EMERGENCY MEDICAL SERVICES

Strained Resources
Creating Major Impediments to Quick Response Time

December 2007

Alan Butkovitz
City Controller
November 20, 2007

Mr. Lloyd Ayers, Commissioner
Philadelphia Fire Department
240 Spring Garden Street
Philadelphia, PA 19123

Dear Commissioner Ayers:

Pursuant to Section 6-400 (d) of the Home Rule Charter, the City Controller’s Office, with assistance from the accounting firm of Goldenberg Rosenthal, LLP, has performed an assessment of the Philadelphia Fire Department’s (PFD) response to medical emergencies. This assessment was an objective and systematic examination to determine how effective the PFD was in responding to pre-hospital emergency medical care and transportation. A synopsis of the results of our work is provided in the executive summary to the report.

We discussed our findings and recommendations with you and your staff at an exit conference and included your written response to our comments as part of the report. We believe that our recommendations, if implemented by management, will improve the effectiveness of the PFD’s response to medical emergencies. Our recommendations have been numbered to facilitate tracking and follow-up in subsequent years.

We would like to express our thanks to you and your staff for the courtesy and cooperation displayed during the conduct of our work.

Very truly yours,

[Signature]

ALAN BUTKOVITZ
City Controller

cc: Honorable John F. Street, Mayor
Honorable Anna C. Verna, President
and Honorable Members of City Council
Members of the Mayor’s Cabinet
Emergency Medical Services

Executive Summary

Why the Controller’s Office Conducted the Examination

The Office of the Controller initiated this review in connection with its authority to examine city operations under Section 6-400 of the Home Rule Charter. We designed the review to determine how effective — as measured by response time — Philadelphia Fire Department’s (PFD) response is to 9-1-1 calls for medical emergencies.

What the Controller’s Office Found

Though effective in getting fire apparatus to the scene of a medical emergency in under nine minutes, the PFD’s ability to send an appropriate level of ambulance care, which is the care that counts most, has deteriorated. Utilizing a widely held benchmark of eight minutes 59 seconds, we found that the ability of PFD ambulances to arrive at medical emergencies within this time went from 77 percent of the total emergency runs in fiscal year 2002 to below 60 percent of them in fiscal 2006. For fiscal year 2006, nearly one-third of the runs took 10 minutes or longer.

Despite the commendable efforts by EMS staff, the PFD’s deteriorating trend in ambulance response is the result of too few transport-capable ambulance units to handle the demand. This situation has led to many ambulance units handling extremely high workloads — in many cases well over 8,000 runs a year instead of the recommended range of between 2,500 and 3,000 runs.

Additionally, the City Controller’s Office observed a number of other issues impeding on the ability of PFD ambulances to respond timelier. Some of the more significant issues include:

- a steady increase in call volume, high employee turnover, and frequent understaffing that plagues the Fire Communication Center (FCC);
- a dispatch system that fails to prioritize emergencies; and
- inadequate technology that impedes the ability of dispatchers to locate the nearest appropriate ambulance.

Finally, the Controller’s Office observed that performance indicators used to manage and report on EMS operations need to be improved. We found that: (1) the PFD’s definition of its key measure — “response time” — is seriously flawed; (2) reported measures lack context and are not tied to results; and (3) underlying performance data from the PFD’s computer assisted dispatch (CAD) system is sometimes incomplete and inaccurate.

What the Controller’s Office Recommends

The Controller’s Office has offered a number of recommendations to the PFD. Some of the most significant include: (1) increase the number of transport-capable ambulance units available to respond to 9-1-1 calls and ensure they are adequately staffed and deployed; (2) revise, to the extent possible, the existing policy of providing a response to every 9-1-1 call received; (3) employ a 3-1-1 system as a means of diverting non-emergency calls from the City’s 9-1-1 system; (4) implement a priority dispatch system; and (5) upgrade the technology of the 9-1-1 system. These and other recommendations are discussed in the body of the report.
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INTRODUCTION

Background

Since 1974, the Philadelphia Fire Department (PFD) has provided emergency, pre-hospital care and transportation to the citizens and visitors of the City of Philadelphia. The department’s Emergency Medical Services (EMS) Division provides the service and has adopted the mission of providing the best medical care possible to every patient it serves. It strives to accomplish this mission through the delivery of high quality, pre-hospital emergency medical care, and transportation in a timely and professional manner.

Overview and Demographics

The City of Philadelphia covers a 135 square mile area in Southeastern Pennsylvania. It has a nighttime population of 1.4 million people and close to 2.0 million during the day. About one of every seven citizens uses the EMS system. PFD analyses show that EMS responses average about 220,000 annually. On average, EMS ambulances respond to an emergency about every two minutes.

Philadelphia’s EMS is delivered through a tiered system, which includes Basic Life Support (BLS) Units, Advanced Life Support (ALS) Units, and “first responder” Engine and Ladder Companies. BLS Units are staffed with two Emergency Medical Technicians (EMTs) who are certified to perform basic pre-hospital emergency medical care and management of illness or injury. They typically perform procedures such as reading vital signs, administering oxygen, performing cardiopulmonary resuscitation, or splinting. EMTs are not trained to carry out invasive procedures or administer drugs.

ALS Units are generally staffed with two paramedics\(^1\) who receive the highest level of emergency medical technician training and are certified to handle advanced pre-hospital emergency medical care of serious illness or injury. Paramedics on ALS Units might be required to analyze electrocardiograms, perform invasive procedures (such as intravenous cannulation or endotrachael intubation), and/or administer a wide variety of medications.

The use of Engine and Ladder Companies as part of the EMS system in Philadelphia was first initiated in 1988. The concept of “first responder,” which has gained wide-acceptance in many large municipal systems throughout

\(^1\) If staffing restrictions are present, the ALS Unit may be staffed with one paramedic and one EMT.
the United States since the mid-1980’s, is to get firefighters, trained as EMTs, to the scene of emergencies as rapidly as possible to provide at least basic emergency medical care prior to arrival of an ambulance. Fire suppression units can frequently arrive at the scene of emergencies before ALS or BLS ambulances because there are 90 engine and ladder companies well distributed geographically throughout the City versus 45 ambulances. Although fire engines can get trained EMTs to the scene, they cannot transport patients to the hospital.

The PFD employs an EMS system that starts static, but becomes dynamic, that is, ambulance units are assigned to a home-base firehouse, but can be sent outside their home base boundaries to respond because they are closest to the scene of the next service call. Of its 45 ambulances, the PFD staffs 28 of them 24 hours a day, seven days a week. The remaining 17 units are used for “peak hours” and staffed at varying hours and days of the week.

The EMS Division responds to all calls for medical assistance. EMS related incidents account for 72 percent of all incidents (fire and medical) to which the PFD has responded in recent years. As depicted in Figure 1, public demand for emergency medical services in Philadelphia has steadily increased over the last eight years as measured by the number of EMS responses — from 165,000 responses in fiscal year 1999 to 210,000 in fiscal 2006. The increase in responses represents a growth of nearly 30 percent.

Figure 1: Number of EMS Responses made by the PFD

![Figure 1: Number of EMS Responses made by the PFD](image)

Source: Prepared by Office of the City Controller based on the Mayor’s Report on City Services

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2 This is the number of ambulances on hand at the end of fiscal year 2006 and comprises 36 ALS units and 9 BLS units. For most of fiscal 2005, the PFD had 40 ambulances.
INTRODUCTION

Ambulances (including both ALS and BLS Units) averaged a Unit Hour Utilization (UHU) of .85 based on data recorded by the PFD in 2006.³ UHU measures ambulance usage. It represents the ratio of the number of unit-hours spent delivering EMS to the total of unit-hours that the system could possibly deliver. UHUs of individual PFD ambulances range from a low of .20 to a high of 1.19.

