Firefighting Task Competency: Annual Evaluation Options at the Atascocita Volunteer Fire Department

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Certification Statement

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

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Abstract

The problem was that the Atascocita Volunteer Fire Department (AVFD) did not know what options were available for the annual evaluation of its firefighters' ability to perform firefighting tasks. The purpose of this applied research paper was to identify options available to the AVFD for the annual evaluation of its firefighter's ability to perform firefighting tasks. The descriptive research method was employed and the following research questions derived: 1) What methods are fire departments using for incumbent firefighter ability testing? 2) What metrics are fire departments using to evaluate firefighters' physical capacity to perform firefighting tasks? 3) What tasks have been identified for annual evaluation by other fire departments? 4) How are fire departments managing competency of fitness deficiencies? A comprehensive literature review and an electronic survey were conducted to ascertain answers to the research questions. Testing method options, for the department's suppression workforce, were identified along with metrics for use in measuring their fitness level. It was recommended that the adoption of annual physicals be undertaken. The creation of a standing, stakeholder committee for the evaluation of methods and metrics should also be considered. Likewise, initiation of a wellness/fitness program is advised. The adoption of a metered accountability approach to managing deficiencies will allow for members to assimilate to the change of implementation and improve acceptance. Finally, the continuation of Position Task Books and regular training were recommended based on the presented research.

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Many organizations use ongoing competency testing to measure the ability of their workforce to perform job specific tasks (i.e.: nursing, pilots, etc.), to a predetermined standard. Of 185 fire departments across the country surveyed, 88% of them use this type of testing to screen new candidates, without giving it much thought (Biddle & Bell, 2011). Not as many (25%) also use similar testing to evaluate their incumbent members on a regular basis to ensure readiness and gauge skill atrophy (Biddle & Bell, 2011). The physical preparedness of firefighters to carry out these tasks adds to their safety, the safety of their partners and the safety of their customers. Having a working understanding of the workforce's ability to not only perform the necessary work, but also knowing if they have the physical capacity to do so is valuable information. The problem was that the Atascocita Volunteer Fire Department (AVFD) did not know what options were available for the annual evaluation of its firefighters' ability to perform firefighting tasks.

The NFPA, in its *Standard 1001, fire fighter professional qualifications, 2013 edition*, has identified Job Performance Requirements (JPRs) for firefighters. Similarly, several studies have identified ranges for cardiorespiratory fitness that should be achieved by properly prepared firefighters. The purpose of this applied research paper was to identify options available to the AVFD for the annual evaluation of its firefighter's ability to perform firefighting tasks.

The Descriptive Research Method was used to identify existing evaluation options and fitness levels. A comprehensive literature review and an electronic survey of surrounding Harris County, Texas fire departments (54) provided the answers to the following research questions:

1) What methods are fire departments using for incumbent firefighter ability testing?

2) What metrics are fire departments using to evaluate firefighters' physical capacity to perform firefighting tasks?
3) What tasks have been identified, for annual evaluation, by other departments?
4) How are fire departments managing competency or fitness deficiencies?

Background and Significance

The Atascocita Volunteer Fire Department is a combination department in northeast Harris County, Texas. The AVFD is a 501c4 corporation that contracts with Harris County Emergency Services District #46 (the district), a subdivision of the county government responsible for emergency services delivery. The AVFD came into existence in 1978 as an all volunteer, home response department. They added Emergency Medical Services (EMS) sometime in the early 80's and have grown into an all hazards, emergency service organization. In the early 2000's, AVFD realized that it could not sustain its home response model, having grown into a large, "bedroom" community. With the departure of many volunteers during the daytime working hours, the district was left with marginal protection, at best. Reliance on mutual aid became untenable and the decision was made to hire part time, paid firefighters to cover the day shifts. This has evolved to a point now where paid members work seven days a week covering the day shift Monday through Friday and augmenting volunteer staff on the weekends.

The district is 30 square miles of unincorporated area, with a population of approximately 66,000. This gives it a population density in 2,200 per square mile, which makes the area urban in nature (Center for Public Safety Excellence [CPSE], 2008, p. 20). It has a mix of commercial properties, but is predominantly residential in its makeup. The district employees the Fire Chief,

the Deputy Fire Chief, the Assistant Chief-EMS/EMS Director and an Administrative Assistant. All other paid positions are employees of the AVFD.

The AVFD has evolved over time into a robust combination department of 200 members, operating out of three firehouses and a HQ/Administration building. It is separated into five divisions: Administration, Personnel and Logistics Support (PALS), Emergency Operations Center (EOC), EMS, Fire, and Training. It responded to 5600 requests for service in 2014, with the majority of the requests being for EMS and the remainder being fire related. Only a handful of the fire related responses were working fires that presented a need to carry out recognized firefighting tasks. Of the 200 members, 85 are firefighters and are made up of part time paid (35) and volunteer personnel (50).

The 35 part time paid personnel all work for other fire departments fulltime. They are all Texas Commission on Fire Protection certified (NFPA FFII) and are required to present 20 hours of continuing education (CE) each calendar year to retain their certifications. Some are from busy companies in large departments and some are from smaller yet still busy departments. Others are from slower companies at large departments and still others from slow, small departments. This means that the level of training and skills use varies within the paid staff. The volunteers generally work at jobs outside of the fire service, although some are career firefighters elsewhere and get varying levels of training and activity.

AVFD conducts an annual, recruit academy for new members, without fire service experience. The academy curriculum encompasses the JPRs listed by *NFPA 1001* and all graduates are then submitted for certification through the State Firefighter's and Fire Marshal's Association (SFFMA). Once assigned to a company, each member is given a Position Task Book (PTB) which allows for company level training and self paced work to maintain skill levels.

AVFD also provides online training, for the didactic portion of the needed skills. Finally, there is regularly scheduled training on all but the first Tuesday of each month. This training is designed to refresh and refine necessary skills.

The training opportunities described above are available to all firefighters, whether they are volunteer or paid. Unfortunately, AVFD has still seen deficiencies when the skills are needed on the fire ground. These deficiencies range from improper technique with tools to inappropriate application/use of equipment. In some cases, firefighters are not physically able to complete a task due to a lack of physical conditioning, strength, or other characteristics. Since a situation such as this has a direct bearing on the safety of the firefighters, the crews and the public, some form of regular evaluation is needed.

Initiation of annual evaluations will be a significant departure from what is now a less formal approach to accountability. In the current culture, should a member be deemed deficient, only their pride governs the actions they take. The hope is that they will engage in training of their own accord and bolster their skills. They may be referred to their company officers for individualized training and encouraged to attend scheduled training, or they may, in the case of volunteers, become a target for removal from the department. This process is obviously lacking in many ways, but change will be met with resistance as people don't like to be held accountable.

The implementation of the findings of this research paper will require incremental change to ease the membership into compliance. Adaptive change methods, as discussed in *Executive Development* during the first year of the Executive Fire Officer Program (EFOP) at the National Fire Academy (NFA) and addressed in *Leadership on the Line* (Heifetz & Linsky, 2002), will need to be employed. These methods will allow for controlling the level of discomfort

experienced by the group, without creating discontent to the point of mass exodus (Heifetz & Linsky, 2002).

This research paper relates to the third and fourth of the five goals of the United States Fire Administration (USFA). It directly relates to the third goal, "Improve the fire and emergency services' capability for response to and recovery from all hazards". Once AVFD has the requisite knowledge to adopt an agreeable evaluation process, they can begin providing a workforce that is properly trained and physically prepared to use that training. This will improve their overall service delivery and allow for safer, quicker and more thorough mitigation of hazards. This research relates to the fourth goal of the USFA, "Improve the fire and emergency services' professional status", in that by becoming and executing as experts, AVFD will continue to present itself in a professional manner.

