression personnel daily to staff 5 Type I Engine companies, 1 Truck Company, and 2 Advanced Life Support (ALS) paramedic transport units. All of the District Type I Engines are staffed with a minimum of one Captain, and two firefighter/paramedics and are advanced life support capable and equipped. NFD also cross-staffs 3-Type III Engines during the California wildfire season. In 2004, NFD responded to 4,700 calls for service.

Currently 84% of NFD personnel live outside the Fire District boundaries and call back of personnel continues become problematic for constant daily staffing and emergency call back during greater alarms. Callback of personnel has changed historically and more recently become problematic primarily due to high cost of housing in Marin County requiring new employees to find housing in areas with less volatile housing prices. The June 2005 median home price index in Marin County was \$1,033,500. (Westbay Properties, 2005) Callback has also caused personnel to be held-over on a mandatory basis in order to cover the minimum staffing requirements of the NFD.

Prior to 2005, NFD suppression force worked a “Kelly” schedule. On January 1, 2005, District suppression personnel changed to a 2 x 4 work schedule on a one year trial basis. This change was negotiated through a collective bargaining process *Memorandum of Understanding – Novato Professional Firefighters* (Novato Fire District, 2005). The change in work shift from the “Kelly” schedule to the 2 x 4 schedule was consummated primarily due to driving-commute distances and to accommodate employees living far from the District boundaries. At the time of the July 2004 executed labor agreement between represented personnel and NFD Board of

Directors, there were no restrictions placed on the consecutive number of shifts or hours an employee could work. NFD employees are allowed to work overtime and trade scheduled work days with other firefighters. There are no restrictions on the number of trades a firefighter may work annually (except for probationary employees), and no restriction on the number of consecutive 24 hour shifts and employee can work. This agreement allows NFD suppression personnel to work unlimited consecutive days without a day of full rest and rehabilitation. As such, firefighters are working longer hours.

This applied research project is consistent with the United States Fire Administration's (USFA) operational objectives by revealing critical issues that may result in reduction of life loss, accidents, and safety to firefighters. This author investigates the root causes of firefighter accidents and injuries as they relate to various work shift schedules. This research project is related to the Executive Development course of the Executive Fire Officer Program because management decisions implemented through a negotiated labor agreement may require monitoring and modification if evidence exists that suggests safety of firefighters/paramedics may be compromised by selection and adherence to the 2 x 4 work schedule. This research is intended to identify the impact if any, of working consecutive 24 hour shifts as it relates to firefighter safety.

Literature Review

The use of the 24 hour shift schedule by fire departments is not new and is used widely by fire service and medical service providers. (Manacci et al 1999 p.20) Firefighters are required to be available 24/7 and as such, there are a number of shift work schedules that are used (Shirmer and Glazner, 1983 p. 255). These include but are not limited to the 56 hour work week

also called the “Kelley” schedule. This schedule consists of 24 consecutive hours on-duty followed by 24 hours off-duty for three consecutive shifts, followed by 96 hours off-duty. Another shift schedule is referred to as the “2 x 4” or 48/96. This schedule consists of 48 consecutive hours on-duty followed by 96 hours off-duty. According to Coburn and Sirois (1999), there are more than 23 million people working shift work in the United States and this includes factories, hospitals, power plants, railroads, police and fire departments, paper mills and hundreds of other 24 hour operations. (¶ 1)

In an article entitled *Should 24-Hour Shifts Be Allowed?*, arguments pro and con were offered by two authors Gregory M. Lathrop and David P. Thompson . (Airmed, May/June, 1997) Lathrop (1997) argues in favor of air medical pilots and flight nurses working 24-hour shifts suggest “24-hour shifts have proven to be an effective tool with regard to the overall operation of our transport system”. (p. 8)

Lathrop (1997) although arguing against the 24-hour shift schedule suggests:

From a management perspective, 24-hour shifts mean fewer people are needed to provide coverage...Fewer people mean less money spent for benefits. Everyone is looking to save health care dollars, so not paying benefits for two FTE's may be what saves the program.” (p. 11)

Glazner (1996) attempts to identify factors involved in injuries to fire fighters within three municipal fire departments using data from Workers' Compensation forms. Glazner (1996) discovered:

The most frequent injuries involved inhalation of hazardous materials and lacerations. Ninety-two percent of the injuries occurred at the fire scene and their causes were related to firefighting duties such as rescue, extinguishment and overhaul. (p. 255)

Several causes of injuries were reported just due to the nature of shift work according to Glazner, (1996). She reported that “The timing of the highest frequencies of injuries suggest that, due to the shiftwork nature of firefighting, both disruption of eating patterns and fatigue increase the risk of work-related injury to fire fighters.” (p. 255) Glazner further reported that factors such as “altered metabolism (due to disruption) and fatigue (due to time elapsed since awakening, alteration/disruption of sleep-wake pattern or hypoglycemia), interventions can be developed which should decrease the incidence of injuries to firefighters”. (p. 255)

Coburn and Sirois (1999) found that shift workers have “increased health and safety risks... in addition to the health and safety issues faced by their day to day working counterparts.” (§ 2) The authors suggest that “in order to improve health and safety of employees, employers must address additional areas. These fall into two categories: employee lifestyle training and corporate policies and practices”. (§ 2)

Firefighters in essence work all shifts and schedules day and night and swing shift. As such night shift workers have a higher incidence of ulcers, see 1A here. What this piece is saying is that schooling and training is not provided nor any formal preparation on handling these special demands. Fatigue that comes with the job adversely affects attention, judgment, energy, morale, and . According to Coburn and Sirois (1999), they report that “Compared to well rested people, tired people move slower and work less efficiently.... They pay less attention to what they’re doing and take longer to respond to mistakes. (§ 4) Hence, alarm response is slower.

“The Center for Disease Control and Prevention (CDC) recognizes various diseases that are caused by stress, including: heart disease, hypertension, ulcers, colitis, anxiety, depression, allergies, arthritis, cancer, diabetes, gout, migraines, glaucoma, epilepsy, hemorrhoids, asthma, acne, and back pain” (Morshead, 2002, p.36).

According to Morshead (2002), “Shift work also can result in long-term health problems”. (p. 36) Morshead (2002) reports that “physical exercise has been shown to improve sleep quality and reduce stress levels” (p. 36). Morshead (2002) also found that the “quality of sleep is just as important as the quantity”. (p. 36) Sleep deprivation causes a variety of health problems beyond that of just being tired. Changes in eating patterns causing, problems with digestion, and increase alcohol use all contribute to additional feelings of stress. Morshead (2002)

Morsehead (2002) also reported that according to “Occupational Safety and Health Administration data, injuries are caused by errors in judgment and failure to follow protocols when employees are experiencing disruptions in their circadian rhythms” (p. 38).

In a recent study titled *Effects of shift schedules on fatigue and physiological function among firefighters during night duty*, the frequency of ambulance calls at night lead to increased stress and fatigue among paramedics. (Takeyama et al., 2000). The report indicated that “It is assumed that such an irregular sleeping pattern causes many complaints of subjective fatigue, and adversely affects physiological functions.” (p. 1)

According to an Executive Fire Officer (EFO) Applied Research Project Paper (ARP), *The Management Effects of Firefighters Working a Consecutive 48-hour Shift*, Clack (2003) studies the injuries and accidents within the Minneapolis Fire Department. Assistant Chief Clack reports that “the department lost 44 employees in 1999 and 56 more in 2000 due to retirement, resignation or discharge”. (p. 7) “Additionally the Minnesota State Legislature repealed a residency requirement for new firefighters in the year 2000”. Clack (2003) reported “this resulted in both new and existing fire department employees relocating outside the city to find less expensive homes in the suburbs”. (p. 7).

Clack (2003) revealed an increase incidence of injuries in the 48 hour schedule for periods 2001 and 2002 compared to the 24 hour work shift. “The second 24-hour period of the consecutive 48-hour shift shows a 44.4% increase in injuries compared to the first 24-hour period of the same shift”. (p. 19)

The National Fire Protection Association (NFPA) is a non-profit organization dedicated to fire protection code and standards development. NFPA Standard 1500, *Standard on Fire Department Occupational Safety and Health Program* (2002), is a nationally recognized standard that provides guidelines and “emphasis on medical and physical fitness capabilities, the use of incident management, and communication”. (p. 1) Chapter 10 and Chapter 11 of NFPA Standard 1500 outline guidelines for medical and physical requirements as well as member assistance and wellness programs.