EMS Call/Dispatch Procedures

Individuals in Philadelphia that are in need of EMS dial 9-1-1. All 9-1-1 calls — including those for police, fire, and medical emergency assistance — are received by the City of Philadelphia’s (City) Public Safety Answering Point (PSAP), which is located at the Philadelphia Police Department’s (PPD) central headquarters located at 8th and Race Streets. If a caller is in need of fire or medical emergency assistance, a PPD 9-1-1 call-taker will transfer the call to the Fire Communications Center (FCC) located at 240 Spring Garden Street.

Once a 9-1-1 call is received by the FCC, a call-taker there identifies the call as either a fire emergency or a medical emergency. When a call is classified as a medical emergency, FCC call-takers make inquiries using protocol established by the Associated Public-Safety Communications Officers (APCO).⁴ Such inquiries include, for example, asking the caller’s location and callback number; asking the patient’s age; and inquiring whether the patient is conscious and/or breathing appropriately.

Upon establishing the nature of the medical emergency, FCC call-takers classify it into one of three types: Code Blue, ALS/Trauma, or BLS. While call-takers remain on the line to gather additional information and to provide any necessary pre-arrival instructions, they electronically log the incident in to the FCC Computer Assisted Dispatch (CAD) System for dispatch.

FCC dispatchers receive a beep on their CAD System computer, which alerts them to a pending incident. On their computer screen, they review the address and nature of the pending incident. PFD’s CAD System is programmed to make recommendations as to what ambulance to assign to the incident. The CAD System makes recommendation assignments based on the closest fire station to the patient that is home base for an ambulance. However, dispatcher’s may override the system’s recommendation if they can determine through radio/mobile data transmitter (MDT) communication that another ambulance unit is closer.

Service calls are dispatched in the order they are logged into the CAD System. The PFD has adopted a policy of responding to all calls with

³ As provided by the Continuous Quality Improvement Unit.
⁴ APCO is an organization providing support to public safety agencies in the area of public safety communications standards, technology, training, and networking
INTRODUCTION

At the end of fiscal 2006, the number of PFD paramedics totaled 244, not including supervisors. Fire fighting operations of the PFD are integrated into the EMS program in that all of the department’s approximately 2,000 firefighters are cross-trained as EMTs. Firefighters are frequently required to staff BLS ambulances.

To work in its EMS Division, the PFD hires only state-certified paramedics who reside in Philadelphia. Paramedics appointed by the department must successfully complete a six-week training course in PFD protocols and procedures. Appointees who successfully complete the training process are sworn in and assigned to serve on ALS ambulances.

The FCC, which is staffed around the clock, has a budgeted staff of 44 civilian dispatchers, six civilian supervisors, and two civilian managers. FCC call-takers/dispatchers are trained in phone interview techniques to determine the exact nature and severity of the emergency involved, and to provide the caller with basic fire or medical instructions over the phone until the arrival of emergency responders.

The PFD routinely tracks and publishes five key measures to gauge the effectiveness of its EMS system. These measurements include: Number of EMS Runs, Average Response Time (minutes: seconds), First Responder Runs, EMS Gross Revenue Collections, and Percent of Customer Satisfaction with EMS Response. In tracking response times, the department measures from the time a “first responder” or ambulance is dispatched to the time these units arrive on scene. Table 1 below shows the average EMS Response Times, in addition to the other key measures that the PFD has reported for fiscal years 2002 through 2006.

Table 1: Key EMS Performance Measures

<table>
<thead>
<tr>
<th>Measurement</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMS Medical Runs</td>
<td>188,200</td>
<td>195,504</td>
<td>200,849</td>
<td>206,670</td>
<td>209,654</td>
</tr>
<tr>
<td>Average Response Time (Minutes: Seconds)</td>
<td>5:54</td>
<td>6:35</td>
<td>6:41</td>
<td>6:53</td>
<td>7:09</td>
</tr>
<tr>
<td>EMS Gross Revenue Collections (in $millions)</td>
<td>$18.6</td>
<td>$20.1</td>
<td>$20.7</td>
<td>$23.1</td>
<td>$25.0</td>
</tr>
<tr>
<td>First Responder Runs</td>
<td>34,661</td>
<td>52,802</td>
<td>62,334</td>
<td>70,154</td>
<td>74,000</td>
</tr>
<tr>
<td>Percent Satisfied with EMS Response</td>
<td>91%</td>
<td>89%</td>
<td>87%</td>
<td>88%</td>
<td>90%</td>
</tr>
</tbody>
</table>

Source: Mayor’s Report on City Services

Reported EMS runs do not include ambulance runs to ambulance and accident scenes.

5 Measures are published annually in the Mayor’s Report on City Services.
6 The City has a fiscal year that ends on June 30th.
Administration

The EMS Division is headed by a Medical Director who reports directly to the Philadelphia Fire Commissioner. The director is responsible for all medical aspects of emergency pre-hospital care rendered by the departments. He supervises the medical care provided by EMTs on all BLS units, including “first responder” engine and ladder companies. The director provides medical direction to the paramedics that staff the division’s ALS ambulance units. Additionally, the director manages numerous EMS support offices that are involved in continuous quality improvement; research; selecting, purchasing, maintaining equipment and supplies; special investigations; continuing medical education and training; emergency preparedness; as well as providing medical coverage for City-sponsored special events.

Daily operational and logistical facets of the EMS system are handled by the PFD’s Emergency Medical Services administrative staff that is headed by a Chief of EMS Operations who reports to the department’s Deputy Commissioner of Operations. All BLS and ALS ambulance units report upwards to the Chief of EMS Operations. “First responder” engine and ladder companies consist of two divisions, each with four platoons. Each platoon is headed by a Deputy Chief.

The FCC that houses the department’s 9-1-1 operation is responsible for processing and dispatching all phone requests for fire or medical assistance. It is overseen by a Chief Dispatcher that reports to the PFD’s Deputy Commissioner of Technical Services.
PFD FIRST RESPONDERS TIMELY, BUT AMBULANCE RESPONSE — THE RESPONSE THAT COUNTS MOST, IS DETERIORATING

CAD records portraying the PFD response times to medical emergencies for fiscal years 2002 through 2006 show that the department is generally very effective at getting a “first responder” engine or ladder to the scene of a medical emergency within the widely used standard of eight minutes 59 seconds (8:59). During the fiscal year that ended June 30, 2006, for instance, “first responder” fire apparatus carrying Emergency Medical Technicians (EMTs) beat the standard in 94 percent of the incidents to which such apparatus were dispatched.

Not nearly impressive, however, was the PFD’s performance for getting an ambulance to the scene. For the same fiscal year, department CAD records show that ambulances arrived on scene within 8:59 for only 60 percent of the incidents to which they responded. Over 30 percent of ambulance runs that the Controller’s Office analyzed for fiscal year 2006 took 10 minutes or longer to arrive on scene, with some — 8.3 percent — taking 15 minutes and longer.

