

LATE DISTRIBUTION FOR COUNCIL - JULY 7, 2009

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ADMINISTRATIVE REPORT

Report Date: April 24, 2009
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VanRIMS No.: 08-2000-20
Meeting Date: July 7, 2009

TO: Vancouver City Council

FROM: General Manager/Fire Chief, Fire and Rescue Services

SUBJECT: Joint Vancouver Fire & Rescue Services (VF&RS) and Vancouver Fire Fighters' Union (Local 18) Physical Fitness Training and Equipment Program

RECOMMENDATION

- A. THAT Council approve the initiative between VF&RS and Local 18 to develop and implement a joint physical fitness training and equipment program through a 50/50 cost-sharing arrangement.
- B. THAT Council approve the purchase of 22 treadmills and 22 elliptical trainers, with the capital and one time implementation costs of approximately \$324,000 to be cost-shared (50/50) between VF&RS and Local 18; source of funding to be a loan from the Truck and Equipment Plant account.
- C. THAT Council approve the annual operating costs of \$45,000 (\$90,000 total costs with \$45,000 cost-sharing from Local 18) for the fitness training and equipment program, with funding to be provided from within VF&RS' operating budget beginning in 2010.

CITY MANAGER'S COMMENTS

The City Manager recommends approval of the above recommendation.

COUNCIL POLICY

Council's policy is to secure contracts for the purchase of equipment, supplies and services that will provide the best value, based on an overall assessment of quality, service and price.

PURPOSE

The purpose of this report is to obtain Council approval for VF&RS to:

- Implement a physical fitness training and equipment program in partnership with the Vancouver Fire Fighters' Union Local 18.
- Authorize the purchase through a Request for Quotation (RFQ) to purchase 22 treadmills and 22 elliptical trainers at an estimated cost of \$324,000, cost-shared 50/50 between VF&RS and Local 18.
- Add ongoing operating costs of \$45,000 to VF&RS' operating budget to support the ongoing associated costs for continued program development, as well as maintenance and future replacement of the fitness equipment.

DISCUSSION

The nature of firefighting and emergency rescue work requires staff to engage in periods of strenuous physical labour. While firefighters may have periods of inactivity during various parts of their shifts (e.g., late at night), they are inevitably required to carry out their duties at a moment's notice, often inside of challenging and time sensitive environments. They do so while carrying heavy tools and equipment and while wearing personal protective gear (PPE) that restricts movement, adds weight and increases core body temperature. The PPE consists of a coat, pants, gloves, boots, helmet, balaclava and Self Contained Breathing Apparatus (SCBA gear) all of which weighs approximately 40 lbs. Firefighters are called to respond to many emergency situations, including, but not limited to:

- providing emergency medical aid that may involve lifting, carrying or tending to patients who are in awkward positions and/or spaces.
- responding to fire alarms that involve walking up numerous flights of stairs, in full PPE while dragging water filled hoses and other assorted rescue tools to their destination.

Firefighters perform their work without the benefit of an actual warm up and, as a result, face increased risk of injury. It is widely recognized that a key component of injury prevention is maintaining a reasonable level of physical fitness. Ideally, firefighters should have a good balance of strength, endurance and cardio vascular conditioning. Because of these fundamental work requirements there is an expectation that firefighting staff maintain a high level of physical fitness.

In the past, firefighters were provided with the ability to participate in physical activities while at work. Primarily, these activities were a competitive type of sport like handball or volleyball. Initially, these activities were seen as a way to promote "team building" while encouraging firefighters to remain active when they were not on a call and not scheduled to other duties such as technical training or drills. The department provided staff the time and space to engage in these activities and the Vancouver Fire Fighters' Union (through their Athletic Committee) funded and supplied the bulk of the equipment. Unfortunately, participation in sports like volleyball led to firefighter injury. As a result, in late 2007 VF&RS advised firefighters that they were no longer permitted to participate in competitive sports while at work.

This has resulted in frustration by our firefighters who have continued to express their disappointment that no formal undertaking by the department to replace previous activities with other more appropriate fitness initiatives. To date, firefighters have used whatever

limited fitness equipment is available to them (primarily treadmills supplied by the union - now past or near the end of their life cycle) to maintain some form of physical activity.

In view of the above, and during the most recent contract negotiations between the City and the Vancouver Fire Fighters' Union, it was agreed that the parties should work together to identify reasonable opportunities to enhance firefighter fitness and wellness. Specifically, the parties agreed to:

1. Form a committee with three representatives from the Union and management
2. Develop (and recommend to principles) a Fitness/Wellness Program that serves to:
 - Increase employee awareness of wellness
 - Improve and maintain overall employee fitness with a view to reduce sick leave usage

The parties have met on several occasions sharing information and ideas. The joint initiative laid out in this report (including identified rationale) is a result of the Committee's efforts to date.

Upon approval by Council, VF&RS and Local 18 will enter into a Letter of Agreement (LOA) to define the specific parameters on cost sharing for this program. Both parties have agreed to share all costs 50/50.

Why Have Fitness Training?

