Fire Services Deployment Study

Tredyffrin and Easttown Townships
Chester County, PA

October 2008

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Tredyffrin and Easttown Townships
Chester County, PA

Submitted to:

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EXECUTIVE SUMMARY

In October 2007, the townships of Tredyffrin and Easttown Pennsylvania put forth a Request for Proposals to conduct a Fire and Emergency Medical Service (EMS) Needs Study. The jurisdictions selected TriData, a division of System Planning Corporation, to conduct this study. TriData personnel conducted several visits to the area and met with all of the major stakeholders, including operational and administrative leaders from both the Berwyn and Paoli Fire Companies, township managers, other township employees, Chester County Emergency Communications officials, and local business leaders. TriData also assessed the facilities and equipment of the fire companies. Additional meetings were held to clarify information and assure that TriData has a clear understanding of the fire and EMS service in the townships.

Tredyffrin and Easttown Townships are at a crossroads when it comes to deciding the future of the fire/rescue service for the townships. The choices are:

1. The townships can continue with the status quo that consists of a system of individual companies where each works independent of the whole. This choice is the easiest and safest in that it creates no need for change, which is always a difficult process to successfully enact.
2. The townships can create an area-wide fire/rescue plan using the recommendations from this report and the successes of other local jurisdictions as a guide. This choice will take considerable planning, commitment, and relationship-building between the township officials, citizens, and the independent volunteer fire companies that now protect the townships.
3. The Townships and the fire companies can take pieces of the recommendations set forth and create a system that works for them and slowly build toward the future, or create a different system independent of the recommendations in this study.

Whichever option is chosen, one thing is certain: the process will have its share of supporters and non-supporters who will have a great effect on the outcome of the decisions. The leaders must always keep the mission of all fire/rescue services at the sharp point of this endeavor. That mission is to save lives and protect property, and to do what is right for Mrs. Smith. This report should be viewed as a source for response standards, management guidelines, and financial options to consider, not a bible that must be followed. It is like a cookbook which allows you to choose the recipe but decide what fits best or even alter ingredients. It is up to Tredyffrin and Easttown to choose the elements and make the recipe into a workable plan for your citizens and visitors.

Major findings of the analysis are presented below.

Response Time and Station Location Analysis

Response time analysis for both fire companies indicates that call processing and travel times are good. Turnout time segment that begins when the alarm is received by operations personnel and extends until the apparatus starts driving to the incident scene needs to be reduced. Both the average turnout time and the 90th percentile times increased from 2006 to 2007. Total response times are slightly over the recommended NFPA 1720 response time goal of nine minutes for communities served by volunteers. Reducing turnout times should make this goal reachable. One method that often improves turnout times is the establishment of duty crews – firefighters in the stations for agreed upon tours of duty, which can be made mandatory.

Geographically, the fire stations are well-located. A potential area to watch given the demand pattern is east of Berwyn Fire Company. Based on the current coverage analysis, there are not severe impacts on response times stemming from the many bridge and overpass height or weight restrictions. The current road network does not drastically affect the coverage for the larger, heavier apparatus such as trucks and engines. However, as geographical and population characteristics evolve, re-evaluation of this issue will be needed.

Evaluations of Operations and Management Procedures and By-Laws

The report examined operations, management, and communications systems in place in the Berwyn and Paoli Fire Companies. Staffing, apparatus, and cooperative activities are addressed. Management of both companies, including volunteer recruitment and retention strategies, is also addressed. A plan for reducing false alarms and implementing user fees is given.

Staffing levels are discussed with a focus on the overall complement of personnel by incident type as opposed to addressing staffing at the unit level. Neither unit-level staffing nor overall complement staffing requirements are supported by a hard, scientific background. Jurisdictions must consider guidelines from consensus standards and organizations such as the National Fire Protection Agency (NFPA). It is incumbent on the Incident Commander of any emergency scene to assure that staffing levels are compliant with NFPA standards and Federal regulations. The report provides recommendations for minimum personnel responses by incident type. Data indicating how many firefighters responded on initial alarm to each incident was not available, which is a common issue with many fire departments.

Apparatus complements, both in the organizations assessed and in surrounding companies, are appropriate for the services provided. Apparatus acquisition, insurance, and maintenance are a potential area for increased cooperation and likely some financial savings. The Berwyn and Paoli Fire Companies already coordinate work together very well including

operations, automatic aid, and training. There is no recommendation for further consolidation. The possibility of consolidation was considered, but our finding is that there is no large cost-savings potential from such an action. The two companies already cooperate better than many other communities we have assessed. We do recommend establishment of a Joint Advisory Board to further aid in cooperative efforts.

Analysis of Capital Equipment and Finances

The study considers finances, including capital equipment, in the Berwyn and Paoli fire companies. Areas of review include stations, apparatus, and major equipment. A financial plan is presented to assist in operational and future capital planning of the companies and the townships.

The fire station operated by the Berwyn Fire Company needs to be replaced. The current facility is barely capable of supporting existing operations. Functionality of the company, particularly living space for career or volunteer staffing, is restricted by the structure. The time and money required to maintain this almost 90-year-old structure takes away from the primary mission of the company.

The apparatus fleets operated by the two companies are appropriate in terms of size and composition, but the fleet of the Berwyn Fire Company is outdated. Specific recommendations are given for developing a vehicle replacement schedule based on the American Public Works Association replacement scoring system. This formula is applied to the existing fleets, and a schedule for apparatus replacement over the next decade is presented.

The financial standing of both fire companies and their affiliated relief associations are assessed. A major finding is that the cost of providing advanced life support (ALS) service to the citizens is creating a financial hardship for the Berwyn Fire Company. Additional funds need to be directed to this organization based on ALS call volume. If the Paoli Fire Company decides to provide this same service, then additional funds related to its ALS call volume may be justified.

A funding plan is provided to allow for continued service by both fire companies. Operating expenses are differentiated from capital expenses, with township contributions for operating funds being tied to call volume. Capital expenses are less dependent on call volumes—a fire station costs the same to build, whether the units running out of it respond to 500 or 5,000 calls a year. Sources of funding for capital expenses include State aid, direct aid from the townships, and assistance from relief associations.

Prioritized Recommendations and Developing a Master Plan

The last section of this report discusses implementation of the recommendations made. First discussed is a means of prioritizing the recommendations. Following this is a proposed Master Plan that includes specific details regarding a Fire/Rescue Advisory Board. This board should begin as a continuation of the current Fire Task Force, but with expanded roles and membership. It would act as an advisory board and report to the Township Supervisors, rather than behaving as a control board. Each fire company should retain the controls they already have. This board will help township management to understand the needs of the fire companies and provide the support necessary to supply effective and efficient fire and rescue services. Following the proposed Master Plan is a discussion of strategic planning and the recommended process for setting long term goals and objectives for emergency service delivery.

I. INTRODUCTION

In 2007, Tredyffrin and Easttown Townships formed a task force of principal stakeholders, including elected officials, township staff, and fire company representatives, to gather information and explore issues related to fire/rescue services. Areas of interest included expenses, finances, planning, and levels of service. After the task force's review and subsequent recommendations, the townships determined there was a need for further study of the situation. From the needs set out by the task force, an RFP was developed to solicit a professional consulting firm to evaluate the fire/rescue/EMS system in Tredyffrin and Easttown Townships and provide recommendations for future operations and finance.

Background

Tredyffrin and Easttown Townships are located in northeast Chester County, Pennsylvania, an area with many elegant homes and estates. The area is also a principal economic engine for many Southeastern Pennsylvania and Chester County businesses, including retail, manufacturing, and scientific and technical operations. Chester County has experienced 1.5 percent growth for the past 15 years and shows no signs of slowing down.

Tredyffrin and Easttown Townships cover 28 square miles and have an estimated population of 40,000. Fire and ambulance services are primarily provided by Berwyn and Paoli Fire Companies with a small area covered by Radnor Fire Company. Both Berwyn and Paoli Fire Companies are combination systems with large volunteer contingents supported by some career staffing. Both fire companies operate fire/rescue/EMS departments with a combined annual run total of about 4,500 calls.

Berwyn Fire Company is a combination company with 65 volunteers and 9 career staff. The fire company responds to about 3000 fire and emergency medical service (EMS) calls annually. The Berwyn Fire Company operates a variety of fire and EMS vehicles. Berwyn maintains and operates 3 engines (pumpers). These vehicles are designed to deliver water and personnel to extinguish fires and provide EMS services, and serve as the backbone of the fire company's response profile. One of the pumpers also carries tools for the extrication of people trapped in motor vehicle accidents. All three pumpers are equipped with 1000 feet of large diameter hose for water supply. Each pumper carries 750 gallons of water on board for small fires or to allow structural fire fighting operations to commence before a water supply is established. Two of the three pumpers have pumps rated at 1500 gallons per minute (GPM) while the third is rated at 1250 GPM.

Berwyn also owns a ladder truck with an elevated platform, known as a tower ladder. The tower ladder also has a pump and on-board water tank, although the tank is smaller than those on the pumpers and the tower does not carry large amounts of hose. The tower ladder can provide elevated steam delivery, and the platform is useful in rescues of people above the reach of the ground ladders that are carried on the truck. The platform can be extended to a height of 95 feet.

Berwyn carries technical rescue equipment on Rescue 2. This mobile tool box is stocked with everything necessary for confined space, high-angle, water, and trench rescue situations.

EMS services are provided in three ambulance vehicles that can deliver basic life support (BLS) or advanced life support (ALS). ALS is considered paramedic service that can provide certain drugs to a patient in the pre-hospital environment under the direction of a physician via radio communications. The vehicles are equipped almost identically. The level of care provided is a function of the training and certification of the crew on board at the time of the incident.

The Traffic Safety Unit provides support equipment and can be used as an adjunct for the fire police in motor vehicle traffic control. This vehicle is a modified sport utility vehicle. Berwyn's command vehicles also are modified sport utility vehicles that can be used as mobile command posts. These vehicles are equipped with multiple radios, maps, and other materials to be used by the incident commanders in the direction and control of emergencies. One of the vehicles is assigned to the chief and the other by the duty officer, a position that rotates among several of the company officers.

Paoli Fire Company is also a combination company with 45 volunteers and 4 career staff. Paoli responds to approximately 1400 service calls per year for three townships, including Willistown Township. Paoli has a smaller apparatus fleet—eight vehicles as opposed to Berwyn's eleven. Paoli has two engines, one which carries extrication equipment for use on automobile accidents. The other pumper has a large (3000 gallons vs. 750 gallons) on-board water tank and is called a pumper-tanker. Both pumpers carry LDH, and the pumper-tanker is equipped with a compressed air foam system (CAFS). This type of foam has unique properties for pre-treating threatened structures and is the only unit equipped with the type of system we found in our review of the surrounding fire companies.

Paoli also has a tower ladder with a reach of 100 feet. Similar to Berwyn's tower, this vehicle has as pump and a 300-gallon water tank.

Paoli Fire Company also operates a mini-pumper, a vehicle with a smaller water tank (260 gallons) and a lower pump capacity of 500 gallons per minute. This mini-pumper has 4-wheel drive and is designed for off road operations. The vehicle is very versatile in its ability to

go off-road, on dirt roads, or in unplowed snow or other conditions where the size and weight of a full size engine would unable to go.

The traffic safety unit in service in Paoli is a modified pickup truck. Paoli has two command vehicles; both are modified sport utility vehicles. One of the command vehicles is assigned to the chief of the department and the other to the deputy chief.

One BLS ambulance rounds out the fleet of vehicles in Paoli.

Scope of Work

Tredyffrin and Easttown Townships requested the assistance of an outside firm to provide a comprehensive review of fire and ambulance needs for the townships. TriData, a division of System Planning Corporation located in Arlington, Virginia, was selected to conduct this study. Central to the study was an analysis to determine how the townships' fire and emergency medical services should be funded and deployed to best accommodate service demands. The study also reviewed the departments' organization and the relationships between departments. Finally, the study provided a master plan of the fire and rescue services for the future.

TriData evaluated all the issues outlined in the RFP. The issues were grouped into four major areas: risk, demand, and deployment; management, operations, and finance; facilities and equipment; and future plan. Table 1 is a breakout of the areas from Phase 2, Emergency Services Information Review, of the Tredyffrin/Easttown RFP, each aligned with the appropriate major section of the TriData study tasks.

Table 1: Task Overview

TriData Study Tasks	Phase 2: Emergency Services Information Task Review
Risk, Demand, and Deployment	Staffing and workload
	Delivery systems – suppression/rescue/EMS
Management, Operations, and Communications	Organizational overview
	Personnel management
	Fire company coordination and cooperation
	Fire companies that provide aid to Berwyn and Paoli
Capital Equipment and Finances	Apparatus and equipment
	Capital improvement plan
Future Plan	Planning for fire protection and other emergency services
	Community support and funding
	Fire company support and funding
	Township support and funding

Approach

This study was a complex undertaking and required input from all major stakeholders. Extensive interviews were conducted with key township officials and volunteer officers. Needed information was gathered through four site visits, conference calls, questionnaires, and e-mail exchanges.

TriData project team members made the initial site-visit to Tredyffrin and Easttown Townships in February 2008 to meet with township officials and representatives of the departments and familiarize themselves with the geography and area-specific risks. Extensive meetings with stakeholder groups were conducted during the initial visit and in subsequent visits at numerous locations.

Data and background information, including call statistics, budget information, personnel figures, staffing reports, apparatus and maintenance reports, and CAD and GIS data were also collected. Throughout the project, team members reviewed information collected from interviews and analyzed and verified data.

Organization of the Report

The remainder of the report is organized as follows:

Chapter II, Response Time and Station Location Analysis – This chapter discusses the deployment of fire stations and emergency response apparatus in Tredyffrin and Easttown Townships. There are many factors that should be taken into account when determining the appropriate number of stations, including demand for services, population density, size of the jurisdiction, and desired response times. This chapter considers these factors for the current and future situation of Tredyffrin and Easttown Townships and sets out recommendations for continuing quality fire/rescue services.

Chapter III, Analysis of Operations and Management Procedures and Bylaws – This chapter examines the operations, management and communications systems in place with the fire companies that serve Tredyffrin and Easttown Townships. First examined are the fire and Emergency Medical Services response profiles of the two fire companies that provide the bulk of emergency response to the townships. The next section of the chapter addressed the management structures in place in the Paoli and Berwyn Fire Companies. Finally, an overview of the communications systems in use by the Chester County Fire Companies is presented

Chapter IV, Analysis of Capital Equipment and Finances – This chapter looks at the finances, including capital equipment in Berwyn and Paoli Fire Companies. Areas of review include stations, apparatus, and major equipment. Additionally, the financial conditions of each

fire company are analyzed and a financial plan is presented to assist in operational and future capital planning of the companies and the townships.

Chapter V, Prioritized Recommendations and Master Plan – As part of the original request for proposals, Tredyffrin and Easttown Townships requested that a master plan be developed for the future organization and operation of fire/rescue services in the townships. To assist the townships with the assessment process, the study team developed a method to evaluate and prioritize each recommendation using similar criteria. Finally, as part of the report for Tredyffrin and Easttown Townships, a master plan with options was developed for fire-rescue services in the Townships.

II. RESPONSE TIME AND STATION LOCATION ANALYSIS

This chapter discusses the deployment of fire stations and emergency response apparatus in Tredyffrin and Easttown Townships. The stations included in this analysis are Berwyn Fire Company (Chester County Station 2), Paoli Fire Company (Chester County Station 3), and, to a limited extent, Radnor Fire Company (Delaware County Station 15), Narberth Fire Company (VMSC #313), and Malvern Fire Company (Chester County Station 5). These stations in combination provide fire and/or EMS coverage for Tredyffrin and Easttown Townships. There are many factors that should be taken into account when determining the appropriate number of stations, including demand for services, population density, size of the jurisdiction, and desired response times. This chapter considers these factors for the current and future situation of Tredyffrin and Easttown Townships.

Data

Before the analysis took place, project team members visited the townships and gathered and reviewed information related to properly locating fire stations, including:

- Current station locations and building ages
- Current apparatus deployment
- Current risk areas
- National response time standards
- Current and projected population
- Current and projected demand

Response data from the computer aided dispatch (CAD) system for 2006 and 2007 was provided by the Department of Emergency Services in Chester County, Pennsylvania. Data included addresses for geocoding, type of incident, units responding, and response time segments.[1] Geographic information system (GIS) files used for the analysis were provided by Easttown and Tredyffrin Townships directly.

Data Format

Initially, a major data limitation was the format of the CAD data provided by Chester County Department of Emergency Services. The county's system does not have the capability to export data in a tabular format (Excel or similar program). Rather, the system produces text files

[1] A GIS operation for converting street addresses into spatial data that can be displayed as features on a map, usually by referencing address information from a street segment data layer.

which are very difficult to analyze. Before any analysis took place, the CAD data had to be converted from the Microsoft Word documents provided to a tabular format. The conversion steps included logic, sort, and lookup functions constructed together to re-organize the data with appropriate field headings and format manipulation to achieve a row/column format. Data integrity checks were made for quality assurance. Once the data conversion was finished, the analysis was completed with only a few issues. Future analysis may be more efficient if data is exportable to formats which lend themselves to statistical analysis such as what was completed in this analysis. Such formats include tabular programs such as Microsoft Excel or database programs such as Microsoft Access.

Data Limitations and Assumptions

An analysis limitation was the inability to distinguish between emergency and non-emergency incidents. The CAD data included a field for "call type" which often can be used to make this determination. A code was provided in the "call type" field; however, the data lacked clarification related to the codes. Unsuccessful attempts were made to access this information and all CAD data was assumed to be for emergency incidents. The dataset also included a priority field, and this was used to distinguish the call level/importance.

Two analysis variables were determined using fields provided in the CAD data. First, the home station for each primary responding unit was determined using the unit identifier provided in the CAD. Second, the type of call (EMS, fire, other) was determined using the type code provided in the CAD data. "The Responder" July 2007 issue developed by the Chester County Department of Emergency Services provided the information used to determine the type of call. Medical calls all have a type code beginning either with an "A" for ALS (calls requiring a medic) or "B" for BLS (calls requiring an ambulance only). The remaining type codes are fire calls and abbreviate the type of call without a preceding letter. For example, a type code of "BRUSH" is a fire involving a bush, shrubs, leaves or trees, "HOUSE" is a fire involving a non-commercial structure, and "BARN" is a fire involving a barn.[2]

Response Time Analysis

The first step in the deployment analysis was a review of response times. Total response time is the time between an individual calling 911 and emergency service personnel arriving at the scene. Total response time can be broken down into multiple segments for analysis: call processing, dispatch, turnout, and travel time.

[2] "The Responder," Chester County Department of Emergency Services, July 2007: pg. 6.

The analysis of response times included incidents occurring from 2006 through 2007 as recorded in the CAD system. In some instances, there were invalid entries (e.g. they did not have a time recorded) or obvious errors (e.g. unit arrived before the call came in) that were excluded from the dataset. Finally, to eliminate outliers that would distort the response analysis, times that were more than three standard deviations from the mean were also eliminated. If response times have an approximately normal distribution, 99.7 percent of incidents are expected to fall within three standard deviations and the 0.3 percent of incidents that were excluded from the response time analysis likely contains errors.

The NFPA 1710 standard gives guidelines for response times of one minute for call processing/dispatch, one minute for turnout, and four minutes for travel. These are to be met at the 90th percentile level. However, the 1710 standard applies to career fire departments and not to volunteer departments such as those in Tredyffrin and Easttown Townships. The guidelines the NFPA established for volunteer departments (NFPA 1720) bases response standards upon population density. NFPA 1720 only shows the total response time and the number of personnel that should be assembled. Table 2 shows the NFPA 1720 response recommendations. Tredyffrin Township has 1,468 people per square mile and Easttown Township has 1,252 people per square mile according to the 2000 Census. Tredyffrin and Easttown Townships therefore both fall within the urban category which has a recommended total response of nine minutes with at least 15 personnel, 90 percent of the time.

Table 2: NFPA 1720 Recommended Staffing for Initial Response and Response Times

Demand Zone	Demographics	Staffing	Response Time (minutes)	Percentage of Responses	90th Percentile Tredyffrin & Easttown Response Time*
Urban	>1,000 people per square mile	15	9	90	11:08
Suburban	100-1,000 people per square mile	10	10	80	
Rural	< 500 people per square mile	6	14	80	
Remote	Travel distance > 8 miles	4	Not Available	90	

* Turnout time plus travel time

Call Processing and Dispatch Time – Call processing time includes recording the necessary information by a 911 call-taker when an individual calls 911, before the call is sent to a dispatcher. This is measured from the time the call is received to the time the call is transferred to a dispatcher. Dispatch time begins when the call is transferred from the call-taker to a dispatcher and continues until the units are alerted to respond. Many jurisdictions consider call

processing and dispatch together as a single time segment. It is important to note that Chester County E911 is responsible for handling the initial call and dispatch.

Although NFPA 1720 does not address it, call processing/dispatch should be completed in one minute at the 90th percentile (an NFPA 1710 recommendation). Overall, the average call processing time for Berwyn and Paoli units was 25 seconds with a 90th percentile time of 56 seconds, under the NFPA 1710 recommendation. 90th percentile call processing times have improved, from 57 seconds for 2006 to 55 seconds for 2007. Table 3 shows the breakdown of call processing times by call type. There is little variation when examined by call type; however, fire calls are slightly higher than EMS calls.