Literature Review

A review of available literature on the subject of annual evaluation of firefighting task competency was initiated to ascertain background information on research done in that area of interest to assist in answering the research questions posed. Information was gathered regarding the types of tasks being evaluated and their importance to fire ground operations. Internet searches, educational manuals, journal and magazine articles, and technical reports were used in this research.

As detailed information was retrieved from the above mentioned sources, it became obvious that evaluation of competency to perform a firefighting task was closely coupled with the physical ability to perform the tasks. A thorough examination of the fitness aspect, along with competency was conducted.

The first research question asks: what methods are being used to test the ability of incumbent firefighters? It was determined through this review that there were two general methods in use, work sample testing and general fitness activity testing (Mamen, Oseland, & Medbo, 2013). The Norwegian fire service uses fitness activity style of testing, while in Canada, work sample or firefighting task evolutions are used (Mamen et al., 2013). This study made comparisons between task based testing and general fitness based testing. Task based testing being a work sample based testing regimen (i.e.: climbing a ladder, donning PPE, pulling a hoseline, simulated tool use, etc.) versus general physical activities (i.e.: running, climbing stairs, doing sit-ups, etc.) (Mamen et al., 2013). Mamen et al. (2013) found that similar fitness levels were required for both tests. This correlation between test types allows for a choice, when it comes to measuring fitness, within the department, but the work sample provides the necessary competency check and has proven easier to defend legally.

The second research question looks at which specific metrics are being used, by fire departments, to measure the physical ability of firefighters to carry out firefighting tasks. Several research studies have been conducted over the years, the focuses of which were the physical demands of being a firefighter (Davis & Dotson, 1987, p. 280). "V02 is milliliters of oxygen per your body weight per minute that you can move or utilize," says Paul Robbins, the metabolic specialist for Athletes' Performance. Simply put, the higher that number, the more cardiovascular strength you have (Williams, 2009). Maximum aerobic capacity (VO_{2max}) is, "the maximum amount of oxygen that an individual can use during intense or maximal exercise" (Quinn, 2014, January 1, para. 1). VO_{2max} has been identified as an important factor in the work performed by firefighters (Davis & Dotson, 1987, p. 280). The minimum value of this metric ranges from 33 ml/kg/minute (Storer et al., 2014) to 42ml/kg/minute (Poston, Haddock, Jahnke,

Jitnarin, & Day, 2013, p. 2; Schonfeld, Doerr, & Convertino, 1990, p. 638; Storer et al., 2014). The recommended VO_{2max} level for firefighters is 42 ml/kg/minute. It is generally accepted that to complete the tasks expected of a firefighter, the higher the number the better. Mamen et al. (2013) have stated that, "firefighters must exhibit a VO_{2max} of greater than 40 ml/kg/minute, in order to adequately perform fire suppression tasks." Finally, Shvartz and Reibold (1990), acknowledged that the level of VO_{2max} in firefighters was greater than that of sedentary, middle-aged adults.

There has been a connection made between Body Mass Index (BMI) and VO_{2max}. The World Health Organization (WHO) categorizes BMI as follows: normal (< 25 kg/m^2), overweight ($\geq 25 < 30$ kg/m^2), obese ($\geq 30 < 39$ kg/m^2), and morbidly obese (≤ 39 kg/m^2) (Clark, Rene, Theurer, & Marshall, 2002, p. 940). Clark et al. (2002, p. 944) goes on the stipulate that as BMI increases, VO_{2max} decreases. These findings gave the impression that the measurement of BMI would be a good indicator of fitness as it correlates to VO_{2max}. Additional indicators are: percent body fat, heart rate, and respiratory rate (Storer et al., 2014). Finally, grip strength, upper body strength and endurance are each indicative of potential success and level of fitness in firefighters (Storer et al., 2014).

It has been previously determined that whether a department used a fitness activity oriented test or one that evaluated traditional firefighting task activities, the metrics described above would be valid. The third research question asks: what tasks have been identified, for annual evaluation, by other departments? A survey of local (Harris County, TX) fire departments was conducted as part of this research, the results of which will be presented later, in order to better understand what is being done locally. The literature review identified several comprehensive lists that include tasks that are necessary for firefighting.

The Canadian test mentioned above (Mamen et al., 2013, p. 1562), utilizes the following list: hose carry, ladder carry and raise, hose drag, ladder climb 3x, rope pull, simulated forcible entry, victim rescue, ladder climb 2x, ladder lower and carry, and spreader tool carry. At the Kennedy Space Center, Schonfeld et al. (1990, p. 639) identified the Combat Task Test (CTT). This testing procedure closely assimilates the tasks identified by the National Aeronautic and Space Administration (NASA) as being critical to base firefighting activities. The CTT consists of a stair climb of seven flights, a chopping simulation using a sledge hammer attached to a pulley and weight system, and a victim drag using 178.5 lbs, anthropomorphic manikin (Schonfeld et al., 1990, p. 639). As stated previously, *NFPA 1001* provides a list of JPRs that are widely accepted as curriculum for new firefighters, any subset of which could be used for incumbent testing (National Fire Protection Association [NFPA], 2013, Chapter 5 & 6). Finally, suppression task related testing with an aggressive, preset duration is an acceptable form of firefighter field performance evaluation (Mamen et al., 2013).

Once testing has been completed, the results must drive action. The literature review shows that the fire service is out of shape. Poston et al. (2013, p. 2) present that, "The US Fire Service faces several daunting health crises including high prevalence of obesity, substandard fitness, and cardiovascular-related deaths." One study reported that 25% of their sample of 214, male, career firefighters failed to meet [the] accepted standard for cardiorespirator fitness VO_{2max} = 42 ml/kg/minute (Donnovan et al., 2009). The results from another sample of firefighters found that only 20% exercised regularly (Durand et al., 2011). Low fitness and obesity are at epidemic levels and are considered critical issues facing the fire service because of their association with injury risk and lowered occupational readiness (Poplin, Harris, Pollack, Peate, & Burgess, 2011; Walton, Conrad, Furner, & Samo, 2003). Firefighters who exercised regularly

were found to be at half the risk for non-exercise injuries, which typically represent over 60% of all firefighter injuries (Jahnke, Poston, Haddock, & Jitnarin, 2013). "It is no secret that, historically, the fire service has placed a great deal of its focus on maintaining apparatus and equipment rather than the uniformed personnel who provide emergency services and use such equipment."(IAFF & IAFC, 2008, p. 4)

The final research question posed asks: how are fire departments managing competency or fitness deficiencies? It should be noted that, some loss of physical acumen is culture or lifestyle based and some is age related. Unfortunately, telling the difference is difficult. Firefighters should engage in regular endurance type training to maintain a required level of physical fitness (Mamen et al., 2013). In more and more countries, firefighters are subjected to entry level physical screening tests and then repeat those tests on a regular basis (Mamen et al., 2013). Also, the establishment of structured physical activity programs has been effective at slowing age-related, physical degradation in firefighters (Walker, Driller, Argus, Cooke, & Rattray, 2014).

