THE MANAGEMENT EFFECTS OF FIREFIGHTERS WORKING A CONSECUTIVE 48-HOUR SHIFT

EXECUTIVE PLANNING

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ABSTRACT

The problem was that the Minneapolis Fire Department Management Team lacked data on the management effects of firefighters working a consecutive 48-hour shift. A new labor agreement required that one third of the firefighters working for the Minneapolis Fire Department be assigned to a shift that worked 48 hours consecutively effective January 1, 2001 (48-hour shift). The purpose of this research is to analyze and describe any differences in workforce data between a 24-hour and 48-hour shift schedule. Descriptive research methodology was used to answer the following research questions:

1. Did any other fire service organizations use a consecutive 48-hour shift schedule?
2. What problems and benefits have been identified by other organizations associated with working a consecutive 48-hour shift?
3. Was there any difference in disciplinary problems among members of the Minneapolis Fire Department working a 48-hour shift as compared to those working a 24-hour shift?
4. Was there any difference in sick leave use and work-related injuries among members of the Minneapolis Fire Department working a 48-hour shift as compared to those working a 24-hour shift?
5. Was there any difference in emergency response turn out time and motor vehicle accidents among members of the Minneapolis Fire Department working a 48-hour shift as compared to those working a 24-hour shift?

The principal procedure used to complete this research was an e-mail survey of fire service organizations using a consecutive 48-hour shift. An internal data review was also completed for the Minneapolis Fire Department.

The results of this research revealed 29 fire service organizations working a consecutive 48-hour shift. The experience of the Minneapolis Fire Department indicates that there are significant management problems associated with a 48-hour shift.

The recommendations of this research project included an internal review of the data addressed in this research by organizations considering or currently using a consecutive 48-hour shift.

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INTRODUCTION

The problem was that the Minneapolis Fire Department Management Team lacked data on the management effects of firefighters working a consecutive 48-hour shift. Due to a new labor agreement provision, beginning January 1, 2001 one-third of the firefighters working for the Minneapolis Fire Department were assigned to a shift that worked 48 hours without a break and then was off for 4 days over a six day cycle. The other two-thirds of the department remained on a schedule that worked a consecutive 24-hour shift, followed by 24 hours off, then worked another 24-hour shift, followed by 72 hours off at the end of it's six-day cycle. The purpose of this research is to analyze and describe any differences in work data including discipline problems, sick leave use and work-related injuries. This research also examined differences in emergency response turn out time and motor vehicle accidents between the two different shift schedules. Descriptive research methodology was used to answer the following research questions:

1. Did any other fire service organizations use a consecutive 48-hour shift schedule?
2. What problems and benefits have been identified by other organizations associated with working a consecutive 48-hour shift?
3. Was there any difference in disciplinary problems among members of the Minneapolis Fire Department working a consecutive 48-hour shift as compared to those working a consecutive 24-hour shift?

4. Was there any difference in sick leave use and work-related injuries among members of the Minneapolis Fire Department working a consecutive 48-hour shift as compared to firefighters working a consecutive 24-hour shift?
5. Was there any difference in emergency response turn out time and motor vehicle accidents among members of the Minneapolis Fire Department working a consecutive 48-hour shift as compared to members working a consecutive 24-hour shift?

BACKGROUND AND SIGNIFICANCE

The Minneapolis Fire Department is a full time, paid professional emergency service organization with an authorized strength of 489 employees. The organization provides service for a metropolitan population of 383,000 people located over 59 square miles. Minneapolis firefighters responded to 34,802 calls for emergency service in 2001. Emergency medical events accounted for 70.5 percent of the emergency call load.

A new labor agreement was signed in the year 2000 that allowed the labor union representing firefighters (International Association of Firefighters, Local 82) to unilaterally select a three-shift work schedule for the calendar year 2001. A mail ballot sent out by the union to its members after the new labor agreement was signed to decide on a work shift. This election resulted in a work schedule where two-thirds of the suppression force remained working a consecutive 24-hour shift, followed by 24 hours off, then another 24 shift, concluding with 72 hours off. This was the existing work schedule used by Minneapolis firefighters dating back at least 50 years. The remaining

one-third of the suppression force moved to a new schedule that worked 48 consecutive hours followed by 96 hours off.

When the union presented the new work schedule to the administration they did not agree with allowing firefighters to work a 48-hour shift. The administration was concerned about possible increases in sick leave, injuries and accidents. The disagreement over the merits of the 48-hour shift ended up in binding arbitration. The arbitrator ruled in favor of the union and the new shift schedule became effective January 1, 2001. A key factor in the arbitrator's decision was the fact that the entire department in Albuquerque, New Mexico had been working the 48-hour shift schedule with no reported management problems.

The union reported that one factor in the decision to move to a new shift for one-third of the workforce was the fact that the department lost 44 employees in 1999 and 56 more in 2000 due to retirement, resignation or discharge. To replace these employees, the department hired 170 new firefighters over a 30-month period from November 1998 to May 2001. This represented a 35.2% employee turnover over 2 ½ years. Additionally, the Minnesota State Legislature repealed a residency requirement for new firefighters in the year 2000. This resulted in both new and existing fire department employees relocating outside the city to find less expensive homes in the suburbs and in greater Minnesota and Wisconsin.

The Minneapolis Fire Department management team was interested in research regarding the difference in work data between the two shift schedules. An initial study was prepared in January 2002 by the Management Analysis Division of the Minneapolis

Finance Department that reported on sick leave, work related injuries, motor vehicle accidents.

This research project expands on the data elements analyzed in the January 2002 report to include disciplinary action and turnout time. This research also expands the data analyzed to both calendar year 2001 and calendar year 2002.

This research related directly to the environmental monitoring phase of the strategic planning process as outlined in the Executive Planning curriculum. This research attempted to monitor the change process and attempted to assess the impact on the department and it's employees of the change in shift schedules. The results of this research were used in the Minneapolis Fire Department's five-year business plan.