Table 3: Call Processing Times by Call Type, 2006–2007

Call Type	Average	90th Percentile
EMS (ALS)	00:22	00:54
EMS (BLS)	00:25	00:52
Fire	00:28	01:01

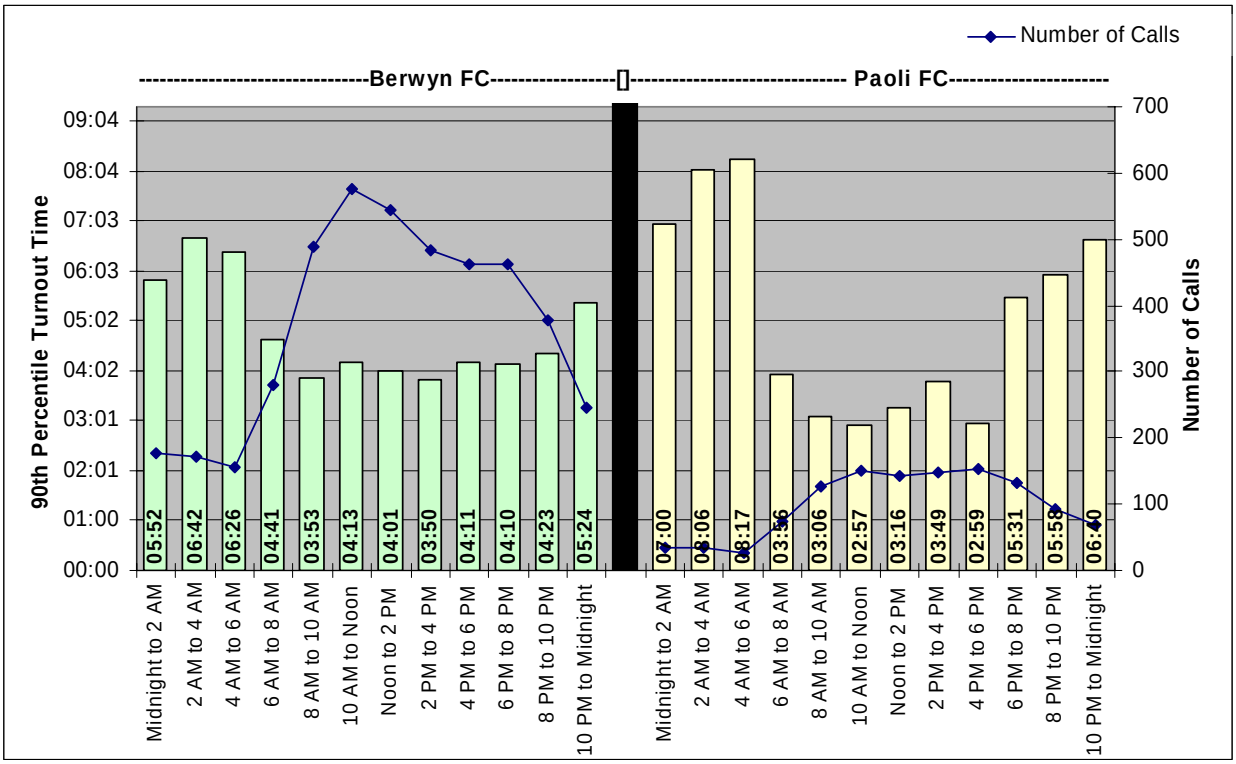
Turnout Time – Turnout is the time segment that begins when the alarm is received by operations personnel and extends until the apparatus commences driving to the incident scene. There is no set standard for volunteer department turnout times.

The average turnout time for incidents in Tredyffrin and Easttown Townships was 2 minutes, 52 seconds and the 90th percentile time was 4 minutes, 56 seconds. When examined by year, the average turnout time increased from 2 minutes, 47 seconds in 2006 to 2 minutes, 57 seconds in 2007. 90th percentile turnout times also increased during the period of 2006 to 2007 from 4 minutes, 44 seconds to 5 minutes, 6 seconds, respectively.

Turnout times also varied by time of day, as expected. The lowest turnout times were between 6 a.m. and 10 p.m. while the highest turnout times were during the overnight hours of 10 p.m. through 6 a.m. This variation is expected as fire and EMS personnel are typically asleep or at home during this time. Figure 1 shows the 90th percentile turnout time by station. Also depicted in the figure is the number of calls (represented by the blue line) showing the highest turnout times correlating with the lowest number of calls. The variations described are found at both stations.

High turnout times could be reduced by ensuring some personnel are at the station and available to respond, as well as ensuring CAD timestamps accurately reflect response time segments, and that all personnel are adequately trained in and following all response procedures from department policies.

Figure 1: 90th Percentile Turnout Time by Time of Day and Station, 2006–2007



Recommendation 1: Study and evaluate ways to reduce turnout times at both Berwyn Fire Company and Paoli Fire Company.

The turnout time segment is currently a significant interval in overall response times. Reducing this time segment would subsequently reduce the amount of time required to respond to an incident and ultimately improve the total response time. Fire company officers should look for ways to get the first unit en route as quickly as possible with a proper complement of personnel. This may include using a procedure of a "duty crew" at the station, which would provide this resource is always available for calls or it may include allowing certain "qualified" firefighters and officers to respond directly to the call from home or business to shorten turnout and response times. With 90th percentile turnout times in excess of 5 minutes during early morning hours, there is certainly room for improvement and Fire Companies leadership needs to re-examine response protocols.

Travel Time – Travel or drive time is the time required to drive from the station, or wherever the unit is located, to the scene of the incident. Station and apparatus placement have the biggest impact on travel time, although apparatus are not always in the station when dispatched. Additional factors influencing travel time include traffic, weather, traffic limiting devices (stop lights, speed bumps, etc.), and driver familiarity with the area. Traffic congestion and weather are beyond the fire companies' control; driver knowledge is not.

Overall travel times for both Berwyn and Paoli Fire Companies are good at the 90th percentile with times of 7 minutes, 56 seconds and 7 minutes, 26 seconds, respectively. Radnor Fire Company, which responds to a small section of Tredyffrin Township, also has reasonably good travel times at 9 minutes for the 90th percentile. Travel times have increased slightly over the past year at the 90th percentile from 7 minutes, 45 seconds in 2006 to 8 minutes in 2007, but both are still well under the recommended 9 minutes for the area.

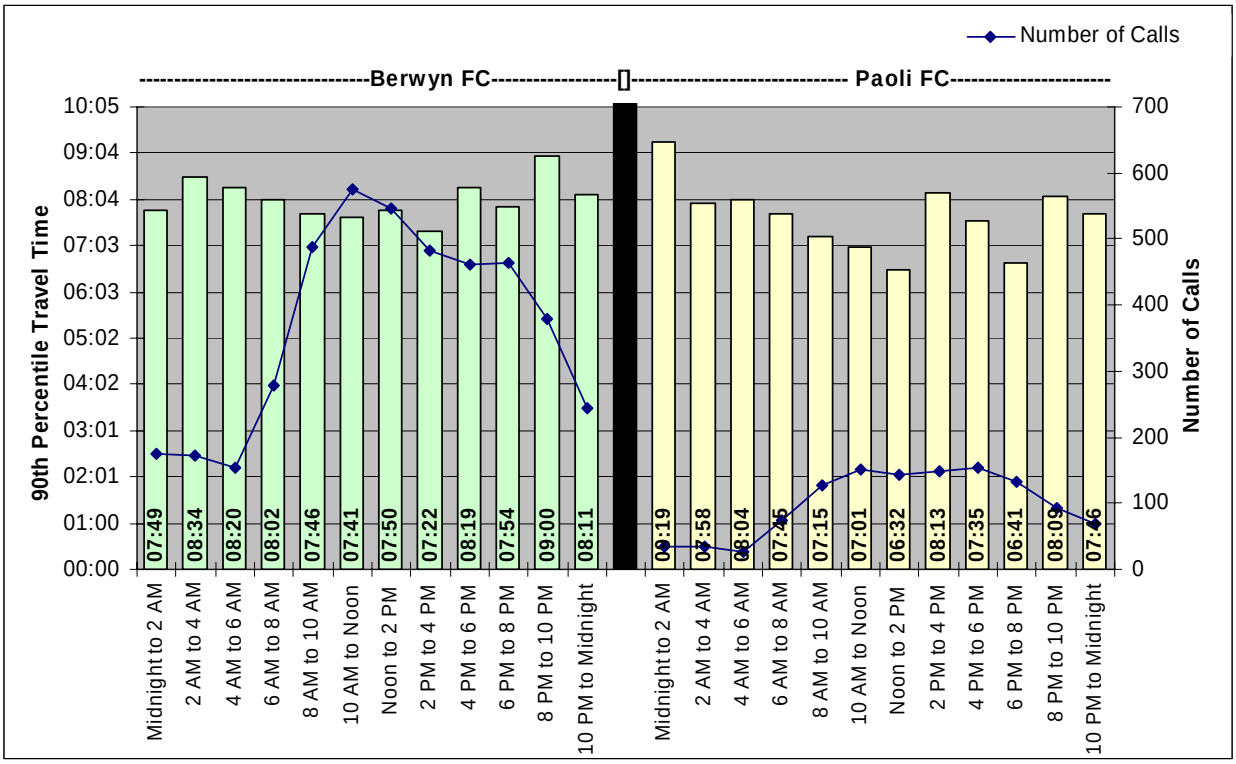
Variations in travel time were present when examined by call type—Medical ALS, Medical BLS, or fire. Table 4 shows the average and 90th percentile travel time for these call types. While fire calls had slightly higher travel times than medical calls, medical calls account for over 70 percent of all calls throughout the two townships keeping overall travel reach very good for the area.

Table 4: Average and 90th Percentile Travel Time by Call Type, 2006–2007

Call Type	Average	90th Percentile
Medical – ALS	04:30	07:50
Medical – BLS	04:21	07:44
Fire	04:37	07:59

When examined by time of day, variations in travel time are apparent. Travel times are highest from the late evening hours through early morning hours. However, in order to keep travel times as good as they are, it is recommended to maintain good overnight travel time coverage. This is illustrated in Figure 2 showing the 90th percentile travel time by time of day.

Figure 2: 90th Percentile Travel Time by Time of Day and Station, 2006–2007



Total Response Time – The total response time is the time between receipt of the emergency call and arrival of the responding unit to the scene of the incident. From a citizen's point of view, this is the amount of time elapsing from their initial request for service until that request is fulfilled by a fire or EMS unit arriving at the incident location. Table 5 shows the total response time overall and by year.

Table 5: Total Response Time Overall and by Year, 2006–2007

	Average	90th Percentile
Overall	07:50	11:45
2006	07:43	11:38
2007	07:57	11:53

Overall, the average total response time was 7 minutes, 50 seconds with a 90th percentile time of 11 minutes, 45 seconds. As shown previously in Table 2, the recommended response time for an urban volunteer area is 9 minutes at the 90th percentile. While this time is over that target, it can be significantly reduced by improving the turnout time segment as described above. Call processing and travel times are excellent when examined overall as well as by Fire Company. Addressing and reducing the turnout time at all stations can result in a significant change in the total response time and make the NFPA recommended benchmark of 9 minutes well within reach.

Station Location Analysis

This section examines station coverage and the placement of apparatus. The primary objective is to determine which areas, if any, need additional resources and how existing resources can be distributed to serve the townships more efficiently and accommodate the demand for service. The section begins with a review of the current demand patterns. This is followed by a discussion of response coverage and resource needs, with alternate deployment recommendations presented.

Maps are included to show theoretical travel time reach for the current station and apparatus locations. An accurate representation of the travel time reach is generally calculated based on the length of GIS road centerline segments and the posted speed limits. However, because of the unique Tredyffrin and Easttown geography, travel speeds were not assumed to be the posted speed limit. Instead, actual travel times from the CAD data were used to calculate average travel speeds, accounting for topography, narrow roads, congestion, and other limiting factors. In addition, barriers such as height and weight restrictions on bridges were included to ensure the most accurate coverage depiction.

Distance along the road network was calculated between each geocoded incident location and the station housing the responding unit. The distance and the travel time from the CAD unit record were used to compute the mean travel speed for each response. Travel speeds were then averaged for each station and applied to the road segments within the corresponding first due area. To maintain a conservative estimate of the coverage area from each station, no road segment was assigned a travel speed higher than the posted speed limit. The computed average travel speed was 28 miles per hour for Berwyn, Paoli, and Radnor Fire Companies.

Expected Population Growth

Population estimates for 2000 through 2030 are shown in Table 6. From 1990 to 2000, Tredyffrin had a net increase of 1,034 persons and Easttown had a net increase of 700 persons. The population is expected to grow at a slightly lower rate from 2000 to 2010. Overall, the two townships are expected to experience a steady growth rate over the next twenty years. The Chester County Planning Commission model projects a 9 percent increase from the 2000 population to 2020; and a 15 percent increase from the 2000 population by 2030.

Table 6: Population Growth, 1990–2030

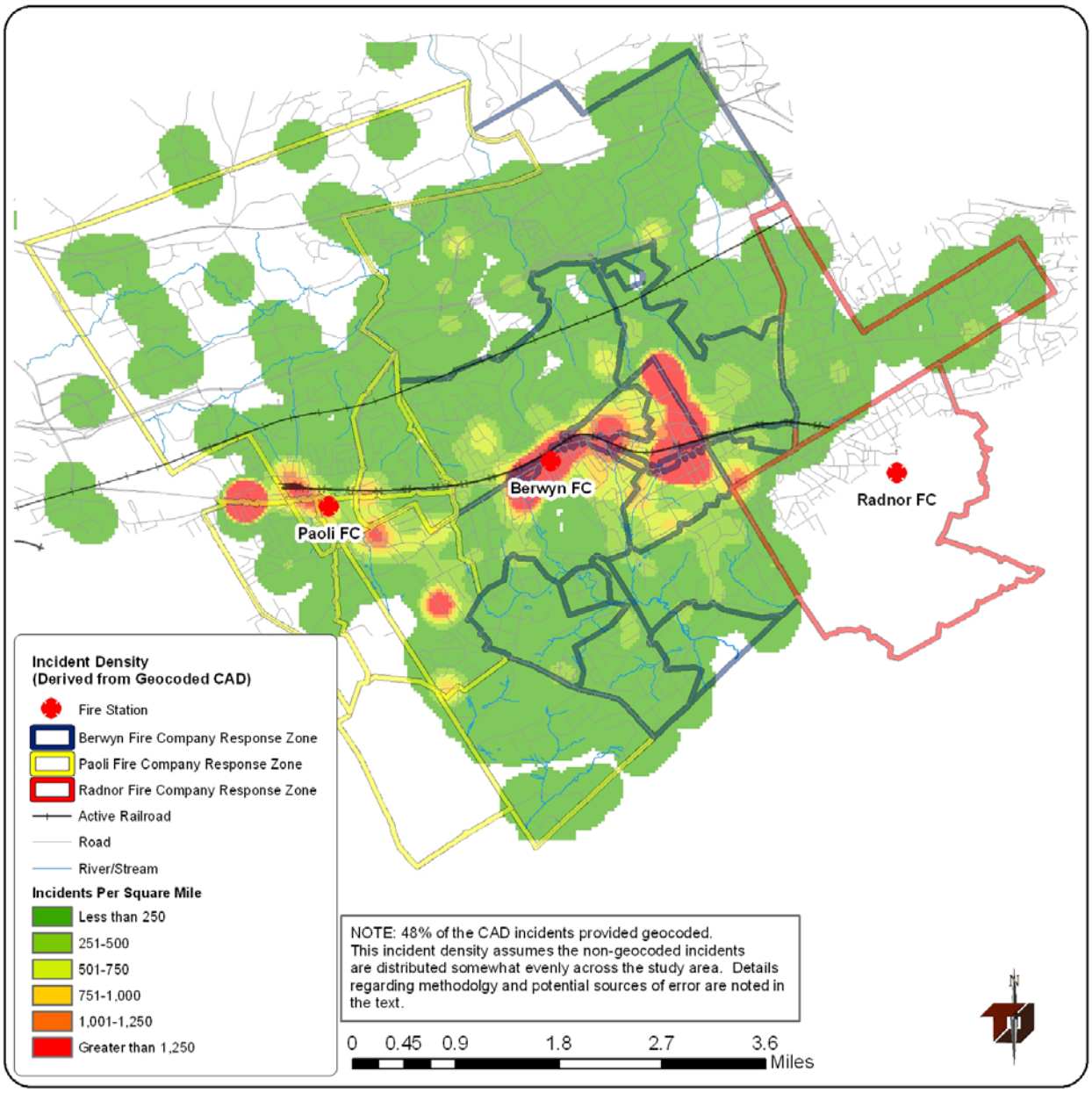
	Census		Chester County Planning Commission Projections		
	1990	**2000**	**2010**	**2020**	**2030**
Tredyffrin	28,028	29,062	29,440	30,920	32,630
Percent Change		*3.7%*	*1.3%*	*5.0%*	*5.5%*
Easttown	9,570	10,270	11,040	11,870	12,720
Percent Change		*7.3%*	*7.5%*	*7.5%*	*7.2%*
Tredyffrin/Easttown Region	37,598	39,332	40,480	42,790	45,350
Percent Change		*4.6%*	*2.9%*	*5.7%*	*6.0%*

Demand

The highest concentration of incidents is occurring around or near each fire company in the areas of higher population density. The current station locations provide excellent travel time reach (shown in Maps 3 through 6) to the majority of incidents within the high incident density areas. Map 1 shows the incident density for 2006 through 2007 calculated based on the geocoded CAD data.[3]

[3] The CAD data geocoded at 48%. The incident density assumes the non-geocoded incidents are distributed somewhat evenly across the study area.

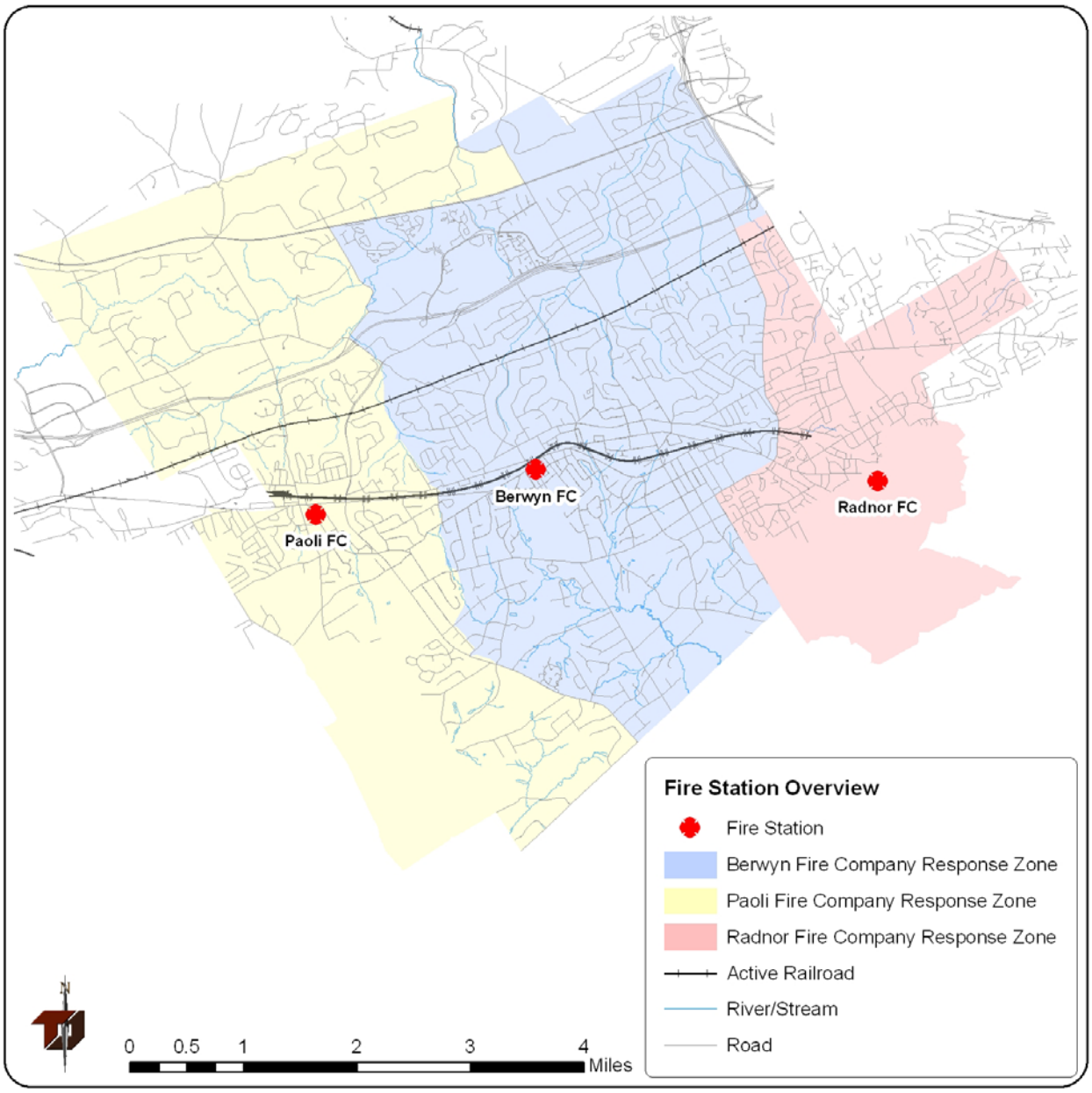
Map 1: Incident Density, 2006–2007



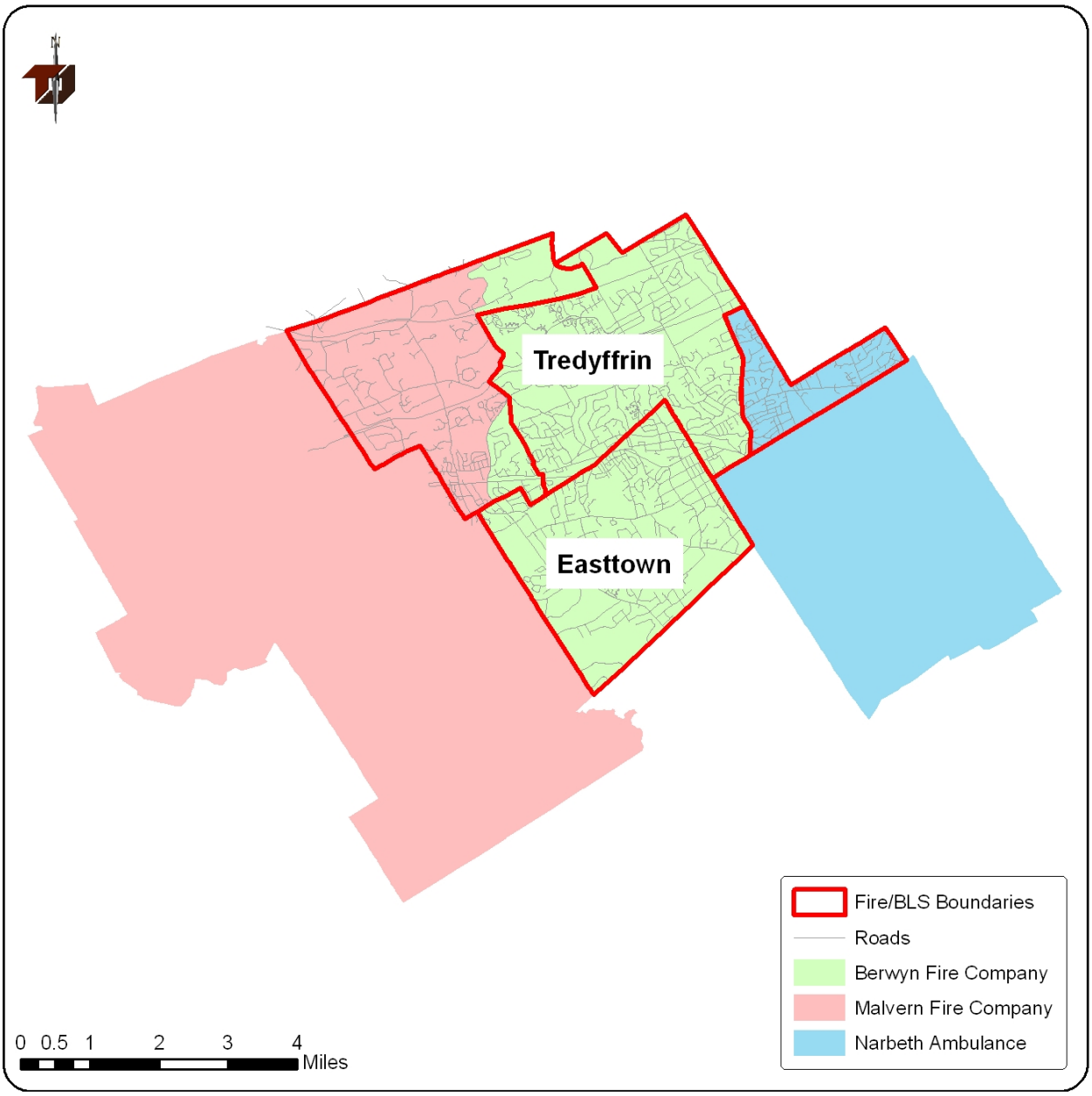
Geographic Operational Areas

Tredyffrin and Easttown Townships are covered by three fire companies well-distributed over the area. Berwyn Fire Company's (Chester County Station 2) is located centrally to both Townships. Paoli Fire Company's (Chester County Station 3) is located in the western-most portion of the Townships' area. Finally, Radnor Fire Company (Delaware County Station 15) has a small first due area in eastern Tredyffrin Township. Map 2 shows the current station locations with their respective first due areas. Map 3 shows the current ALS locations with their respective first due areas (note: included are areas surrounding Tredyffrin and Easttown).