CAD records from fiscal years 2002 through 2006 depict a spiraling decline in the overall timeliness of PFD ambulance response to medical emergencies. Figure 2 below shows that in fiscal year 2002, PFD

Figure 2: Declining Timeliness of Ambulance Response to Medical Emergencies

Source: Office of the City Controller analyses of complete CAD System database supplied by the PFD

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7 See Appendix I for a discussion of why the Controller’s Office used the 8:59 target benchmark.
8 However, response time is actually worse than the PFD’s CAD data indicates. As discussed in more detail beginning on page 14, the first segment of call processing time that occurs in the City’s PSAP located in the Police Headquarters is not included in the statistics presented in Figure 2.
ambulances reached their destinations within 8:59 for just 77 percent of the time — well below the 90 percent compliance reliability rate recommended and used by many EMS experts as a gauge for measuring EMS performance. Four years later, PFD ambulances were meeting the 8:59 benchmark only about 60 percent (59.77) of the time. This result represents a 22 percent decline in the rate of ambulance on-time performance and, in our opinion — based on our findings as discussed more thoroughly in the Findings and Recommendation Section titled “Why Ambulance Response Time Has Worsened” — will continue to deteriorate unless appropriate management intervention occurs.

As discussed more completely in Appendix I, the Controller’s Office also analyzed some 240 randomly sampled EMS incidents, which occurred during fiscal year 2006. The results of that analysis are summarized in Table 5 of Appendix I and show that delays are occurring in almost every component of response time (as described in Appendix II). The delays are evident in the low percentages of 9-1-1 calls within the sample that meet the benchmark time for each part of the process. For instance, FCC dispatchers handling 9-1-1 call processing met the recommended 35-second processing time for only 52 percent of the calls. On average, each call took about 42 seconds — seven seconds above the benchmark time.

Additionally, FCC dispatchers had trouble meeting the benchmark time for sending out the ambulances. For only about 26 percent of the dispatches could they timely send out the most appropriate ambulance. Usually, one minute elapsed before they could do it. Similarly, once dispatched, it took ambulance teams close to two minutes (1 minute 45 seconds) after receiving the call until they started traveling to the scene (chute time). In only 18 percent of the incidents did teams depart for the emergency scene within the 45-second recommended time.

Where PFD ambulance teams did notably beat benchmark time — at least for 75 percent of the runs — was the time they spent treating patients once on scene. On average, they generally spend about 11 minutes, which is 4 minutes better than the benchmark time.

Because the scope of the Controller’s Office did not encompass studying the quality aspects of EMS performance, we did not pursue why ambulance personnel were performing better then the benchmark time for this phase of the work. From a positive perspective, it may imply that paramedics and EMTs are extremely skilled and efficient at providing patient care. Alternately, it may suggest that ambulance teams are either significantly pressed for time and take shortcuts in treating patients, or they are insufficiently trained and primarily providing just transport services.
The PFD’s success at getting a “first responder” engine or ladder to the scene of a medical emergency in a timely manner is certainly commendable. When only basic emergency medical care prior to arrival of an ambulance for transport to a hospital is all that is needed, the patient’s well-being may not be at risk. However, in more serious emergencies — such as cardiac arrests or shooting victims — when every second of appropriate pre-hospital care and quick transport to a hospital emergency room is critical to the patient’s survival, a “first responder” response may be inadequate.

Since the PFD did not give the Controller’s Office access to the department’s patient care records (PCR), and no other statistics on the survival rate of the department’s EMS patients were available, we were unable to analyze the consequences of the worsening ambulance response times. In recent years, there have been several media accounts of patients waiting 20 minutes and longer for a PFD ambulance, only to subsequently die. No one can say for sure whether these individuals would have survived with a quicker response. However, in general, a patient’s chance of survival in a very critical emergency is clearly improved when the PFD can get an ALS medic team on site in the least amount of time.
WHY AMBULANCE RESPONSE TIME HAS WORSENED

Despite the commendable efforts by EMS staff, the PFD’s deteriorating trend in ambulance response is because there are too few transport-capable ambulance units to handle the demand. This situation has led to many ambulance units handling extremely high workloads — in many cases well over 8,000 calls a year instead of the recommended range of 2,500 – 3,000. Because of the overload, paramedics have reported being fatigued or exhausted. The overload, combined with a steady loss of EMS personnel, has required an increasing reliance on overtime. Moreover, morale, which is low, is fueling discontent and increasing turnover at a time when the PFD is experiencing difficulty in attracting new paramedics.

Ambulance response time is related to the availability of ambulances, which is the opposite of ambulance usage. The standard measure of ambulance usage across the nation, including Philadelphia, is unit-hour utilization (UHU), which is the ratio of the number of unit-hours spent delivering EMS to the total number of unit-hours that the system could possibly deliver services in a specific period of time. Put another way, UHU measures how much time during a given period that an ambulance is handling an emergency run versus how often it is not. The formula for computing UHU, as shown below, assumes that it takes on average about one hour to complete a run.9 The potential number of hours that an ambulance could deliver service in a year is 8,760.

\[
\text{UHU} = \frac{\# \text{ of EMS runs}}{\# \text{ of ambulances} \times 8,760}
\]

EMS experts indicate that the UHU ratio used as a target depends significantly on the geographical nature and density of a region. During our research, the Controller’s Office identified acceptable UHU ranges of 0.33 to 0.50 for good performance. For instance, Houston, TX likes its UHU for each ambulance to stay under 0.33, while Austin, TX has a target UHU of less than or equal to 0.45. One published expert wrote that a UHU of 0.50 is also acceptable.

According to EMS experts, UHU targets in the range of 0.33 to 0.50 allow ambulance crews time to return to the station to re-fuel, maintain, and sanitize vehicles, wash-up, eat, rest, restock, as well as perform chores in the fire station and accomplish good productivity. To establish a single target measure for purposes of this report, we used 0.42, which represents an average of the 0.33 to 0.50 range.

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9 Individual incidents the Controller’s Office sampled (240 incidents in total) for fiscal 2006 showed that this was a reasonable assumption for Philadelphia.
The Controller’s Office analyses show that PFD’s ambulance fleet is overworked to the breaking point. Overall PFD UHUs for 2002 through 2006 are presented in Table 2 below. As shown, the UHU for the entire

<table>
<thead>
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<th>Table 2: UHU Data for Philadelphia Fire Department</th>
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<tbody>
<tr>
<td>2002</td>
</tr>
<tr>
<td>Number of ambulances</td>
</tr>
<tr>
<td>Number of EMS runs²</td>
</tr>
<tr>
<td>Possible service hours</td>
</tr>
<tr>
<td>Overall UHU</td>
</tr>
<tr>
<td>Target UHU</td>
</tr>
<tr>
<td>High</td>
</tr>
<tr>
<td>Low³</td>
</tr>
<tr>
<td>% of fleet above target</td>
</tr>
</tbody>
</table>

Prepared by the City Controller’s Office based on data provided by the PFD Continuous Quality Improvement Office

¹At fiscal year end
²Includes runs associated with fires and accidents.
³Medic 30 (Philadelphia International Airport)

ambulance fleet exceeds the target level of 0.42 in each of the five years presented. In fiscal year 2002, for example the department’s overall UHU was 0.69. By 2006, the UHU had increased by almost 25 percent to 0.85. UHUs of individual ambulances (not shown) range from a high of 1.19 for Medic 40 in fiscal 2006 to a low of 0.16 for Medic 30 in fiscal 2003¹⁰.

From our analyses of the individual UHUs, we saw that almost the entire PFD fleet was significantly overburdened. This is evident by the fact that by fiscal year 2006 nearly 98 percent of the fleet was operating at or greater than the 0.42 target. In fact, by 2006 almost 20 percent of the fleet was operating at or above full capacity (1.0).

