

Developing skills sets for apparatus/pump operators in Solon Fire-Rescue

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A research project submitted to the Ohio Fire Executive Program

9 June 2008

CERTIFICATION STATEMENT

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ABSTRACT

This is an applied research project focused on looking at the position of apparatus/pump operator in a suburban fire-rescue organization. The problem this study addressed is the inconsistency of knowledge and skill sets among personnel assigned the position of apparatus/pump operator while working for Solon Fire-Rescue. The purpose of this study was to describe and develop performance objectives fire fighters must meet to qualify as pump operator (identify the necessary training requirements, experience levels, and skill sets needed for apparatus/pump operators in the suburban department.) This paper addressed the following questions: What are the basic required knowledge, experience, and skill sets for a person assigned as an apparatus/pump operator and what do other like-size fire-rescue organizations, in Ohio, use today? How can Solon Fire-Rescue develop standardized training to be implemented across three shifts? What alternative approaches are there for training all of the personnel to apparatus/pump operator level? What type of evaluation processes should be used to identify and maintain the apparatus/pump operator's performance objectives within the organization? Surveys were used to gather data to answer the research questions within this organization and randomly throughout The State of Ohio. The literature review gave this researcher information from the fire service but also allowed a comparison of fire service training techniques to private industry training and education. The project gave an awareness of three points that this organization will need to address to move forward. The need for written policies, competency-based training, and a competency-based testing procedure were indicated. This organization will need to re-write their "Standard Operating Guidelines" (SOG's) to address the responsibilities of the apparatus/pump operator. They will also need to develop a competency-based training program and a corresponding competency-based testing procedure for their personnel.

TABLE OF CONTENTS

CERTIFICATION STATEMENT	2
ABSTRACT.....	3
TABLE OF CONTENTS.....	4
INTRODUCTION	5
Statement of the Problem.....	5
Purpose of the Study	7
Research Questions.....	7
BACKGROUND AND SIGNIFICANCE.....	8
LITERATURE REVIEW	12
PROCEDURES.....	20
Definition of Terms.....	22
Limitations of the Study.....	22
RESULTS	23
DISCUSSION.....	28
RECOMMENDATIONS	30
REFERENCES	32
APPENDIX 1 – Apparatus/Pump Operations Questions for Solon Fire-Rescue.....	34
APPENDIX 2 – Apparatus/Pump Operations Questions for Like Size Fire Departments.....	36

INTRODUCTION

Statement of the Problem

The levels of knowledge, experience, and capability vary greatly among fire fighters who are rotated through the assignment of apparatus/pump operators. At Solon Fire-Rescue, as well as any multi-station, platoon oriented fire departments; this can be compounded by differences on three unique shifts. One problem that arises is when there are personnel working on a different shift and the training that has been done on their regular shift with pump operations may not be at the level of the shift they are working on at present. It is not prudent to just assume they have the same degree of proficiency with regard to pump operation.

In the fire-ground standard operating guidelines Solon Fire-Rescue has very general references to engine companies and virtually nothing to address pump operator responsibilities. Because of the lack of guidance that officers and senior fire fighters have when training pump operations with their shifts, they expand and teach from their own experience and knowledge, not necessarily from fire department guidelines. As this may be great information for new pump operators, it would tend to give inconsistent information on pump operations across three shifts. It could even give different information depending on which officer and/or senior firefighter is running a particular drill on the same shift.

Another reason for the inconsistencies among the staff is the lack of fire-ground experience. Solon Fire-Rescue does not have many working fires; therefore it could be years before a firefighter has the first, let alone, a second opportunity to function in the capacity as pump operator. The lack of real time experience, for example the simple task of changing from tank water supply to a hydrant supply while flowing an attack line, can be demanding for some new operators and is a problem that needs to be worked on. Also, when an operator is required

to flow multiple lines of different sizes it can be demanding and challenging especially when nozzle discharge pressures and friction loss calculations come into play.

The problem this study addressed is the inconsistency of knowledge and skill sets among personnel assigned the position of apparatus/pump operator while working for Solon Fire-Rescue. Like many other suburban fire departments, Solon Fire-Rescue provides more than just fire protection for the City of Solon. Because these suburban fire departments provide EMS, technical rescue, and haz-mat responses as well as their normal fire response, in depth training for apparatus pump operators has been deluded with all the other technical training each member must maintain.

Unfortunately for many years, a vast number of fire departments have been lulled into a sense of complacency regarding pump operators. The misguided logic states that the number of actual fires is down and those that we do respond to are usually handled by a single line often using tank water. It seems such a waste of time to have to learn all there is to know about pump operations. This makes perfect sense until you turn the corner and realize the fire you are rolling into will require more than just a single line (Naylis, 2004, p. 115).

Many suburban fire departments mandate fire personnel to maintain an EMT-P (paramedic) level of training which has state and federal training requirements. These requirements are continuing and each person needs to recertify every three years. Up until recently, in Ohio, there has been no required continuing education for fire fighters. Once certified at one of three levels of fire fighting in the State of Ohio there are no requirements for further education. Almost all fire departments have some semblance of weekly or monthly training, but again pump operation is usually only a small portion of the overall training plan.