LITERATURE REVIEW

The body of research available on the effects of working a consecutive 48-hour shift is very limited. Because of this limitation, this literature review focused on the related topics of fatigue as well as federal regulations regarding required periods of rest after extended work shifts for United States Forest Service firefighters and over-the-road truck drivers. Studies and articles comparing firefighter work shifts of 24 hours with schedules requiring less than 24 hours were also researched.

In a book entitled "Fatigue", Koester (1997) outlined the effects of sleep loss on humans. He stated "the effects of sleep loss include mood changes (irritable, fatigue), impaired vigilance, faulty short-term memory (write it down!), increased appetite, problems with communication, sleepiness, increased sexual drive, decreased performance and microsleep." He goes on further to state that "the consequences of

fatigue include poorly written plans and tasks, lost paperwork, lowered morale, poor patient care, and accidents". Koester (1997) also wrote in an article entitled *Fatigue and Search and Rescue* that a strong relationship between sleep and accidents has always existed. The three effects of firefighter fatigue identified by Atkinson (1999) were increased personal injury increased accidents and injuries to coworkers and long-term health problems.

In a journal article, Krull, Smith, Sinha and Parsons (1997) wrote "After 16 hours awake (the end of a typical day), loss of reaction time in a simulator is the same as someone who is at 0.05% blood alcohol content". In his article about reasoning ability, Herman (1994) states "It seems that, under conditions of stress and fatigue, many individuals are not able to reason at more than the first level of abstraction. In other words, they consider only the most obvious factors" when reasoning a solution to a problem. This observation about the ability of emergency responders to develop effective solutions to emergent problems is shared by Macias (1999) in an article about long work shifts required of resident doctors working in hospitals. He states that "Residents often have difficulty concentrating, fall asleep at work and are prone to irritability". According to Macias, resident doctors worried about their susceptibility to mistakes due to a lack of sleep. In a related letter to the Minneapolis Fire Department, Thomas Jetzer, M.D. pointed out that he new of no residency program that required more that 36 hours of work without a 12-hour break. Jetzer also recommended against firefighters working more than 36 consecutive hours. A copy of this letter is included in Appendix D.

Some government organizations had legal and policy limitations on the number of hours truck drivers are allowed to work without time off. The United States Forest Service allowed drivers to operate a vehicle for a maximum of ten hours within a fifteen-hour period according to Matthews (2000). Similarly, the US Department of Transportation limited the number of hours that over-the-road truck drivers can work (Federal Motor Carrier Safety Administration, 2000). The rules were:

1. Maximum driving time of 10 hours.
2. Minimum off-duty time of 8 hours.
3. Work cycle implications of the above (current rules encourage an 18-hour cycle for maximum productivity in long-haul operations).
4. Distinctions between driving and non-driving duty time; the maximum on-duty time is 15 hours, of which 10 hours may be driving.
5. Maximum cumulative on-duty hours (60 hours in 7 days or 70 hours in 8 days).

A review of research reports done by Executive Fire Officers found few references to shifts where firefighters worked beyond 24 consecutive hours. In the only research paper found, Cobb (1994) recommended moving away from a consecutive 56-hour schedule because of an increasing call load and fatigue for members of a very small fire department in Alabama.

The most relevant Executive Fire Officer research focused on the effects of consecutive 24-hour shifts compared to working a variety of shorter shifts. The findings of research done by Mims (1999), Rule (1999) and Townley (1980) indicated that a change from a 24-hour shift to a split shift of 10 hours and 14 hours would reduce fatigue and would be more efficient. Tomaszewski (1995) stated that a move away from 24-hour shifts to 12-hour shifts would reduce legal liability and alleviate concerns about

over-tired workers. Also arguing for a shorter shift than 24 hours in a row, Coon (1997) stated “Fire service leaders have a responsibility to provide well trained and alert responders. It is clear that the 24-hour shift needs to be replaced.” Brewer (1998) also found that the Wilmington Fire Department should adopt a 12-hour shift and move away from a 24-hour schedule.

Conversely, Research done by Frazier (1999) and Ross (1997) recommended that a 24-hour shift be adopted followed by 48 hours off. Hansen (1996) found resistance to moving away from a 24-hour shift. The findings of this research indicated that 93.4% of the firefighters and 89.8% of the officers surveyed feel there is no advantage to switching from the 24-hour duty shift to a shorter shift. The major objections found were based on economic issues and resistance to change. That resistance also included loss of income generated by part-time work, increased commuting cost resulting from increased frequency of commuting, and increased daycare costs. Two non-economic issues included spousal objections and loss of family quality time. Remaining on a 24-hour shift was also the recommendation of research done by Davis (2000).

PROCEDURES

Research Methodology

A comprehensive literature review was conducted using the Learning Resource Center at the National Fire Academy in Emmitsburg, Maryland and the Minnesota Fire/EMS/Safety Center in St Paul, Minnesota. Books, periodicals and

historical research reports written by Executive Fire Officers and others were reviewed. An Internet search was used in an attempt to find relevant information.

To answer research questions one and two; an Internet search was conducted to find fire service organizations using a consecutive 48-hour shift. Fire Chiefs from cities with a website mentioning the 48-hour shift provided the initial contact and leads to find other similar organizations. Once these 29 organizations were identified, an e-mail survey was conducted to determine when the department had implemented the consecutive 48-hour shift, and any resulting workforce differences between a previous shorter shift and the consecutive 48-hour work shift. A total of 14 fire departments returned the survey. A copy of this survey instrument is included as Appendix A.

To answer research questions three, four and five, an analysis of Minneapolis Fire Department work data on discipline, sick leave, work injuries, emergency response turn out time and motor vehicle accidents for the years 2001 and 2002 was completed. The Minneapolis Fire Department was the only organization found working two different shifts within the same organization. This provided a controlled environment to analyze differences between shifts. Management information system reports were available and provided most of the data used for this Minneapolis Fire Department work data analysis. Data regarding motor vehicle accidents was compiled from hard copy accident reports.

Assumptions and Limitations

There was a lack of previous research on the effects of working a 48-hour shift in the fire service or any other profession. Much of the previous research done by Executive Fire Officers was focused on a 24-hour work shift (or less) and most of this research was focused on advocating for one shift over another with little objective data

to support their recommendations. Previous research efforts measuring work schedule differences used various methodologies and lacked consistency for accurate comparison.