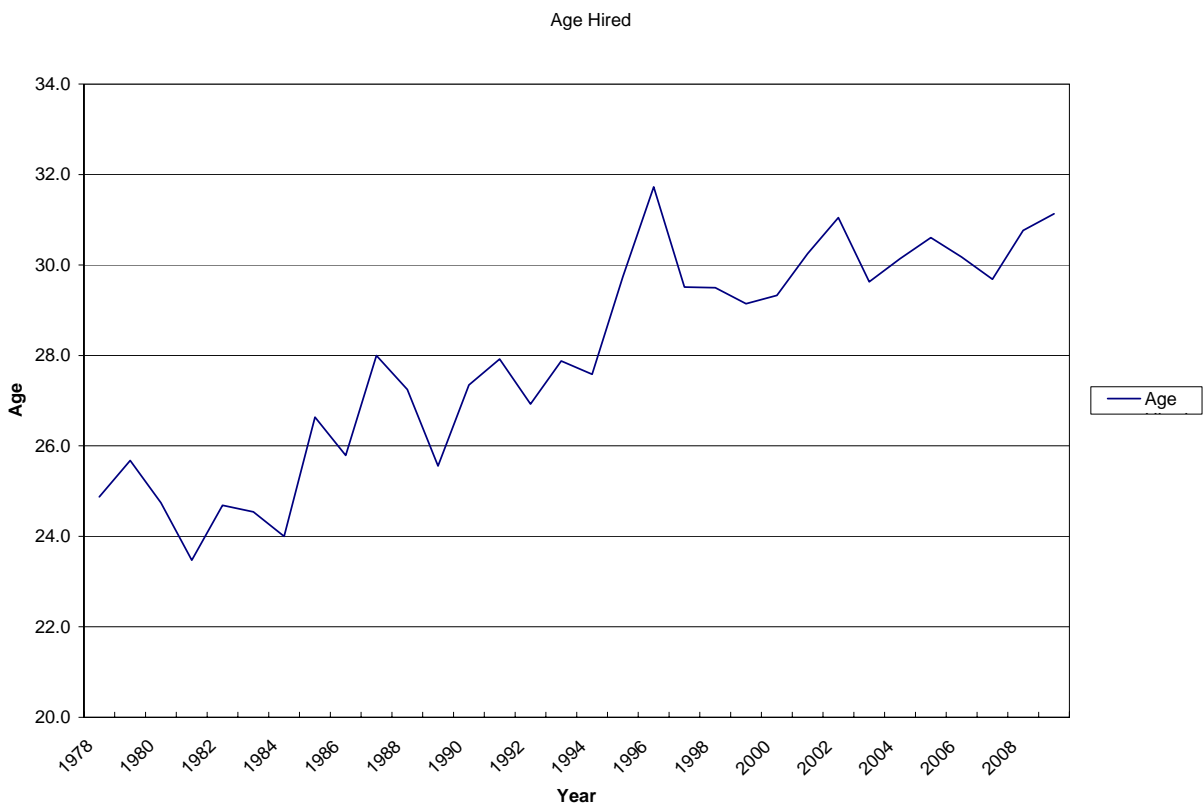
In 1996, the International Association of Fire Chiefs (IAFC) and International Association of Fire Fighters (IAFF), created and adopted the Fire Service Joint Labour Management Wellness-Fitness Initiative (WFI). In conjunction with this program a study of participating departments that looked at injuries and their related costs was carried out. What the study found was that for the WFI departments there was a reduction in lost work days of 28%, with a resulting reduction in average cost per claim of 23%. An excerpt from this document relating to these findings is included as Appendix A.

Data for our department shows that absence due to illness or injury (sick leave) comprises a significant amount of musculoskeletal injuries (MSI). The percentage of days lost that are related to MSI is estimated at 50-60%, with back injuries making up approximately 20-25% of these injuries. Because of the physical job demands of the work, a staff member with a MSI is not able to work as a firefighter. As the department must maintain a minimum staffing level in order to provide appropriate emergency services to the communities it serves, injured firefighters must be replaced at overtime costs

The department has a progressive return to work program, placing staff members into temporary transitional work until they are able to return to their full (pre-disability) duties. However, the Department is still required, at additional cost (overtime), to backfill the temporarily injured and reassigned firefighter to maintain required staffing levels in suppression. Consequently, any reduction to the time a firefighter spends off the job (including reassignment to temporary alternate work) will assist the Department to reduce absenteeism rates and corresponding overtime costs.

In addition to the requirement to maintain minimum staffing levels when Firefighters are injured and off the job, the average age at time of hire for successful Firefighter applicants has increased from 24 to 31 over the past three decades. As a result and because as we age

we are more susceptible to musculoskeletal injuries and take longer to recover when injured the requirement to remain physically fit and active becomes even more important in relationship to reducing the risk of injury as well as managing the physically demanding elements of the fire and rescue work. Currently VF&RS mean age for staff is 42.2 years old.



VF&RS, like the general Fire Service industry, recognizes the importance and benefits associated with having a physically fit fire force. Consequently, VF&RS tests every prospective new firefighter to determine if they meet a level of physical strength and conditioning necessary to perform fire and rescue work. This begins with timed physical testing that measures their fitness in relationship to the work they would be required to perform as firefighters.

Fitness Training Models

The department has examined several options and models to facilitate fitness training for staff.

- A. We have looked into using community centers throughout the city. This model was inappropriate because it required too much movement of staff and apparatus to engage in the training. Staff would either be moving to the community center for training or moving to another fire hall to provide fill-in coverage to allow other staff to go for training. Such movement would negatively impact response capabilities, interrupt firefighting standards training, and increase fuel usage and not align with the principles of environmental stewardship by increasing green house gases

- B. Another model examined was to put fitness equipment in geographically central firehalls within the city and have staff attend those firehalls to do fitness training excessive apparatus movement, reduced response capabilities and the related increase in fuel use, pollution and green house gases.
- C. The third approach was to follow a fitness training model that is used in other fire departments within Canada and the USA, which has equipment available within each worksite (firehall) and time scheduled for staff to train at these locations. This model maintains response capabilities, eliminates the need for staff to travel to other locations (no pollution or green house gas issues) and allows the scheduling of fitness training at any available time.