Purpose of the Study

The purpose of this study was to describe and develop performance objectives fire fighters must meet to qualify as pump operator (identify the necessary training requirements, experience levels, and skill sets needed for apparatus/pump operators in the suburban department.) Information gathered will be used to develop a guideline for apparatus/pump operators that are employed by Solon Fire-Rescue. This proposed guideline will be presented to the Chief and his staff for review. Four research questions were developed to help provide a direction for the author to look and find solutions to the purpose of this applied research project. Descriptive research will be used to answer these research questions.

The research questions this study will investigate are:

1. What is the basic required knowledge, experience, and skill sets for a person assigned as an apparatus/pump operator and what do other like-size fire-rescue organizations, in Ohio, use today?
2. How can Solon Fire-Rescue develop standardized training to be implemented across three shifts?
3. What alternative approaches are there for training all of the personnel to apparatus/pump operator level?
4. What type of evaluation processes should be used to identify and maintain the apparatus/pump operator's performance objectives within the organization?

BACKGROUND AND SIGNIFICANCE

Solon Fire-Rescue services the City of Solon in southeast Cuyahoga County, a suburb of the city of Cleveland, Ohio. Residential population is approximately 22,000 people. During a normal work day the City of Solon's population can swell to approximately 60,000 people. The city is diverse with residential, commercial and industrial base. The department services the community with 54 line personnel divided into 3 shifts, one battalion chief, 4 lieutenants, and 13 firefighters on each shift. Fire prevention bureau consists of one lieutenant and 2 fire fighters. Administration is the fire chief, assistant chief and one civilian secretary. The fire department utilizes 3 stations to cover the city of approximately 23 square miles with 1 command car, 1 elevated platform, 2 engines and 3 squads.

The Solon Fire Department started as a career department in the mid 60s. Initially the fire department responded to the city from a single fire station centrally located. At that time the department responded primarily to fire related incidents. Fire apparatus/pump operators were selected primarily because of seniority at this point in the Solon Fire Department's history. By 1976 fire departments in the Northeast Ohio region, including Solon, took on the added task of responding to requests for emergency medical service. Because of the added call volume, manpower was increased from 3-4 per shift to 5 and then 6 per shift.

At this same time fire fighter/EMT-B participated in one of the first classes in the state designed to teach advanced life saving skills to fire fighters. This was an EMT-P (paramedic) level course. With multiple members of the fire department completing the course over the next year, Solon Fire Department began to operate a rescue squad. There was no change with regard to selection of fire apparatus/pump operators with this change in response. Since the mid 80s all personnel hired as fire fighters were required to complete a paramedic course. Typically the

junior fire fighters were the members going to take the additional training and thus being assigned to the squad.

Solon Fire Department functioned out of a single station until 1991. In October 1991 Solon Fire-Rescue opened a second station in the northwest quadrant of the city. This was a beginning step to lower response times and to provide a better service to the community. The city hired 12 additional fire fighters to staff the additional station. Almost all of the fire fighters came with previous fire fighting experience. With a 2 station operation and several of the older fire fighters preparing to retire, a change in operations started to take place. With 2 stations and fewer senior fire fighters, the decision was made to rotate apparatus operators at both stations. This was welcomed by some but put a burden on others because of the additional training. This continued throughout the 90s and new personnel were assigned to the rotation once their officers felt comfortable.

In 2002 the city prepared to open a third fire station and hired an additional 12 fire fighters. This was done in 3 groups of 4 to facilitate training and adjustment to shift. Many of these candidates had no previous fire fighting experience. Because of additional retirements, almost all of the fire department personnel are certified as paramedics, and with the 12 new recruits, Solon Fire-Rescue has pushed up the time table and put younger personnel in the apparatus rotation. This was done to avoid paramedic burn out and familiarize all personnel to all facets of the job. This posed a larger training problem that still exists today. How does Solon Fire-Rescue adequately prepare the personnel to assume apparatus/pump operator?

Currently Solon Fire-Rescue has no formal pump operator training. As stated in the introduction, there is virtually nothing in Solon Fire-Rescue's Standard Operating Guidelines (SOG's) about pump operation specifically. This basically leaves each shift to make their own

performance guidelines. As one can imagine, when there is no department wide performance criteria to guide the shift officers, a wide range of information can be disseminated to the fire fighters during training. This can lead to vast differences in knowledge base and experience among the fire fighters. These differences or inconsistencies can show up when personnel are transferred between shifts or working on another shift for other reasons. Problems like the inability to establish a hydrant supply to the pump before the tank water is used completely, being unable to properly estimate pump discharge pressures for different types of nozzles or different size attack lines, and being unable to coordinate relay pumping for the delivery of water to a remote location or to an aerial apparatus for an elevated master stream.