Map 2: Overview of Fire Company Locations with First Due Areas



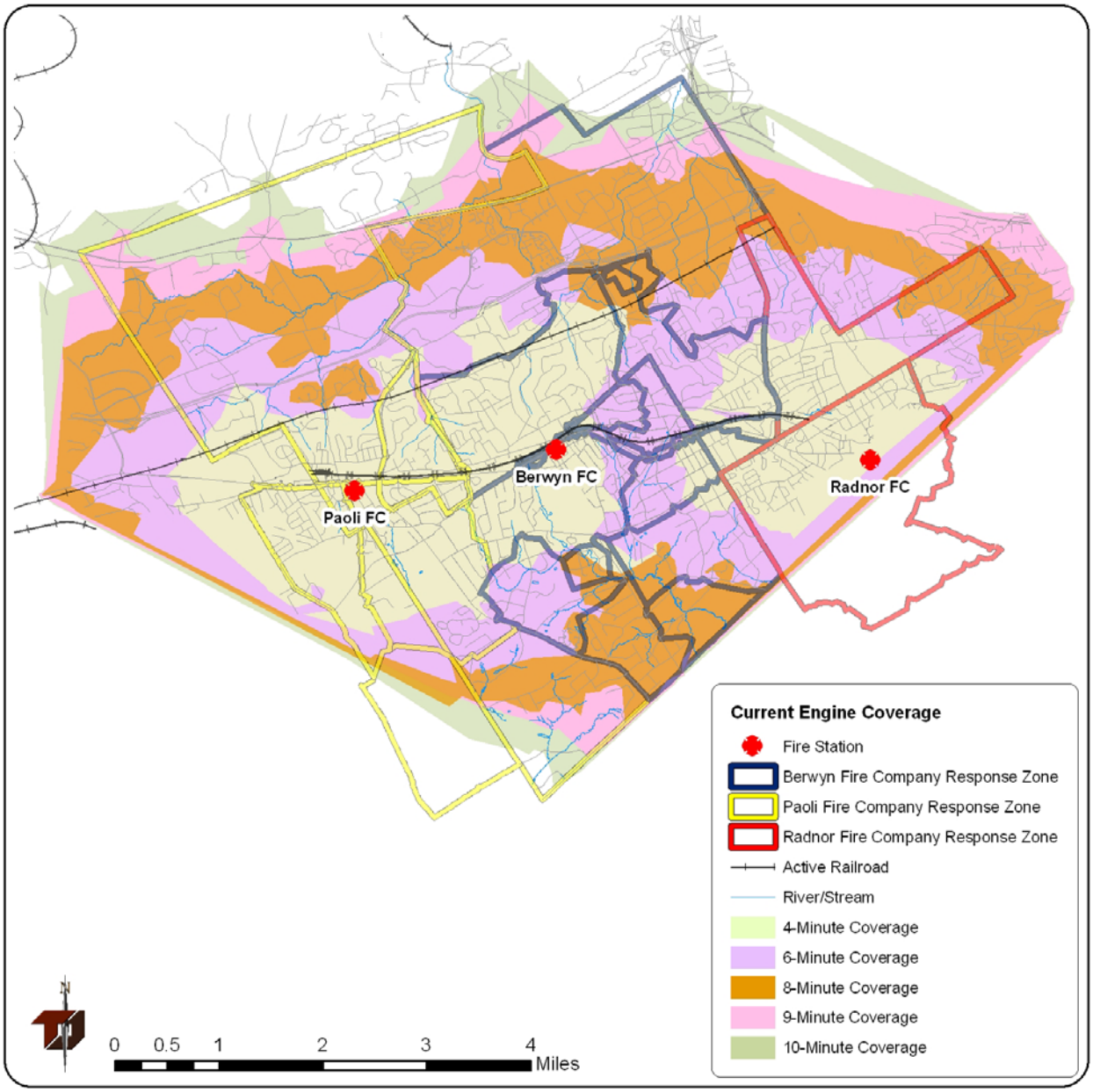
Map 3: ALS First Due Areas



Current ALS needs are served by Berwyn and Malvern Fire Company and Narbeth Ambulance. The service areas adequately cover the Tredyffrin and Easttown Townships. A potential future response need might be addressed by placing an additional ALS ambulance at the Paoli station if call volume increases significantly. Due to the current size of the Malvern Fire Company response area, there is the potential for this area to experience future ALS growth. This potential is probably several years away but planning and discussions should be ongoing to avert service delivery shortfalls even five to ten years out.

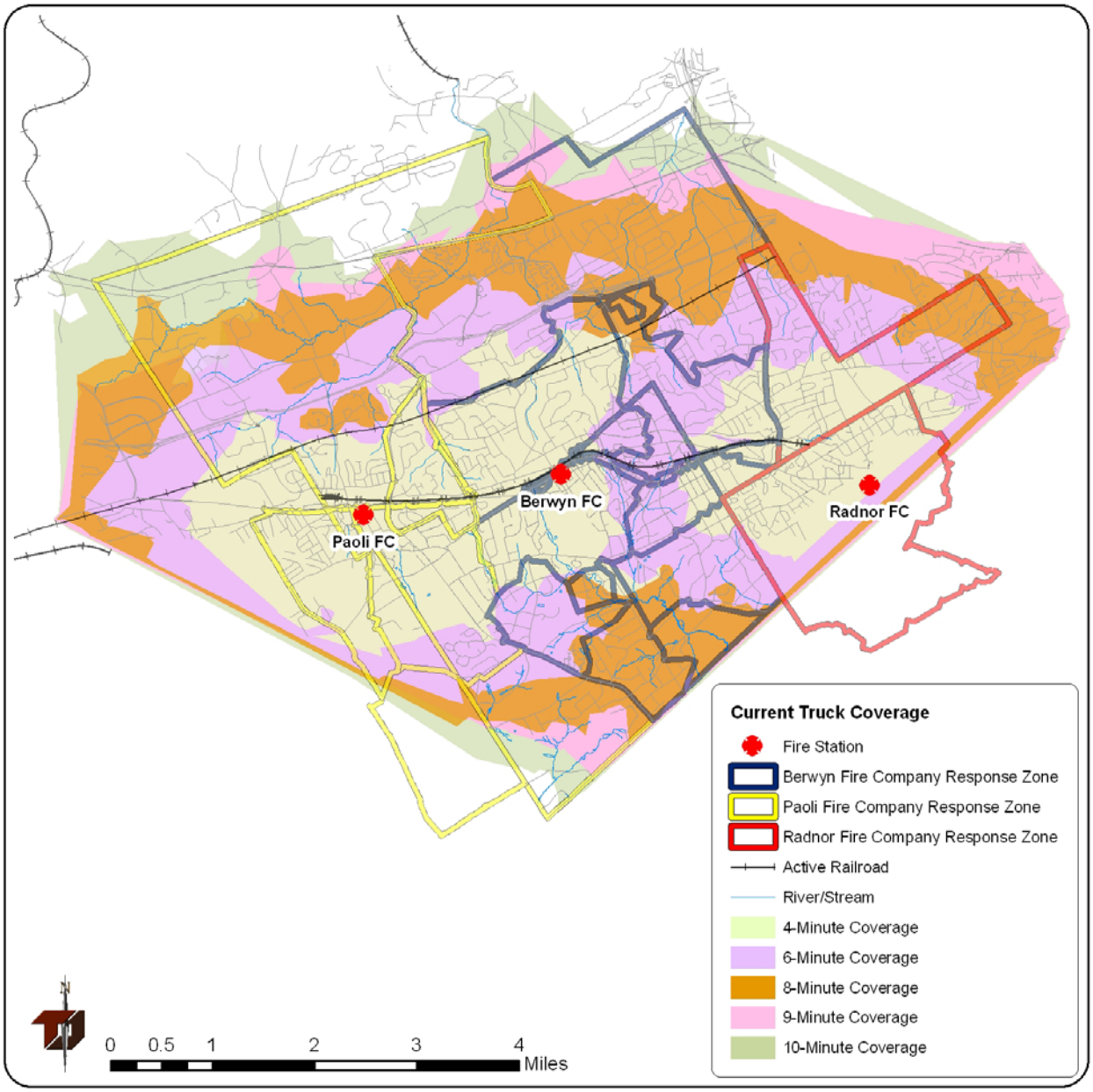
Map 4 shows the current theoretical engine coverage for both Tredyffrin and Easttown Townships as covered by Berwyn, Paoli, and Radnor Fire Companies. Given the total response standard of 9 minutes from NFPA 1720, both Township areas have adequate existing engine coverage.

Map 4: Current Engine Coverage



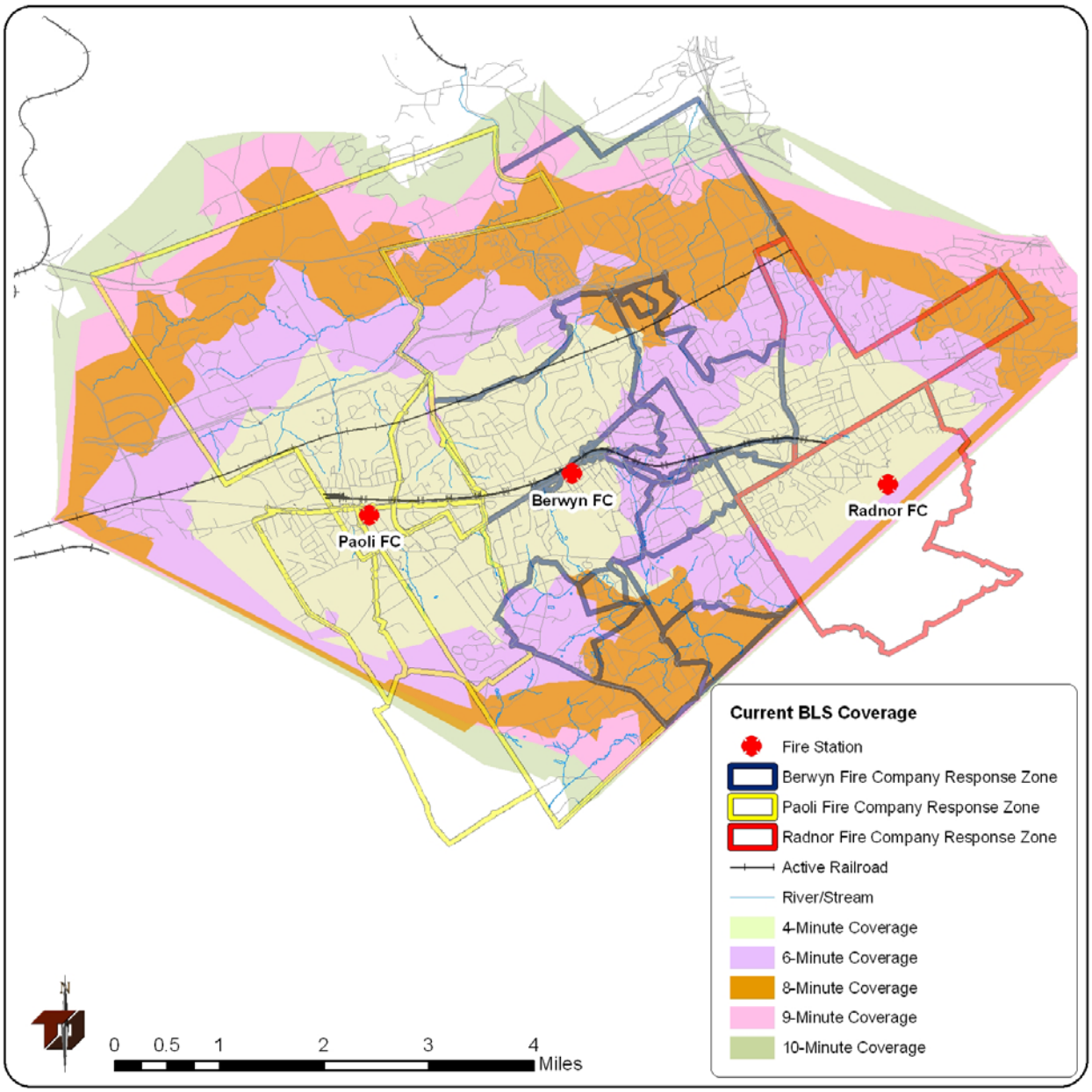
Map 5 shows the current theoretical truck coverage for both Tredyffrin and Easttown Townships as covered by Berwyn, Paoli, and Radnor Fire Companies. As with engine coverage, truck coverage is good for both township areas.

Map 5: Current Truck Coverage



Map 6 shows the theoretical coverage for BLS ambulances stationed in Tredyffrin and Easttown. BLS coverage is provided by all three fire companies—Berwyn, Paoli, and Radnor. ALS coverage is provided by Radnor Fire Company, Berwyn Fire Company, and Malvern Fire Company. BLS coverage is good for the township areas. ALS coverage is also acceptable per NFPA 1720 standards. However, EMS coverage should be monitored as demand patterns evolve. Over 70 percent of all incidents for both Tredyffrin and Easttown were EMS, and of those, over half were coded as an ALS-level call. As populations age nationally this call volume will continue to increase.

Map 6: Current BLS Ambulance Coverage



Summary

Overall, call processing and travel times are good for both Tredyffrin and Easttown Townships with the current fire company configuration. Turnout times should be examined closely to evaluate the need for additional in-house staffing or direct scene response by qualified personnel to reduce turnout time. Total response times are slightly over the recommended 1720 response time level of nine minutes; however, reducing turnout times should make this goal easily reachable. ALS and BLS ambulance service in the townships should also be evaluated annually to be sure response benchmarks are being met.

Geographically, the fire companies are well-located. A potential area to watch given the demand pattern is the area to the east of Berwyn Fire Company. Based on the current coverage analysis, there are not severe issues with the many bridges and overpasses in the area with height and/or weight restrictions. The current road network does not drastically affect the coverage for larger/heavier apparatus such as trucks and engines. However, as geographical and population characteristics evolve, re-evaluation of this issue will be needed.

III. EVALUATION OF OPERATIONS AND MANAGEMENT PROCEDURES AND BY-LAWS

This chapter examines the operations, management, and communications systems in place with the fire companies that serve Tredyffrin and Easttown Townships. The first section examines the fire and emergency medical services response profiles of the Berwyn and Paoli Fire Companies, which provide the bulk of emergency response to the townships. The operational guidelines of the two companies will be compared to guidelines set forth in the National Fire Protection Association Standard 1720, "Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations and Special Operations to the Public by Volunteer Fire Departments, 2001 Edition." The next section of the chapter addresses the organization and management structures in the Berwyn Fire Company, followed by a similar section focusing on the Paoli Fire Company. Finally, an overview of the communications systems in use by the Chester County Fire Companies will be presented. The radio system in use is a countywide system and not under direct township control. However, the radio system is the primary means of communications and decisions made by the county about the radio system affect fire/rescue operations in the Townships. Also, the age of the system limits the types and quantity of data that can be generated by the communications system.

As needed, specific recommendations for each company will be inserted in the text of this chapter. Additionally, strategic recommendations that would impact both companies and the townships will be included in the chapter.

Response Profiles and Staffing Levels

Each fire company determines the response complement to send on a call for service based on emergency type. Responding with the appropriate personnel and apparatus is necessary for effective fireground operations.

The number of firefighters needed per engine or truck company is a contentious subject in the fire service. The NFPA has much influence in this area, as does the International City/County Management Association. Staffing standards vary for volunteer and career fire departments, but the fundamental issues in determining unit staffing include:

1. The ability to start operations with the first arriving unit;
2. The ability to rapidly amass critical staffing for incidents of various sizes and types of hazards;
3. Productivity of a unit and the system of units, and, above all;
4. Firefighter safety.

NFPA Standard 1500, *Fire Department Occupational Safety and Health Program* says that "…a minimum acceptable fire company staffing level should be four members responding or arriving with each engine and each ladder company responding to any type of fire." NFPA 1710, which applies to career departments, also suggests that fire suppression units be staffed with a minimum of four personnel, while NFPA 1720, which outlines volunteer and combination operations, does not specify minimum staffing by piece of apparatus

While the staffing of the unit affects its efficiency, a more important criterion is how fast the total team can be assembled for a given incident regardless of the number of vehicles on which they ride. The *National Fire Protection Handbook, 18th Edition, Typical Initial Attack Response Capability Assuming Interior Attack and Operations Response Capability* (Table 10-2A), makes staffing recommendations based on the number of firefighters arriving on the scene of a fire depending upon the type of occupancy (low-, medium-, and high-hazard occupancy). The NFPA staffing recommendations by the type of hazard areas follows:

- **High-Hazard Occupancies** (schools, hospitals, nursing homes, explosive plants, refineries, high-rise buildings, and other high-risk or large fire potential occupancies) – At least four pumpers, two ladder trucks (or combination apparatus with equivalent capabilities), two chief officers, and other specialized apparatus as may be needed to cope with the combustible involved; not fewer than 24 firefighters and two chief officers.
- **Medium-Hazard Occupancies** (apartments, offices, mercantile and industrial occupancies not normally requiring extensive rescue or firefighting forces) – At least three pumpers, one ladder truck (or combination apparatus with equivalent capabilities), one chief officer, and other specialized apparatus as may be needed or available; not fewer than 16 firefighters and one chief officer.
- **Low-Hazard Occupancies** (one-, two-, or three-family dwellings and scattered small businesses and industrial occupancies) – At least two pumpers, one ladder truck (or combination apparatus with equivalent capabilities), one chief officer, and other specialized apparatus as may be needed or available; not fewer than 12 firefighters and one chief officer.

The recommendations and guidelines outlined in the *NFPA Handbook* should be carefully considered, but are not necessarily the final word as the NFPA guidelines do not address how fire departments will also be able to comply with the OSHA-mandated "Two-in/Two-out" rule (discussed below). Also, the NFPA guidelines do not address OSHA's requirement that a rapid intervention team (RIT) be on-scene at a working fire. Depending on local staffing levels, the number of firefighters responding may need to be increased by two or

three from the levels outlined in NFPA's guidelines if they are to meet OSHA regulations which are, in fact, legal requirements.

Table 7: Hazard Table

Low Hazard	Medium Hazard	High Hazard
• Comprised of 1, 2, or 3 family dwellings and scattered small businesses. • Response – 2 engines, 1 ladder, 1 command = 13 personnel	• Comprised of apartments, offices, mercantile, and light industrial • Response - 3 engines, 1 ladder, and 1 command = 17 personnel	• Comprised of schools, hospitals, nursing homes, heavy industrial, and high rises • Response – 4 engines, 2 ladders, 2 command = 25 personnel

Source: NFPA handbook 18th edition, table 10-2A

Recommendation 2: The Fire Companies should ensure that at least 13 personnel, plus 2 EMS personnel, are responding to any reported low hazard structural fire or emergency and upgrade the response to 17 or 25 personnel if needed. Since both Berwyn and Paoli fire companies are largely volunteer operations and number of responding volunteers will vary by time of day and day of the week, the Incident Commander should ensure that at least the number of personnel and equipment listed in Table 7 are responding on first alarm.