In Calgary and Edmonton which follow the complete WFI program they have provided the following equipment in each worksite (firehall):

- One treadmill
- One elliptical trainer
- One stationary bike
- Resistance training equipment including:
 - Bench press
 - Squat machine
 - Lat pull down machine
 - Rowing machine

Vancouver Fire Fighters' Union Local 18 has partnered with Groundwork Athletics to design a fitness program that is specifically tailored to the firefighter occupation, is adaptable to different fitness levels, targets the core and requires minimal financial commitment. Local 18 evaluated several companies prior to committing to Groundwork. Groundwork has been training professional athletes for the past four years and was able to meet the union's criteria including best price.

Groundwork have developed four exercise programs, a 30 and 60 minute total body workout, a push-pull workout and a legs and shoulder workout. These programs do not use traditional resistance training equipment, but rather rely on lighter weights, bands, a bosu ball, an exercise ball, medicine balls or the person's body weight to perform exercises that build body strength and endurance with a focus on core conditioning.

This model is extremely cost effective when compared to the financial commitment to purchase and maintain a variety of resistance training equipment for each worksite and encourages staff to exercise as a group working at different stations simultaneously.

750 suppression staff will participate in this program at an annual cost of \$45,000: cost per person would be \$60 per person annually to facilitate this program.

The goal of VF&RS's fitness program is not intended to train unfit people and make them fit, rather to maintain the already fit staff we have. With that in mind the program will have two main components:

- Cardio vascular conditioning
- Strength/endurance/core training

Staff would be expected to use the treadmill, elliptical trainer or stationary bike to maintain a high level of cardio vascular training. In conjunction with this, all staff would participate in the core training program designed by Groundwork Athletics. Fitness coaches would be trained to champion and facilitate the fitness program.

Both parties agree that to be successful and provide the most benefit, the fitness program would have to be designed in the following way:

- Fitness programs would be structured with identified fitness activities and scheduled while on shift rotation. All staff members would work out at least twice during a four shift rotation.
- All staff members would be required to participate at their own fitness levels. The fitness program is designed to be easily adaptable to different fitness levels ensuring participation.
- Fitness coaches drawn from firehall staff, would be trained to assist in the facilitation of fitness training. Staff members (coaches) would attend Groundwork Athletics to participate in a half day workshop to understand how to promote, guide and coach co-workers through the different workouts. The goal to identify one coach for each of the eighty worksites-(80 coaches - 20 firehalls x 4 shifts). Coaches would also facilitate measurements to quantify changes in staff fitness levels.
- The fitness program though mandatory, can not contain punitive elements, quantifiable program evaluations or measurements are acceptable. Initial measurements based on weight, height, blood pressure and resting heart rate and VO2 max would be recorded. The highest, lowest and average for each age group would be recorded. All data would be blind with no names attached to specific data, which looks at overall age group metrics.

Union Participation

Both VF&RS and the Vancouver Fire Fighters' Union are committed to supporting firefighters to improve their overall health and wellness to better perform on the job and enjoy a better quality of life. To this end, the union has committed to supporting the program's development and implementation as well as sharing the costs associated with the program on an equal basis (50/50 cost sharing).

FINANCIAL IMPLICATIONS

Capital and One-time Implementation costs

The table below shows the total capital costs for implementing this fitness program. These costs would be paid incrementally over the life span of the equipment through a loan repayment to the Truck and Equipment Plant account. A competitive bid process would be used to ensure the best price for the equipment is obtained.

Component Description	Capital Costs
Purchase Costs for Fitness Equipment	\$310,500
Delivery and Installation	\$5,300
Firehall Electric upgrades (8 Fire Halls)	\$8,200
Total Capital and one-time Implementation Costs	\$324,000
CoV Portion	\$162,000

Ongoing Operating Costs

The on-going cost to the City of Vancouver associated with implementing the joint physical fitness program is estimated to be \$45,000 annually, comprised of the City's share of loan repayment for purchase of fitness equipment, fitness equipment maintenance and staff training. It is anticipated that there will be a cost savings in WorkSafe BC premiums paid by VF&RS due to improved attendance and a corresponding reduction of days lost to MSI. Any savings achieved through a reduction in WSBC rates will be used to offset these costs in future budget years. However, an up-front investment is needed to purchase the equipment and implement the fitness program.

The fitness program would need to be re-evaluated and updated to keep it fresh and relevant every two years. The department would like to continue the partnership with Groundwork Athletics that was started with Local 18 to fully assess the value and appropriateness when all members are participating in the newly structured fitness program. Appropriate measurement tools will be developed collaboratively to measure the program's success. Fitness coaches (fire personnel) would be trained by Groundwork Athletics as necessary to facilitate the program.

Table1 - On-Going Maintenance & Loan Repayment Costs

Component Description	Operating Costs
Maintenance Costs for Fitness Equipment	\$12,000
Staff Training Costs	\$12,000
Loan Repayment to the Truck & Equipment Plant account	\$66,000
Total On-Going Operating Costs	\$90,000
Increase in annual operating budget (CoV portion)	\$45,000

IMPLEMENTATION PLAN

1. Issue a Request for Quotation (RFQ) for 22 treadmills and 22 elliptical trainers with purchase and delivery to worksites.
2. Select vendor identify schedule to supply Halls with Fitness Equipment.
3. Train fitness coaches.
4. Schedule fitness training times into firefighter work schedules at all suppression worksites (minimum twice a set of shifts).
5. Develop measurement tools to evaluate the program's success as well as methods for future enhancement.

CONCLUSION

The City, through its promotion of fitness initiatives (i.e. Fit City), recognizes the value and benefits to encouraging a more physically fit workforce. Similarly, VF&RS recognizes that it is essential for firefighters to maintain a high degree of physical conditioning to meet the strenuous occupational demands that fire and rescue work entails. It is for this reason that the Department wishes to implement a regimented fitness program that aligns with the bona fide job requirements of firefighting in the workplace. This level of commitment to physical conditioning will assist to ensure that firefighters are ready and able to serve the citizens of Vancouver.

