City of Bangor

Maine

Fire Department

Performance Management Review

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Emergency Services Consulting International

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Executive Summary

The City of Bangor, Maine engaged Emergency Services Consulting International (ESCI) to conduct a Fire Department Performance Management Review for the Bangor Fire Department (BFD) that involved a review of the fire protection and emergency medical services provided by the department. The contents of this report represent the culmination of that review. This executive summary provides a snapshot of the evaluation components as well as major recommendations.

The report begins with an agency analysis in which can be found the results of the evaluation of the organization. This section provides an overview of the organization, governance and lines of authority, foundational policy documents, organizational design, finance, budget and financial controls. The Bangor Fire Department is a direct operating department of City of Bangor and provides fire protection and advanced life support (ALS) emergency medical transport services to the community. The department's jurisdiction duplicates the governmental boundaries of the community. The response area includes older historical downtown structures, a mix of high-density commercial and residential developments, and some lower density suburban residential areas. Bangor is the county seat of Penobscot County and is situated on the west bank of the Penobscot River, about 75 miles northeast of the state capital of Augusta.

The department now provides emergency services to a population of 31,450 in an area of roughly 34 square miles. As a commercial and retail hub in the region, daytime population swells to 50,338. The department's services are provided from three facilities located within the city. The department maintains three fire engines, one aerial truck, one tanker, one heavy rescue truck, and three ambulances. Specialty or utility units include a mobile command unit, utility truck, and small boat. In addition, one engine, one ladder, and two ambulances are available in a reserve fleet not typically used for front-line service. There are 95 individuals involved in delivering service to the jurisdiction. The department's primary management team includes a chief and four assistant chiefs. Three clerical staff, one mechanic, a fire inspector and a public educator provide additional support services. Primary staffing coverage for emergency response is through the use of career firefighters on shifts covering all 24 hours a day. For immediate response, at least 18 personnel are on duty at all times. In regards to resources, the department has a slightly lower number of stations and engines (pumpers) than the national median of departments of similar size and serving similar geographies and populations. The

evaluation also found that the department experiences a significantly higher number of total incidents than comparable departments but an only slightly higher number of actual fires.
The second segment of the report reviews management components including planning, communications, document control and security and information management and technology.

The department has not fully conducted formal strategic planning processes and no clear organizational vision for the future has been developed. Member value statements do not exist, nor are goals and objectives formally established to direct organizational effort. Regular staff meetings have been initiated in this agency, and include all officers in the management team on a monthly basis. All company officers are included at least annually. Written, formal memorandums are regularly utilized for distribution of information, ensuring that all members receive critical data in an organized and consistent fashion. Paper records (hard copy files) are adequately secured with passage and/or container locks with limited access. Important computer files are backed-up to a secure data location on a regular and consistent basis. As such, this department's members direct their efforts at the immediate issues of the day and are unable to commit cohesive time to team planning for future service delivery, evaluating service improvement opportunities, or developing new programs and services desired by the customer. A customer-centered strategic planning process could resolve much of this deficiency and give the department a clear sense of direction.

Part three of the evaluation provides a review of the personnel management function of the department including policies and rules and regulations, reporting, compensations systems, labor-management relations, disciplinary and appeals processes, application, recruitment and retention efforts, testing and measurement and health and wellness programs as well as an evaluation of staffing systems including overtime usage. Although the International Association of Firefighters (IAFF Local 772) is active within BFD and maintains a Collective Bargaining Agreement (CBA) that outlines many of the requisite personnel policies and procedures, the City of Bangor also maintains a Human Resources department that publishes and updates a *City Personnel Rules and Regulations* manual covering aspects of employment not otherwise addressed within the CBA. These policies also cover personnel that are non-union such as the fire chief, assistant fire chiefs, and clerical personnel. Compensation systems are in line with industry practices and labor-management relations are considered to be good.

The administrative and support component of BFD is comprised of the fire chief, four assistant chiefs, one fire inspector, one fire educator, and three clerical positions. All administrative and support functions are handled by these positions, with some delegation to the department's captains and lieutenants. Statistically, the department maintains a ratio of 9.5 percent of administration and support staff to total personnel. The department's administrative and support staffing level is slightly below the comparison 10 to 15 percent range that is typical for a career fire department mentioned previously. BFD uses career staffing to carry out its primary emergency services functions. All administrative, support, and response staff are career personnel. The fire inspector, public educator, and mechanic are all qualified firefighting personnel; although considered to be part of the bargaining unit and covered by the CBA, they are not allowed to participate in fire suppression or medical response activities.

Cross-staffing of units (jump-staffing) is the standard method of personnel deployment for BFD unless at maximum staffing. This method is complicated and individual apparatus staffing varies based on type of incident dispatched and availability of personnel at the time of the incident. For example, if a large structure fire incident is dispatched in Station 1's area, an engine with three persons will respond along with a ladder with one person (at minimum staffing). If the dispatched incident is a rescue situation, then those same personnel would respond in the engine and the heavy rescue.

The average number of responders is lower than the minimum on-duty staffing for department. This is due, in part, to the likelihood of other incidents occurring simultaneously with structure fire incidents such as medical responses and other non-structure fire related incidents. Based on the National Fire Incident Reporting System (NFIRS) used by BFD, the average structure fire staffing for the 2008 to 2010 study period was 10.4 personnel, not including mutual and automatic aid personnel. BFD had a high of 97 FTEs in the fiscal years 2004, 2006, and 2008 and a low of 93 FTEs in the current fiscal year. The following figure illustrates the year-to-year percent of change in FTEs and the average percent of change from 2004 to 2011. Over the eight-year period, BFD has decreased FTEs an average of 2.2 percent annually with the largest percentage occurring during 2007 and 2009 (3.1 percent) with an offsetting increase during fiscal year 2008 of a 3.2 percent increase.

Overtime use is often unpredictable in the fire service by the very nature of working with emergency activities. However, statistical data can be used as the predictor of future use.

Overtime in fiscal year ending in 2008 exceeded the budgeted amount by 42.4 percent and has averaged 33.6 percent for the last five fiscal years. The population for the City of Bangor has remained steady over the last decade. To gauge the impact of overtime on the community, actual overtime costs were calculated on a per capita basis for each of the last five years. The cost per capita has varied between $10.78 and $13.07 during the five years and has averaged $12.14. Per capita costs for overtime have been trending downward lately, albeit slightly. As a regional comparison, the City of Lewiston maintained an average per capita overtime expenditure of $11.64 over the same period, not a statistically significant difference.

The next section of the report focuses on the capital assets and capital improvement programs of the department. The department has millions of dollars' worth of capital assets. These assets are necessary to provide service and must be maintained and replaced as needed. Maintenance and replacement plans for facilities, apparatus, and other high value equipment are essential and a funding mechanism must be in place to ensure money is available to meet these costs. Stations were considered to be in new to good general condition and no significant issues were identified in regards to safety and or code compliance. Each apparatus was evaluated as to general condition and suitability for current use. The following categories illustrate the results of that evaluation.

- Excellent – 6 apparatus
- Good – 1 apparatus
- Fair – 3 apparatus
- Poor – 1 apparatus
- Serviceable – 0 apparatus
- Un-rated – 5 apparatus (not on-site during evaluation)

The Bangor Fire Department has a designated full-time mechanic to perform maintenance and repairs for all apparatus, staff vehicles, and small equipment. The mechanic has a well-stocked and equipped facility located at Central Station and performs all preventive maintenance, emergency repairs, and required inspections. On-duty shift personnel perform visual inspections for leaks, worn parts, and damage. They may also top off fluids and make minor repairs such as light bulbs changes and tool mount adjustments.

The final sections of the report focus on actual service delivery and include an evaluation of communications and dispatch systems, service demand, distribution of resources, concentration

of resources, reliability and concurrency of incidents and system response performance as well as an evaluation of the emergency medical services, hazardous materials and technical rescue functions of the department.

The department is provided communications and dispatch services through the Bangor Police and Fire Communications Center (BPFCC or Communications Center), a branch of the Bangor Police Department. The dispatch center is the primary Public Safety Answering Point for the City. The Communications Center is managed under the police department command structure without formal representation from the fire department.

National Fire Incident Reporting System (NFIRS) records were provided for a two-year period between December 1, 2008, and November 30, 2010. In addition, the department also provided historical workload data for 2003 through 2009. Monthly workload for fire calls varies in any given year. Generally, service demand is slightly higher in the mid-summer and mid-winter months and analysis of workload by day-of-week indicates that workload is lower on the weekends than during the normal workweek. Activity for fire calls generally begins to increase between the hours of 7:00 a.m. and 8:00 a.m., reaching peak volume during the midday hours before gradually declining into the evening. Peak activity times can be reflected in response time performance in certain cases.

The department does not have any formal performance objectives that it has used in the past. For purposes of service delivery performance analysis, ESCI strongly recommends that the city adopt formal performance objectives by which various response and service delivery performance points can be measured for the department. Based on analysis of current resource distribution, the department can physically cover almost 90 percent of the service demand inside the city limits within four minutes (4:00) of travel time. The department can cover almost 100 percent of its service demand within six minutes of travel time. This is favorable when compared against NFPA 1710, the standard that pertains to career fire departments. That same standard also recommends that a full-alarm assignment of suppression personnel be assembled within eight minutes of travel time. The number of firefighters needed for a structure depends on size and complexity of the structure and is discussed in length in another section of this report.

Most of the southeastern half of the city is within the capability of amassing between 12 and 16 firefighters within eight minutes. By contrast, much of the northwestern half of the city is limited to five or fewer firefighters within eight minutes. Again, if additional development occurs in the northwest areas of the city, it may require deployment of additional resources and fire stations to achieve appropriate resource concentration.

For most departments, the majority of calls occur one or two at a time. However, as communities grow the propensity for concurrent calls increases. When the concurrency reaches a level to which it stretches resources to near capacity, response times begin to extend. Although multiple medical calls will cause drawdown, especially as concurrency increases, they usually occupy only one unit at a time. Concurrent fire calls, however, are of more concern as they may require multiple unit responses for each call depending upon the dispatch criteria. Analysis indicates that Rescue 1 is committed and therefore unavailable for another response a little over 22 percent of the time and Rescue 6 is unavailable about 17 percent of the time. Each of these units can be expected to have to have a replacement rescue unit dispatched into their first due response area about a fifth of the time. Simultaneous dispatch of an EMS-equipped engine or truck from the home station will mitigate the delay of the ambulance.

The most frequently recorded response time for calls is within the seventh minute. Specifically, the average is 7 minutes 46 seconds, with 90 percent of all calls answered in 11 minutes 49 seconds or less, substantially longer than the response performance recommended in NFPA 1710. One element of the overall response time performance that firefighters can control is the turnout time interval. Turnout time represents the period between the radio dispatch of a call and the time the unit actually leaves the building or location where it is staged and begins travel to the incident. It can include activities such as moving to the apparatus, donning gear and equipment, verifying travel routes and maps, and buckling safety harnesses. The lack of a fire service CAD system is discussed in this report, and response time performance measurement provides another example of the reason why it is important. The incident data provide to ESCI by the department (National Fire Incident Reporting System records), does not provide specific timestamps for call answering, call processing, call dispatch, and when each individual unit responded to the call. Therefore, call processing and turnout time could not be established and analyzed.

The department operates Advanced Life Support (ALS) transport ambulances, as well as ALS engine companies, as part of the department's overall delivery of emergency services to the community. The delivery of emergency medical services is an integral part of the department's mission. The department staffs three ambulances 24-hours a day each staffed with at least one emergency medical technician–paramedic (EMT-P) and one emergency medical technician (EMT). In addition to ALS ambulances, all department apparatus are typically staffed with at least one additional EMT-P and a vast majority of department personnel are certified at least to the EMT level. There are several options available to the City of Bangor in regard to staffing of emergency medical services units that may have the potential to reduce total costs but each option has both pros and cons that must be considered including the use of civilian paramedics, the use of part-time firefighter/paramedics during peak hours, considering alternatives to providing specialty transports, and potential privatization of the service. Each option is discussed and pros and cons of each strategy are provided.

The department provides hazardous materials response services at the operations level. Primary mitigation occurs during motor vehicle accidents to contain leaking fluids, as well as air monitoring for various odor investigations including carbon monoxide and smells of gas. Operations level services are primarily delivered by the department via engine companies, but can be supported by the ladder company or heavy rescue. For incidents requiring mitigation at the technician level, the Orono Fire Department jointly responds with six hazardous materials technicians and a specialized vehicle. Memorandums of understanding (MOU) are in place through the county response system. Members of the department provide incident support within their scope of training. The Orono Fire Department is also the initial WMD response agency, with a tiered response in place from county to state response based on the scope and magnitude of the incident. There is a plan in place to summon a back-up team if needed. The department does not have a specific response guideline for hazardous materials; however, it does have a dedicated running order in place.

The department is an active provider of technical rescue response and support. In the event of an incident that is beyond the scope of the department's staffing or operational capability, there is an identified system in place to activate external technical rescue resources. A formal department-wide technical rescue risk assessment should be conducted to determine the need for each specific discipline. History, frequency, and potential of technical rescue events should be part of the assessment. Tower rescue should receive direct attention under the rope rescue

portion of the assessment. Specific attention should be given to the feasibility of delivering these services based on number of trained rescuers and time commitment required for skills maintenance. Although the intention to provide all of these services is genuine, the demand of initial and continued education is difficult for an organization to maintain in addition to fire suppression responsibilities. A comprehensive assessment should evaluate the feasibility of sharing some of these specialized services with other departments or the elimination of some services.

Management of the training program is assigned to an assistant chief; this task is in addition to his shift supervisory responsibilities. Other experienced officers or senior firefighters will assist the assistant chief with the delivery of various training topics. The department has a number of certified instructors at Level I; however, only a few are certified at Levels II and III to assist with training tasks. An established training calendar is in place, addressing skills maintenance and compliance training. The department has had its own dedicated training facility located in its jurisdiction since 1987. Various structures and props at this site include a roof vent simulator, forcible entry building, drafting pit, and propane tanks. Rope and confined space evolutions can also be conducted at this site. The facility offers the ability to conduct live fire and search and rescue training as well. Acquired structures are used for live fire training when available.

The most effective way to combat fires is to prevent them. A strong fire prevention program reduces loss of property, life, and the personal disruption that accompanies a catastrophic fire. A fire department should actively promote fire resistive construction, built-in warning and fire suppression systems, and an educated public trained to minimize the risk to fire and health challenges and to respond effectively when faced with an emergency. Fire code enforcement and administration within the City of Bangor is the responsibility of the fire chief who delegates that authority to an assistant chief. Actual code enforcement activities, however, are further delegated to a single fire inspector. During 2009, fire prevention personnel conducted 1,291 inspections. In addition to those inspections noted above, the bureau also handles over 3,000 calls for citizen assists, over 100 plans reviews and meetings, and nearly 150 referrals and complaints. This level of workload has been accomplished on an on-going basis although the division has seen an overall reduction in staffing over the past several years.

ESCI began collecting information regarding the delivery of fire and emergency services to the City of Bangor in December 2010. This report serves as the result of extensive evaluation and

analysis of information obtained through personal interviews, the review of written documents and reports, and electronic data. Throughout the report, ESCI has provided recommendations that are achievable in the short or mid-term, typically within a maximum of five years. These 65 individual recommendations have been prioritized into five categories as summarized below.

- Priority 1 – Immediate Internal Life Safety — No recommendations
- Priority 2 – Legal or Financial Exposure — 2 recommendations
- Priority 3 – Corrects a Service Delivery or Management Issue — 17 recommendations
- Priority 4 – Enhances Service Delivery or Management — 42 recommendations
- Priority 5 – A Good Thing to Do — 4 recommendations

The evaluation has taken nearly five months to complete and this document contains an enormous amount of information related to the Bangor Fire Department's delivery of fire suppression, rescue and emergency medical services to the City of Bangor. It is ESCI's sincere hope that the information presented and the recommendations provided will allow the city to enhance its delivery of emergency services to the community.

Fire Department Agency Analysis

The City of Bangor, Maine engaged Emergency Services Consulting International (ESCI) to conduct a Fire Department Performance Management Review for the Bangor Fire Department (BFD) that involved a review of the fire protection and emergency medical services provided by the department. The contents of this report represent the culmination of that review.

Organization Overview

The Bangor Fire Department is a direct operating department of City of Bangor and provides fire protection and advanced life support (ALS) emergency medical transport services to the community. The department's jurisdiction duplicates the governmental boundaries of the community. The response area includes older historical downtown structures, a mix of high-density commercial and residential developments, and some lower density suburban residential areas. Bangor is the county seat of Penobscot County and is situated on the west bank of the Penobscot River, about 75 miles northeast of the state capital of Augusta.

The department has a rich tradition, providing well over a century of service to the city. Unquestionably the worst disaster to strike Bangor was the Great Fire of 1911, which reshaped the city's landscape, burning 55 acres, destroying 267 buildings, damaging 100 more, and causing $3,188,081.90 in losses and damage. Flames were visible up to 25 miles away, and light from the fire was visible 50 miles away in Bar Harbor, 33 miles away in Belfast and 107 miles away in Brunswick. When it became apparent the fire was too much for firefighters in Bangor and surrounding towns, firefighters in Waterville, Augusta, Lewiston and Portland boarded special trains to Bangor. The conflagration left 75 families homeless and destroyed more than 100 businesses during a nine-hour span.

BFD now provides emergency services to a population of 31,450[1] in an area of roughly 34 square miles. As a commercial and retail hub in the region, daytime population swells to 50,338[2]. The area served by the department is experiencing very limited growth.

The department's services are provided from three facilities located within the city. The department maintains three fire engines, one aerial truck, one tanker, one heavy rescue truck,

[1] U.S. Census Bureau, 2009 population estimates data.
[2] U.S. Census Bureau daytime population estimates data.

and three ambulances. Specialty or utility units include a mobile command unit, utility truck, and small boat. In addition, one engine, one ladder, and two ambulances are available in a reserve fleet not typically used for front-line service.

There are 95 individuals[3] involved in delivering service to the jurisdiction. The department's primary management team includes a chief and four assistant chiefs. Three clerical staff, one mechanic, a fire inspector and a public educator provide additional support services. Primary staffing coverage for emergency response is through the use of career firefighters on shifts covering all 24 hours a day. For immediate response, at least 18 personnel are on duty at all times.

The Insurance Services Office (ISO) reviews the fire protection resources within communities and provides a Community Fire Protection Rating system from which insurance rates are often based. The rating system evaluates three primary areas: the emergency communication and dispatch system, the fire department, and the community's pressurized hydrant or tanker-based water supply. The overall rating is then expressed as a number between 1 and 10, with 1 being the highest level of protection and 10 being unprotected or nearly so. As of the latest rating, ISO gave the service area a split rating of Class 3/8b. The lower class applies to structures within 1,000 feet of a creditable water source (hydrant), while the higher class applies to structures located further from water supplies.

The last rating review was completed by the Insurance Services Office in February 2011. At that time, the ISO classification details indicate that the fire department received a credit of 35.75 out of a possible 50 points, while the community's water system received 36.06 out of a possible 40 points. The dispatch center received a score of 8.53 out of a possible 10 points. The community was assigned a basic fire flow requirement of 3,500 gpm (gallons per minute), and the maximum needed fire flow that was listed in the evaluation was 7,500 gpm. Primary improvement areas for the fire department included additional personnel response to incidents and additional documented training. The department only received 1.89 points out of a possible 9 points of credit for training. The deficiencies in the training program will be discussed in greater detail elsewhere in this report, but a higher training score could have been sufficient to have moved the city to a Class 2 rating. The department's rating should be reviewed in detail to

[3] Current number at time of field research. Includes all operations, support and civilian personnel.

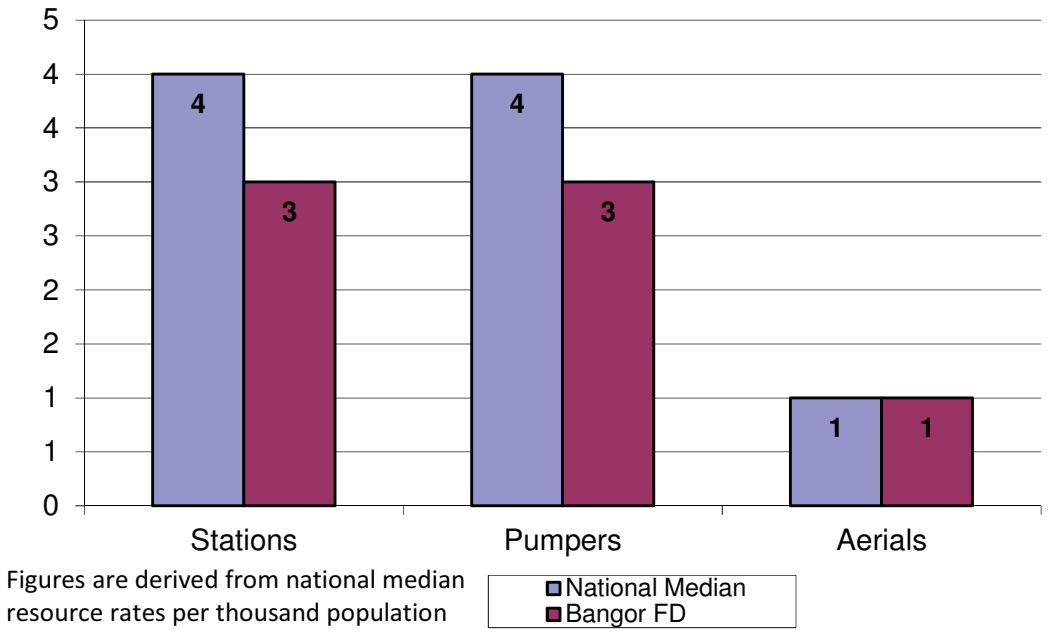
determine what simple improvements can be made and, if necessary, when a re-rating should be requested.

The department provides a variety of services, including fire suppression, emergency medical transport, operations-level hazmat, and technician-level rescue disciplines of confined space, building collapse, trench, high-angle rope, swift and cold water. The department also provides fire inspections and public education, as well as oversees the city's emergency management functions. A regional hazardous materials response team operated by Orono Fire Department provides technician-level hazmat response.

The Bangor Police and Fire Communications provides emergency call receipt and dispatch service. Enhanced-911 telephone service, computer-aided dispatch, and a multi-channel radio system are in place.

The following figure provides an overview of the Bangor Fire Department's fire suppression resources and compares these with the average rate of resource allocation in other communities of similar size within the same region of the United States[4].

Figure 1: Comparison of Fixed and Mobile Resources

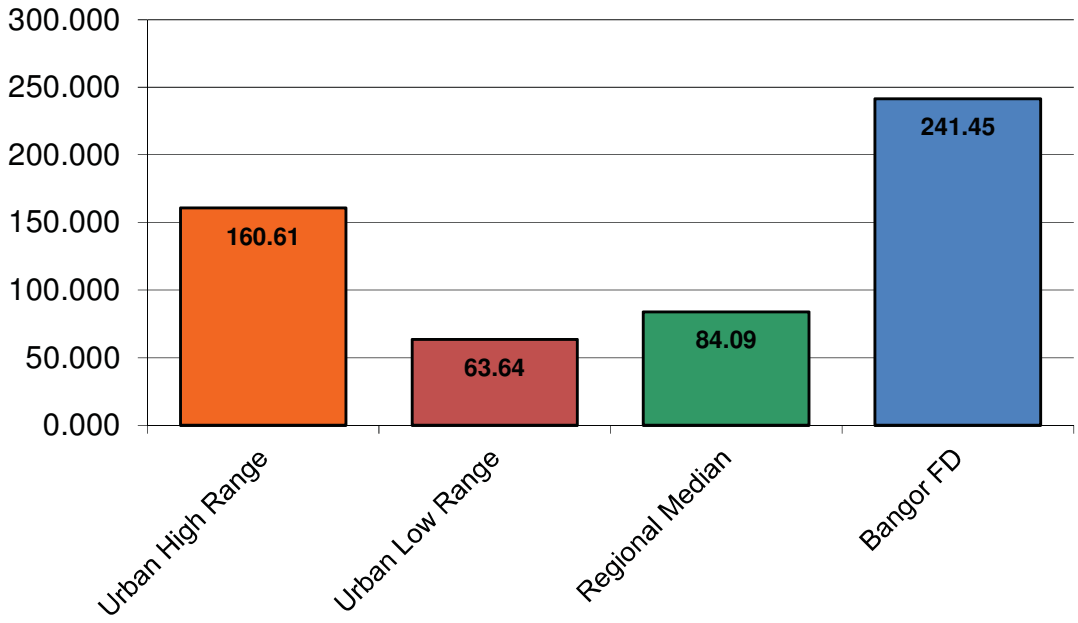


[4] All comparison data from the National Fire Protection Association *Fire Department Profiles 2009.*

The chart demonstrates that BFD has a slightly lower than median allocation of stations for departments serving similar populations. The department also has a lower than median number of pumpers in front-line service.

The following figure provides a comparison between the total workload of the Bangor Fire Department with that of other communities of similar population in the northeast region of the United States. The numbers are expressed per 1,000 population.

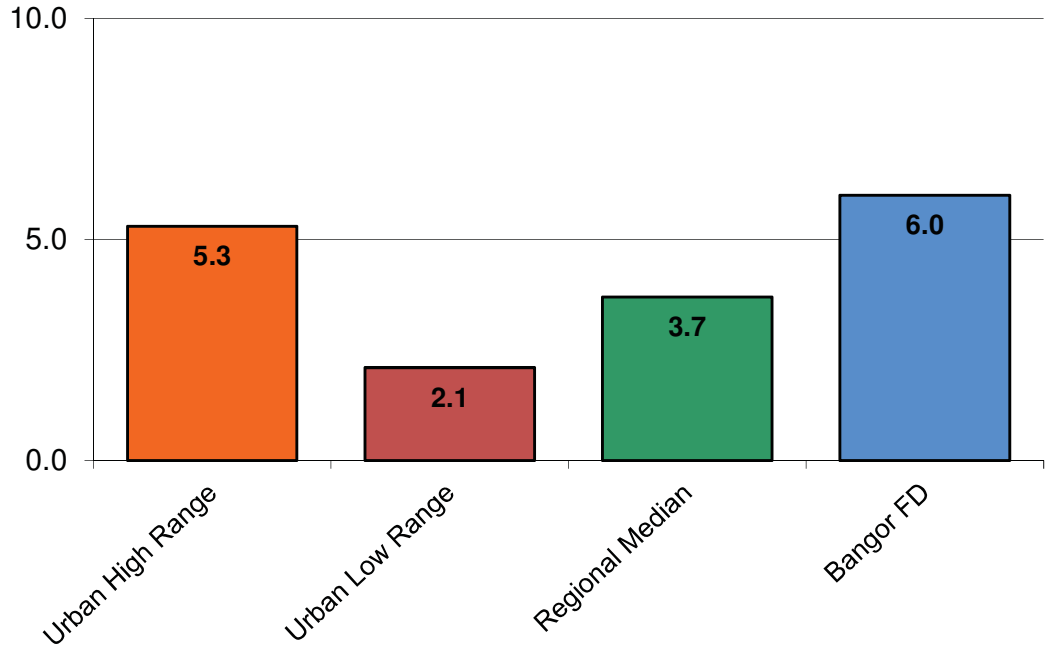
Figure 2: Comparison of All Incidents per 1,000 Population



The Bangor Fire Department experiences a significantly higher than median ratio of total incidents to population. It should be noted that source data from the National Fire Protection Association does not segregate departments that provide transport ambulance service from those that do not. Departments with responsibility for ambulance service will always have a much higher number of responses than those departments that do not provide this service. This may account for at least a portion of the higher incident experience in Bangor.