When an incumbent firefighter fails to pass a competency or fitness test, there are several possible options for behavior modification. One potential option is the implementation of a conditioning or wellness program (Biddle & Bell, 2011, p. 13). This approach is the least punitive, as the affected firefighter would not lose their position with the organization. Additionally, this option provides for monitored progress. The second potential approach offered by Biddle and Bell (2011, p. 13) is a forced leave of absence. Under this plan, compensation may be withheld, which adds a punitive component, but the firefighter is not severed from the organization. They retain their position, but are unable to return to work until they successfully complete the competency or fitness test. Next is disability leave (Biddle &

Bell, 2011, p. 14). This option allows for some form of compensation, potentially at a reduced rate of pay, but lets the firefighter concentrate on improving their performance without putting others in jeopardy. Finally, Biddle and Bell (2013, p. 14) suggest retirement with pension. Depending on the department's retirement and pension rules, this could be considered punitive. It should not go without saying that a fifth option would be termination for cause. This is based on the presumption that the employee knew the expectations when they accepted employment with the department.

It is clear that the fire service has a problem with fitness, obesity. Determining the best way to assess competency and fitness is paramount to safety and efficiency. Each of these articles provided great insight into the challenges and potential solutions faced by departments around the world. The biometric information was particularly useful because it provided a means to measure the success of any future programs that are implemented at the AVFD. As the compliment of firefighters is made up of part time paid and volunteer staff, all AVFD has ever been able to do is provide a carrot to achieve compliance. Initiating annual performance testing along with the implementation of a wellness program and then applying metered accountability for non-compliance would allow us to drive success.

Procedures

The purpose of this applied research paper was to identify options available to the AVFD for the annual evaluation of its firefighter's ability to perform firefighting tasks. The Descriptive Research Method was used to identify existing evaluation options and fitness levels. First, the problem was narrowly identified. Then, a comprehensive literature review was undertaken to establish the quantity, maturity, and scope of research that had already been done, in this area of

interest. Finally, and electronic survey was used to gauge the level of attention being paid at a local level.

The first step was to narrowly identify the problem. Evaluation of firefighters' performance has many facets. Overall work performance (i.e.: attendance, attitude, appearance, etc.) are sometimes evaluated in a fashion similar to that used by the private sector for traditional jobs. Performance can also be evaluated with a work sample test that assimilates the tasks that a firefighter would be expected to perform at a fire scene. Finally, a firefighter's physical ability to the do the required work would be open to evaluation and would have a significant bearing on their success or failure at the job. The problem was narrowed to identification of options that were available to the Atascocita Volunteer Fire Department for the evaluation of their firefighters' competency and fitness.

Next, existing literature on the subject of firefighter performance evaluation was reviewed. The information was retrieved from the National Fire Academy (NFA) Learning Resource Center (LRC) as well as through Internet searches. Once reviewed and relevance determined, the material was placed in categories based on relationship to each research question. This allowed for ease of use during the final compilation.

An electronic survey was constructed to determine the current state of the problem on a local level. Review of the existing research material assisted in the development of the questions included in the survey. The survey was distributed via emailed hyperlink to the Fire Chiefs of all 54 fire departments in Harris County, TX. My response rate was 43% (23 of 54). The first four questions of the survey establish the demographics of the department:

1) Area covered by the department in square miles?
2) What is the size of the population served by the department?

3) Number of suppression personnel with the department?
4) What is your department's operational model?

The remainder of the questions relate to the department's current position on annual competency and fitness testing:

5) Does your department conduct skills evaluations of its suppression members on a regularly scheduled basis?
6) Do you see any value in it?
7) What skills do you evaluate?
    a. Timed PPE donning
    b. Search patterns & rescue techniques
    c. Flow path control techniques
    d. Advancing hose lines
    e. Post incident apparatus reset (i.e.: packing hose, replacing tools, etc.)
    f. Ladder inspections
    g. PPE inspections
    h. Ladder handling and placement
    i. Ventilation practices
    j. Forcible entry
    k. Transitional attack recognition
    l. Customer service
    m. Additional skills not listed above
8) Rank the order of the skills selected
9) Which evaluation methods are used?

a. Written test

b. Practical test

c. Written & practical test

10) Are skills evaluations at your department punitive?

Assumptions and Limitations

It was found during this process that a considerable amount of work had been done in the evaluation for firefighter fitness. This was not the expected result of the literature search. Several attempts were made at narrowing the search to only include work sample style testing research and competency (skill or proficiency in completing the task) evaluation options, but the search criteria were too closely related and the information too intertwined.

I found the quantity of responses to the survey to be disappointing. Many of the chiefs that the request was sent to may have passed it along to staff for completion and it got lost in the shuffle. Still more may never have received it due to the prevalence of network security measures and the increase in malevolent emails.

Results

The results of this research effort were derived from a comprehensive literature review of existing, pertinent research and a survey of local fire departments current processes. These results are presented below, as answers to the original research questions.

Questions #1: What methods are fire departments using for incumbent firefighter ability testing? It was discovered via the literature review that departments are either using a work sample style of test (Biddle & Bell, 2011; Mamen et al., 2013), a fitness activity style of test (Mamen et al., 2013), or both (Schonfeld et al., 1990). Depending on the department's need, history, local governmental regulation or desire. Departments tended to use tests that fit the

needs of their organization. Schonefeld et al. (1990) indicated that the firefighters at the Kennedy Space Center were subjected to both field testing and laboratory testing, in the interest of safety and control. The research bore out that so long as the measurement of VO_{2max} was possible; either style of test was acceptable.

The survey conducted in conjunction with this research paper showed that, for each of the skills selected for evaluation, by an organization, written testing, work sample testing, or both were used in the evaluation.

Question #2: What metrics are fire departments using to evaluate firefighters' physical capacity to perform firefighting tasks? VO_{2max} and BMI are the two predominant metrics used to evaluate an individual's ability to perform firefighting work successfully. As expressed in the literature review, an extensive amount of research has been conducted and it has been determined that a VO_{2max} of either 33 ml/kg/minute (Storer et al., 2014) or 39 ml/kg/minute (Schonfeld et al., 1990, p. 638; Clark et al., 2002, p. 944), is the minimum to be successful at firefighting tasks, with 40 ml/kg/minute (Mamen et al., 2013; Storer et al., 2014) or 42 ml/kg/minute being the recommended level (Davis & Dotson, 1987; Donnovan et al., 2009; Durand et al., 2011; Poston et al., 2013; Schonfeld et al., 1990; Shvartz & Reibold, 1990). A correlation between BMI and VO_{2max} exists (Clark et al., 2002, p. 944) and therefore, BMI, which is easier to measure, can be used as a metric for determining general fitness.

Question #3: What tasks have been identified for annual evaluation by other departments? During the literature review, it was found that departments are using the JPRs from *NFPA 1001* as the foundation of the testing regimens, or a subset thereof. Question #7, from the survey conducted for this research effort shows similar results, see Table 1.

Table 1

Survey Question 7 Results

If your answer to Q5 was yes, what skills do you evaluate? (select all that apply)		
Answer Options	**Response Percent**	**Response Count**
Timed PPE donning	82.4%	14
Search patterns & rescue techniques	82.4%	14
Flow path control techniques	23.5%	4
Advancing hose lines	88.2%	15
Post incident apparatus reset (i.e.: packing hose, replacing tools, etc.)	58.8%	10
Ladder inspections	47.1%	8
PPE inspections	88.2%	15
Ladder handling and placement	76.5%	13
Ventilation practices	58.8%	10
Forcible entry	58.8%	10
Transitional attack recognition	29.4%	5
Customer service	52.9%	9
Additional skills not listed above		5
answered question		17
skipped question		6

As represented in Table 1, traditional, fire ground activities (i.e.: PPE donning, search and rescue, hose advancement, and ladder handling) scored the highest in inclusion in departments' testing programs. Ventilation, truck reset, and forcible entry were next.