It is essential that all operations are completed safely, at any emergency scene. Technology has improved dramatically in the past several years, but the basic goal of firefighting is still to stabilize the incident, rescue anyone in danger, and extinguish the fire. This type of incident tasking requires emergency responders to operate in high risk environments. Thus, the safety and accountability of all suppression personnel is critical to a successful operation.

To protect the safety of firefighters, the United States Department of Labor and OSHA have enacted 29CFR1910.134, known as the two-in/two-out rule that requires 4 personnel on scene at all structure fires before initial interior attack begins as well as several other document provisions.

Recommendation 3: Ensure that operational policies establish 29CFR1910.134 compliance including fit and performance testing for SCBA, physical examinations for suppression personnel, and proper documentation of compliance.

Apparatus Complement

As shown on pages 4, 5, and 6 of this report, the following apparatus are housed at the respective fire companies.

Berwyn Fire Company Apparatus – The Berwyn Fire Company operates a variety of fire and emergency medical service (EMS) vehicles. Berwyn maintains and operates 3 engines (pumpers). These vehicles are designed to deliver water and personnel to extinguish fires and provide EMS services, and serve as the backbone of the fire company's response profile. One of

the pumpers also carries tools for the extrication of people trapped in motor vehicle accidents. All three pumpers are equipped with 1000 feet of large diameter hose for water supply. Each pumper carries 750 gallons of water on board for small fires or to allow structural fire fighting operations to commence before a water supply is established. Two of the three pumpers have pumps rated at 1500 gallons per minute (GPM) while the third is rated at 1250 gpm.

Berwyn also owns a ladder truck with an elevated platform. These types of trucks are called tower ladders. The tower ladder also has a pump and on board water tank although the tank is smaller than those on the pumpers and the tower does not carry large amounts of hose. The tower ladder can provide elevated stream delivery, and the platform is useful in rescues of people above the reach of the ground ladders that are carried on the truck. The platform can be extended to a height of 95 feet.

Berwyn carries technical rescue equipment on Rescue 2. This mobile tool box is stocked with everything necessary for confined space, high-angle, water, and trench rescue situations.

EMS services are provided in three ambulance vehicles that can deliver basic life support (BLS) or advanced life support (ALS). ALS is considered paramedic service that can provide certain drugs to a patient in the pre-hospital environment under the direction of a physician via radio communications. The vehicles are equipped almost identical. The level of care provided is a function of the training and certification of the crew on board at the time of the incident.

The Traffic Safety Unit provides support equipment and can be used as an adjunct for the fire police in motor vehicle traffic control. This vehicle is a modified sport utility vehicle. Berwyn's command vehicles also are modified sport utility vehicles that can be used as mobile command posts. These vehicles are equipped with multiple radios, maps and other materials to be used by the incident commanders in the direction and control of emergencies. One of the vehicles is assigned to the chief and the other by the duty officer, a position that rotates among several of the company officers.

Paoli Fire Company Apparatus – Paoli has a smaller apparatus fleet—eight vehicles as opposed to Berwyn's eleven. Paoli has two engines; one which carries extrication equipment for use on automobile accidents. The other pumper has a large (3000 gallons vs. 750 gallons) on-board water tank and is called a pumper-tanker. Both pumpers carry LDH, and the pumper-tanker is equipped with a compressed air foam system (CAFS). This type of foam has unique properties for pre-treating threatened structures and is the only unit equipped with this type of system we found in our review of the surrounding fire companies.

Paoli also has a tower ladder with a reach of 100 feet. Similar to Berwyn's tower this vehicle has as pump and a 300-gallon water tank.

Paoli Fire Company also operates a mini-pumper, a vehicle with a smaller water tank (260 gallons) and a lower pump capacity of 500 gallons per minute. This mini-pumper has 4-wheel drive and is designed for off road operations. The vehicle is very versatile in that it can go off road, on dirt roads, or in unplowed snow or other conditions where the size and weight of a full size engine would unable to go.

The traffic safety unit in service in Paoli is a modified pickup truck. Paoli has two command vehicles; both are modified sport utility vehicles. One of the command vehicles is assigned to the chief of the department and the other to the deputy chief.

One BLS ambulance rounds out the fleet of vehicles in Paoli.

Apparatus in Surrounding Jurisdictions and Company Cooperation

The equipment in service at Berwyn and Paoli is comparable to the rolling stock at Malvern, Radnor, East Whiteland, and the Valley Forge Fire Companies. There is modern, well-equipped fire apparatus available to support Berwyn and Paoli on large scale emergencies in the townships. This total interjurisdictional inventory includes: 16 pumpers, 4 pumper-tankers, 4 aerial ladders, 10 ambulances, 4 brush trucks, and 11 command vehicles, plus several support and utility vehicles.

The size of the response areas and the location and proximity of the stations (Paoli and Radnor are less than six miles apart and Berwyn is in between, for example) provide for very good placement of apparatus.

Using a township wide (Tredyffrin/Easttown) approach that included the two fire companies Berwyn and Paoli it would have a combined fleet of 5 pumpers (2 equipped with auto extrication equipment), 1 pumper-tanker, 2 aerial ladders, 4 command vehicles, 4 EMS transport vehicles (ambulances), 1 brush truck, and several support and utility vehicles would exist. This amount of equipment is adequate to provide NFPA compliant service to a community of this size. A single High Hazard (school) response would virtually use up all combined resources from this combined scenario. This includes equipment and personnel. See Table 7 for apparatus and personnel needed for this first alarm assignment.

Also of note is the idea that if the same population that these two companies protect was consolidated into a single fire department or fire district (though consolidation is not recommended in this report), some savings could likely be made in the joint acquisition, operation, insurance, and maintenance of the rolling stock by buying equipment in larger amounts and timing apparatus acquisitions to lessen peak and valley cycles. A joint apparatus replacement schedule, which can be implemented without consolidation, is included in Chapter

IV of this report, as well as discussion of other ways to save monies by interjurisdictional or state contract purchasing.

Berwyn Fire Company Organization and Management

Organization and management of the Berwyn Fire Company is primarily addressed through two sources—the Standard Operations Manual and the By-Laws. The Standard Operations Manual covers operational issues, and the By-Laws define the structure of the organization. The documents work together, with an appropriate amount of overlap where necessary.

Berwyn Fire Company Operating Procedures – Berwyn's Standard Operations Manual (SOM) is a large (189 pages) comprehensive document. The SOM has 11 major sections. They are:

1. General
2. Membership
3. Occupational Safety and Health Program
4. Standard Operating Guidelines (General)
5. Incident Command System (General)
6. Standard Operating Guidelines for Incidents
7. Training
8. Discipline and Awards
9. Computers
10. Public Fire Prevention Education
11. Appendix

The manual includes a log and record of changes and revisions and the effective date(s) of the changes.

The first two sections of Berwyn's SOM are General and Membership, respectively. The General section identifies the mission, values, and vision of the fire company. A brief profile of the company is included. The profile is a synopsis of the company the response area served, and the equipment that Berwyn uses. The administrative officers and their responsibilities are also included in the General Section.

The Membership section of the SOM establishes three levels of response personnel: Junior, Probationary, and Active.

Junior members are those members under age 18 and they are covered by certain tenets of Pennsylvania Child Labor Law. They must have working papers to participate in fire company activities.

Probationary members are new members over the age of 18. Probationary status is given until the member completes 6 months of service and completes the in-house training program. Training requirements are discussed further under Section 7 of the SOM.

Active members are those members who have completed their probationary time and the in-house training. Certain activity levels are required to maintain this status. Part of the activity is to maintain the active status to complete the continuing education program conducted by the company. These requirements include:

- Hazardous Materials Operations Level
- Cardio-Pulmonary Resuscitation (CPR) and Automatic External Defibrillator (AED)
- Bloodborne Pathogens
- Annual Competency/Mandatory Skills Training (MAST)

The requirements will be described in more detail in Section 7.

The third section of the SOM is the Occupational Safety and Health Program. This section establishes the health and safety for the Berwyn Fire Company. This is in keeping with the guidelines put forth in the National Fire Prevention Association Standard 1720.[4] NFPA 1720 cross-references NFPA 1500 and 1521.[5] The safety program also covers record keeping, training, and education concerning safe operating practices, on vehicles and safe operating practices with departmental equipment such as self-contained breathing apparatus and life safety ropes. This section requires the use of seat belts at all times while on Berwyn Fire Department apparatus. This is a progressive element because approximately 25 percent of all firefighter line of duty deaths nation-wide are the result of fire department vehicle accidents.

Scene safety is again addressed in this section with the requirement of a 2-in-2-out system of operations. This requirement, based on Federal Occupational Safety & Health statutes, calls for a two-person back up team to be in place whenever a two-person fire attack team enters a burning structure.[6]

[4] NFPA 1720 Standard for Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations and Special Operations to the Public by Volunteer Fire Departments 2001 Edition. Chapter 5.
[5] NFPA 1500 Standard on Fire Department Occupational Health and Safety Program. NFPA 1521 Standard for Fire Safety Officer.
[6] Code of Federal Regulations 1910.134 Respiratory Protection Standard.

Section 3 concludes with a bloodborne pathogen protection program. This program is designed to limit the possibility of a fire department member from being exposed to various illness or conditions, such as AIDS or Hepatitis, which may confront the employee in the performance of their duties.

Section 4 of the OSM addresses standard operating procedures for the receipt of alarms, response to and returning from alarms, pre-arrival and post-arrival actions at various emergency scenes, and the preservation of evidence should the situation so require.

This section also addresses specific tactical actions such as the deployment of ladders, use of thermal imagining equipment, and emergency operations on the Pennsylvania Turnpike. The section concludes with funeral procedures for members or friends of the department.

The fifth section of the SOM regards the Incident Command System. Incident command systems are used for the command and control of operations. This section is up to date in the application of the federal mandates for incident management structures. For several years Federal OSHA standards have required the use of incident management systems on hazardous materials releases.[7] More recently, the Department of Homeland Security created the National Incident Management System (NIMS) to be used on all types of events. In order for public safety agencies to receive federal homeland security grants the implementation of this system is required.[8]

The Berwyn Fire Companies SOM complies with the intent of the regulations with minor discrepancies. For example, the term "Sector" was discontinued with the adoption of NIMS over former models.

Recommendation 4: Edit Sections 5.6 and 5.15 of the SOM to reflect current vocabulary of the National Incident Management System.

The fifth section also provides guidance for operations with several support agencies such as the Chester County Fire Marshall, County Coroner, and the American Red Cross. Other issues including the deployment of resources, command post operations, and radio procedures are covered in this section.

Section 6 of the SOM addresses specific hazards, risks, and situations that typically arise in the course of fire department activities. The hazards include automatic fire alarms, structure fires in buildings with or without sprinkler systems, natural gas leaks, motor vehicle accidents, helicopter operations, automobile and truck fires, ground cover fires and other risks. The section

[7] Code of Federal Regulations 1920.120
[8] Homeland Security Presidential Directive #5, 2003

also addresses hazardous material incidents and specialized rescue situations such as collapsed building and excavations.

Section 7 addresses training for the members of the Berwyn Fire Company. Training is the core of the modern fire department. There are increasing federal mandates via OSHA, EPA, and the Department of Homeland Security, as well as more demanding consensus standards from the NFPA that require fire department members to be trained and to maintain training in specific areas.

The effort necessary to maintain a well-trained fire department is considerable. There are many areas that require annual or biannual training and certification of members. These topics are part of the training that Berwyn members must take to complete probationary status and to maintain active member status. These are found in section 7.3 of the SOM. In addition, in the Appendix to the SOM there is a description of annual fire fighter competency and mandatory skills demonstration. This is an excellent concept and should be continued.

The record keeping and administration of the training records is a vital task. The person in charge of training must be a skilled administrator as well as being a skilled teacher. Section 7.2 of the SOM identifies the duties of the training officer. While the listing of duties is thorough, there is only one item, 7.2.2.17 that addresses the qualifications of the training officer. Section 7.2.2.17 calls for the training officer to, "Attend outside training programs as needed to develop skills as a fire service training instructor."[9] This clause does not go far enough in establishing the qualifications for a departmental training officer. The SOM should be amended with the following recommendation.

Recommendation 5: Training officers should complete a fire service instructor training program that meets or exceeds the criteria found in NFPA 1041 Standard for Fire Service Instructor Professional Qualifications.

Section 8 of the SOM identifies disciplinary procedures and the requirements for receiving various types of annual awards.

The Berwyn Fire Company has a structure that enables the fire chief to temporarily suspend members. This allows the chief to manage any acts of "gross insubordination" or a "gross infraction of the Berwyn Fire Company By-Laws or SOM on the fire ground."[10] The suspended member can be compelled to leave if necessary. The Chief has to notify the President of the Company in writing following this type of suspension. The section also defines the means

[9] Berwyn Fire Company, Standard Operations Manual page 149.
[10] Berwyn Fire Company, Standard Operations Manual section 8.1.2 page 158

to handle less urgent issues. In addition, section 8.3 describes how complaints and disputes between members can be addressed.[11]

The remainder of the section describes two categories of awards granted by the Berwyn Fire Company. The first is the "member of the year." The second group is activity awards based on the number of responses. There is a top fire responder, top EMS responder, top driver, top fire police, and top training hours for fire and EMS.

Section 9 is a brief (one page) section that sets guidance for the use of Berwyn Fire Company-owned computers in the station. The guidance provides penalties for unauthorized usage or modifications to the hardware or software.

Section 10 defines the Public Fire Prevention and Education of the Berwyn Fire Company. The section describes what topics, age groups, and materials should be used for the varied audiences. This section also addresses uniform policy and demeanor at public events such as parades and musters.

The last section is the appendix. The appendix elaborates on multiple topics from other sections of the SOM. In some cases, forms that are needed such as an Employee Exposure Form is used in the case of a bloodborne pathogen exposure or suspected exposure. The annual fire fighter competency and Mandatory Annual Skills Maintenance (MAST) program are listed here. The Appendix has a heading for an Annual Drivers Competency program although the page is blank.

Recommendation 6: Amend the appendix of the SOM to include an annual skills maintenance program for apparatus operators.

There are several sections that address specific hazards and response modes. These are additions to the items covered in Section 6.

Berwyn Fire Company By-Laws – The By-Laws of the Berwyn Fire Company are structured into 12 Articles. They provide the organizational framework of the Berwyn Fire Company. In comparison, the SOM provides operational guidance.

The Articles spell out such necessary items as the legal framework and fiscal year (Article I). Article II identifies the elected officers of the company and the terms of office. Article III defines duties of the elected officers. An interesting feature of the description of duties of the president, vice president, recording secretary, finical secretary, and the treasurer is that all are required to be bonded to the amount of $250,000.

[11] Ibid

Article III, in addition to the duties and requirements of the abovementioned positions, also lists the duties of the director of Facilities, members of the Board of Directors, and the administrative duties of the fire chief. The duties of the assistant chief(s), ambulance captain, fire police captain and the business members and ambulance-only members are also described.

Article IV solely regards memberships. It provides great depth and detail on all forms of memberships available. Article V describes the process for the election of officers. Article VI delineates the application and acceptance process for new members, expulsion from the Berwyn Fire Company and any other form beyond what is described in Section 8 of the SOM.

Articles VII and VIII establish membership dues and the conduct of meetings.

Article IX establishes the budget process. The article includes the formulation, approval, and execution of the budget, as well as procedures for budgeted and unbudgeted expenses. The financial structures and controls are through and represent a business-like approach to the fiscal management of the company.

Article XI identifies the functions and composition of the two standing committees of the Berwyn Fire Company. The first committee is the finance committee. This committee is charged with assisting the Treasurer with the development of the budget. The second committee is the investigations committee. The investigations committee monitors and interprets the By-Laws and makes suggestion for amendments as needed.

Article XII establishes the roles, composition, and authority of the Management Board. The Management Board is an elected body that approves the proposed budget and unbudgeted expenses.

Overall, the By-Laws and SOM provide well for the business and operational needs of the Berwyn Fire Company. The By-Laws are a solid professional approach to the financial management of the company, with checks and balances, and shared power and responsibility. The SOM is comprehensive with the exceptions noted in the recommendations listed.

One area that is understated is the qualifications for line officers. The Chief is elected. The only requirement is that, "the nominee(s) for fire Chief must be selected from the body of active members."[12] The elected Chief appoints the Assistant Chief(s). To enhance the position of Chief and Assistant Chief we recommend the following.

[12] Berwyn Fire Company By-Laws, Article III, Sec. 9

Recommendation 7: Amend the Berwyn Fire Company By-Laws to add minimal qualifications of chief officers. In addition to the current requirements, candidates for Fire Chief or any chief-level officer should require they demonstrate training and/or experience equivalent to the requirements in NFPA 1021 Standard for Fire Officer Professional Qualifications, 2003 Edition.

The proposed level establishes a minimum of Fire Officer II as found in the standard. Any other line officer should meet the requirements of Fire Officer I.

Paoli Fire Company Organization and Management

The Paoli Fire Company has a similar organizational structure when compared to Berwyn Fire Company. There are separate Recommended Operating Procedures and By-Laws documents. Paoli's Recommended Operating Procedures also include information for the company's paid employees.

Paoli Fire Company Operating Procedures – The first 15 pages of the Employee Handbook and Operating Procedures are a manual for paid fire fighters who supplement the volunteers. While not extensive, the subjects addressed are employee and employer relations. This portion of the Handbook addresses issues and circumstances that may arise during the normal course of employment. The Manual addresses Equal Opportunity and Immigration Law Compliance, timekeeping, family leave, and compliance with HIPPA, safety and termination of employment.

The Recommended Operating Procedures (ROP) is the third section of the Manual. The ROP was originally prepared in 1973. Revisions to certain sections were completed in 1994, 2002 and 2007.

The ROP is subdivided into eight articles and an appendix. The articles are listed as:

1. New Members
2. Fire Station Rules and Regulations
3. Response to Alarms
4. Use and Operation of Equipment
5. Company Personal Property
6. Responsibilities of Officers
7. Communications
8. Training
9. Appendix

The New Members section (Article I) provides information for prospective and new members of the Paoli Fire Company. The types of membership and the qualifications for membership are identified in the By-Laws. A description of the types of memberships will be covered when the By-Laws are examined.

The ROP gives new members instructions on the acquisition of various types of gear and property such as pagers and keys to the station. The new member is required to become familiar with company policy and procedures and complete a Fire Fighter 1 course within one year.

The second article defines general rules and regulation for conduct in and around the fire station in non-emergency conditions.

The third article of the ROM concerns general procedures for response to various types of alarms. The nine sections of this article provide direction and identify responsibilities of members and officers prior to departing the station, en route to the emergency, at the scene of the emergency, returning from the emergency, and preparing fire and EMS apparatus for service. A very positive feature of this section is the requirement found in Section 2.4 for seat belt use. If every fire company in the United States adopted and enforced this policy there would be fewer fire fighter fatalities every year.

The responsibilities and duties of the Ambulance Captain and response with non-Paoli medical units are identified in Section 7.4 of this article. Section 8 of Article 2 lists varied types of alarms and the order of response of apparatus.

Article 4 addresses the use and operation of Apparatus and Equipment. Section 1 of this article establishes staffing minimums and maximums, and defines the qualifications for the crews of the primary engines and tower.

Section 1.8 of Article 4 presents guidance that limits personnel from entering a building without a charged (ready for service) hose line or respiratory equipment. An exception (1.8b) prohibits, “Fire fighters from entering a building alone unless such actions can save a life.” While not referencing NFPA 1500 or CFR 1910.134 (OSHA Respiratory Protection statutes), this is similar to the “2 in-2 out” requirements of OSHA.

Section 1 of Article 4 concludes with a description of hose line usage, ladder procedures and tower ladder placement. Section 2 of the Article addresses procedures for the non-emergency use of Paoli Fire Company equipment. Routine maintenance is the topic of Section 3. Section 4 provides criteria for driving or operating department vehicles. Essentially, all that is required to operate equipment is the approval of the Chief, the appropriate motor vehicle operator’s permit from the State and an Emergency Vehicle Operator Class (EVOC). Section 8 of the Appendix is referenced to provide more details.

Recommendation 8: In addition to the criteria listed for driver qualifications, each driver should demonstrate mastery of the skills and knowledge provided in NFPA Standard 1002 Standard for Fire Apparatus Driver/Operator Professional Qualifications (2003 Edition).

Article 5 is subdivided into three sections and covers turnout gear, dress uniforms, and pagers. The turnout gear portion lists requirements for use and for the cleaning and maintenance The Paoli Fire Company station is equipped with appropriate machines to clean and dry the personal protective gear.

Section 2 of this article discusses the use and composition of the Paoli Fire Company dress uniform. Company pagers are issued to active members.

The Responsibilities of Officers is the title of the Article 6. Article 6 is subdivided into five sections. The first section establishes the chain-of-command for the Paoli Fire Company. The second section covers fireground (operational) duties of Officers. This section establishes procedures such as size-up, initial placement of apparatus, and communicating this information via the radio. This section calls for the command officers to provide management of the incident through the line officers by completing such tasks as ventilation, rescue and fire attack. While this section resembles some elements of the National Incident Management System (NIMS), it is incomplete.

Recommendation 9: The Paoli Fire Company should adopt the NIMS and amend the ROP accordingly.

The Company should train its officers and personnel to the meet the criteria found in NFPA 1561, Standard on Emergency Services Incident Management Systems, 2008 edition.

The Paoli Fire Company has embraced the forerunner to NIMS, the Incident Command System to comply with Federal regulations regarding responses to releases of hazardous materials.[13]

Section 4 of Article 6 refers to the "Point System" to determine and maintain Active Member status. Section 3 of the Appendix also addresses this topic.

Section 5 provides a basis for discipline of the members of the company. The Chief is empowered to suspend members from the fireground if needed. The By-Laws in Article XII provide greater detail on maintaining discipline in the company.

[13] OSHA regulation CFR 1910.120. (q) Requires the use of ICS for Hazardous Materials releases.

Article 7 concerns the radio system in use by the Paoli Fire Company. The four sections of the article define and describe the purpose of the system, radio usage, verbal messaging (the Paoli Fire Company has partial compliance with NIMS in that use of "10-Codes is prohibited) and radio designations for the Paoli Fire Company units.