The following figure compares the ratio of only actual fire incidents to that experienced by other similar communities.

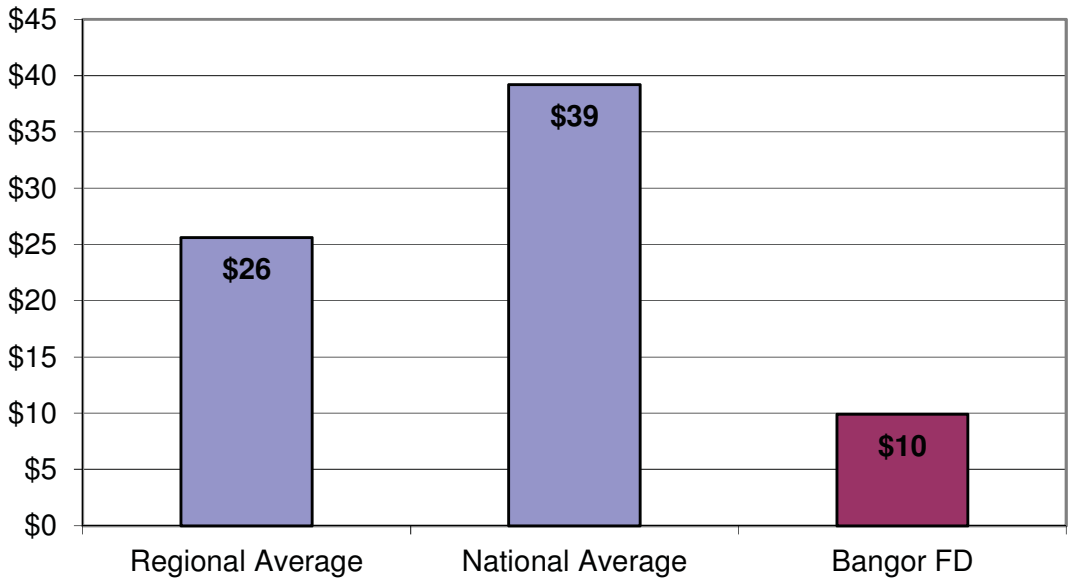
Figure 3: Comparison of Fire Incidents per 1,000 Population



Again, Bangor has a much higher ratio of fire incidents than communities of similar size in the northeast United States, even higher than the typical range of incident ratios from all population groups considered to be 'urban' in size.

While the total incident ratios and fire incident ratios are significantly higher than the regional median, the actual dollar loss by fire per capita is significantly lower, as shown in the following figure.

Figure 4: Comparison of Fire Loss per Capita



ESCI's observations are that the fire incident ratio is extremely high, nearly twice that of the regional median, while the fire loss per capita is less than half that of the regional comparisons. These comparisons are unusual enough that caution should be used in the application of the comparisons. ESCI has no means to audit the individual incident data and cannot comment conclusively on its accuracy, but we find the differences to be extreme enough to recommend additional review of the methods behind the data entry.

It is possible for fire incident ratios to be pushed artificially high by errors in coding the incidents in the National Fire Incident Reporting System (NFIRS). Additional quality assurance (QA) reviews of the incident reports may reveal any such problems, which could then lead to any necessary remedial training in use of the NFRIS data entry program. ESCI has already discussed this with the department and efforts are underway to review the data. If, in fact, the community is experiencing this high ration of fire incidents, further analysis of the NFIRS data can reveal any trends in occupancy types, age groups involved, location within structures, and other crucial pieces of information that can be used to tailor or fine-tune enhanced, targeted public education efforts aimed at reducing these numbers.

Likewise, BFD's fire loss per capita ratio is extremely low, less than half that of the regional median. ESCI's experience is that this is often an indication of inaccurate data collection. For instance, the calculations used by ESCI are taken from the loss reporting fields of the NFIRS

incident reports, the same fields that are used by the state and federal governments for data compilation. However, the department officers indicated that personnel often enter loss information only in the narrative section of the incident records. Indeed, the total dollar loss figures computed from the official NFIRS loss fields does not match that found in the department's annual report.

The fire department should have a system for accurately estimating fire loss for all fire incidents, structure or otherwise, and should train fire officers on the correct process for data entry. Whenever possible, follow-up information on actual loss figures should be obtained from the insurance company and updated in the incident report. Fire insurance adjusters can be a helpful source of training in basic loss estimating procedures.

Recommendation:

- BFD should perform routine audit and quality control on the NFIRS incident reports to ensure accuracy in incident coding and loss estimates.

Governance and Lines of Authority

The City of Bangor is a municipal corporation, formed under the laws of the State of Maine, and operates as a charter city that is provided the authority to levy taxes for operating a fire protection system.

The municipal corporation operates under a Council-Manager form of governance, and the city council is provided with necessary power and authority to govern the provision of fire protection and emergency services in the designated jurisdiction. As the governmental authority, the powers of City of Bangor include: organizing a fire protection system, appointing officers and members, purchasing land and equipment, entering into contracts, issuance of bonds, and levying of taxes.

The role and authority of the city council and the city manager is further clarified within city charter and ordinances and written policy documents describing their function and tasks. The city council maintains strictly policy-level involvement, avoiding direct management and hands-on task assignment, an arrangement established within written policy.

The fire chief is an appointed at-will employee and is provided with a personal services contract. The city manager is to provide an annual formal written evaluation of the chief's services as a means of documenting performance and establishing personal objectives.

Foundational Policy

Organizations that operate efficiently are typically governed by clear policies that lay the foundation for effective organizational culture. These policies set the boundaries for both expected and acceptable behavior, while not discouraging creativity and self-motivation.

A comprehensive set of departmental operating rules and guidelines should contain at least two primary sections. The following format is suggested.

1. Administrative Rules – This section would contain all of the rules that personnel in the organization are required to comply with at all times. Administrative rules, by definition, **require** certain actions or behaviors in all situations. The governing body should adopt or approve the Administrative Rules since the chief is also subject to them. However, the governing body should then delegate authority to the chief for their enforcement on department personnel. Administrative rules should govern **all** members of the department: career, part-time, volunteer or civilian. Where rules and policies, by their nature, require different application or provisions for different classifications of members, these differences should be clearly indicated and explained in writing. Specifically the Administrative Rules should contain sections which address:
    - Public records access and retention
    - Contracting and purchasing authority
    - Safety and loss prevention
    - Respiratory protection program
    - Hazard communication program
    - Harassment and discrimination
    - Personnel appointment and promotion
    - Disciplinary and grievance procedures
    - Uniforms and personal appearance
    - Other personnel management issues
2. Standard Operating Guidelines (SOGs) – This section should contain *street-level* operational standards of practice for personnel of the department. SOGs are different from administrative rules in that variances are allowed in unique or unusual circumstances where strict application of the SOG would be less effective. The document should provide for a program of regular, systematic updating to assure it remains current, practical and relevant. SOGs should be developed, approved, and enforced under the direction of the fire chief.

BFD works with four primary policy manuals: the collective bargaining agreement, the city employee handbook, the standard operating guidelines (fire and EMS), and the state EMS protocols.

The *Employee Handbook* was given a basic review for quality and content. The handbook was fairly well organized, and it appears that a great deal of time went into writing the various policies and procedures in a professional and clear manner. The documentation includes the appropriate policies either required by law or focused on reducing the risk of civil liability. These include a sexual harassment policy, family medical leave, and basic benefit policy.

The *Standard Operating Guidelines* are well organized, easy to understand and apply, and reflect the current industry standards and best practices. The procedures are reported to be reasonably up to date, with a system in place to review and update the procedures on a periodic basis. The procedures contain adequate sections on emergency scene operations and provide field personnel with guidance on fire ground operations such as fire streams, pump operations, search procedures, evacuations, etc.

Administrative policies or rules and regulations are available in the workplace or distributed individually. This practice is encouraged, since easy access to such policies is important and reinforces their importance. A distribution system is also in place to confirm the receipt of revisions or additions to the documents.

The *Standard Operating Guidelines* have been distributed adequately in support of their purpose, both electronically and at the fire stations. Members have access to the operational guidelines for reference during training sessions and drills and can study them at their leisure. This encourages the daily use and application of the guidelines and ensures that outdated ones are brought to the attention of management as early as possible.

Organizational Design

A well-designed organizational structure should reflect the efficient assignment of responsibility and authority, allowing the organization to accomplish effectiveness by maximizing distribution of workload. The lines on an organizational chart simply clarify accountability, coordination and supervision. Thorough job descriptions should provide the details of each position and ensure that each individual's specific role is clear and centered on the overall mission of the organization.

A review of this agency's organizational chart reveals that it is organized in a typical top-down hierarchy. The organizational structure of the department demonstrates a clear unity of command, in which each individual member reports to only one supervisor (within the context of any given position) and is aware to whom he or she is responsible for supervision and accountability. This method of organization encourages structured and consistent lines of communication and prevents positions, tasks, and assignments from being overlooked. The overall goals and objectives of the organization can be more effectively passed down through the rank and file members in a consistent fashion.

The organizational structure is charted with clear, designated operating divisions that permit the core functions of the organization to be the primary focus of specific supervisors and assigned members. While some task-level activities may carry over from division to division, the primary focus of leadership, management, and budgeting within the division are clarified by the division's key function within the mission statement. Those individuals supervising or operating within a specific division are positively clear as to the role of the division and its goals and objectives.

The department has sufficiently analyzed its mission and functions such that a resulting set of specific agency programs have been established. Organized, structured programs permit better assignment of resources, division of workload, development of future planning, and analysis of service delivery. Those departments that have clarified their programs with titles, assigned leadership, resources, budget appropriations, performance objectives and accountability are among the most successful.

The fire chief appears to directly supervise ten other individuals, including four assistant chiefs, the fire inspector, public educator, mechanic, secretary, and two billing clerks. The chief's span of control exceeds the range typically considered normal and acceptable. Many times, chief officers accept or encourage a span of control that exceeds their ability to maintain good communication and leadership; often with good intentions but just as often to the detriment of the organization. An excessive span of control is not necessarily a good reflection of efficiency or even ability and should be corrected. Recommendations regarding the current organizational structure and distribution of responsibilities will be discussed in the staffing section of this report.

The fire chief has been provided with the disciplinary authority to issue a suspension from duty and recommendation for termination.

The department maintains a set of job classifications for most positions. The documents are inconsistent in style and format and some of the documents appear out of date. The department's job descriptions should be made contemporary and consistent and should adequately describe the primary functions and activities, critical tasks, and levels of supervision and accountability, as well as reasonable qualifications for each position.

The department currently maintains collective bargaining agreements (CBA) that clarify the salary, benefits, and many of the working conditions under which the employees in a particular classification will operate. Currently, everyone is covered by a CBA, with the exception of the fire chief, assistant chiefs, and civilian clerical staff.

Recommendation:

- Accurate and up-to-date job descriptions, consistent in style and format, should be developed for each position in the department.

Maintenance of History

The Bangor Fire Department has extensive levels of history retention in place. Appropriate records of all corporate or municipal meetings are maintained in accordance with the laws of the state governing various types of public meetings and decisions involving public funds.

The department maintains a "scrapbook" or file containing items of historical significance, including pictures, newspaper articles, etc. These are helpful when updating a historical perspective of the organization and the major events in its development.

A regularly maintained historical record serves as a valuable tool for planning and decision-making. It allows quick recollection of how the department has adapted to changes in the community and provides valuable historical data to agencies, such as the Insurance Services Office, for evaluation purposes. It also allows for permanent memory of the people who have contributed to the success of the department in its service to the community.

A well-produced annual report can serve to satisfy this need. In addition, an annual report is a wonderful communications tool to share the efforts and activities of the department with the public. The department has been producing and distributing an annual statistical report of incident and activity information. The department should consider expanding the annual report to include description of all program activities and accomplishments, provide a historical reference, and include measurement of its performance rather than just workload. At a minimum an annual report should include:

- Brief history of the department
- Summary of events and activities during the report year
- Description of major incidents handled by the department
- Identification of new or improved services and programs
- List of people who served with the department during the year
- Awards received by the department or individuals
- Financial summary including revenues and expenditures, grants, etc.
- Statistical analysis, with trends, of key community service level indicators

The annual report should be printed and distributed to the community and made available at such places as the local chamber of commerce and library.

Recommendation:

- The department should expand its annual report to include a summary of events and activities during the report year, description of major incidents, identification of new or improved services and programs, and statistical analysis and trending of key community service level indicators.

Finance, Budget and Financial Controls

Essential to the continued success of any emergency services organization is sustainable funding. Additionally, internal financial controls that require organization officials to remain within existing financial limitations will ensure that the organization remains solvent. Financial oversight of BFD is the responsibility of the fire chief and an appointed city manager in concert with an elected city council. Overall financial oversight for the city lies with the appointed finance director (who also reports to the city manager).

As a recipient of state and federal financial assistance, the city is required to undertake a Single Audit performed by an independent audit firm in accordance with the Single Audit Act of 1984 and the U.S. Office of Management and Budget's Circular A-133, Audits of States, Local Government and Non-Profit Organizations. The standards governing Single Audit engagements require that the independent auditor report not only on the fair presentation of the financial statement but also on the audited government's internal controls and compliance with legal requirements, giving special emphasis to internal controls and legal requirements involving the administration of federal awards.

Each year, the city conducts an audit and publishes a Comprehensive Annual Financial Report (CAFR). The report is prepared using financial reporting requirements in accordance with generally accepted accounted practices. The most recent report was published on December 27, 2010; no material deficiencies or reportable practices were noted by the independent accounting auditor Runyon, Kersteen, and Ouellette, a public accounting and business consultancy firm fully licensed and qualified to perform audits of municipalities within the State of Maine. The City of Bangor was awarded a Certificate of Achievement for Excellence in Financial Reporting for its CAFR for fiscal year ending June 30, 2009.

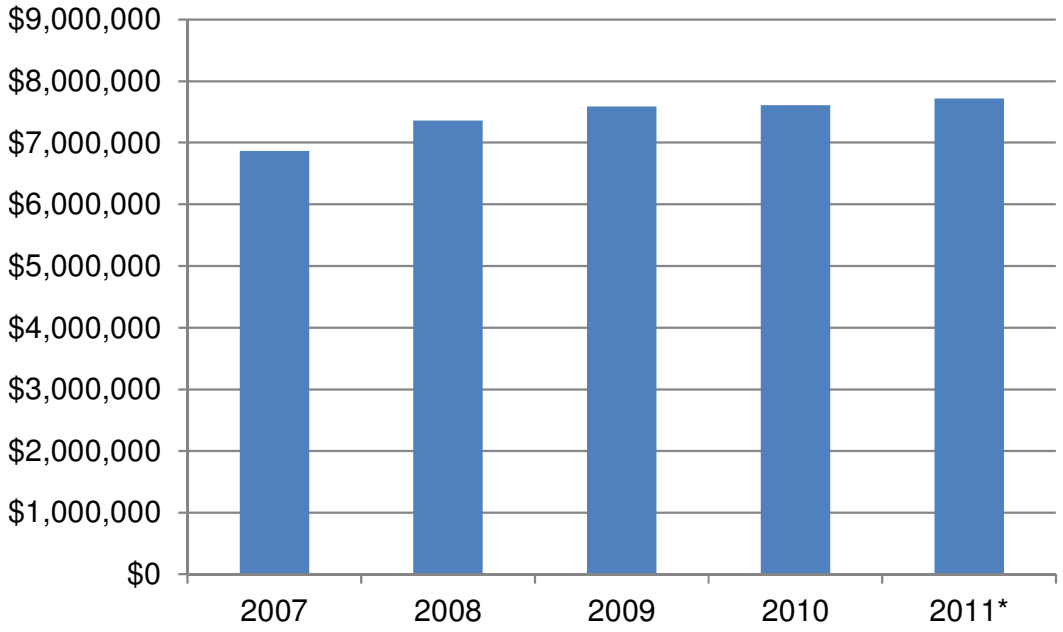
The city uses a one-year budget cycle to prepare the annual operating budget and capital improvement plan based on a July 1 through June 30 fiscal year; the city uses a modified accrual basis of accounting. Under the modified accrual basis of accounting, revenues and other financial resources are recognized as accrued when they are billed. Expenditures are recognized when the fund liability is incurred rather than disbursed. This method of accounting is *generally accepted* in governmental operations.

Although it was past practice, the city no longer maintains a Capital Improvement Program (CIP) for major capital purchases and projects and these projects are updated annually as part of the typical budget. The fire department's operating budget and capital expenditures are funded primarily from the city's General Fund. The department also generates revenue from the provision of certain services and the levying of fines for false fire alarms,[5] as well as a significant amount of revenue from a number of grant sources. The following figure shows a historical

[5] §58-10 of the City of Bangor Ordinances authorizes the fire department to fine businesses and residents up to $1,000 for repetitive false fire alarms, as well as to levy a fine of $100 on persons responsible for damage to private fire alarm systems.

comparison of the fire department's budget/expenses for the past five years including the current budget for fiscal year 2011.

Figure 5: Departmental Budget History, 2007 – 2011

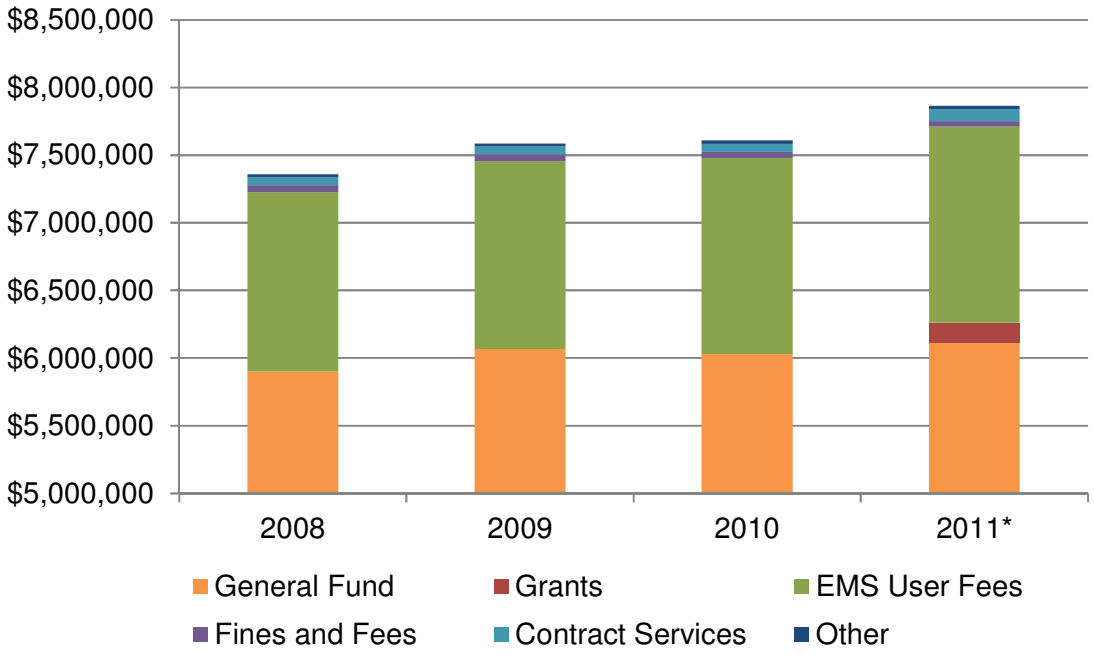


**2011 indicates the current 2011 budget, not actual expenditures.*

Departmental funding has increased steadily over the study period with a slight leveling off during the last three years. The following figure illustrates the primary revenue sources for the fire department over the 2008 to 2011 period.[6]

[6] 2007 revenue data was not available.

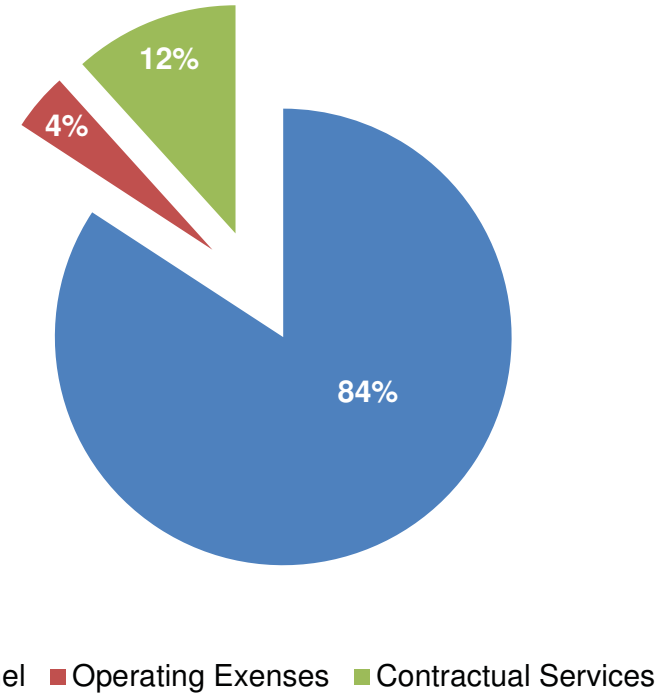
Figure 6: Departmental Revenue History, 2008 – 2011



**2011 indicates the current 2011 budget, not actual revenue.*

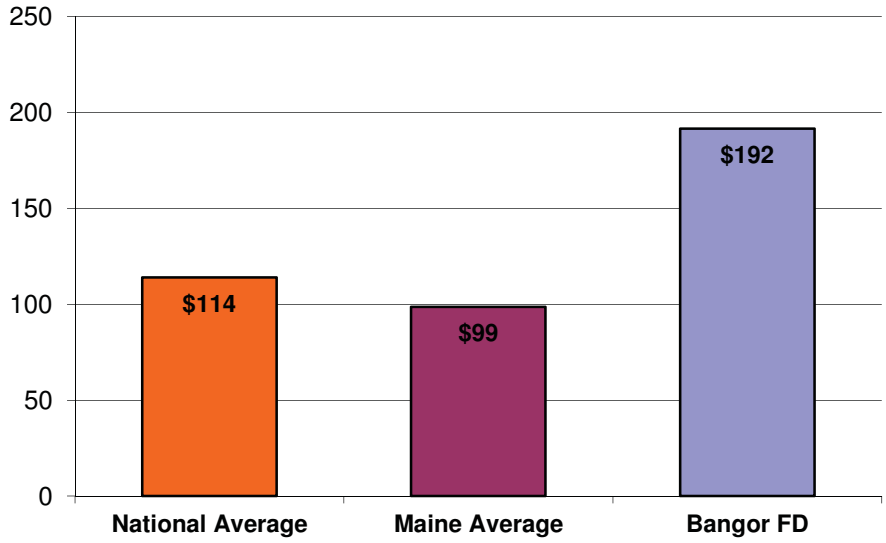
Like most career emergency services agencies, operations comprise a vast majority of the operating budget. For ease of illustration, the BFD budget has been grouped into two primary categories (personnel and operations) based on the format of the departmental budget. The following figures illustrate how the departmental budget was allocated among the various expenditure categories for the 2011 fiscal year.

Figure 7: Service Cost Allocation – Fire Suppression, Fiscal Year 2010



Population is an important component of the fire protection equation. The trouble with accepted jurisdictional populations is that such numbers frequently do not account for our highly mobile culture. Factors such as transportation, commerce, and recreation tend to make the given population for a region fluctuate widely depending on time, day, and season. With that in mind, the following chart illustrates a comparison of the per capita cost of the city's provision of fire suppression and EMS based on the most recently reported census permanent population figures.

Figure 8: Comparison of Tax Cost per Capita



Source: U.S. Census Bureau Local Government Spending by Function. The local government data are from a sample of local governments and, as such, are subject to sampling variability.

Experience has shown that it is very common for the cost of fire protection to exceed $100 per capita in urban settings, trending up to about $150 in some cases. The higher cost of fire service in an urbanized zone is usually a function of the level of sophistication required by that system (i.e. career staffing, paramedic services, and fully-staffed fire prevention bureaus). Costs usually trend downward as one compares an urban fire system to suburban and rural settings. It is obvious from the figure above that BFD is well above both the Maine and National average per capita cost for fire protection.

Management Components

As with most emergency service agencies, the Bangor Fire Department faces challenges to organizational processes and management. In addition to the operational challenges of emergency response, the management of the business of a fire department always presents unique issues involving the administration of financial resources, the setting of goals and objectives, internal and external communications, information management, and security. This section of the report examines the department's efforts in this area and preparation for the future health of the organization.

Mission, Vision, Strategic Planning, Goals and Objectives

The process of strategic planning involves clarifying an organization's mission, articulating its vision for the future, and specifying the values within which it will conduct itself.

BFD has not fully conducted formal strategic planning processes and no clear organizational vision for the future has been developed. Member value statements do not exist, nor are goals and objectives formally established to direct organizational effort.

As such, this department's members direct their efforts at the immediate issues of the day and are unable to commit cohesive time to team planning for future service delivery, evaluating service improvement opportunities, or developing new programs and services desired by the customer. A customer-centered strategic planning process could resolve much of this deficiency and give the department a clear sense of direction.

A departmental strategic plan, when developed, should include an organizational mission statement, vision, and values. Service delivery and program goals should be developed and objectives defined for accomplishment of the goals. Critical tasks and timelines for accomplishment should also be produced. This effort is clearly important to the future of the fire and emergency services system in the City of Bangor.

Recommendation:

- BFD should complete a customer-centered strategic planning process with all key stakeholder groups represented on the planning team.

Internal and External Communications

Quality communications is an achievable goal for any organization, but one that always seems to be most elusive. However, it is extremely important. To its credit, there are established communication processes within this department that provide opportunities for department personnel to be heard and be involved.

Regular staff meetings have been initiated in this agency, and include all officers in the management team on a monthly basis. All company officers are included at least annually. Such meetings encourage the sharing of ideas, issues and concerns and encourage a teamwork approach to overall department management. Minutes or summaries of regular staff meetings are not regularly made available or distributed for review by all members of the organization. Such an effort is recommended, as it encourages internal communications and permits members to share ideas on issues involving departmental issues, enhancing a feeling of empowerment among personnel.

Written, formal memorandums are regularly utilized for distribution of information, ensuring that all members receive critical data in an organized and consistent fashion. This process also provides a critical written record of internal communications that are important to organizational efficiency. A systematic method for distribution of written communications includes an email copy and a station posting, a process that is followed regularly in order to make certain that no members are left out of the information loop. When certain types of critical memos or policies are released, a system has been established for verification of the distribution to all personnel by signature at a training session. This system provides a record of confirmation that the information was received and improves accountability.

The fire chief meets with personnel at the fire stations on an occasional basis in a manner that provides personnel with an opportunity or forum for exchanging and discussing concerns, ideas, or issues directly. These types of opportunities enhance the feeling of teamwork, open lines of communications, and encourage a feeling of ownership among the members.

An employee newsletter has been initiated by the city manager's office that provides an excellent opportunity for distribution of agency news and information, as well as less formal information about members such as birthdays, marriages, or personal off-duty accomplishments.