The survey instrument used in this research asked for data from other fire service organizations that was, for the most part, not available. This research relies on the subjective reports of various fire officers in an attempt to answer research question 2. Many fire departments, especially in California, had moved to a 48-hour shift for the convenience of their firefighters with no intention of moving back to a shorter shift. This management environment provided very little incentive for leaders to study the effects of the longer shift within these organizations.

Forty-eight percent of the departments (14 of 29) contacted completed the research survey. Many of the organizations that did not participate were very small and hard to contact. All but two of the twenty-nine organizations with a 48-hour shift were located in California.

Definition of Terms

24-hour Shift: The work shift schedule used by a fire department that requires fire personnel to work 24 consecutive hours before being off for at least 24 consecutive hours.

48-hour Shift: The work shift schedule used by a fire department that requires fire personnel to work 48 consecutive hours before being off for 96 consecutive hours.

Battalion Chief: The rank of the officers on the Minneapolis Fire Department that supervises a geographic district containing five fire stations and seven to nine fire companies.

Emergency Response Turnout Time: The measurement between the time that a fire station was alerted by the emergency communications center and the time that a fire company left the station in route to a call for service.

Firefighter: Generic term used to describe the ranks of Firefighter, Fire Motor Operator and Fire Captain working as emergency responders on a 24-hour or 48-hour shift.

Minneapolis Fire Department Management Team: A group of the 30 Chief Fire Officers who make up the upper management of the Minneapolis Fire Department. Consists of Battalion Chiefs, Deputy Chiefs, the Assistant Chief and the Fire Chief.

RESULTS

Research Question #1: Did any other fire service organizations use a consecutive 48-hour shift schedule?

Twenty-nine fire service organizations were found that work a consecutive 48-hour shift followed by 96 hours off duty. Of these 29 organizations, 27 were located in California. The two organizations found outside of California were Albuquerque, New Mexico and Minneapolis, Minnesota. Minneapolis was the only organization found in this group that did not schedule all of their emergency response personnel on a consecutive 48-hour shift. The Minneapolis Fire Department is the subject of research questions three through five. A complete list of all the fire service organizations found that work a 48-hour shift is contained in Appendix B.

Research Question #2: What problems and benefits have been identified by other organizations associated with working a consecutive 48-hour shift?

Fourteen out of twenty-nine fire departments surveyed responded to the survey questions. It should be noted that no organization surveyed for this research had data to support any of their responses. The information gathered was entirely based on the professional opinion of the survey respondents. The written responses to the survey questions are contained in Appendix C.

Table 1 contains the composite responses that described benefits to the organization and individual employees of working a consecutive 48-hour shift. The most common responses described benefits to the individual employee with regard to commuting long distances and more affordable housing choices. Increased morale was also commonly cited with 7 of 14 organizations responding that firefighters considered the 48-hour shift a benefit to their careers.

Table 1

Benefits of a Consecutive 48-hour Shift

Statement	Number of Responses
The 48-hour shift is popular with the firefighters; Increased morale.	7
Projects have two full days to get done; Better productivity	3
Less commuting; more affordable housing choices	3
Sick leave use has decreased	3
Less time is spent doing daily maintenance and briefings	2
Better ability to schedule daily duties; more versatile	2
Crews only have to shop for meals once every two shifts	1
More time off between work shifts	1

Table 2 on the next page contains the composite responses that described problems to the organization and individual employees working a consecutive 48-hour shift. Some organizations responded with the same or similar information. Items in this table are grouped reflecting when respondents gave similar answers. No organization that responded to the survey indicated that they would be abandoning the 48-hour shift.

Table 2

Problems with a Consecutive 48-hour Shift

Statement	Number of responses
Personnel can be slow getting started on the 2nd day if busy	4
There are no personnel to call in if someone gets sick due to travel distance from home.	3
Organizational communication is worse because of the lack of continuity with the 8-hour shift in the office and between shifts.	3
Firefighters live further away from work and feel less connection to the community they serve	3
Sick leave use has increased	2
This shift is not advisable for a busy department	2
Sometimes one shift has to work Christmas Eve and Christmas	1
Organizational accountability has decreased	1

Research Question #3: Was there any difference in disciplinary problems among members of the Minneapolis Fire Department working a 48-hour shift as compared to those working a 24-hour shift?

There were 290 Battalion Chiefs, Captains, Fire Motor Operators (Drivers) and Firefighters working 24-hour shifts in 2001 and 2002. These firefighters provided a control group against which to evaluate the employees assigned 48-hour shift. These 290 employees were formally disciplined for the calendar years 2001 and 2002 according to Table 3:

Table 3

Discipline Recorded for Employees Working a Consecutive **24-hour** Shift

Year	# of occurrences	# of employees assigned	Discipline per employee
2001	21	290	. 0724
2002	29	290	. 10

There were 145 Battalion Chiefs, Captains and Firefighters working a consecutive 48-hour shift in 2001 and 2002. These 145 employees were formally disciplined for the calendar years 2001 and 2002 according to the following chart:

Table 4

Discipline Recorded for Employees Working a Consecutive **48-hour** Shift

Year	# of occurrences	# of employees assigned	Discipline per employee
2001	19	145	. 131
2002	19	145	. 131

The data for calendar years 2001 and 2002 show that 48-hour shift employees were disciplined 52% more often than 24-hour shift employees. The measurement of discipline per employee shows that for every two 24-hour employees disciplined, there were three 48-hour employees disciplined over the same 24-month period.

When a comparison was done regarding severe discipline given to these two groups of firefighters working different shifts, the difference became even greater. Severe discipline included personnel who were suspended without pay, temporarily or permanently demoted or discharged from employment. There was 60% more occurrences of severe discipline given to personnel assigned to the 48-hour shift as compared to the 24-hour shift. The two different shifts compared according to the following chart:

Table 5

Severe Discipline Recorded for Employees by Shifts 2001 and 2002

Shift	# of occurrences	# of employees assigned	Discipline per employee
24-hour	15	290	. 0259
48-hour	12	145	. 0414

Research Question #4: **Was there any difference in sick leave use and work-related injuries among members of the Minneapolis Fire Department working a 48-hour shift as compared to firefighters working a 24-hour shift?**

Sick leave use was 18.5% higher among employees assigned to the consecutive 48-hour shift when compared with employees assigned to a consecutive 24-hour shift.