Many of these issues have been seen over time through the training programs. It seems the Monday engine evolutions can vary from station to station and maybe more from shift to shift. Officers and senior fire fighters talk among their shift and occasionally between shifts about these problems and ways to modify training to look for consistency. The shifts also critique most all live fire calls and discuss positive and negative aspects of each call. Mistakes are reviewed and suggestions are made to help everyone do better. One shift has been noted to have its newer apparatus/pump operators perform difficult and sometimes almost unrealistic scenarios with multiple lines deployed with water flowing and a truck mounted deck gun in operation before securing a water supply to the apparatus. When this is done without proper grooming it becomes detrimental to the confidence of the apparatus/pump operator.

Solon Fire-Rescue does have a driver's training program that seems to fit well. This is a set of performance guidelines developed by an insurance company for the fire service and has been adopted by many instructors and departments alike. Apparatus/pump operation performance criteria will need to be formulated to address the lack of consistent training within

Solon Fire-Rescue. This research project will be a guide to address the inconsistency of knowledge and skill sets of apparatus/pump operators.

One of the most respected positions in the fire service is that of engineer, most commonly referred to as pump operator. That respect was evident generations ago in the title bestowed upon the head of the fire department, chief engineer. In today's fire services, the role of the pump operator is just as important and just as critical as it was more than 100 years ago. (Naylis, 2004, p. 115)

Fire fighter safety and ultimately the safety of the City of Solon's citizens may be impacted by inadequately trained personnel operating pumping apparatus. In all aspects of the fire service, safety becomes one of the fire department's primary concerns. Proper and complete training in any aspect of the fire service is essential to provide the fire department's personnel the best measure of safety. The fire department's personnel show such vast differences in expertise with regard to pump operation, a training program with proper performance criteria would not only benefit the fire department's staff but ultimately the citizens of Solon. This program could not only help each shift, but also make Solon Fire Department more uniform across all 3 shifts.

The potential impact this study could have for Solon Fire-Rescue is the adaptation of a comprehensive training program that can identify performance objectives as well as minimum knowledge needed to proficiently operate pumping apparatus in the City of Solon. With this type of training the confidence level of the personnel should go up. When personnel feel more confident in their jobs the tasks are completed quickly and the overall scene safety is enhanced. With safety enhanced all the personnel stand a better chance of going home at the end of the shift.

LITERATURE REVIEW

National Fire Protection Association Standard 1002, *Fire Apparatus Driver/Operator Professional Qualifications* (2003 edition) speaks to multiple types of apparatus found in the fire service and starts out with general requirements of preventative maintenance and apparatus driver's knowledge and skill sets. The focus was on Chapter 5 (pg 2002-8) where the main emphasis is on apparatus equipped with fire pumps. Chapter 5 outlines some basic knowledge and skill sets that would be required of personnel responsible for apparatus pump operator selection. The requisite knowledge needed for pump operation, with regards to this standard, are specifications and requirement of the apparatus and procedures of the jurisdiction, the understanding of multiple types of water supply, proper understanding of hydraulic calculation with regard to friction loss and flow rates, and knowledge of foam systems with regard to proportioning rates and concentration. The requisite skills include recognition of system problems and the ability to correct deficiencies, the ability to position the apparatus to most effectively use water source and attack lines, to properly engage power transfer from vehicle engine to pump, draft, operate pump pressure control systems and operate auxiliary cooling systems for the fire pump, and the ability to operate foam proportioning equipment. (National Fire Protection Association, [NFPA] , 2003, p. 1002-8)

Pumping Apparatus Driver Operator Handbook gives the reader a basic list of skills and physical abilities needed by the driver operator. These skills, as described in this text, are not unlike skills needed in many hands-on types of jobs. The skills suggested in this text are as follows: Reading skills, writing skills, and mathematic skills (primarily used for hydraulic calculations). Certainly a basic physical fitness level will be needed, vision requirements of

corrected 20/30 are suggested and a hearing requirement as described in NFPA 1582. (Smith & Brakhage, 1999, p. 4-5)

Several other skills, although not required, will help the driver/operator perform well. Mechanical ability aides in understanding the operation and maintenance of the apparatus. Because the driver/operator is often in command of the apparatus while the officer is absent, basic supervisory skills will help in coordinating activities on the fireground. (Wieder, 1999, p. 5)

Sturtevant (2005) suggests certainly following NFPA 1002 requirements as a basic starting point for pump operators. He goes on to talk about knowledge base that will include having a basic understanding of preventative maintenance, emergency driving and operating the pump and its peripheral equipment. Memorization of the steps to perform the activities of pump operator alone is not adequate. “A pump operators knowledge should include the *understanding of the process* (the how, the why, and the variables), not just the steps.” (p. 12). Knowledge is only half the equation in pump operation. Developing hands on skills is the second part of effective apparatus pump operators. Certainly classroom lecture is an important first step but proper hands on time with an actual fire apparatus puts into practice what is learned in class. One must understand working with a pumping apparatus one time by no means makes someone a competent pump operator.

The old saying that you cannot put a fire out with books has some validity when discussing pump operations. Although learning pump operations in the classroom is the vital first step, you simply cannot effectively and safely operate a pump from just reading a book. Operating a pump requires skills achieved through

hands on training. Acquiring these skills is not just a one-time event. Pump operators must continually hone their skills through practice, practice, practice.