Departmental bulletin boards are adequately controlled and organized, with information being sorted and updated on a regular basis.

Departmental business email addresses have been issued to all personnel, offering an efficient and verifiable method of information distribution. Individual member mailboxes or station/shift mailboxes are used to exchange important hard-copy documents and prevent missing or misplaced documents. Voicemail is in place for primary staff and officers, permitting other members or external customers to efficiently and quickly leave personal contact messages.

The department has not published a community newsletter for distribution to the public. Such a newsletter would permit the release of specific and detailed information, authored directly by the agency, to those served by its programs and could be an excellent tool for improved public relations. The department does make use of the local cable television channel. No formal procedure has been established for handling complaints from the public. Such a policy should be established and all members should be made familiar with its contents in order to make certain such complaints are handled consistently, quickly, and with due process.

A department website is currently maintained and provides a means of distributing information and communicating with the public. The site contains only basic information about the department and could be improved to include statistical analysis, charting of trends, search functions, fire safety information, school resources, etc. There are many examples of robust and useful fire department websites available from resources at the International Association of Fire Chiefs. The department also maintains a Facebook page.

The department has conducted a survey of EMS services intended to provide customer feedback on service priorities, quality issues, or performance efforts but received little response. These surveys, when utilized appropriately, can provide valuable input for organizational planning. Consideration should also be given to establishing a citizen's advisory group that can meet occasionally with department management to provide the customer perspective to issues within the department and assist in planning efforts. This process encourages a close connection between agency management and the consumer of its services and also serves as an additional public relations tool.

Recommendations:

- Consideration should be given to distributing minutes and information from officer staff meetings to department members to enhance internal communications.
- A formal public complaint process should be established and personnel should be trained in its application.
- The department's website should be expanded and improved.
- Consideration should be given to an occasional customer survey and use of a citizen's advisory group to assist in providing customer perspective in department planning and finances.

Document Control and Security

Records management is a critical function to any organization. A variety of uses are made of written records and, therefore, their integrity must be protected. State law requires public access to certain fire and EMS department documents and data. Clear written procedures are in place to provide for public records access through the department staff.

The Health Insurance Portability and Accountability Act (HIPAA) includes regulations that require all individually-identifiable health care information be protected to ensure privacy and confidentiality when stored, maintained, or transmitted. BFD has a HIPAA compliance officer in place and strict policies to guide compliance. Efforts to access response records containing protected medical information are strictly controlled and require appropriate identification of the purposes involved in such access.

Paper records (hard copy files) are adequately secured with passage and/or container locks with limited access. Important computer files are backed-up to a secure data location on a regular and consistent basis.

The Bangor Fire Department has a significant investment in facilities, apparatus, equipment, and other items, along with its financial assets. Protecting these assets is very important. Stations are consistently locked and secure from unauthorized entry. Public access to the buildings is limited to business areas or when accompanied by an employee. Electronic locks and key fobs that can easily be deactivated are used to prevent orphan keys and unauthorized entry. No security alarm systems are used to provide for automatic notification of unauthorized entry or break-in. Monitored fire or sprinkler alarm systems provide early smoke and fire detection for buildings, as well as an additional life-safety measure for occupants in the event of

a fire. Although no monitored alarm system is currently in place at the central station, plans are underway to connect monitoring upon installation of the sprinkler system. Stations 5 and 6 are currently monitored through the City's box alarm system.

Department computers are programmed with password security on sensitive file access and software to provide an additional level of security and data integrity. Firewall protection is in place for computers accessing the internet and other outside servers. The protection is adequately up to date and capable of preventing most unauthorized network intrusions. Up-to-date virus protection software is utilized on all incoming email, and files or operating systems are regularly scanned for undetected virus infection.

The agency maintains a current inventory of capital assets. A process is in place to maintain this inventory and new assets are logged and recorded at purchase. No business-related cash is routinely kept on the premises of the department, reducing or eliminating risks associated with burglary and theft. Petty cash is available for use by key managers, but in an extremely small amount. Written, formal purchasing policies and procedures are in place and are strictly enforced. Virtually all purchases require specific purchase orders (POs) with appropriate approval signatures and appropriation verifications.

Information Management and Technology

The department utilizes up-to-date Zoll™ records management software to enter and store incident information. The software is compliant with current NFIRS standards. Emergency medical services patient reports are computerized and secure. Training records are maintained on computer, permitting easy retrieval of accurate reports on training attendance, certification status, and subject matter. Code enforcement activities and occupancy records are not currently entered into a computerized database to permit analysis of prevention activities, community risks, and trends. CADZone™ was purchased for pre-plan development but has not yet been installed. Maintenance records are kept only in rough, hard-copy format, making collection and analysis of fleet management processes more difficult.

Personnel records are complete and up to date and maintained in a manner that protects private medical information. Records are maintained on employment history, discipline, commendations, work assignments, injuries and exposures, and leave time. Financial activities, including budgets, expenditures, revenues, purchase orders, and other encumbrances are kept

in Pentamation™, a financial records management software system permitting consistent and up-to-date monitoring of all financial activities and accounts. Amazon Software™ provides the EMS billing system.

The department uses a PC-based computer system, with Windows XP™ as its primary operating system, and all stations are networked to a municipal server located in the basement at City Hall by way of fiber optic. The city has redundant servers that are backed up on-site with a tape drive removed daily from the premises.

The fire department also has access to the city-wide 900mhz data network, which uses fiber optic lines from eight access points back to the city servers. This allows in-vehicle access to the client version of the computer-aided dispatch system maintained by the county. Since this is a county system, the information provided is limited. Further discussion on the computer-aided dispatch system is located in a later section of this report.

A sophisticated video conferencing system is in place at all fire stations and the police department. This system can be used for centralized company-level training, as well as emergency operations functions during disasters.

An assistant chief (AC) is assigned to handle initial Tier 1 requests for technology assistance. There is no “help desk” system. The city’s Information Services Department is contacted for Tier 2 support when the AC or other “superuser” in the department is unable to solve the problem.

Some technology training is provided to fire department personnel in the recruit class, including basic use of email and other city systems, as well as entry of incident records.

Recommendation:

- Additional department records, including fire prevention, code enforcement, and maintenance records should be adequately and efficiently computerized.

Personnel Management

Emergency services organizations must provide sufficient personnel matched to the service demand and risks found within their respective community. As a component of this study, ESCI evaluated the current deployment of emergency services staff of BFD in order to determine how the organization compares against other departments of similar size, geography, and demographic composition.

Several standards address staffing issues. Specifically, the *OSHA Respiratory Protection Standard 29 CFR 1910.134*; *NFPA 1710 Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments; and NFPA 1720 Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments* are frequently cited as authoritative documents. In addition, the Center for Public Safety Excellence (CPSE) publishes benchmarks for the number of personnel required on the emergency scene for various levels of risk.[7]

Policies, Rules, Regulations, and Manuals

It is important that members of the organization know to whom they should go when they have a problem, question, or issue related to their relationship to the department. In large companies, this function is typically handled by a human resource department. Staff within such a department handles questions, issues, and tasks related to appointment, benefits, performance, disciplines, promotion, or termination.

Although the International Association of Firefighters (IAFF Local 772) is active within BFD and maintains a Collective Bargaining Agreement (CBA) that outlines many of the requisite personnel policies and procedures, the City of Bangor also maintains a Human Resources department that publishes and updates a *City Personnel Rules and Regulations* manual covering aspects of employment not otherwise addressed within the CBA. These policies also cover personnel that are non-union such as the fire chief, assistant fire chiefs, and clerical personnel.

[7] CPSE: formerly the Commission on Fire Accreditation International (CFAI).

Reports and Recordkeeping

The maintenance of adequate and up-to-date personnel records is critical in every organization that depends on the effective performance of its people. The fire department maintains certain written and computerized records of its personnel at the headquarters fire station, as well as full personnel records within the city's administrative offices. Original application materials are retained in an attempt to create a full historical record of the employee's participation in the organization, from application and/or initial appointment as a full-time employee to separation. Additional documents and records referring to assignments, promotions, commendations, discipline, and other personnel actions are maintained as well both at the department and city levels. Forms or other documentation pertaining to performance of members are retained and reports describing details of accidents or other injuries or injury-related incidents are maintained should future reference and cumulative evaluation or analysis be needed.

Records of health evaluations, exposures to hazardous substances or contagious diseases, and other medical records are on file. All medically-related records, protected under federal privacy laws and stored by the fire department, are kept separate from routine personnel records. Access to these records is on a need-to-know basis and is maintained under lock and key with additional security measures in place to protect Protected Health Information (PHI).

Compensation

In order for a department to recruit and retain quality personnel, compensation and benefits (as well as overall working conditions) must be in line or in excess to those of surrounding organizations. BFD maintains a Collective Bargaining Agreement (CBA) with the IAFF Local 772, which outlines the compensation and benefits package afforded to full-time employees of the fire department for all ranks below that of assistant chief, including the fire education officer/fire inspector positions as well as the department mechanic. A comprehensive compensation study comparing those of BFD with surrounding agencies was outside the scope of this particular study. The following figure illustrates the median salary of each operational position within BFD.

Figure 9: Median Salary by Position[8]

Position	Median Salary
Fire Chief	$93,405
Assistant Fire Chief	$72,805
Captain	$63,958
Lieutenant	$52,996
Firefighter	$50,532

In addition to the base median salaries noted above, stipulations contained within the CBA require that if an individual serves in a temporarily higher rank, then the individual is paid at the wages established for the higher rank. This is consistent with industry practice.

Labor-Management Relations

All emergency services organization, whether career, volunteer or combination, must maintain a proper relationship between department management and line staff. A balance between authority, leadership, management, organizational trust, and followership must exist. An optimally efficient and effective organization will have created a labor-management committee to address issues that are of concern to both parties while maintaining the primary focus on the delivery of service to the community they are charged to protect.

As stated previously, BFD maintains a collective bargaining agreement (CBA) with IAFF Local 772 that outlines the responsibilities and authorities of management while identifying the rights and benefits of line staff below the rank of assistant chief. During the evaluation of documents and through interviews with department personnel, ESCI was made aware that, although considered to be within the bargaining unit and covered by the CBA, neither fire prevention/public education staff nor the department mechanic are allowed to participate in fire suppression or emergency medical scene response unless they are conducting services in line with their current roles. It is worth mentioning that the public education officer and the mechanic are certified firefighters and that both are medically trained to assist on EMS responses.

Recommendation:

- The City should ensure that, through contract negotiations, individuals properly qualified as firefighters and/or medical responders and covered by the CBA should be allowed to participate in suppression activities and medical responses to increase available personnel on scene when necessary.

[8] City of Bangor – Approved Expenditure Budget Worksheet

Disciplinary Processes

A formal progressive disciplinary process for employees should be clearly identified and available. The process should provide for various levels of discipline focused on correcting unacceptable behaviors with the most reasonable actions considered appropriate and effective. The process under which discipline is applied should be clear and unambiguous. A multi-level appeals process must be documented to afford the employee who feels aggrieved by an unreasonable disciplinary action the opportunity to have his/her issues reviewed by an impartial party.

Disciplinary procedures for BFD are outlined within the CBA as negotiated between the city and IAFF 772 and are in line with the expected policies and procedures of a department of this size and personnel composition. For personnel not covered by the CBA, *City Personnel Rules and Regulations* address disciplinary processes but nothing was noted in regard to appeals processes.

Recommendation:

- The City of Bangor should modify its *Personnel Rules and Regulations* to include a formal appeals process for disciplinary actions taken against employees.

Application, Recruitment and Retention

Successful emergency services agencies strive to ensure that their recruitment efforts are focused on the specific demographics of the population served combined with streamlined applications processes and formalized retention programs. BFD has not instituted a formal recruitment program but, rather, relies on normal avenues for advertisement when positions within the department are available.

New personnel hired by BFD must possess a valid Maine driver's license, high school diploma or equivalent, must be certified at least to the Emergency Medical Technician (EMT) level, and must successfully complete a modified Candidate Physical Agility Test (CPAT). Employees hired after January 1, 2007, are required to obtain and continue to maintain a paramedic license. In addition, a newly implemented residency policy requires all new applicants (as well as the last five personnel hired full-time) live within one hour's drive to the central station. As part of the application process, both written and skills examinations are administered through

the City Human Resources Department and a medical examination is completed through St. Joseph's Healthcare at the department's expense.

Testing, Measuring and Promotion Processes

Once achieving active employment, individuals should be evaluated periodically to ensure their continued ability to perform their duties safely and efficiently. Technical and manipulative skills should be evaluated on a regular basis. This provides documentation about a person's ability to perform their responsibilities and provides valuable input into the training and education development process.

Regular evaluation and feedback for personnel is critical to behavior modification and improvement. It has long been proven that employees sincerely wish to perform well and to be a contributing part of any organization. This desire to succeed is best cultivated through effective feedback that allows an employee/member to know whether they are doing well or what needs improvement. The honest and effective presentation of this feedback encourages the member to reinforce those talents and abilities they already excel in and to work harder to improve the areas where they fail to perform as desired.

BFD does not conduct formal proficiency testing; however, typical skills are evaluated by each company officer during regularly scheduled training evolutions. While department officials indicate some skills are evaluated, not all critical functions are routinely checked for proficiency. *City Personnel Rules and Regulations* state that, "After the first six (6) months of employment with the City, prior to the expiration of the employee's probationary period and at least every twelve (12) months thereafter on the employee's anniversary date, the employee's job performance shall be evaluated in writing by the immediate supervisor."

The opportunity for promotion within an organization gives employees the ability to advance while gaining experience and expanding individual abilities. Advancement within BFD, in regard to career personnel advancement, is outlined within the CBA for all positions below the rank of assistant chief.

Health and Wellness Programs

Physical capacity testing cannot detect all potential limiting conditions of an individual's health and fitness levels. A periodic medical evaluation is necessary. National safety standards for firefighters recommend annual medical evaluations and bi-annual physical examinations. The examinations should include all the criteria included in the entry-level exam, as well as periodic stress EKGs for persons over 40 and regular blood toxicology screening. Communicable disease vaccinations can also be updated as needed during this process. The NFPA standard on medical requirements for firefighters (*NFPA 1582*), or equivalent, should be used as a resource for establishing the criteria of both entry-level and on-going medical evaluations for operational personnel.

BFD personnel are required to undergo periodic medical screenings with presumptive testing included. These examinations are conducted at St. Josephs Healthcare and are provided at the expense of the department.

Staffing

As discussed above, the current personnel management components in place are critical in operating an efficient and effective emergency services organization. The effective utilization of these components require sufficient personnel resources; including operational, administrative and support, to adequately carry out the duties and responsibilities with which they are charged. This section evaluates the personnel resources in place within BFD. It makes recommendations to assist the department in improving effectiveness and efficiency where necessary.

Administration and Support Personnel

The primary responsibility of a department's administration and support staff is to ensure that the organization's operational entities have the abilities and means to fulfill its mission at an emergency incident. Efficient and effective administration and support are critical to the department' success. Without adequate oversight, planning, documentation, training, and maintenance program the operational capabilities of the department will suffer and may fail operational testing. Administration and support require appropriate resources to function effectively.

Analyzing the ratio of administration and support positions to the total departmental positions facilitates an understanding of the relative number of resources committed to this function. The appropriate balance of administration and support positions to the operational component is critical to the department's ability to fulfill its mission and responsibilities. Although no formal studies have been conducted to identify the optimum personnel mix, it has been ESCI's experience that the typical ratio of administrative and support staff to total personnel in career departments fall within the 10 to 15 percent range.

The administrative and support component of BFD is comprised of the fire chief, four assistant chiefs[9], one fire inspector, one fire educator, and three clerical positions. All administrative and support functions are handled by these positions, with some delegation to the department's captains and lieutenants. The following figure illustrates the administrative and support functions for the department.

[9] Assistant Chiefs are included here as well as in the operations section of the document since each position has administrative duties in addition to regular operations responsibility.

Figure 10: Administrative and Support Personnel

Position	Number
Fire Chief	1.0
Assistant Chief	2.0
Fire Inspector	1.0
Public Educator	1.0
Mechanic	1.0
Clerical	3.0
Total	**9.0**

Statistically, the department maintains a ratio of 9.5 percent of administration and support staff to total personnel. The department's administrative and support staffing level is slightly below the comparison 10 to 15 percent range that is typical for a career fire department mentioned previously. The Assistant Chief positions (4) have been divided equally between administration and operations, discussed later, to illustrate that the duties and responsibilities of those positions are distributed between the two divisions. It should be noted here as well that two of the clerical positions are dedicated to data entry and EMS billing functions. These two positions assist the department with revenue generation and collection.

Critical Tasking

Tasks that must be performed at a fire can be broken down into two key components - life safety and fire flow. Life safety tasks are based on the number of building occupants, and their location, status, and ability to take self-preservation action. Life related tasks involve the search, rescue, and evacuation of victims. The fire flow component involves delivering sufficient water to extinguish the fire and create an environment within the building that allows entry by firefighters.

The number and types of tasks needing simultaneous action will dictate the minimum number of firefighters required to combat different types of fires. In the absence of adequate personnel to perform concurrent action, the command officer must prioritize the tasks and complete some in chronological order, rather than concurrently. These tasks include:

- Command
- Scene safety
- Search and rescue
- Fire attack
- Water supply
- Pump operation
- Ventilation
- Back-up/rapid intervention

The Center for Public Safety Excellence (CPSE), a division of the International Association of Fire Chiefs (IAFC), has a sample critical tasking analysis for the number of personnel required on scene for various levels of risk. This information is shown in the following chart.

Figure 11: Critical Task Staffing Needs by Risk

Sample Critical Tasking Analysis
Firefighting Personnel Needed Based on Level of Risk

Critical Tasks	Structure Fire Maximum Risk	Structure Fire Significant Risk	Structure Fire Moderate Risk	Non-Structure Fire Low Risk
Attack Line	4	4	2	2
Back-Up Line	4	2	2	0
Support for Hose Lines	4	3	2	0
Search and Rescue	4	4	2	0
Ventilation	4	2	2	0
Rapid Intervention Team (RIT)	4	4	2	0
Pump Operator	2	1	1	1
2nd Apparatus/Ladder Operator	1	1	1	0
Command	2	1	1	1
Safety	2	1	1	0
Salvage	4	0	0	0
Rehabilitation	2	2	2	0
Total	**37**	**25**	**18**	**4**

At the request of ESCI, BFD was asked to conduct a tabletop critical tasking review to compare against the sample provided by CPSE. The results of that analysis are illustrated in the figure below.

Figure 12: Summary of Tabletop Critical Task Analysis

Incident Type	Number of Personnel	
	CPSE Sample	BFD
Low Risk Residential Structure Fire	18	13
Moderate Risk Commercial Structure Fire	25	13
High Risk Commercial Structure Fire	37	13
Grass/Brush Fire	4	5
Car Fire	4	5
Emergency Medical Incident	3	2
Motor Vehicle Crash/Extrication	3	5
Hazardous Materials Incident	3	N/A

There are some variances between the sample provided by CPSE and BFD as to what is believed to be an appropriate number of personnel for each specific incident type. It should be noted, however, that each specific incident is different and requires varying degrees of involvement and varying numbers of personnel dependent upon the situation. This comparison is provided only to illustrate how various incidents require different numbers of personnel to

perform specific tasks in order to effectively mitigate emergency incidents and will be used again later in this report comparing actual staffing performance against critical task needs.

Operational Staffing Levels

It takes an adequate and well trained staff of emergency responders to put the appropriate emergency apparatus and equipment to its best use in mitigating incidents. Insufficient staffing at an operational scene decreases the effectiveness of the response and increases the risk of injury to all individuals involved. The following list summarizes the services that are provided by BFD.

- Fire Suppression
- EMS Advanced Life Support First Response
- EMS Advanced Life Support Transport
- Vehicle Extrication
- Fire Prevention Inspections
- Public Education
- Hazardous Materials Response (Operations Level)
- Technical Rescue including water and other special rescue disciplines

BFD uses career staffing to carry out its primary emergency services functions. All administrative, support, and response staff are career personnel. The following figure shows the distribution of emergency personnel by rank.

Figure 13: Emergency Services Personnel

Position	Number
Assistant Chief	2.0
Fire Captain	6.0
Fire Lieutenant	10.0
Firefighter	68.0
Total	**86.0**

As mentioned previously, the fire inspector, public educator, and mechanic are all qualified firefighting personnel; although considered to be part of the bargaining unit and covered by the CBA, they are not allowed to participate in fire suppression or medical response activities. A recommendation has already been made to rectify this issue and allow these personnel to assist when necessary to increase on-scene personnel resources. As noted in the administrative and support personnel section previously, the Assistant Chief positions have been divided equally between administration and operations since these positions function within both positions.

Noted above, the span of control of the Fire Chief is substantially higher than what is considered to be a normal range of supervision. Similarly, it was determined that the overall administrative and support to total personnel ratio was slightly below recommended levels. If the department were to add a Deputy Chief, this position could be utilized to oversee day-to-day administrative functions of the department thereby reducing the overall span of control of the Fire Chief to a more management level and allowing the four Assistant Chief to place more focus on the function of supervising the operations personnel. Adding this position would increase the overall administrative and support to total personnel ration to 10.4 percent, within the normal range of comparable departments.

Recommendation:

- Consider creating a Deputy Chief position to oversee day-to-day administrative and support functions within the department, to reduce the Fire Chief's excessive span of control and allow the Assistant Chiefs to focus on operations.

Scheduling Methodology

Given that BFD's minimum staffing of 18 personnel per shift (one assistant chief, three personnel on Engine 1, two on Ladder 1, two on Rescue 1, three on Engine 5, two on Rescue 5, three on Engine 6, and two on Rescue 6), it is obvious that apparatus frequently respond with less than four firefighters on board (as do many fire departments across the country). In this scenario, the time it takes for the second unit to arrive becomes very important to achieve the four-person company required to meet the "two-in, two-out" OSHA/EPA standards. Fortunately, BFD can meet this four-person requirement with multiple unit responses. The ability of the department to assemble an effective response force within the specific period of time, also known as *resource concentration*, will be analyzed in a later section of this report.

In departments that rely on volunteers to staff units or to supplement career personnel, analysis by hour of day and by day of week is useful in determining staffing performance. This is not the case in Bangor. BFD relies solely on career staffing. The department does not vary its staffing during peak hours; therefore, it can be assumed that a minimal level of staffing is maintained at all times.

Cross-staffing of units (jump-staffing) is the standard method of personnel deployment for BFD unless at maximum staffing. This method is complicated and individual apparatus staffing varies

based on type of incident dispatched and availability of personnel at the time of the incident. For example, if a large structure fire incident is dispatched in Station 1's area, an engine with three persons will respond along with a ladder with one person (at minimum staffing). If the dispatched incident is a rescue situation, then those same personnel would respond in the engine and the heavy rescue. The following figure summarizes BFD personnel deployment.

Figure 14: Staffing Deployment Summary

	Maximum Staffing	Minimum Staffing
Station 1		
Fire Command	1	1
Engine 1	4	3
Ladder 1	3	2
Rescue 1	2	2
Heavy Rescue 1	2	Cross
Station 5		
Engine 5	3	3
Rescue 5	2	2
Station 6		
Engine 6	3	3
Rescue 6	2	2
Ladder 6	Cross	
Tanker 6	Cross	

In addition to the apparatus noted in the preceding figure, Rescue 2 and Rescue 4 serve as dedicated out-of-town transport unit as well as a back-up transport unit when demand requires. When utilized for out-of-town transports, these units are staffed with personnel that are called back to duty to handle these transports. During periods of high service demand, on-duty personnel are able to utilize these units to accommodate the increased demand. This staffing of additional units during periods of high demand provides additional depth to the department's ability to respond to incidents.

Based on minimum and maximum staffing as illustrated, BFD can produce a total of 18 operational personnel at minimum staffing (including one command officer) and 22 at maximum staffing (including one command officer). These totals do not include call-back personnel, the fire chief, or additional mutual aid personnel that may be requested.

Operational personnel covered by the CBA report for duty at 8:00 a.m. and work an average of 42 hour per week on a rotating schedule. Command personnel (assistant chiefs), however, work a schedule different than other operational personnel. Assistant chiefs also work an average of 42 hours per week but are scheduled on two 10-hour days, two 14-hour nights and are then off

for four days. This difference in the schedules of line personnel compared to supervisory personnel is reported to cause a bit of a disconnect between labor and management.

Recommendation:

- Command staff and line personnel should work the same schedule so as to improve consistency of supervision and continuity of command.

Staffing Performance

In most communities around the country, the number of fire calls has declined over the past decade. Yet as the frequency of fires diminishes, in part due to stricter fire codes and safety education, the workload of fire departments has risen sharply — medical calls, hazardous materials calls, and every sort of household emergency are now addressed by fire departments. Therefore, as the frequency of fires diminishes, the need for a ready group of firefighters has increased.

Although modern codes tend to make fires in newer structures more infrequent, today's energy-efficient construction (designed to hold heat during the winter) also tends to confine the heat of a hostile fire. In addition, research has shown that modern furnishings generally burn hotter (due to synthetics), and roofs collapse sooner because prefabricated roof trusses separate easily after a very short exposure to flame. In the 1970s, scientists at the National Institute of Standards and Technology found that after a fire broke out, building occupants had about 17 minutes to escape before being overcome by heat and smoke. Today, that estimate is three minutes.[10] The necessity of firefighters arriving on the scene of a fire in the shortest span of time is more critical now than ever.

ESCI is providing analysis of incident staffing performance in two ways. Initially, the report will provide a glimpse of how well the department is doing at producing its own manpower for incidents within its primary service area. ESCI believes this data is important and can be an indicator for the individual department as to the effectiveness of its staffing efforts.

ESCI also recognizes that for all but the smallest, low-risk incidents, fire departments are typically acting together in providing fire protection through a coordinated regional response of

[10] National Institute of Standards and Technology, *Performance of Home Smoke Alarms, Analysis of the Response of Several Available Technologies in Residential Fire Settings,* Bukowski, Richard, et al.

mutual and automatic aid. This is particularly true for structure fires and other high-risk incidents where staffing needs are high. ESCI believes that this data is equally important and can be an indicator of the level of success the department is achieving in providing adequate staffing to meet the needs of the higher-risk incidents.

Of significance to the staffing objective of this study is that *NFPA 1710* establishes that a response company consists of four personnel. The standard does not *require* that all four be on the same vehicle, but does expect that the four will operate as a single functioning unit once on scene. The *NFPA 1710* response time standard also requires that all four personnel be on scene within the recommended response time guidelines.

There is another reason the arrival of four personnel is critical for structure fires. As mentioned earlier, OSHA regulations require that before personnel can enter a building to extinguish a fire, at least two personnel must be on scene and assigned to conduct search and rescue in case the fire attack crew becomes trapped. This is referred to as the two-in, two-out rule.[11] There are, however, some exceptions to this regulation. If it is *known* that victims are trapped inside the building, a rescue attempt can be performed without additional personnel ready to intervene outside the structure. The following figure illustrates, on average, how many personnel responded to working structure fires within the City of Bangor over the past three years.

Figure 15: Average Structure Fire Staffing Performance History

Year	Average Staff
2008	12.2
2009	10.0
2010	10.5

The average number of responders is lower than the minimum on-duty staffing for BFD. This is due, in part, to the likelihood of other incidents occurring simultaneously with structure fire incidents such as medical responses and other non-structure fire related incidents.