Finally, the department sees significant benefits to a formalized, mandated fitness program. Some of the expected benefits include:

- Improved firefighter fitness levels and better job performance;
- Reduction of workplace injuries;
- Earlier recovery and return to work from injury;
- Reduced absenteeism and corresponding costs (i.e. - overtime);
- Enhanced employee engagement, well-being and morale;
- Demonstrated commitment to employee wellness through a proactive and regimented approach to firefighter fitness; and
- Improved union/management relations through a positive employee-focused partnership.

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CHAPTER 6 — Cost Justification

Management and labor shall work together to reduce injuries to uniformed personnel, and the associated costs, by fully implementing the Fire Service Joint Labor management Wellness Fitness Initiative.

This chapter highlights the following:

- Introduction
- Methods of Collection
- Measurement and Outcome
- Costs and Claims of WFI Departments Versus Non-WFI Departments
- Discussion
- Economic Indicators of Fire Department Wellness
- Cost of Fire Fighter Wellness Programs and Return on Investment (ROI)
- Summary
- Endnotes

INTRODUCTION

Uniformed personnel are at an increased risk for musculoskeletal injuries and cardiorespiratory illness compared to other occupations.^{1,2} Occupational injuries are the leading cause of disability and/or early retirement for uniformed personnel, and cardiovascular disease is the most common cause of work related death.^{3,6} Fire fighters must perform physically intense work in extraordinary environments including high heat, low oxygen, high carbon monoxide and other combustible products. In addition to these job-related hazards, cardiac risk factors are higher among fire fighters than other comparable worker groups.⁷ As uniformed personnel age, there can be an increase in the prevalence of inactivity, hypertension, lower fitness level, and obesity.⁸ Although the work-related death rate is lower than several occupations, fire fighters' rate of injury is markedly higher than other comparable jobs, with the annual injury rate 8.6 times that in mining.

Tens of thousands of fire fighters are injured each year while fighting fires, rescuing people, responding to hazardous materials incidents and training for their job. While the majority of these injuries are minor, a substantial number are debilitating and career ending. These injuries contribute to a significant human and financial toll to personnel and the jurisdictions where they work, through lost work hours, higher insurance premiums, overtime, disability and early retirement payments.

In recent years health care costs have risen dramatically, in the past year alone a 12 percent increase was seen in both the public and private sectors.¹⁰ Administrators are calling for more rigorous use of economic evaluations to guide resource allocation and spending. This is especially true in city and county governments with regard to the rising

costs of fire and police agencies.¹¹ One strategy used to control the rising health care costs is to implement worksite health promotion.¹² The rationale for worksite health promotion has been well documented from research outside of the fire service. A number of studies have addressed the question and have shown a favorable Return on Investment (ROI),¹³⁻¹⁷ for comprehensive health promotion programs. In fact, over 143 studies demonstrate positive ROI associated with worksite health promotion. Examination of the this peer-reviewed literature concludes that the financial benefits of well-designed, well-implemented health promotion programs substantially exceed their costs and have a positive ROI and benefit/cost ratio.¹⁸⁻²⁰

While worksite wellness programs have achieved economic success, initial start up costs can be expensive to implement and may not always be viewed as cost effective, especially in the short-term.²¹ In addition, most of the programs studied were in white collar or management industries, and the favorable outcomes were in the reduction of medical costs for chronic illnesses, rather than musculoskeletal injuries that are common in fire fighting. In general, most fire departments have limited "wellness" resources and services available to the uniformed personnel. Thus, fire service decision-makers debate whether or not an adequate ROI is available for the amount of time, effort, and energy that go into implementing and maintaining a fire fighter health promotion program.

In 1996, the IAFF and IAFC, in conjunction with 10 fire departments in North America, created and adopted the Fire Service Joint Labor Management Wellness-Fitness Initiative (WFI). Components of the WFI include a medical evaluation, fitness assessment, injury prevention and rehabilitation, behavioral health, and data collection (department injury and associated cost). The WFI is designed to improve the quality of life for all fire fighters²² while simultaneously seeking to prove the value of investing wellness resources over time. One of the major roadblocks in preventing fire departments from implementing the WFI is cost and concerns about the economic benefit of such a program. Therefore, the objective of this chapter is to determine the economic impact by calculating occupational claims and costs among the charter fire departments that adopted and implemented the WFI.

METHODS OF COLLECTION

In 2006 and 2007, Human Resources and Risk Management Sections of the original 10 fire departments were contacted to acquire aggregated data on workers' compensation claims, lost work hours, and total incurred costs, prior to and after implementation of the WFI. Eight of the fire departments had sufficient data to be included in this report (Table 1), but only four had adopted tracking cost information prior to and after implementation (Fairfax County, Virginia; Indianapolis, Indiana; Los Angeles County, California; and Phoenix, Arizona). The other four fire departments for various reasons, did not advance in the adoption of policies, procedures, and practices recommended in the WFI, however, they did track occupational injury and illness claims and cost information to act as comparison or control sites (Austin, Texas; Calgary, Alberta; Miami-Dade, Florida; and Seattle, Washington). Table 1 shows the departments that participated in this project and their participation rates. Wellness-Fitness Initiative fire departments have a mandatory, non-punitive policy for individual participation and the participation rates increased steadily over the course of implementation from an average of 54 percent in the first year to 79 percent in 2004.

By working with each department, we were able to gather occupational injury/illness claims, disability costs, lost work hours, and total incurred costs annually for a period of at least five years prior to (as a baseline) and after implementation of the WFI. We attempted to account for missing information by either not including the specific individual data into the total, or extrapolating from similar data the extent of the injury and cost of a claim. All participating fire departments had a computerized system of injury and cost tracking with site-specific unique software that was either developed internally by the department or purchased externally.