(Sturtevant, 2005, p.12)

Hands on training until many of the routine challenges become second nature are important. Sturtevant suggests that computer controlled pump simulators and pump software can aid in developing competencies and maintaining competencies in the future but does not take the place of actual hands on training. (Sturtevant, 2005, p 11-13).

Skill standards define work to be performed, the criteria of mastery and knowledge and skill necessary for competent performance. Organizations representing wide range of occupations have sought to identify skill standards used by their respective industries, with the goal of generating a critical set of functional skills for their application. (Davis, 2006, p. 22)

Industry-based standards merge employment and education, clarify job competencies, improve capabilities and productivity and aid in student's transition to the work place. Industry-validated standards help educators develop performance-based curriculum that emphasize real-world work-ready skills.

(Davis, 2006, p. 22)

Kitsantas expanded on several previous studies that she, with others, has researched. (Kitsantas, Reiser, & Doster, 2004 p.269-286).

In many of the studies examining self-regulated learning students have been instructed to set a process goal or an outcome goal for themselves. Specifically, students in the process goal condition are encouraged to concentrate on methods and strategies that can help them master a skill, whereas students in outcome goal condition are encouraged to concentrate on obtaining the desired outcome. (Kitsantas, et al., 2004 p.270).

Most of the studies that have examined the affects of the type of goal setting for students and student self-evaluation have focused on the affects these variables have on rule learning or motor skill acquisition. However, many of the skills that educators expect students to acquire are procedural in nature. Such skills require learners to employ properly a sequence of actions that, when taken together, constitute the entire task. In light of the step wise nature of these skills, the researchers felt that it would be beneficial to encourage students engaged in such tasks to focus on 2 self-regulated learning processes that draw a learner's attention to the steps necessary to perform the skill: Process goals and self-evaluation. No studies have examined the affects of these variables on student acquisition of procedural skills. Therefore, the researchers examined how goal setting and self-evaluation would affect student acquisition of procedure skills, in this case, the ability to animate slides created via presentation software. (Kitsantas, et al., 2004 p.271).

Kitsantas, Reiser, and Doster concluded that student's performances and attitudes can be enhanced when they focus on process goals as they are learning a procedural skill. The study indicated that self-evaluation did not work well with process goals but worked much better with students working in an outcome goal orientation. (Kitsantas, et al., 2004 p.285-286).

The paper *Understanding Organizational Learning Capability* discusses how learning takes place in 4 organizations. For the purposes of this research paper focus was placed on only 3 of the 7 learning orientations that this paper discusses. They are learning focus, value-chain focus, and skill development focus. (DiBella, Nevis, & Gould, 1996 p. 361).

Learning focus has to do with whether learning is concentrated on methods and tools to improve what is already being done versus testing the assumptions underlying what is being done. Value-chain focuses indicates which functional, core competencies are valued and supported. Skill development focuses involves the orientation towards individual versus collective learning. (DiBella, et al., 1996 p. 361).

This paper evaluated 6 groups within 4 companies for this study. It used 2 U.S based firms and 2 European based firms, one auto maker, one electronics manufacturer, one investment corporation and one public utilities corporations. They evaluated senior management in several groups and lower levels of organizational units in others. Learning capabilities and processes were identified in all the organizations we studied. There are formal and informal processes and structures in place for the acquisition, sharing, and utilization of knowledge and skills in all these firms (p. 372). These authors concluded that both learning focuses actually reinforced each other

and it seems to depend on how labor oriented the process as to which is the primary process. It appears that most labor oriented groups tried to improve processes versus testing the process. The authors concluded value chain focus for all companies is towards the market and delivery end of their operation but not all at this point are at the same focus, some lag behind. The authors concluded that with regard to skill development both individual and group development is necessary. All of the groups evaluated appeared to use individual learning primarily but have different avenues focusing on working group training and cooperation into the system. (DiBella, et al., 1996 p. 363).

In the article *The Role of the Fire Service Mentor* by James D. Piech he suggests that the fire department organization needs to actively support the company officers with their hands on role of teaching, training and encouraging new recruits. He goes on to state,

Progress reports must be kept and the training officer must be kept abreast of any areas in the trainees abilities found to be deficient after leaving formal training.

This will present the opportunity for the company officers and training officer to coordinate what is being taught and compare it with what needs to be taught. The department, as an organization, will benefit immensely from open lines of communications and from actively supporting company officers in their role, which is essentially that of a field training officer. (Piech, 2004 p. 88)

Piech suggests that standard operating procedures on exactly what to teach are essential.

The Fire Service Training Manual used by fire service instructors in the State of Ohio back in 1972 and before has a complete chapter devoted to understanding several different types

of pumps as well as automatic relief valves and automatic regulating governors. It goes on to talk about a series-parallel valve used with 2 stage centrifugal pumps. It gives a detailed list of general precautions, a definition of pump cavitation, as well as a detailed list of procedures to be followed while operating pumpers. Operating a pump from draft as well as positive pressure hydrant intake is discussed as well as precautions for both, cold weather operations and the care of the pump are discussed in detail. It even talks about tandem pumping and relay pumping operations.