Based on the National Fire Incident Reporting System (NFIRS) used by BFD, the average structure fire staffing for the 2008 to 2010 study period was 10.4 personnel, not including mutual and automatic aid personnel. The following figure illustrates the potential available staffing from agencies surrounding the City of Bangor at minimum levels.

[11] 29 CFR 1910.134(g)(4).

Figure 16: Mutual Aid Agency Resources

Department	Apparatus	Minimum Staffing	
Air National Guard – Station 3	Tanker	2	Off-Base Incidents
	Crash	1	
	Crash	1	
	Crash	1	On-Base Incidents
	Crash	1	Only
	Chief	1	
	Rescue	2	
Brewer FD	Engine	2	
	Engine	2	
	Ladder	1	
	Ambulance	2	
Capital Ambulance	Ambulance	2	
Hampden FD	Ambulance	2	
Total		**18**	

The availability of the personnel identified in the figure above from the listed departments is based on each department's individual workload and only considers on-duty personnel. Additional on-call personnel are available from Glenburn FD's Lakeview and Ohio Street stations, Hampden FD, Hermon FD, Levant FD, and Hermon Rescue Squad.

Overtime Practices

Four particularly sensitive budget items are often the source of discussion among elected officials, management, and labor: compensation (pay), pensions, health and welfare, and overtime. As a task of this project, ESCI reviewed the issue of overtime in BFD for any compelling reason to alter current practice or maintain the status quo.

For this portion of the project, ESCI was provided with and reviewed the following documents:

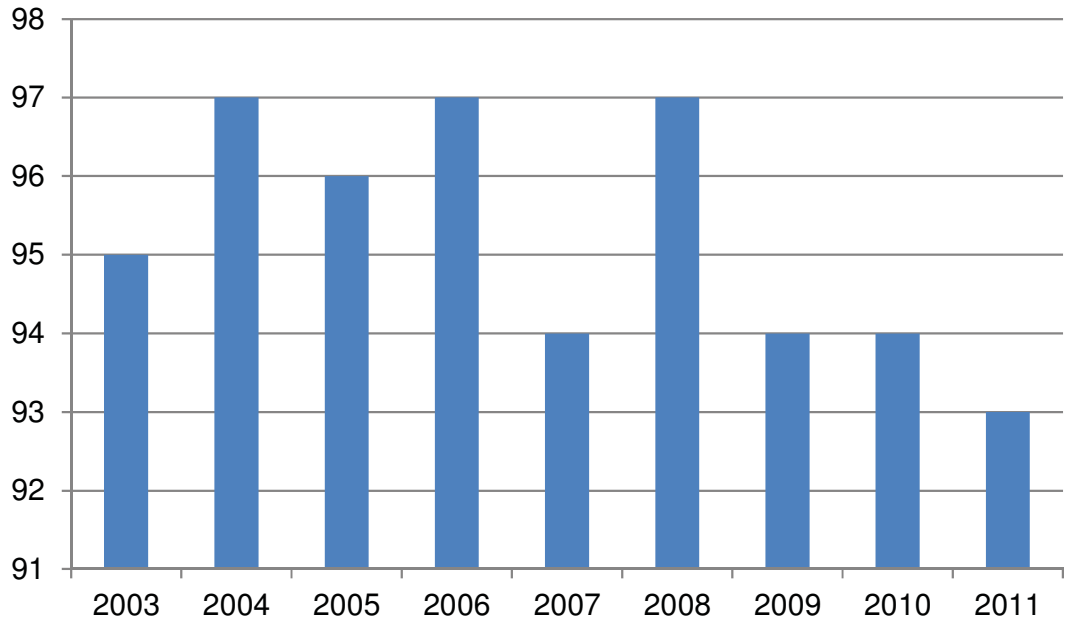
1. City of Bangor, Comprehensive Annual Financial Report, Fiscal Year Ended June 30, 2010.
2. Bangor Fire Department line-item budget documents for fiscal years 2007 through 2011.
3. Collective Bargaining Agreement between the City of Bangor and the Bangor Fire Fighters Association.

Historical and current personnel costs and financial records of the City and BFD were also made available for the purpose of the project.

Staffing Levels and Personnel Deployment

Before determining if overtime use is properly managed, consideration to a number of variables was identified. To begin, the number of FTEs at BFD in any given year was determined. The number of employees in the fire department has decreased slightly over the last decade as illustrated in the following figure.

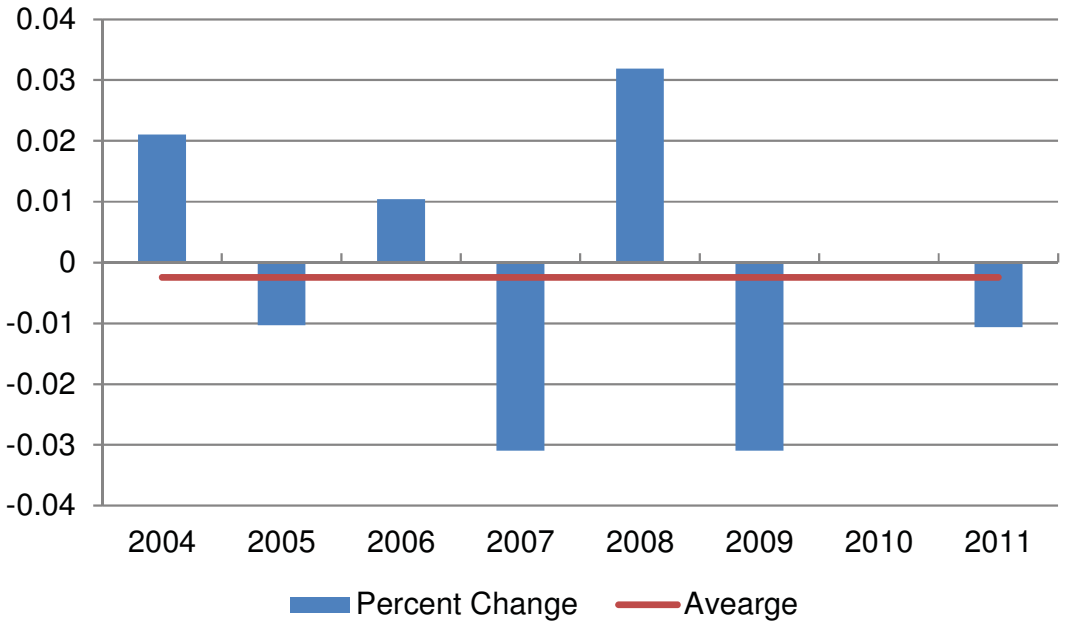
Figure 17: Historical FTEs, Fiscal Years 2003 – 2011[12]



BFD had a high of 97 FTEs in the fiscal years 2004, 2006, and 2008 and a low of 93 FTEs in the current fiscal year. The following figure illustrates the year-to-year percent of change in FTEs and the average percent of change from 2004 to 2011.

[12] City of Bangor *Comprehensive Annual Financial Report, Fiscal Year Ended June 30, 2009*, page III-18.

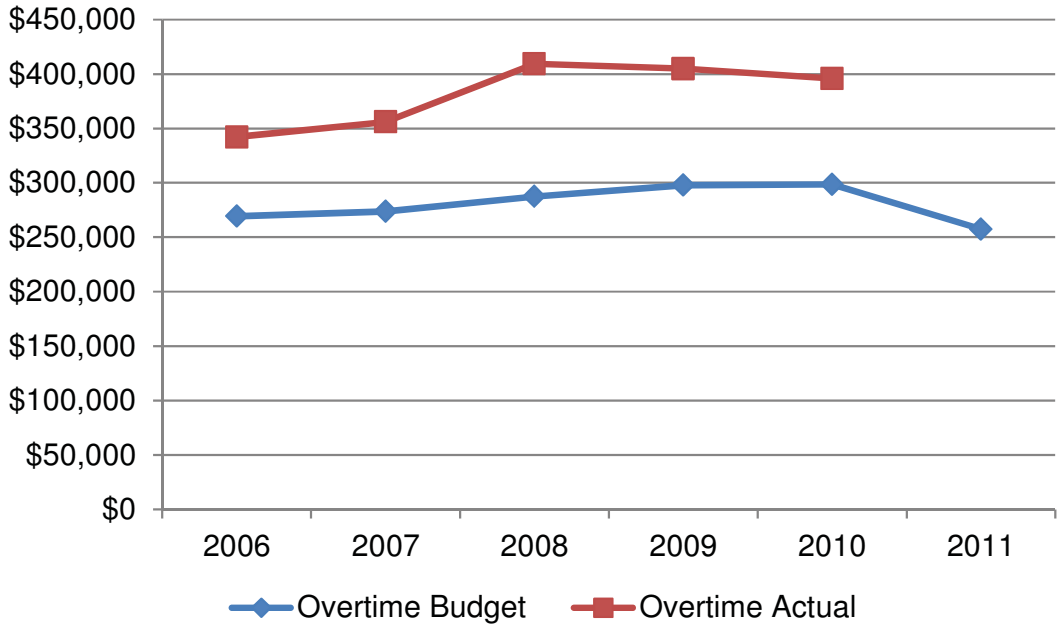
Figure 18: Historical Percent and Average Change in FTEs, Fiscal Years 2004 – 2011



Over the eight-year period, BFD has decreased FTEs an average of 2.2 percent annually with the largest percentage occurring during 2007 and 2009 (3.1 percent) with an offsetting increase during fiscal year 2008 of a 3.2 percent increase. ESCI reviewed the amount budgeted for overtime and the actual expenditures for a five-year period. The following shows the budgeted versus actual overtime costs for fiscal years 2006 through 2010.[13]

[13] For fiscal year 2010, the first six months of actual overtime use was extrapolated for the full year.

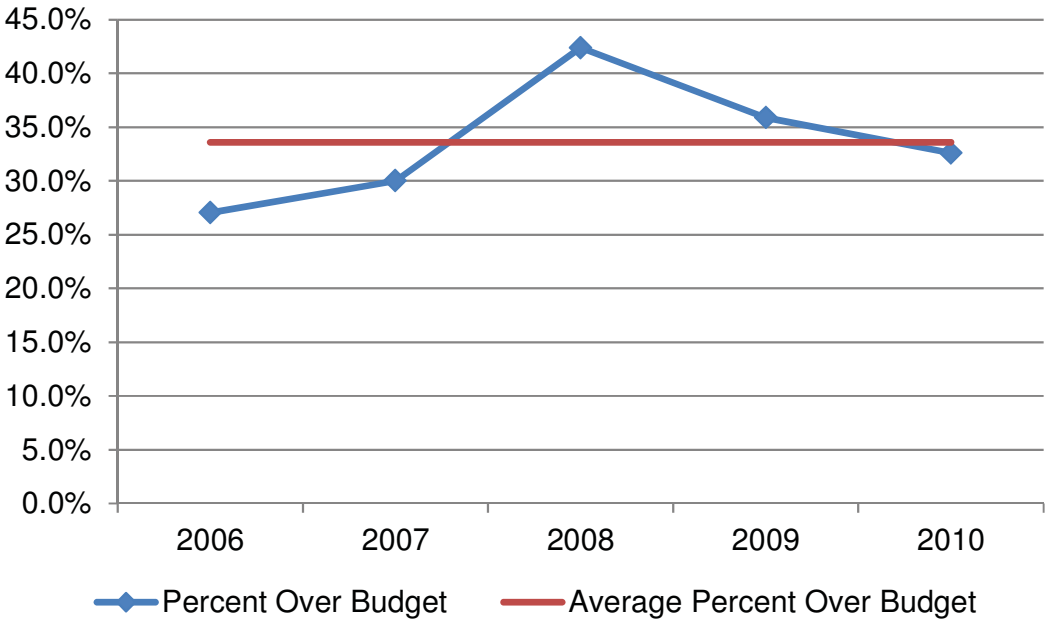
Figure 19: Budget versus Actual Overtime Cost, Fiscal Years 2006 – 2011



Overtime use is often unpredictable in the fire service by the very nature of working with emergency activities. However, statistical data can be used as the predictor of future use.

The following figure illustrates the actual percentage that expenditures for overtime exceeded budgeted overtime and the average percent for the last five fiscal years.

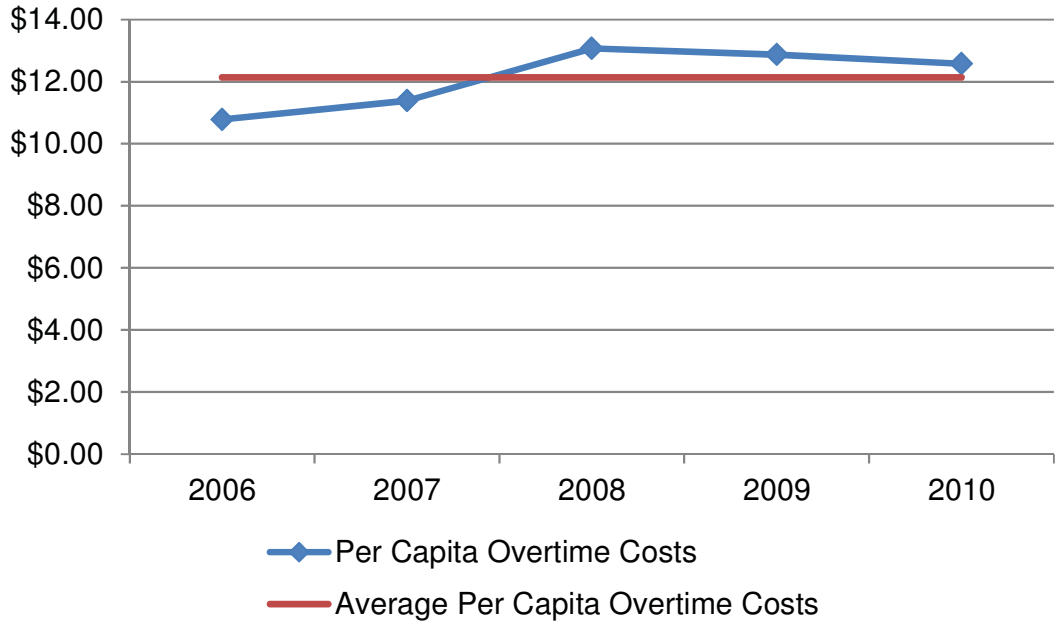
Figure 20: Budget versus Actual Overtime by Percentage, Fiscal Years 2006 – 2010



Overtime in fiscal year ending in 2008 exceeded the budgeted amount by 42.4 percent and has averaged 33.6 percent for the last five fiscal years.

The population for the City of Bangor has remained steady over the last decade. To gauge the impact of overtime on the community, actual overtime costs were calculated on a per capita basis for each of the last five years. The following figure shows the cost per capita and average for fiscal years 2006 through 2010.

Figure 21: Annual and Average per Capita Cost of Overtime, Fiscal Years 2006 – 2010



The cost per capita has varied between $10.78 and $13.07 during the five years and has averaged $12.14. Per capita costs for overtime have been trending downward lately, albeit slightly. As a regional comparison, the City of Lewiston maintained an average per capita overtime expenditure of $11.64 over the same period, not a statistically significant difference.

Personnel services costs for the BFD over a five-year period were examined. Between fiscal years 2007 and 2011, the personnel services expenditures for the fire department have increased approximately 13.0 percent.[14]

The following figure compares the BFD personnel services to the overtime expenditure as a percentage for fiscal years 2007 through 2011.

Figure 22: Personnel Services to Percentage of Overtime, Fiscal Years 2007 – 2011

Year	2007	2008	2009	2010	2011[15]
Personnel Services by Fiscal Year	$5,751,841	$6,196,064	$6,328,019	$6,380,315	$6,498,545
Percentage of Actual Overtime to Personnel Services Budget	6.2%	6.6%	6.4%	6.2%	4.0%

[14] Revenue offsets were not included in the calculation.
[15] Percent based on budgeted overtime rather than actual expenditures.

Deployment

A total of 22 personnel are assigned to each shift and, although there is no stipulation within the CBA to ensure a minimum staffing complement, BFD rarely falls below 18 personnel on a single shift. Based on the rank and number of positions required to meet minimum staffing, there are a given number of slots to fill per year. The following figure summarizes the number of shifts.

Figure 23: Number of Shifts per Year, Minimum Staffing

	Assistant Chief	Company Officer	Firefighter EMT/Paramedic	Total
Minimum Staffing	1	4	13	18
Days per Shift	91	91	91	91
Positions to Fill per Shift	91	365	1,183	1,638
Total Requirement	**365**	**1,460**	**4,732**	**6,552**

A total of 6,552 shifts are required to meet the informal minimum staffing recommendations. The next figure shows the potential number of shifts for the total authorized positions.

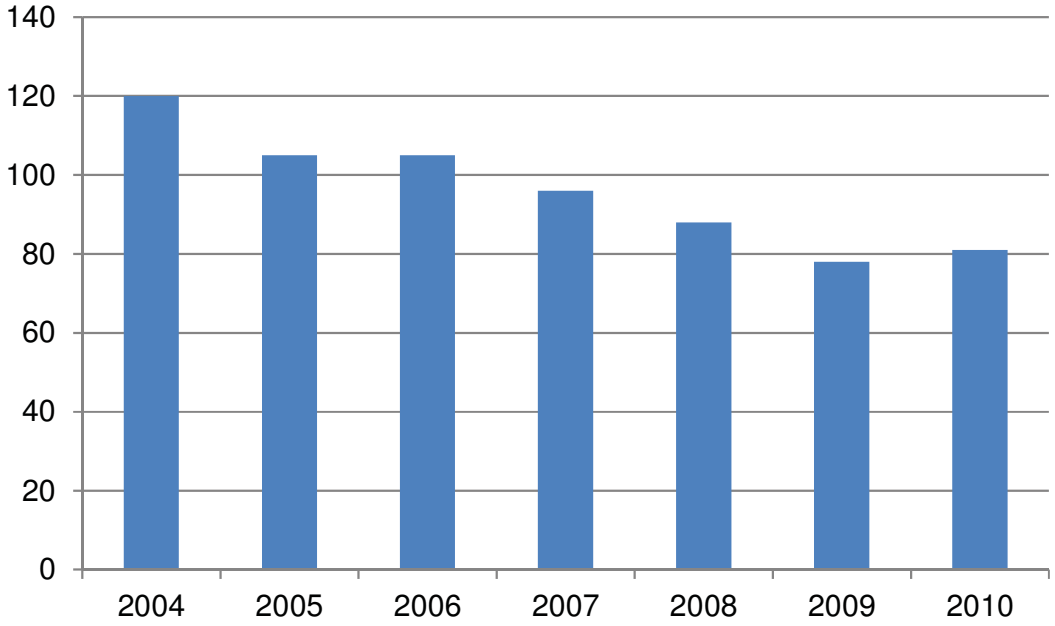
Figure 24: Number of Available Shifts by Position per Year

	Assistant Chief	Company Officer	Firefighter EMT/Paramedic	Total
Positions	4	16	68	
Shifts per Position	91	91	91	
Total Shifts	**365**	**1,456**	**6,188**	**8,009**

A gross total of 8,009 shifts are available compared to 6,552 required to be filled at the minimum staffing recommendation; a net difference of 1,457 shifts. However, vacation, sick and injury leave, compensatory, and other leaves obviously reduce the number of available shifts for personnel to work (net shifts available).

In addition to the regular shift patterns within the fire department, BFD operates Rescue 2 and Rescue 4 for out-of-town transports of patients to regional medical facilities and staff these units with call-back personnel. These units also serves as a back-up for the primary transport ambulances (Rescues 1, 5, and 6) if any of those units should be placed out of service for mechanical or other issues. In other words, any time Rescue 2 or Rescue 4 is in service for an out-of-town transport, overtime is being expended. The following figure illustrates how often Rescue 2 was utilized over the past seven years. The only full year of data available for Rescue 4 was 2009.

Figure 25: Rescue 2 Historic Utilization, 2004 – 2010



The utilization of Rescue 2 and Rescue 4 (out-of-town long-distance transports) has decreased steadily over the past seven years. With a decrease in utilization, there should be an accompanying reduction in revenue from these types of transports as well as a reduction in the amount of overtime expended to place these units into service. Although an analysis of this relationship could not be performed due to limited data, the assumption must be made that as workload decreases so does revenue.

It should be noted that there is significant discrepancy between the number of responses recorded and reported from various sources. The figure above, as reported within the department's yearly reports, indicates that Rescue 2 responded to 60 incidents during 2009 while NFIRS reports indicate that Rescue 2 responded to only 39 incidents for the same period. This is only one example of the differences that exist within the various reporting mechanisms. For the purposes of this analysis, the highest number was utilized.

Another relationship to analyze is the utilization of overtime to staff units for out-of-town transports. Since call-back personnel are used to place these units into service, the units are operated strictly on overtime. When an out-of-town transport is required, two personnel are called in to staff the unit for the duration of the transport. Without reviewing individual response reports for each transport completed by out-of-town transports, it would be impossible to determine the personnel staffing the unit and, therefore, a precise accounting of the cost of

operating the units cannot be determined. ESCI did, however, make certain assumptions in order to evaluate the potential cost of operating units for out-of-town transports.

First, it was assumed that two firefighter/paramedic personnel placed the unit in service for all out-of-town transports. Although it is likely that one firefighter/paramedic and one firefighter/EMT staffed the unit, two ALS personnel were used to estimate the highest potential cost of unit operation. Second, it was assumed that Rescue 2 and Rescue 4 were placed into service and completed *only* out-of-town transports. Third, it was assumed that the overtime rate for personnel staffing these units was based on the median hourly rate as outlined in the CBA with IAFF Local 772 regarding the 7/10/10 rate ($28.30 overtime rate for a three-year firefighter/paramedic). Fourth, in accordance with the CBA, each person staffing the units for these transfers receives a minimum of 10 hours of overtime pay.

Based on the 2009 Rescue 2 and Rescue 4 out-of-town transport total of 78 responses and a total commit time of 60:55:22 plus an assumed one additional hour per response as a buffer, the estimated total cost of completing these 78 responses based on actual time equals $7,867. Using the minimum of 10 hours of overtime per person for these same 78 incidents results in a total estimated overtime cost of $44,148. Conversely, under the assumption that each out-of-town response was billed at the lowest level of care (BLS Non-Emergency - $450.00) the total estimated revenue for these responses equals $35,100. Information submitted by BFD in regards to overtime expenditures for out-of-town transports indicate that $18,476.43 was expended to complete out-of-town transports during calendar year 2010.

Based on the analysis above, the department should begin to track out-of-town transport costs and revenues separately in order to determine the most cost effective method of delivering this service to the community.

Recommendation:

- Recordkeeping practices in regard to the utilization of Rescue 2 and Rescue 4 should be enhanced to capture actual overtime usage and revenue attributable to out-of-town transports as well as other incidents where units are staffed with overtime or call-back personnel.

Scheduled and Unscheduled Leave

The number of hours an employee has for vacation is based on the years of completed service with the City of Bangor.[16] The following accrual rate is effective October 1, 2010:

- 0 to 5 years, 96 hours per year
- 6 to 10 years, 144 hours per year
- 11 to 14 years, 168 hours per year
- 15 to 19 years, 192 hours per year
- More than 20 years, 240 hours per year

Growth of the department has been relatively stable over the past ten years as discussed previously. If the 11 to 14 years of service is used as a median point, the number of accrued vacation hours is 140 per employee per year. The result is 5.8 shifts per employee and a total of 394 shifts of vacation.

The amount of sick, injury, and other leave used by fire department personnel varies by employee. Typically, sick leave use in fire departments of similar size and character averages between 2.5 to 4.0 shifts per year. For this exercise, ESCI used 4.0 shifts per year, per employee, to arrive at a total of 272 shifts of sick and leave.[17]

The following figure uses the total annual available shifts and deducts those required for minimum recommended staffing, vacation leave, holiday, and sick and injury leave to arrive at the number of unallocated shifts. In addition to vacation, sick and injury hours, 48 hours for training and other leave per year per employee were included in the following calculation.

Figure 26: Number of Shifts Available Less Minimum and Leaves per Year

Gross Number of Shifts	8,009
Less Minimum Staffing	6,552
Less Vacation	394
Less Sick and Injury	272
Unallocated Balance	**791**

Assuming an average of 8.5 shifts of vacation and 4.0 shifts of sick and injury leave per employee, a total of 791 shifts are unallocated.

[16] Collective Bargaining Agreement between the City of Bangor and IAFF Local 772.
[17] ESCI's experience is that the number of sick leave shifts will generally be less than 4.0 shifts per employee per year. Average sick leave use is 2.5 shifts.

Alternative Scheduling Methodologies and Overtime Usage

Firefighters' work schedules depend on individual fire department needs and in most instances the CBA between the agency and labor. Firefighter schedules vary from 72 hours on duty and 96 hours off, to 48 hours on duty and 96 hours off, to the more traditional 24 hours on duty and 48 hours off, or any one of many other variations. Other departments have firefighters that work two 10-hour day shifts and two 14-hour overnight shifts in an eight-day schedule, such as BFD's assistant chiefs do. With the exception of some very large fire agencies, the majority have either a 24 or 48-hour work shift with alternating day(s) off-duty. Larger departments may have a number of their firefighters on alternative schedules to align staffing to workload; an example is the staffing of PAUs (peak activity units).

It has been argued that the 10-hour day and 14-hour overnight shift would allow firefighters to be more productive. Often, however, fire department managers elect to use 24-hour shifts to cut down on overtime pay by limiting the chance fire personnel will work late due to emergency calls (fewer shift changes). For every scheduling scheme, there are many variations.

For fire departments, there are work rules that apply specifically to firefighters that allow for special work periods:

> *Public-sector (government) fire departments may establish special "7(k) work periods" for sworn firefighters, which can increase the FLSA overtime "thresholds" beyond the normal 40 hour week. Firefighters covered by these special work periods are entitled to FLSA overtime only for hours worked in excess of a threshold set by the Department of Labor on a chart. For example, in a 28 day work period, fire fighters would be entitled to FLSA overtime only for hours actually worked over 212 during that 28 day period (in essence, a 53 hour work week). "7(k)" refers to the section of the FLSA in which these special rules are contained, 29 USC §207(k). Most fire fighters who work "platoon schedules" will be classified by their employers as "7(k) eligible" and compensated accordingly.*[18]

The CBA in place for BFD states that, "…all hours not included in his/her scheduled workweek…" is paid at the overtime rate. This supersedes the FLSA requirement for overtime practices.

BFD operational firefighters' normal duty period is 24 hours. In the absence of an FLSA work period, maintaining current staffing would significantly increase overtime costs. Unlike many

[18] Source: 29 U.S.C. §207(k).

other fire agencies, BFD utilizes four shifts of personnel rather than three (typical in a 24 hours on – 48 hours off schedule, resulting in a 56-hour workweek). This increases the total number of departmental personnel and the associated costs.

As stated previously, BFD does not have a mandatory minimum staffing but rarely drops below a total of 18 personnel on duty. With vacancies for vacation, sick leave, training, military leave, jury duty, or any number of other ancillary issues, supplementary staff is needed to maintain the current staffing level. Given that many of the vacancies are unpredictable, BFD has essentially two options to maintain current staffing levels: hire back replacements from off-duty personnel or have additional personnel assigned to each shift. BFD has chosen the former and continues to use call-back personnel to fill vacancies.