The high UHUs reflect an extreme elevated number of runs experienced by PFD ambulance teams. One expert, to whom we spoke, recommends a range of 2,500 – 3,000 annually per unit. PFD ambulances are averaging close to 5,200; with many during fiscal year 2006 exceeding 8,000 runs. Data provided to the City Controller’s Office shows that the average number ambulance runs has been steadily rising since 2002 when it stood at 5,200. By 2005, PFD ambulances were handling, on average, close to 6,200 runs. The average runs decreased to approximately 5,800 in 2006, because the PFD added five more ambulances to the fleet.

¹⁰ Medic 30, which is stationed at Philadelphia International Airport, is consistently underutilized in line with its role.
The impact of the PFD’s overworked fleet on the response time measure is reflected in Figure 3 below. Figure 3 shows that as the overall UHU for the fleet has increased from 0.69 to 0.85, the ability Philadelphia’s EMS system to meet the response time target of under nine minutes has significantly declined — in other words, the higher the UHU, the lower the success in meeting the targeted response time. In fiscal year 2002, for example, when the UHU was, what experts would consider significantly high, the percent of ambulance runs meeting the under nine minute target response time was 77 percent. By 2006, when the UHU hit 0.85 the percent of runs beating the response time target had fallen to 60 percent. Put another way, during 2006, there was a 40 percent chance that those in need of an ambulance could expect to wait nine minutes or longer for one to arrive.

Given the number of ambulance runs, the Controller’s Office can compute the appropriate number of ambulance transport units needed to reduce the PFD’s UHU to 0.42. For the fiscal years 2002 through 2006, Philadelphia’s ambulances averaged 238,000 EMS runs, including those involving accident and fire scenes. Accordingly, Philadelphia theoretically needs about 65\textsuperscript{11} ambulances to bring the UHU down to an average of 0.42 assuming the

\begin{equation}
0.42 \text{UHU} = \frac{238,000 \text{ estimated runs}}{(8,760 \times 0.42) \text{ hrs}}
\end{equation}

\begin{equation}
(8,760x) \times 0.42 = 238,000
\end{equation}

\begin{equation}
x = 65 \text{ units needed to maintain a UHU of 0.42}
\end{equation}
number of runs remains comparable to the five years of data the Controller’s Office analyzed. That equates to an additional 20 ambulances (65 needed ambulances less 45 ambulances in the existing fleet).

However, the level of demand can influence the above number of needed ambulances. If EMS demand continues at the actual 2006 level of nearly 261,000 runs or grows higher over the next several years, which we believe is likely, there will be a need for even more ambulances. A linear extrapolation of EMS demand, which assumes similar growth in calls as occurred over the eight years ending with fiscal 2006, suggests that by 2010, the number of runs experienced by the PFD could reach 332,000. If this level of demand should actually occur, the PFD would need upwards to 90 ambulances.

Two other variables adversely affecting Philadelphia’s overloaded EMS System are the number of ambulances actually in service on a daily and hour-by-hour basis, as well as the significant number of non-emergency calls. Of the 45 ambulances in the PFD fleet, only 28 operate as 24-hour units. The remaining 17 ambulances are partial day units that follow various 12-hour schedules during different days of the week.

As to the number of non-emergency 9-1-1 calls, 90 percent of dispatchers, EMTs, and paramedics we surveyed estimated that over 50 percent of the calls and runs are non-emergency in nature. Ambulance personnel also told us that the lack of 24/7 coverage and the requirement that they respond to non-emergency calls caused them concern, because too frequently, there are no ambulances available to dispatch when there is a true emergency.

In addition to the impact on response time, the heavy workload is taking an incredible toll on the PFD workforce, especially the paramedics. Focus group meetings the Controller’s Office held with both EMTs and paramedics highlighted the fatigue and exhaustion of the paramedics, as well as their frustration with always being overburdened. Despite the fatigue, exhaustion, and frustration, it was also unmistakably evident that members of the EMS workforce we surveyed were professional and dedicated to saving lives.

Additionally, Philadelphia’s overtaxed EMS System has led to an increasing reliance on overtime. For the fiscal years 2002 through 2006, overtime pay for paramedics increased from $2.3 million to $3.5 million, respectively. This increase represented a 52 percent increase in overtime costs brought about not only because of the demand for service, but because of the declining numbers of paramedics — from 314 in 2002, to 258 in 2006.¹²

¹² These numbers also include supervisory personnel.
Low Morale Causing Discontent and Increasing Turnover

Adding to the PFD’s troubles, poor morale among many paramedics is fueling discontent and increasing turnover at a time when the PFD is experiencing difficulty in attracting new paramedics to staff ambulances. Paramedics to whom we spoke gave a variety of reasons they believed morale was low among EMS staff — everything from feeling overworked to the impression that overtime is not being paid timely. These reasons — real or perceived — appear to originate from a cultural divide within the department. Like many fire departments that provide EMS, there exists a “cultural gap” between EMS and firefighting staffs. Paramedics believe PFD management treats them as second-class employees. They perceive that firefighters, including those in command positions, prioritize the firefighting function of the PFD, and are often dismissive of the EMS function. Despite the fact that the EMS workload far outpaces that of firefighting, paramedics believe that the dominance of traditional firefighters in management positions affects the decision-making processes, budgets, and even incident command authority.

Many paramedics are unhappy and leaving. From fiscal years 2002 through 2007, for example, the turnover ratio for PFD paramedics was over 50 percent. Many are retiring, seeking other career options, and becoming firefighters, where they can enjoy a better career path and eventually, higher pay.

The high turnover of paramedics comes at a most inopportune time. As paramedics leave, replacing them is becoming more and more challenging. Between fiscal years 2002 and 2006, for example, an average of 45 paramedic positions remained unfilled. During one of those years (fiscal 2005), the PFD could not fill 97 funded positions. One recent class of paramedics graduating from the Fire Academy consisted of only four graduates.

The PFD’s efforts to recruit paramedics have been hampered by a couple of factors. First, there is the residency requirement. Although the PFD has tried to change this requirement, candidates seeking to become paramedics still must live in the City of Philadelphia for at least one year before being hired. This prerequisite means relocating to Philadelphia for a job that may never materialize. Second, the PFD has had to compete with EMS operations in surrounding suburbs and counties, where the pay and fringe benefits may not be quite as good, but the workload and working conditions are significantly less stressful.
OTHER ISSUES THAT ARE IMPEDING BETTER AMBULANCE RESPONSE

During our review of the PFD’s EMS System, the Controller’s Office also identified a number of other issues, which are hampering the ability of the department to respond quicker to medical emergencies. These issues include:

- A 9-1-1 system for medical emergencies that must be accessed indirectly through the Philadelphia Police Department;
- A 9-1-1 system that lacks the capability of identifying the location of callers using cellular phones;
- 9-1-1 users who frequently make it difficult for call-takers to understand the exact nature and urgency of calls;
- A steady increase in call volume, high employee turnover, and frequent understaffing plagues the FCC;
- A dispatch system that fails to prioritize emergencies,
- Inadequate technology that impedes the ability of dispatchers to locate the nearest appropriate ambulance, as well as managing delays associated with radio communication problems;
- Ambulances that lack global positioning systems (GPS) capable of providing directions to ambulance drivers;
- Resources have not kept pace with the changing needs of the PFD.

Each of these issues can add seconds and perhaps even minutes to a response. In turn, these seconds and minutes can mean the difference between life and death.