In the article, *Implementing a Pump Operator Training and Evaluation Program*, written by Gerald J. Naylis he talks about what he considers the primary duties of a pump operator. He divides them into three duties, driving the apparatus, pump operations, and pump maintenance. Naylis starts out by stating it is wise to review what has been written on the subject matter and then build on it to suit the department's needs. The primary source Naylis discusses is National Fire Protection Association (NFPA) 1002, *Fire Department Vehicle Driver/Operator Professional Qualifications*. This document, like all of NFPA professional qualifications standards, set basic job performance requirements. He believes this should be the basis of any fire department apparatus/pump operator training program. Naylis goes on in the article to talk about the three duties at length. Naylis explains that the evaluation process becomes a function of measuring the operator's performance against the tasks identified on a simple checklist compiled from the NFPA job performance requirements.

In the article, *Increasing Your Driver's Safety Awareness* by Paul Dow. Dow, an instructor for Albuquerque, New Mexico, Fire Department Training Academy, also talks about using NFPA 1002, Job Performance Requirements as a basis for his training. They have created

detailed skill sheets for driving apparatus, pumping operations and aerial operations. “These sheets provide a consistency in our training that had been lacking in previous years: all instructors teach the same job skills to all students.” (Dow, 2007 p.70 and 72).

An article written by Eddy Daves from Gwinnett County, Georgia discusses at length a relief driver program that is required of any fire fighter wishing to operate fire apparatus under emergency response conditions. This is a 4 week program with the first week of classroom and the second and third week completely hands on with driving and apparatus operation. “Repetition in both areas has been an overwhelming positive factor in the program. Within a few short days, students see their skills and abilities improving drastically.” (Daves, 2005 p. 153) The fourth and final week the student rotates among station assignments and is assigned the function as relief driver. The fire engineer at that station will evaluate his/her performance during the course of that day. At the end of the week he/she will have 5 performance evaluations by 5 separate fire engineers. Daves states that they use the requirements from NFPA 1002 as a basis and have expanded on the minimum requirements.

As one may expect, many of the trade magazine articles that talk about apparatus/pump operation have a common thread, that thread is the National Fire Protection Association (NFPA) Standard 1002, *Fire Department Vehicle Driver/Operator Professional Qualifications*. This appears to be a reasonable and prudent place to start because this seems to be what the fire service is measured by if and when a problem is identified. Also noted to be common amongst the text and articles is the philosophy of starting with the basic standard, expanding on it as needed, and the ability to evaluate the training outcomes with each individual.

It would appear that the fire service is not unlike many other manual labor intensive occupations. The research found outside of the fire service shows similar philosophies and training regimens for unique skill sets. Researchers have compared process goal versus outcome goal training to determine what may be best. Whether in the fire services or outside it appears that competency based training and proper evaluation of that training are becoming more the accepted practice in any occupation.

PROCEDURES

The purpose of this applied research project is to develop written standards and performance objectives for the apparatus/pump operator to assist personnel that are employed by Solon Fire-Rescue. Both descriptive and evaluative research methodologies have been incorporated to guide the applied research project to discover many answers to the research questions.

Research and data collection for a literature review started in April of 2007 at Lakeland Community College Library. Several other visits to the Lakeland Library, as well as visits to the Cuyahoga County Public Library-Solon Branch, and the Geauga County Public Library-Chardon Branch were completed in June and July 2007. These visits revealed sources outside of the fire service that have parallel training requirements and issues for their work force. Fire Service training manuals and fire service trade magazines were reviewed for information pertaining to this applied research project as well.

Two surveys have been developed and used to gather information. The first survey was distributed to Solon Fire-Rescue personnel. The goal was to survey all 58 members of the department. Its design was to gather internal information that has helped to answer the research

questions. The second survey targeted like-sized fire departments within Ohio. The goal was to gather information from approximately 25 like-sized fire departments. This survey gathered information from outside Solon Fire-Rescue that could be pertinent and used in developing guidelines for Solon Fire-Rescue to evaluate. This survey has also given Solon Fire-Rescue contacts for more detailed information and guidelines that could prove useful in solving our problem.

The first survey consisted of 8 yes/no questions and 3 multiple choice questions that were answered by 46 of 58 Solon Fire-Rescue members. This included administrative staff, the fire prevention bureau, and line personnel within the organization. The questions included in the survey that was used internally at Solon Fire-Rescue can be found in Appendix 1. The statistical analysis of the data gathered has revealed several points. Solon Fire-Rescue personnel overwhelmingly believe that the personnel assigned to the position of apparatus pump operator have a minimum time on the job before being assigned. They also believe that all shifts do not receive the same basic training on apparatus pump operation currently. The personnel consistently believe that there should be annual competency based testing for apparatus pump operator and have specific evolutions that we would typically see in our community for that testing procedure.