The use of call-back personnel to fill vacancies creates additional overtime. One method to combat excessive overtime is to staff shifts with extra personnel that are used to maintain minimum staffing without incurring overtime. This method of overstaffing works well as long as those additional personnel are being used to fill vacancies; otherwise any potential cost avoidance is lost.

Based on the number of positions to be filled to maintain current shift staffing (18) and the number of personnel available per shift (22), it would appear that by modifying department policies, the number of overtime shifts could be reduced.

Recommendations:

- The maximum number of personnel allowed to be on scheduled vacation leave should be capped at three.
- Cap the number of personnel allowed on unscheduled leave to limit the number of overtime opportunities.
- Periodically (annually or more frequently) review minimum staffing levels and options for filling overtime.
- The City should work through negotiations with labor to determine an appropriate minimum staffing and include that staffing level in future contracts.

Many departments have made the decision to purchase an electronic staffing program with automated telephone callback system that combines scheduling at the fire station level, payroll,

and administrative functions.[19] Evidence of the benefits described by fire departments around the country provides testimony to the rapid recovery of the initial cost of acquiring this type of software. Benefits of a staffing program include:

- Receive and respond to scheduling notifications and other work communications by telephone, cell, pager, e-mail, Internet and PC.
- Check schedules and find out where they are working through self-service access points such as telephone, cell, Internet, or PC.
- Sign-up for overtime.
- Sign-up for special duty assignments.
- Request time-off and leave.
- Conduct shift trades.
- Review payroll data and accrual balances.
- Personally update profile based on security.

Command staff can:

- Automatically align staffing demands with employee availability, qualifications, and regulatory constraints.
- Generate and send schedule-driven notifications and communications to a telephone, cell, pager, or e-mail, automatically linking work assignment information for employee response base on your rules and guidelines.
- Create and maintain an unlimited number of schedules supporting multiple shifts, rotating positions, future assignments and promotions.
- Manage daily operations with real-time rosters that track regular duty, special duty assignments, training, off-duty detail, and emergency deployments.
- Manage time-off requests.
- Monitor staffing levels.
- Automatically alert you by way of real-time alarms when staffing levels fall below pre-determined requirements.
- Find replacement personnel who are off-duty, can be held over, are not fatigued, or have signed-up for overtime work.
- Track training and certifications.
- Deploy personnel for emergency recall or mutual aid.
- Account for, locate, and contact all staff at any given time.
- Finalize pay sheets for payroll.
- Ensure policy enforcement and Meet and Confer compliance.

[19] *JEMS*, Innovation in Action, Workforce Wonder, December 1999, Vol. 24, No. 12.

- Run reports for greater insight into operations.

A number of fire departments have purchased electronic staffing software and have done so from the same source, PDSI TeleStaff.[20] While individual departments have several types, versions, and configurations of the software, all of the programs operate in a similar manner. The software was designed to be accessible with or without a computer network and will accept requests and make contact with staff members by telephone. The program is capable of placing outbound phone calls or delivering messages by pager, fax, or e-mail. The software can make multiple phone calls simultaneously and is considered a solution for emergency and other staffing recalls.

Recommendation:

- Purchase an electronic staffing program to perform automated personnel resource tracking.

[20] ESCI does not endorse a particular brand or product. PDSI is identified here simply as a software that is in current use by a number of local fire departments.

Capital Assets and Capital Improvement Programs

Fire departments need a balance of three basic resources to successfully carry out their emergency mission: people, equipment, and facilities. Because firefighting is an extremely physical pursuit, the adequacy of personnel resources is a primary concern. But no matter how competent or numerous the firefighters are, the department will fail to execute its mission if it lacks sufficient fire apparatus distributed in an efficient manner and housed in adequate facilities.

Bangor Fire Department has millions of dollars' worth of capital assets. These assets are necessary to provide service and must be maintained and replaced as needed. Maintenance and replacement plans for facilities, apparatus, and other high value equipment are essential and a funding mechanism must be in place to ensure money is available to meet these costs.

Regardless of the type or size of a fire department, there are basic needs each must address—quick response time and efficient use of apparatus and equipment. Everything else depends on a particular department's budget and needs. Fire station designs are unlike any other type of project; there are many subtle elements and specialized systems that go into a fire station. Likewise, fire apparatus are extremely specialized pieces of equipment that require extensive planning to ensure proper use of resources.

Facilities

Inadequate facilities for housing firefighters and apparatus detract from a department's mission. Limited space can significantly impact the available options for resource assignment, hinder the ability to maintain a well-trained and fit workforce, and may affect member and employee morale. The primary functions that take place within the fire station environment should be closely examined and adequate, efficient space for all functions should be provided. Some examples include:

- Housing and cleaning of apparatus and equipment
- Administrative office duties where necessary
- Firefighter training
- Firefighter fitness
- Residential living that is gender compatible for on-duty members
- Operations that include enough room for community groups and parking

While this list may seem elementary, the lack of dedicated space compromises the ability of the facility to support these functions, and can detract from its primary purpose. ESCI reviewed the three stations in the study area.

The following evaluation and general condition assessment was conducted at the department's facilities. However, it should be noted that this study is not a full facilities assessment as would be conducted by an engineer or architect. Such a study would be far more detailed than the review conducted for this report, and the Department should consider any recommendations of an architect or engineering study as final authority in issues of condition and need. This focus is on operational conditions, efficiency, safety, and staff and apparatus space needs.

Central Station
289 Main Street
Built in 1977, this 23,000-square foot concrete platform building serves as the main fire station housing administrative officers and fire/EMS crewsand consists of two drive-thru and eight back-in apparatus bays. Located near the downtown area, the station fits in well with the surrounding area.

Any specific issues or observations with this facility can be classified into the following seven categories.

Design:	The majority of the facility is adequate for its current use; however, there are some space limitations for administrative staff.
Construction:	Concrete/masonry platform construction with flat roof. The roof was updated within the last five years. Heating is provided by natural gas; with central air conditioning provided throughout the building with the exception of the apparatus bays.
Safety:	The building currently has no fire sprinkler system, but the city is waiting for confirmation of a grant submitted to retro-fit both the station and City Hall. Heat detectors and pull stations are monitored locally, and a security key card system is provided throughout the building. Commercial cooking equipment located on the second floor is clean and well maintained. No central shut off is provided for this equipment. An SCBA compressor is located in the apparatus bay, with accurate records. All cylinders are properly secured. Back-up power is provided by a diesel powered generator with automatic transfer.
Environment:	A Plymovent® exhaust system is provided for all front-line apparatus. All were in use at time of inspection. A double-lined 10,000-gallon underground diesel tank for the back-up generator is located on the property.
Code Compliance:	Designated parking for handicapped is provided; however, no ADA compliant restrooms were noted.
Staff Facilities:	Adequate room for safe and effective turnout is provided, in addition to space for working in, on, and around apparatus and small equipment. Administrative space is somewhat limited. Plycom™ system in place for videoconferencing.
Efficiency:	No efficiency issues noted.

Station 5
168 Hogan Road
Built in 1993, this 6,000-square foot block construction facility with peaked metal truss roof consists of three back-in apparatus bays. Serving the eastern section of the city, this station houses Engine 5, Ambulance 5, and a mobile command unit. This comfortable, yet responsible facility adequately accommodates the working and living needs of the on duty personnel.

Any specific issues or observations with this facility can be classified into the following seven categories.

Design:	Adequate parking for staff and visitors is provided, with safe and effective apparatus exit into traffic. This could be enhanced by fire department traffic signs to alert motorists as they approach the station in either direction.
Construction:	Masonry block building with peaked metal roof. Natural gas heated; all living areas cooled with central air conditioning.
Safety:	Automatic door stops are provided for all apparatus doors and functioned correctly at time of inspection. Offering 75 percent sprinkler protection, this facility has a back-up generator powered by propane with automatic transfer. No commercial cooking equipment, as residential appliances are maintained in the kitchen for food preparation.
Environment:	There are no underground storage tanks at this facility. Direct connect apparatus exhaust removal system is provided. This system was in use with all apparatus and appears to be used regularly. Apparatus floor drain oil separation provided.
Code Compliance:	Facility is ADA compliant, with designated parking and restrooms handicapped accessible.
Staff Facilities:	Apparatus bays provide ample room for normal work activities including working on apparatus, small equipment maintenance, and turnout for emergency response. Adequate provisions for both male and female members is provided. This includes sleeping, personal hygiene, and changing areas. Plycom™ system in place for videoconferencing.
Efficiency:	No efficiency issues noted.

Station 6
11 Griffin Road

Built in 2009, this 8,000-square foot masonry construction facility with peaked metal roof consists of three back-in bays apparatus bays. This station is located in the eastern section of the city, housing Engine 6, Tanker 6, and reserve Ladder 6. This new facility easily meets the working and living needs of the on duty personnel.

Any specific issues or observations with this facility can be classified into the following seven categories.

Design:	Although traffic flow from fire station is safe and effective, fire station signage for approaching motorists would enhance awareness. This structure is easily adaptable for future community needs and provides adequate parking for visitors and on duty personnel.
Construction:	This building is in excellent condition. All living and working areas are clean and well maintained. On duty crews seemed to be very pleased with facility. Central air conditioning provided for all living areas and natural gas heat throughout.
Safety:	Automatic sprinklers cover 100 percent of the building with heat/smoke detectors monitored off-site by the dispatch center. Although there is no security monitoring, station is secured well with key card access for all personnel. All compressed air cylinders are properly stored. All building fire extinguishers, commercial cooking suppression system, and automatic sprinklers inspections are up to date with proper tags and records.
Environment:	Apparatus floor drain oil separation is in place and no underground storage tanks on-site. Positive pressure apparatus exhaust removal system provided for each apparatus. LEED Silver certified building.
Code Compliance:	Facility is ADA compliant, offering designated parking and restrooms.
Staff Facilities:	Ample space provided in apparatus for safe turnout, as well as working on apparatus and small equipment repairs. Day room doubles as a training room, with Polycom™ video conferencing provided to link all stations together for classroom and in-service training sessions.
Efficiency:	No staff efficiencies for this state-of-the-art facility.

Apparatus

BFD maintains a fleet of 17 response vehicles. All of the current emergency vehicles fall within what is considered to be an acceptable life span, with an average age calculated at 5.78 years – a very young fleet. BFD has been fortunate in being able to recognize and address the importance of providing and maintaining high quality emergency vehicles to its responders.

The following charts summarize currently existing fire and emergency medical response apparatus, as well as the equipment capacities and condition.

Engine 1
2005 Pierce Arrow XT Pumper

Seating Capacity: **6**
Pump Capacity: **1,500 gpm (gallons per minute)**
Tank Capacity: **750 gallons**
Condition: **Good**
Mileage: **55,195**

Additional Comments or Observations: Engine Hours: 4,808. ALS equipped, including thermal imaging camera, RIT pack, 5K gasoline generator, PFDs for each riding position, and powered hydraulic system including cutter, combination tool and power unit for one tool operation.

Engine 5
1994 Pierce Arrow Pumper

Seating Capacity: **4**
Pump Capacity: **1,250 gpm**
Tank Capacity: **750 gallons**
Condition: **Fair**
Mileage: **145,764**

Additional Comments or Observations: Engine hours: 10,629. Light extrication tool complement featuring minimal cribbing, powered hydraulic combination tool and cutter with one-tool at a time pump. Electrolisis noted on compartment doors.

Engine 6
1997 Pierce Saber Pumper

Seating Capacity: **4**
Pump Capacity: **1,250 gpm**
Tank Capacity: **750 gallons**
Condition: **Poor**
Mileage: **120,396**

Additional Comments or Observations: Engine hours: 10,166. This ALS engine is furnished with PFDs for each riding position, two cold water exposure suits, throw bags, 5K gasoline gasoline generator, and 40-gallon class B foam tank.

No Photo Available

Engine 2
1989 Pierce Arrow Pumper

Seating Capacity: **4**
Pump Capacity: **1,250 gpm**
Tank Capacity: **750 gallons**
Condition: **Fair**
Mileage: **169,350**

Additional Comments or Observations: Engine hours: 11,496. Primary reserve engine. Offers two stage pump, 5K gasoline generator, and minimal tools including full hose complement and SCBAs.

Ladder 1
2010 Pierce Velocity Quint

Seating Capacity: **4**
Pump Capacity: **1,500 gpm**
Tank Capacity: **250 gallons**
Condition: **Excellent**
Mileage: **12,213**

Additional Comments or Observations: 75' aerial ladder, 28' and 35' extension ladders, A-frame folding ladder, and two 16' roof ladders. K12 and chain saws, various hand tools, thermal imaging camera, RIT pack, and high-rise packs.

Ladder 6
1988 Pierce Quint

Seating Capacity: **Unknown**
Pump Capacity: **Unknown**
Tank Capacity: **Unknown**
Condition: **Good**
Mileage: **Unknown**

Additional Comments or Observations: 105' aerial ladder-Not on site during inspection. Loaned to a neighboring department.

Command Car
2009 Chevy Suburban Command

Seating Capacity: **5**
Pump Capacity: **n/a**
Tank Capacity: **n/a**
Condition: **Excellent**
Mileage:

Additional Comments or Observations:

Truck 15
2006 Chevy Pick-up Utility

Seating Capacity: **2**
Pump Capacity: **n/a**
Tank Capacity: **n/a**
Condition: **Excellent**
Mileage:

Additional Comments or Observations: Primary vehicle for towing fire safety house, ATVs, and boats. Also used for snow removal.

Rescue One
2007 Spartan Rescue One Heavy Rescue

Seating Capacity: **4**
Pump Capacity: **n/a**
Tank Capacity: **n/a**
Condition: **Excellent**
Mileage: **3,912**

Additional Comments or Observations: BLS equipped, 9,000 lb portable electric winch, dive/water rescue equipment featuring an ice rescue sled, complete set of powered hydraulic rescue tools, high pressure lifting bags, and Paratech rescue struts for heavy vehicle stabilization.

Rescue 1
2009 Chevy Ambulance

No Photo Available

Seating Capacity: **2**
Pump Capacity: **n/a**
Tank Capacity: **n/a**
Condition: **Excellent**
Mileage: **Unknown**

Additional Comments or Observations: ALS equipped.

Rescue 5
2005 Ford E450 Ambulance

Seating Capacity: **2**
Pump Capacity: **n/a**
Tank Capacity: **n/a**
Condition: **Fair**
Mileage: **58,012**

Additional Comments or Observations: ALS equipped.

Rescue 6
Ford Ambulance

Seating Capacity: **2**
Pump Capacity: **n/a**
Tank Capacity: **n/a**
Condition: **Good**
Mileage: **Unknown**

Additional Comments or Observations: ALS equipped.

Rescue 2
Ford Ambulance

Seating Capacity: **2**
Pump Capacity: **n/a**
Tank Capacity: **n/a**
Condition: **Fair**
Mileage: **Unknown**

Additional Comments or Observations: ALS equipped. Serves as a reserve unit, as well as long distance transfers.

Rescue 4
Ford Ambulance

Seating Capacity:
Pump Capacity: **n/a**
Tank Capacity: **n/a**
Condition: **Fair**
Mileage: **Unknown**

Additional Comments or Observations: ALS equipped. Serves as a reserve unit, as well as long distance transfers.

Incident Command Vehicle
2005 Freightliner Farber Mobile Command Post

Seating Capacity: **2**
Pump Capacity: **n/a**
Tank Capacity: **n/a**
Condition: **Excellent**
Mileage: **3,189**

Additional Comments or Observations: This unit is only one of four in the state, obtained via grant funding. Features include dispatching console, satilite phone, four laptops, spare cell phones, portable weather station, VHF/UHF radios, and camera mast. Slide out feature provides additional

Tanker 6
2010 Kenworth Tanker

Seating Capacity: **2**
Pump Capacity: **1,000 gpm**
Tank Capacity: **3,000 gallons**
Condition: **Excellent**
Mileage: **4,443**

Additional Comments or Observations: Engine hours: 235. Offers only rear dump feature. No portable tanks carried on this tanker.

Maintenance

The Bangor Fire Department has a designated full-time mechanic to perform maintenance and repairs for all apparatus, staff vehicles, and small equipment. The mechanic has a well-stocked and equipped facility located at Central Station and performs all preventive maintenance, emergency repairs, and required inspections. On-duty shift personnel perform visual inspections for leaks, worn parts, and damage. They may also top off fluids and make minor repairs such as light bulbs changes and tool mount adjustments.

Warranty repairs are completed by the respective vendor/manufacturer. Priority repairs will occasionally be subcontracted in the event the department mechanic is committed to other maintenance responsibilities. The department also has the ability to have apparatus repairs performed by the city garage as needed based on availability of the department mechanic. On occasion, the department mechanic will assist neighboring fire departments with repair of their apparatus.

Small equipment includes items such as saws, portable pumps, and generators. This equipment is serviced once a year by the department's mechanic or as needed. The department mechanic is also certified to repair/maintain both Striker™ and Ferno™ cots in-house.

Hose testing is conducted annually, typically in the month of July. All hose testing is conducted by on-duty personnel. Results are documented in the field and entered into a spreadsheet. The department maintains a database of annual hose testing.

Pump testing is conducted annually by on-duty personnel at the department's training facility. Pump testing is documented following the *NFPA 1911* standard for inspecting and testing in-service fire apparatus. All recorded results are maintained by the department.

Aerial and ground ladder testing is conducted annually by an outside vendor following the *NFPA 1911, 1914, and 1932* standards for inspecting and testing. Complete and thorough documentation of testing and certification is provided by the vendor, with all records maintained by the department.

Bangor Fire Department uses Scott® for its Self-Contained Breathing Apparatus (SCBA). Annual testing and maintenance repair is performed by an outside vendor. Department members may

change batteries for PASS devices and minor O-rings, and the majority of minor maintenance is performed by on-duty shift personnel. Annual SCBA testing includes flow testing of all packs and regulators. Hydrostatic bottle testing is completed as required. Fit testing for each member of the department is completed annually, performed in-house by the company officer.

Preventative maintenance for all powered hydraulic rescue tools is performed annually by the department mechanic. This includes both the motor and hydraulic side of the pumps. The local Hurst® dealer only performs repairs as needed.

Recommendations:

- Consideration should be given to have the department mechanic obtain EVT certification.
- An equipment replacement schedule for technical rescue equipment should be developed based on industry standards and wear and tear.
- A comprehensive work order records management system should be put in place rather than current hard copy system augmented by an email to the mechanic.
- A cost benefit analysis should be conducted to determine if apparatus repairs for neighboring departments performed by the Bangor mechanic could generate revenue.
- A cost benefit analysis should be conducted to see if consolidating the fire department mechanic with the City's fleet maintenance garage would reduce duplication and maximize staff.
- A well-defined policy should be developed outlining allowable in-house repairs by members.

Service Delivery and Performance

The delivery of fire suppression and rescue services is no more effective than the sum of its parts. It requires efficient notification of an emergency, rapid response from well-located facilities in appropriate apparatus, and sufficient staffing following a well-practiced plan of action. This section of the study evaluates these various components and provides observations of the elements that make up the delivery of the most critical core services provided by Bangor Fire Department.

Communications and Dispatch System

The Bangor Fire Department is provided communications and dispatch services through the Bangor Police and Fire Communications Center (BPFCC or Communications Center), a branch of the Bangor Police Department. The dispatch center is the primary Public Safety Answering Point for the City.

The Communications Center is managed under the police department command structure without formal representation from the fire department. A police sergeant is assigned the responsibility for the center, along with several other areas of responsibility, but there are no other supervisory positions within the center's staffing structure. Only an on-duty police supervisor is in the building, with 24-hour responsibility over communications supervision as an ancillary duty. This is an extremely unusual supervisory structure for a busy communications center and a point of concern in ESCI's review. It is an indication that dispatch and communications are not recognized as primary functions of the department and are receiving only shared attention with other basic support functions. A fully trained, certified, and experienced communications supervisory staff should be in place, with 24-hour supervisor coverage.

The BPFCC maintains between two and three personnel on duty, depending on workload. The center uses cross-trained call-taker/telecommunicators and dedicates at least one communications position to the dispatch function for fire. While one console is typically assigned fire duties, there is capability to expand this if workload necessitates. The dispatchers are also responsible for non-communication ancillary functions, including answering incoming business calls, monitoring video feeds from security cameras and holding cells, managing some data cards and records, after-hours calls for Public Works and Health and Human Services, and

monitoring 178 direct-line alarm systems. In ESCI's experience, based on incoming call volume and ancillary duties, the center appears understaffed.

The center handles about 21,000 incoming 9-1-1 calls annually, or a daily average of 58 calls. There are six incoming 9-1-1 telephone trunk lines and a total of eight incoming lines. The center also answered an estimated 250,000 additional non-emergency administrative calls. The center's system is not compliant with Phase Two cellular location identification because all cellular calls are routed through the Maine State Police center in Orono and then transferred to Bangor.

Formal call answering time standards have been established by the state and adopted by BPFCC with mandated state reporting. Quality assurance is being conducted by a police sergeant and/or lieutenant, who by policy review or monitor calls for standards compliance.

Spillman™ computer-aided dispatch software is available to the dispatchers. This software is controlled by Penobscot County but is used primarily to drive the police records management system. This system is not currently fully programmed for fire and EMS dispatching. Instead, dispatchers rely on a paper card file system. When a call is received, dispatchers refer to a map to determine the appropriate card and then look up that card to receive a recommendation on which apparatus to send. With no computer-aided dispatch (CAD), apparatus availability is not automatically tracked and dispatchers must manually determine whether a backup unit should be sent. Backup recommendations are included in the card file, up to three layers deep. The card file method of dispatch processing was popular in the 1960's and early 70's. With the availability of cheaper computers in the 1980's, most urban dispatch centers had moved to computer-aided dispatch. The BPFCC fire and EMS call processing methodology is extremely outdated and subject to delay and human error.

Notification of companies takes place by specific unit dispatch, with assignment of specific apparatus quantities and types located on the paper cards in the file. Dispatch of apparatus within the fire stations takes place by direct-line Zetron™ annunciators, backed up by station radios. At this time, no direct line in-station printers are in place or planned for the immediate future. This is advisable, since it would provide another redundant method for transmitting alarms and would provide a "rip and run" sheet containing basic call information for responders. Field or command personnel are notified by pocket-sized radio receivers or SMS text

messaging. The CAD system does not currently include an interface for direct and automated creation of SMS paging.

As required by the state, dispatchers are fully certified in the Emergency Medical Dispatch (EMD) system, allowing them to provide pre-arrival instructions to bystanders at medical incidents. Initial dispatcher training consists of a 40-hour basic state academy course, emergency medical dispatch certification course, NCIC terminal certification training, and 911 equipment training, followed by three months working with a field training dispatcher. Annual recurrent training includes a 12-hour EMD update, some rotating certification classes, and approximately one week per year of professional development seminars or workshops per dispatcher.

The BFD radio system operates on a digital VHF repeater system from five sites. The department has one main channel, one tactical channel, and a state mutual aid channel available. Dispatchers report that system queuing is rare, particularly on the fire channels.

The dispatch center has adequate contingency plans for system failure. Back-up power is in place with spare consoles available. A back-up transmitter and a functionally redundant dispatch site are available at the county communications center. Additionally, the Mobile Command Vehicle has two dispatch consoles that can serve as back-ups for the communications center if necessary. Security is strong, with a key card system for entry. There are external windows present that are non-hardened. Evacuation and transfer drills should be conducted at least annually to train dispatchers for emergency relocation and other system failure procedures.

Recommendations:

- A modern and robust computer-aided dispatch system should be implemented and fully programmed for fire and emergency medical services as soon as possible. Back-up apparatus recommendations should go to at least six layers.
- A thorough staffing study should be conducted for the communications center, including consideration of communication workload and ancillary functions.
- The communications center supervisory and command structure should be reevaluated.
- Consistent, trained and qualified center supervision should be available on a 24-hour basis.
- The city should consider modifying the governance and management of the communications center and an independent city communications department, with a director at the department head level, should be considered in order to make the city's multi-department communications function independent of any specific user department.
- User departments (fire, police, public works, etc.) should be represented on a user committee to provide operational and procedural input to the center's director.

Demand Analysis

BFD provided access to its detailed National Fire Incident Reporting System (NFIRS) records for a two-year period between December 1, 2008, and November 30, 2010. In addition, BFD provided historical workload data for 2003 through 2009. The following details the volume of calls by type over the data period evaluated.

Figure 27: Workload Historical Data

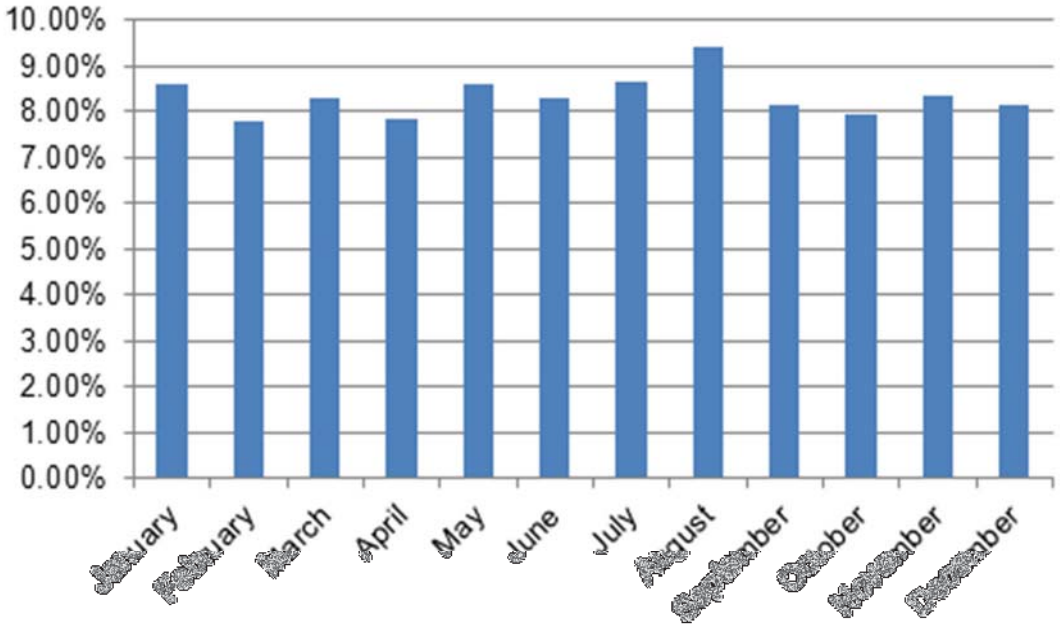
	2003	2004	2005	2006	2007	2008	2009
Fire	209	239	202	186	213	218	193
EMS/Rescue	4,739	4,667	4,521	4,668	4,758	4,991	4,788
Transfers	1,130	1,545	1,454	1,414	1,386	1,489	933
Other	1,392	1,354	1,315	1,217	1,242	1,292	1,443
Total Workload	**7,470**	**7,805**	**7,492**	**7,485**	**7,599**	**7,990**	**7,357**

It should be noted that the number of incidents in all major categories have been somewhat inconsistent during the period. Currently calls for service for medical assistance make up the majority of service calls. This is not unusual for fire departments that provide either first responder or ambulance transport services.