NFPA Standard 1582, *Standard on Comprehensive Occupational Medical Program for Fire Departments* (2003) is intended “to reduce the risk and burden of fire service occupational morbidity and mortality while improving the safety and effectiveness of firefighters operating to protect civilian life and property”. (p. 1)

NFPA Standard 1583, *Standard on Health Related Fitness Programs for Fire Fighters* (2000), “provides the minimum requirements for a health-related-fitness program for fire department members who are involved in rescue, fire suppression, emergency medical services, hazardous materials operations, special operations and related activities”. As reported:

The technical committee believes that a health-related fitness program will contribute significantly to reducing firefighter fatalities and injuries. Overweight, out-of-shape firefighters are an accident waiting to happen. The multiple stress factors and rigors of

the profession require firefighters to be medically fit in order to perform the required tasks. (p. 1)

A non published study was conducted by the NFD Safety Committee for periods November 4, 2004 through May 13, 2005. The study results were distributed by NFD Memo 05305 on May 25, 2005. Out of a “population of 91 members, 23 injuries” were reported during that time period. (p.1) Injuries were recorded by time of day; age group; and type of activity.

According to a report by the USFA (2001) entitled *Firefighter Fatalities in 2000*, 102 firefighter fatalities were reported. Sixty three percent were volunteers and 37 percent were career personnel. The report states that “many fire departments in the US are comprised solely of volunteers rather than career personnel”. (p. 2)

A study conducted by Linda K. Glazner (1992), Assistant Professor at the University of California-Los Angeles, attempts to identify similarities and dissimilarities among nurses and firefighters. While there are differences in hospital nursing staff particularly in shift scheduling and incident settings, Glazner (1992) reports that:

Firefighters are subject to rapid, unanticipated transitions from friendly environment of the fire station to the hostile environment of fire. Actual firefighting requires intense physical exertion, mental concentration and a high level of team work in an unpredictable work environment. (p. 46)

Glazner (1992) also reports that disruptions of the circadian rhythms of shift workers and the “effects of shift work on health of firefighters has shown that maladaptation and negative health affects occurred in some firefighters”. (p. 45)

In a report by McCallion and Fazackerley (1991) the authors cite legislation imposing new regulations on the maximum length of shift for shift workers. “New York state recently passed legislation regulating the work hours of residents and interns, possibly paving the way for similar regulation throughout the health-care industry”. (p. 43) McCallion and Fazackerley (1991) indicate that the New York legislation was promulgated out of medical malfeasance and death of a patient largely believed to have been caused by “inadequate medical supervision and resident fatigue”. (p. 43)

This author found remarkable similarity in the culture of the NFD to that reported by McCallion and Fazackerley (1991). Reports on conditions of chronic fatigue among firefighters and EMS personnel were substantiated. According to McCallion and Fazackerley:

Many employees like working shift schedules that allow them to “trade” themselves into a 72-hour shifts so that they can then take a week off....Some EMS personnel moonlight by taking on other jobs or splitting their work among different jurisdiction and cumulatively end up working excessive hours. (p.46)

Excessive overtime and consecutive shift trades poses the question asked by McCallion and Fazackerley (1991), “What quality of care is being delivered by these chronically fatigued workers?” McCallion and Fazackerley contend that the quality of care becomes the issue. “The tendency to become uncaring and irritable to patients, not to mention other public-safety personnel, can also result in complaints and, ultimately, lawsuits, even if the care delivered was technically competent.” (p.46)

In *Public Roads Journal* (September/October 2003), a journal “featuring developments in Federal highway policies, programs, and research and technology”, Sullivan (2003) wrote “to improve the safety of the transportation system, multimodal partnerships within the USDOT are

addressing problems caused by sleep deprivation”. (§1) In that article, Sullivan (2003) states that “one person’s lack of sleep can contribute to another’s lack of safety on the Nation’s roads”.

Sullivan references links made by the National Transportation Safety Board between “operator fatigue with a number of costly public incidents, including the Exxon Valdez grounding and the collision of subway trains on the Williamsburg Bridge in New York City”. (§ 2)

“Sleep deprivation and operator fatigue are critical safety issues that cut across all mode of the transportation industry”. (Sullivan 2003 § 3). Sullivan also reports that “fatigue affects physical and mental alertness, decreasing an individual’s ability to operate a vehicle safely and increasing the risk of human error that could lead to fatalities and injuries.”

An EFO ARP by Assistant Chief Bill Holmes of the California Department of Forestry and Fire Protection (September 2002) studied the effects of the 24 hour shift on wildland fire fighters. Holmes (2002), references an excerpt from the post incident investigation report “where four US Forest Service firefighters were burned to death on the Thirtymile Fire near Winthrop Washington. The single overwhelming physiological factor that impacted upon this mishap was fatigue caused by sleep deprivation”. (p. 9)

An EFO ARP by Assistant Chief James Clack (2003) discovered the number of vehicle accidents over the same period 2001-2002 in the Minneapolis Fire Department were also distinguishably different between the 24 and 48 hour work shift. Clack’s findings revealed that the vehicle accident rate was greater on the 48 hour shift (.1276 accidents per shift compared to the 24 hour work shift .0924). Clack (2003) also provided differentiation between accidents occurring on the first versus the second 24 hour work shift. Clack (2003) identified that “accidents occurring during the 2nd 24 hours of the 48-hour shift were 112.9% higher than those occurring during the days that the 24-hour shift was working”. (p. 21)

Clack's research also discovered that:

motor vehicle accidents were higher during non-emergency operations than during an emergency run. Accidents occurring during the first 24 hours of the 48 hour shift occurred 11.9% less than the accidents recorded among firefighters assigned to the 24 hour shift". (p. 21)

Stokowski (2004), addresses fatigue and sleep deprivation among nursing staff at the 7th Annual Neonatal Advance Practice Nursing Forum 2004. Stokowski (2004) differentiates sleeplessness and fatigue and purports that they are "often used interchangeably, although they are not precisely the same thing. ... Fatigue is the desire or disinclination to continue performing the task at hand. It is a weariness that can be caused by either mental or physical exertion". (¶ 3) She further indicates that "a person can be fatigued without being sleepy". (¶ 3)

Stokowski, (2004) also reports that "reduced vigilance, reaction time, memory, psychomotor coordination, and decision making are the traits of the sleepy individual". (¶ 4) Other signs and symptoms found common to sleep deprivation include: "Increased negativity and irritability, bad mood; Inability to concentrate; Lack of energy; Short term memory loss; Apathy; Poor communication; and Perseveration on ineffective solutions". (¶ 5)

Stokowski (2004), reports the following on the association of fatigue and impairment: Most Nurses would never dream of going to work after having a couple of alcoholic drinks. The same nurses, however, might not think twice about pulling a double shift or going without sleep for as long as 24 hours.....Alarming, though, studies show that when an individual has been awake for as few as 17 hours straight, their cognitive and psychomotor performance deteriorates to equal that of someone with a blood alcohol level of .05%. (¶ 11)

Stokowski (2004) found that “despite a lack of research linking fatigue among nurses and nurse practitioners to errors in patient care, there is a substantial body of research concerning fatigue-related performance degradation and error in other industries”. (§ 17) Fatigue related injuries in other industries also exist. She reported that “according to the National Transportation Safety Board, 21% of those incidents reported are attributed to pilot fatigue”. (§ 17)

Meirovitz (1991) identifies two key management and labor issues surrounding the current 24-hour shift and any future shift schedule changes. One management issue according to “Gary Olsen Deputy Chief of Operations for the Long Beach Fire Department, California” (p. 45) is the cost of increased staffing to go from 24-hour shifts to 8-hour shifts. In that article Chief Olsen indicates “that it would be difficult to retain current employees if the department was to convert to an eight hour shift.” (p.45) According to “Bill Wells, a paramedic supervisor at the Los Angeles City Fire Department”, labor issues would include “union politics and policies” which are subject to the California State Labor Code. Any change in shift schedules would “require the agreement of the employees’ association or union”. (p.45)

The NFPA, Fire Analysis and Research Division, publish annually a report on *Firefighter Fatalities in the United States*. The 2004 report by LeBlanc and Fahy (June, 2005) includes firefighter fatality statistics of:

any injury sustained in the line of duty that proves fatal, any illness that was incurred as a result of actions while on duty that proves fatal, and fatal mishaps involving non emergency occupational hazards that occur while on duty. (p. 1)

The report categorizes firefighter injuries based on those which occur at incidents, those which occur while training, and those accidents which occur responding to or returning from an alarm. Unfortunately, as with most of the research reviewed and available to this author,

incomplete data exists with respect to long-term job related illness not reported under the types of injuries categorized by the NFPA report. As such:

The NFPA recognizes that a comprehensive study of firefighter on-duty fatalities would include chronic illnesses (such as cancer) that prove fatal and that arise from occupational factors. In practice, there is as yet no mechanism for identifying fatalities that are due to illnesses that develop over long periods of time. This creates an incomplete picture when comparing occupational illnesses to other factors as causes of firefighter deaths. This is recognized as a gap the size of which cannot be identified at this time because of limitations in tracking the exposure of firefighters to toxic environments and substances and the potential long term effects of such exposures. (p. 1)

Procedures

The Research Method

The research methods to be utilized for this applied research project are literary reviews of periodicals, journals, reports, internet sites, Executive Fire Officer Applied Research Project research papers, and from an electronic questionnaire email to various non-selective California Fire Departments.