Although the Controller’s Office analysis of the entire CAD database showed that 60 percent of PFD ambulances responding to EMS 9-1-1 calls occurred in less than 9 minutes during fiscal year 2006, the response times we computed excluded the elapsed time associated with the Police Department’s handling of the 9-1-1 call first. Because access to the City’s 9-1-1 EMS system is indirect, through the City’s PSAP located at the Philadelphia Police Department’s central headquarters, there is another segment of response time that technically should, but was not included in the computations used in our analyses. This segment of time (shown as T-0 in Appendix II) represents the length of time it takes to process and then transfer a 9-1-1 emergency medical call from the Police Department to the FCC.

Indirect Access to 9-1-1 for Medical Emergencies Adds Time to Response
The Controller’s Office was unable to quantify, with any precision, the T-0 aspect of response time because the Police Department asserts that for most of the period under our review (fiscal years 2002 through 2006), its CAD System did not capture the time the department received an emergency call. However, we were able to determine — by observations and an analysis of some 2006 EMS incidents — that it can take a number of additional seconds and perhaps even minutes for the Police Department to process EMS calls at its end. For example, when a call comes into the Police Department, we observed that call-takers connect to calls after four to five flashes that display on their consoles. This takes approximately two to three seconds. Police call-takers do not automatically connect to the PFD’s FCC simply because the caller requests it. On the contrary, call-takers ask a number of pertinent determining and verifying questions and record responses into a template on the right side of their CAD screen. We noted that this process could take up to one minute, and the ability and/or willingness of the caller to provide the requested information can influence the length of time it takes. A Police supervisor who accompanied us during our observations also explained that the process could increase or decrease depending on the level of the call-taker’s experience.

Additional seconds can pass after the Police operator finally transfers the call to the FCC. In some instances, FCC call-takers report they become disconnected in the transfer process. When this occurs, if the Police Department took enough identifying information from the caller, the FCC can call the individual back to confirm the location and determine the nature and urgency of the call. However, this can add moments to the call-taking process. Additionally, valuable seconds are lost, just waiting for the FCC call-takers to pick up the call when the Police make the transfer. For instance, on one transfer, we observed that the phone rang four to five times, approximately 10 to 12 seconds, before the FCC call-taker answered.

Of the 240 EMS incidents we sampled for fiscal year 2006, the Police Department could only provide us with eight call-received times. Although very limited, the Controller’s Office analysis of the eight calls revealed that an average of 32 seconds went by before the FCC received the calls. The elapsed times ranged from a low of six seconds to a high of one minute, ten seconds.

Once the FCC receives a 9-1-1 EMS call, our sample showed that on average, about 42 seconds elapse before call-takers log the call in for dispatch. Of the 240 fiscal year 2006 incidents we analyzed, call-takers handled just 52 percent of them within a benchmark time of 35 seconds. Of particular significance is the growing use of cellular phones by residents, workers, and visitors to the City. Since cellular phone users do not always know where they are when reporting an event, and the PFD’s current 9-1-1
FINDINGS AND RECOMMENDATIONS

System is unable to identify the caller’s location from a cell phone, FCC call-takers frequently lose time trying to confirm the caller’s location.\(^\text{13}\) This is especially difficult on expressways, when there are sometimes multiple calls and locations given, and callers provide mile markers instead of exit names.

FCC call-takers also indicated they lose time trying to obtain enough information from callers to determine the nature and urgency of the medical emergency. Some 9-1-1 users are understandably upset and have difficulty describing the emergency; others are rude or abrupt and short on details, indicating they just want an ambulance. Moreover, when a 9-1-1 caller speaks a foreign language, additional moments go by until the call-taker can access the PFD’s language-line service.

Frequently, when the nature and urgency of the 9-1-1 call cannot be determined, FCC call-takers categorize the call as “Sick Unknown.” Paramedics and EMTs, who participated in our focus-group sessions, indicated that ambulance runs of this nature tend to be particularly stressful because they do not know what to expect when they arrive on-scene. In some instances, paramedics and EMTs told us the situations have been life-threatening to them. Based on the latest statistics provided by the PFD’s Continuous Quality Improvement (CQI) staff, EMS calls categorized as “Sick Unknown” represented 13 percent of the total incident types.

Additional factors that have adversely influenced the PFD’s response to medical emergencies are Philadelphia’s increasing 9-1-1 call volume coupled with the FCC’s high turnover and frequent understaffing. Using the number of EMS and fire runs as a proxy measure for 9-1-1 calls\(^\text{14}\) the Controller’s Office analyzed the growth in runs since 1999. As illustrated in Figure 4 on the next page, from fiscal years 1999 through 2006, the total runs (fire and EMS combined) grew from 12,686 per 100,000 citizens in fiscal year 1999 to 18,674 in fiscal 2006, representing an increase of over 45 percent. Between the two types of 9-1-1 runs, EMS comprises the majority of activity and the growth has been very disproportionate. EMS runs grew by 52 percent from 11,850 per 100,000 citizens in fiscal year 1999 to 18,017 in fiscal 2006. Conversely, over the same period, fire runs actually decreased by more than 20 percent going from 836 per 100,000 citizens in fiscal year 1999 to 657 in fiscal 2006.

\(^\text{13}\) Telecommunication equipment at Police Headquarters does have the capability of identifying the location of cellular phone callers, so FCC call-takers can make inquiries of the Police 9-1-1 operation.

\(^\text{14}\) The volume of calls is much greater, however, because frequently there are multiple calls for the same event.
Call Volume, High Turnover, and Frequent Understaffing Plague the FCC

While the volume and composition of 9-1-1 activity for the PFD during this time was shifting from Fire to EMS activity, staffing problems at the FCC were hampering call-taking and dispatching operations. During the eight years of increasing call volume, the FCC actually lost staff, decreasing from 49 to 47, not including supervisors. For some of the interim periods, the FCC actually found itself with only 44 dispatchers.

Moreover, EMTs and paramedics we surveyed during our work commented that, from their perspective, there has been a decreased level of experience in the FCC. They indicated that this situation was hampering response because all too frequently FCC staff were slow in discerning the nature and urgency of calls or incorrect in dispatching the nearest and most appropriate unit because of insufficient information or unfamiliarity with the layout of the city. FCC dispatchers we surveyed corroborated that both of these processes caused them difficulty and delays.

The Controller’s Office review of FCC operations shows that trainees now comprise 26 percent of the FCC staff. This is up from 13 percent in 2000. Furthermore, in the six most recent fiscal years that ended June 30, 2007, the FCC experienced a turnover rate of over 100 percent. That means the FCC actually lost more staff than the average number it regularly employed.
for the same six-year period. These two circumstances indicate that the level of experience may be declining and thus could adversely affect response.

Additionally, despite the increased demand for EMS services over the years, the configuration of dispatchers and call-takers in the FCC has remained relatively fixed. As shown in Table 3 below, for each shift FCC management schedules two staff to dispatch EMS runs and two to dispatch fire runs. For the first and second shifts, four additional dispatchers function as call-takers; on the third shift there are three call-takers. Management also schedules one additional dispatcher to serve as a “roamer” on each shift, that is, an individual that assists the supervisor and relieves shift call-takers or dispatchers needing to take a break.

### Table 3: FCC Staffing Configuration by Shift

<table>
<thead>
<tr>
<th>Staff</th>
<th>First 7:00 am to 3:00 pm</th>
<th>Second 3:00 pm to 11:00 pm</th>
<th>Third 11:00 pm to 7:00 am</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervisors</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Call-takers</td>
<td>4</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Dispatchers (EMS)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Dispatchers (Fire)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>“Roamer”</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: Philadelphia Fire Department

However, given the dramatic increase in medical emergency calls, the current configuration of staff assigned to the FCC negatively affects EMS response in three ways. First, the total number of calls has risen significantly since 1999 without any increase in the number of personnel handling the calls. This, in turn, can add seconds to the call-answering time, as 9-1-1 callers must wait additional moments for FCC staff to answer their calls for help.