Question #4: How are fire departments managing competency or fitness deficiencies? When asked in survey question #10, if their annual testing is punitive or not, 63% of the respondents stated that it was not. Biddle & Bell (2011, p. 13) provided four possible options for the management of deficient members. The most desirable of these is mandatory wellness program participation. This leaves the firefighter and the department options and places the responsibility for success in the hands of the affected individual. This option allows the firefighter to continue working, although probably in another job assignment, until they can show compliance with the department's competency and fitness standards.

Discussion

The topic of this research paper was selected based on several personal experiences of the researcher. The requisite skills needed for the proficient execution of firefighting tasks were found to be missing or significantly atrophied, in some of the firefighters at the AVFD. Personal observation indicated that ladder handling, a skill that is perishable and used infrequently, was lacking. Hose advancement and handling was seen to result in inefficient fire attack and improper stream placement. PPE donning evolutions exposed the fact that an inordinate amount of time was needed to achieve a ready state for fire attack. All of these tasks are the focus of a recruit academy classes and are trained on during weekly drills.

The use of work sampling for the evaluation of competency and fitness (Biddle & Bell, 2011; Mamen et al., 2013; Schonfeld et al., 1990) rose to the top as the preferred method. Although some of the testing described used simulated fire ground tasks, the overall approach was more desirable than treadmill walking, pull-ups, sit-ups, or running. Work sampling actually allows the organization to determine the fitness level of the individual and then see if they can actually perform the required task to department standards.

As for the measurement of the physical ability of a firefighter to complete a task, the use of BMI, VO_{2max}, heart rate, blood pressure, etc., should be used to form the basis of any evaluation process. Although there were differences in the desired values presented, each of the teams of researchers reviewed was in agreement that these metrics were indicative of a firefighter's fitness and that poor values (low or high) would be a sign of success or failure.

The tasks identified as useful for evaluation of competency as well as fitness, fall in line with fire service tradition. All fire department leaders want their firefighters to be able to pull hose, handle ladders, ventilate buildings, perform search and rescue, don their PPE quickly,

provide good customer service, etc. and so on. The use of the JPRs listed in NFPA 1001 (NFPA, 2013, Chapter 5 & 6) would be an excellent starting point. AVFD would likely use a list similar to that shown in Q7 of the accompanying survey, and all departments would essentially have to select tasks that are important to them.

The survey conducted showed that 62.5% of the respondents do not take punitive action against firefighters that fail their annual evaluation. This is in line with Biddle's and Bell's findings from the literature review. They presented that their respondents offered: conditioning programs, leaves of absence, disability leave, and retirement with pension (Biddle & Bell, 2011, p. 13-14). Although it would appear that all but the conditioning program are, in fact, punitive in nature, there is no indication that the firefighter is being docked pay. Only in the allowance of retirement is the firefighter being severed from the organization, but their retirement is still being paid. This researcher doesn't consider any of these to be punitive. Many chances are being given for compliance and success. A non-punitive would be desirable at AVFD.

Recommendations

Because of the nature of the AVFD, training is only mandatory for the volunteers and then only to the extent that a requisite number of hours are needed to stay in good standing with the department. "Firefighters are charged with the serious responsibility of ensuring the safety of their crew and the public." (Biddle & Bell, 2011, p. 1) Safety and efficiency on the fire ground are essential to the success of an operation. It is the responsibility of the department's leadership to ensure that each member is capable of performing their duties. To be clear, they are responsible to their community (the external customers), to the department (their internal customers), and most importantly, in my opinion, to the individuals who serve (the firefighter and their family). Considering this responsibility of leadership, it is puzzling that any

department would not implement some form of validation that proves the ability of their department to do the required tasks safely, properly, and efficiently. What better way to prove that their personnel are combat ready, than to conduct testing.

Some reasons for not implementing an evaluation program may be: union antagonism, fear of litigation by those that can't pass (Biddle and Bell, 2011, p. 1), membership resistance, and membership revolt. Regarding membership resistance and membership revolt, it has been shown that fear of loss will cause resistance to change (Heifetz & Linsky, 2002, p. 71). Initiation of a testing process that will probably expose weaknesses is a significant change. Volunteers have a tremendous sense of pride about being volunteers. When that is threatened, they will push back. This pushback can be detrimental to the health of the organization, not to mention the careers of its leadership. This has to be considered when selecting evaluation options.

Likewise, part time firefighters have come to rely on the salary that they garner for their work and the loss of that money can be a strong motivator for maintaining the status quo. It may even be stronger than the pride exhibited by volunteers. As an aside, since many of the part time firefighters at AVFD are employed elsewhere, the existence of a failed competency test could pose problems for them at the primary employer. If they are not tested for competency at their primary employer and their competency, relating to that employment, is called into question the results of a failed competency test could become evidence.

When this topic was initially considered, the goal was to identify ways to address the noted deficiencies in a way that was acceptable to all stakeholders. When dealing with volunteers, and part time paid personnel for that matter, kid gloves must be used so that no threat is perceived. The prevention of the loss of personnel let alone mass exodus must be considered. It is too difficult to recruit, train and retain people. The application of accountability must be

managed appropriately. This concept presents a difficult challenge to leadership as having lax or tiered requirements is contradictory to the fire service mantra of training and safety and standards for all. Not to mention the fact that different treatment for individuals doing the same job is legally shaky ground.

The research presented in this paper takes into consideration all facets of firefighter fitness and competency. It supports wellness programs and the measurement of baseline and ongoing fitness levels. It outlines testing procedures that not only account for the level of fitness needed, but also the required skill acumen to complete specific firefighting tasks. To that end, the following recommendations are presented:

1) The Atascocita Volunteer Fire Department (AVFD) should establish baseline fitness levels for all suppression personnel through the initiation of a mandatory, annual NFPA 1582 (National Fire Protection Association [NFPA], 2013) physical program and the adoption of the metrics presented in this paper as departmental standards.
2) The AVFD should establish a committee of stakeholders to evaluate the options presented in this report and select a course of action that will ultimately lead to a more fit and competent workforce. Inclusion is the key to success in potential loss situations.
3) AVFD should embark on the implementation of either The Fire Service Joint Labor Management Wellness-Fitness Initiative (IAFF & IAFC, 2008) or an NFPA 1583 fitness/wellness program (National Fire Protection Association [NFPA], 2015).
4) AVFD should take the approach of metered accountability, which is to say that no one will be displaced by the finding of physicals or the results of testing, but they will be constantly encouraged to improve. This position may change over time.

5) AVFD should continue to require the completion of Position Task Books as a training tool and exhibit of competency.
6) AVFD should continue its regularly scheduled training activities in an effort to provide access to quality training to all who seek it.

References

Biddle, D. A., & Bell, S. L. (2011). Using work-sample physical ability tests to maintain fitness standards of incumbent firefighters. Retrieved from http://www.fpsi.com/pdfs/Physical-Ability-Test-Maintenance-Standards-Article-FPSI.pdf

Center for Public Safety Excellence. (2008). *CFAI: Standards of cover*. Chantilly, VA: Author.

Clark, S., Rene, A., Theurer, W. M., & Marshall, M. (2002, October). Association of body mass index and health status in firefighters. *Journal of Occupational and Environmental Medicine*, *44*(10), 940-946. http://dx.doi.org/10.1097/01.jom.0000034345.94005.02

Davis, P. O., & Dotson, C. O. (1987, November). Physiological aspects of fire fighting. *Fire Technology*, *23*(3), 280-291.