Sick leave use among Minneapolis Firefighters for calendar year 2001 and calendar year 2002 is summarized in Table 6:

Table 6

Total Sick Leave Use by Shift for Years 2001 and 2002

Shift	# of sick shifts	# Assigned	Sick shifts per employee
24-hour shift	1923	290	6.6310
48-hour shift	1139	145	7.8552

Total work-related injuries were 18.2% higher on the 24-hour shift compared with the 48-hour shift for calendar years 2001 and 2002:

Table 7

Total Work-Related Injuries by Shift for Years 2001 and 2002

Shift	# of injuries	# Assigned	Injuries per employee
24-hour shift	364	290	1.2552
48-hour shift	154	145	1.0621

The data changed when the 48-hour shift was separated into two consecutive 24-hour periods. 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. The following table shows the 48-hour shift is broken down by injuries sustained during the first 24-hours compared to the second 24 hours of the shift:

Table 8

Total Work-Related Injuries Among 48-hour Shift Employees by Time Period for Years 2001 and 2002

Time Period	# of injuries	# assigned	Injuries per employee
1st 24 hours	63	145	. 4345
2nd 24 hours	91	145	. 6276

Research Question #5: Was there any difference in emergency response turn out time and motor vehicle accidents among members of the Minneapolis Fire Department working a 48-hour shift as compared to working a 24-hour shift?

Emergency response turn out time had been available as a performance measure only since January 1, 2002. There was no data available on turnout time for the year 2001. Response data for calendar year 2002 shows that fire personnel assigned to the 48-hour shift were 6.3% slower than personnel assigned to the 24-hour shift in getting out of the station after being alerted to respond on an emergency call. The computerized information system used by the department was not able to separate the first 24 hours of a 48-hour shift from the second 24 hours of the same shift. Additionally, Battalion Chiefs assigned to the 48-hour shift were 4% slower than Battalion Chiefs assigned to the 24-hour shift in responding to a call for service.

Motor vehicle accident data recorded over the calendar years 2001 and 2002 showed a significant difference between when the 24-hour shift was working and when the 48-hour shift was working. Overall, accidents occurred 38% more often during the days that the 48-hour shift was working than accidents that occurred during the days

that the 24-hour shift was working. Motor vehicle accidents were more common during non-emergency operations that during an emergency run. Accidents occurring during the first 24 hours of the 48-hour shift occurred 11.9% less that the accidents recorded among firefighters assigned to the 24-hour shift.

Significantly, 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. The largest difference was between accidents occurring during the second 24 hours of the 48-hour shift and the first 24 hours of the 48-hour shift.

Table 9

Total Motor Vehicle Accidents for the Years 2001 and 2002

Shift	# of accidents	# of shifts	Accidents per shift
24-hour shift	45	487	. 0924
48-hour shift	31	243	. 1276
48-hour shift 1st 24 hours	10	121	. 0826
48-hour shift 2nd 24 hours	24	122	. 1967

DISCUSSION

As can be seen in the survey responses contained in Appendix B, there is very little objective data (outside the City of Minneapolis) currently available regarding the effects of extended shifts on fire service organizations and their employees. The literature outside the fire service focuses on the negative effects of fatigue on personnel who work beyond 16 hours according to Krull et al. (1997) and Koester (1997). Truck

drivers who work beyond 10 hours are at risk for accidents according to Matthews (2000) and the Federal Motor Carrier Safety Administration (2000).

Previous research efforts by Executive Fire Officers are split regarding extended shift work. Cobb (1994) argued for a reduction in a consecutive 56-hour work shift. Mims (1999), Rule (1999), Coon (1997), Brewer (1998) Tomaszewski (1995) and Townley (1980) state that 24-hour shifts should be avoided in favor of a shorter work shift without rest. Conversely, Frazier (1999) and Ross (1997), Davis (2000) and Hanson (1996) argued in favor of a consecutive 24-hour shift. These research reports lacked fire service data to support their conclusions.

Addressing the survey results, only two of the twenty-eight organizations identified as working a 48-hour shift were located outside the State of California. Many of the fire departments that have adopted the 48-hour shift are located in coastal communities near Los Angeles and San Francisco. The economic realities in these high-cost areas do not make it possible for firefighters to purchase housing near the communities they serve. Because of reduced commuting time, most respondents cited the popularity of the longer shift with the firefighters that commute long distances from their homes to work.

There were many differing opinions expressed in the survey by Chief Officers regarding the effectiveness and efficiency of fire fighting and EMS personnel working a consecutive 48-hour shift. The overall tone of the responses to the survey questions was positive. It is important to note that no organization surveyed indicated that they were considering a move back to a shorter shift. It seems that either no obvious problems have come up in these fire departments related to the longer shift or the

labor/management environment provides little motivation to do detailed analysis of the effects of a 48-hour shift on the organization and it's employees. It is possible that small organizations with a modest workload may not suffer the same negative consequences when working extended shifts as shown in the data from the City of Minneapolis.

The Minneapolis Fire Department presented a unique opportunity to analyze the work effects of personnel working a consecutive 24-hour shift with personnel working a consecutive 48-hour shift. This group of 435 firefighters all worked in the same organization with the same management and labor climate, work environment and rules of operation. This provided a control group against which measurement of the differences between the length of shifts could be more accurately made.

The results of the research into the work effects of the 48-hour shift on the Minneapolis Fire Department are alarming. Over the years 2001 and 2002, discipline problems, sick leave, work-related injuries, motor vehicle accidents and turn out time were all significantly and negatively affected by firefighters working a 48-hour shift. Especially striking were the large differences in work-related injuries and motor vehicle accidents. These risk management measures convincingly demonstrate the increased costs associated with allowing firefighters to work beyond 24 consecutive hours in large emergency services organizations.