The study did not focus on the type or severity of injury, but simply the total number of claims. In addition, measurements were obtained including calculations on the average cost per claim, however, this is an indirect indicator of the severity of injury/illness, total days lost and the total annual incurred disability costs. One limitation of this data is that it only represents occupational injuries or illness, which likely underestimates the positive impact of implementing the WFI since some reports suggest one-third to one-half of fire fighter injury or illness time loss is non-occupational. For example, a fire fighter hurt off shift is not considered a reportable injury and is not included in this dataset. That type of injury or illness would only be tracked by the use of sick leave. Since a fire fighter does not have to report why they are using sick leave, reporting and tracking the impact of the WFI on off-shift or non-occupational injuries is difficult. Confidentiality policies and standards were followed according to the Health Insurance Portability and Accountability Act of 1996 (HIPAA) medical standards with no ability to identify an individual fire fighter claim. All fire department data information and claims are combined then averaged between the four WFI and four non-WFI participating fire departments. Thus, the numbers represent the aggregate mean number of claims and costs for an individual fire department (mean of the 4 departments) over an annual period.

MEASUREMENT AND OUTCOMES

All fire departments aggregated claims data was combined and is summarized in the following tables and graphs. Total number of occupational claims, number of lost days, total incurred costs, and cost per claim, were assessed between the four WFI fire departments (Fairfax, Indianapolis, Los Angeles, and Phoenix) and the non-WFI departments (Austin, Calgary, Miami-Dade, and Seattle)

Table 1: Participating fire department sites

FIRE DEPARTMENT	UNIFORMED PERSONNEL	WFI PARTICIPATION RATE IN 1997	WFI PARTICIPATION RATE IN 2004
Austin, TX	1032	CONTROL	CONTROL
Calgary, ALB	983	CONTROL	CONTROL
Fairfax County, VA	1280	65%	85%
Indianapolis, IN	780	70%	95%
Los Angeles County, CA	3013	10%	50%
Miami-Dade County, FL	1900	CONTROL	CONTROL
Phoenix, AZ	1588	70%	90%
Seattle, WA	1005	CONTROL	CONTROL

for seven years prior to and after implementation of WFI among WFI and non-WFI fire departments. As stated above, data from each department was totaled, then combined and averaged between the four WFI participating and four non-WFI fire departments. In doing so this removed any ability to identify an individual fire department's cost data, therefore allowing each participating department to maintain financial confidentiality. The numbers presented, represent the mean number of claims and costs for one fire department (mean of the four departments) over an annual time period. The numbers of lost days from claims were available from some of the departments. Lost work hours data was also extrapolated and averaged from just those fire departments and adjusted for all the departments to get the estimated average number of lost days and hours per site.

The mean total claims, lost hours, and total incurred costs represent service or occupational benefits paid per fiscal year for a department. Data from these fire departments do not include any non-occupational claims and costs because of the difficulty in tracking this type of information through private insurance and individual medical providers. This exclusion of non-occupational injuries in

the cost table below will logically cause the numbers to underestimate the cost savings and potential impact of the WFI intervention.

COSTS AND CLAIMS OF WFI DEPARTMENTS VERSUS NON-WFI DEPARTMENTS

In Table 2 the summary data shows the WFI sites (Fairfax, Indianapolis, Los Angeles, and Phoenix) and non-WFI sites (Austin, Calgary, Miami-Dade, and Seattle) beginning with pre-implementation, 1991-1997, to post implementation, 1998 - 2004. Pre-implementation, for the WFI sites, there were a total of 3,033 claims, with a total of 40,611 days lost, and an incurred cost totaling \$21,695,644, an average cost per claim over the seven years was \$56,845 per department. For the seven years post WFI implementation, there was a 5 percent increase in claims, a 28 percent reduction in days lost, a 3 percent increase in total incurred costs to \$22,276,143, and a 23 percent decrease in the average cost per claim. By contrast, in the non-WFI departments there was a 22 percent increase in claims from 1991-1997 to 1998 - 2004, a 55 percent increase in days lost, a 58 percent increase in total incurred costs, and a 35 percent increase in average cost per claim per fire department.

Table 2: Mean Occupational Claims, Loss Work Days, Total Incurred Costs, and Average Cost Per Claim For WFI and Non-WFI departments.

Claim Date	Implementing WFI				Not Implementing WFI			
	WFI Claims	Lost Work Days	Total Incurred Cost*	Average Cost Per Claim	Non-WFI Claims	Lost Works Days	Total Incurred Cost *	Average Cost Per Claim
1991	401	4,213	\$1,582,424	\$7,645	344	3,689	\$2,243,993	\$6,699
1992	407	4,753	\$1,951,752	\$7,571	339	3,899	\$2,155,654	\$6,553
1993	429	5,759	\$2,418,216	\$7,626	347	3,431	\$2,402,384	\$6,900
1994	436	6,085	\$3,576,916	\$8,146	359	3,220	\$2,385,562	\$6,697
1995	438	6,326	\$3,600,762	\$8,247	342	4,441	\$2,702,118	\$7,279
1996	434	6,895	\$4,236,084	\$8,321	372	4,189	\$2,764,044	\$6,724
1997	488	6,580	\$4,329,490	\$9,299	256	3,878	\$2,401,968	\$7,060
Totals	3,033	40,611	\$21,695,644	\$56,855	2,359	26,747	\$17,055,723	\$47,912
1998	386	3,351	\$2,458,116	\$6,233	371	3,515	\$2,536,780	\$7,278
1999	400	3,834	\$2,627,379	\$6,177	387	4,672	\$3,104,697	\$8,167
2000	435	4,716	\$2,891,599	\$6,391	442	5,823	\$3,476,799	\$8,517
2001	452	4,847	\$3,075,238	\$6,115	464	6,404	\$3,806,243	\$8,856
2002	498	4,725	\$3,688,405	\$7,175	428	6,335	\$4,080,519	\$10,054
2003	531	4,702	\$3,871,945	\$7,061	449	7,208	\$4,919,355	\$11,146
2004	508	5,496	\$3,663,493	\$7,073	482	7,431	\$5,067,383	\$10,560
Totals	3,210	31,671	\$22,276,145	\$46,225	3,023	41,388	\$26,991,776	\$64,608
Percent Change	5%**	-28%	3%**	-23%	22%	55%	58%	35%