Donnovan, R., Nelson, T., Peel, J., Lipsey, T., Voyles, W., & Isreal, R. G. (2009, July 3). Cardiorespiratory fitness and the metabolic syndrome in firefighters. *Occupational Mecidine*, *59*(7), 487-492. http://dx.doi.org/10.1093/occmed/kqp095

Durand, G., Tsismenakis, A. J., Jahnke, S. A., Baur, D. M., Christophi, C. A., & Kales, S. N. (2011, September). Firefighters' physical activity: Relation to fitness and cardiovascular disease risk. *Medicine and Science in Sports and Exercise, 43*(9), 1751-1759. http://dx.doi.org/10.1249/MSS.0b013e318215cf25

Heifetz, R. A., & Linsky, M. (2002). The heart of danger: At the heart of danger is loss. In *Leadership on the line: Staying alive through the dangers of leading* (1st eBook ed. (pp. 63-72). [iBooks version]. Retrieved from The Apple Store: iBooks

IAFF & IAFC. (2008). *The fire service joint labor management wellness-fitness initiative*. Retrieved from www.iafc.org/files/healthwell_wfi3rdedition.pdf.pdf

Jahnke, S. A., Poston, W. S., Haddock, C. K., & Jitnarin, N. (2013, March 16). Injury among a population based sample of career firefighters in the central United States. *Injury Prevention*, *19*(6), 393-398. http://dx.doi.org/

Mamen, A., Oseland, H., & Medbo, J. I. (2013). A comparison of two physical ability tests for firefighters. *Ergonomics*, *56*(10), 1558-1568. http://dx.doi.org/10.1080/00140139.2013.821171

National Fire Protection Association. (2013). *NFPA 1001, standards for fire fighter professional qualifications, 2013 edition* [Educational standards]. Retrieved from http://www.nfpa.org/codes-and-standards/document-information-pages?mode=code&code=1001

National Fire Protection Association. (2013). *NFPA 1582: Standard on comprehensive occupational medical program for fire departments*. Retrieved from http://www.nfpa.org/codes-and-standards/document-information-pages?mode=code&code=1582

National Fire Protection Association. (2015). *Standard on health-related fitness programs for fire department members*. Retrieved from http://www.nfpa.org/codes-and-standards/document-information-pages?mode=code&code=1583

Poplin, G. S., Harris, R. B., Pollack, K. M., Peate, W. F., & Burgess, J. L. (2011, November 23). Beyond the fireground: Injuries in the fire service. *Injury Prevention*, *18*(4), 228-233. http://dx.doi.org/10.1136/injuryprev-2011-040149

Poston, W. S., Haddock, C. K., Jahnke, S. A., Jitnarin, N., & Day, R. S. (2013, September 5). An examination of the benefits of health promotion programs for the national fire service. *BMC Public Health*, *13*(805), 1-14. http://dx.doi.org/10.1186/1471-2458-13-805

Quinn, E. (2014, January 1). What is VO2max? Retrieved from http://sportsmedicine.about.com/od/anatomyandphysiology/a/vo2max.htm

Schonfeld, B. R., Doerr, D. F., & Convertino, V. A. (1990, July). An occupational performance test validation program for fire fighters at the Kennedy Space Center. *Journal of Occupational Medicine*, *32*(7), 639-643. http://dx.doi.org/0096-1736/90/3207-0638$02.00/0

Shvartz, E., & Reibold, R. C. (1990). Aerobic fitness norms for males and females aged 6 to 75 years: A review. *Aviation, Space and Environmental Medicine, 61*(1), 3-11.

Storer, T. W., Dolezale, B. A., Abrazado, M. L., Smith, D. L., Batalin, M. A., Tseng, C. H., & Cooper, C. B. (2014). Firefighter health and fitness assessment: A call to action. *Journal of Strength and Conditioning Research, 28*(3), 661-671.

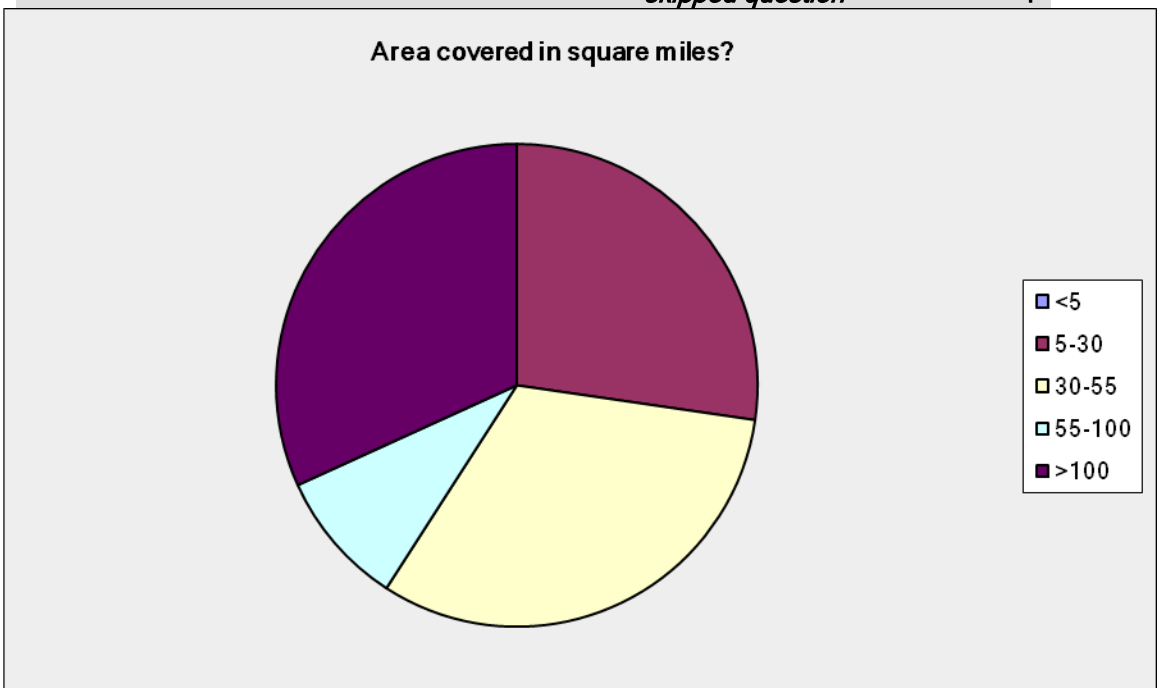
Walker, A., Driller, M., Argus, C., Cooke, J., & Rattray, B. (2014). The aging Australian firefighter: An argument for aged based recruitment and fitness standards for urban fire services. *Ergonomics, 57*(4), 612-621. http://dx.doi.org/10.1080/00140139.2014.887790

Walton, S. M., Conrad, K. M., Furner, S. E., & Samo, D. G. (2003, March 13). Cause, type, and workers' compensation costs of injury to firefighters. *American Journal of Industrial Medicine, 43*(4), 454-458. http://dx.doi.org/10.1002/ajim.10200