RECOMMENDATIONS

Large fire service organizations considering a change to a 48-hour shift should consider the possible negative effects on their organizations and it's employees. All organizations currently working a 48-hour shift should study the potential negative effects of the extended shift on resources. Hard data is very important to impartial and

honest dialogue, especially when economic realities and other workforce concerns outside the organization are driving change.

The Minneapolis Fire Department should continue to monitor the work effects of the 48-hour shift on the organization. This research used 2 years of comparative data. Study of additional data available in future years will allow management to form a more complete picture of the resource costs involved with an extended shift. If the trends identified in this research continue, management should consider moving back to shorter shifts during future contract negotiations with the labor union. This future research should be published for the benefit of the fire service and other organizations considering or using a 48-hour shift.

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Appendix A

Electronic Mail Survey Letter

I am interested in finding other fire departments that use a consecutive 48-hour shift (or longer) for firefighters working in suppression. I have heard that you may be using an extended shift (48-hour shift or longer). If so, will you send me a note and let me know when you went to the longer shifts and if you have seen any increase in:

1. Sick leave
2. Work related injuries
3. Motor vehicle accidents
4. Discipline problems or
5. Emergency response turn out time

The comparison we are interested in is your experience since implementing the longer shifts. Any help would be appreciated. I am also interested to know if you have not had any problems with the extended shift. I will certainly share the information from this research project if you are interested. Thanks in advance!

Jim Clack

Staff Deputy Chief

Minneapolis Fire Department

(612) 673-2688

Appendix B

Table B1: Survey Contact List

Department	State	Telephone Number	Contact Name	E Mail Address
Atascadero Fire	CA	805-461-5070	Chief Kurt Stone	kstone@atascadero.org
Atwater Fire	CA	209-357-6355	Chief Dennis Sparks	cityinfo@ci.atwater.ca.us
Brisbane Fire	CA	415-467-1216		firechief@ci.brisbane.ca.us
Burlingame Fire	CA	650-558-7600		fire@burlingame.org
Chino Fire	CA	909-902-5260	Chief Paul Benson	info@chinovalleyfire.org
Donner Summit Fire	CA	530-426-3456		info@dspud.com
El Segundo Fire	CA	310-524-2236	Chief Norm Angelo	nbangelo@elsegundo.org
Foster City Fire	CA	650-286-3350	Andra Lorenz	alorenz@fostercity.org
Half Moon Bay Fire	CA	650-726-5213	Chief James Asche	jasche@hmbfire.org
Hermosa Beach Fire	CA	310-318-0303	Chief Russell Tingley	rtingley@hermosabch.org
Hillsborough Fire	CA	650-579-3833	Chief Joe Bunnell	jbunnell@hillsca.org
Hisperia Fire	CA	760-947-1601	Chief Thomas Pambianco	TPambianco@ci.hesperia.ca.us
Kern County Fire	CA	661-391-7000	Chief Steve Gage	geoffdw@onemain.com
Kings County Fire	CA	559-582-3211X2882	Chief Doug Dawson	webmaster@co.kings.ca.us
Manhattan Beach Fire	CA	310-802-5203x7645	BN Chief Ron Redmond	rredmond@citymb.info
Menlo Park Fire	CA	650-688-8406	Chief Paul Wilson	paulw@menlofire.org
Moraga-Orinda Fire	CA	925-258-4512	Pete Nowicki	pnowicki@mofd.org
North Lake Tahoe Fire	CA	775-831-0351	Assistant Chief Bill Metcalf	wmetcalf@nltfpd.net
Oakdale City Fire	CA	209-847-5904	Chief Michael Wilkinson	mwrp@earthlink.net
Pacifica Fire	CA	650-738-7362	Chief Andrew Stark	starka@ci.pacifica.ca.us
Paso Robles Fire	CA	805-237-3973	Chief Ken Johnson	ESchief@prcity.com
Piedmont Fire Department	CA	510-420-3038	Chief John Speakman	jspeakman@piedmont.com
Redondo Beach Fire	CA	310-318-0663	Deputy Chief Robert Kittell	robert.kittell@redondo.org
San Bernadino City Fire	CA	909-384-5286	Chief Larry Pitzer	Pitzer_La@ci.san-bernardino.ca.us
San Bernadino County Fire	CA	909-387-5940	Chief Peter Hills	phills@fire.sbcounty.gov
San Mateo Fire	CA	650-522-7900	Chief Willie McDonald`	fire@cityofsanmateo.org
South Pasadena Fire	CA	626-403-7300	Chief Richard Elliott	relliott@ci.south-pasadena.ca.us
Truckee Fire	CA	530-582-7850	Chief Mike Terwilliger	mterwilliger@sbcglobal.net
University of CA- Davis	CA	530-752-3850	Chief Mike Chandler	mbchandler@ucdavis.edu
Minneapolis Fire	MN	612-673-2890	Deputy Chief Jim Clack	jim.clack@ci.minneapolis.mn.us
Albuquerque Fire	NM	505-833-7305	Commander Gabriel Marquez	reortega@cabq.gov

Note: Cities listed in bold participated in the survey.

Appendix C

Text of Survey Responses

Chief Clack, I am relatively new to El Segundo about 1 1/2 years, but allow me to attempt to answer your questions.

1. We do not have evidence of the 48-hour shift impacting sick leave. However impacts may be camouflaged by other factors in our schedule and rules that I will explain in a bit.

2. Work Related Injuries again this may be more influenced by other factors and can not be directly attributed to 48 hour shift.

3. There is no evidence of 48-hour shifts relating to this criterion.

4. Discipline problems are not correlated in anyway to the change to 48 hours

5. Turn out time has not been an issue as it relates to the 48-hour schedule. However -

There are some other factors you need to understand we have a large city problem with respect to hazards but this is relatively a small town 16,000 people residential, 75,000 day time. We work constant staffing which means a minimum of 18 on duty with only 18 assigned per shift. This means a lot of overtime. We run about 2,400 alarms a year, most of which are EMS. Over the years a number of Management Rights have been eroded through the MOU and past precedence. One of the big ones is that we are limited to scheduling a person for 96 hours straight maximum. However the Union Members can voluntarily schedule themselves for over 200 hours straight. It is not uncommon for them to do that with trades and volunteering for over time. No matter how few alarms a department runs at some time the consecutive hours gets to a point of response readiness and fitness for duty.