To answer research question number 1, an email questionnaire instrument (Appendix A), was distributed through the California Fire Chief's membership list. Prior to distribution of the questionnaire, this author convened the input from 5 California Fire Chiefs in order to validate the instrument. A follow-up telephone interview was conducted with one of the fire departments who responded to the questionnaire that indicated their organization monitors accidents, injuries, and illnesses based on shift duration.

To answer question number 2, the researcher used blind subject data from injury and illness reports, and by reviewing data from OSHA Form 300 and Novato Fire District AD69 forms. Datum was extracted from the reports and formatted in tables for analysis. Data was compared against individual employee time sheets to determine shift duration-elapsed time from beginning of shift.

To answer question number 3, the researcher used literary reviews of periodicals, journals, reports, internet sites, and EFO ARP's obtained through the National Fire Academy Learning Resource Center.

Limitations and Assumptions

Departments that responded to the electronic questionnaire instrument indicated that few track accidents, injuries and illness based on consecutive number of shifts worked. Due to limited information and data surrounding this area of concern, this researcher used additional data from other industries and professions.

Due to the Federal Health Insurance Portability and Accountability Act (HIPPA), this author was not able to confirm specific personal injury and accident data by reviewing personnel medical records. One component of HIPPA is a federal privacy standard designed to protect patient's medical records and other health information provided to health plans, doctors, hospitals, and other health care providers which became effective April 14, 2003. The result of the data is based solely on blind subject documentation provided by the employee and what was listed in the OSHA Form 300 and AD69 reports.

Definition of Terms

ALS Transport – Advanced life support emergency medical services with transportation to a medical facility.

2 x 4 Shift Schedule – A firefighter work schedule consisting of 48 consecutive hours on duty followed by 96 consecutive hours off duty.

Form AD69 – A report form used by the NFD to document Personal Injury-Illness Investigations.

HIPPA – Health Insurance Portability and Accountability Act of 1996. Enacted by Public Law 104-191 found in CFR Title 45- Public Welfare Code, amends the Internal Revenue Code of 1986 to among other things, improve portability and continuity of health insurance coverage in the group of individual markets, to combat waste, fraud and abuse in health insurance and health care delivery, and to simplify the administration of health insurance.

Kelly Shift Schedule – A firefighter work schedule consisting of 24 hours on duty followed by 24 hours off duty for three consecutive shifts followed by 96 hours off duty. This work schedule is also known as the 56 hour work week.

OSHA Form 300 - *Log of Work Related Injuries and Illnesses – An Occupational Safety and Health Administration Reporting Form*, provides employers a format for reporting information about every work related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid.

Type I Engine – An Engine generally used for structural firefighting with a minimum 1,000 gallon per minute pump and 400 gallon water tank with specific hose, ladder, and personnel complements in accordance with the Field Operations Guide ICS 420-1 Incident Command Publication published by the California Office of Emergency Services (Firescope. Riverside, CA, June, 2004).

Type III Engine - An Engine generally used for wildland firefighting with a minimum 120 gallon per minute pump and 300 gallon water tank with specific hose, ladder, and personnel complements in accordance with the Field Operations Guide ICS 420-1 Incident Command Publication published by the California Office of Emergency Services – Firescope. Riverside, CA, June, 2004.

Results

1. What in line of duty accidents have occurred in other similar size fire departments with similar shift work schedules, and on what numbered consecutive shift did the accident occur?

This author obtained information through an email questionnaire instrument (Appendix A) electronically sent to members of the California Fire Chief’s Association. Of the 23 responses, only one department in Paso Robles, California tracked worker compensation injuries relative to the number of consecutive hours worked by an employee. In a telephone follow-up interview with Fire Chief Kevin Taylor of the Paso Robles Fire Department (personal interview October 11, 2005), when asked about the timing of the injuries the department tracked, stated “the two injuries that occurred in 2004, both occurred on the second consecutive 24 hour shift”. Further review of medical or injury reports to verify this data was not conducted by this author.

Departments that responded to the questionnaire varied in size. Nine (9) departments reported that they employ between 0-50 career personnel. Seven (7) departments reported that they had between 50 and 100 career personnel. Five (5) departments reported that they had between 100-150 career personnel. Two (2) departments reported that they had over 150 personnel.

Eighteen (18) departments responding to the questionnaire reported that they employed both firefighter paramedic services and five (5) departments reported that they only employed firefighters. When questioned if the departments provide limitations on the number of consecutive hours/shifts worked, twelve (12) departments reported that they did and eleven (11) departments reported that they did not limit the number of consecutive shifts worked.

Of the departments that stated they limit the number of shifts/hours worked nine (9) indicated that they have written policies that state same. Of the 23 departments that responded to the questionnaire, 11 departments (48%) indicated that they have no restrictions on the number of consecutive shifts personnel are allowed to work. Table 1 illustrates the number of consecutive 24-hour shifts allowed by department.

Table 1.

Consecutive Number of 24-hour Shifts by Department

Number of consecutive shifts	2	3	3.5	4	5	14	No limit
Number of Departments	0	5	1	4	1	1	11

Two work schedules were predominant among departments who responded to the email questionnaire. Of the departments that responded, 57% reported personnel work the 2 x 4 shift schedule and 30% indicated their personnel work a “Kelley” schedule. Remaining other shift schedules made up 13% of the responses.

Table 2 illustrates the number of departments that work a specific shift schedule:

Table 2.

Department Responses to Type of Shift Schedule

<u>Shift Schedules</u>	<u>Number of Departments</u>	<u>Depts. by %</u>
3/3/4	1	4.3
2 x 4	13	57
Kelly 56	7	30
4/4, 4/6	1	4.3
3/4	1	4.3
Totals	23	100%

2. What in line of duty accidents have occurred in the Novato Fire Protection District, and on what numbered consecutive 24 hour shift?

This author found that data collected by the NFD Safety Committee does not track accidents, injuries, and illness by length of consecutive hours worked. The most recent accident, injury and illness report conducted by the NFD Safety Committee was for the period November 4, 2004 to May 13, 2005 and recorded 23 injuries out of a total population of 91 personnel. As such, the author reviewed individual blind subject OSHA Form 300 and AD69 reports for that time period and from which the committee extracted reported statistics. The author noted the dates, time of injury, personnel rank, subject age, and location of the accident/injury to correlate personnel time sheets.

Table 3 illustrates the time elapsed from the start of shift to time of injury. The information is presented in average, high, low, and median terms by age of employee and elapsed time.

Table 3

Novato Fire District Injury Statistics from November 4, 2004 to May 13, 2005.

	<u>Employee Age</u>	<u>Elapsed Time*</u>
Average	37	19:07:57
High	58	72:30:00
Low	26	00:00:00
Median	36	8:30:00

Note: Elapsed time from start of shift. Shift begins at 0730 hours.

Table 4 identifies the injury by time of day. Interestingly, 61% of the injuries reported during the time period November 4, 2004 to May 13, 2005, occurred between 0730 and 1330 hours.

Seventeen percent of the injuries occurred between the hours of 1331 and 1930 hours. No injuries were reported between the hours of 1931 and 0130 hours. Twenty two percent of the injuries occurred between the hours of 0131 and 0729 hours.

Table 4.

*NFD Injury by Time of Day**

<u>Time of Day</u>	<u>0730-1330</u>	<u>1331-1930</u>	<u>1931-0130</u>	<u>0131-0729</u>
Number of Injuries	14	4	0	5

Note: Injury Statistics from November 4, 2004 to May 13, 2005. Shift begins at 0730 hours.

3. What factors contribute to the injury of firefighters working shift schedules?

The NFD Safety Committee (2005) reported that six (6) of the injuries reported were attributed to physical fitness activities. Nine (9) of the injuries reported by the NFD Safety Committee were attributed to incident activities. Ten (10) of the injuries reported were attributed to lifting or carrying heavy objects.

LeBLanc and Fahy (2005) report that 2004 recorded the lowest fatality statistics for firefighters on the fire ground since NFPA began collecting statistics in 1977. (p. 2) “Stress and overexertion, which usually results in heart attacks or other sudden cardiac events continued to be the leading cause of fatal injury, as it has been in almost all the years of this study. (p.3)

Table 5 provides an abbreviated illustration of firefighter fatality statistics for calendar year 2004 as reported by NFPA. (p. 14 Table 1)

Table 5.

Comparison of on Duty Deaths between Career and Volunteer Municipal Firefighters

	Career Firefighters		Volunteer Firefighters	
	Number of Deaths	Percent of Deaths	Number of Deaths	Percent of Deaths
Type of duty				
Operating at fire ground	10	34%	15	24%
Responding to or returning from alarm	8	28	25	40
Cause of fatal injury				
Stress	10	34%	38	60%
Struck by or contact with object	6	21	16	25
Caught or trapped	10	34	2	3
Nature of fatal injury				
Sudden cardiac death	9	31%	35	56%
Internal trauma	7	24	16	25
Asphyxiation	5	17	0	0

Note: Source 2004 national statistics as reported by NFPA. (p. 14, Table 1)

Clack (2003) studied the injuries and accidents within the Minneapolis Fire Department with respect to fighters working a consecutive 48-hour shift. Assistant Chief Clack found that “the department lost 44 employees in 1999 and 56 more in 2000 due to retirement, resignation or discharge”. (p. 7) “Additionally the Minnesota State Legislature repealed a residency requirement for new firefighters in the year 2000”. Clack (2003) reported “this resulted in both

new and existing fire department employees relocating outside the city to find less expensive homes in the suburbs”. (p. 7).