Second, medical emergencies tend to be the more complex and time-consuming. These tend to require more inquiries of the caller, and sometimes require call-takers to stay on the line providing callers with instructions until first responders or ambulances arrive on the scene, thus delaying call-takers from answering the next call.

Third, the current configuration represents management’s plan to allocate resources on each shift. In actual practice, however, the plan is frequently not in place due to staff absences. FCC dispatchers we surveyed indicated that there are often only two call takers on duty instead of four.
FCC call-takers we surveyed prioritize calls into three principal urgency categories. These include:

- **Priority 1 (Code Blue)** — calls of this nature generally involve an emergency where the caller describes the patient as not breathing.

- **Priority 2 (A/T)** — denotes an ALS/Trauma situation such as a patient described as having difficulty breathing, in cardiac arrest, as having a stroke, or as having been the victim of a shooting, stabbing, or falling from a distance of greater than 10 feet.

- **Priority 3 (B)** — refers to a BLS event and involves conditions such as minor injuries, minor bleeding, flu-like symptoms, or simply not feeling well.

Although call-takers prioritize EMS calls by category, emergency jobs go to the dispatch console in the order the call-takers received them. Since dispatchers handle emergency calls in the order received, the advantage of using priority codes at the call-taking level is somewhat mitigated, especially in the context of a system short on ambulances. By not prioritizing the dispatch assignments, an ambulance could be sent across the City for a “Priority 3” run, and therefore not be available to answer a “Priority 1” within its home base boundaries.

As previously discussed, the most significant impediment to sending ambulances to the scene of an incident timely is that there are too few of them to handle the workload. All too frequently, however, the dispatch process is also slowed because FCC dispatchers are often burdened trying to identify the location and availability of ambulances, as well as managing distractions associated with radio communications.

To assist dispatchers in identifying ambulance units for dispatch, the PFD’s CAD System automatically recommends a unit. However, the system makes recommendations based on the closest fire station to the incident. Because station ambulances are frequently handling other runs, the CAD System recommendation is generally of no use.

Additionally, while the FCC has a stand-alone GPS tracking system, only supervisors have access to it for monitoring activity. Dispatchers must instead rely primarily on radio communication to identify the location of ambulances, and then choose which unit to dispatch.

As of result of the flaw in the CAD’s recommendation capabilities and the inadequate GPS tracking system, dispatchers spend a great deal of time trying to locate the most appropriate and nearest available ambulance unit via the radio system. This method of tracking units, however, takes
additional time because the communication system is overburdened. Interruptions in the assignment process can occur for up to several minutes because dispatchers must wait for radio traffic to stop before communications with ambulance units can commence.

Additionally, the radio method of locating available units increases the risk for dispatch errors. These can cause additional delays — either because the dispatcher inappropriately chooses to send an ambulance that is further from the incident than another (which in turn might take longer for response), or takes corrective action after initially making a dispatching error.

In our opinion, the risk of errors in making ambulance assignments is incredibly high because unless a dispatcher is thoroughly familiar with the layout of all the streets in Philadelphia, it becomes very difficult to make dispatch decisions. Paramedics and EMTs to whom we spoke pointed out they often question the appropriateness of a dispatch decision and will recommend an alternative unit for assignment instead. These judgment errors can occur especially when the dispatcher is new and inexperienced.

Other delays in the dispatch process occur because dispatchers find themselves frequently tied up with other radio communications. For instance, when ambulances need to alert a hospital that they are going to arrive in a few minutes with a critical patient, they must call on the radio to the dispatcher. The dispatcher in turn radios the hospital via a hospital alert system known as HASTE (Hospital Alert System Tone Encoded). Some other radio distractions include requests for police assistance at accident and crime scenes, and requests for estimated arrival times of police or utility companies. In addition to consuming airtime, the process of relaying information between the ambulance units and the FCC distracts dispatchers from making ambulance assignments for other medical runs.

Delays in ambulance runs can also occur because EMTs and paramedics become lost enroute to the scene. This situation can occur especially when units cross the City outside their home base territory. Medic teams are frequently unfamiliar with an area to which dispatched and are forced to rely on paper maps because the GPS in PFD ambulances do not have a direction-finding function.

Since fiscal year 2001, the PFD’s budget has provided on average 84 percent of its resources to fire-fighting operations while providing only 16 percent to EMS activities. While our review makes no judgment on the resources needed to fight fires, it is noteworthy to mention that resources have not kept pace with the changing demand for EMS. As depicted in Figure 4 on page 17, between fiscal years 1999 and 2006, EMS runs per
100,000 citizens have increased 52 percent, while fire runs per 100,000 citizens for the same period decreased by about 20 percent.
CHANGES NEEDED TO IMPROVE AMBULANCE RESPONSE

In this part of the report, the Controller’s Office makes a number of recommendations that address the issues discussed in the immediate three preceding sections. In our opinion, the recommendations listed below will help the City Administration and management of the PFD provide more effective emergency medical services.

While our recommendations address the most significant immediate causes for delays in response time, PFD management will have difficulty implementing many of them unless the Administration addresses the underlying cause — a lack of financial resources. With that preface, to achieve an EMS system that responds timely, we offer the following recommendations:

- **Increase the number of transport-capable ambulance units available to respond to 9-1-1 calls and ensure they are adequately staffed and deployed**[21106.01]. The ultimate goal of management should be to bring the UHU measure down to 0.42 from its existing average level of 0.85. Such a UHU would be more in line with what the International Association of Fire Fighters and other EMS experts recommend, as well as with what other major cities such as Houston and Austin, Texas use as a benchmark.

  However, the cost for each additional ambulance could be expensive. According to the PFD, for instance, the initial cost of each fully equipped ambulance will range from approximately $175,000 to $200,000, depending on whether it is a BLS unit or ALS unit. Annual costs for supplies will run somewhere between $10,000 for BLS units and $25,000 for ALS units. Finally, there will be personnel costs. Annual costs to staff the units for 24-hours a day will cost about $430,000 for a BLS unit and $470,000 for an ALS unit. Therefore, management needs to implement the above recommendation in conjunction with the other suggestions the Controller’s Office is making. Moreover, it is essential that management recognize all ambulances need to operate 24 hours a day 7 days a week.

- **Revise, to the extent possible, the PFD existing policy of providing a response to every 9-1-1 EMS call received**[21106.02]. Implementing this recommendation will be challenging, to say the least, and the City administration will have to consider both medical, as well as legal implications. However, other cities have done it successfully and Philadelphia should be no exception. To accomplish it effectively, the PFD needs to:
○ Re-educate the media, public, and schoolchildren on the function of 9-1-1 emergency service to reduce the number of non-emergency calls. Use advertising medium such as information flyers, brochures, bill inserts, posters, coloring books, activity books, mascots, balloons, telephone stickers, educational DVDs, public service announcements, speakers’ bureaus, newspapers, and other publications.

○ Retrospectively study EMS incident records and identify the classic non-emergency type calls received in the past. The EMS medical director with input from dispatchers, EMTs, and paramedics should be able to identify non-emergencies. Once identified, the PFD needs to develop a plan and long-term solution for dealing with such calls. One solution, for example, might include contracting with an outside ambulance or transport service that would provide transportation to hospital emergency rooms or nearby public health centers.