*All costs are adjusted to 2001 U.S. dollars

Below, in Figure 1 is graphical representation of Table 2, which shows the percentage change in claims, lost work-days, total costs, and average cost per claim for a WFI department versus a non-WFI department. Statistically, there was a significant difference ($p < .026$) for occupational claims and costs between the fire departments that implemented the WFI and those sites not implementing the WFI. Regarding occupational claims, there was a 5 percent increase over the 7 years for a WFI department versus a 22 percent increase for a non-WFI department over the 7 years. For a non-WFI fire department, this represented an increase of 81 claims per year when compared to 25 claims per year for a WFI fire department. When comparing lost hours, there is a 28 percent reduction in lost hours for the WFI departments compared to a 55 percent increase in lost hours for non-WFI departments. When assessing total incurred costs, there was a 3 percent increase in costs over the 7 years for the pre- and post-implementation WFI departments and a 58 percent increase in total costs for the non-WFI fire departments for both pre- and post-implementation.

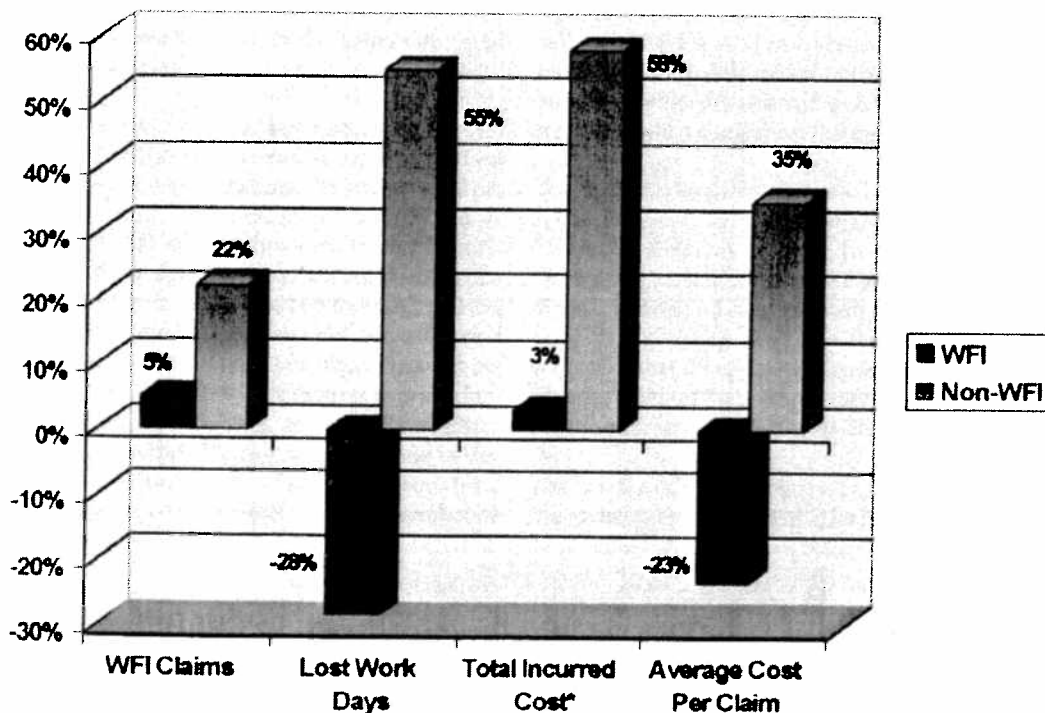
In actual dollar amounts (adjusted to 2001 U.S. dollars), this equates to a total incurred cost increase of \$82,900 per year, per WFI department and a total incurred cost increase of \$1,419,435 per non-WFI fire department, per

year. This represents a difference of \$1,336,535, which indicates that non-WFI departments spent over \$1.33 million dollars more per year, per department when compared to WFI departments. Results also indicate a similar cost benefit for the WFI sites as the average cost per claim was reduced by 23 percent (-\$1,518 per claim) over the seven year period for WFI sites as compared to an increase of 35 percent (+\$2,386 per claim) for non-WFI departments. When these two figures are combined, there was a savings of \$3,904 per annual occupational claim per WFI fire department as compared to the non-WFI sites. In other words, a fire department with 500 occupational claims could save \$1,952,000 per year. This potential savings, nearly \$2,000,000 annually, per WFI department is from occupational claims alone and probably underestimates the potential longer-term savings from other wellness interventions including non-service related injuries, early screening and detection of disease, and behavioral health program components. See Figure 1 below.

DISCUSSION

The information presented suggests an interval reduction of occupational injury and illness claims and costs among fire departments that implemented the IAFF/IAFC Wellness Fitness Initiative when compared to fire departments that had only partially implemented the WFI. The results

Figure 1: Percent change in Claims, Lost hours, Costs and Average claim cost between WFI and Non WFI departments 7 years pre and post implementation.



also demonstrate that the WFI fire departments have a lower rate of increasing claims and costs, while simultaneously decreasing lost hours and average cost per claim. The fact that lost hours and average cost per claim is reduced suggests that injury and illness severity is reduced, especially in the face of rising health care costs that are greater than the rate of inflation. Therefore, adoption of the WFI confers a savings in the short term. We conclude that the long-term economic benefit could be much greater by preventing and reducing premature fire fighter musculoskeletal injuries and cardiovascular disease through a comprehensive health risk screening and health promotion program which also avoids the passive impacts of reducing off-duty injury and illness costs.