Training is the topic of Article 8. Company drills are the responsibility of the Training Officer. The position of Training Officer is not specifically described or identified in either the ROM or the By-Laws. The By-Laws reference Service Officers as the Chief, Deputy Chief, Assistant Chief, Lieutenants, and other such assistants deemed necessary by the Chief."[14] As training is a major function of today's fire service we recommend the establishment of a designated Training Officer.

Recommendation 10: Training officers for the Paoli Fire Company should complete a fire service instructor training program that meets or exceeds the criteria found in NFPA 1041 Standard for Fire Service Instructor Professional Qualifications.

The training officer would be responsible for establishing training programs and maintaining records to show compliance with the various training requirement for such topics as respiratory protection, blood borne pathogen protection, Hazardous Materials, and any other topics also deemed to be necessary.

Recommendation 11: The Paoli Fire Company should establish a Training Program that tracks and documents all of the federally required training areas such as hazardous materials, bloodborne pathogens, and respiratory protection.

The appendix consists of 10 sections and addresses the following topics:

1. Grooming
2. Station Rules
3. Point System
4. Line officer Responsibility and Safety Officer
5. Uniform Policy
6. Infection Control Program
7. Personal Accountability Guidelines
8. Motor Vehicle Operations
9. Alcohol and CDS Polices
10. Hazardous Material Response.

[14] Article VI By-Laws of the Paoli Fire Company. Section 4.

The grooming regulations are based on a need for a tight-fitting seal on Self-Contained Breathing Apparatus (SCBA). This policy is consistent with Federal OSHA regulations regarding respiratory protection. CFR 1910.1349(g)(1)(i)a states, "the employer (in this case the Paoli Fire Company) shall not permit respirators with tight-fitting face pieces (SCBA) to be worn by employees (the members of the Paoli Fire Company) who have facial hair that comes between the sealing surface of the face piece and the face or that interferes with valve function."[15]

The second section of the appendix regards basic rules and regulations for conduct in the station. Although this appendix was adopted in 1973, it remains valid today.

Section 3 of the Appendix describes the "point system." The point system is used to maintain active members' status and is a reward and retention system to attempt to keep and motivate volunteers. Points are awarded to members on the member's participation in such activities as fire and EMS calls, drills, work details, meetings, etc. A higher point value is assigned for emergency calls between the hours of midnight and 7 AM. Under this system, there will be a member with the most points at the end of the calendar year. This person is the Top Responder Fire and Top Responder EMS. To maintain Active Member status every other member must have at least 25 percent of the Top Member's total points. In addition to maintaining active member status, there are cash awards based on the participation above the 25 percent threshold.

Line officer and safety officer responsibilities are identified in Section 4 of the Appendix. The 6 paragraphs about line officer responsibilities are rather theoretical and do not address specific situations. This section is a discussion about decision-making. The Safety officer section is similar in that it appears to be a preamble to a job description for a safety officer.

Recommendation 12: The Paoli Fire Company should develop an Occupational Safety and Health program that meets or exceeds the standards set in NFPA 1500 2007 Edition.

As part of this program a designated Safety Officer should be added to the cadre of line officers. The ROM and or By-Laws should be amended to reflect this change.

The proper placement of Paoli Fire Company patches and flags on the uniform is addressed on Section 5 of the appendix.

Section 6 is Paoli Fire Company infection control program. The appendix has one sentence, "Refer to NFPA Standard 1581." While the NFPA Standard does provide benchmarks and programs, The Paoli Fire Company should do more than reference another document to implement the program.

[15] Code of Federal Regulations 1910.134

Recommendation 13: As part of the development of an Occupational Safety and Health Program, an Infectious Disease Control Program under the direction of the Safety Officer identified above should be established.

This program should meet or exceeds the standard presented in NFPA 1581, 2005 Edition.

The Personnel Accountability Guidelines system is the topic of Section 7 of the Appendix. The system described is versatile and is in recommend by the Main Line Chiefs Association.

Section 8 provides additional guidance on driving and operating EMS and fire apparatus. This appendix deals with the legal requirements for driving, including the member's responsibilities for maintaining a valid operating permit and the notifications required if that status changes, as listed. The company policy for ensuring a vehicle is ready for service when it returns to the station is also included in this section.

Section 9 is the Paoli Fire Company policy on alcohol consumption and Controlled Dangerous Substances. The guidelines are strict, to the point, and represent a firm policy. Enforcement of this policy helps ensure a drug-free unimpaired workplace.

The last section of the Appendix regards Hazardous Materials responses. Paoli Fire Company members are trained to either the Awareness or Operations Level. This section establishes company to ensure compliance with CFR 1910.120(q)

Paoli Fire Company By-Laws – The Paoli Fire Company's By-Laws were last revised in 2007. The By-Laws are a 20 page single-sided document subdivided into 22 Articles. In similar fashion to the By-Laws at Berwyn, Paoli Fire Company By-Laws are the constitution of the company. The ROM addresses operational situations and policies while the By-Laws are the framework for the Company.

The first two articles are routine explanations of the purpose, name, mission and seal of the fire company. Article III defines the six classes of membership. The classifications are:

- Active Member
- Active Associate Member
- Administrative Member
- Contributing Member
- Honorary Life Member
- Honorary Member

Active members include the service officers (to be defined in Article VIII) and the emergency responders that maintain 25 percent of the point system. The Chief can determine the number of active members.

An Active Associate Member is an Active Member that cannot make the 25 percent threshold established in the Point System. As with Active Members, Associate Member status is at the discretion of the Chief.

Administrative Members are those members that are elected to the Board of Directors or appointed by the President of the company to an executive committee. This status can be held along with either Active or Active Associate membership status.

Contributing Members do not vote or respond to emergencies and support the company by paying dues.

After 20 years of service in Active, Active Associate, or Administrative categories of membership, a member is granted Honorary Life Membership status. The Company may grant Honorary Membership to anyone for a time period of one year as a means to acknowledge a special contribution to the company. This level of membership has no voting privileges.

Article IV defines the qualifications for active membership. The process for joining the Paoli Fire Company is also defined. If accepted by a vote of the membership, the new member is placed on probationary status for six months. This Article defines the steps for either dismissal or retention in Active Member status.

The next Article (V) lists the qualifications for the other types of memberships. These are the memberships listed in Article III.

The administrative organization is defined in Article VI. There is an elected Board of Directors with nine members. There are five Executive Officers that also serve on the Board. They are the president, vice president, secretary, treasurer, and chief. These officers manage the business of the Paoli Fire Company. The Service Officers are the line officers that are supervisors for operational matters. Service Officers are:

- Chief
- Deputy Chief
- Assistant Chief
- Chief Engineer
- Deputy Engineer
- Captain

- Captain of the Ambulance
- Captain of the Fire Police.
- Lieutenants or other positions as deemed necessary by the Chief.

There is a provision restricting members to only holding no more than one Executive and Service Officer position. (Section 5 of Article VI)

Article VII spells out the duties of the Officers and Directors of the Company. There are structures that establish protocols for record keeping, financial management, meeting attendance, and the replacement of Board members for failure to attend meetings.

The duties of the Service Officers are described in Article VIII. The Chief is an elected position and the Chief appoints the rest of the positions. There are no qualifications identified for the Service Officers.

Articles IX and X establishes the process of nominating candidates and the election of Board members, Service Members and Executive Officers. The qualifications to run for office are not well-defined. Section 2 of this article states, " the nominating committee shall prepare a list of nominees after giving due consideration to the qualifications of the persons they propose to nominate…these selections, along with a brief resume of each nominee unknown to the membership shall be posted on the company bulletin board."[16] The only qualification for Chief is also found in this section: "No one may be nominated for Chief unless he has served for two years preceding the nomination."[17]

Recommendation 14: The Paoli Fire Company should establish minimal position descriptions for the Executive Officers and Board Members.

These positions should be task-oriented and reflect the nature of the position.

For example, for the financial position, Treasurer, the nominee should demonstrate experience in the development and execution of budgets.

Recommendation 15: Amend the Paoli Fire Company By-Laws regarding minimal qualifications of Chief Officers. In addition to the current requirements, candidates for Fire Chief or any chief-level officer should be required to demonstrate training and/or experience equivalent to the requirements found in NFPA 1021 Standard for Fire Officer Professional Qualifications. (2003 Edition).

This level is a minimum of Fire Officer II as found in the standard. Any other line officer shall meet the requirements of Fire Officer I.

[16] Article IX Section 2 Paoli Fire Company By-Laws.
[17] Ibid, sec 2

The Board of Directors under Article XI has the authority to establish committees to facilitate the operation of the Company. There are 11 standing committees; the duties and composition are listed in Section 3 of this Article. The Standing Committees are:

- Entertainment
- Welfare
- House
- Membership
- Publicity
- Apparatus
- Store
- Communications
- Finance
- Audit/Human Resources
- Executive

Article XII expands on the duties of Active Members from the guidance provided in the ROM. The "Point System" identified in Section 3 of the Appendix to the ROM is further explained and the authority of the Chief to remove a member from Active status for failure to meet the 25 percent threshold is explained.

This article defines the powers of the Chief in disciplinary matters. The disciplinary process is defined in Section 6 through 9 and the Audit and Human Resources committee reviews the actions of the Chief in disciplinary matters. This committee is the final arbiter and can hear appeals of rulings of the Chief.

The thirteenth article establishes voting privileges for the various types of memberships.

Article XIV identifies the dates and times of Company and Board meetings. A provision for special meetings is included.

The terms of the fiscal year are identified in Article XV.

Article XVI address conflicts of interest. This type of section is not typical; the subject is not mentioned in Berwyn's By-Laws, for example. The article acknowledges that there may be occasions when members of the company may be in a position to conduct business with the Company. In that case, this article provides a mechanism to notify the membership of the company.

The confidentiality of the company in regards to its internal operations is protected by the Proprietary Information in Article XVII.

To defray the costs incurred by the Executive Officers, Directors, and Service Officer as well as the Active and Active Associate Members, a stipend system is provided. The features of this system are identified in Article XVIII. The intent of the stipend is to reimburse the members for such costs as mileage for personal autos.

Article XIX is the Indemnification and Insurance Article. This article, in section 8, provides protections for the individual members of the Company from lawsuits and judgments arising from activities occurring during their membership in the company.

The establishment of a routine order of business and the requirements for parliamentary procedures are covered in Articles XX and XXI, respectively.

Finally, a procedure to amend these By-Laws is addressed in Article XXII.

The By-Laws for the Paoli Fire Company are a modern, thorough, comprehensive document that provides a structure for conducting the business of a fire department. With the exception of the two recommendation regarding position descriptions we offer no other changes.

The Employee Handbook and Operating Procedures is another matter. Sections I, II, IV, V, and VI all address issues and tasks for the employees of the Paoli Fire Company. These sections are important and should be together as a stand-alone document.

Recommendation 16: The Paoli Fire Company should discontinue the use of the current Employee Handbook and Operating Procedures and create in its place two separate manuals.

The first is the above-mentioned Employee Handbook. The second is totally revised version of the Operating Procedures. While revising, implement the recommendations in this report.

Twelve specific recommendations are directed at either the Berwyn or Paoli Fire Companies. The following are several strategic recommendations for both companies and townships to consider. These recommendations are intended to increase the efficiency and effectiveness of the companies and recognize the growing role that the townships play by order of their fiscal support to the companies.

Recommendation 17: As part of the process to become either a new member or employee of the fire companies, a criminal background check should be conducted. This check is part of the application and screening process.

There is absolutely no indication of any criminal activity on the part of any current or future members or employees of the fire companies. But, as holders of a public trust and in order

to demonstrate the highest levels of integrity, the background check for new members or employees is needed. This check would be consistent with background checks for new township employees for other agencies and could be funded from the township budgets.

Recommendation 18: Both companies should institute a pre-employment/pre-membership, random, and post-critical incident Controlled Dangerous Substance (CDS) and Alcohol Testing Program.

As with the background checks listed above, there is no implication or suggestion of illegal or inappropriate activity. Again, as with the background checks, raising the standard will improve the service. Pre-membership/pre-employment screening demonstrates the commitment to a drug/alcohol free environment. Random testing helps to ensure continuance this environment.

Post-event testing will actually protect the companies and by extension, the townships. If there were an accident involving a fire department vehicle causing damage to either the fire company or civilian vehicle, a CDS/Alcohol test should be performed for the operator of the fire apparatus, since six months later when an attorney from an insurance company calls, an accusation of impairment cannot be substantiated if the test were not done. This would protect the fire companies from unwarranted accusations. This policy would be consistent with Tredyffrin Township policy for anyone operating a Township owned vehicle.

Inspection/Fire Prevention – During the Triage visit, TriData staff met with code enforcement personnel of both townships. We found both townships are well served by the code enforcement personnel that provide the plan review process for the new construction and other projects that require building permits.

Recommendation 19: Expand the fire prevention process by establishing a proactive fire inspection program.

What is lacking is a proactive inspection program for existing occupancies. A program that inspects existing occupancies for fire code violations is in order. This program has several benefits

- The current fire prevention code for the townships can be enforced.
- If a system of citations and fines were established, revenue could be generated for non-compliance
- If inspections were conducted by fire company members, additional familiarization with existing structures can be conducted and incorporated to pre-incident planning as found in NFPA 1720 Section 5.5 (2004 edition)

This inspection program would require either the training of fire company personnel to perform the inspections or hiring staff at the Township level to perform the inspections. The

evaluation process to determine if fire company personnel can perform all fire inspections in their first due area should be evaluated based upon the number of buildings to inspect in the respective areas and amount of time needed for the inspections. International Fire Inspectors Association officials state that an average of 1 hour should be provided for each fire inspection. If the time demand exceeds time available for fire company personnel to perform all inspections at the proposed frequency this task will require fulltime fire inspectors at the township level. The exact number of full-time and/or part-time inspectors will be determined based upon the previously stated time per inspection parameters, plus the rule of thumb that a single inspector can perform 1000 inspections and follow-up per year.

ISO Ratings – ISO information from both jurisdictions was evaluated by the TriData team and there were no major discrepancies in the public fire protection ratings. Specifically, ISO ratings are of no financial impact to the jurisdictions' residential fire insurance costs, because all residential occupancies in classes 2 through 8 are banded and there is no cost difference between the residential classes. Additionally, commercial buildings which require a 100 percent fire flow of over 3500 gpm are also rated separately, outside the jurisdictional ISO classification, thus ISO ratings actually only affect commercial structures of 350,000 cubic feet or less for classification ratings based upon the community fire defenses. ISO impacts to Tredyffrin and Easttown are minimal at best. ISO ratings are an insurance based classification system and fail to measure several important components of community fire defense planning, including fire safety education, fire inspection compliance rates, special operations functions, and EMS, to name a few examples. More information about the ISO rating system is available at their website at www.iso.com.

Since ISO ratings are primarily personnel complement driven, the only real way to impact ISO fire ratings significantly is more personnel. This brings forward the need for more volunteers in fire and EMS operations in Berwyn and Paoli Fire Companies.

Recruitment and Retention

It is imperative that Township and Fire Company officials evaluate the effectiveness of their efforts to increase volunteer personnel and be willing to implement additional recruitment and retention incentives.

TriData has a large file of volunteer incentive programs we have observed nationally, some of which are listed below.

Targeted Recruitment of Professionals and Paraprofessionals – Recruiting new members who already have some level of emergency service training can reduce the time

required for a new volunteer to become a fully functional member of the emergency response team. Additionally, in many cases their required continuing education is provided by their employer. The community already has members who are medical professionals who work in the community and fire service professionals who work in other jurisdictions. This program could be expanded as a goal of recruitment.

Cadet Program – Fire departments in other regions of the United States also have had success in recruiting volunteers through high school cadet programs. High school cadet programs are partnerships between the local fire and EMS departments and the school system. Interested high school students enter a classroom structure that provides fire and EMS certifications for the student, and the student earns high school credit for completion of the courses. The high school cadet programs can serve as a preparatory program for future volunteers and career fire and EMS providers.

Length of Service Award Program – The Length of Service Award Program (LOSAP) is a voluntary program funded by either the fire company or the townships. Volunteer fire and rescue personnel who enroll in LOSAP are eligible to receive several benefits. After five years of qualified service in LOSAP, volunteers are covered by a life insurance policy. After completing 25 years of qualified service, volunteers are eligible to receive a cash benefit upon reaching age 65.

Health Insurance – The fire companies could provide health insurance for volunteers who meet certain minimum requirements. This type of incentive program is currently being used in Sedona, Arizona.

Cable Television and Utility Bills – Volunteers could be given free cable television, and/or exempted from some local utility bills. This is done in Sitka, Alaska and Lacey, Washington, for example.

Tuition Assistance – Volunteers could be offered tuition assistance after a certain period of service, similar to tuition assistance offered to municipal employees in some jurisdictions. This type of program is available at the state level in Virginia and has been implemented successfully in Maryland.

Volunteer Recognition – Volunteers generally want to be appreciated and receive some form of recognition for their service to the community. Some are willing to work quietly for years and obtain satisfaction just from doing the job, helping those in need, and the camaraderie in the department. Information obtained from surveys taken by former volunteers (as well as self-perception of the volunteers) from across the country indicates that a little recognition goes a

long way. Although most volunteers never mention the desire for recognition, it is almost always well-received when given and usually deleterious when withheld.

Volunteers in the fire and rescue service today are part of the first line defenders for any type of emergency or disaster. As a result, local governments should recognize the volunteers with recognition programs similar to those used by the armed forces reserves.

This recruitment and retention program must be a combined effort between the townships and the fire-rescue departments. This program should concentrate its recruitment, retention, and public educational efforts toward a wide range of groups and organizations.

The result of recruitment and retention programs' failure is that the townships will likely have to provide this service through a paid delivery system. These alternatives will be much more costly for the taxpayers than the time and efforts that will be involved in helping expand a quality volunteer fire-rescue system in the townships.

False Alarms

TriData staff reviewed false fire alarm data from both Berwyn and Paoli Fire Companies. The instances of false alarms were a significant part of the total number of responses annually; nearly 40 percent of fire calls are false calls, which is an inordinately high percentage of total calls. This false call response volume clearly indicates that the current deterrence ordinances or the lack of its enforcement are not adequately addressing the false alarm problem in Tredyffrin and Easttown Townships. False alarms stress the entire fire service system, including personnel, equipment, and citizen safety. Staff and equipment incur unneeded wear and tear. Citizens are placed in jeopardy when fire companies are out of position on a false call should they have a real emergency.

TriData encourages the establishment of a realistic user fee system for false calls and any service demands which exceed normal daily departmental operations. The user fee can be assessed after a specific number of false alarms are generated by a single occupancy.

User fees are those charges for service beyond the daily scope of fire department operations. The application of user fees for services should be for actual time the Berwyn and/or Paoli Fire Company personnel and equipment are on scene to provide service. Instances where user fees the can be charged include:

- Hazardous Materials
- False Alarm (malicious and habitual)
- Arson
- Special Rescue (water, trench, confined space, and high angle)

- Extrication (industrial, personal injury accident)
- Inspection Fees (plan review, violation revisit, and special processes)

Many departments are using a specific methodology to determine the cost to them to respond to incidents of different types. These response costs are then used as the basis for cost to violators for the services listed above.

The methodology for determining cost of response begins with determining who responded and for how long (a one hour minimum should be used). Responders can be grouped by level (firefighter, lieutenant, captain, battalion chief, etc.) Next, the number of responders in each category is multiplied by the average hourly wage for that category plus 30 percent for employee benefits. This total is the personnel costs for the call.

Finally, the hourly cost of each piece of equipment must be determined. For this purpose the Department of Transportation, Schedule C, Report #375 is used (Table 8) in conjunction with an apparatus cost worksheet.

Table 8: Department of Transportation, Schedule C, Report #375

Category	Vehicle Size	Base Cost Per Hour
Automotive	Car or Station Wagon	$8.03
	Suburban/Excursion	$9.20
Trailers	Under 2 Tons	$7.09
	2 Tons Minimum	$12.89
Trucks (Gas or Diesel Classified by G.V.W.R.)	Under 10,500	$7.29
	10,500 minimum	$12.67
	16,000 minimum	$15.71
	19,500 minimum	$17.27
	23,000 minimum	$19.28
	26,000 minimum	$22.61
	33,000 minimum	$28.08
	41,000 minimum	$31.32
All Wheel Drive	Under 20,000	$9.53
	20,000 minimum	$17.47
	35,000 minimum	$37.03
	40,000 minimum	$39.24
	43,000 minimum	$43.96
	51,000 minimum	$44.97
Tandem Axel	Under 41,000	$22.22
	41,000 minimum	$29.16
	49,000 minimum	$31.93
	57,000 minimum	$35.18

Category	Vehicle Size	Base Cost Per Hour
Enclosed Van/Trailer		$3.98
Aerial Devices Tower and/or Platform (hydraulic, not including chasses)	50' minimum height	$11.54
	100' minimum height	$23.08
Pumps Classified by GPM	500 gpm minimum	$5.12
	750 gpm minimum	$8.55
	1,000 gpm minimum	$13.15
	1,250 gpm minimum	$14.50
	1,500 gpm minimum	$17.35
Water Tanks (internal and portable)	Under 500 gallon	$3.44
	500 gallon minimum	$5.37
	750 gallon minimum	$5.32
	1,000 gallon minimum	$7.10
	1,250 gallon minimum	$17.90
	1,500 gallon minimum	$10.65
	2,000 gallon minimum	$8.15
	3,000 gallon minimum	$21.30
	4,000 gallon minimum	$13.30
	5,000 gallon minimum	$35.50
	6,000 gallon minimum	$20.19
Electric Generators (portable or mounted)	0.021 AC rating 999 watts or less	$4.31
	0.022 AC rating 1,000 watts minimum	$5.00
	0.022B AC rating 1,500 watts minimum	$3.75
	0.023 AC rating 2,500 watts minimum	$2.45
	0.023 B AC rating 5,000 watts minimum	$12.50
	0.024 AC rating 10,000 watts minimum	$10.41
Miscellaneous Equipment	0.95 200 Winch	$3.23
	0.96 .001 Cellular Phone	$0.67
	0.96 .006 Two Way Radio	$0.25
	0.96 .100 Out Board Motor	$1.45
	0.96 .401 Pontoon Boat	$4.76
	0.96 .405 Boat 7' minimum	$3.61

APPARATUS COST WORKSHEET

Vehicle ID:_____ Type:_____ GVRW:_____

Apparatus Cost _____
_____
_____
_____
_____
_____
_____

Total Base: _____

_____ *x* _____ = _____

Total Base Emergency Factor Billable Apparatus Cost per Hour

Emergency Factors:

Auto/Suburbans/Pick-Up/Trailers: 2.5
Squads/Rescues/Water Craft: 2.75
Engines/Tenders: 3.0
Aerial/ARFF: 3.5

Emergency factors are multipliers for emergency apparatus over non-emergency apparatus due to higher maintenance costs, shorter service life, and additional risk to apparatus during a response.
Adding together the personnel costs and the apparatus cost will yield the total user fee for each such incident.