The second survey included 10 yes/no questions with several questions which allowed a space for comment, 1 multiple choice question, and 2 questions designed to gather information for demographics. This survey was answered by 30 respondents. Of the 30 responses, 25 survey demographics appear to be reasonable comparisons to Solon Fire-Rescue. The 5 others are full time organizations with a single station operation. Some information may be helpful with regards to this study. This researcher was unable to find a proper source to identify like-sized and like-

staffed fire-rescue organizations as compared to Solon Fire-Rescue. Because this information was important for the results of this study, the decision was made to send this survey out through the internet through 2 separate fire service sources. The first was through the OFE office and the second was through the office of the researcher's mentor, Fire Chief in Concord Township, Ohio. A brief description of Solon Fire-Rescue, as it relates to district size, total manpower, minimum manpower strength and number of stations staffed accompanied the survey so perspective survey takers understood what they were comparing themselves to. The questions included in the survey that was used externally throughout Ohio can be found in Appendix 2. The statistical analysis of the data gathered from this second survey has revealed 2 noted points. The first point being that almost all like-sized fire departments look for additional outside training for their apparatus/pump operators. The second notable point was that Solon Fire-Rescue is not unique with respect to assignment of apparatus/pump operators. Two-thirds of the departments that returned surveys rotate all personnel through the position of apparatus/pump operator.

Definition of Terms

Apparatus/pump operator. Person assigned the responsibility of driving and operating the emergency apparatus with a pump. (SFD 2007).

Engineer. Person tested or appointed position that would be responsible to operate emergency apparatus with a pump. (SFD 2007).

Limitations of the Study

This study was based on two surveys. The first survey was an internal survey with the audience being all members of Solon Fire-Rescue. All 58 members of the organization were given the opportunity to participate in this survey process. This researcher received 46 surveys

from Solon Fire-Rescue personnel. Unfortunately, 12 members were unable or opted not to add their input to this survey.

The second survey was designed to solicit input and opinion from officers of like-sized fire departments in comparison to Solon Fire-Rescue within the State of Ohio. This researcher found no good way to locate and classify like-sized fire departments within Ohio for this comparison. Thus this survey had no defined target audience. Understanding that there was no defined list of departments to send the survey to, the researcher opted to use 2 starting points for an e-mail based blind survey. Using the OFE e-mail network and a Northeast Ohio Fire Chief's e-mail network, a brief description of the survey, an introduction of the researcher, and the goals of the survey were stated. Therefore, this survey was limited to the 30 surveys received.

RESULTS

Solon Fire-Rescue was the subject of a study for the purpose of describing and developing performance objectives fire fighters must meet to qualify as pump operator (identify the necessary training requirements, experience levels, and skill sets needed for apparatus/pump operators in the suburban department.) This study was based on 2 surveys; the first survey being an internal survey to Solon Fire-Rescue personnel and the second being sent out to like-sized fire departments within Ohio. A copy of the surveys can be found under appendix 1 and 2. This study addressed specific questions regarding apparatus/pump operators.

Table 1

Apparatus/pump operation questions for Solon Fire-Rescue

1. Do you feel your current level of training is sufficient for apparatus/pump operator?	Yes	50%	No	50%
2. Should apparatus/pump operators have a minimum time-on-the-job before allowed to operate?	Yes	95.7%	No	4.3%
3. If yes to question 2, how many years of experience should a fire fighter have on the job before they would be able to function as an apparatus/pump operator?	1 yr	19.6%	3 yr	41.3%
	5 yr	17.4%	Other	21.7%
4. Should all suppression personnel be rotated through the position of apparatus/pump operator?	Yes	58.7%	No	41.3%
5. Should we initiate a new position of “engineer” where willing personnel are trained specifically for apparatus/pump operation?	Yes	47.8%	No	52.2%
6. Do you believe all shifts receive the same basic training on apparatus/pump operation currently?	Yes	13.0%	No	87.0%
7. Do you believe we should incorporate annual competency-based testing for all apparatus/pump operators?	Yes	91.3%	No	8.7%
8. Do you believe we should have specific evolutions for apparatus/pump operations that we would typically see in our community?	Yes	95.7%	No	4.3%
9. Did you have any experience with apparatus/pump operations prior to coming to Solon Fire/Rescue?	Yes	71.7%	No	28.3%
10. If you were to experience a problem while pumping, to what degree do you feel comfortable in solving that problem?	Comfortable	76.1%	I will wing it	17.4%
	Not comfortable	6.5%		

11. How many years have you worked in the fire service?	1-5 yrs	4.3%
	6-10 yrs	28.3%
	11-15 yrs	17.4%
	16-20 yrs	17.4%
	21-25 yrs	8.7%
	Over 25 yrs	23.9%
12. How many years have you worked for Solon Fire-Rescue?	1-5 yrs	11.1%
	6-10 yrs	40.0%
	11-15 yrs	8.9%
	16-20 yrs	26.7%
	21-25 yrs	2.2%
	Over 25 yrs	11.1%

Table 2

Apparatus/pump operation questions for like size fire departments

1. Do all of your suppression personnel rotate through the function of apparatus pump operator?	Yes	66.7%
	No	33.3%
2. Do you provide additional training besides basic recruit training with regards to apparatus/pump operator?	Yes	90.0%
	No	10.0%
3. If yes to above, is this in-house or training from an outside source?	In-House	96.3%
	Outside	3.7%
4. Do you have a minimal time on the job or experience level required for apparatus/pump operators that work for your department?	Yes	56.7%
	No	43.3%
5. Do you have written Standard Operating Guidelines for the apparatus/pump operator position?	Yes	36.7%
	No	63.3%
6. Do you use a classification of “engineer” in your fire department? (or other name for apparatus operator)	Yes	33.3%
	No	66.7%