A review of incidents by time of occurrence also reveals when the greatest response demand is occurring. The following charts show how activity and demand changes for BFD based on

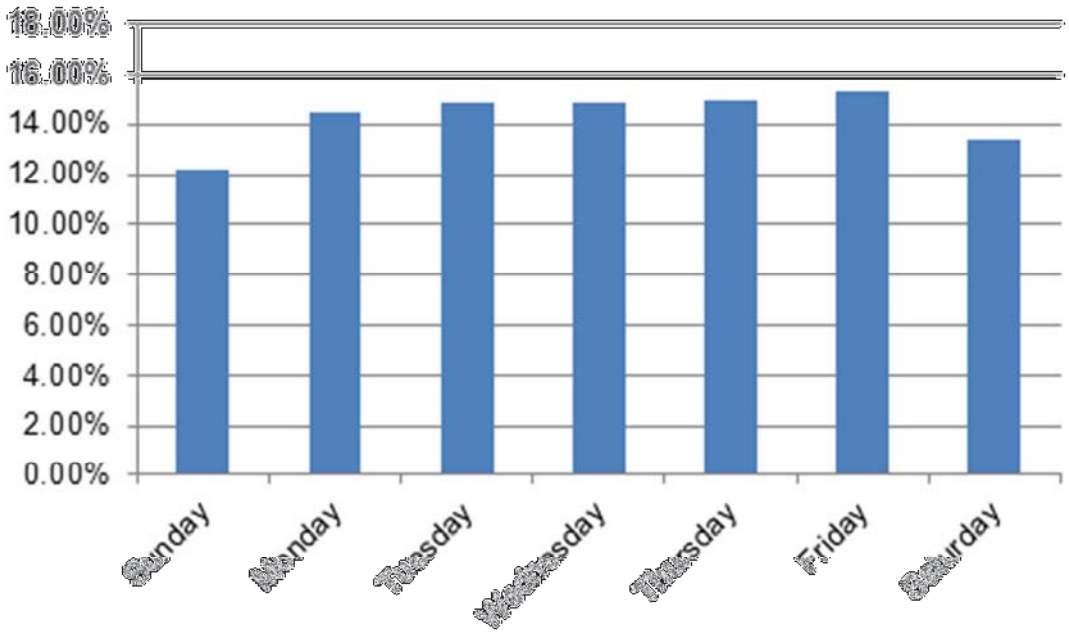
various measures of time. ESCI began by breaking down yearly workload into monthly increments.

Figure 28: Monthly Workload



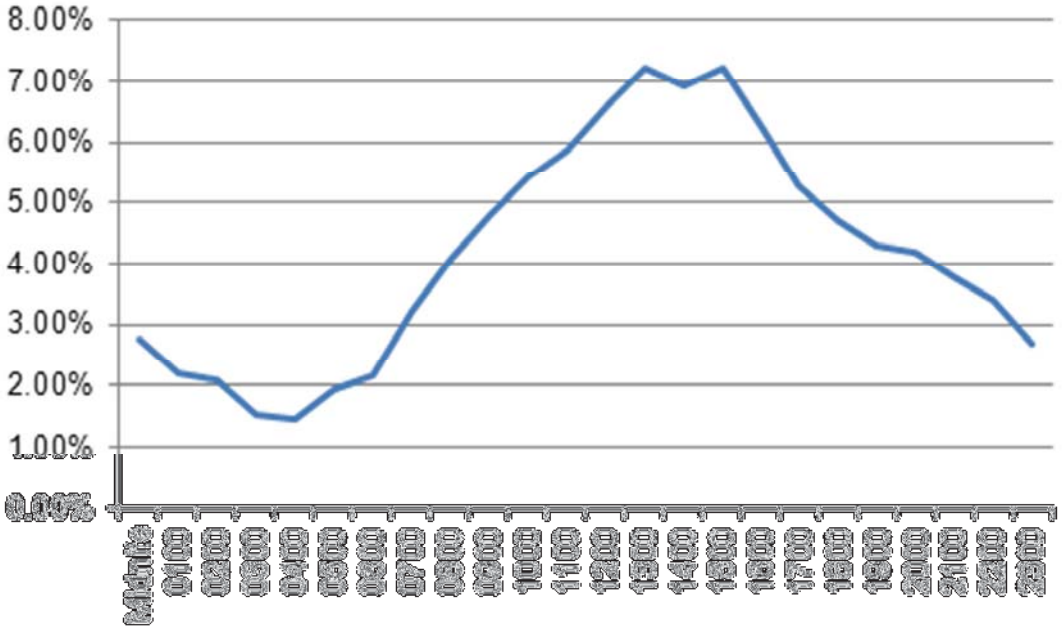
Monthly workload for fire calls varies in any given year. Generally, service demand is slightly higher in the mid-summer and mid-winter months. In further analysis, workload is examined by day of the week, showing a slight decrease in volume on weekends.

Figure 29: Workload by Day of Week



The final analysis of historical workload concludes with examination of service demand by hour of day. Understanding when peak activity occurs begins the process of reviewing deployment strategies and needs assessment. This figure represents an aggregate of the data period evaluated rather than any one single year of incidents to show an overall trend of hourly workload.

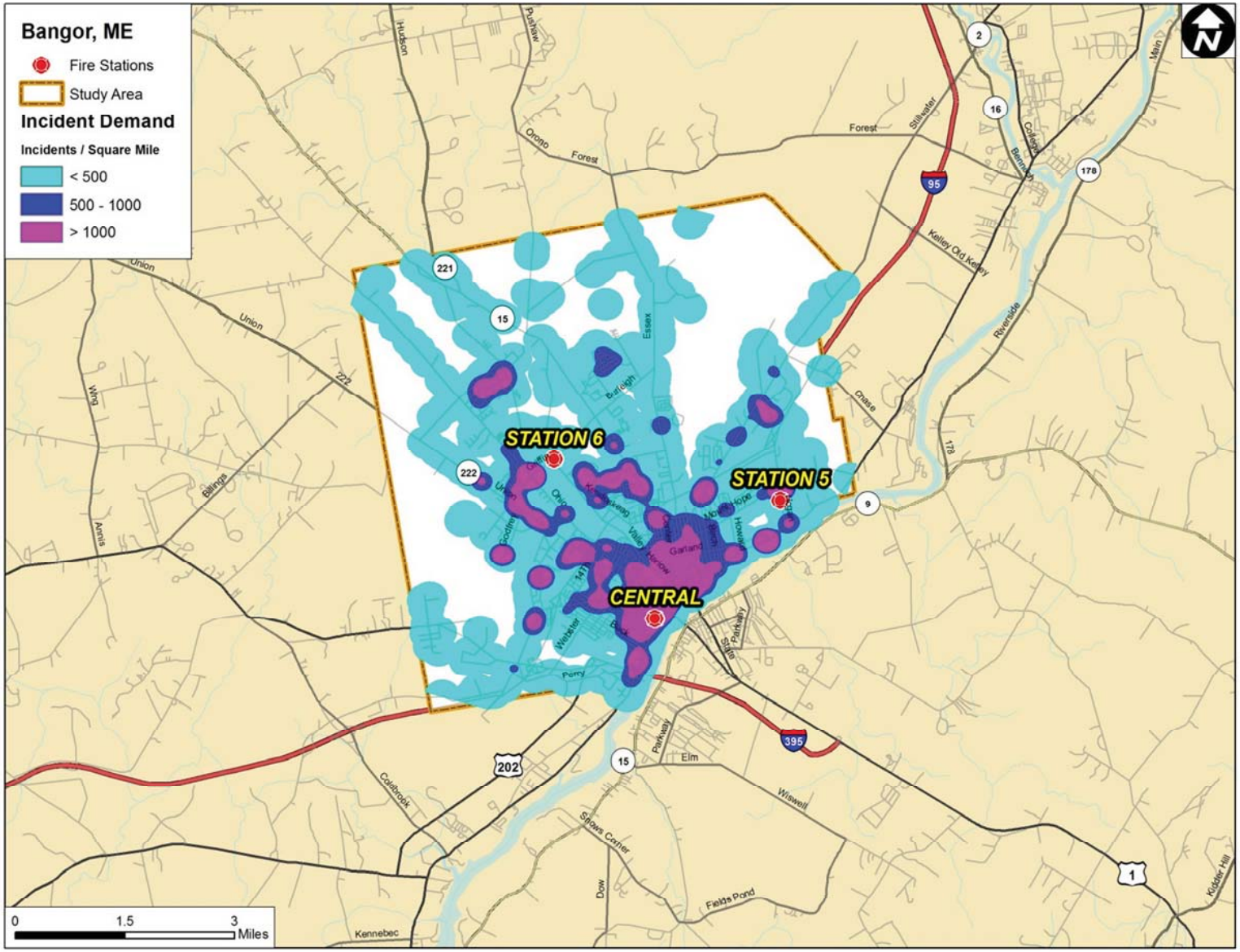
Figure 30: Workload by Hour of Day



Activity for fire calls generally begins to increase between the hours of 7:00 a.m. and 8:00 a.m., reaching peak volume during the midday hours before gradually declining into the evening. Peak activity times can be reflected in response time performance in certain cases. The impact of response time on the outcome of emergency incidents has been exhaustively studied, both in the laboratory and in historical data, with a predictable correlation between the two. Though seemingly intuitive, it is still useful to review how longer response times can have a negative effect on the ability to suppress fires, particularly in structures, or to successfully intervene in a life-threatening medical emergency. Response time performance is examined in a separate section of this report.

In addition to the temporal analysis of the current service demand, it is useful to examine geographic distribution of service demand. This analysis will allow for assessing the location of stations in comparison to the actual service demand within the area. The following map indicates the distribution of emergency incidents responded to during the period December 2008 through November 2010. The figure indicates the highest volume for calls exists in the downtown portion of the city where dense development is prevalent.

Figure 31: Service Demand Concentration



Performance Objectives

The ultimate goal of any emergency service delivery system is to provide sufficient resources (personnel, apparatus, and equipment) to the scene of an emergency in time to take effective action to minimize the impacts of the emergency. This need applies to fires, medical emergencies, and any other emergency situation to which the fire department responds.

Emergency service agencies should have clearly defined response performance objectives established to allow evaluation of capability and service delivery. An organization's performance objectives should clearly state both the current and desired emergency service capabilities in very measurable terms. For emergency response, performance objectives should define response performance using both time and resource criteria. For example:

1. Provide for the arrival of adequate resources to initiate basic emergency medical services at the scene of any medical emergency within "X" minutes following dispatch, 90 percent of the time.
2. Provide for the arrival of adequate resources to initiate interior fire suppression operations at the scene of any fire within "X" minutes following dispatch, 90 percent of the time.

With specific performance criteria a fire department can develop deployment methodologies to achieve desired levels of performance, and can quickly identify when conditions in the environment degrade performance.

The Bangor Fire Department does not have any formal performance objectives that it has used in the past. For purposes of service delivery performance analysis, ESCI strongly recommends that the city adopt formal performance objectives by which various response and service delivery performance points can be measured for the BFD.

In the absence of formal performance objectives, ESCI will provide general analysis of actual system performance for BFD but will not have an objective against which to measure this performance.

Distribution Analysis

Bangor Fire Department operates three facilities within the City of Bangor. There exists a certain extent of the jurisdiction that can be reached within a certain travel time from the stations regardless of staffing patterns. The following table indicates the percentage of service demand

within the city limits of Bangor that fall within various periods of travel time from the fire stations, without neighboring mutual aid stations. The right hand column indicates the total percentage of demand falling within that travel time period from any of the stations.

Figure 32: Distribution and Travel Time Capability Analysis

Within Minutes	Station 5	Station 6	Central	Total
4:00	29%	26%	60%	89%
6:00	71%	80%	82%	99%
8:00	89%	99%	94%	100%
10:00	95%	100%	96%	100%
15:00	100%	100%	100%	100%

According to the table, the department can physically cover almost 90 percent of the service demand inside the city limits within four minutes (4:00) of travel time. BFD can cover almost 100 percent of its service demand within six minutes of travel time.

One of the national peer standards, *NFPA 1710 Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*[21] includes a performance objective of 240 seconds or less travel time for the arrival of the first arriving engine company.[22] The travel time models produced by ESCI indicate that Bangor Fire Department's station deployment would be capable of producing a travel time performance just 1 percent less than the *NFPA 1710* standard. Actual performance may be different from modeled performance, and the department's overall response time performance will be discussed in a later section of this report.

Concentration

NFPA 1710 also requires 480 seconds or less travel time for the deployment of an initial full alarm assignment at a fire suppression incident.[23] This is to ensure that enough people and equipment arrive soon enough to be effective in controlling a fire before substantial damage occurs or the fire becomes uncontrollable. The number of firefighters needed for a structure

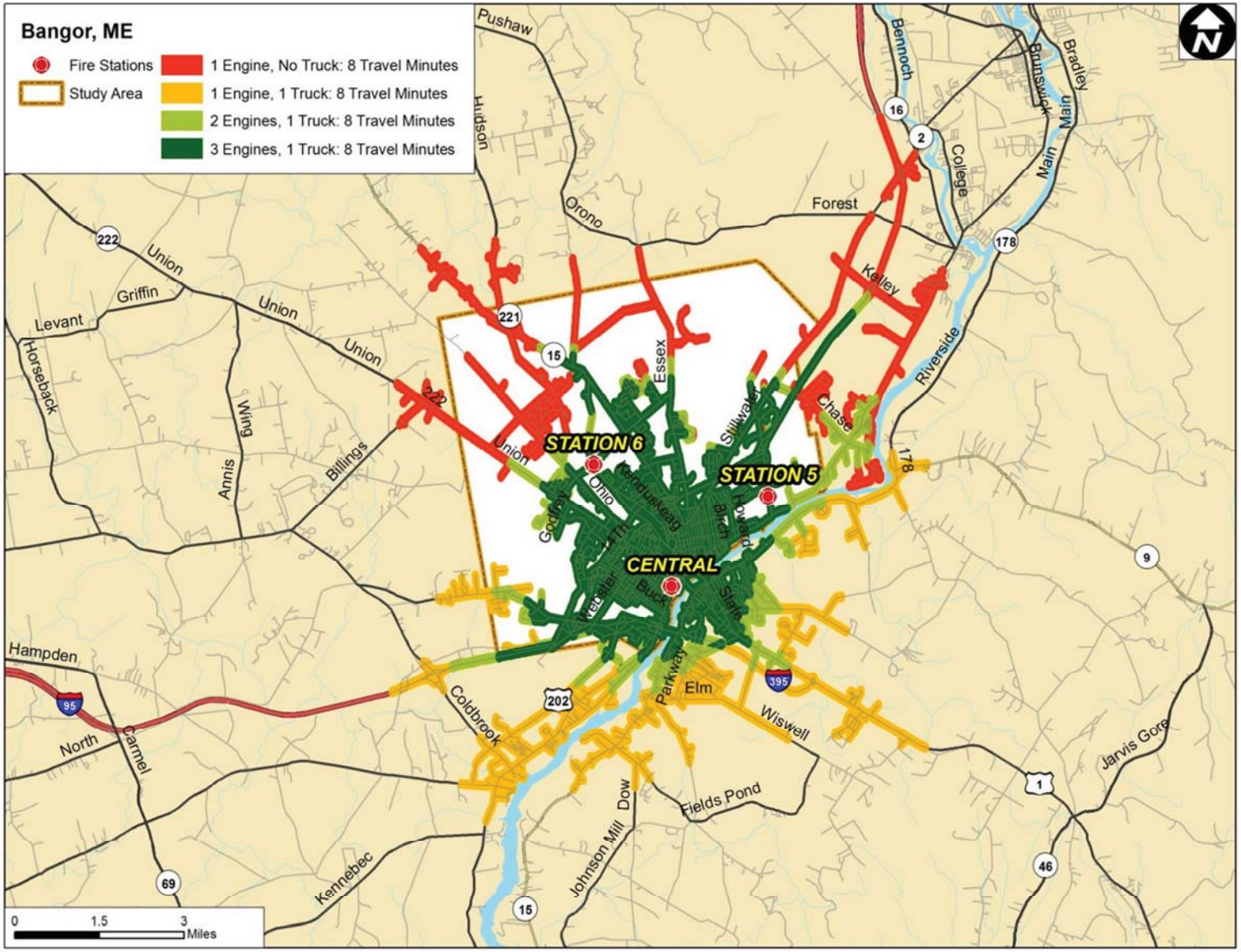
[21] *NFPA 1710*, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*. (National Fire Protection Association 2010.)
[22] *NFPA 1710*, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*. (National Fire Protection Association 2010.)
[23] *NFPA 1710*, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*. (National Fire Protection Association 2010.)

depends on size and complexity of the structure and is discussed in length in another section of this report.

The following figure illustrates what portions of the response area can be reached with various concentration of fire apparatus within eight minutes of travel time. This concentration analysis also includes apparatus from neighboring jurisdiction's fire stations, since mutual and automatic aid agreements could be negotiated to permit their deployment on structure fires to which they would be beneficial in resource concentration.

The figure illustrates that the greatest level of concentration can be achieved within the most densely developed areas of the city, those containing the highest service demand and highest risk occupancies. Additional development, particularly high-risk occupancies, in the northwest areas of the city may require deployment of additional resources and fire stations to achieve appropriate resource concentration.

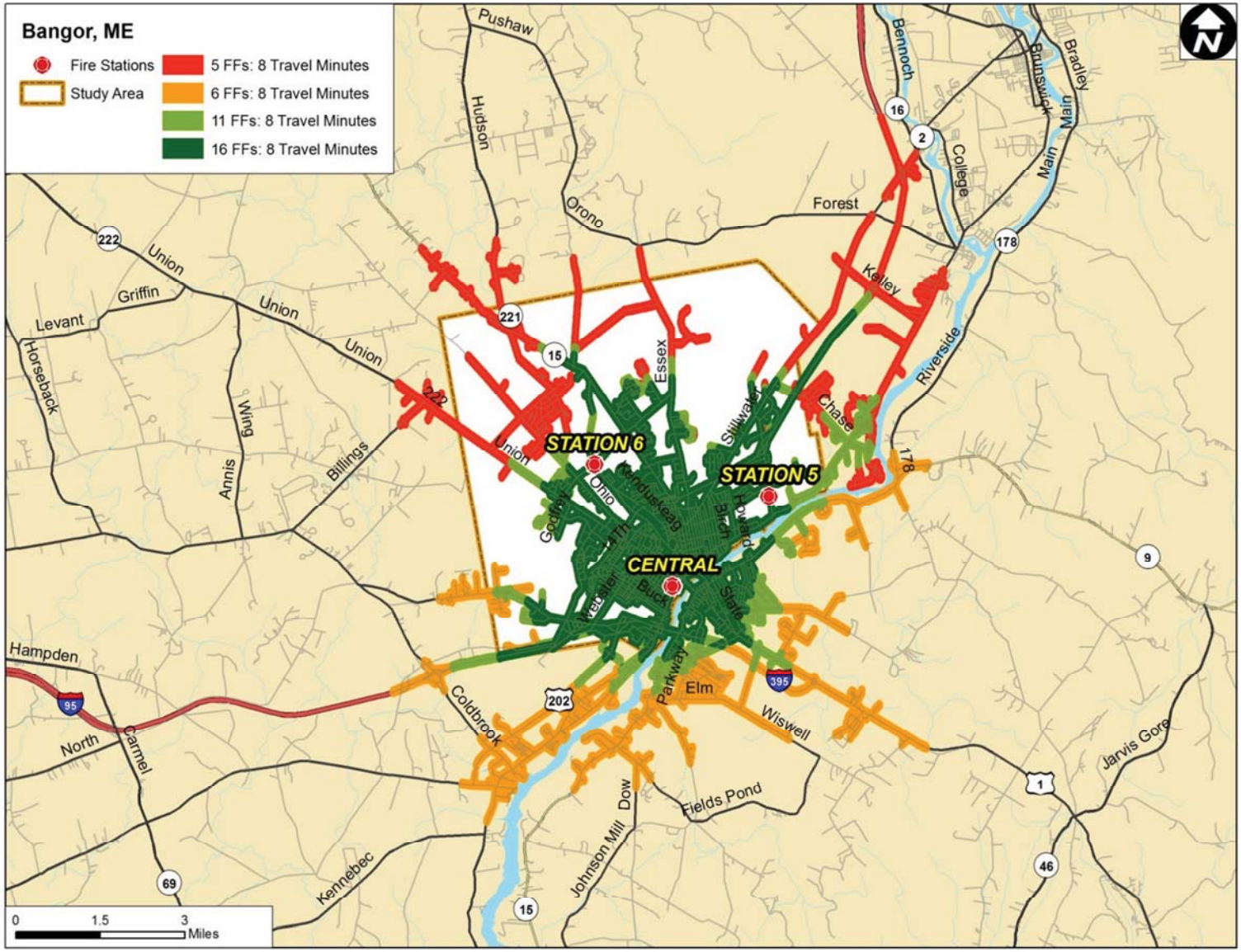
Figure 33: Apparatus Concentration in 8:00 Travel Time Limit



The previous analysis focuses on various concentrations of apparatus, but trucks do not fight fires themselves. It takes a sufficient number of personnel to make up an effective firefighting force (EFF). For the staffing concentration analysis, typical staffing amounts were utilized as reported to ESCI to illustrate the normal capacity of firefighters available to combat a fire. The full available staff of the host fire department was counted along with the typical number of firefighters on duty or responding on units from each neighboring department. The following map series illustrates the depth of resources and the geographic concentration within an eight-minute travel time.

Most of the southeastern half of the city is within the capability of amassing between 12 and 16 firefighters within eight minutes. By contrast, much of the northwestern half of the city is limited to five or fewer firefighters within eight minutes. Again, if additional development occurs in the northwest areas of the city, it may require deployment of additional resources and fire stations to achieve appropriate resource concentration.

Figure 34: Staffing Concentration in 8:00 Travel Time Limit



Reliability and Concurrency

The workload on emergency response units can also be a factor in response time performance. The busier a given unit, the less available it is for the next emergency. If a response unit is unavailable, then a unit from a more distant station must respond, increasing overall response time. A cushion of surplus response capacity above average values must be maintained due to less frequent, but very critical times, when atypical demand patterns appear in the system. Multiple medical calls, simultaneous fires, multi-casualty events, or multiple alarm fires are all examples.

One way to look at resource workload is to examine the amount of time multiple calls occur within the same time frame on the same day. ESCI examined the calls during December 2008 through November 2010 to find the frequency that the department is handling multiple calls within any given time frame. This is important because the more calls occurring at one time; the more stretched available resources become leading to extended response times from distant responding available apparatus.

Figure 35: Call Concurrency Rates

Number Of Concurrent Incidents In Progress							
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
45.26%	32.69%	14.75%	5.46%	1.50%	0.31%	0.03%	0.01%

For most departments, the majority of calls occur one or two at a time. However, as communities grow the propensity for concurrent calls increases. When the concurrency reaches a level to which it stretches resources to near capacity, response times begin to extend. Although multiple medical calls will cause drawdown, especially as concurrency increases, they usually occupy only one unit at a time. Concurrent fire calls, however, are of more concern as they may require multiple unit responses for each call depending upon the dispatch criteria. Typically, “other” calls that are not actual fires or medical calls have higher rates of concurrency than fires and depending on the dispatch criteria, may create periods of extensive resource drawdown.

To measure the extent of resource drawdown, calls were examined for the number of apparatus that responded. The following table details the instances of multiple apparatus being committed

simultaneously. The table illustrates the number of times a particular quantity of apparatus was committed at the point of the dispatch of a new call.

Figure 36: Resource Concurrency and Drawdown

Number Of Units On Calls Concurrently								
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
35.14%	30.95%	16.66%	8.35%	4.40%	3.05%	1.08%	0.35%	0.02%

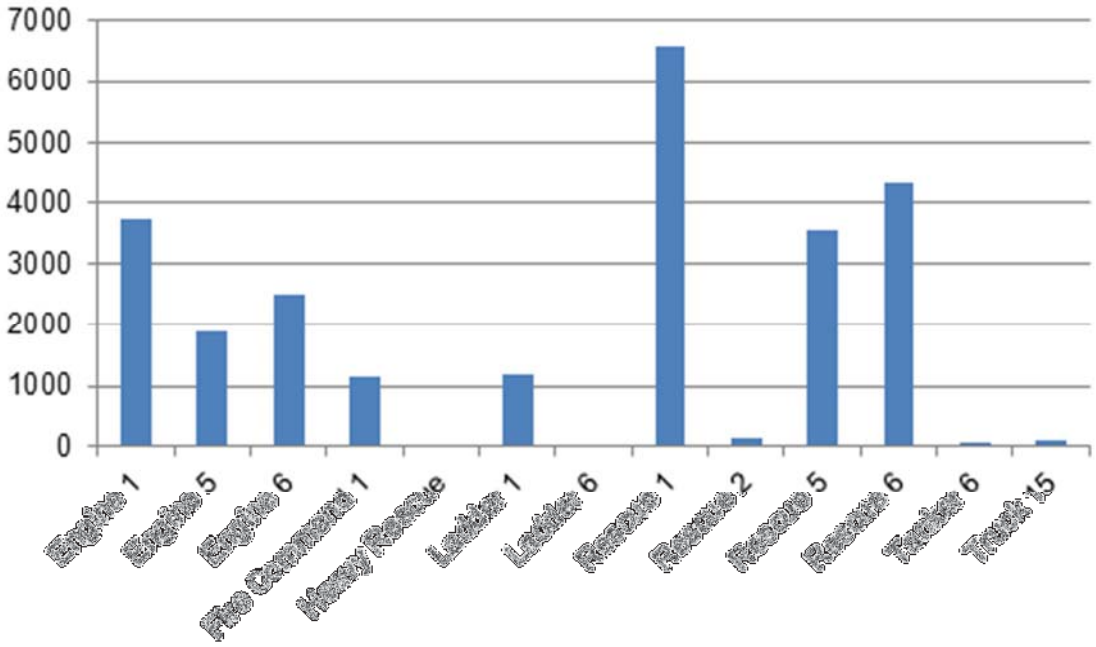
It is important to note that an area with the highest workload will typically have the highest rate of concurrent calls and resource drawdown. This requires response units from other stations, to respond into this area. The impact on station area reliability can be affected by several factors such as:

- Out of service for mechanical reasons
- Out of service for training exercises
- Out of area on move-up deployment
- Lack of staffing
- Concurrent calls

When these factors impact the reliability of a station to respond within its prescribed territory, response time performance measures for the back-up station/apparatus can be negatively affected.