○ Use computer assisted techniques to analyze and identify callers who use the 9-1-1 system excessively. Try to determine the reason for the excessive use and take appropriate action.

○ Implement a 3-1-1 system, similar to many other cities in the United States, as a means of diverting non-emergency calls from the City’s 9-1-1 system. The 3-1-1 system is intended to connect callers to a call center that can be the same as the regular 9-1-1 call center, but with 3-1-1 calls assigned a secondary priority, answered only when no 9-1-1 calls are waiting.

○ As a last resort to eliminating non-emergency calls, consider enforcement action under Pennsylvania Statutes Title 35. Health and Safety Chapter 37A Emergency Medical Services Act. Under this Act, it is unlawful for any person to intentionally report a medical emergency and summon an ambulance when the person does not have good cause to believe that the services of an ambulance are needed. An individual violating the Act commits a summary offense.

- Address the growing discontent among EMS personnel, including the so-called “cultural gap” that divides EMS and firefighting operations within the department [21106.03]. Although the PFD’s organization chart depicts the EMS operation
equal in stature to Firefighting Operations, many within the department (managers as well as subordinates) still perceive EMS as afterthought to firefighting. Over the years, PFD leadership has done an outstanding job at minimizing the extent of death, harm, and property loss resulting from fire. However, EMS demands on the department are growing fast, and PFD leadership needs to address EMS staff’s concerns. Accordingly we suggest that management:

- Consider the need to rewrite the PFD mission statement. Management should supplement the mission statement with a value statement that clarifies the values by which the department operates. This statement should make clear that members of both the EMS operations and Firefighting operations are afforded the same level of respect.

- Demonstrate on a daily basis that it is committed to closing the cultural gap that divides firefighting and EMS operations. Moreover, the Commissioner should require that every level of the PFD chain of command meet with subordinates to discuss ways of addressing the gap and then implementing appropriate changes that come from these discussions.

- Consider ways to begin having more EMS input over the decision-making processes, budgets, and incident command authority.

- **Deal with the current shortage of paramedics [21106.04].** Management needs to begin actively recruiting new paramedics immediately. Until there are enough paramedics, the PFD may want to consider the following three actions:

  - Staff all ALS units with one paramedic and one EMT instead of two paramedics. Be advised, however, that the PFD should make EMT assignments long-term. To the extent possible, the department should partner the same EMT and paramedic on a regular and consistent basis. This will allow members of each team to develop an effective working relationship with one another, which according to both EMTs and paramedics is very important when dealing with emergencies.

    Be aware, however, that teaming paramedics with EMTs could cause the stress level of paramedics to increase, as they no longer will have a partner with the same level of
knowledge and experience of which to “bounce” decisions regarding the treatment of patients. The department will have to develop a method that enables paramedics at the scene to corroborate with experienced paramedic supervisors, when necessary.

- Continue to seek a waiver for the residency requirement as a condition of being employed as a paramedic. New paramedics should be given up to one year to establish Philadelphia as their residence.

- Convert a percentage of engine companies into paramedic-engines to help meet response time objectives [21106.05]. As the PFD is very successful in getting a “first responder” to the scene of a medical emergency in less than nine minutes, the department should consider fully equipping and staffing a segment of its engines as paramedic engines. This recommendation can complement increasing the number of transport capable ambulance units. It would be a more cost-effective way to increase medical service than just adding additional ambulances to reduce the PFD’s UHU to an appropriate level. For instance, instead of spending close to $220,000 to acquire and annually stock an ALS ambulance unit, the department could upgrade and stock a first responder fire engine to a paramedic engine for less than 10 percent of that cost. Additionally, to staff the paramedic units and minimize staffing costs, the department should: (1) begin cross-training firefighters as paramedics, and (2) allow those paramedics that have moved to the firefighting side of operations to function as paramedics on the engines.

- Determine the feasibility of consolidating 9-1-1 communication-room operations of Police and Fire Departments and placing them under a Public Safety Emergency Agency directed by a professional public safety director [21106.06]. The PFD, together with the Police Department and the City’s 9-1-1 coordinator should establish the viability of consolidating the City’s 9-1-1 communication operations. Benefits include:
  - Administrative functions of 9-1-1 such as budgeting and planning, maintenance of equipment and facilities, administering, hiring, and training of personnel, ongoing review and evaluation of center activities, as well as public education would become primary functions of a public safety director instead of ancillary support functions of the Police and Fire Departments.
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- A career path for call-takers and dispatchers could be developed and perhaps improve employee morale, and eliminate the high turnover and frequent understaffing of the FCC.

- Cost savings could be achieved in the long run because consolidation would require only a single CAD system, and thus eliminate the need for duplicate equipment, software, and maintenance agreements as presently exist.

- Staff shortages might be less common because of a larger pool of call-takers and dispatchers from which to draw replacements due to illnesses and vacations.

- **Pursue technology enhancements similar to the Police Department that will enable PFD’s 9-1-1 system to identify the location of callers that use cellular phones [21106.07].** PFD needs to work closely with appropriate City officials and service providers to achieve a cost effective upgrade to its 9-1-1 system. To the extent possible, try to recoup some of the costs through the Pennsylvania Emergency Management Agency’s Wireless E-9-1-1 Emergency Services Fund.¹⁵

- **Educate the public on how to make a successful 9-1-1 call, especially when using cellular phones [21106.08].** While it is important to instruct the public on what circumstances warrant dialing 9-1-1, it is equally important that users be well informed on what to tell the 9-1-1 call-taker who responds to their call. For instance, they need to explain what the emergency is and what type of assistance is needed. They also require instruction on the importance of staying calm and speaking clearly and on what types of questions to expect from 9-1-1 call-takers under different types of emergencies.

  In addition, until Philadelphia can upgrade its 9-1-1 system to handle cellular technology, the City must embark on an education plan specifically directed toward cell phone users. For example, cellular phone users need to understand that the City’s 9-1-1 system does not automatically display their location and cell phone number. Therefore, they should be prepared to tell the 9-1-1 call-taker both the location of the emergency and their cell phone number.

- **Implement a priority dispatch system [21106.09].** To ensure not only a timely 9-1-1 response, but also a response with the most

¹⁵ The Commonwealth of Pennsylvania established this fund in November 2004 in response to the death of a 9-1-1 caller who upon being forced into the back of a van, blindfolded and gagged, somehow managed to call 9-1-1 twice using a cell phone, but to no avail because Philadelphia’s 9-1-1 technology could not identify from where the individual was calling. The van and victim’s body were recovered the next day.
appropriate ambulance, the PFD needs to prioritize dispatch assignments. A heart attack patient’s chance of survival will significantly decrease, if the ALS ambulance staffed and equipped to handle such events is cross-town tending to a patient complaining of a toothache. It is important for the PFD to realize not every 9-1-1 call requires “lights and sirens.” Those 9-1-1 events that are not life-threatening should be treated with a lower response priority, in much the same way the Police Department gives a lower response priority to a minor disturbance versus a robbery in progress.

- **Upgrade the CAD System to include a user friendly and fully integrated GPS that makes recommendations based on the closest available ambulance unit rather than the closest fire station to the incident [21106.10].** Such a capability will help reduce the time it takes to dispatch the most appropriate ambulance to the scene of the emergency. Moreover, it will lessen the stress experienced by trainee dispatchers, who early in their careers may not be fully aware of the layout of the City. To function properly, however the PFD must also keep operational the reciprocal component units of the GPS, which it has installed in the fleet of ambulances.