7. If yes to above, is this a tested position?	Yes	31.3%
	No	68.8%
8. Do you have yearly apparatus/pump operator competency testing?	Yes	40.0%
	No	60.0%
10. Is there uniform training across all shifts?	Yes	66.7%
	No	33.3%
11. Would you describe your organization as:	Full time employees	40.0%
	Combination Full/Part time	53.3%
	Full time/Volunteer	6.7%

When conducting the surveys the questions of basic required knowledge, experience and skill sets for a person assigned as an apparatus/pump operator were identified. The results indicated that within Solon Fire-Rescue over 40% of the respondents believe that a minimum of 3 years experience was necessary for this assignment. In the survey from like-sized fire departments over 56% responded that time on the job experience was required. This varied from 6 months to 5 years. Most comments seemed to center on a 1 year time frame with certain specific requirements needing to be mastered.

Looking at how to develop standardized training across 3 shifts several items have come to light. Results from the Solon Fire-Rescue survey showed that over 90% of the personnel believe there should be some type of competency based testing. Over 95% of the personnel believe we should have specific evolutions designed to test apparatus/pump operators with typical scenarios that we would find in our community. 87% of the personnel surveyed believe that we do not get the same basic training on apparatus/pump operation across 3 shifts. Results from the like-sized fire departments revealed that 90% of the departments returning information

provided additional training besides recruit training with regards to apparatus/pump operator. Also, 40% of the respondents stated that they used apparatus/pump operator competency testing at this time. Noted in comments from that question, several other departments are working on developing a competency-based training program.

Trying to understand alternative approaches to training personnel to the apparatus/pump operator level was interesting. The researcher found it difficult to ask specific questions to obtain this type of information. Fortunately, space for comments was left after most questions and many of the survey participants took the time to add their comments. Most of the information to answer this question was found in those comments. As has been discussed above, competency based training and evolutions that would closely mirror typical operations within the community seem to be what the Solon Fire-Rescue personnel are looking for as an alternative compared to what is provided today. This researcher would suggest that Solon Fire-Rescue make contact with several of the respondents that filled out the outside survey. Several comments talked about implementation of the National Fire Protection Association 1002 curriculum within their organizations. Another comment spoke to a formal refresher consisting of 3 hours of classroom and 3 hours hands-on training. One more comment talked about developing a state certified instructor base within the department to maintain many fire department skills, pump operation being one of them.

When looking for the type of evaluation processes that could be used within Solon Fire-Rescue regarding apparatus/pump operators, several points were made. First, the employees of Solon Fire-Rescue that returned the surveys believed annual competency based testing would be the right way to go for this organization in the future. Secondly, the survey shows that this same group believes hands-on training and testing need to be a part of the future training of Solon

Fire-Rescue. Survey data received from the like-sized departments also pointed towards some move to competency based testing within our region. In 40% of the departments surveyed they stated that they do some type of competency based testing now. The comments from that survey also noted several fire departments in the process of formulating some type of competency based testing.

DISCUSSION

The information from the surveys and the literature review were carefully studied and it is concluded that Solon Fire-Rescue definitely needs to put in place both a competency-based training program specifically directed at the apparatus/pump operator and a way to test the knowledge gained from this training. Thus, an annual competency test for the apparatus/pump operator needs to be put into place. Understanding that putting into place these programs is not going to happen overnight, the first leg of the undertaking is done, knowing it needs to be done.

As stated in the literature review, *Pumping Apparatus Driver Operator Handbook*, there are basic skills that every fire fighter should have. But the following quote helps to understand what else is needed for the apparatus/pump operator:

Several other skills, although not required, will help the driver/operator perform well.

Mechanical ability aids in understanding the operation and maintenance of the apparatus.

Because the driver/operator is often in command of the apparatus while the officer is absent, basic supervisory skills will help in coordinating activities on the fireground.

(Wieder, 1999, p.5)

It is also important for the operator to have a basic understanding of preventative maintenance, emergency driving, and operating the pump and its peripheral equipment.

Memorizing the steps to perform activities alone is not adequate. “A pump operators

knowledge should include the *understanding of the process* (the how, the why, and the variables, not just the steps. “ (Sturtevant, 2005, p 12). Therefore the operator must understand the knowledge he has gained from text books as well as mechanical ability and hands-on knowledge out in the field.

The question of assigning only a select number of the personnel within a department to the apparatus/pump operator or “engineer” position fueled much debate. What was seen in the internal survey was 58.7% of the Solon personnel believe all firefighters should be trained and rotated through the apparatus/pump operator position. Also, a slightly smaller majority (52.2%) believe we should not initiate a new “engineer” position. A similar response was noted from the external survey data. This survey showed that 66.7% of departments that returned information do not use an “engineer” or small group of employees to operate their emergency apparatus. The comments from both surveys seemed to send the message from many respondents that even though the “engineer” concept has merit, a moderate sized fire rescue organization does not have enough personnel to dedicate manpower to a single position within the organization. With time off, of all types, it becomes extremely difficult not to have all personnel cross-trained to perform all the job functions that the average fire-rescue organization is responsible for on a daily basis.