If you don't have constant staffing or a large amount of trades or overtime, this may not be a factor for you.

A bigger question you want to answer is how does it impact your program productivity. If you are going to a 48 I would suggest at least a one year trial period. The purpose is to identify the key issues which you can not probably totally identify and I may not be able to answer. Tied to this trial and if it is permanent should be clear written understanding of how it will benefit the City. e.g. that personnel will accomplish inspections or public education or training more effectively and productive or at least not less than it is now. If goals are not met the schedule should be open for management to have the ability to return to the former schedule. In reality because of our size, the BCs and Firefighters feel it is an advantage to have two consecutive days to begin and follow through on assignments.

A problem area is that with the schedule it could be a half a month (depending on holidays and other scheduled events) before I see them, that means BCs have to be flexible about off duty meetings.

Other than scheduling themselves for too many hours the only other potential problem, depending on how far away your personnel live, is the availability for call back due to them being tired from over scheduling or because the 4 days come around quick and the may have other commitments that affect their availability.

Again all of these and other issues/concerns need to be identified up front and in writing to avoid different interpretations later. It is all doable. Our circumstances may not apply but look at your rules on the number of overtime and trade hours that can be worked consecutively. Then if you put a cap on them understand that they will come back and tell you can't hire them back past that cap either. In an emergency it is a catch 22 if the reason for the cap is solely fitness for duty and safety.

Feel free to give a call, we don't have all the answers but I think there are some questions beyond the 5 above that you need to analyze based on your operation and historical culture. This is something that benefits them, don't hesitate to tie it to other organizational needs with ongoing measures. Thank you

Norm Angelo, Fire chief
El Segundo CA
310 524-2219

Dear Chief Clack:

Without an in-depth study, I cannot give you any specific facts and figures related to our newly implemented 48-96 schedule. However, I can tell you that both Management and Labor have recently agreed to extend the original one-year trial period for the new schedule until it can be formally adopted as a part of upcoming labor negotiations.

I did a cursory examination of sick leave use earlier in the year and did not find significant increase. Nor have we experienced a notable increase in injuries or accidents that can be attributed to the new schedule.

As I stated, this is a relatively new program for us, having been implemented February 7, 2002. So far, it seems to be popular with the members of the labor group. During the time we have been on the new schedule we have also moved to a new building, so it is difficult to make a direct causal relationship between any one set of factors. However, we have found that the schedule seems to have had a positive effect on morale and no significant adverse effect(s). In general, the schedule seems to have been very well received by all involved.

If you have any more specific questions, I would be happy to try to answer them or forward them to the appropriate personnel for further details. I would definitely be interested in any information you are able to compile.

Sincerely,
'Andra Lorenz, Management Analyst
Foster City Fire Department
Foster City, CA

January 14, 2003

Jim;

Firefighters here went to the 48/4 (48 hours on, 4 days off) schedule in the mid-1990's as a response to Ride Sharing/Air Quality mandates in the greater Los Angeles area. They had been working a more traditional 3/4 (work a day every other day for 3 shifts then 4 days off) schedule, so a 48/4 cut down the number of trips to the workplace in half.

Many Hermosa Beach Firefighters cannot afford to live at the beach, or prefer not to, and live as far away as 100 miles or more. The 48/4 schedule helps with that.

48 hours straight is not much of a problem here with 1800 calls for service annually, but in a busier department, I would not advise it. In fact, the firefighters sometimes leave after 48 hours more rested than when they came on.

Projects can be left out to get done for 48 hours rather than putting them away every day.

Sick leave reduced.

I work 4 days - 10 hours each Mon thru Thurs and so does my Assistant Fire Chief. Depending on the schedule, 14 days can pass before you see a company or Captain - that is my biggest concern.

Russell Tingley, Fire Chief
City of Hermosa Beach
540 Pier Avenue
Hermosa Beach, CA 90254

Telephone: 310-318-0303
Fax: 310-379-7725
E-mail: rtingley@hermosabch.org

Deputy Chief Clack,

We have been on the 48/96 (2-24 hour shifts on and four days off) shift for approximately 5 years. I have no quantifiable data to show increases in any of these areas. All these areas maintained stable after we changed schedules. We thought sick leave would decrease because personnel are working two days in a row and would be less likely to call off sick for one day. This did occur in some instances. Unfortunately, habitual users take the two days no matter the schedule.

I was a proponent of this shift while I was still working on the floor. I think the shift has its disadvantages like any other schedule. Primarily, the advantages are less time doing unit check outs (major check out the first day, cursory the second), shop for meals one time, better scheduling of daily duties, less time doing redundant maintenance (each shift does a unit check out each day, station maintenance each day, etc). If the first day is busy, it can immediately be picked up on the next day. This shift provides more versatility.

I hope this helps!

Thomas Pambianco
Fire Chief
Hesperia Fire District

Chief Clack,
The Menlo Park Fire Protection District, located in San Mateo County California (halfway between San Jose and San Francisco) just implemented a 48-hr on-duty with a 96-hr off-duty schedule Jan. 2003.

We do not yet have the data you requested but are tracking the info. for a one-year pilot program.

The impetus in this area for the new schedule is firefighters live 2-4 hrs away from the workplace, due to the high cost of housing. In order to attract/retain qualified personnel, the 48 hr on-duty schedule is being used to lessen commuting.