By using this real cost process for violation charges, the system can be easily updated annually to assure accurate fees. Additionally, the violator is clearly able to see the exact amount of financial stress their incidents placed upon the emergency service system, although the risks to citizens should simultaneous incidents occur is not part of this process. Finally, previous experience from other jurisdictions using this actual costs system has shown a dramatic reduction in the number of false calls almost immediately upon enacting the actual costs fee system as proposed.

Communications

The radio communications system is owned and operated by the Chester County Government. The radio system is the primary means of dispatching fire and EMS as well as police units. The unit-to-unit communications is also done via the radio system. The current system is an analog 800 mega-hertz (MHz) system. This system, when acquired and placed in service almost 20 years ago, was state of the art. However, first generation 800 MHz systems are limited by signal strength and reach. The number of towers limits the signal strength. Each tower in the system has devices called repeaters that boost the signal strength. First generation 800 MHz systems were tower-to-curb, and provide limited use within structures. The County system signal strength was further limited in that it is a line-of sight system and large dense buildings can interfere with the signal. This is especially true below grade. This is a potential safety hazard.

When interviewed, Chester County officials informed the study team that work was underway to upgrade the system to a digital 800 MHz system. This upgrade will require additional repeater sites to upgrade signal strength and reach.

While recognizing that the radio system is administered above the township level, both townships should support and encourage Chester County efforts to upgrade and improve the radio systems. This support could come in the form of political support for upgrades and cooperation with the County in the selection and locations of repeater tower locations.

Summary

Chapter III was a review the operations, management, communications and communications systems in place with the fire companies that serve Tredyffrin and Easttown Townships. Our intent was to make recommendations for the maximization of service and staffing levels effectiveness. The station visits and interviews allowed TriData staff to discuss coordination and cooperation, not only with the fire companies but with other township agencies as well. We found no evidence of conflicts, issues, or problems between companies or agencies.

IV. ANALYSIS OF CAPITAL EQUIPMENT AND FINANCES

This chapter looks at the finances including capital equipment in the Berwyn and Paoli fire companies. Areas of review include stations, apparatus, and major equipment. Additionally, the financial conditions of each fire company are analyzed and a financial plan is presented to assist in operational and future capital planning of the companies and the townships.

Facilities

The facilities operated by Berwyn and Paoli fire companies are major components of each organization's fiscal health and must be considered in discussions about resource deployment and capital needs. Although the scope of work for this study did not include a full engineering assessment of each station, the necessity of planning where future resources should be located required at least a cursory look at the condition of each facility. Typically fire stations have a usable lifespan of 50 years. Properly maintained and periodically upgraded, however, fire stations can provide adequate service for a much longer period. The suggested lifecycle of 50 years is a 'rule-of-thumb' used by architects; it is not a hard and fast rule.

Berwyn Fire Company – Fire Station #2, operated by Berwyn Fire Company, was built in 1920. Over the past 88 years the station has undergone several expansions and renovations. The 2007 Financial Statements found the value of the land to be $108,340 and the building to be $747,952 for a total of $856,292. This facility is expensive to maintain, with facility expenses of $51,677 in 2007—7.8 percent of the non-salary budgeted expenses and the greatest expense not directly related to protecting the community.

Recommendation 20: The facility operated by Berwyn Fire Company should be replaced in the very near future.

There are two concerns, in addition to the expense of maintaining this older structure. First is the lack of functionality, particularly due to the size of the apparatus bays and personnel facilities. Increasing demand for service requires increased staffing. The existing facility is barely able to handle the current staffing arrangement and limits flexibility in developing more efficient staffing plans. Space for spare equipment is already lacking, and there is no room for expansion. Another concern is the amount of time required to maintain this aging structure. Volunteers have limited time to donate to the community, and time spent fixing a leaking roof is time *not* spent conducting the primary function of the company—fire and EMS service to the public.

Paoli Fire Company – The Paoli Fire Company operates out of a much newer building than that of Berwyn Fire Company. Fire Station #3 was built in 1972. It is able to house modern fire apparatus and has sufficient storage space. It is also less expensive to maintain than Station #2. For the year ending September 2006, annual building maintenance expenses were $14,517, or 4.8 percent of all non-salary expenses. The land was valued at $426,612 and the structure at $436,211 for a total of $862,823.

The Paoli Fire Company's facility is 36 years old and in good condition. The one significant issue with this building is the lack of sleeping quarters that are necessary for 24-hour staffing by career or volunteer firefighters. There is space for such quarters on the lower level, but remodeling to accommodate this would be at the expense of a useful training and meeting room. The Paoli Fire Company has placed $800,000 in reserve for facility replacement.

Apparatus

The quality, type, condition, and replacement of apparatus are critical elements to consider in conjunction with station locations and deployment of apparatus. Safe and reliable emergency vehicles are essential to the department's mission. As with the fire stations, there is a significant difference between apparatus at Berwyn Fire Company versus apparatus operated by Paoli Fire Company. Table 9 and Table 10 identify the apparatus of each company.

Table 9: Berwyn Fire Company Apparatus

Apparatus Type	Year	Make	Unit	Mileage on 1/31/08
Pumper	1996	E-One	Engine 2-0	45,200
Pumper	1983	E-One	Engine 2-1	25,400
Rescue Pumper	2007	Pierce	Engine 2-2	1,800
Truck	1990	E-One	Tower 2	30,600
Rescue	1990	E-One	Rescue 2	13,600
Traffic Safety	2001	Ford Excursion	Traffic 2	20,300
Command	2002	Chevy Tahoe	Chief 2	
Command	1999	GMC Yukon	Duty Officer 2	
ALS/BLS Transport	2007	Horton Type III	Ambulance 2-1	8,000
ALS/BLS Transport	2006	Horton Type III	Ambulance 2-2	23,600
ALS/BLS Transport	2006	AEV Type I	Ambulance 2-3	7,500

Table 10: Paoli Fire Company Apparatus

Apparatus Type	Year	Make	Unit	Mileage on 1/31/08
Rescue Pumper	2003	Pierce	Engine 3-1	8,988
Pumper Tanker	2005	Pierce	Engine 3-5	4,776
Truck	2000	Pierce	Tower 3	11,232
Mini Pumper	2007	KME	Tac 3	1,305
Traffic Safety	1995	Ford F350	Traffic 3	5,962
Command	2006	Ford Expedition	Chief 3	
Command	2005	Ford Expedition	Deputy 3	
BLS Transport	2005	Horton Type III	Ambulance 3	18,681

Replacement – The overriding factor when determining whether to replace a given vehicle is whether it still functions reliably and safely and has adequate capability to fulfill its role.

The NFPA has the following guidelines for fire vehicle replacement:

> "The normal life expectancy for first-line fire apparatus will vary from county to county, and city to city, depending upon the amount of use the equipment receives, and the adequacy of the maintenance program. In general, a 10–15-year life expectancy is considered normal for first-line pumping engines. First-line ladder trucks should have a normal life expectancy of at least 15 years. In fire departments where ladder trucks make substantially fewer responses to alarms than engines, a planned first-line service of 20 years may be warranted for ladder trucks. Some smaller fire departments that have infrequent alarms operate pumping engines up to 20 years with reasonable efficiency, although obsolescence will make older apparatus less desirable, even if it is mechanically functional. In some types of service, including areas of high fire frequency, a limit of 10 years may be reasonable for first-line service. The older apparatus may be maintained as part of the reserve fleet, as long as it is in good condition, but in almost no case should the fire department rely on any apparatus more than 25 years old.[18]"

These NFPA guidelines have proven to be reasonable in practice and tend to be followed by most fire departments that have neither extremely high nor extremely low numbers of runs or vehicle mileage. They are a good benchmark for "best practices."

[18] NFPA Fire Protection Handbook (18e), Quincy, MA, 2000, pp. 10-208-209.

The guidelines provide some latitude in determining useable life for a fire service vehicle. Age and accumulated mileage are the most important variables to consider in vehicle replacement. The numbers of calls to which a vehicle responds and the frequency and quality of preventive and other maintenance received can also affect vehicle lifespan.

As a rule of thumb, an annual replacement review process should be undertaken for any piece of front-line fire apparatus more than ten years old to determine whether replacement is warranted. More heavily used apparatus may need to be replaced sooner than less heavily used pieces. Apparatus can be taken out of front-line service and placed in a reserve status for a few additional years of life, as long as such vehicles can still be safely used for their designated purpose and still meet ISO and NFPA performance standards. Modern safety features also are important to consider. Older vehicles may lack important new features (e.g., enclosed cabs, and older aerial ladder may not have interlocking safety devices), which may be significant reason not to wait until the end of a replacement cycle to order a new vehicle, even if the current vehicle is in good condition.

Replacement Scoring System – Some fire departments (primarily on the east coast) use a scoring system developed by the American Public Works Association Fleet Service Committee for assessing fire apparatus for replacement, or a scoring system similar to it.[19] Examples of its use may be found in Chesapeake, Hampton, Newport News, Virginia Beach, and York County, Virginia. The system entails considering a combination of variables that include age, mileage, maintenance costs, and operating conditions. A replacement score is calculated for each vehicle based on the sum of its scores for age, usage, and condition. The data for these calculations are usually obtained from computerized vehicle maintenance records and work orders, but can also be obtained otherwise.

The age of the vehicle is scored by assigning one point for each month from the date on which it was purchased. The usage score assigns one point for each 1,000 miles traveled or 3.5 points for each 100 hours of use, whichever is higher. The condition of the vehicle is scored on a scale of zero to four (with zero being the best and four the worst) for each of five aspects- body, interior, functionality, maintenance/repair cost, and mission. Each of the 5 aspect scores is then multiplied by 12, and these values are summed with the points assigned for age and mileage to obtain the overall vehicle score. If the overall score exceeds the point limit established for the respective vehicle category, the vehicle is recommended for replacement. The categories and associated maximum scores are listed in Table 11.

[19] American Public Works Association (2003). *Fleet Service Committee. http://www.apwa.net*

Table 11: Maximum Vehicle Points Before Disposal/ Replacement is Recommended (APWA System)

Vehicle Category	Maximum Vehicle Points
Sedans, station wagons, and jeeps	162
Light-duty trucks	196
Medium- to heavy-duty trucks (including ambulances)	220
Fire apparatus	225

The critical component in any service-life-assessment system is the absolute requirement that a vehicle must be able to safely and reliably perform in a manner consistent with the vehicle's design purpose, regardless of mileage or hours of use. Elected officials and organizational leaders must remember that fire service vehicles are subject to much more demanding operational conditions than other vehicles in a jurisdiction's fleet. Rapid acceleration and deceleration, hard turns, quick stops, and other extreme demands are placed on fire apparatus on a regular basis. Additionally, fire apparatus are almost always fully-loaded with equipment. The water carried on a pumper can easily weigh several tons (over 12 tons in the case of Paoli's pumper-tanker), and aerial ladders may weigh more than 40 tons. Public works type trucks are not always at their maximum load, which reduces wear and tear on suspension, brake, and driveline systems.

Findings – The fire companies have different needs based on the current conditions of their fleets as well as the services provided by each organization. Berwyn Fire Company provides both ALS and BLS services. Paoli provides only BLS service. Berwyn also responds to more fire suppression calls than Paoli. Table 12 shows that Berwyn runs nearly twice as many calls as Paoli. This results in greater wear and tear to the vehicles.

Table 12: 2006 Call Volumes

Call Volume by Type (2006)	Berwyn Fire Company	Paoli Fire Company
Fire	832	482
ALS	1,187	0
BLS	897	989
Total	2,916	1,471

Table 9 and Table 10 showed that Berwyn Fire Company apparatus fleet is much older than that of Paoli Fire Company. Not including Engine 2-1, the average age of the heavy stock apparatus in the Berwyn fleet is 12.3 years with 22,800 miles versus 5.3 years and 8,332 miles in the Paoli Fire Company. Using the APWA system identified in Table 11, none of the Paoli

apparatus is close to replacement, while two of Berwyn's vehicles (Tower 2 and Rescue 2) are beyond replacement, and Engine 2-0 is approaching replacement.

These findings concur with observations made during station visits by TriData personnel. Apparatus with the Paoli Fire Company appears to be in excellent condition, while apparatus in Berwyn shows signs of wear and tear due to higher call volume. An aggressive apparatus replacement plan is necessary for Berwyn. Paoli appears to have implemented a very aggressive apparatus replacement plan.

Recommendation 21: Adopt the APWA replacement schedule identified in Table 11 as a guide for an apparatus replacement plan.

Apparatus should be replaced in accordance with Table 11 and the formula preceding the table. It is not possible to forecast the exact timeframe in which a vehicle will exceed the maximum points that call for replacement. For planning purposes Table 13 should be used.

Table 13: Apparatus Replacement Ages

Vehicle Type	Age	Cost	Cost per Year
Command Vehicles and Traffic Safety	8	$40,000	$5,000
Ambulances and Minipumpers	8	$150,000	$18,750
Engines	12	$500,000	$41,667
Ladder Trucks and Squads	15	$1,000,000	$66,667

Table 13 is only for planning purposes. For example, if an engine is only ten years old but exceeds the maximum point value found in Table 11 then it should be replaced. Conversely, a ladder truck that is 16 years old but does not meet the maximum point value does not yet need to be replaced. This topic is expanded upon later in this chapter.

Apparatus Replacement Schedule

An apparatus replacement schedule based on the recommended APWA formula has been prepared with several assumptions. The first and most important assumption is that mileage on each vehicle will continue to accumulate at the same monthly rate as has been accumulated over the life of the vehicle. Months of service were the second assumption worked into the formula, assuming that all vehicles enter the fleet in the same month of the year. The third assumption used in following the APWA formula is that each of the five aspects identified in the formula (body, interior, functionality, maintenance/repair cost, and mission) were assigned scores of one on a scale of zero to four. These scores need to be reevaluated annually.

These assumptions result in an age factor that may be slightly exaggerated, and a mileage factor that can be manipulated by each company as necessary to increase or decrease the score

for each piece of equipment. Mileage factors for command vehicles are lower than they should be, as mileage for these rigs was never reported.

2009 – The apparatus fleet at Paoli is in good condition, and after working through the APWA calculations the only rig to be replaced in 2009 is Traffic 3. The Berwyn Fire Company, however, has three vehicles that exceed the allowable scores—Engine 2-0, Tower 2, and Rescue 2. As the engine is the backbone of the fire service, the priority for replacement should go to Engine 2-0. Replacement of other heavy-stock vehicles can be deferred for now.

2010 – No apparatus with Paoli should need replacement in 2010. The Berwyn Fire Company should replace Tower 2 in 2010. The score for Tower 2 still indicates replacement, but in order to avoid a huge budgetary impact the purchase of these vehicles should be spread out over a period of years.

2011 – Again, the Paoli Fire Company should not need to replace any apparatus in 2011. The Berwyn Fire Company should replace Rescue 2, completing the last of three major purchases over a three-year period. This aggressive replacement schedule is necessary in order to get their fleet back into shape. Purchasing heavy stock in three consecutive years will require hard work in specifying the apparatus, and hard work with the townships to identify funding for these vehicles.

2012 – There is only one purchase forecast for 2012- a replacement for Berwyn's Duty Officer vehicle. As was mentioned earlier, the mileage factors for this vehicle may be understated, so an earlier replacement may be justified. However, based on the three heavy stock purchases, holding this action back until a time when budgets may not be stretched so thin could be beneficial.

2013 – By 2013, Tower 3 in Paoli should be due for replacement. In the Berwyn Fire Company, the heavy stock should all be in good shape, but their Traffic 2 apparatus will be due for replacement.

2014 – Both companies should plan to replace an ambulance in 2014. Ambulance 2-2 in Berwyn and Ambulance 3 in Paoli are projected to exceed their maximum allowable point values by this year. As this time approaches the companies may consider ordering these pieces of equipment off of the same contract in order to help control costs.

2015 – In 2015 Paoli should look to replace Engine 3-1. There are no other heavy-stock purchases in the previous or following year, and Paoli's good financial position should be able to handle this schedule with minimal hardship. In Berwyn, the vehicle serving as Chief 2 should be replaced.

2016 – Our forecast indicates that in 2016 the Paoli Fire Company will not have to replace any vehicles in 2016. Berwyn should plan to replace Ambulance 2-1.

2017 – In 2017 Berwyn should plan to replace another ambulance- Ambulance 2-3. Paoli should look to replace the vehicle currently serving as Deputy 3. Depending on the financial conditions of the Townships and Berwyn, it may be wise to consider replacing Ambulance 2-1 a year late or Ambulance 2-3 a year early, particularly if a vehicle's condition warrants such an action. Additionally, there is the potential for cost savings if a multiple-unit order is feasible.

2018 – At this point Berwyn will have replaced every vehicle that is currently in their fleet and no action is required for the year. Paoli will be due to replace Engine 3-5 and Chief 3. This is the only year in the schedule that calls for multiple units to be purchased by one company in the same calendar year.

At the end of this timeframe the fleets of each company should have both been completely replaced. A table of apparatus should approximate Table 14 and Table 15 .

Table 14: Berwyn Fire Company Apparatus in 2018

Apparatus Type	Year	Unit
Pumper	2009	Engine 2-0
Rescue Pumper	2007	Engine 2-2
Truck	2010	Tower 2
Rescue	2011	Rescue 2
Traffic Safety	2013	Traffic 2
Command	2015	Chief 2
Command	2012	Duty Officer 2
ALS/BLS Transport	2016	Ambulance 2-1
ALS/BLS Transport	2014	Ambulance 2-2
ALS/BLS Transport	2017	Ambulance 2-3

Table 15: Paoli Fire Company Apparatus in 2018

Apparatus Type	Year	Unit
Rescue Pumper	2015	Engine 3-1
Pumper Tanker	2018	Engine 3-5
Truck	2013	Tower 3
Mini Pumper	2007	Tac 3
Traffic Safety	2009	Traffic 3
Command	2018	Chief 3
Command	2017	Deputy 3
BLS Transport	2014	Ambulance 3

As was mentioned in the beginning of this section, there are several assumptions that went into the development of this replacement schedule. While the earlier years are not likely impacted by these assumptions, later years may be significantly affected. It is imperative the townships and fire companies review the APWA formula annually to assure accurate replacement of apparatus.

Finance

The financial conditions of the Berwyn and Paoli fire companies are very different. Each has a Relief Association. These non-profit organizations receive state aid from state tax on fire insurance purchased by Pennsylvania residents from insurance companies incorporated outside of the commonwealth. The funds are used to pay for insurance to protect volunteer firefighters, purchase fire equipment, and cover volunteer training expenses. Relief Associations are distinct organizations separate from fire companies. The following section describes the financial status of each fire company as well as their Relief Association.

Berwyn Fire Company – Berwyn Fire Company provided an independent audit report representing the condition of the organization in December 31, 2007 and a separate audit for their Relief Association from the same date. Table 16 is an excerpt from these audits showing current assets and liabilities for the fire company and the relief association.

Table 16: Berwyn Fire Company and Relief Association Assets and Liabilities ($)

	Fire Company 2007	Fire Company 2006	Relief Association 2007	Relief Association 2006
Cash & Equiv.	640,050	537,705	1,108,365	1,301,916
Fixed Assets	822,884	682,057	187,964	0
Other Assets	1,916	2,416	0	0
Total Assets	**$1,464,850**	**$1,222,178**	**$1,296,329**	**$1,301,916**
Current Liabilities	13,271	14,956	0	0
Long-term Liabilities	306,075	238,697	0	0
Total Liabilities	**$319,346**	**$253,653**	**$0**	**$0**

Another factor that must be considered is where this money is coming from and where it is going to. Table 17 depicts an overview of revenues for the company (not the Relief Association), and Table 18 shows expenses for the company. The audit report goes into more detail. The values identified are the major sources of revenue and/or expenses.

Table 17: Berwyn Fire Company Consolidated Revenues ($)

Revenues	2007	2006
Billing	739,856	643,122
Contributions	58,274	28,269
Fund Drive	262,694	278,457
Township Funding	265,596	247,457
Sale of Asset	145,000	0
Other	179,100	156,735
Total Revenues	**$1,650,520**	**$1,364,040**

Table 18: Berwyn Fire Company Consolidated Expenses ($)

Expenses	2007	2006
Facility	51,677	44,096
Personnel- Career	807,602	757,578
Personnel- Volunteer	34,367	41,547
Service Delivery	140,575	129,706
Vehicle Maintenance	111,241	52,332
Depreciation	149,016	106,911
Other	179,063	186,309
Total Expenses	**$1,473,541**	**$1,318,489**

The Berwyn Relief Association revenues and expenses are shown in Table 19 and Table 20. The detailed audit breaks these values out as restricted, temporarily restricted, and permanently restricted. For the sake of simplicity these tables consider only the total values.