Clack (2003) revealed an increase incidence of injuries in the 48 hour schedule for periods 2001 and 2002 compared to the 24 hour work shift. “The second 24-hour period of the consecutive 48-hour shift shows a 44.4% increase in injuries compared to the first 24-hour period of the same shift”. (p. 19)

Discussion

Research conduct by this author indicates prodigious studies on worker fatigue and sleep deprivation have been conducted. Evidence exists through scientific research and empirical datum that stress and sleep deprivation cause adverse chronic and acute health affects.

Morshead (2002) reports that “the cost of sleep-related accidents is estimated to be \$16 billion in the United States each year in reduced productivity and efficiency.” (p. 38) According to Coburn and Sirois (1999), “To reduce or eliminate these costs requires a comprehensive program that addresses the operational, physiological, and sociological factors”. (¶ 3)

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Fire Department by Clack (2003) provides similar alignment with that which occurred in the NFD in 2004, prior to the execution of the 2005 MOU.

Clack (2003) revealed an increase incidence of injuries in the 48 hour schedule for periods 2001 and 2002 compared to the 24 hour work shift. “The second 24-hour period of the consecutive 48-hour shift shows a 44.4% increase in injuries compared to the first 24-hour period of the same shift”. (p. 19)

Clack’s (2003) injury statistic and relevance finding is significant to the research problem statement contained within this applied research project.

Sullivan (2003) indicates that the Federal Motor Carrier Safety Administration (FMCSA) initiated regulations governing the driving times for trucking industry as follows:

In April 2003, the (FMCSA) issued the first significant revision to the hours-of-service regulations in more than 60 years. The new regulations – which allow truckers to drive up to 11 hours after 10 consecutive hours off duty – provide an increased opportunity for drivers to obtain rest and restorative sleep, and at the same time reflect operational realities of motor carrier transportation. (§ 19)

The FMCSA regulations were promulgated according to Sullivan (2003), because the research has shown that “sleepiness impairs driving performance, affecting reaction time, vigilance, attention, and information processing”. In addition, he states that “fatigue and sleep deprivation also affect other transportation operators such as railroad engineers, airline pilots, and ship captains”. (§ 3)

Clack (2003) discovered the number of vehicle accidents over the same period 2001-2002 in the Minneapolis Fire Department were also distinguishably different between the 24 and 48 hour work shift. Clack’s findings revealed “accidents occurring during the 2nd 24 hours of the 48-

hour shift were 112.9% higher than those occurring during the days that the 24-hour shift was working”. (p. 21)

Clack’s research also discovered that:

Motor vehicle accidents were higher during non-emergency operations than during an emergency run. Accidents occurring during the first 24 hours of the 48 hour shift occurred 11.9% less than the accidents recorded among firefighters assigned to the 24 hour shift”. (p. 21)

Even though evidence exists that fatigue impacts cognitive thinking and critical motor skills, “outside of the wildland setting”, there exist no regulations governing firefighter operational periods. (Pond, 2003, p.36)

Other than self imposed restrictions for departments that responded to the author’s questionnaire, few restrict length of an operational shift or maximum set of consecutive shifts. If stress and fatigue create increased incidence in accidents and health problems as suggested by the literature, it seems a prudent and responsible management practice to monitor if not regulate shift duration for firefighters.

This author found remarkable similarity in the culture of the NFD to that reported by McCallion and Fazackerley (1991). Reports on conditions of chronic fatigue among firefighters and EMS personnel were substantiated. According to McCallion and Fazackerley:

Many employees like working shift schedules that allow them to “trade” themselves into a 72-hour shifts so that they can then take a week off....Some EMS personnel moonlight by taking on other jobs or splitting their work among different jurisdiction and cumulatively end up working excessive hours. (p.46)

Excessive overtime and consecutive shift trades poses the question asked by McCallion and Fazackerley (1991), “What quality of care is being delivered by these chronically fatigued

workers?” McCallion and Fazackerley contend that the quality of care becomes the issue. “The tendency to become uncaring and irritable to patients, not to mention other public-safety personnel, can also result in complaints and, ultimately, lawsuits, even if the care delivered was technically competent.” (p.46)

The literature identifies a question of quality of the care provided by firefighters and EMS personnel who are subjected long shift durations. This too, albeit difficult to quantify should be the subject of study.

Holmes (2003) analyzed the impacts of 12 and 24-hour operational shifts as they pertain to wildland fires. He reviewed and cited numerous wildland fire fatality incidents nationwide and discovered:

Almost 100% of the CDF Fire subject matter experts felt firefighters were working much more than 12-hours per shift, usually 18 hours, and firefighters were not getting eight hours of sleep or adequate rest... They felt that there was not enough off shift time to take care of the crew, equipment and personal needs plus sleep. (p. 37)

Holmes (2003) research regarding the appropriate shift duration for wildland firefighters, suggests the following:

There seems to be very solid opinion by the CDF Fire subject matter experts, US Forest Service reports and literature cited that the 12-hour shift is the shift of choice one the fire, or any portion of the fire, is contained and/or there is a safety reason not to use the night shift. (p. 42)

Holmes (2003) also suggests that through his survey of CDF Fire subject matter experts for his research on this issue, “one benefit of the 12-hour shift is that it allows one shift to be staffed heavier than the other, such as a heavy day shift and lightly staffed night shift”. (p. 42)

According to Coburn and Sirois (1999), “Safe operations depend on three factors: performance, attentiveness and alertness”. (¶ 7) The authors indicate that management generally focuses on performance reviews. What the authors suggest is missing is training on accident prevention and training people to stay alert at the required level. What is also interesting to note is that “in most cases, the length of shift is far less important than the time of day being worked”. (¶ 15) This finding appears to be contrary to preponderance of research conducted by this author.

Conclusions from the USFA (2001) report suggest that by continuing to study trends in firefighter fatalities overtime, “new prevention strategies can be developed to reduce the terrible toll to firefighters”. (Conclusions, ¶ 2) While this is certainly true, additional data should be collected by USFA and documented nationwide with respect to duration of the shift worked.

Unfortunately, NFPA Standards 1500, 1581, nor 1582, neither address firefighter stress nor fatigue to critical medical conditions that other researchers have found to be distinct cause and origin of injury and accidents.

While the NFD injury, illness, and accident investigations attempt to identify the root cause of the injury or accident, there is no review of the number of awake hours or uninterrupted sleep hours based on call volume.

Recommendations

The suggests the following recommendations to help the NFD determine if duty related accidents, injuries, and illnesses have any direct or indirect correlation to the number of consecutive shifts worked.

1. The NFD should include in its Injury and Illness Prevention Program safety review of statistics on accidents, injuries and illness the duration of the shift worked prior to the reported injury or illness. This will provide empirical data needed to track accidents, injuries, and illnesses and may assist in determining if trends exist or if fatigue is a root cause of the accident or injury. Additionally it will provide management and labor with supplemental information that may assist in making decisions, based on fact and empirical data, to determine if fatigue or sleep deprivation is, or may be, a root cause of accidents occurring due to consecutive 24-hour shifts. This data, if shared with other fire agencies, may assist in determining long term impacts and affects of working multiple consecutive 24 hour shifts.

2. The NFD should collect accident, injury, and illness statistics on an annual basis with quarterly reports. This will assist management and the NFD Safety Committee to help determine if seasonal variations exist based on types of service provided.

3. Tracking of US firefighter accidents, injuries, and illness nationwide should be conducted by the US Fire Administration (USFA) and the National Fire Protection Association (NFPA). Although the USFA and NFPA provide annual firefighter accident, injury, and illness statistics and reporting, these organizations should consider adding the shift duration element in their data collection to determine if any correlation exists. This will provide empirical data necessary in determining if fatigue or sleep deprivation is a root cause of the accident or injury. Such statistics might also prove significant to NFPA Technical Committees in revising existing standards.

4. Shift duration should be included as a required data field in the National Fire Incident Reporting System (NFIRS) when reporting accidents, injuries, and illness of firefighters.

5. Duration of shift worked prior to a reported accident, injury, or illness should be tracked by OSHA and NIOSH. For OSHA, collecting this information may require enacting legislation. However, this could be included in the agency reporting forms. Tracking and reporting such data may assist NIOSH and OSHA in developing standards and regulations concerning firefighter/paramedic maximum shift duration similar to those regulations imposed by the National Transportation Safety Board on trucking and aviation industries.