Thank you
Paul Wilson
Fire Chief

Hi Jim,

Hope the following info. is of some use to you. We went to the 48/96 staffing model exactly one year ago. The troops seem to like it much more than the older 'Kelley' schedule and that is a moral booster. To answer your other questions, we have had:

1. increased sick leave usage
2. no increase in injuries
3. no increase in accidents
4. no more discipline problems that usual
5. no increase in turnout time

If you have any other questions, please feel free to call.
(925) 258-4512

Pete
(Moraga-Orinda Fire Protection District)

I really can't equate the fact that the 24/48 led to this increase in sick leave usage. It's funny that you emailed today, as I have just finished my sick leave report for the month. I'll attach the file here and hope that you can make some sense of it. Bottom line is that for the same 6-month period last year we've used 1141 hours more of sick leave. I can attribute some of that to the time period, as we were involved with negotiations. Some of the membership attempted to make their negative emotions felt by not coming to work.

If the attachment doesn't come through let me know and I'll re-send it.

Pete
(Moraga-Orinda Fire Protection District)

Good Morning Chief,

Our dept. has 45 line personnel for three shifts (48 hrs on and 4 days off). We have three stations and operate 3 ALS engines (some days one is not ALS), 1 100' rear mount ladder and 2 ALS transport ambulances. Each shift also has 1 Battalion chief not included in the union local. One station runs a single engine and will "park" the engine and take their unmanned transport ambulance if we need a third transport unit. We respond to about 1600 calls per year - a high percentage are EMS. Minimum transport time for us is 30 minutes to the closest hospital, and for trauma criteria we have to transport to Reno which is 50 minutes away. We try to use an EMS helicopter where appropriate, weather permitting. Many times we have both ambulances "out of town" on transports. We also do inter-facility transfers from the local clinic to various hospitals in the area. We also provide and receive automatic mutual aid with neighboring fire districts. We have two wild land brush engines we respond during fire season - sometimes out of our district on strike teams to other fires in the area. If we do that, we cover our apparatus left in the district with callback OT.

That’s a very quick thumbnail sketch of our FD ops. If you have any more questions let me know and I will get the info for you. Hopefully our assistant chief and/or union

president will get back to you with the other info you requested on our 48 and 4 plan. Take care!

Tom Andrews.
NLTFPD.

Very interested in the results. I am also interested on how you found out that we are on 48-4's? I thought your department was looking at going to these shifts, sorry about the confusion. I will work on numbers next week, I work Monday - Tuesday next week.

Ryan Sommers
NLTFPD

Chief,

We also fall in the category of not having any statistical analysis of the results of this shift change. As Ryan mentioned, there was a change in sick leave use following implementation of the new schedule, but because there were other significant changes/events at the same time, it is impossible to attribute the change in sick leave utilization to any single cause. We have heard much anecdotal evidence that the shift results in a change in sick leave utilization, but we have never seen any proof.

For questions 2-5 in your list, we have seen no significant change in any of these areas.

Ryan has appropriately summarized the rest of our experience:

- We have had a couple of isolated incidents when there has been someone who has had to go home unexpectedly during the 48...no one wanted to work....and there was no one to force (we aren't very good at forced callbacks).

- There has also been some concern that we're a little slow to get started with daily activities on the 2nd morning. Not an operational concern, but an appearance and daily activity concern.

Good luck with your NFA project.

Bill Metcalf, Assistant Chief
North Lake Tahoe Fire Protection District
Incline Village, NV

Dear Chief,

The Piedmont Fire Department has been on the 24/48 schedule since June 23, 2002. Please call (510) 420-3038

John C. Speakman
Piedmont Fire Chief

(Research Note: I talked with Chief Speakman on December 13, 2002. He indicated that his department had been working a 48-hour shift for less than a year and had no significant problems. One firefighter had been calling in sick on 24-hour shift and then using vacation for the next 24 hours to get nine days off in a row. Chief Speakman was also very helpful with finding other fire departments in California working 48-hour shifts.)

Chief Clack:

I apologize for the delay in getting back to you; however, I was on vacation and am just now catching up to the in basket/e-mail monster.

Our Deputy Chief recently conducted an extensive study of the 48/96 shift.
I will be speaking with him, re. this issue sometime this week. Hopefully, we will be able to give you some good information, between the two of us. You will hear back from me within the next few days.

Please say hello to Chief Seal for me. He and I shared a room at the NFA about 12 years ago.

We implemented the 48-hour shift in March 2001. Talk to you soon.

Larry Pitzer
Fire Chief
San Bernardino City Fire Dept

James,

We do not track any of the areas you are looking to analyze. The South Pasadena Fire Department has operated off the 48-96 schedule since 1991.However, I have recently responded to another fire chief's inquiry with the following information.

"From an administration standpoint there are more negatives than positives in considering the schedule although the elements are difficult to quantify. The most significant problem associated with the schedule involves organizational communications and accountability. The amount and quality of communications denigrates as personnel approach the 48th hour. It is a common occurrence for personnel going off-duty to fail to share basic information with firefighters reporting for duty. The lack of communications creates an environment where accountability suffers. We have attempted to address the issue with written mechanisms but continue to experience significant communications problems.

A second problem involves the scheduling cycle and overlaps with the fire administration/city staff schedule. If an employee works a Sunday/Monday one week, he or she will work a Saturday/Sunday the next week and a Friday/Saturday the third week. In this scenario, there are only two overlapping days in a three week cycle. The schedule can present numerous challenges for meeting with firefighters to resolve personnel issues or answer labor/management questions.

Another consequence of the schedule concerns firefighters' lack of proximity to work. The schedule makes it easier for members of the fire department to move farther and farther from the workplace. Department members appear to be less involved in both the organization and the community they serve. It is difficult to get people involved in activities that require meetings or returning to town on their days off. From an operational standpoint, it is extremely challenging to recall personnel for emergencies due to extended travel time from remote residences."

This is my opinion in dealing with the schedule. Let me know if you have any additional questions.

Richard Elliott
Fire Chief

Jim,

We have been using the 2 on 4 off for two years now. Specific to your questions:

1. Sick Leave- our shift ff.'s accrue sick leave at 24 hours per month and use it hour for hour. They work the same amount of hours as the 1 on 1 off program so there is no change in use.

2. Injuries- I have not seen an increase or decrease in injuries due to the shift. We developed an exercise program some time ago and have a professional trainer to help them work out. That significantly reduced injuries.