Were there other factors that may have contributed to this observed reduction in occupational claims and costs among the WFI departments when compared to the non-WFI departments? It is important to understand the difficulty in obtaining specific, reliable, and valid injury and illness, and workers' compensation information from departments. Human Resource and Risk Management departments have strict policies that protect and preserve medical confidentiality. This component coupled with collecting data retrospectively rather than tracking and collecting prospective information as in a prospective study is very difficult. In any event, the data collected is substantial and represents a significant analysis of positive impact on return on investment (ROI) through WFI implementation. With some of the other registry data that is available, from a national level, an understanding exists regarding inherent problems in registries and that many assumptions and variability occur in fire fighter injury and illness reporting systems.

In 2000, the National Fire Protection Association (NFPA) reported 84,550 fire fighter injuries that required medical treatment and resulted in at least one day of restricted activity.²⁵ The national fire fighter injury rate reached its lowest level of 78,000 in 2004; however, the NFPA estimates that 80,100 fire fighter injuries occurred in the line of duty in 2005.²⁶ This is an increase of 5.6 percent and the highest fire fighter injury rate since 2002. An estimated 19,900 injuries or 24.8 percent of all fire fighter injuries resulted in lost work time in 2005. Of interest to note, during the same period, 1990–2004, trends in fire fighter injuries decreased in the U.S. despite an increase in department's disability budgets.^{23,24} One of the reasons for a reduction in injuries is due to a decrease in the number of

responses and actual fires; however, the rate of injuries at the fire scene remained the same.⁹ According to the NFPA, the rate of fire ground injuries per 1000 fires over a 15-year period (1988-2002) ranged from a high of 28.3 registered in 1990 to a low of 22.4 in 2002.²³ Another reason the estimated number of injuries dropping during this period is partially due to additional questions on exposures and a change in tracking and categorizing annual injury and fatality survey reports. However, it appears from the occupational claims and cost information collected for this project, among the control sites, there has been a steady increase in fire service related occupational claims, costs, and lost hours.

ECONOMIC INDICATORS OF FIRE DEPARTMENT WELLNESS

Over the past five years, in other industries, research supports the cost-effectiveness of work site wellness programs having a positive cost benefit ratio on medical illness and injury, as well as costs by providing preventive care.^{12,21} The impact, however, of wellness-health promotion programs on uniformed personnel is less obvious. Limited scientific data is available on wellness programs in the fire service and no prospective studies exist that examine the potential economic impact of a health promotion program with uniformed personnel.

Uniformed personnel and administration officials are concerned that not enough is being done in terms of prevention (prefab) versus treatment (rehab). For instance, researchers in Oregon compared dollars spent on fire fighters health to dollars spent on apparatus maintenance and repair (Table 3). If maintenance is thought of as prevention, and repair is thought of as treatment, we can see how much a fire department spends on prevention versus treatment when comparing fire fighters to apparatus.

The example department's annual costs are 70 percent for apparatus preventative maintenance, with approximately 30 percent allocated to repair. In contrast, 97 percent of fire fighters expenditures are for work related injury and disability costs, and only 3 percent is budgeted for prevention, "fire fighter wellness." The interesting element in this scenario is that the apparatus depreciates over a 12-15 year life span with no Return on Investment (ROI) outside of functioning properly during its lifetime of use.

The benefits of wellness-fitness programs, as they relate to the reduction of fire fighter injuries, have been shown in

	Apparatus	Fire Fighter
Maintenance/Prevention	70%	3%
Repair/Treatment	30%	97%
Total	100%	100%

Table 3: Percent Cost of Maintenance (Prevention) and Repair (Treatment)

some older studies.^{32,39} A large-scale study examining the relationships among the cause, nature, and costs of fire fighter injury found that overexertion accounted for a significant portion of injuries (35 percent of all fire fighter injuries) at a cost of \$9,715 per claim.⁴⁰ Overexertion injury occurs when a physical task exceeds the capabilities of a fire fighter, which can cause injury. Some of the contributing factors to overexertion injuries are understaffing, training, unsafe environmental conditions, poor posture or ergonomically unsafe positions, and fatigue. Walton et al calculated that eliminating injuries caused by overexertion saved, on average, \$545,000 per year for a large city fire bureau from 1992-1999.⁴⁰

Other studies have examined injury prevention and the mechanism by which a cost savings is realized. One study demonstrated that an injury prevention program that improved the flexibility of fire fighters did not reduce injury rates, but did reduce the severity of an injury and thus reduce the costs associated,²⁹ which indicated that fire fighters who participated in a regular flexibility program returned to work sooner after an injury when compared to fire fighters in the control group that did not participate in a flexibility program. Another study showed that increased emphasis and education on physical fitness contributed to a reduction in fire fighter injuries and injury costs.³²

COST OF FIRE FIGHTER WELLNESS PROGRAMS AND RETURN ON INVESTMENT

Although fire fighter injuries have been well documented, the data on the costs associated with such injuries is limited. More important, the costs associated with preventing injury are not well documented.^{27,29} In the TriData Corporation's final report to the National Institute of Standards and Technology (NIST) and the U.S. Department of Commerce on, "The Economic Consequences of Fire Fighter Injuries and Their Prevention," states on page 36, "while wellness and fitness programs are designed to improve overall fire fighter health and reduce occurrence of injury, it is difficult to determine the annual cost of these programs."²⁷ The report emphasizes that wellness programs appear to be the exception and not the rule among fire departments in the United States. The TriData report presents a general idea of what fire departments across the country pay annually for a wellness-fitness program ranging from \$0 to \$420,000 (this was representative of only eight departments with a wide range of services that were offered).