6. Additional research should be conducted in the area of firefighter fatigue and sleep-deprivation with respect to accidents, injuries, and illness and shift duration.

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Appendix A

Work Schedule and On-duty Injury Questionnaire

Name _____ Date _____

Department _____

Address _____

City, State, Zip _____

Contact telephone number _____ Email _____

Instructions: Answer the following questions by placing a check mark on the appropriate line or by providing the requested information.

1. Number of personnel in your organization _____ .

1.1 Does your department deliver paramedic service? _____ Yes _____ No

2. What is the standard work shift schedule for firefighters and/or paramedics in your organization? (Check the appropriate line(s) below)

Firefighter	Paramedic	
_____	_____	2 x 4 (48hrs on 96 hrs off)
_____	_____	56 hour work week "Kelly Schedule"
_____	_____	10-14's?
_____	_____	Other schedule? Please state. _____

3. Do you limit the number of consecutive shifts/hours firefighter/paramedics can work?
 _____ Yes _____ No

4. If yes, do you have policies that state same? _____ Yes _____ No

5. If yes, to #3 above what is the number of consecutive shifts/hours allowed? _____

6. Do you track worker comp related injuries relative to the number of consecutive shifts or number of consecutive hours worked by an employee? _____ Yes _____ No

7. If yes to #6 above are you willing to share this information (following the guidelines and limits of HIPAA)? _____ Yes _____ No

Please return this survey to: Forrest M. Craig, Division Chief
 Novato Fire Protection District
 95 Rowland Way, Novato, CA 94945
 Ph (415) 878-2603 Fx (415) 878-2660
fcraig@novatofire.org

Appendix B

Responses to the Work Schedule and On-duty Injury Electronic Questionnaire

Name Mark D'Ambrogi Date 9/29/05

Department Auburn City Fire Department

Address 1225 Lincoln Way

City, State, Zip Auburn, CA 95603

Contact telephone number 530-823-4211 ext172 Email mdambrogi@auburn.ca.gov

Instructions: Answer the following questions by placing a check mark on the appropriate line or by providing the requested information.

1. Number of personnel in your organization 32 .

1. Does your department deliver paramedic service? _____ Yes No

2. What is the standard work shift schedule for firefighters and/or paramedics in your organization? (Check the appropriate line(s) below)

Firefighter	Paramedic	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2 x 4 (48hrs on 96 hrs off)
<input type="checkbox"/>	<input type="checkbox"/>	56 hour work week "Kelly Schedule"
<input type="checkbox"/>	<input type="checkbox"/>	10-14's?
<input type="checkbox"/>	<input type="checkbox"/>	Other schedule? Please state. _____

3. Do you limit the number of consecutive shifts/hours firefighter/paramedics can work?
 _____ Yes No

4. If yes, do you have policies that state same? _____ Yes _____ No

5. If yes, to #3 above what is the number of consecutive shifts/hours allowed? _____

6. Do you track worker comp related injuries relative to the number of consecutive shifts or number of consecutive hours worked by an employee? _____ Yes No

7. If yes to #6 above are you willing to share this information (following the guidelines and limits of HIPAA)? Yes _____ No

Name Derek Witmer Date 10-02-2005

Department South Santa Clara County Fire Dist.

Address 15670 Monterey Rd

City, State, Zip Morgan Hill, Ca 95037

Contact telephone number 408-779-2121 Email Derek.witmer@fire.ca.gov

Instructions: Answer the following questions by placing a check mark on the appropriate line or by providing the requested information.

1. Number of personnel in your organization 22 .

1. Does your department deliver paramedic service? Yes No

2. What is the standard work shift schedule for firefighters and/or paramedics in your organization? (Check the appropriate line(s) below)

Firefighter	Paramedic	
_____	_____	2 x 4 (48hrs on 96 hrs off)
_____	_____	56 hour work week "Kelly Schedule"
_____	_____	10-14's?
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Other schedule? Please state. 72 hour on 96 off _____

3. Do you limit the number of consecutive shifts/hours firefighter/paramedics can work?
 Yes No

4. If yes, do you have policies that state same? Yes No

5. If yes, to #3 above what is the number of consecutive shifts/hours allowed? 14

6. Do you track worker comp related injuries relative to the number of consecutive shifts or number of consecutive hours worked by an employee? _____ Yes No

7. If yes to #6 above are you willing to share this information (following the guidelines and limits of HIPAA)? Yes No

Name Derek Witmer Date 10-02-2005

Department South Santa Clara County Fire Dist.

Address 15670 Monterey Rd

City, State, Zip Morgan Hill, Ca 95037

Contact telephone number 408-779-2121 Email Derek.witmer@fire.ca.gov

Instructions: Answer the following questions by placing a check mark on the appropriate line or by providing the requested information.

1. Number of personnel in your organization 22.

1. Does your department deliver paramedic service? Yes _____ No

2. What is the standard work shift schedule for firefighters and/or paramedics in your organization? (Check the appropriate line(s) below)

Firefighter	Paramedic
_____	_____ <u>2 x 4 (48hrs on 96 hrs off)</u>
_____	_____ <u>56 hour work week "Kelly Schedule"</u>
_____	_____ <u>10-14's?</u>
<input checked="checked" type="checkbox"/> X	<input checked="checked" type="checkbox"/> X <u>Other schedule? Please state. 72 hour on 96 off</u> _____
_____	_____

3. Do you limit the number of consecutive shifts/hours firefighter/paramedics can work?
 Yes _____ No

4. If yes, do you have policies that state same? Yes _____ No

5. If yes, to #3 above what is the number of consecutive shifts/hours allowed? 14

6. Do you track worker comp related injuries relative to the number of consecutive shifts or number of consecutive hours worked by an employee? _____ Yes No

7. If yes to #6 above are you willing to share this information (following the guidelines and limits of HIPAA)? Yes _____ No

Name Ken Massucco Date 10-3-05

Department Marin County Fire Department

Address PO Box 518/33Castlerock Rd.

City, State, Zip Woodacre, CA 94973

Contact Telephone number 507-4100

Instructions: Answer the following questions by placing a check mark on the appropriate line.

- 1. Do have firefighter paramedics in your department? Yes No
- 2. What is the standard work shift schedule for firefighter paramedics? (check one below)
 - 2 x 4 (48hrs on 96 hrs off)
 - 56 hour work week "Kelly Schedule"
 - 10-14's?
 - Other schedule? Please state. _____

3. Do you limit the number of consecutive shifts firefighter/paramedics can work?
 Yes No

4. If yes, do you have policies that state same? Yes No

5. If yes, to #3 above what is the number of consecutive shifts/hours allowed? _____

6. Do you track worker comp related injuries relative to the number of consecutive shifts or number of consecutive hours worked by an employee? _____ Yes No

7. If yes to #6 above are you willing to share this information (following the guidelines and limits of HIPAA)? Yes No

Name Ron Vega Date Oct. 6, 2005

Department Santa Clara County Fire Department

Address 14700 Winchester Blvd.

City, State, Zip Los Gatos, CA 95032

Contact telephone number 408-341-4413 Email ron.vega@cnt.sccgov.org

Instructions: Answer the following questions by placing a check mark on the appropriate line or by providing the requested information.

1. Number of personnel in your organization 230 safety/ 40 non-safety_____ .

1. Does your department deliver paramedic service? X____ Yes _____ No

2. What is the standard work shift schedule for firefighters and/or paramedics in your organization? (Check the appropriate line(s) below)

Firefighter	Paramedic	
_____	_____	2 x 4 (48hrs on 96 hrs off)
<u>X</u>	X_____	56 hour work week "Kelly Schedule"
_____	_____	10-14's?
_____	_____	Other schedule? Please state. _____

3. Do you limit the number of consecutive shifts/hours firefighter/paramedics can work?
X____ Yes _____ No

4. If yes, do you have policies that state same? X____ Yes _____ No

5. If yes, to #3 above what is the number of consecutive shifts/hours allowed? 72 hrs.

6. Do you track worker comp related injuries relative to the number of consecutive shifts or number of consecutive hours worked by an employee? _____ Yes X____ No

7. If yes to #6 above are you willing to share this information (following the guidelines and limits of HIPAA)? ___ Yes _____ No

Name Michael T. Barrows Date 10/7/2005

Department Sonora Fire Department

Address 201 South Shepherd St.

City, State, Zip Sonora CA 95370

Contact telephone number (209) 532-7432 Email barrows@sonoraca.com

Instructions: Answer the following questions by placing a check mark on the appropriate line or by providing the requested information.