Table 19: Berwyn Relief Association Consolidated Revenues ($)

Revenues	2007	2006
Contributions	343,218	307,063
Investment Income	66,000	48,662
Total Revenues	**$409,218**	**$355,725**

Table 20: Berwyn Relief Association Consolidated Expenses ($)

Expenses	2007	2006
Equipment Purchase	122,279	211,832
Equipment Maintenance	111,153	51,334
Depreciation	46,991	0
Insurance	76,181	60,992
Other	58,201	34,763
Total Expenses	**$414,805**	**$358,921**

At first glance, the financial situation in Berwyn appears to be tenable. The Fire Company has revenues in excess of expenses, and the liabilities are not excessive. The Relief Association has expenses slightly greater than revenues, but no liabilities against their assets that are greater than $1 million. The problem comes when considering their finances in conjunction with an aggressive vehicle replacement program. This issue will be addressed after a brief overview of the finances of the Paoli Fire Company and Relief Association.

Paoli Fire Company – The Paoli Fire Company provided an audit as of September 30, 2006 and a separate audit of their Relief Association as of December 31, 2005. The audit of the Relief Association only shows cash and investment values as of December 31, 2005. In order to show other data points, information from an audit of the Relief Association from December 31, 2003 is also included.

Table 21 shows that the Paoli Fire Company and Relief Association both have significant assets. The nearly $2 million identified as "Other Assets" are investments held by the Relief Association, including certificates of deposit, U.S. Government securities, mutual funds, and stocks.

Table 21: Paoli Fire Company and Relief Association Assets and Liabilities ($)

	Fire Company 2006	Fire Company 2005	Relief Association 2005	Relief Association 2004
Cash & Equiv.	1,304,420	1,248,813	540,320	275,131
Fixed Assets	1,304,880	1,121,255	0	0
Other Assets	25,016	148,658	1,950,087	2,079,303
Total Assets	**$2,634,316**	**$2,518,726**	**$2,490,407**	**$2,354,434**
Current Liabilities	16,170	7,844	0	0
Long-term Liabilities	128,307	113,513	0	0
Total Liabilities	**$144,477**	**$121,357**	**0**	**0**

Revenues and expenses for the fire company are shown in Table 22 and Table 23. These values are consolidated from the audit reports.

Table 22: Paoli Fire Company Consolidated Revenues ($)

Revenues	2006	2005
Billing	216,729	134,471
Contributions	141,216	165,689
Township Funding	130,619	128,983
Other	112,447	84,661
Total Revenues	**$601,011**	**$513,804**

Table 23: Paoli Fire Company Consolidated Expenses ($)

Expenses	2006
Facility	14,517
Salaries & Benefits	242,107
Ambulance Expenses	64,268
Fire Expenses	15,309
Operating Expenses	37,992
Depreciation	88,516
Other	79,598
Total Expenses	**$542,307**

The Paoli Volunteer Firefighter's Relief Association revenues and expenses data are depicted in Table 24 and Table 25. As with the preceding data, these numbers came from independent audit reports. The Relief Association revenue and expense values are for the two-year period from January 1, 2004 through December 31, 2005.

Table 24: Paoli Relief Association Revenues ($)

Revenues	2004-2005
State Aid	528,295
Investments Sold	1,413,297
Interest Income	161,811
Other	116,927
Total Revenues	**$2,220,330**

Table 25: Paoli Relief Association Expenses ($)

Expenses	2004-2005
Equipment Purchase	341,005
Equipment Maintenance	21,399
Investments Purchased	1,272,569
Insurance	277,552
Other	42,616
Total Expenses	**$1,955,141**

The financial situation in the Paoli Fire Company is very stable. In Table 21 we see that, between the Fire Company and the Relief Association, there are over $5 million in assets and only $144,000 in liabilities. Both entities in Paoli also have revenues in excess of expenses. Long-term planning is already underway in Paoli, where the Facility Replacement Fund holds $800,000. An Apparatus and Other Capital Equipment Fund holds $175,000.

Long-Term Planning – Long-term planning, particularly for major expenses, is an essential component of fiscal responsibility. Fire apparatus and fire stations are very expensive, and their replacement must be planned years in advance. Failure to effectively plan for these needs reduces an organization's ability to provide vital services to the community. Tredyffrin and Easttown Townships have vested interests in participating in this planning, as supporting the efforts of volunteer fire companies is significantly less expensive than the cost of establishing a career fire service through the townships. A financial plan that addresses major capital expenses is in the following section of this report.

Supplemental Income Sources – Both fire companies are engaged in collecting funds to help support their operations. Historically, volunteer fire and rescue organizations have brought in much of the money necessary to maintain their operations. Fundraising activities targeted at the surrounding communities are still used by both the Berwyn and Paoli fire companies. These activities can be very time-consuming. Pressures on volunteerism are already an issue nationwide, and it is increasingly difficult for primarily volunteer organizations to both respond to emergencies while soliciting the funds to support these responses at the same time. There are, however, several actions that can be taken to help offset the expense of operating a quality fire and rescue service.

Cost recovery for services provided was discussed earlier in the report. Public-private partnerships are another possibility for supplementing income, particularly in training and public education. Organizations that need to provide basic fire suppression competencies to their employees (fire extinguisher training, basic first aid) could partner with local fire companies to a mutual benefit. Such an arrangement may not generate a large fiscal return, but it may provide fire companies with training equipment that could be very valuable.

Financial Plan

An effective financial plan considers the operating and capital expenses of an organization. These expenses must be balanced with state and local funding, bills for service, fundraising, and other revenue sources. The plan should address short and long-term needs and allow for unexpected contingencies. This plan will put each fire company in a position to provide effective fire and rescue services to their communities while living within their budgets.

Basic Principles – The financial plan for the fire companies and relief associations follows several basic principles:

- Each organization remains autonomous
- Funding is provided to meet a minimum standard

- Organizations wishing to exceed a minimum standard are encouraged to do so with their own money
- Fire companies must continue to seek new funding sources

Operating Expenses – Each company currently receives funding from the townships that is applied to operating expenses. Township contributions are shown in Table 26.

Table 26: 2007 Township Operating Contributions ($)

Township	Operation	Berwyn	Paoli
Easttown	Fire & BLS	59,400	29,765
	ALS	37,060	0
Tredyffrin	Fire & BLS	81,554	81,554
	ALS	92,400	0
Willistown	Fire & BLS	0	29,711*
Total Operating		**$270,514**	**$139,230**

*2006 Value

Tredyffrin and Easttown Townships allocate their funds to the fire companies at different percentages. Easttown Township allocates roughly 2/3 of their fire and BLS operating contribution to Berwyn and the balance to Paoli, while Tredyffrin Township (after a small contribution to the Radnor Fire Company) divides their funding equally between Berwyn and Paoli. Both townships provide ALS contributions only to Berwyn Fire Company, as Paoli Fire Company is not involved in ALS transport.

Operating contributions from the townships are marginally adequate. Table 17 and Table 18 show Berwyn's operating revenues and expenses. Not including the sale of assets, Berwyn barely broke even after bringing in over a quarter of a million dollars in fund raising efforts. More operating funds are necessary in order to guarantee the solvency of the volunteer organizations. Note that depreciation expense is a large expense for both organizations. Depreciation of vehicles is accounted for under operating expenses, while replacement for vehicles is considered a capital expense.

ALS funding totals $129,460 to Berwyn Fire Company from both townships combined. With 1,187 responses in 2006, this is approximately $109 per ALS response. We recommend that funding for ALS operations be increased so that Berwyn receives at least $120 per ALS response. This funding level would have been $142,440 in 2007. Assuming the same proportions between the townships as the state pass-through aid, Easttown Township would have contributed $46,088 and Tredyffrin Township would have contributed $96,432.

The reason for suggesting an increase in ALS contributions and not recommending any changing in fire and BLS operating expense contributions is simple—Berwyn needs the money.

Increasing financial support of ALS activities and not modifying fire and BLS contributions allows for more money to be directed to Berwyn, where it is needed to provide a safe operating margin, without having a negative effect on Paoli. We suggest $120 per response as a starting point, and this figure may need to increase in the future. Allocating a set dollar amount per ALS call ties funding directly to services provided to the citizens. As more calls are run, more funding is provided. This action is intended to improve only the operating expense aspect of Berwyn's financial position. The $120 figure can be modified in the future if operating expenses and revenues become unbalanced.

This money should be provided in compensation for services rendered. In order to maintain ALS service to the citizens, either the subsidy per call needs to increase, or fees need to increase. If another organization were to decide to provide ALS service then Berwyn would experience a reduced call volume for ALS responses, and have a commensurate reduction in operation expenses. Likewise, another organization providing this new service could expect an increase in operating expenses that would require additional compensation.

Recommendation 22: Provide a stipend of $120 per ALS response to Berwyn Fire Company.

Another factor to consider in the discussion of operating expenses is the manner by which funds are allocated from the townships. Operating costs vary more directly with call volumes than do capital expenses. Capital items, which are addressed in detail in a later section, have minimal correlation with call volumes. Tredyffrin Township allocates equal financial resources to each company for fire and BLS calls, despite the fact that Berwyn runs many more calls into the township than does Paoli. Table 27 shows only fire responses in 2006 to Tredyffrin and Easttown Townships.

Table 27: Fire Calls to Townships by Fire Companies

Township	Company	Volume	Percentage
Easttown	Berwyn	268	77.0%
	Paoli	80	23.0%
Tredyffrin	Berwyn	487	64.6%
	Paoli	267	35.4%

This data clearly shows that the Berwyn Fire Company provides more services to each township than does Paoli, yet operating funds are divided equally by Tredyffrin, and in a 2/3 to1/3 split by Easttown. Several parties involved in this report commented on the inequity in this split. One means of rectifying this is to allocate future operating funds based on past call volumes. This can be done, but only with great care. Annual fluctuations in calls would result in variable budgets, making planning much more difficult. Using a running average of past years

can smooth out these fluctuations, but an anomaly in annual responses for a single year may result in skewed contributions for years to come. A one-time incident can change funding allocations for as many years as that incident is included in the funding formula.

Capital Expenses – Capital expenses are a major concern in the fire service. Fire stations are expensive, and apparatus prices are always increasing. Paoli has a plan in place to allow for capital expenses, but Berwyn needs additional financial assistance. Each organization's relief association has assets in cash and investments that can be used for equipment purchases. There are several restrictions on how this money can be spent, but the 2008 edition of the Management Guidelines for Volunteer Firefighters' Relief Associations allows for many more uses than had been the case in the past. The Paoli Fire Company also has significant cash reserves in addition to the money with the Relief Association.

Both organizations need to have detailed plans for applying these funds to appropriate apparatus purchases. The Berwyn Fire Company had developed a long-range plan prior to this study. This plan may need to be modified to correlate to the plan proposed in this document.

Apparatus: As discussed earlier, a major difference between the two companies' operations is apparatus. Paoli has a fleet of new or like-new rigs in excellent condition, while Berwyn's fleet is certainly showing its age. Berwyn needs to replace several vehicles, while Paoli could continue their operations even with a less-aggressive fleet replacement program. That being said, nobody is saying that Paoli should not do as they wish and can afford to do in terms of apparatus. However, the townships should only fund vehicle replacements *up to the minimum standard*. Anything a company wishes to do in excess of this standard should not be a burden on the townships.

The previously mentioned APWA document provides a guideline for vehicle replacement. A funding mechanism should accompany that guideline so that funding for replacement vehicles can be built up over the life of the current apparatus. We recommend the following life spans and costs for *planning* purposes and a replacement timeline in accordance with APWA recommendations:

Table 28: Apparatus Replacement Ages

Vehicle Type	Age	Cost	Cost per Year
Command Vehicles and Traffic Safety	8	$40,000	$5,000
Ambulances and Minipumpers	8	$150,000	$18,750
Engines	12	$500,000	$41,667
Ladder Trucks and Squads	15	$1,000,000	$66,667

Table 29 shows that apparatus currently operated by each company and the replacement cost per year. These replacement costs represent the amounts which should be set aside annually in anticipation of the replacement of a vehicle.

Table 29: Minimum Annual Capital Expense Needed for Vehicle Replacement

Vehicle Type	Berwyn		Paoli	
	Number	Total Cost per Year	Number	Total Cost per Year
Command Vehicles and Traffic Safety	3	$15,000	3	$15,000
Ambulances and Minipumpers	3	$56,250	2	$37,500
Engines	2	$83,334	2	$83,334
Ladder Trucks and Squads	2	$133,334	1	$66,667
Total		**$287,918**		**$202,501**

These values offer a minimum standard. While the townships should assure that each relief association is setting *at least* this much money aside, we do not intend to tell a fire company that they may not exceed these values if they are in a position to do so. For example, replacing a ladder truck on a 10-year replacement cycle would require annual capital expense escrow of $100,000 instead of the $66,667 for a 15-year cycle. If a company can afford the $33,333 difference and wants a new truck every ten years, go buy a truck! Just don't expect the townships to pick up the extra portion of the tab. Likewise, if a company can take care of a truck so that it exceeds its replacement age and is still a fully capable unit, the money already allocated for replacement should remain with the company, and annual allocations should continue.

The fire companies and townships should have a mutual understanding of the intended purposes associated with money set aside for specific purposes. Ultimately each fire company is free to do as they wish with these funds. Actions taken outside of the mutual understanding, however, may result in the townships reconsidering future contributions.

Equipment Maintenance: Maintenance is a significant expense that both organizations cover with capital funds through their relief associations. Berwyn, due to its older fleet, spent $111,153 in 2007 while Paoli spent $21,399 over the two-year period from January 1, 2004 through December 31, 2005. Assisting the companies with equipment maintenance will help to assure that apparatus are serviceable for the life spans suggested in Table 28. The expense of maintaining an older fleet is evidenced in the difference in maintenance costs for Berwyn versus Paoli. As Berwyn's older apparatus is replaced this expense can be expected to drop.

Budgeting for equipment maintenance is a difficult task. Accurately identifying the components of fire apparatus that will break down over a given budget period is impossible. Instead, a formula based on age and mileage can be used to estimate the expense to budget for.

Table 30 identifies factors that are entered into a formula to produce estimates of equipment maintenance expense. Mileage cost is added to ten times the age factor to come up with the cost to budget for maintenance of each vehicle.

Table 30: Apparatus Age and Mileage Expenses

Age (in months)	Age Factor	Mileage	Mileage Cost
0-24	1	0-19,999	25 cents per mile
25-48	2	20,000-39,999	29 cents per mile
49-72	4	40,000-59,999	41 cents per mile
73-96	8	60,000-79,999	58 cents per mile
97-120	16	80,000-99,999	60 cents per mile
121-144	32	100,000-119,999	60 cents per mile
145-168	64	120,000-139,999	60 cents per mile
169-192	128	140,000-159,999	60 cents per mile
193-216	256	160,000-179,999	60 cents per mile
217-240	512	180,000-199,999	60 cents per mile

Fire Stations: Fire stations are another capital expense that should not be ignored. New facilities can easily cost $350 or more per square foot, with a small modern fire station starting at 10,000 square feet. The cost of building a new facility is independent of the call volume of the units occupying the structure. If land must be purchased for a fire station the cost will quickly climb to the $5 million neighborhood. A rule-of-thumb for fire station life span is 50 years. Assuming a total cost of $5 million, the annual set-aside could be as high as $100,000 in current dollars, particularly in more expensive areas of the country like Chester County.

An account receiving $100,000 over a long period of time will grow rather rapidly. This provides two substantial benefits to the townships and to the fire companies. First is that this money would be available should some sort of disaster require a fire company to spend a large sum to continue operations. A second consideration is the interest that such an account would accrue. The figures in the following tables assume that $100,000 would be allocated annually to an escrow account. Interest earned by the funds in an escrow account result in a smaller figure than $100,000 to allocate annually. The amount to place in this account varies based on rate of return and inflation rates. Additionally, use of the existing location would eliminate the need to acquire land, or the existing land could be sold, further reducing the total cost of a new facility.

Insurance: Insurance is a major expense for both companies, and both cover this cost through their relief associations. The Berwyn Relief Association spent $76,181 in 2007, and the Paoli Relief Association spent $277,552 over the two-year period from January 1, 2004 through December 31, 2005. Note that the figures provided for the Paoli Relief Association are for a two-year period. Another difference in these figures is accounted for in life insurance contracts with

total payments of $169,164. This figure is essentially an investment of the Relief Association and should not be reflected as an expense. The balance, $108,388, represents insurance expenses for the two-year period.

Equipment and Supplies: Purchasing major equipment such as gear and SCBA's as well as routine maintenance needs at the single fire company level may not be the most frugal use of funds. Joint purchasing at a Township or County level may result in some savings for the Fire Companies. Additionally, some products and services are available through state bid from Commonwealth of Pennsylvania. This might be an area of future exploration by a committee set up by the Fire/Rescue Advisory Board as presented in Chapter V, Master Plan step #4 of this report.

Total Major Capital Expenses: The annualized capital expenses combining apparatus, equipment maintenance, fire stations, and insurance are reflected in Table 31. These values are for years ending December 2007 (Berwyn) and September 2006 (Paoli).

Table 31: Major Annualized Capital Expenses

Expense	Berwyn	Paoli
Apparatus	287,918	202,501
Equipment Maintenance	111,153	10,700
Fire Stations	100,000	100,000
Insurance	76,181	54,194
Total	**$575,252**	**$367,395**

Capital Revenue – Capital expenses are only a portion of their total expenses. Given the ability of fire companies to bring in revenue through other sources, though, the townships should not be expected to cover all capital expenses. We recommend that the townships assume responsibility for that portion of the capital expenses listed in Table 31 that are above and beyond state pass-through aid. 2007 pass-through aid is listed in Table 32, as are the percentages of each company's aid received from each township. State funding for the fire companies comes through the townships. The existing division of funds should be maintained. We see no need to change these allocations, and any decision to do so should be made within the framework of each company's financial planning needs. A 50/50 split would not provide the Paoli Fire Company with sufficient funds, nor would allocations based on call volumes.

Table 32: 2007 State Aid Pass-Through

Township	Berwyn	Paoli
Easttown	95,238 (32.3%)	47,762 (16.1%)
Tredyffrin	199,377 (67.7%)	199,377 (67.3%)
Willistown	0	49,185 (16.6%)
Total	**$294,615**	**$296,324**

Table 31 and Table 32 show that in the case of both Berwyn and Paoli, major capital expenses exceed state pass-through aid. Additionally, capital expenses identified in Table 31 are only a portion of the total expenses incurred in providing fire and EMS service to the citizens. Both organizations need supplemental funding in order to assure adequate capital replacement planning. From the tables above, Berwyn needs an additional $280,637 per year and Paoli needs an additional $71,071. Assuming the same percentages as are provided in state funding shows the additional funding per company by township.

Table 32 shows that, as with operating funds, the current system has Tredyffrin Township State Pass-Through aid being divided equally between Berwyn and Paoli, and Easttown splitting funds roughly 2:1 with Berwyn receiving the larger share. While funds for operating expenses can be divided with call volumes in mind, doing so with capital expenses is not feasible. The costs of building and maintaining a fire station, acquiring apparatus, and other capital expenses are not, to a large extent, dependent on call volumes. To divide these funds based on call volumes would provide a totally inadequate sum to the Paoli Fire Company. Neither fire company can alone provide the necessary services to both townships. Both townships should provide capital funds to both companies, as has been done for years. This aspect of funding should not change. The focus should be on providing suitable operating funds to each company, based on services provided.

Table 33: Suggested Additional Capital Funding by Township

Township	Berwyn	Paoli
Easttown	90,646	11,442
Tredyffrin	189,991	47,831
Willistown	0	11,798
Total	**$280,637**	**$71,071**

These values include several assumptions and represent a worst-case scenario from the perspective of the townships. The station replacement values do not include any interest earned on funds saved from year to year, vehicle maintenance figures do not allow for reduced expenses as older vehicles are replaced, and apparatus replacement assumes that the townships agree to fund each piece of equipment.

Planning Worksheet – The financial planning worksheets allow for a more detailed picture and allow for assumptions to be replaced with more accurate estimates to the liking of township and organizational leaders. These worksheets are located in an Excel spreadsheet that is being provided to the townships with this document. This tool can be used to see exactly how independent variables affect funding necessary for the fire companies. The Financial Plan spreadsheet is set up as a tool to help in planning for necessary capital expenses for Berwyn and Paoli Fire Companies. It is a "living" document that will require changes and annual adjustments.

The file contains seven worksheets, the first of which is instructions. The second worksheet provides a summary of capital and operating expenses in addition to the total recommended support from each township to each fire company. Each of the other worksheets is used to input data that links back to the Summary worksheet.

Financial Reporting

A primary responsibility of fire company leaders and elected officials is to ensure accountability for financial programs and activities to contributors, fire company members, the public, and government entities. Accountability requires that organizations comply with applicable legal and ethical standards, adhere to organizational missions, and follow policies to minimize conflicts of interests. Through audits and several straightforward actions each organization can maintain transparency and assist township supervisors in developing a clear picture of financial positions.

Both fire companies already engage in annual audits through certified accounting firms, and each relief association is audited biannually by the State Auditor General. These audits show that each organization has been presenting accurate assessments of their financial positions. Audits also assess the internal controls that the fire companies have in place to maintain control over their finances. While audits may not assess the effectiveness of these internal controls, assuring that controls are in place is a significant action. This report does not assess specific internal or external financial controls in place in each company; decisions regarding specific controls are matters for the fire companies, townships, and auditing firms. This report will establish a standard for financial reporting by fire companies to governmental organizations.

The previous section provided a financial plan that allows for the townships to determine which of each fire company's capital expenses they choose to fund. It is reasonable to expect that funds provided for a given purpose are earmarked and subsequently used for such purposes. To that end, each fire company should track accumulated funds for each of the aforementioned categories. This accounting should be included in each company's annual budget process.

By law, each fire company must report revenue and expense summaries to the townships on an annual basis. Currently both make such reports on a monthly basis. This presentation is not assures that money provided by the townships is being allocated for the desired purpose. This presentation should also encourage the townships to review the level of support they are providing to the companies and make adjustments as necessary. The information presented should be similar to that found in the biannual audits. One major difference is that assets should be broken out to show asset allocations by fund as opposed to just totals in each asset class.