When researching outside of the fire service regarding skill sets and competency the following was found:

Industry-based standards merge employment and education, clarify job competencies, improve capabilities and productivity and aid in students’ transition to the work place.

Industry-validated standards help educators develop performance-base curriculum that emphasize real-world work-ready skills. (Davis, 2006, p. 22)

In other words, this competency based learning and testing is needed in the fire service just as it is needed in many industries and the direction we are heading with putting this into place at Solon Fire-Rescue is definitely the right direction.

RECOMMENDATIONS

There are several steps needed to resolve the problem of inconsistency in knowledge and skill sets among personnel assigned the position of apparatus/pump operator while working Solon Fire-Rescue. This researcher has concluded that to resolve the problem described above, Solon Fire-Rescue will need to develop a competency-based training program for the position of apparatus/pump operator. Solon Fire-Rescue will need to revise and develop Standard Operating Guidelines (SOG's) to define the responsibilities of the apparatus/pump operator and how they fit into the master firefighting plan of the organization. The apparatus/pump operator skill sets that Solon will need to teach will have to be identified by a group of personnel assigned with that task. This group should have diversity from all areas of the organization to receive a broad range of opinion for this assignment. Once these skill sets are defined a training program will need to be developed to teach these competencies to all personnel.

A competency-based written and hands-on testing procedure will need to be developed to verify that the defined competencies have been taught and more so mastered by the selected personnel. Before this testing procedure is adopted the training personnel with help from senior shift personnel will need to validate these testing procedures to make sure they will fit the organization.

When gathering data to answer research questions this researcher found that asking for comments with the answers to the survey questions many times gave more insight to the problem

as a whole. Any additional information that can be gathered with surveys addressing this type of a problem will most likely be beneficial information.

One point that may need to be expanded upon in the future is what size organization would benefit from having a true “engineer’s position.” Within the data that was received in these 2 surveys there was certainly no clear cut direction.

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APPENDIX 1

APPARATUS/PUMP OPERATION QUESTIONS FOR SOLON FIRE-RESCUE

1. Do you feel your current level of training is sufficient for apparatus/pump operator?
 Yes No

2. Should apparatus/pump operators have a minimum time-on-the-job before allowed to operate? Yes No

3. If yes to question 2, how many years of experience should a fire fighter have on the job before they would be able to function as an apparatus/pump operator?
1 year 3 years 5 years Other

4. Should all suppression personnel be rotated through the position of apparatus/pump operator? Yes No

5. Should we initiate a new position of “engineer” where willing personnel are trained specifically for apparatus/pump operation? Yes No

6. Do you believe all shifts receive the same basic training on apparatus/pump operation currently? Yes No

7. Do you believe we should incorporate annual competency-based testing for all apparatus/pump operators? Yes No

8. Do you believe we should have specific evolutions for apparatus/pump operations that we would typically see in our community? Yes No

9. Did you have any experience with apparatus/pump operations prior to coming to Solon Fire/Rescue? Yes No

10. If you were to experience a problem while pumping, to what degree do you feel comfortable in solving that problem?

Comfortable___ I will wing it___ Not Comfortable___

11. How many years have you worked in the fire service?

1-5___ 6-10___ 11-15___ 16-20___ Over 20___

12. How many years have you worked for Solon Fire-Rescue?

1-5___ 6-10___ 11-15___ 16-20___ 21-25___ Over 25___

APPENDIX 2

APPARATUS/PUMP OPERATION QUESTIONS FOR LIKE SIZE FIRE DEPARTMENTS

1. Do all of your suppression personnel rotate through the function of apparatus/pump operator? Yes___ No___
2. Do you provide additional training besides basic recruit training with regards to apparatus/pump operator? Yes___ No___
3. If yes to above, is this in-house or training from an outside source?
In House ___ Outside Source ___
4. Do you have a minimal time on job or experience level required for apparatus/pump operators that work for your department? Yes___ No___

If yes, please give basic description.

5. Do you have written Standard Operating Guidelines for the apparatus/pump operator position? Yes___ No___

If yes, would you be willing to share?

6. Do you use a classification of “engineer” in your fire department? (or other name for apparatus operator) Yes___ No___
7. If yes to above, is this a tested position? Yes___ No___
8. Do you have yearly apparatus/pump operator competency testing?
Yes___ No___

9. If you use competency-based testing do you have a remedial training program for someone that does not meet the standards?

If so, how many times are they allowed to take this remedial training?

10. Is there uniform training across all shifts? Yes___ No___

11. Would you describe your organization as:

a) Full time only b) Combination-Full/Part time employee c)

Combination-Full Time employee/volunteer

12. What is your current manpower on duty and number of stations used in your response area?

13. May we contact you in the future for additional information? This is optional on your part. Below please find a space for contact information.

Contact Information: (Optional)

Name_____

Contact Number_____