1. Number of personnel in your organization 30 .

1. Does your department deliver paramedic service? _____ Yes XX No

2. What is the standard work shift schedule for firefighters and/or paramedics in your organization? (Check the appropriate line(s) below)

Firefighter	Paramedic	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2 x 4 (48hrs on 96 hrs off)
<input type="checkbox"/>	<input type="checkbox"/>	56 hour work week "Kelly Schedule"
<input type="checkbox"/>	<input type="checkbox"/>	10-14's?
<input type="checkbox"/>	<input type="checkbox"/>	Other schedule? Please state. _____

3. Do you limit the number of consecutive shifts/hours firefighter/paramedics can work?

Yes No

4. If yes, do you have policies that state same? Yes No

5. If yes, to #3 above what is the number of consecutive shifts/hours allowed? 5

6. Do you track worker comp related injuries relative to the number of consecutive shifts or number of consecutive hours worked by an employee? Yes No

7. If yes to #6 above are you willing to share this information (following the guidelines and limits of HIPAA)? Yes No

Name Paul D. Smith Date 10-23-05

Department Kentfield Fire Protection District

Address 1004 Sir Francis Drake Blvd

City, State, Zip Kentfield, CA 94904

Contact telephone number 415 453-7464 Email psmith@kentfieldfire.org

Instructions: Answer the following questions by placing a check mark on the appropriate line or by providing the requested information.

1. Number of personnel in your organization 36 .

1. Does your department deliver paramedic service? Yes No

2. What is the standard work shift schedule for firefighters and/or paramedics in your organization? (Check the appropriate line(s) below)

Firefighter	Paramedic	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2 x 4 (48hrs on 96 hrs off)
<input type="checkbox"/>	<input type="checkbox"/>	56 hour work week "Kelly Schedule"
<input type="checkbox"/>	<input type="checkbox"/>	10-14's?
<input type="checkbox"/>	<input type="checkbox"/>	Other schedule? Please state. _____

3. Do you limit the number of consecutive shifts/hours firefighter/paramedics can work?

Yes _____ No

4. If yes, do you have policies that state same? Yes _____ No

5. If yes, to #3 above what is the number of consecutive shifts/hours allowed? 72hrs _____

6. Do you track worker comp related injuries relative to the number of consecutive shifts or number of consecutive hours worked by an employee? _____ Yes _____ No

7. If yes to #6 above are you willing to share this information (following the guidelines and limits of HIPAA)? ___ Yes _____ No

Forrest, since going to 2x4 we have only had one new 4850 injury.

Name Bill Metcalf Date September 29, 2005

Department North County Fire Protection District

Address 315 E. Ivy Street

City, State, Zip Fallbrook, CA 92028

Contact telephone number 760-723-2012 Email wmetcalf@ncfire.org

Instructions: Answer the following questions by placing a check mark on the appropriate line or by providing the requested information.

1. Number of personnel in your organization 92 .

1. Does your department deliver paramedic service? Yes _____ No

2. What is the standard work shift schedule for firefighters and/or paramedics in your organization? (Check the appropriate line(s) below)

Firefighter	Paramedic	
_____	_____	2 x 4 (48hrs on 96 hrs off)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	56 hour work week "Kelly Schedule"
_____	_____	10-14's?
_____	_____	Other schedule? Please state. _____

3. Do you limit the number of consecutive shifts/hours firefighter/paramedics can work?

_____ Yes No

4. If yes, do you have policies that state same? _____ Yes _____ No

5. If yes, to #3 above what is the number of consecutive shifts/hours allowed? _____

6. Do you track worker comp related injuries relative to the number of consecutive shifts or number of consecutive hours worked by an employee? _____ Yes No

7. If yes to #6 above are you willing to share this information (following the guidelines and limits of HIPAA)? Yes _____ No

Name Paul L. Benson, Fire Chief Date 09/29/05

Department Chino Valley Independent Fire District

Address 2005 Grand Ave

City, State, Zip Chino Hills, CA 91709

Contact telephone number (909) 902-5260 Email pbenson@chofire.org

Instructions: Answer the following questions by placing a check mark on the appropriate line or by providing the requested information.

1. Number of personnel in your organization 115.

1. Does your department deliver paramedic service? Yes _____ No

2. What is the standard work shift schedule for firefighters and/or paramedics in your organization? (Check the appropriate line(s) below)

Firefighter	Paramedic
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> 2 x 4 (48hrs on 96 hrs off)
_____	_____ 56 hour work week "Kelly Schedule"
_____	_____ 10-14's?
_____	_____ Other schedule? Please state. _____

3. Do you limit the number of consecutive shifts/hours firefighter/paramedics can work? Yes _____ No

4. If yes, do you have policies that state same? Yes _____ No

5. If yes, to #3 above what is the number of consecutive shifts/hours allowed? 96

6. Do you track worker comp related injuries relative to the number of consecutive shifts or number of consecutive hours worked by an employee? _____ Yes No

7. If yes to #6 above are you willing to share this information (following the guidelines and limits of HIPAA)? N/A Yes _____ No

Name Kevin Smith Date 9/29/05

Department El Segundo Fire Dept.

Address 314 Main Street

City, State, Zip El Segundo, CA 90245

Contact telephone number 310-524-2219 Email Ksmith@elsegundo.org

Instructions: Answer the following questions by placing a check mark on the appropriate line or by providing the requested information.

1. Number of personnel in your organization 54 .

1. Does your department deliver paramedic service? Yes No

2. What is the standard work shift schedule for firefighters and/or paramedics in your organization? (Check the appropriate line(s) below)

Firefighter	Paramedic	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2 x 4 (48hrs on 96 hrs off)
<input type="checkbox"/>	<input type="checkbox"/>	56 hour work week "Kelly Schedule"
<input type="checkbox"/>	<input type="checkbox"/>	10-14's?
<input type="checkbox"/>	<input type="checkbox"/>	Other schedule? Please state. _____

3. Do you limit the number of consecutive shifts/hours firefighter/paramedics can work? Yes No

4. If yes, do you have policies that state same? Yes No

5. If yes, to #3 above what is the number of consecutive shifts/hours allowed? n/a

6. Do you track worker comp related injuries relative to the number of consecutive shifts or number of consecutive hours worked by an employee? Yes No

7. If yes to #6 above are you willing to share this information (following the guidelines and limits of HIPAA)? Yes No

Name Bill Reilly Date September 30, 2005

Department Central County Fire Department

Address 1399 Rollins Road

City, State, Zip Burlingame, CA 94010

Contact telephone number 650-558-7601 Email breilly@centralcountyfd.org

Instructions: Answer the following questions by placing a check mark on the appropriate line or by providing the requested information.

1. Number of personnel in your organization 75 .

1. Does your department deliver paramedic service? Yes No

2. What is the standard work shift schedule for firefighters and/or paramedics in your organization? (Check the appropriate line(s) below)

Firefighter	Paramedic	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2 x 4 (48hrs on 96 hrs off)
<input type="checkbox"/>	<input type="checkbox"/>	56 hour work week "Kelly Schedule"
<input type="checkbox"/>	<input type="checkbox"/>	10-14's?
<input type="checkbox"/>	<input type="checkbox"/>	Other schedule? Please state. _____

3. Do you limit the number of consecutive shifts/hours firefighter/paramedics can work? Yes No

4. If yes, do you have policies that state same? Yes No

5. If yes, to #3 above what is the number of consecutive shifts/hours allowed? 84 hrs

6. Do you track worker comp related injuries relative to the number of consecutive shifts or number of consecutive hours worked by an employee? Yes No

7. If yes to #6 above are you willing to share this information (following the guidelines and limits of HIPAA)? Yes No

Name Doug Williams Date 9-30-05

Department Rincon Valley FPD

Address 91 Middle Rincon Road

City, State, Zip Santa Rosa, CA 95409-3406

Contact telephone number 707-539-1801 Email dwilliams@rvfire.org

Instructions: Answer the following questions by placing a check mark on the appropriate line or by providing the requested information.

1. Number of personnel in your organization 22 (full time) .

1. Does your department deliver paramedic service? _____ Yes X No

2. What is the standard work shift schedule for firefighters and/or paramedics in your organization? (Check the appropriate line(s) below)

Firefighter	Paramedic	
_____	_____	2 x 4 (48hrs on 96 hrs off)
<u>X</u>	_____	56 hour work week "Kelly Schedule"
_____	_____	10-14's?
_____	_____	Other schedule? Please state. _____

3. Do you limit the number of consecutive shifts/hours firefighter/paramedics can work? X Yes _____ No

4. If yes, do you have policies that state same? X Yes _____ No

5. If yes, to #3 above what is the number of consecutive shifts/hours allowed? 72 hours

6. Do you track worker comp related injuries relative to the number of consecutive shifts or number of consecutive hours worked by an employee? _____ Yes X* No

*Consecutive hours worked would probably be flagged when injury is reviewed. So far none of the injuries have raised that flag.

7. If yes to #6 above are you willing to share this information (following the guidelines and limits of HIPAA)? ___ Yes _____ No

Name BC Chris Riley _____ Date 09.30.05

Department Costa Mesa Fire Dept

Address 77 Fair Drive _____

City, State, Zip COS, CA. 92626 _____

Contact telephone number 714.754.5204 _____ Email criley@ci.costa-mesa.ca.us

Instructions: Answer the following questions by placing a check mark on the appropriate line or by providing the requested information.