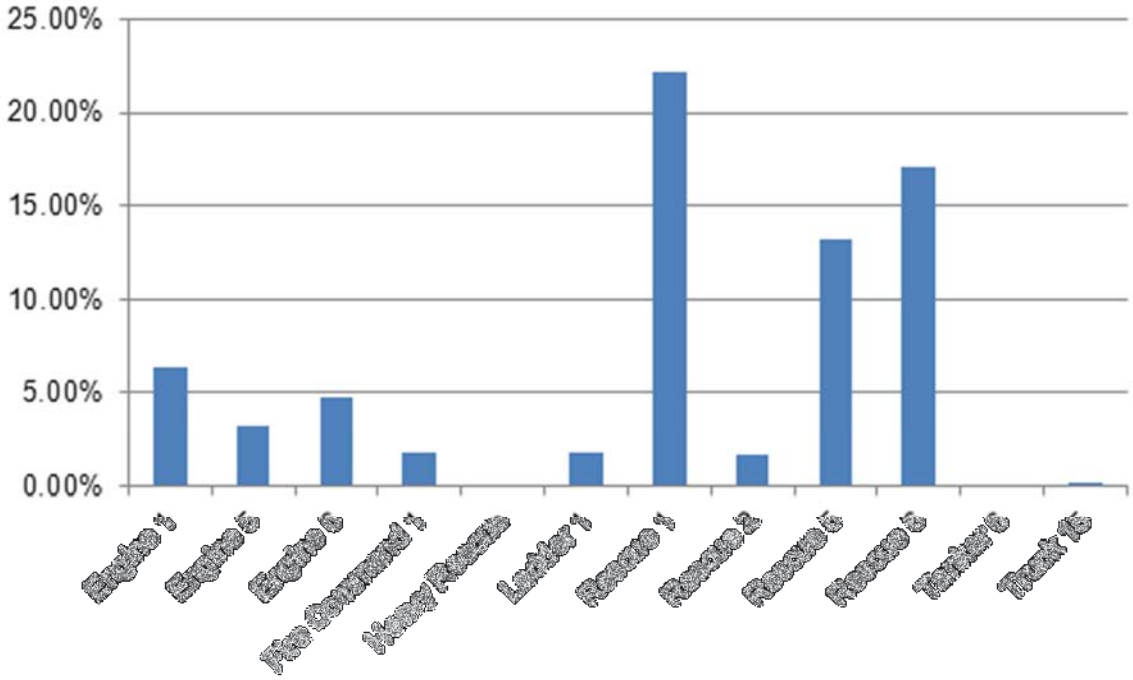
In order to evaluate which stations experience the greatest likelihood of being unavailable for a call within their primary response area, the workload of each individual unit is evaluated in the following figures. The first figure charts the total number of responses made by each unit during the study period of December 2008 through November 2010.

Figure 37: Unit Workload, December 2008 - November 2010



During this time period, Engine 1, Rescue 1, Rescue 5, and Rescue 6 were among the busiest units. However, the gross volume of calls does not always tell the full story. The length of time a unit is committed on a call can vary significantly based on the type of call. The following figure analyzes the total time each unit was committed to all incidents during the study period and expresses this as a percentage of a total year.

Figure 38: Percentage Commit Time, December 2008 - November 2010



This figure indicates that Rescue 1 is committed and therefore unavailable for another response a little over 22 percent of the time and Rescue 6 is unavailable about 17 percent of the time. Each of these units can be expected to have to have a replacement rescue unit dispatched into their first due response area about a fifth of the time. Simultaneous dispatch of an EMS-equipped engine or truck from the home station will mitigate the delay of the ambulance.

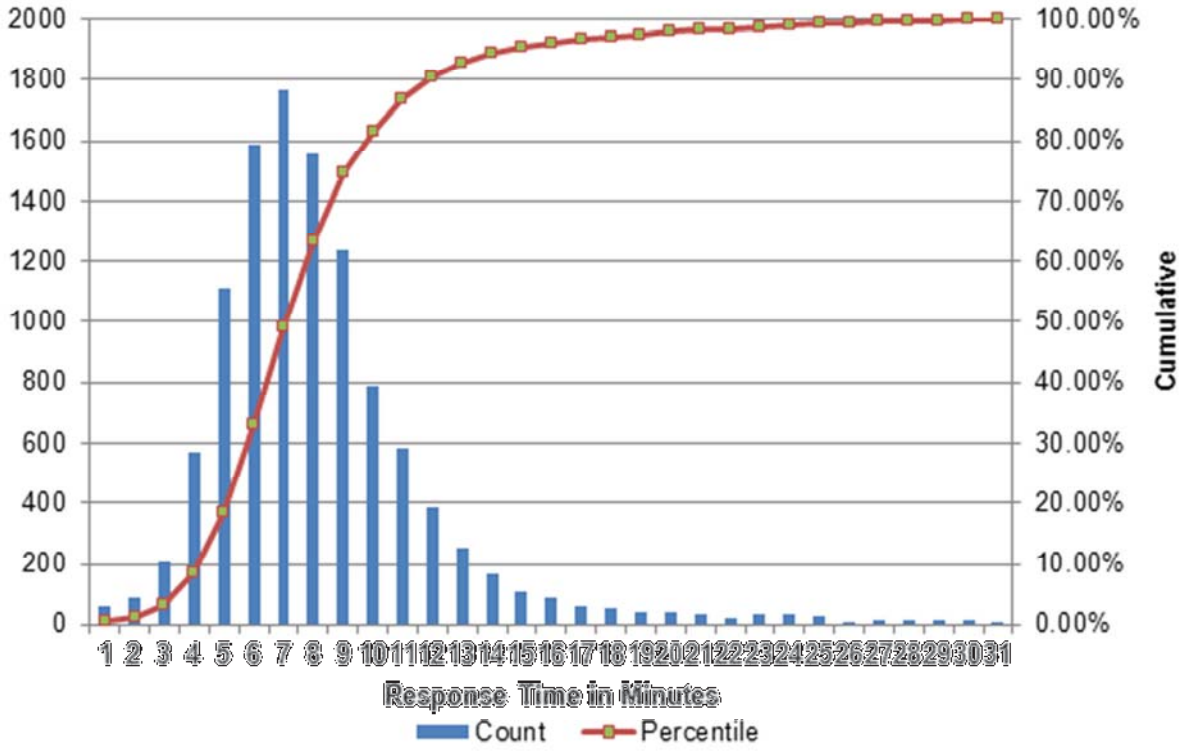
For ambulance units in fire-based EMS systems, a unit hour utilization rate of 30 percent is considered maximum before paramedic burnout becomes a serious factor. None of the BFD rescue units has exceeded this level. Based on the analysis in this section of the report, reliability of all stations in their primary response area should be high and significant resource drawdown is rare.

Recorded System Response Time Performance

Total response time is the amount of time a resident or business waited until an apparatus arrived at the scene of emergency beginning when they first called the designated emergency number, often 9-1-1. The following charts illustrate the response time frequency for BFD over the two-year period December 2008 through November 2010.[24]

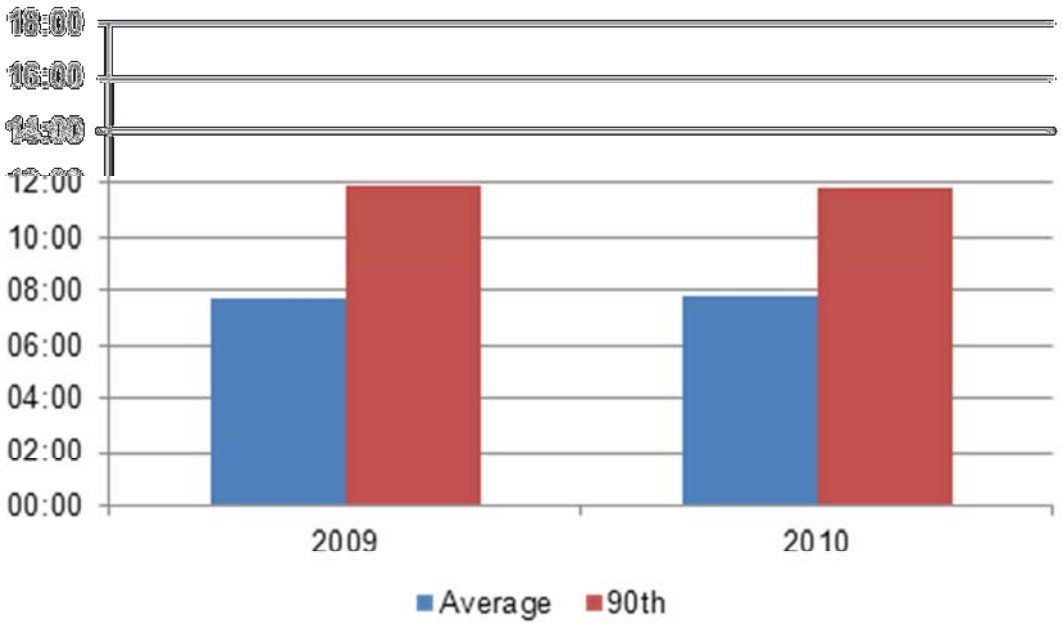
[24] Mutual aid calls, non-emergent calls, and interfacility transfers were removed from response time analyses as they were found.

Figure 39: Historical Response Time Performance Frequency



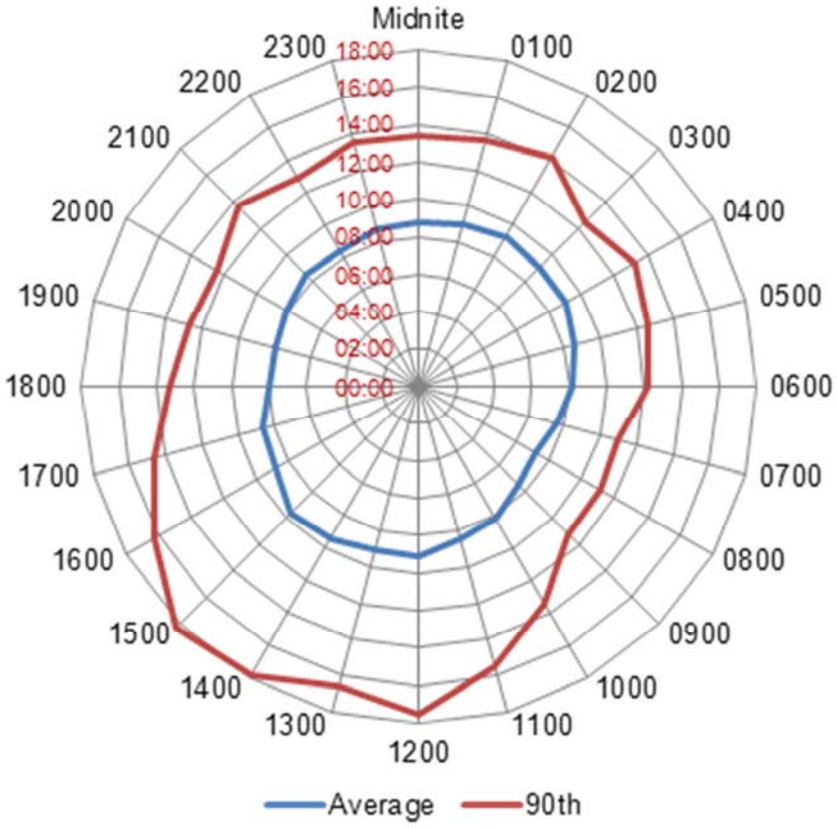
The most frequently recorded response time for calls is within the seventh minute. Specifically, the average is 7 minutes 46 seconds, with 90 percent of all calls answered in 11 minutes 49 seconds or less. The next chart shows average and 90th percentile response time for the last two years.

Figure 40: Historical Response Time Performance



Response times can vary by time of day in reflection of service demand workload, traffic congestion, weather, and distance to the call from the station, to name but a few. The following chart illustrates how the average response time performance varies by the hour of day.

Figure 41: Response Time by Hour of Day



One element of the overall response time performance that firefighters can control is the turnout time interval. Turnout time represents the period between the radio dispatch of a call and the time the unit actually leaves the building or location where it is staged and begins travel to the incident. It can include activities such as moving to the apparatus, donning gear and equipment, verifying travel routes and maps, and buckling safety harnesses.

The lack of a fire service CAD system was discussed earlier in this report, but response time performance measurement provides another example of the reason why it is important. The incident data provide to ESCI by the department (National Fire Incident Reporting System records), does not provide specific timestamps for call answering, call processing, call dispatch, and when each individual unit responded to the call. Therefore, call processing and turnout time could not be established and analyzed.

ESCI could not measure the call processing time performance of the Bangor dispatch center. Without specific CAD data, it was also unclear as to whether the dispatch time in the NFIRS

records represented the true time the fire department was notified of the call or the time when the dispatch center picked up the call. Therefore, ESCI could not determine whether call processing time was included in the overall fire department response time analysis, nor could ESCI measure the turnout time performance of Bangor Fire Department. The reason is a lack of specific time stamps from a computer aided dispatch system.

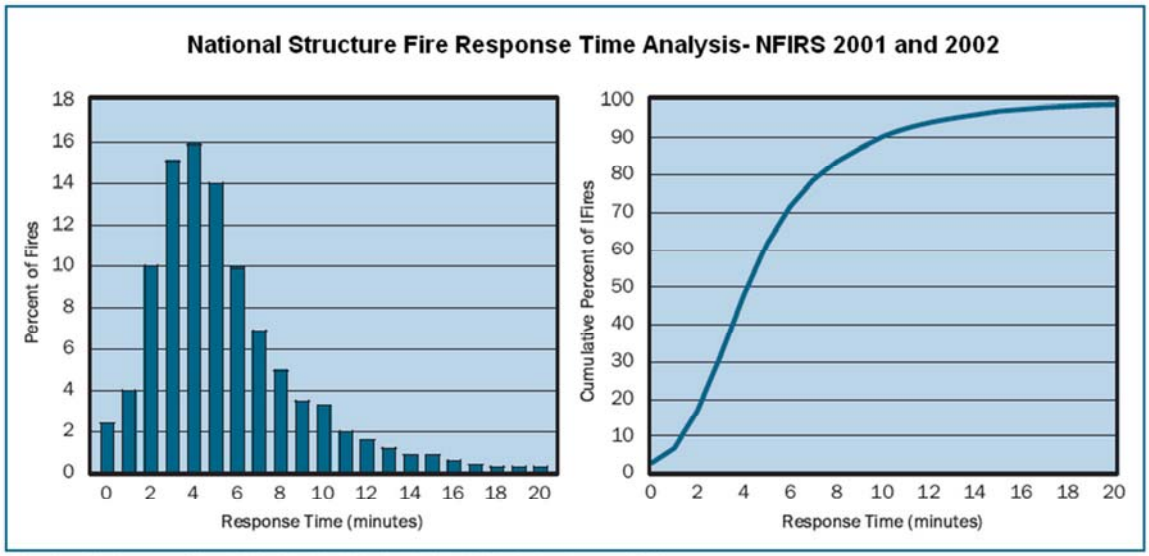
This is a critical loss for overall department performance analysis. Earlier in this report, the distribution analysis indicated that almost 90 percent of city incidents were within four minutes of travel time from a fire station. From the response time analysis, the actual response time performance to 90 percent of calls is well over eleven minutes. This is a difference between the modeled travel time and the actual full response time of over seven minutes.

The *NFPA 1710 Standard* calls for turnout time to be 80 seconds or less for fire and special operations response and 60 seconds or less for EMS response.[25] It is unlikely that turnout time alone could be responsible for this difference. It is important for the department to determine why its actual 90th percentile response time performance is as high as it is. However, without the specific timestamps for unit responding, it is impossible to determine the turnout time performance and its impact on overall response time.

The following charts were excerpted from a U.S. Fire Administration publication that illustrates how response time correlates response time to the effectiveness of fire services.

[25] *NFPA 1720*, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments.* (National Fire Protection Association 2010.)

Figure 42: National Structure Fire Response Time Analysis[26]



"Structure Fire Response Times"- U.S. Fire Administration/ National Data Center, January 2006

Nationally, the highest percentage (16 percent) of structure fires had a response time in the 4-minute range. The percent of structure fires with response times of three minutes and five minutes were not far behind at 15 percent and 14 percent, respectively. Overall, 61 percent of structure fires in 2001 and 2002 had a response time of less than six minutes. BFD's current response time performance exceeds both the national average and 90th percentile contained in this USFA study. However, the analysis contained in this report indicates that station distribution and travel time should not be a significant factor. Overall unit workload and resource drawdown also should not be a response time factor. The department and its dispatch center should be held accountable for more detailed and precise response time performance measurement, with a focus on call processing time, turnout time analysis and determination of methods to improve response time.

[26] United States Fire Administration. "Structure Fire Response Times." *National Fire Data Center Topical Fire Research Series*, Volume 5 Issue 7, January 2006.

Recommendations:

- Additional timestamps should be recorded by the dispatch center and analyzed regularly.
- Call processing should be analyzed as a separate and stand-alone component of overall response time and compared to national standards for emergency communications centers.
- Turnout time should be thoroughly analyzed by call type, station, shift, and time of day to determine its adverse impact, if any, on overall department response time.

Incident Control and Management

BFD uses standardized response assignments based on the type of call dispatched. These assignments are intended to provide the quantity and type of apparatus needed for the incident, as well as the correct number of staff to accomplish the critical tasks necessary to mitigate the emergency.

City maps are available in all department apparatus. Pressurized hydrants are identified on the maps, but no information on main sizes of hydrant flow capacity is available to the Incident Commander. No static water points have been mapped, nor have any pre-designated water shuttle plans been prepared in the event of water system failure.

The department currently maintains a platoon officer system, using an assistant fire chief as the duty officer, ensuring that at least one individual designated for incident command will be available 24 hours a day. The agency also reports that the Incident Command System is used on all calls.

A fire ground accountability system is in place for the department. Most reports indicated the system is primarily implemented in alarms involving significant incidents.

Water Supply

The City of Bangor is served by the Bangor Water District. The source of supply for the Bangor Water District is Floods Pond in Otis. Johnston Pump Station, located on the shores of Floods Pond, has two intake pipes which are 36 inches in diameter. Four vertical well-type electrically driven 150 horsepower pumps are on site, each capable of pumping five million gallons per day. The Butler Ozone Treatment Facility is located about a mile from the pump station. Both plants

have auxiliary generators to ensure pumping capability during a power failure. The facility is manned 24 hours a day, seven days a week.

Three pump stations in Bangor are used to control water flow. Water for emergency purposes is stored in seven standpipes, totaling 15,850,000 gallons. The transmission facilities include a 30-inch reinforced pre-stressed concrete pipeline from Floods Pond to the Penobscot River. The main is located along the northerly side of Burnt, Little Burnt, and Snowshoe Ponds, and then runs westerly to East Eddington. At the east bank of the Penobscot River at Eddington Bend, the transmission line splits into two 24-inch pre-stressed reinforced concrete mains which pass under the river.

On the west bank of the river in Veazie, the two lines rejoin and form a single 30-inch main which runs to a control valve facility, and then out Mount Hope Avenue and into the city. The distribution system has cement-lined and cast iron mains, varying in size from 4 to 30-inch diameter.

For areas without pressurized water supply, BFD continues to operate a 3,000-gallon water tanker with a 1,000 gallon per minute pumping capacity.

Mutual and Automatic Aid Systems

There are numerous mutual aid agreements, both formal and informal, in place between fire, police, and emergency medical agencies in the surrounding areas. Mutual aid is employed primarily on an “as needed” basis where units are called for and specified one by one through an Incident Commander. Unlike the mutual aid box alarm systems (MABAS) found in many other states, the system in BFD fails to provide for pre-designated mutual aid responses to a variety of call types based on incident severity and is not programmed or coordinated through any regional communications center. Few agreements for automatic aid for certain alarms have been established between fire departments.

The incident locations can be broken down for the last two years indicating the level of mutual aid provided and received by the Bangor Fire Department.

Figure 43: Workload by Mutual Aid Status

	2009	2010
Bangor City Response	97.42%	97.50%
Outside Area Response	2.58%	2.50%
Mutual Aid Received	0.21%	0.36%

The maps contained earlier in this report indicate that several stations are within a geographic proximity that provides potential advantages to the City of Bangor. Some of these stations are staffed either part-time or full-time by paid firefighters and have additional personnel on call. In addition to the benefits already discussed regarding the ability of BFD to achieve effective firefighting force, some ISO distribution credit may be available where written automatic aid agreements are in place. ISO apparatus credit for these agreements would only be given to the extent the other apparatus met ISO criteria and staffing credit would only be given for unit staffing that those units could consistently provide. To be most effective, any such agreements should specify the exchanged apparatus involved and the minimum equipment carried on board, minimum qualifications of responding personnel, and minimum staffing for the unit.

According to interviews, multi-agency training is relatively rare, with greatest attention focused on interoperability of specialty teams. For the most effective mutual and automatic aid programs, as well as maximum credit in the ISO Fire Protection Rating system, multi-agency drills should be scheduled regularly. Ideally, these should occur at least once per quarter and be recorded as multi-agency training in all agency records. In addition to the ISO credit, these trainings will naturally lead to enhanced working relationships, more regional thinking, and perhaps cooperative planning, policy, and procedural development.

From a formal standpoint, BFD regularly interacts with the city's police agency. Interviews indicated that this relationship is effective and efficient with no problems or issues cited by either fire or police officials. In many cases, police agencies are even responding to fire or EMS calls and assisting with traffic and other needs, underscoring the quality of the relationships between fire and police.

Emergency Medical Services

Bangor Fire Department operates Advanced Life Support (ALS) transport ambulances, as well as ALS engine companies, as part of the department's overall delivery of emergency services to the community. This section provides an evaluation of those services, focusing on logistical support services, administrative and support services, medical control and oversight, quality assurance and quality improvement mechanisms, and a review of system integrity in regard to credentialing of personnel.

BFD's delivery of emergency medical services is an integral part of the department's mission. The department staffs three ambulances 24-hours a day each staffed with at least one emergency medical technician–paramedic (EMT-P) and one emergency medical technician (EMT). In addition to ALS ambulances, all department apparatus are typically staffed with at least one additional EMT-P and a vast majority of department personnel are certified at least to the EMT level.

Logistical Support Services

Emergency medical services (EMS) are delivered as an integrated service of BFD. As such, all logistical support services exist under the overall logistical services of the fire department. Personnel assigned to each BFD station staff specific units based on the type of incident dispatched. All personnel are responsible for inspection of each ambulance at the beginning of their duty shift and supplies are replenished from the general station stock.

Disposable equipment utilized during the course of patient care activities such as dressings, bandages, oxygen delivery devices, intravenous fluid administration equipment, etc. can be replaced on a one-for-one basis at the receiving facility but the department is charged for these items. Most restocking of ambulances is accomplished when units return to their respective stations.

Administrative and Support Services

The process of delivering EMS to a community the size of Bangor can become quite complicated, particularly when medical incidents make up a vast majority of the organization's total workload. Proper administration and support of the EMS program is a critical function that must be given a priority.

BFD has assigned overall responsibility of the EMS division to an Assistant Chief. This position oversees the day-to-day issues of EMS as an added duty over and above the normal duties of the position. Although there are minimum requirements for promotion to assistant chief, there are no specific requirements for the added responsibility of EMS oversight. Typical minimum requirements should include:

- Five years previous experience that includes firefighting, EMS, and training
- Intermediate Firefighter; (higher level preferred)
- Fire Service Instructor II
- EMS Instructor II
- Emergency Medical Technician-Paramedic
- CPR Instructor
- Pre-Hospital Trauma Life Support
- Pediatric Advanced Life Support
- Advanced Cardiac Life Support
- EMS Examiner
- Associate Degree or higher: (emphasis in Fire Science, EMS, or general management preferred)
- Valid drivers' license with appropriate endorsement

Based on a description of the duties and responsibilities of the assistant chief assigned to oversee EMS, the responsibilities appear to be a combination of operations supervision, quality assurance, and training, which would have a high potential for employee burnout or inability to accomplish necessary tasks due to an over burdensome workload. The department should consider dedicating one position to EMS administration and supervision and another to quality assurance and training responsibilities.

Primary field supervision for EMS rests on the individual companies. An EMS Captain is assigned to A-Crew; B-Crew has both an EMS Captain and Lieutenant; and C and D-Crews have oversight provided by the Assistant Chief assigned to EMS. Each officer has delegated responsibilities within the EMS division.

Aside from the assistant chief described above, the EMS 'Division' within BFD has no dedicated support staff. Two personnel are assigned to the fire department to oversee data collection and

billing operations for the EMS function but no direct administrative assistance is provided to the assistant chief, particularly regarding the EMS function.

Recommendations:

- Consider separate dedicated personnel to EMS administration and supervision and quality assurance and training.
- Consider implementing on-shift EMS supervision equal to the current assistant chief positions.
- Implement an EMS Training position within the Training Division.
- Dedicate funds each year to enhanced EMS training and continuing education opportunities.

Medical Control and Oversight

Medical control for BFD is provided through contract with Dr. Robert Bowie. Dr. Bowie is assisted in providing quality assurance (QA) programs and services by two registered nurses. Medical direction for field crews is supplied 24-hours per day through the receiving facilities. On-line medical control for field support is provided 24 hours per day by the on-duty physicians at the respective receiving facilities.

Medical direction is not actively involved in the current EMS system as much of the training and protocol development are handled through the Region 4 EMS Council. Region 4 is responsible for approving and/or providing all training programs other than in-house continuing education courses, which are delivered within BFD. All licensing, protocols, and credentialing is provided through Maine EMS (MEMS).

Recommendation:

- Establish written policies that outline the authority of the medical director in regard to implementation of decisions and directives and remedial training and disciplinary actions.

Quality Assurance and Quality Improvement Programs

Performance measurement is a process by which organizations measure specific criteria and use that measurement as a gauge of needed improvement and or to produce a report card of performance. Quality assurance can be viewed as a use of performance measurement to

ensure that established levels of quality are being met by individuals and by the organization as a whole. Quality improvement is the process of evaluating performance measurement and quality assurance efforts and cyclically developing programs and/or refining processes to correct any identified deficiencies. The following figure illustrates this cyclical program of measurement, evaluation, and improvement.

Figure 44: EMS Quality Improvement Cycle

BFD is involved in two QA/QI programs; internally with two nurses that work with the medical director to review medical cases that are brought to their attention or fall within a specific area of focus, and the regionally mandated program. There is a formal methodology or process of remediation and/or disciplinary action based on the medical review as outlined in the Quality Assurance/Quality Improvement SOG contained with the department's SOG manual.

In light of the lack of the remedial training and/or disciplinary action, the department should consider development and implementation of a progressive disciplinary policy specific to clinical care. This policy would give some weight to the overall quality assurance/improvement process while ensuring personnel are operating at the highest level possible.

Recommendations:

- BFD should work with the medical director to establish a formal and progressive disciplinary and remedial training policy to address clinical issues.

Staffing Options for Emergency Medical Services

There are several options available to the City of Bangor in regard to staffing of emergency medical services units that may have the potential to reduce total costs but each option has both pros and cons that must be considered. The following options are presented in no particular order and have not been prioritized and any combination of the options could be implemented.

Use of Civilian Paramedics

The most significant differences between dual-certified firefighter/paramedics and civilian paramedics are that while dual-certified personnel are multi-functional and can participate in both EMS and fire suppression responses, civilian personnel are typically compensated at a lower rate. Thus, staffing dedicated emergency medical units with civilian personnel has the potential to reduce overall personnel costs attributable to EMS. However, the fire department, which currently utilizes dual-certified personnel, would need to maintain a level of suppression personnel matched to the risk and needs of the community. In all likelihood the use of civilian personnel coupled with the need to maintain a sufficient firefighting force would increase overall personnel costs.

Use of Part-Time Firefighter/Paramedics during Peak Hours

This strategy relies on the ability of the department to analyze when service demand is the highest, particularly for EMS incidents, and implement a dynamic deployment of resources based on when the need is greatest. This is most usually accomplished by either implementing a part-time program or hiring full-time personnel but scheduling them to work a schedule that is more appropriate for periods of increased service demand, typically during daytime hours. The advantage to this type of personnel utilization is that the total staff on duty fluctuates throughout the day based on potential need, therefore reducing personnel costs during periods of historically low activity.