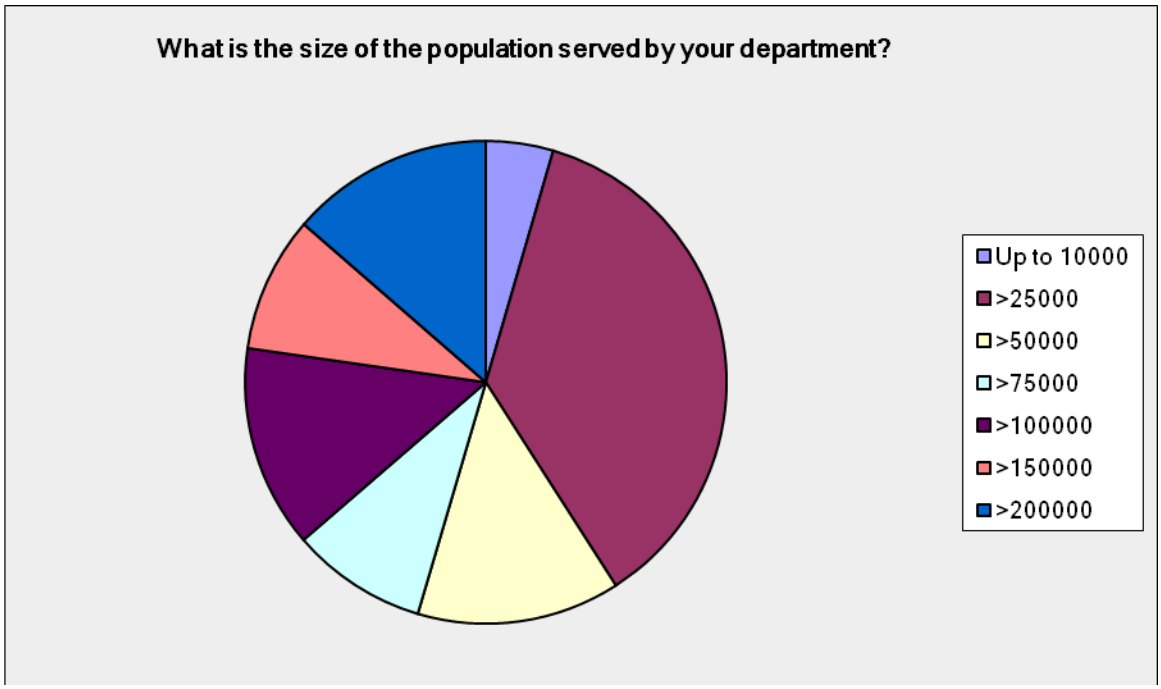
Williams, P. (2009). So what exactly is VO2. Retrieved from http://www.coreperformance.com/daily/the-performance-life/so-what-exactly-is-vo2.html

Appendix: Electronic Survey Results

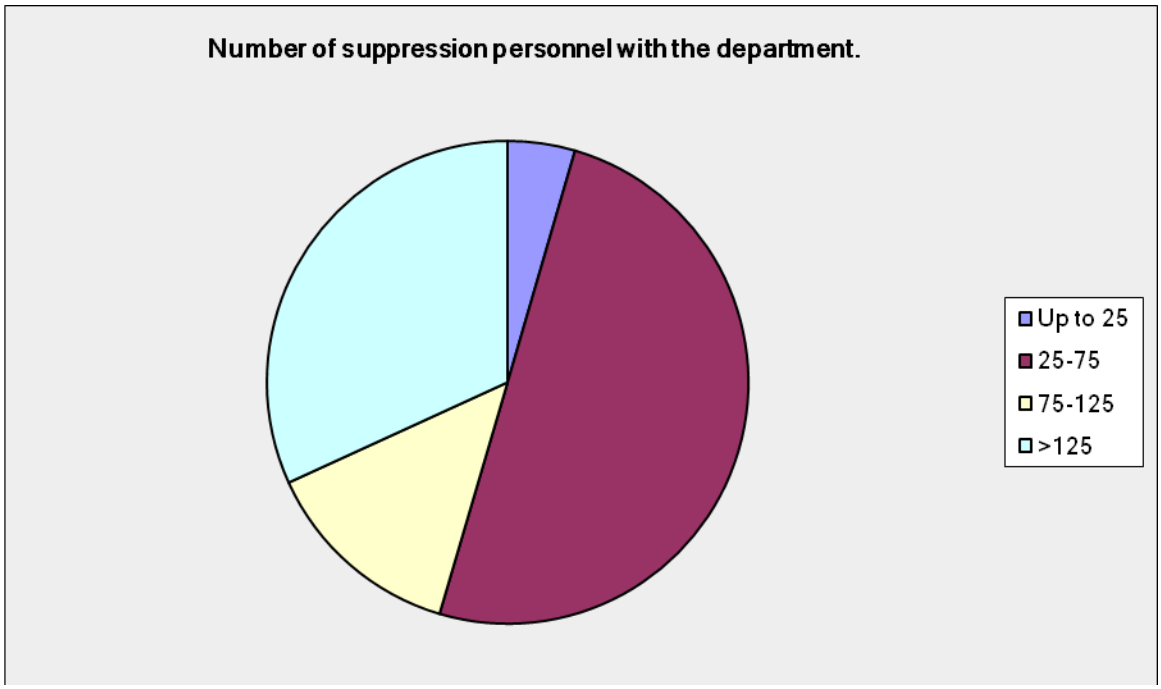
Area covered in square miles?		
Answer Options	**Response Percent**	**Response Count**
<5	0.0%	0
5-30	27.3%	6
30-55	31.8%	7
55-100	9.1%	2
>100	31.8%	7
	answered question	22
	skipped question	1



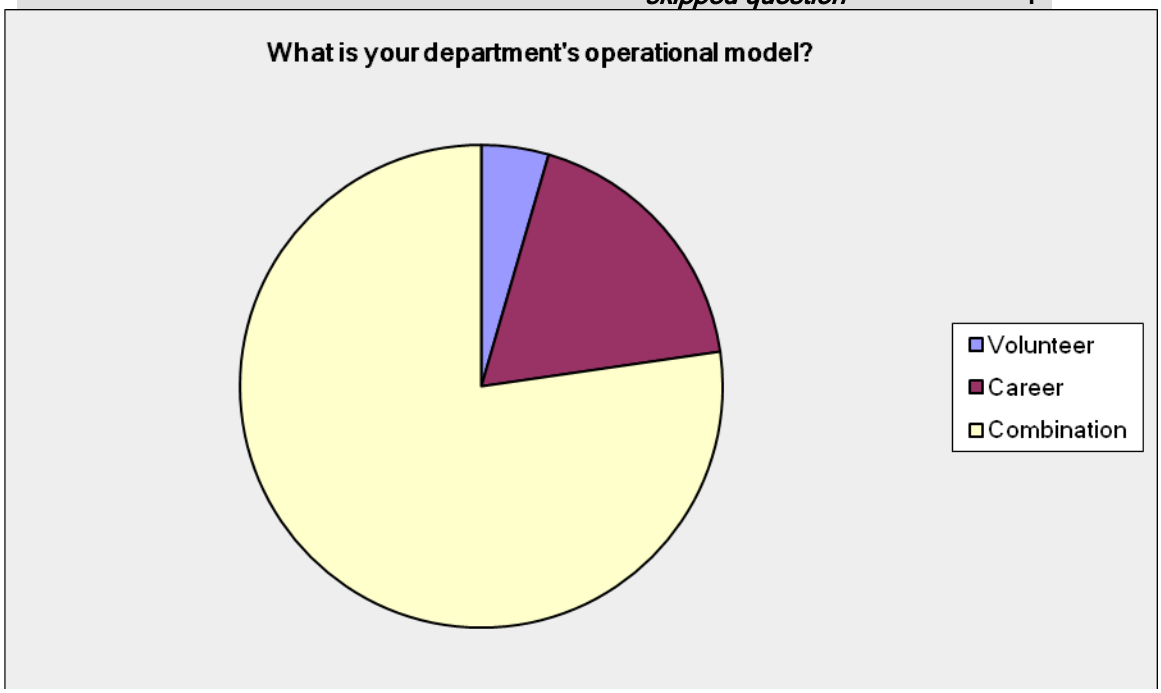
What is the size of the population served by your department?		
Answer Options	**Response Percent**	**Response Count**
Up to 10000	4.5%	1
>25000	36.4%	8
>50000	13.6%	3
>75000	9.1%	2
>100000	13.6%	3
>150000	9.1%	2
>200000	13.6%	3
	answered question	22
	skipped question	1