3. MVA- no real changes and the incidents are not on the second day of a long shift. We do Inter Facility Transfers with ambulances and we watch the work rest cycle to make sure the driver meets California DMV rest requirements.

4. Discipline/turn out- no change at all, or nothing obvious. The on shift personnel respond quickly just because they are a motivated bunch I suppose. We have had some long 2-day shifts recently with the severe storms and I noticed some dragging. To work with fatigue, if a shift hits it hard for the first 24 after they finish daily's they can catch up on rest, but that is very rare.

I allowed the shifts to go to this shift on their request. I can't think of a reason not to. I believe in one thing in negotiations. If you can give the employees something that costs you nothing then do it so you can bargain better on the expensive stuff.

Good Luck,
Mike Terwilliger, Fire Chief
Truckee Fire Protection District
530-582-7850

Chief Chandler has asked me to respond to your inquiry about 48-hour shifts.

- We went to the 2X4 (2-on, 4-off) schedule one-year ago.
- Sick leave initially dropped off considerably. At this point we are seeing it stabilize back to where it was when we were on the 24s.
- There has been no increase in accidents, discipline, work-related injuries, etc.
- There have been only a handful of shifts where the second day was basically shot because of a very busy 1st shift.
- We run about 1,100 calls a year out of one station.
- We cross-staff one engine, one tillered quint and one haz mat rig.
- The crews love the schedule and morale would take a serious hit if we reverted back to the old schedule.

We'd love to get a copy of your survey results when completed. Please feel free to contact me if you have other questions.

Phil Davis
Assistant Fire Chief
University of California at Davis
Fire Department
One Shields Ave.
Davis, CA 95616
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http://fire.ucdavis.edu

The following is the results of a telephone interview with Commander Gabriel Marquez of the Albuquerque Fire Department on January 29, 2003. This is not a transcript, but a summary of his view of the 48-hour shift.

How long have you been working a 48-hour shift? Answer: 6-7 years.

Sick leave use: No Increase. “We have a program where firefighters can take 12 hours

of unscheduled personal leave each year with the approval of management. We also allow firefighters to take 48 hours of unscheduled vacation each year. Overtime is used to cover for firefighters on vacation. Firefighters are allowed to accrue 700 hours of vacation in their vacation bank. Firefighters are allowed to work a maximum of 72 hours in a row.

Work-Related Injuries. Answer: We have seen no increase in injuries.

Vehicle Accidents: Answer: Accidents are rare. We have drug testing post accident,

Discipline: Answer: No problems due to the 48-hour shift. The problems in this area are more “generational”.

Turn Out Time. Answer: No increase in turn out time due to the 48-hour shift.

APPENDIX D

OCCUPATIONAL MEDICINE CONSULTANTS, LTD.

Thomas C. Jetzer, MD, MPH, FACOEM
Richard F. Hirt, MD
Joseph Horozaniecki, MD
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May 31, 2000

Chief Jim Clack
Minneapolis Fire Department
350 South 5th Street, #230
Minneapolis, MN 55415-1387

RE: OPINION ON THE PROPOSED CHANGE OF SHIFT SCHEDULES FOR THE MINNEAPOLIS FIRE FIGHTERS

Dear Chief Clack:

Per our phone conversation today, it appears to me that there has been an ongoing review of the type of shifts that the Minneapolis fire fighters will have. Apparently the issue of having 48 hour shifts, has been raised. You have asked my opinion on this issue as to whether it is in the best interest of the fire fighters, as well as the general public, from a safety and health perspective.

Based on my review and understanding, as well as personal experience, I would like to express the following opinion. I think that 48 hours generally is a bit long for anybody, given the intensity and the type of work that fire fighters do. Clearly there can be varieties of activity levels, depending on the station, as well as on any particular day. However, it is very conceivable that a fire fighter could be very active with both fire and medical calls, during the entire 48 hour period of time. I would not recommend working on a regular basis, more than 36 hours at a time, for the fire fighters.

I base this on a number of experiences and opinions. First of all, in the last few years I have attended the airline medical directors meeting, in which Air Force studies with sleep deprivation in pilots was presented. I cannot remember the specific year of that, but with time I could retrieve some of that information. However, the specifics of that conference are very clear to me. Any time that more than one sleep cycle was lost, the second day of the sleep cycle loss had an increased level of safety and health hazards with it. As a result of that, a number of airlines have modified their pilot schedules, so that they do not lose more than one night of sleep.

In addition, they are allowed to rest after being up one full night. Rarely do any airlines now schedule people to miss sleep two nights in a row. This is based on decreased alertness and increased fatigue. I think that basically this would apply to fire fighters as well. Secondly, I base this on my review over the years of medical training programs, which are notorious for long hours. I know of no program that required anybody to work more than 36 hours on a shift. Clearly, there was also some time to sleep and rest during the 36 hours, but no residency program that I am aware of, required anyone to work more than 36 hours without at least a 12 hour break. I have known this to be the case on pretty much a national basis.

From my own personal experience of having been a physician and working emergency room hours, and scheduling many physicians in multiple emergency rooms, I never scheduled anyone to work two nights in a row, because their efficiency and ability to function in my opinion, clearly dropped off. Personally, I would not work two nights in a row, in a place where public safety is at risk. There is never a guarantee that you can get adequate rest during a long shift, such as 48 hours. Again, my maximum recommendation for any shift for the fire fighters would be 36 hours.

The other question asked was whether there was any occasion where a fire fighter could work 48 hours. I think that despite my afore mentioned opinion, certainly on a rare occasional basis this could be done. I can conceive of a situation such as a major flu influenza or a major metropolitan catastrophe, where they would need to have people working extra hours. Clearly people can rise to those occasions, but I think that it should not be a matter of course to solving scheduling problems, but only be done in an extremely rare and unusual circumstance.

Hopefully this opinion helps you in your deliberations over the appropriate scheduling of the fire fighters. This opinion is based on reasonable review of the medical literature, as well as significant personal experience. If you need further information or would like to discuss this further with me, please do not hesitate to contact me. Thank you for the opportunity to express my opinion.

Yours truly,

Thomas C. Jetzer, M.D.

TCJ/mf