This methodology does however have its potential negative impacts. Increasing personnel numbers during peak demand periods places more personnel ‘on the street’ during certain

periods of the day but can reduce total personnel to levels below what is necessary to provide an effective response force for structure fires or other major incidents should one occur during the periods of reduced staffing.

Consideration of Specialty Transport Alternatives

Over the last 30 years or so as fire departments have become more and more involved in the delivery of EMS to their communities, these programs have tended to migrate from a service delivery question to more of a question of revenue production. Many fire departments are involved in EMS because there are no other providers within their areas that can deliver the same level of service. Other areas of the country, however, seem to be in direct competition with private and third-service providers within their areas, particularly in regard to non-emergency transports. As noted previously, however, it appears as though the provision of these non-emergency out-of-town transports is currently generating more revenue than the cost of providing these services. Although the department should evaluate the effect of discontinuing this service, it should also consider the potential negative fiscal impact on overall EMS revenues.

Privatization of EMS Services

Although migrating from a publicly provided, fire-based advanced life support (ALS) system to a service delivered by a private or third-party provider can be hugely unpopular, the realization is that those agencies can possibly deliver services for a lower cost. One primary reason for this reduction in cost is that private EMS providers are single function and are profit driven in most cases, whereas fire departments are multi-function providers and are not bound by profit margins or corporate pressure. This option does not however come without significant potential negative impacts.

If Bangor Fire Department no longer provided EMS to the community, the City of Bangor would see a gross revenue decline of approximately $1,450,000 based on 2010 revenue EMS user fee figures. Also, as with the other strategies noted above, it would be necessary for the fire department to maintain a sufficient firefighting force to mitigate suppression incidents. Seemingly, discontinuation of the fire-based EMS model would result in the elimination of 24 firefighter/paramedic positions, but at least a portion of those positions would need to be reallocated to suppression apparatus for the department to maintain an effective response force

for suppression and other incidents, thereby effectively eliminating any realized savings from outsourcing the service.

Hazardous Materials Response Services

Bangor Fire Department provides hazardous materials response services at the operations level. Primary mitigation occurs during motor vehicle accidents to contain leaking fluids, as well as air monitoring for various odor investigations including carbon monoxide and smells of gas.

Operations level services are primarily delivered by the department via engine companies, but can be supported by the ladder company or heavy rescue. For incidents requiring mitigation at the technician level, the Orono Fire Department jointly responds with six hazardous materials technicians and a specialized vehicle. Memorandums of understanding (MOU) are in place through the county response system. Members of BFD provide incident support within their scope of training.

The Orono Fire Department is also the initial WMD response agency, with a tiered response in place from county to state response based on the scope and magnitude of the incident. There is a plan in place to summon a back-up team if needed. The department does not have a specific response guideline for hazardous materials; however, it does have a dedicated running order in place. BFD does have operational guidelines in place for operations level response.

Program Management

The hazardous materials program is managed by an assistant chief and is considered an ancillary duty. Basic supplies for hazardous materials are funded through the general fire budget. Specialized equipment and items to be replaced from an incident are purchased by the county hazmat team, in which the Orono Fire Department is the primary agency. An annual county budget of $24,000 is dedicated to hazardous materials. State grant funding also provides specialized equipment and training.

The agency has a means of billing, reimbursement, or supply replacement when operating jointly with the county team. Currently BFD does not bill for replacing operations level supplies when responding as a single agency within their jurisdiction, i.e. absorbent used during motor vehicle accidents.

Training

Members of the department maintain state certification for operations level hazardous materials. Annual refresher training is conducted to meet compliance requirements and recorded by the training officer in the training RMS. In order to record and analyze the results of the hazmat program for large scale incidents, county training exercises are conducted at various locations throughout the county, with after action reports completed.

Response

Adequate supplies for Bangor's desired level of response is sufficient, as basic operations level supplies are carried on various apparatus as well as detection equipment for hazardous atmospheres. The department conducts fresh-air set up testing during equipment checks, with required testing and recorded results conducted by an outside vendor. To facilitate incident management, BFD and the county team maintain tactical worksheets. BFD maintains a hazmat specific resource list to support local operations, and the county team maintains a resource list for the entire county and surrounding area.

Recommendations:

- A hazardous materials response operating guideline should be developed for each incident level including which apparatus is to respond based on the specific call-type.
- Consideration should be given to billing for miscellaneous hazardous materials supplies used on routine calls that do not involve the Orono response.
- Review of standard operating guidelines should be part of annual compliance training.

Technical Rescue Services

BFD is an active provider of technical rescue response and support. In the event of an incident that is beyond the scope of the department's staffing or operational capability, there is an identified system in place to activate external technical rescue resources. A formal department-wide technical rescue risk assessment should be conducted to determine the need for each specific discipline. History, frequency, and potential of technical rescue events should be part of the assessment. Tower rescue should receive direct attention under the rope rescue portion of the assessment.

Specific attention should be given to the feasibility of delivering these services based on number of trained rescuers and time commitment required for skills maintenance. Although the intention to provide all of these services is genuine, the demand of initial and continued education is difficult for an organization to maintain in addition to fire suppression responsibilities. A comprehensive assessment should evaluate the feasibility of sharing some of these specialized services with other departments or the elimination of some services.

Physical and Personnel Resources

Vehicle/Machinery

BFD independently provides vehicle/machinery rescue services to the technician level. This includes gaining access and freeing victims trapped in motor vehicles and machines of all sizes involving complex operations.

Rope

Rope rescue service is independently delivered to the technician level by BFD. This includes high and low angle events in which rope rescue is needed to gain access and/or remove victims. Rope rescue is also used to support water and confined space rescue events.

Tower/Antenna

The department currently has no training or equipment to mitigate a victim trapped on a tower or antenna.

Confined Space

BFD independently delivers confined space rescue (CSR) to the technician level. CSR includes gaining access and removing victims from tanks, bins, and below-grade vaults. The department works in conjunction with other city departments that make entries into confined spaces to provide CSR or stand by. City departments are trained to make non-entry rescues and have a plan in place to summon the fire department when a non-entry rescue cannot be made.

In situations when city departments make an entry that is less than 30 minutes in duration, they will contact the fire department and an engine will stand by at the entry site. If the entry exceeds 30 minutes, the fire department will "hire" a crew to man the heavy rescue truck and stand by at the site.

The fire department will also provide CSR standby's for private sector companies. The department will hire a crew of four to staff the Heavy Rescue for this type of situation, as on duty personnel are not used for private sector company standby's for CSR entries.

Trench/Excavation

The department is not trained or equipped for trench/excavation rescue.

Structural Collapse

The department is not trained or equipped for structural collapse rescue.

Ice/Swift Water/Dive/Surf

These water-related rescue disciplines are delivered to the technician level with the exception of dive. Equipment for dive rescue was noted during the inspection of the Heavy Rescue; however, there are no records to validate dive service delivery. This would include: number of dive-trained personnel, continued training for the few that may have training, minimum staffing for divers, or a dive rescue response system. Although these services are mainly delivered independently, the fire department has worked with the police department on various water-related incidents. There are roughly 25 lakes and ponds in the department's primary response area, as well as a substantial river.

Program Management and Training

The responsibility of managing the technical rescue program is assigned to an assistant chief. This responsibility is in addition to his primary responsibility of shift commander. He has a captain that assists him with managing the program. Technical rescue is also an ancillary duty for the captain. Excluding personnel costs, the department has a limited, yet dedicated annual budget for technical rescue services totaling $1,500. In addition, the department receives $7,480 for technical rescue from the City's Risk Management program.

Regarding equipment management, each apparatus has a complete inventory, including accurate records for all life safety rope. These records are kept in a pouch with the bag that the rope is stored in. BFD maintains general resource lists; however, it does not maintain a technical rescue specific resource list to support operations. Tactical worksheets for rescue services delivered are maintained for each discipline.

The State of Maine does not offer certification for technical rescue disciplines. The responsibility of certifying rescuers falls on the Authority Having Jurisdiction **(**AHJ), which, in this case, is the Bangor Fire Department. Internal training manuals and presentations have been created and are maintained by the technical rescue captain. The department training RMS tracks technical rescue training hours per person, including confined space entries made. BFD does not have a response plan in place for trench and structural collapse. Although there is a belief that state assets may exist, the technical rescue coordinator was not sure how to activate their response. There was even a question as to if the assets do in fact exist.

Recommendations:

- Annual skills checklists for each rescue service delivered should be developed and completed by each member based on their expectations for operating at a technical rescue incident.
- Technical rescue operating guidelines should be reviewed annually, with the review sessions documented.
- Consideration should be given to calling a back-up team for confined space and water related events.
- The department should conduct a needs assessment regarding dive services.
- A defined response plan for tower/antenna, trench, and structural collapse rescue should be determined and put in place.
- A technical rescue response operating guideline should be developed for each discipline including which apparatus is to respond based on the specific call-type.
- A formal needs assessment for tower/antenna, trench, and structural collapse rescue.
- Scenario-based training exercises should be conducted for each discipline, with their results documented.
- Although the agency has a means to document annual confined space entries made per CFR1910.146 by use of their training records management system, a system to review each entry must be established an easily referenced in the event of an audit.

Training Programs

Providing quality and safe fire and emergency services requires a well-trained response force. Training and education of department personnel are critical functions for Bangor Fire Department. In the past, officers in the fire service were raised with a "Management by Objectives" foundation. This type of system was based upon quality, quantity, and costs as the elements. Officers used to plan, measure, control, time, and execute training outcomes.

Today's fire service consists of creating, promoting, and delivering training to members; but many training programs fall short and members become less interested. Training officers should capitalize on a training program that will effectively overcome personal and organizational blocks to achieve results. Without a quality, comprehensive training program, emergency outcomes are compromised and department personnel are at risk.

Because the fire service is constantly changing, training cannot be limited to new recruits. Seasoned firefighters can benefit from training by learning new methods and procedures. In addition to training firefighters in the skills and knowledge needed in today's fire departments, training officers and instructors need to establish educational opportunities for more advanced procedures and new technical subjects.

General Training Competencies

Annual state and federal required compliance training is built into an annual training calendar. New members receive Firefighter I and II (FF I/II) and state Emergency Medical Technician (EMT) certification. BFD conducts bi-annual skills competency testing for its members and minimum physical ability testing for current members is now part of the CBA; only an annual medical physical is conducted. Night drills and multi-agency training sessions are rarely conducted. Annual multi-agency drills at the local airport are conducted, including a tabletop component.

Program Administration, Schedules, and Facilities

Management of the training program is assigned to an assistant chief; this task is in addition to his shift supervisory responsibilities. Other experienced officers or senior firefighters will assist the assistant chief with the delivery of various training topics. The department has a number of certified instructors at Level I; however, only a few are certified at Levels II and III to assist with

training tasks. An established training calendar is in place, addressing skills maintenance and compliance training.

The department has had its own dedicated training facility located in its jurisdiction since 1987. Various structures and props at this site include a roof vent simulator, forcible entry building, drafting pit, and propane tanks. Rope and confined space evolutions can also be conducted at this site. The facility offers the ability to conduct live fire and search and rescue training as well. Acquired structures are used for live fire training when available.

A dedicated training room with up-to-date audio/visual support is available at the main fire station. A video conferencing system by Polycom™ has recently been installed in all stations, which will allow delivery of classroom segments while keeping companies in their response district. The training budget is reportedly split nearly evenly between suppression and EMS activities but conversations with training staff indicate that a large portion of the EMS budget goes to support paramedic school. Four to six members apply to attend the National Fire Academy (NFA) annually.

Training Procedures, Manuals, and Protocols

Lesson plans are usually utilized for training segments. BFD provides its members a dedicated training library, adopting manuals by Jones and Bartlet for FFI and II education. Officers or instructors serve as safety officers during practical or crew training and always have a dedicated safety officer for live fire training events. The department's vehicle extrication program has been developed and maintained in-house, as well as rope and confined space. Consistent officer training is not currently provided, as only basic ICS/IMS is reviewed annually. Although a specific format is in place and outlined in the department's guidelines, post incident analysis is rarely conducted.

Recordkeeping and Clerical Support

Zoll™ is the dedicated software program in place for training records management. The software is well maintained by the Training Officer and is up to date. Mandated training segments, total training hours, and separate topics per member are clearly tracked by code. Specific training category searches can be easily accomplished. Hard copy certifications and course certificates are scanned and stored electronically, with back-up measures in place. Clerical support is provided by the general office staff.

Certification and Credentialing

Minimum level of firefighting certifications for BFD are NFPA compliant Firefighter I and II, Operations Level Hazardous Materials, and state certified EMT. All members are required to complete minimum NIMS training requirements, with the majority of the command staff obtaining NIMS 300 and 400. All officers are currently trained to at least ICS 100 and 200 levels. Officers are not required to complete Incident Safety Officer training but his should be a goal of the department.

Recommendations:

- Training with mutual aid or surrounding response partners should be scheduled, conducted, and documented as such to enable the department to achieve the maximum credit allowed by ISO for this category while ensuring seamless operations.
- Night drills should be scheduled, conducted, and documented as such.
- Consideration should be given to conducting and documenting 20 hours per month, per member in structure fire related subjects as outlined in *NFPA 1001*.
- An officer development program should be created for newly promoted officers.
- An annual officer training schedule should be implemented including leadership, management, supervisory, and incident management systems as outlined in *NFPA 1021*.
- The department should reevaluate how it documents its completed training to achieve its maximum ISO scoring to improve its rating, while meeting internal training expectations.
- Post incident analysis should be conducted and documented on a more frequent basis.
- A minimum physical ability test for current members should be implemented.
- Create opportunities to send lead instructors to outside seminars.
- Implement a program that requires all officers to complete Incident Safety Officer training.

Fire Prevention Programs

An aggressive risk management program, through active fire prevention, is a fire department's best opportunity to minimize the losses and human trauma associated with fire. A community's fire problem should be addressed in a continuous manner whereby each resource and function supports the reduction of the incidence of fires. This cycle includes the following:

- Public education: Awareness of hazards, prevention, and what to do if they occur.
- Engineering and code enforcement: To ensure that community structures are appropriately constructed and maintained.
- Fire suppression: Fires are mitigated when there is a failure of education and code enforcement.
- Fire investigation: To determine fire cause and create a method or process for mitigating future incidents.

The most effective way to combat fires is to prevent them. A strong fire prevention program reduces loss of property, life, and the personal disruption that accompanies a catastrophic fire. A fire department should actively promote fire resistive construction, built-in warning and fire suppression systems, and an educated public trained to minimize the risk to fire and health challenges and to respond effectively when faced with an emergency.

Code Enforcement Activities

Fire code enforcement and administration within the City of Bangor is the responsibility of the fire chief who delegates that authority to an assistant chief. Actual code enforcement activities, however, are further delegated to a single fire inspector. The State of Maine has a statewide fire code in place that mirrors *NFPA 1 – Uniform Fire Code*™. In addition, Boca National Codes (1987 edition) have been adopted locally.

Under the Uniform Fire Code, states and municipalities are permitted to amend or otherwise modify the code based on its authority as the "Authority Having Jurisdiction" (AHJ), by ordinance. In other words, the UFC, being a model code, is intended to provide the AHJ with minimum requirements, which it can modify or add to. Modifications by a local jurisdiction that make the code more restrictive are often appropriate, assuming that they are based on a valid rationale. However, that decision should consider not only fire safety needs and benefits but also the financial impact of the amendment.

Code enforcement activities within BFD consist of regular inspection of new and existing occupancies as well as periodic reviews of buildings posing special hazards. The department administers a formal citation process via which violators can be cited for code violations.

During the course of stakeholder interviews, ESCI met with members of the department's fire prevention staff to obtain their input in the study process. Indications in the interviews were that division staffing is low, resulting in challenges in terms of meeting workload demands, particularly with regard to existing occupancy inspection work. Since the retirement of one inspector approximately three years ago and the decision not to fill that vacant position, the division has had difficulty meeting the required annual inspection frequency.

Based on the 2009 Annual Inspections Report produced by the Fire Prevention Bureau, the single Inspector completed 1,231 inspections based on the following segregation.

Figure 45: Inspection Count, 2009

Inspection Type	Count
Airport Inspections	60
Heating Equipment: Oil, Gas, and Solid Fuels	277
Chimney and Fireplace	9
City License	397
State License	85
Fire Protection Systems	6
Certificate of Occupancy	237
Flammable Liquids, Gases, and Tanks	56
Building Permits	1
Miscellaneous	163
Total	**1291**

The figure above only illustrates inspection activity occurring with the fire prevention office. In addition to those inspections noted above, the bureau also handles over 3,000 calls for citizen assists, over 100 plans reviews and meetings, and nearly 150 referrals and complaints. This level of workload has been accomplished on an on-going basis although the division has seen an overall reduction in staffing over the past several years.

Recommendation:

- The city should consider replacing the vacant fire inspector position to distribute the workload within the Fire Prevention Office and ensure that required inspections are completed based on the necessary frequency.

New Construction Inspection and Involvement

An essential component to a fire prevention program is new construction plans reviews. When proposed construction projects are scrutinized for compliance with fire code requirements, the reviewing agency has the opportunity to identify critical issues early in the process and assure that they are corrected during construction.

When a new building is proposed within a fire department's boundaries, the structure is going to become the protection responsibility of that department for the life of the building. If it is not constructed according to code, it may become a problem for the firefighters in the future and a risk to the community. Consequently, the fire department has a fundamental interest in ensuring that a structure is properly constructed.

The Fire Prevention Office plays an active role in the process of reviewing plans for construction of new buildings, along with proposals for substantial remodeling of commercial buildings in the city. As noted previously, the only person assigned to the Fire Prevention Office is the fire inspector, and this position is also tasked with new construction inspection and plans review. The fire inspector examines, modifies, and/or approves new plans, focusing on fire and life safety issues found in the fire code. Upon successful completion of the building, a signature of fire prevention personnel is required prior to the issue of a Certificate of Occupancy, indicating approval of the construction.

During the process of plan review and final building inspection, personnel have the opportunity to convince owners of the importance of a 'key-box' entry system. This type of program allows emergency personnel access to a structure in the case of fire or other emergency situation without waiting for the arrival of a key-holder. The current program in place within Bangor is contained within City Ordinance and is required for all buildings that have monitored fire alarm and/or sprinkler systems as well as all apartment buildings. This requirement applies to all new construction and all existing structures are recommended to comply and are offered assistance in the purchase and installation of their lock-boxes. As of November 2010, 109 structures within the city were participating in the program.

Fire and Life-Safety Education Programs

Providing fire safety education to the public to minimize the occurrence of fire and train the community in appropriate actions to take when faced with an emergency is a particularly

important fire protection strategy. Life and fire safety education provides the best chance for minimizing the effects of a fire.

Providing sufficient resources for delivery of safety education is necessary to ensure an effective program. Others will need to support the effort through delivery of programs. Personnel at fire stations are an excellent resource for programs delivered within their respective service areas. This is also an opportunity to implement a program using part-time fire suppression personnel and community volunteers to deliver ancillary services.

Finally, there should be some way to measure results of the effort. This would include expanding information tracked on each emergency incident to record whether human behavior was a contributing factor to the emergency; also, whether citizens who were present took appropriate action when faced with the emergency.

Bangor Fire Department conducts a fire and public safety education through the Fire Prevention Office by the dedication of one fire and life safety educator. Programs include:

- Juvenile Firesetter Intervention Program
- Knox Box Program (as previously discussed)
- Fire extinguishers (Level I and II)
- Learn not to Burn program
- General safety
- Other programs as requested

The fire and life safety educator also serves as the department's public information officer and, in such, serves as the primary contact with media outlets, citizen assistance, web presence, professional meetings and other activities related to advertising and/or marketing the fire department.

In addition to the duties and responsibility noted above, the fire and life safety educator is also a certified fire inspector. During 2010, this position completed 340 inspections in addition to the normal duties and activities of the office.

Recommendations:

- The fire and life safety educator should be focused on the delivery of educational programs to the community through a coordinated effort with the city and the local school system.
- A formal program for educating elementary school students should be re-established such as Risk Watch®.

Fire Investigations

Accurately determining the cause of a fire is an essential element of a complete fire prevention program. When fires are set intentionally, identification and/or prosecution of the responsible offender is critical if additional fires are to be prevented. Further, if the cause of fires is accidental, it is also of great importance because knowing and understanding how accidental fires start is the most effective way to identify fire prevention and public education requirements.

The results of fire investigations, if used accordingly, directly reflect public education focus areas, the need for code modifications and changes and modification of fire department deployment and training emphasis. Definition of the community's fire problem can be achieved via effective fire cause determination.

Within BFD, initial scene control and reporting, as well as initial fire origin and cause determination, starts with the fire officer on the scene of a fire. At a small incident, it may be a single company officer that determines whether a fire is accidental or suspicious. Just because a fire was found and extinguished when it was small, does not mean that it does not indicate a much more serious potential arson problem. Further, fires that are, in fact, accidental, need to be properly processed for their cause for reporting and insurance purposes.

If on-scene personnel view a fire as of suspicious origin, or are unsure about the fire's cause, they will initially request assistance from one of the two assistant chiefs that have attended specific fire investigation training at the National Fire Academy. In addition, BFD can utilize the Maine State Fire Marshal's Office for large scale and/or conditions otherwise outside the expertise of departmental personnel. In addition, BPD detectives and the City Electrican have attended National Fire Academy classes regarding fire investigations. Accidental fires will be processed by the appropriate investigator and suspicious fires will be referred to the appropriate law enforcement agencies for processing, usually the Bangor Police Department.

Findings, Recommendations and Conclusions

The intent of this project was to evaluate the Bangor Fire Department and determine how the department's operations compared against national standards, industry benchmarks, and other comparisons against departments of similar size and serving similar geographies and populations. Although recommendations within each segment of the fire department have been provided within the evaluation document, this section intends to highlight and summarize the findings, overall recommendations and conclusions reached from this study.

Findings

In regard to physical resources, BFD is consistent with regional comparisons. Station 1, the oldest of the three BFD stations, is in good condition for its age and is suitable for its current use. Station 5, constructed in 1993 is in excellent condition and well-suited for its current use. Station 6, a new facility constructed in 2010, was well planned and will be suitable for fire department use well into the future. Each of the department's heavy apparatus were evaluated for general condition and usability and each were rated on a scale of Excellent to Serviceable as noted below.

- Excellent – 6 apparatus
- Good – 1 apparatus
- Fair – 3 apparatus
- Poor – 1 apparatus
- Serviceable – 0 apparatus
- Un-rated – 5 apparatus (not on-site during evaluation)

Service demand and staffing are perhaps the two areas that receive the most attention and focus within emergency services agencies for several reasons. Demand or workload drives the need for staffing and adequate staffing determines a department's ability to respond effectively to emergency incidents. For BFD, it was determined that overall workload is nearly three times the regional average when EMS incidents are included. This is to be expected for a system that is the primary provider of emergency medical transport services. Considering fire incidents alone, however, demand is 62 percent greater than the regional per capita average. This indicates that the department is busier than expected given the population, geography, and demographics. This could be a result of insufficient or inadequate recordkeeping and recommendations are provided to address this potential. Although the number of fire incidents is

much higher than expected, the total dollars of fire loss is one quarter the regional average, which further indicates that there may be a recordkeeping issue rather than a higher than average fire workload.

As noted, adequate staffing allows a department to respond effectively to emergency incidents. BFD is currently staffed with 22 personnel per shift at full staffing and maintains an informal minimum staffing of 18 personnel to staff the three stations. During the eight-year period evaluated, the department has been able to produce an average of 10.4 personnel per structure fire, which, based on minimum staffing levels, indicates that EMS responses are negatively impacting the ability of the department to respond effectively to structure fire incidents. During the same data period, the department's staffing has been reduced 2.2 percent by retirements of administrative and support personnel positions that have not been filled.

Overtime is one issue that was repeatedly voiced as a primary concern of city officials. ESCI found that the department routinely exceeds its overtime budget by an average of 33.6 percent over the eight-year data period evaluated. This may seem like a significant expenditure but when compared to other localities within Maine, the per capita overtime expenditure is not significantly different. BFD averages $12.14 per capita in overtime costs while the City of Lewiston Fire Department averages $11.64. It should be noted, however, that the total tax cost for BFD has been calculated at nearly 2.5 times the regional average of departments serving similar populations.

The ability of a department to respond quickly and effectively to emergency incidents is typically how an organization is graded in its delivery of services. For BFD, the three stations are currently deployed such that 89 percent of service demand occurring within the city can be reached within four minutes of travel. However, if development is realized in the northern portions of the city and service demand in this area increases, it is likely that additional resources will be necessary to maintain the current level of service.

Although it has been determined that 89 percent of the department's service demand is within four minutes of travel from the existing stations, calculated response performance is well outside that response model. The average response performance for BFD for last year was calculated at 7:46 (7 minutes 46 seconds) with a 90th percentile measurement of 11:49, both well outside national standards for a career fire department. Based on the data made available to ESCI,

turnout time (the time between dispatch and when units are en route to an incident) could not be calculated. This component of the overall response time is the most common factor in excessive response times. Turnout times should be tracked and analyzed to determine how they are impacting the overall response performance of the department.

Recommendations

The following list summarizes all of the recommendations provided throughout this report that are achievable in the short or mid-term, typically within a maximum of five years. These recommendations have been compiled into a prioritized list for easy reference. The prioritization system is as follows. Each recommendation is also accompanied by a page reference to identify where the recommendation first appears in the report so that the reader can quickly locate the explanatory narrative.

1. **Immediate Internal Life Safety**

   The objective deals with an improvement or initiative that solves an issue affecting the safety of firefighters and/or other department personnel. These are not matters that simply make it easier to do a particular function but in fact make a currently unsafe situation, safe. For example, using self-contained breathing apparatus (SCBAs) that have not passed service tests.

   No Priority 1 recommendations identified.

2. **Legal or Financial Exposure**

   The objective resolves a situation that is creating, or is likely to create, the opportunity for legal action against the department or its members. It may also be a situation that could subject the department to a significant expense, such as resolving a leaking underground storage tank.

   - Consideration should be given to have the department mechanic obtain EVT certification.....74
   - A well-defined policy should be developed outlining allowable in-house repairs by members.....74

3. **Corrects a Service Delivery or Management Issue**

This objective addresses a service delivery situation that, while it doesn't create an immediate safety risk to personnel or the public, does affect the department's ability to deliver service or maintain service in accordance with its standards of performance. For example, adding a response unit to compensate for a growing response workload, or delivering training needed to allow personnel to deal effectively with emergency responses already being encountered.

4. **Enhances the Delivery of Service or Department Management**

This objective improves the delivery of a particular service. For example, relocating a fire station to improve response times to a particular part of town, or adding a specialized piece of equipment that will improve the delivery of a service.

5. **A Good Thing To Do**

The objective doesn't fit within any of the above priorities, but is still worth doing.

Conclusion

ESCI began collecting information regarding the delivery of fire and emergency services to the City of Bangor in December 2010. This report serves as the result of extensive evaluation and analysis of information obtained through personal interviews, the review of written documents and reports, and electronic data. The evaluation has taken nearly three months to complete and this document contains an enormous amount of information related to the Bangor Fire Department's delivery of fire suppression, rescue and emergency medical services to the City of Bangor. It is ESCI's sincere hope that the information presented and the recommendations provided will allow the city to enhance its delivery of emergency services to the community.