Summary – Any funding plan should include components of both operating and capital funding. Ultimately these funds come from several sources—state aid, township assistance, grants, and company fundraising. No single source of funding can adequately meet the needs of combination fire and rescue services. In addition to addressing funding sources, an effective financial plan must also address expenses. The necessary balance between funding and expenses can be addressed through reductions in expenses or additional funding. TriData developed a Capital Items budgeting spreadsheet to show the effects of such decisions on the funding necessary from the townships. This spreadsheet allows organizational leaders to see a bottom-line view of the effects of changes made to several fields. Adjustments can be made to apparatus fleets, fleet maintenance costs, and fire station replacement costs, allowing for user input of rates of return on investments and assumptions for inflation.

After reviewing the budgeting spreadsheet, each fire company should track assets earmarked for a particular purpose. Setting up an actual account for each fund is not necessary, but being able to track the amount set aside for each vehicle, for station replacement, vehicle maintenance, and insurance is necessary. For major capital purchases, fire companies can either take out substantial loans costing tens of thousands of dollars in interest, or money can be set aside annually to cover foreseeable expenses, allowing money to earn interest rather than paying it.

The total contributions from the townships to each fire company are large amounts of money, and the townships should know where their contributions are going. Transparency in budgeting is important, and allocating money to specific funds allows townships to see that funds are being allocated appropriately. Fire companies are able to earn significant returns on this money, and also have incentive to see to it that assets, both physical and fiscal, are well-managed.

V. PRIORITIZED RECOMMENDATIONS AND DEVELOPING A MASTER PLAN

Fire and rescue services in Tredyffrin and Easttown Townships are currently being delivered well by the existing career/volunteer combination system. However, there is also room for improvement in several key areas. There is a need to make some changes to cope with increasing service demands and limited resources of the fire companies and the townships. The main focus of these system improvements should be financial stabilization, standardization, and organizational structure.

As part of the original request for proposals Tredyffrin and Easttown Townships requested that a master plan be developed for the future financial and operational needs of fire/rescue services in the townships. The project team has developed the following template for the Tredyffrin/Easttown stakeholders to set out a proposed master plan. It is essential that this master plan be part of a Township level strategic emergency services planning process which should be created and bought into by all concerned parties (fire companies, township leadership, and citizens). Without this consensus building structure the document will be the subject of constant criticism and just a document created by some "experts" from 200 miles away. The Plan will wind up on a shelf and collect dust. TriData will create the process to follow but the final Plan must be the result of your own blood, sweat, and tears.

Strategic Plan

This is a proposed step-by-step plan to establish a structured process to finance and deliver fire/rescue services within the Tredyffrin and Easttown areas. This plan must be approved and backed by the township administrations and the Fire/Rescue Companies.

Table 34: Tredyffrin/Easttown Strategic Plan

Step	Timeframe	Comments
#1 : Tredyffrin and Easttown Townships should create a Fire/Rescue Advisory Board *	Within 90 days	A. Board's purpose is to assist Townships administration and create structured feedback concerning fire/rescue issues. B. Board comprised of: • reps from each fire or rescue company • reps from medical community • reps from Business • reps from each governing body C. arrange regular meetings and including an agenda and timeline for the meeting

Step	Timeframe	Comments
#2: Berwyn & Paoli Fire Companies should standardize emergency and routine operations where possible	Within 6 months	A. Emergency responses as possible. B. Training and information management C. Prevention and code enforcement. D. Routine reporting to Townships.
#3:Fire companies should establish performance benchmarks for fire/rescue operations	Within first year	A. Time and Level of emergency response. B. Training. C. Reporting requirements.
#4: Fire companies and Townships should coordinate and develop a plan for budgeting and annual township finance	Within first year	A. Fire Companies develop fire/rescue budgets with: 1. Fire/Rescue Advisory Board input 2. Township administration input B. Develop a multi year CIP and Financial Plan. C. Set out a financial accountability system 1. operational budget 2. CIP budget
#5: Develop long range planning by Township Administrators, Fire/Rescue Services and Fire-Rescue Advisory Board	Within 24 months	A. Develop fire/rescue CIP. B. 2, 5, & 10 year plans for major programs and service enhancements. C. Routine evaluation of service modifications, enhancements, and repetitive programs

* The Fire/Rescue Advisory Board is a continuation of the current Fire Task Force, but with expanded roles and membership. It is recommended that the Board have representation from the Fire Companies, emergency medical community, local business, and the two township governments. This Board should not exceed 12 members to allow for timely and extensive interpersonal interaction. Terms should overlap such that at no time will the entire Board be new to the jobs at hand. Finally, the Fire/Rescue Board should be the official advisory body for all issues relating to emergency service delivery in Tredyffrin and Easttown Townships and report to the Townships Boards of Supervisors.

Master Planning Process

There is also a need to develop a long range plan for fire/rescue services in Tredyffrin and Easttown Townships. This is clearly a priority. Using the Townships' Administration, and the Fire/Rescue Advisory Board, the jurisdictions and the fire companies should set a plan for the next 2, 5, and 10 years. The long range plan (master plan) must have sufficient detail to build the structure, operations, and financial foundations for the future financial and operational needs of these essential services.

Recommendation 23: A master planning process should be used to develop the long-range plan for emergency services in Tredyffrin and Easttown Townships and to set a clear course for the foreseeable future.

All stakeholders must be identified and included in this process and all input should be well-structured to avoid allegations of favoritism or exclusion.

Figure 3: Tredyffrin and Easttown Strategic Planning Process

Step #1 – Identify the future mission and vision for townships fire/rescue services. This is the who, what, when, where, why, and how of the process. It is imperative that this process be consensual between the Fire/Rescue Advisory Board and the Townships' Administration. The recommendations from the body of this report should be used as the framework to build this mission and vision statement.

Step #2 – Analyze and prioritize the critical issues that are identified from the organizational assessment process of this study to develop direction for the plan. The recommendations should be triaged and each recommendation evaluated using the scoring process provided to establish the basis for the level of urgency.

Step #3 – From the prioritized recommendations establish broad brush goals to achieve your desired outcomes. These goals will be general statements of the outcomes needed to achieve and maintain the mission and vision of the fire/rescue services for the townships.

Step #4 – Set objectives and activities under each goal area to achieve the desired results. This should include specific steps and timelines for these steps, as well as overall timelines for the objectives.

Step #5 – Feedback and re-evaluation of the plan is essential to the overall success of the process. This must be done routinely during the entire implementation cycle of the plan and at least annually thereafter.

Prioritizing the Recommendations

The 23 recommendations given throughout the study are listed in Appendix A. Not all of the recommendations are equal in importance. To assist the townships with the assessment process, we developed a method to evaluate each recommendation using similar criteria:

1. What is the overall value of the recommendation to the townships? Does it improve the level of fire or emergency medical service provided?
2. What is the overall value of the recommendation to the fire companies as organizations? Does it contribute to firefighter safety and employee welfare?
3. What is the overall level of difficulty to implement the recommendation? Can the recommendation be implemented quickly or does it require a long or difficult planning process?
4. What is the overall cost to implement the recommendation? Is the cost a one-time expenditure or does it require repeated funding?

Criteria Defined – A general definition for each criterion follows:

Value of Recommendation to the Townships: Recommendations with very high value to the townships would be those with the potential to significantly improve service delivery such as adding a new service or improving an existing one. An example may be a recommendation that has the potential to significantly reduce loss or response time. A value judgment score of five means the recommendation has very high potential to improve community safety and emergency service delivery. Conversely, a judgment value of 0 means the recommendation will have no impact on community safety.

Value of Recommendation to the Fire Companies: Recommendations with a very high value to the fire companies are those that improve daily operations, improve efficiency and effectiveness, or change the organizational culture and management in a positive way. These can also be recommendations that are perceived by firefighters as improving their quality of work life or that improve their safety and health. A value judgment score of five means the

recommendation has the highest potential to improve the organization; a score of zero means the recommendation will have no impact on the Department.

Level of Difficulty to Implement: Recommendations with a high level of difficulty to implement are those that have long planning cycles, require significant changes to infrastructure, changes to codes or labor agreements, or require major policy changes. Recommendations with a judgment value score of zero means the recommendation has an extreme level of difficulty to implement; a score of five means there is no difficulty.

Cost of Implementation: Recommendations with high implementation costs are those requiring significant capital outlays like new fire stations, land purchases, or large recurring general fund costs such as additional personnel. A recommendation that requires only a minor change in policy, for example, would likely have a low cost of implementation. Recommendations with a judgment value score of five means that it has no implementation cost; a score of zero means that it has an extremely high cost to implement.

Scoring – For each recommendation a value judgment should be made using the four evaluation criteria above and a numerical score was assigned. The score ranges are shown in Table 35.

Table 35: Criteria for Scoring Range

Criteria	Low Score (Poorest)	High Score (Best)
Value to the Community	No Value = 0	Extreme Value = 5
Value to the Organization	No Value = 0	Extreme Value = 5
Level of Difficulty to Implement	Extreme Difficulty = 0	No Difficulty = 5
Cost of Implementation	Extreme Cost = 0	No Cost = 5

For example, a recommendation with the highest possible value to fire companies and to the townships would have a combined score of 10 for benchmarks 1 and 2. If the same recommendation had the lowest “level of difficulty to implement,” and it also had little (or no) cost to implement, its total score would be 20 points. Such a recommendation would be considered to be a high priority because it could be implemented easily and economically; it would also be of significant value to the community and to the fire departments. The composite score values can be interpreted as follows:

Table 36: Recommendation Priority Classes

Priority	Score
Lowest	0 to 4
Low	5 to 8
Moderate	9 to 12
High	13 to 16
Highest	17 to 20

This study has provided many recommendations, several detailed analyzes, and comparisons of Tredyffrin and Easttown Townships' fire and EMS services to national benchmarks. The study is in essence a cookbook of fire and EMS service recipes. The recipes you choose to use and the exact ingredients you add are in fact up to Tredyffrin and Easttown Townships. Whether you choose to make dessert before the main course is a decision for your leadership, hopefully with stakeholder input.

Whichever option is chosen, one thing is certain: the process will have its share of supporters and non-supporters who will have a great effect on the outcome of the decisions. The leaders must always keep the mission of all fire/rescue services at the sharp point of this endeavor. That mission is simply to save lives and protect property, and to do what is right for Mrs. Smith.

APPENDIX A: STUDY RECOMMENDATIONS AND PRIORITIZATION VALUES

To be completed by raters

Recommendation	Page	Community Value	Organizational Value	Difficulty	Cost of Implementation	Score
II. Response Time and Station Location Analysis						
1. Study and evaluate ways to reduce turnout times at both Berwyn Fire Company and Paoli Fire Company.	10					
III. Analysis of Operations and Management						
2. The Fire Companies should ensure that at least 13 personnel, plus 2 EMS personnel, are responding to any reported low hazard structural fire or emergency and upgrade the response to 17 or 25 personnel if needed.	24					
3. Ensure that operational policies establish 29CFR1910.134 compliance	24					
4. Edit Sections 5.6 and 5.15 of the SOM to reflect current vocabulary of the National Incident Management System.	29					
5. Training officers should complete a fire service instructor training program that meets or exceeds the criteria found in NFPA 1041 Standard for Fire Service Instructor Professional Qualifications.	30					
6. Amend the appendix of the SOM to include an annual skills maintenance program for apparatus operators.	31					
7. Amend the Berwyn Fire Company By-Laws to add minimal qualifications of chief officers. In addition to the current requirements, candidates for Fire Chief or any chief-level officer should require they	33					

Recommendation	Page	Community Value	Organizational Value	Difficulty	Cost of Implementation	Score
demonstrate training and/or experience equivalent to the requirements in NFPA 1021 Standard for Fire Officer Professional Qualifications, 2003 Edition.						
8. In addition to the criteria listed for driver qualifications, each driver should demonstrate mastery of the skills and knowledge provided in NFPA Standard 1002 Standard for Fire Apparatus Driver/Operator Professional Qualifications (2003 Edition).	35					
9. The Paoli Fire Company should adopt the NIMS and amend the ROP accordingly.	35					
10. Training officers for the Paoli Fire Company should complete a fire service instructor training program that meets or exceeds the criteria found in NFPA 1041 Standard for Fire Service Instructor Professional Qualifications.	36					
11. The Paoli Fire Company should establish a Training Program that tracks and documents all of the federally required training areas such as hazardous materials, bloodborne pathogens, and respiratory protection.	36					
12. The Paoli Fire Company should develop an Occupational Safety and Health program that meets or exceeds the standards set in NFPA 1500 2007 Edition.	37					
13. As part of the development of an Occupational Safety and Health Program, an Infectious Disease Control Program under the direction of the Safety Officer identified above should be established.	38					

Recommendation	Page	Community Value	Organizational Value	Difficulty	Cost of Implementation	Score
14. The Paoli Fire Company should establish minimal position descriptions for the Executive Officers and Board Members.	40					
15. Amend the Paoli Fire Company By-Laws regarding minimal qualifications of Chief Officers. In addition to the current requirements, candidates for Fire Chief or any chief-level officer should be required to demonstrate training and/or experience equivalent to the requirements found in NFPA 1021 Standard for Fire Officer Professional Qualifications. (2003 Edition).	40					
16. The Paoli Fire Company should discontinue the use of the current Employee Handbook and Operating Procedures and create in its place two separate manuals.	42					
17. As part of the process to become either a new member or employee of the fire companies, a criminal background check should be conducted. This check is part of the application and screening process.	42					
18. Both companies should institute a pre-employment/pre-membership, random, and post-critical incident Controlled Dangerous Substance (CDS) and Alcohol Testing Program.	43					
19. Expand the fire prevention process by establishing a proactive fire inspection program.	43					

Recommendation	Page	Community Value	Organizational Value	Difficulty	Cost of Implementation	Score
IV. Analysis of Capital Equipment and Finances						
20. The facility operated by Berwyn Fire Company should be replaced in the very near future.	51					
21. Adopt the APWA replacement schedule identified in Table 11 as a guide for an apparatus replacement plan.	56					
22. Provide a stipend of $120 per ALS response to Berwyn Fire Company.	65					
IV. Analysis of Capital Equipment and Finances						
23. A master planning process should be used to develop the long-range plan for emergency services in Tredyffrin and Easttown Townships and to set a clear course for the foreseeable future.	75					

APPENDIX B: COMPARISON OF NFPA 1720 AND BERWYN FIRE COMPANY

NFPA 1720, Chapter 4 and Berwyn Fire Company

Chapter 4. Organization, Operation & Deployment	Meets Standard	Does Not Meet Standard	Unable to Determine	Reference	Comment
Section 4.1 Fire Suppression Organization					
Sec 4.1.1	X			SOM & By-Laws	
Sec 4.1.2	X			SOM Sec. 6.11 & 11.4	
Sec 4.1.3	X			SOM Sec 1.5	
Sec 4.1.4	X			SOM Sec 4.4.4 & 4.4.5	
Sec 4.1.5	X			SOM Sec 4.4.7	
Sec 4.1.6	X			SOM Sec 4.1.9	
Sec 4.1.7	X			Chester County Dispatch	
Sec 4.1.8	X			Chester County Dispatch	
Section 4.2 Fire Suppression Operations					
Sec 4.2.1	X			SOM Sec 4.19	
Sec 4.2.1.1	X			SOM Sec 4.19	
Sec 4.2.1.2	X			SOM Sec 5.2.3	
Sec 4.2.1.3	X			SOM sec 3.15.9	
Sec 4.2.1.4	X			SOM Sec 5.16	
Sec 4.2.1.5	X			SOM Sec 2.23	
Sec 4.2.1.6	X			SOM Sec 4.6	
Section 4.2.2 Initial Attack					
Sec 4.2.2.1			X		Set response complement per NFPA handbook

Chapter 4. Organization, Operation & Deployment	Meets Standard	Does Not Meet Standard	Unable to Determine	Reference	Comment
Sec 4.2.2.2			X		Set response per NFPA handbook
Sec 4.2.2.2.1	X			SOM Sec 3.5.12	
Sec 4.2.2.2.2	X			SOM Sec 3.5.18	
Sec 4.2.2.2.3	X			SOM Sec 3.17	
Sec 4.2.2.3	X			SOM Sec 3.17	
Sec 4.2.2.4	X			SOM Sec 3.5.18	
Section 4.3 Intercommunity Organization					
Sec 4.3.1	X			Chester County	Also Relief Association
Sec 4.3.2	X			SOM Sec 11.1	
Sec 4.3.3	X			SOM Sec 5.11	

Section 4.4. Emergency Medical Services	Meets Standard	Does Not Meet Standard	Unable to Determine	Reference:	Comment
Sec 4.4.1	X			SOM Sec 6.19	
Sec 4.4.1.1					
Sec 4.4.1.2	X			By-Laws Sec 2	
Section 4.4.2 System Components					
Section 4.4.3 EMS System Functions					
Sec 4.4.3.1	X			SOM Sec 1.2	
Sec 4.4.3.2	X			SOM Sec 1.2	
Section 4.5 Quality Management					
Sec 4.5.1					
Sec 4.5.2					
Sec 4.5.3					
Sec 4.5.4					

Section 4.4. Emergency Medical Services	Meets Standard	Does Not Meet Standard	Unable to Determine	Reference:	Comment
Section 4.6 Special Operations Response					
Sec 4.6.1	X			SOM Sec 11.4	Multiple References
Sec 4.6.1.1	X				
Sec 4.6.2	X			SOM Sec 6.11	
Sec 4.6.3	X			SOM Sec 2.4	
Sec 4.6.4	X			SOM Sec 3.12	
Sec 4.6.5	X			SOM Sec 6.11	

NFPA 1720, Chapter 5 and Berwyn Fire Company

Chapter 5. Systems	Meets Standard	Does Not Meet Standard	Unable to Determine	Reference:	Comment
Section 5.1 Safety & Health Systems	X			SOM Sec 3.1	
Section 5.2 Incident Management System	X			SOM Sec 5.1	
Sec 5.2.1	X			SOM Sec 5	Minor Exceptions Noted
Sec 5.2.2	X			SOM Sec 5	Minor Exceptions Noted
Section 5.3 Training Systems	X			SOM Sec 7.0	
Section 5.4 Communications Systems	X			SOM Sec 5.23	
Sec 5.4.1	X			Chester County	
Sec 5.4.2			X	Chester County	Beyond Scope of work
Sec 5.4.3	X			SOM Sec 5.10	
Sec 5.4.3.1	X			SOM Sec 5	Minor Exceptions Noted

Chapter 5. Systems	Meets Standard	Does Not Meet Standard	Unable to Determine	Reference:	Comment
Section 5.5 Pre-Incident Planning	X			Box System Summary	

APPENDIX C: COMPARISON OF NFPA 1720 AND PAOLI FIRE COMPANY

NFPA 1720, Chapter 4 and Paoli Fire Company

Chapter 4 Organization, Operation and Deployment	Meets Standard	Does Not Meet Standard	Unable to Determine	Reference:	Comment
Section 4.1 Fire Suppression Organization					
Sec 4.1.1	X			Art. 1 Bylaws	
Sec 4.1.2	X			Easttown EMA	
Sec 4.1.3	X			Art.8 Bylaws	
Sec 4.1.4	X			ROM Art 8	
Sec 4.1.5	X			ROM Art 8	
Sec 4.1.6			X		
Sec 4.1.7	X			Chester County Dispatch	
Sec 4.1.8	X			Chester County Dispatch	
Section 4.2 Fire Suppression Operations					
Sec 4.2.1		X		Not NIMS compliant	Yes for Haz-Mat
Sec 4.2.1.1		X		Not NIMS compliant	
Sec 4.2.1.2		X			
Sec 4.2.1.3	X			ROM Appendix	
Sec 4.2.1.4	X			ROM Art 3	
Sec 4.2.1.5	X			ROM Art3	
Sec 4.2.1.6	X			ROM Art3	
Section 4.2.2 Initial Attack					
Sec 4.2.2.1			X		Set response per NFPA handbook
Sec 4.2.2.2			X		Set response per NFPA handbook
Sec 4.2.2.2.1			X		
Sec 4.2.2.2.2	X			ROM Art 4	
Sec 4.2.2.2.3	X			ROM Art 4	

Chapter 4 Organization, Operation and Deployment	Meets Standard	Does Not Meet Standard	Unable to Determine	Reference:	Comment
Sec 4.2.2.3		X			No reference to NFPA 1500
Sec 4.2.2.4			X		
Section 4.3 Intercommunity Organization					
Sec 4.3.1	X			Chester County Dispatch	
Sec 4.3.2		X			Not found
Sec 4.3.3	X			ROM Art 7	

Section 4.4. Emergency Medical Services	Meets Standard	Does Not Meet Standard	Unable to Determine	Reference:	Comment
Sec 4.4.1	X			Chester County Dispatch	
Sec 4.4.1.1					
Sec 4.4.1.2			X		
Section 4.4.2 System Components					
Section 4.4.3 EMS System Functions					
Sec 4.4.3.1					
Sec 4.4.3.2					
Section 4.5 Quality Management					
Sec 4.5.1					
Sec 4.5.2					
Sec 4.5.3					
Sec 4.5.4					
Section 4.6 Special Operations Response					
Sec 4.6.1		X			Other than Haz-Mat not indicated
Sec 4.6.1.1					
Sec 4.6.2		X			

Section 4.4. Emergency Medical Services	Meets Standard	Does Not Meet Standard	Unable to Determine	Reference:	Comment
Sec 4.6.3	X			ROM Appendix	
Sec 4.6.4		X			
Sec 4.6.5	X			Chester County Dispatch	

NFPA 1720, Chapter 5 and Paoli Fire Company

Chapter 5 Systems	Meets Standard	Does Not Meet Standard	Unable to Determine	Reference:	Comment
Section 5.1 Safety & Health Systems	X				
Section 5.2 Incident Management System					
Sec 5.2.1	X				
Sec 5.2.2	X				
Section 5.3 Training Systems	X				
Section 5.4 Communications Systems					
Sec 5.4.1	X			Chester County Dispatch	
Sec 5.4.2			X		Beyond Scope of Work
Sec 5.4.3.	X			ROM Art 7	
Sec 5.4.3.1			X		
Section 5.4 Pre-Incident Planning			X		