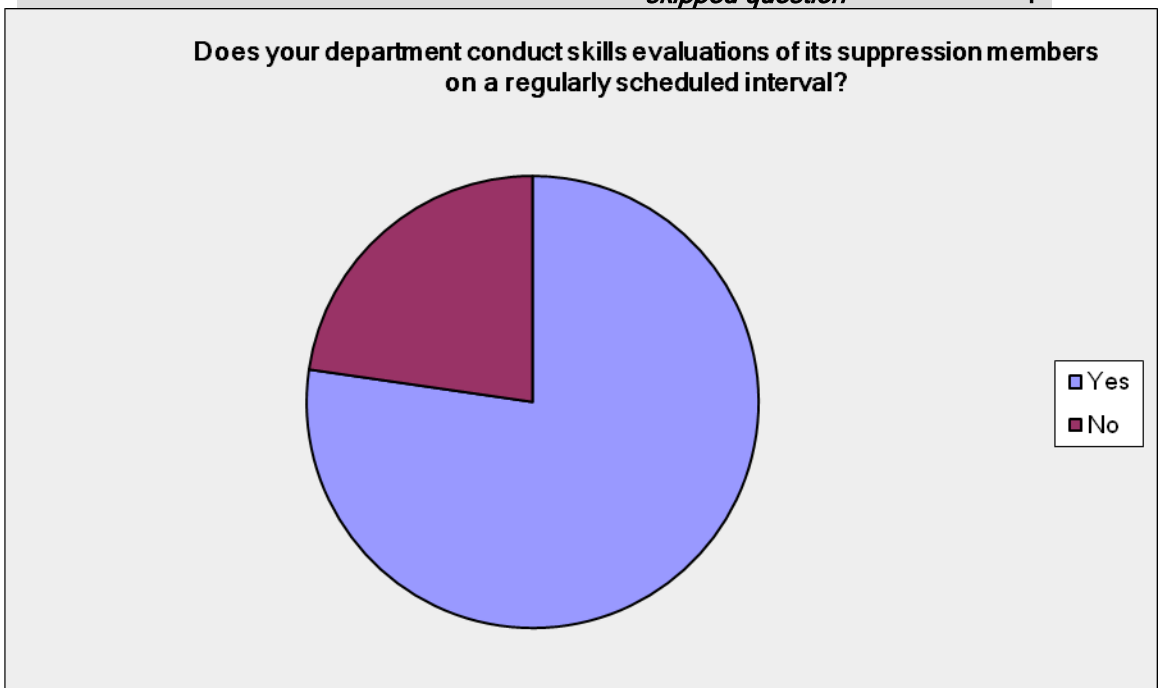
Number of suppression personnel with the department.		
Answer Options	**Response Percent**	**Response Count**
Up to 25	4.5%	1
25-75	50.0%	11
75-125	13.6%	3
>125	31.8%	7
	answered question	22
	skipped question	1



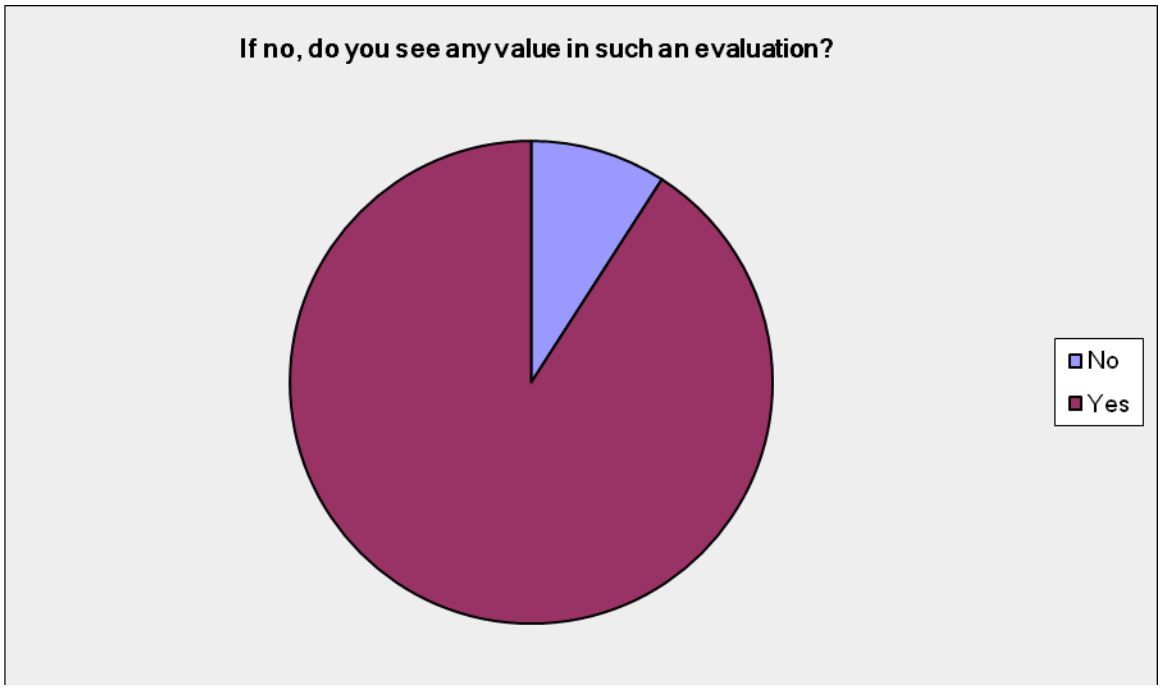
What is your department's operational model?		
Answer Options	**Response Percent**	**Response Count**
Volunteer	4.5%	1
Career	18.2%	4
Combination	77.3%	17
	answered question	22
	skipped question	1



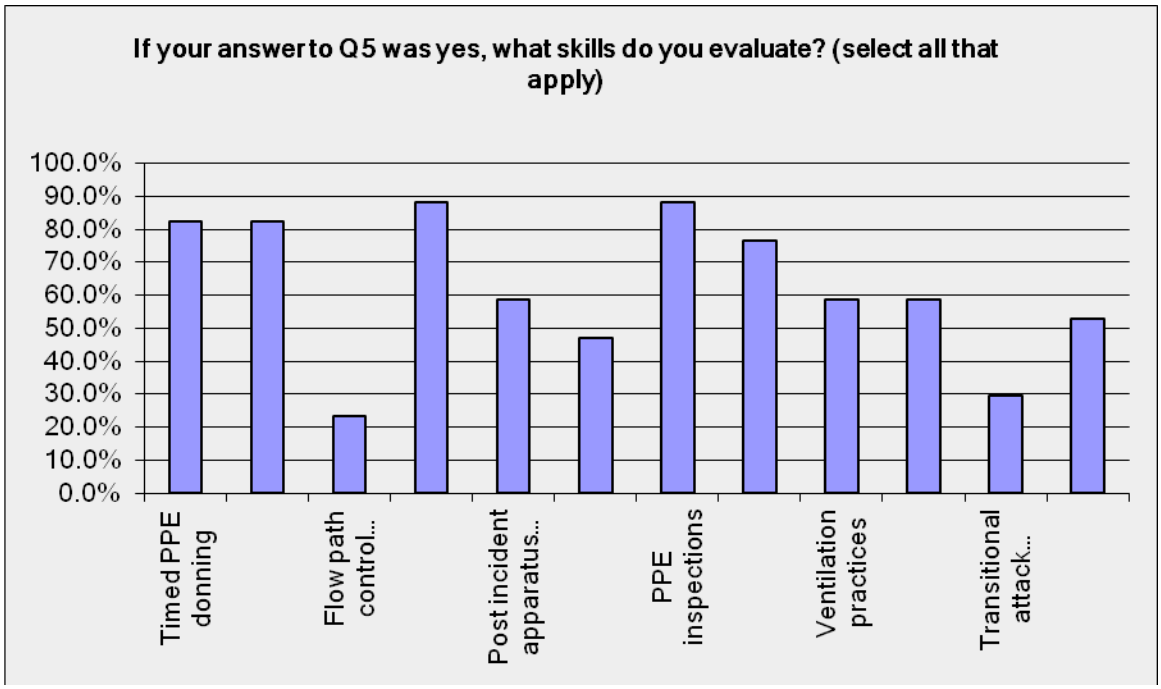
Does your department conduct skills evaluations of its suppression members on a regularly scheduled interval?		
Answer Options	**Response Percent**	**Response Count**
Yes	77.3%	17
No	22.7%	5
How often?		16
answered question		22
skipped question		1