1. Number of personnel in your organization 112

1. Does your department deliver paramedic service? X Yes _____ No

2. What is the standard work shift schedule for firefighters and/or paramedics in your organization? (Check the appropriate line(s) below)

Firefighter	Paramedic
_____	_____ 2 x 4 (48hrs on 96 hrs off)
<u> X </u>	<u> X </u> 56 hour work week "Kelly Schedule"
_____	_____ 10-14's?
_____	_____ Other schedule? Please state. _____

3. Do you limit the number of consecutive shifts/hours firefighter/paramedics can work?
_____ Yes X No

4. If yes, do you have policies that state same? _____ Yes _____ No

5. If yes, to #3 above what is the number of consecutive shifts/hours allowed? _____

6. Do you track worker comp related injuries relative to the number of consecutive shifts or number of consecutive hours worked by an employee? _____ Yes X No

7. If yes to #6 above are you willing to share this information (following the guidelines and limits of HIPAA)? Yes _____ No

Name Bryan Collins Date 9/30/2005

Department Moraga-Orinda Fire District

Address 33 Orinda way

City, State, Zip Orinda, CA, 94563

Contact telephone number 925-258-4514 Email bcollins@mofd.org

Instructions: Answer the following questions by placing a check mark on the appropriate line or by providing the requested information.

1. Number of personnel in your organization 70 .

1. Does your department deliver paramedic service? X Yes _____ No

2. What is the standard work shift schedule for firefighters and/or paramedics in your organization? (Check the appropriate line(s) below)

Firefighter	Paramedic
<u> X </u>	<u> X </u> 2 x 4 (48hrs on 96 hrs off)
_____	_____ 56 hour work week "Kelly Schedule"
_____	_____ 10-14's?
_____	_____ Other schedule? Please state. _____

3. Do you limit the number of consecutive shifts/hours firefighter/paramedics can work?

_____ Yes X No

4. If yes, do you have policies that state same? _____ Yes _____ No

5. If yes, to #3 above what is the number of consecutive shifts/hours allowed? _____

6. Do you track worker comp related injuries relative to the number of consecutive shifts or number of consecutive hours worked by an employee? _____ Yes X No

7. If yes to #6 above are you willing to share this information (following the guidelines and limits of HIPAA)? ___ Yes _____ No

Name: Randy Smith _____ Date 09-30-05 _____

Department Placer Consolidated Fire Protection District _____

Address 11645 Atwood Road _____

City, State, Zip Auburn, CA, 95603 _____

Contact telephone number (530) 823-4155 _____ Email pcf00@placerfire.org _____

Instructions: Answer the following questions by placing a check mark on the appropriate line or by providing the requested information.

1. Number of personnel in your organization 32.

1. Does your department deliver paramedic service? _____ Yes XX No

2. What is the standard work shift schedule for firefighters and/or paramedics in your organization? (Check the appropriate line(s) below)

Firefighter	Paramedic	
<u> X </u>	_____	2 x 4 (48hrs on 96 hrs off)
_____	_____	56 hour work week "Kelly Schedule"
_____	_____	10-14's?
_____	_____	Other schedule? Please state. _____

3. Do you limit the number of consecutive shifts/hours firefighter/paramedics can work? _____ Yes X No

4. If yes, do you have policies that state same? _____ Yes _____ No

5. If yes, to #3 above what is the number of consecutive shifts/hours allowed? _____

6. Do you track worker comp related injuries relative to the number of consecutive shifts or number of consecutive hours worked by an employee? _____ Yes X No

7. If yes to #6 above are you willing to share this information (following the guidelines and limits of HIPAA)? Yes No

Name Chris Albertson, Fire Chief Date September 30, 2005

Department City of Petaluma

Address 198 'D' Street

City, State, Zip Petaluma, CA 94952

Contact telephone number (707) 778-4390 Email calbertson@ci.petaluma.ca.us

Instructions: Answer the following questions by placing a check mark on the appropriate line or by providing the requested information.

1. Number of personnel in your organization 57 employees 51 in uniform .

1. Does your department deliver paramedic service? Yes No

2. What is the standard work shift schedule for firefighters and/or paramedics in your organization? (Check the appropriate line(s) below)

Firefighter	Paramedic	
<input type="checkbox"/>	<input type="checkbox"/>	2 x 4 (48hrs on 96 hrs off)
<input type="checkbox"/>	<input type="checkbox"/>	56 hour work week "Kelly Schedule"
<input type="checkbox"/>	<input type="checkbox"/>	10-14's?
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Other schedule? Please state. <u>56 hour - "3-3-4"</u>

3. Do you limit the number of consecutive shifts/hours firefighter/paramedics can work? Yes No

4. If yes, do you have policies that state same? Yes No NA

5. If yes, to #3 above what is the number of consecutive shifts/hours allowed? _____

6. Do you track worker comp related injuries relative to the number of consecutive shifts or number of consecutive hours worked by an employee? _____ Yes No

7. If yes to #6 above are you willing to share this information (following the guidelines and limits of HIPAA)? Yes No

Name Eric Engberg Date 9/30/05

Department Huntington Beach Fire Department

Address 2000 Main Street

City, State, Zip Huntington Beach, CA 92648

Contact telephone number (714) 563-5411 Email eengerg@surfcity-hb.org

Instructions: Answer the following questions by placing a check mark on the appropriate line or by providing the requested information.

1. Number of personnel in your organization 131-sworn 23- non sworn .

1. Does your department deliver paramedic service? Yes No

2. What is the standard work shift schedule for firefighters and/or paramedics in your organization? (Check the appropriate line(s) below)

Firefighter	Paramedic	
<input type="checkbox"/>	<input type="checkbox"/>	2 x 4 (48hrs on 96 hrs off)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	56 hour work week "Kelly Schedule" (5's and 6's)
<input type="checkbox"/>	<input type="checkbox"/>	10-14's?
<input type="checkbox"/>	<input type="checkbox"/>	Other schedule? Please state. _____

3. Do you limit the number of consecutive shifts/hours firefighter/paramedics can work? Yes No

4. If yes, do you have policies that state same? Yes No

5. If yes, to #3 above what is the number of consecutive shifts/hours allowed? 96

6. Do you track worker comp related injuries relative to the number of consecutive shifts or number of consecutive hours worked by an employee? Yes No

7. If yes to #6 above are you willing to share this information (following the guidelines and limits of HIPAA)? Yes No

Name Forrest M. Craig Date 9/16/05

Department Novato Fire District

Address 95 Rowland Way

City, State, Zip Novato, CA 94945

Contact telephone number (415) 878-2690 Email fcraig@novatofire.org

Instructions: Answer the following questions by placing a check mark on the appropriate line or by providing the requested information.

1. Number of personnel in your organization 91 .

1. Does your department deliver paramedic service? Yes No

2. What is the standard work shift schedule for firefighters and/or paramedics in your organization? (Check the appropriate line(s) below)

Firefighter	Paramedic	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2 x 4 (48hrs on 96 hrs off)
<input type="checkbox"/>	<input type="checkbox"/>	56 hour work week "Kelly Schedule"
<input type="checkbox"/>	<input type="checkbox"/>	10-14's?
<input type="checkbox"/>	<input type="checkbox"/>	Other schedule? Please state. _____

3. Do you limit the number of consecutive shifts/hours firefighter/paramedics can work? Yes No (As of the time of completing this questionnaire.)

4. If yes, do you have policies that state same? Yes No

5. If yes, to #3 above what is the number of consecutive shifts/hours allowed? _____

6. Do you track worker comp related injuries relative to the number of consecutive shifts or number of consecutive hours worked by an employee? _____ Yes No

7. If yes to #6 above are you willing to share this information (following the guidelines and limits of HIPAA)? Yes No

Name Keith Richter Date 9/16/05

Department Contra Costa County Fire District

Address 2010 Geary Road

City, State, Zip Pleasant Hill, CA 94523

Contact telephone number (925) 941-3500 Email _____

Instructions: Answer the following questions by placing a check mark on the appropriate line or by providing the requested information.

1. Number of personnel in your organization >150 .

1. Does your department deliver paramedic service? Yes _____ No

2. What is the standard work shift schedule for firefighters and/or paramedics in your organization? (Check the appropriate line(s) below)

Firefighter	Paramedic	
_____	_____	2 x 4 (48hrs on 96 hrs off)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	56 hour work week "Kelly Schedule"
_____	_____	10-14's?
_____	_____	Other schedule? Please state. _____

3. Do you limit the number of consecutive shifts/hours firefighter/paramedics can work? _____ Yes No (Dist. Has proposed 72 hours to labor union and is interested in establishing a max work hour policy for all suppression staff.)