The WFI fire departments represented in this report were much larger than the fire departments assessed in the TriData report. The four WFI fire departments sites averaged 1665 fire fighters per department and had first year estimated implementation costs of \$1,550,000 per site (~\$931 per head) due to start up costs and capital expenditures. This was followed by an average annual cost of \$865,930 (~\$520 per head) for maintenance of the WFI program.

These results demonstrate that the WFI departments had a total cost savings of \$1,336,535 the first year of implementation per site (due to start up costs) and \$1,952,000 annually per site thereafter. This appears to be a positive return on investment with getting most of the initial costs back the first year and then receiving a positive return on investment of at least 1:2 for year two. Therefore, for every one dollar spent on uniformed personnel wellness, via implementation of the WFI, results in an almost immediate return of over two dollars in occupational injury and illness costs. Another positive consideration is that these numbers underestimate the true cost savings since this does not take into account non-occupational injuries and the long-term medical costs of premature morbidity and mortality. Substantial long-term cost savings are expected from preventing cardiovascular disease, certain cancers, and reducing early disability from musculoskeletal and back injury.

This report advocates that fire department wellness programs do make economic sense and that implementation of the WFI alone will reduce occupational claims and costs. It is even more likely that incorporating a full behavioral health promotion program will increase this benefit. The observed trend in reducing occupational claims and costs from implementing the WFI is also supported by the ongoing PHLAME research study⁴ (website on PHLAME and cancer control P.L.A.N.E.T. (<http://rtips.cancer.gov/rtips/index.do>) which demonstrates for every dollar spent on the fire fighter health promotion program, a substantial cost savings can be realized after the short-term.³⁰⁻³¹ In addition, the health promotion activities were also associated with significant reductions in work-related injury and illness. Table 4 shows the cost savings of the PHLAME health promotion program.

Costs per Fire Fighter	Before PHLAME	After PHLAME
Prevention	\$150	\$585
Treatment	\$5,175	\$2,025
Total Costs Per Claim	\$5,325	\$2,610

Table 4: Return on Investment: PHLAME Program

SUMMARY

This report advocates that fire department wellness programs do make economic sense and that adopting and implementing an occupational wellness program, such as the WFI, alone can reduce occupational claims and costs by while simultaneously improving the quality and longevity of a fire fighter's life. In addition, adoption of the WFI is an important first step in setting up a medical screening and wellness program for fire departments.^{12,44} Adding additional behavioral health promotion programs will only en-

hance and improve cost savings. In reference to the summary report on economic consequences of fire fighter injuries compiled by TriData Corporation for the National Institute of Standards and Technology and the U.S. Department of Commerce stated, "the challenge for fire departments and local governing bodies is judging how to assign the available solutions for reducing direct and indirect expenses from injuries so as to incur the best payoff. Do formal physical fitness programs and requirements make a measurable difference in reducing the rate of injuries and acute, work-related illness? If yes, then more time should be devoted to maintaining physical fitness."

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Pricing for fitness equipment (treadmills and elliptical trainers) based

Treadmills

22 Units

Manufacturers list price in US dollars

Cybox Pro 550 T	\$6,100	\$134,200
Matrix T3X	\$5,859	\$128,898
Matrix T3XI AC	\$6,995	\$153,890

Average Price	\$6,318	\$138,996
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Life 95Ti (current model ordered by community centers in Can dollars)	\$6,500	\$143,000
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Total average price in Canadian dollars	\$6,100	\$134,200.00
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Elliptical Trainers

Cybox 630A Total Body Arc Trainer	\$6,500	\$143,000
Matrix E5XC elliptical	\$5,350	\$117,700
Matrix 15X elliptical	\$6,250	\$137,500

Average price	\$6,033	\$132,733
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Total Average price in Canadian dollars	\$6,500	\$143,000.00
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Additional costs could include taxes, delivery, shipping and set up

Cost		\$277,200.00
GST		\$13,860.00
PST		\$19,404.00
Delivery and Installation		\$5,280.00
Total		\$315,744.00

Hall Electric Installs	\$8,200	\$323,944.00
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APPENDIX B

Fitness Equipment Costing

		2009	2010	2011	2012	2013	2014	2015	2016
Capital Cost	6% inf		1	1.06	1.124	1.191	1.262	1.338	1.419
Treadmills	5 yr life	\$ 134,200.00					\$ 169,424.41		
Elliptical Trainers	7 yr life	\$ 143,000.00						\$ 202,848.23	
Capital Outlay		\$ 277,200.00					\$ 169,424.41	\$ 202,848.23	
Operating Costs									
Loan Repayment		\$ 65,700.00	\$ 65,700.00	\$ 65,700.00	\$ 65,700.00	\$ 65,700.00	\$ 65,700.00	\$ 65,700.00	\$ 65,700.00
Maintanance Costs		\$ 8,800.00	\$ 9,328.00	\$ 9,887.68	\$ 15,721.41	\$ 13,887.25	\$ 14,720.48	\$ 12,482.97	\$ 12,118.26
Training Costs		\$ 10,000.00	\$ 10,600.00	\$ 11,236.00	\$ 11,910.16	\$ 12,624.77	\$ 13,382.26	\$ 14,185.19	\$ 11,991.20
Total Operating Costs		\$ 84,500.00	\$ 85,628.00	\$ 86,823.68	\$ 93,331.57	\$ 92,212.02	\$ 93,802.74	\$ 92,368.16	\$ 89,809.45
Union's Share- Local 18		\$ 42,250.00	\$ 42,814.00	\$ 43,411.84	\$ 46,665.79	\$ 46,106.01	\$ 46,901.37	\$ 46,184.08	
City's Share- Incremental Budget		\$ 42,250.00	\$ 42,814.00	\$ 43,411.84	\$ 46,665.79	\$ 46,106.01	\$ 46,901.37	\$ 46,184.08	\$ 44,904.73