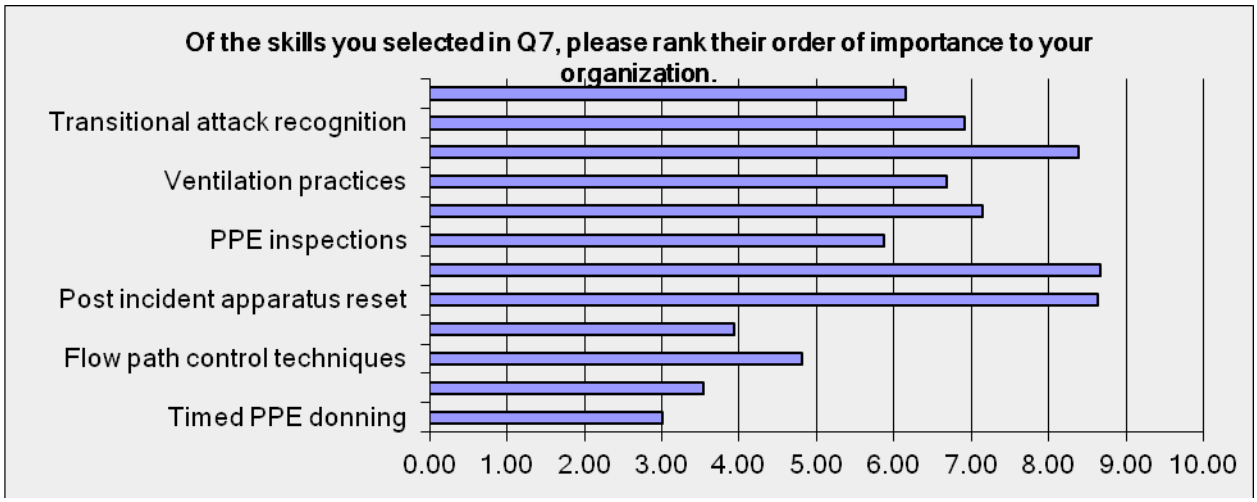
If no, do you see any value in such an evaluation?		
Answer Options	**Response Percent**	**Response Count**
No	9.1%	2
Yes	90.9%	20
answered question		22
skipped question		1



If your answer to Q5 was yes, what skills do you evaluate? (select all that apply)		
Answer Options	**Response Percent**	**Response Count**
Timed PPE donning	82.4%	14
Search patterns & rescue techniques	82.4%	14
Flow path control techniques	23.5%	4
Advancing hose lines	88.2%	15
Post incident apparatus reset (i.e.: packing hose, replacing tools, etc.)	58.8%	10
Ladder inspections	47.1%	8
PPE inspections	88.2%	15
Ladder handling and placement	76.5%	13
Ventilation practices	58.8%	10
Forcible entry	58.8%	10
Transitional attack recognition	29.4%	5
Customer service	52.9%	9
Additional skills not listed above		5
	answered question	17
	skipped question	6

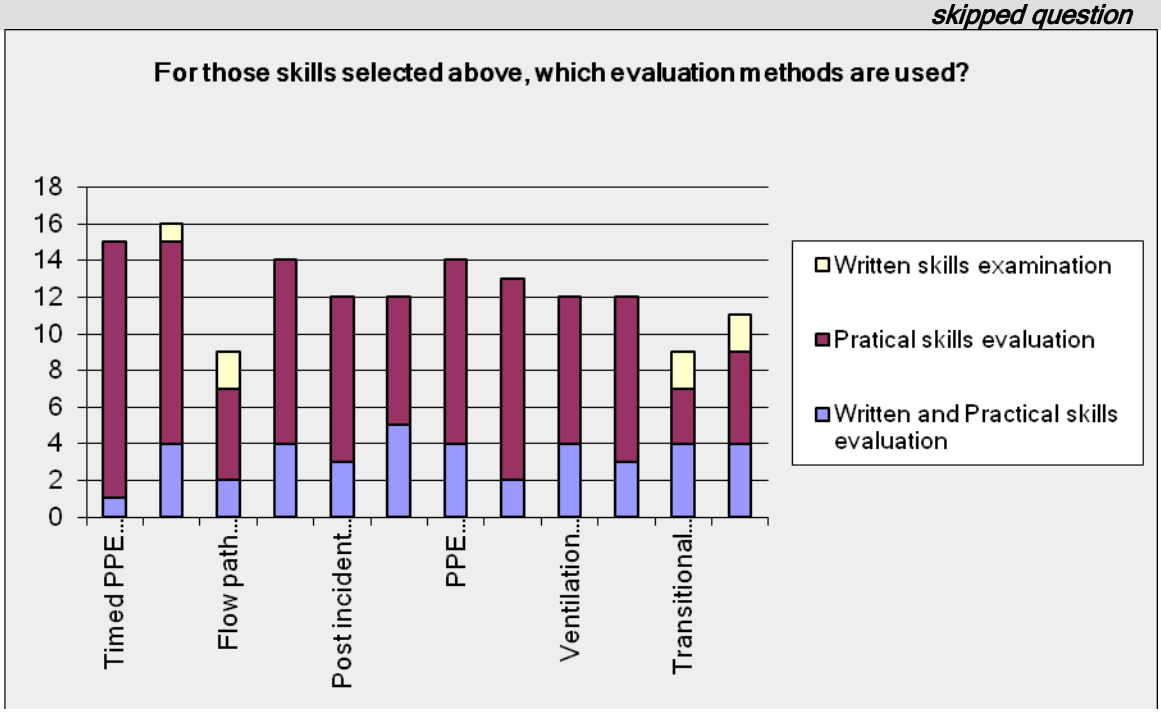


Question #8's data table was intentionally left out of the appendix due to size constrains.



For those skills selected above, which evaluation methods are used?

Answer Options	Written skills examination	Practical skills evaluation	Written and Practical skills evaluation	Response Count
Timed PPE donning	0	14	1	15
Search patterns & rescue techniques	1	11	4	16
Flow path control techniques	2	5	2	9
Advancing hose lines	0	10	4	14
Post incident apparatus reset	0	9	3	12
Ladder inspections	0	7	5	12
PPE inspections	0	10	4	14
Ladder handling and placement	0	11	2	13
Ventilation practices	0	8	4	12
Forcible entry	0	9	3	12
Transitional attack recognition	2	3	4	9
Customer service	2	5	4	11
Other (please specify)				2
			answered question	17
			skipped question	6



Are the skills evaluations at your department punitive?		
Answer Options	**Response Percent**	**Response Count**
Yes	37.5%	6
No	62.5%	10
Clarify as Needed		8
answered question		16
skipped question		7