4. If yes, do you have policies that state same? _____ Yes No

5. If yes, to #3 above what is the number of consecutive shifts/hours allowed? _____

6. Do you track worker comp related injuries relative to the number of consecutive shifts or number of consecutive hours worked by an employee? _____ Yes No

7. If yes to #6 above are you willing to share this information (following the guidelines and limits of HIPAA)? ___ Yes _____ No

Name Robert Fox Date 9/29/05

Department Corte Madera

Address 341 Tamalpais Dr

City, State, Zip CM 94925

Contact telephone number (415) 927-5077 Email _____

Instructions: Answer the following questions by placing a check mark on the appropriate line or by providing the requested information.

1. Number of personnel in your organization 21PD 20 volunteer .

1. Does your department deliver paramedic service? Yes _____ No

2. What is the standard work shift schedule for firefighters and/or paramedics in your organization? (Check the appropriate line(s) below)

Firefighter	Paramedic
-------------	-----------

X X 2 x 4 (48hrs on 96 hrs off)
 _____ 56 hour work week "Kelly Schedule"
 _____ 10-14's?
 _____ Other schedule? Please state. _____

3. Do you limit the number of consecutive shifts/hours firefighter/paramedics can work?
TRY TO Yes _____ No _____

4. If yes, do you have policies that state same? _____ Yes X No

5. If yes, to #3 above what is the number of consecutive shifts/hours allowed? 72

6. Do you track worker comp related injuries relative to the number of consecutive shifts or number of consecutive hours worked by an employee? _____ Yes X No

7. If yes to #6 above are you willing to share this information (following the guidelines and limits of HIPAA)? _____ Yes _____ No

Name Fire Chief Tim Riley Date September 30, 2005

Department Newport Beach Fire Department

Address 3300 Newport Bl. P.O.Box 1768

City, State, Zip Newport Beach, CA 92658-8915

Contact telephone number (949) 644-3101 Email triley@city.newport-beach.ca.us

Instructions: Answer the following questions by placing a check mark on the appropriate line or by providing the requested information.

1. Number of personnel in your organization 146 .

1. Does your department deliver paramedic service? X Yes _____ No

2. What is the standard work shift schedule for firefighters and/or paramedics in your organization? (Check the appropriate line(s) below)

Firefighter	Paramedic
_____	_____ 2 x 4 (48hrs on 96 hrs off)
<u>X</u>	<u>X</u> 56 hour work week "Kelly Schedule"
_____	_____ 10-14's?
_____	_____ Other schedule? Please state. _____

3. Do you limit the number of consecutive shifts/hours firefighter/paramedics can work?
 _____ Yes X No

- 4. If yes, do you have policies that state same? _____ Yes _____ No
- 5. If yes, to #3 above what is the number of consecutive shifts/hours allowed? _____
- 6. Do you track worker comp related injuries relative to the number of consecutive shifts or number of consecutive hours worked by an employee? _____ Yes X No
- 7. If yes to #6 above are you willing to share this information (following the guidelines and limits of HIPAA)? _____ Yes _____ No

Name Roger Smith Date 9/29/05

Department Anaheim

Address 207 S. Anaheim Blvd. Suite 301

City, State, Zip Anaheim, CA 92805

Contact telephone number (714) 765-4001 Email rsmith@anaheim.net

Instructions: Answer the following questions by placing a check mark on the appropriate line or by providing the requested information.

1. Number of personnel in your organization 285-222 suppression .

1. Does your department deliver paramedic service? X Yes _____ No

2. What is the standard work shift schedule for firefighters and/or paramedics in your organization? (Check the appropriate line(s) below)

Firefighter	Paramedic	
_____	_____	2 x 4 (48hrs on 96 hrs off)
_____	_____	56 hour work week "Kelly Schedule"
_____	_____	10-14's?
<u>X</u>	<u>X</u>	Other schedule? Please state. <u>56 hr 4/4 4/6</u>

3. Do you limit the number of consecutive shifts/hours firefighter/paramedics can work? X Yes _____ No

4. If yes, do you have policies that state same? X Yes _____ No

5. If yes, to #3 above what is the number of consecutive shifts/hours allowed? Current 72

6. Do you track worker comp related injuries relative to the number of consecutive shifts or number of consecutive hours worked by an employee? _____ Yes X No

7. If yes to #6 above are you willing to share this information (following the guidelines and limits of HIPAA)? ___ Yes _____ No

Name Kevin Taylor Date 9/30/05

Department Paso Robles F.D.

Address 900 Park St.

City, State, Zip Paso Robles, CA 93446

Contact telephone number (805) 227-7560 Email ktaylor@priority.com

Instructions: Answer the following questions by placing a check mark on the appropriate line or by providing the requested information.

1. Number of personnel in your organization 24 .

1. Does your department deliver paramedic service? Yes _____ No

2. What is the standard work shift schedule for firefighters and/or paramedics in your organization? (Check the appropriate line(s) below)

Firefighter	Paramedic	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2 x 4 (48hrs on 96 hrs off)
_____	_____	56 hour work week "Kelly Schedule"
_____	_____	10-14's?
_____	_____	Other schedule? Please state. _____

3. Do you limit the number of consecutive shifts/hours firefighter/paramedics can work? Yes _____ No _____

4. If yes, do you have policies that state same? Yes _____ No

5. If yes, to #3 above what is the number of consecutive shifts/hours allowed? 96

6. Do you track worker comp related injuries relative to the number of consecutive shifts or number of consecutive hours worked by an employee? Yes _____ No

7. If yes to #6 above are you willing to share this information (following the guidelines and limits of HIPAA)? Yes _____ No

Name Dan Voreyer Date 9/29/05

Department San Bruno Fire Dept..

Address 555 El Camino Real

City, State, Zip San Bruno, CA 94066

Contact telephone number (650) 616-7091 Email dvoreyer@ci.sanbruno.ca.us

Instructions: Answer the following questions by placing a check mark on the appropriate line or by providing the requested information.

1. Number of personnel in your organization 36 .

1. Does your department deliver paramedic service? Yes No

2. What is the standard work shift schedule for firefighters and/or paramedics in your organization? (Check the appropriate line(s) below)

Firefighter	Paramedic	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2 x 4 (48hrs on 96 hrs off)
<input type="checkbox"/>	<input type="checkbox"/>	56 hour work week "Kelly Schedule"
<input type="checkbox"/>	<input type="checkbox"/>	10-14's?
<input type="checkbox"/>	<input type="checkbox"/>	Other schedule? Please state. _____

3. Do you limit the number of consecutive shifts/hours firefighter/paramedics can work? Yes No

4. If yes, do you have policies that state same? Yes No

5. If yes, to #3 above what is the number of consecutive shifts/hours allowed? 96
with min. 24 hrs. off duty after 96 hrs.

6. Do you track worker comp related injuries relative to the number of consecutive shifts or number of consecutive hours worked by an employee? Yes No

7. If yes to #6 above are you willing to share this information (following the guidelines and limits of HIPAA)? Yes No

Please return this survey to: Forrest M. Craig, Division Chief
Novato Fire Protection District
95 Rowland Way, Novato, CA 94945
Ph (415) 878-2603
Fx (415) 878-2660
fcraig@novatofire.org

Appendix C

Novato Fire District raw data for length of hours worked prior to accident-injury.

Subject	Age	Injury Date & Time	On Duty Since	Elapsed Time
A	44	1/16/2005 13:00	1/15/2005 07:30	29:30:00
B	38	3/15/2005 12:00	3/15/2005 08:00	4:00:00
C	31	5/3/2005 15:00	5/3/2005 07:30	7:30:00
D	32	5/13/2005 09:30	5/13/2005 07:30	2:00:00
E	34	4/18/2005 09:00	4/18/2005 08:00	1:00:00
F	31	4/14/2005 07:00	4/13/2005 07:30	23:30:00
G	34	4/6/2005 06:30	4/6/2005 06:30	0:00:00
H	32	4/1/2005 17:30	3/30/2005 07:30	58:00:00
I	35	2/21/2005 09:00	2/21/2005 07:30	1:30:00
J	35	2/23/2005 16:00	2/23/2005 07:30	8:30:00
K	38	2/5/2005 08:28	2/4/2005 07:30	24:58:00
L	41	11/27/2004 03:30	11/26/2004 07:30	20:00:00
M	41	11/27/2004 02:50	11/26/2004 07:30	19:20:00
N	31	11/25/2004 06:30	11/24/2004 07:30	23:00:00
O	58	3/25/2005 09:15	3/25/2005 07:30	1:45:00
P	31	11/2/2004 10:00	11/2/2004 07:30	2:30:00
Q	39	11/5/2004 08:00	11/2/2004 07:30	72:30:00
R	39	11/5/2004 07:30	11/2/2004 07:30	72:00:00
S	51	1/10/2005 09:00	1/9/2005 07:30	25:30:00
T	36	1/14/2005 18:00	1/13/2005 07:30	34:30:00
U	28	2/24/2005 08:30	2/24/2005 07:30	1:00:00
V	41	3/12/2005 11:30	3/12/2005 07:30	4:00:00
W	38	3/20/2005 11:00	3/20/2005 07:30	3:30:00