- **Equip all ambulance units with a GPS that has a direction-finding function [21106.11].** In connection with the above recommendation, the PFD must replace or supplement GPS units currently installed in ambulances with units that not only track the location of the ambulance, but also provides ambulance teams with a method of locating their destination, especially when handling a dispatch assignment outside their normal territory.

- **Seek appropriate financial operating resources that are more in line with the changing needs of the department [21106.12].** Given that EMS activity accounts for 72 to 75 percent of all incidents to which the PFD responds, the City administration will need to increase funding to EMS.
PFD PERFORMANCE INDICATORS USED TO MANAGE AND REPORT ON EMS OPERATIONS COULD BE IMPROVED

The PFD’s measurement, use, and reporting of various performance indicators are not integral enough to operations to allow the indicators to be beneficial in managing for results. The City Controller’s Office observed that the department:

- utilizes a widely known measure — “response time” — as a key indicator of EMS results, but its definition is seriously flawed;
- reports key performance measures that lack context and are not tied to results; and
- generates performance data, which is sometimes incomplete and inaccurate.

PFD lacks an adequate system to monitor EMS performance because the City Administration does not require it. Consequently, managers of the PFD, as well as other City agencies cannot determine whether they are effectively, efficiently, and economically applying resources to achieve the purposes for which the resources have been furnished.

Although the PFD tracks and reports EMS response time, its definition of response time is imperfect for several reasons. To begin, PFD’s definition is not patient-centered. The definition reflects physical resource response; that is, travel time from dispatch until arrival at the scene. PFD’s definition excludes call processing and dispatch times (see Appendix II), which together can add minutes to the response. For example, the Controller’s Office sample, which effectively measured when the first transport unit arrived on scene, showed that, on average during fiscal year 2006, it took one minute 42 seconds before the FCC could physically dispatch an ambulance to the scene. Add yet the average 32 seconds that elapsed for call processing time at the PSAP in Police Headquarters, and the true EMS response time is more than two minutes longer than the average 0:07:09 response time reported in the City’s fiscal year 2006 Mayor’s Report on City Services.

Additionally, the PFD’s response time clock stops when any first unit arrives on scene, regardless of whether it is transport capable or more importantly, the most appropriate staffed and equipped ambulance to handle the incident. Again, the Controller’s Office observed a significant disparity in the computation of average response time reported by the PFD (0:07:09) versus its own analysis, which was based on when the first BLS or ALS ambulance unit arrived on scene (0:10:19).
Also missing from the PFD’s definition of response time is patient contact time. This time accounts for the elapsed moments that it takes for EMTs or paramedics to reach the side of the patient. The PFD’s CAD System does not capture this time, but in large cities with many high-rise buildings such as Philadelphia, this time can be significant.

Another flaw in the PFD’s measuring and reporting of response time involves the use of an average measure versus fractile. Fractile measurement occurs when an EMS operation establishes a response time goal (for example, 8:59) and then measure the level of compliance in meeting that goal (for example 90 percent of the time). In fiscal year 2006, for example, the PFD reported that on average it had any first unit on scene in just 7:09 from the time the FCC dispatched it. This average indicates that half were lower and half were higher. The reality is that the PFD could get a transport unit to the scene in less than seven minutes for just 36 percent of the incidents.

The City Controller’s Office also observed that the PFD does not tie its key performance measurements to outcomes. Of the five key EMS performance indicators that the PFD annually reports (see page 4 of this report), only two — Response Time and the Percent of Citizen Satisfaction with EMS Response — are customer focused and measure outcomes. These two and the other three— EMS Runs, EMS Gross Revenue Collections, and First Responder Runs— however, fail to demonstrate whether the PFD is achieving the desired outcome results of safeguarding the public and effectively responding to emergency medical incidents.

To illustrate the above point with some examples, knowing that the PFD responded to 209,654 EMS runs in fiscal year 2006 fails to provide an individual with knowledge of whether the department improved public safety or effectively responded to EMS incidents. In actuality, as discussed in an earlier section of this report, the growing number of EMS runs is contributing to the decreased effectiveness of PFD to respond timely. As another example, knowing that the department has been increasing the amount of gross revenues collected from EMS billings each year is also a measure of little use. Again, it yields little knowledge as to whether the PFD has improved public safety or the effectiveness of response to medical emergencies. In fact, the collection of EMS billings has no direct impact on PFD’s operation at all because the department never has access to these collections. Rather, the City commingles EMS revenues with all other general fund monies and they become just another funding source to support many city-operating departments.

Developing measures tied to results is an important tool for PFD managers. It provides them with the ability to keep score on the performance of
For management controls to be effective, it is essential that the underlying data that managers use to compute performance measures is complete, accurate, and reliable. Throughout this review, the City Controller’s Office observed instances of when data contained in the PFD’s CAD System was incomplete and inaccurate. For instance, about 46,000 or roughly 22 percent of the fiscal year 2006 EMS incidents lacked a component of time necessary for computing response time. One of the most frequent missing time component was “on-scene” time, but the call time was also often missing. The missing on-scene time, in many instances, was the result of EMTs or paramedics failing to transmit, via radio or their MDT, the time of arrival.

We also noted instances of when entries pertaining to times the FCC received a 9-1-1 call were inaccurate. This condition occurred, on average, for less than one percent of all EMS incidents.\textsuperscript{16} Inquiries of the PFD revealed the errors occurred because of a glitch in the interaction between the 9-1-1 telephone and CAD systems. If the 9-1-1 dispatcher taking the call activated the call-received key of the CAD too quickly, before the telephone system cleared information from a prior call, the CAD would record the time of the previous 9-1-1 call. Consequently, the resulting response time, when computed, was incorrect.

Measuring and reporting on performance is not a new concept. Many cities in the United States have initiated performance measurement systems and city managers use them routinely in monitoring operations for which they are responsible. Two cities in particular, that we surveyed — Houston and Austin in Texas — appear to have been very successful initiating such systems. For example, to help track the quality and effectiveness of the EMS system, the Houston Fire Department monitors the survival rates of cardiac arrest patients it transports to hospitals. The Fire Department in Houston believes that performance measures such as cardiac arrest survival rates (clinical outcomes) are a more accurate indicator of performance than the often misused or misinterpreted response time measure.

Mayors and executive staff of cities that have adopted performance measurements generally tend to be supportive of the development of measurement systems. Unfortunately, the executive leadership in

\textsuperscript{16} In computing response times, the City Controller’s Office eliminated these incidents because it became extremely labor-intensive for the PFD to research the correct call times. The errors were generally distinguishable because of their exceedingly long call processing time — six minutes and over.
Philadelphia has not yet demanded that its managers measure the performance of their agencies and tie this performance to results. For this reason, City agencies such as the PFD do not measure the outcome of their programs and services. Until the executive leadership of Philadelphia mandates and supports establishing a performance measurement system, it will not come to fruition.

The EMS System of the PFD exists to safeguard the public. Achieving that purpose, and doing it economically and efficiently is the job of PFD management. Management achieves the purpose of the EMS program by using an appropriate number of equipped and staffed ALS and BLS ambulances and “first responders.” Accordingly, selection of the appropriate level of units is important in achieving the desired outcome result, which is presumably that of saving lives.

Measuring performance provides management with a tool for achieving the desired results; and, in our opinion, is one of the most basic jobs of managers. Without it, management cannot adequately account for whether the PFD’s EMS System is accomplishing its purpose. Moreover, the City administration cannot effectively budget and fund fire and EMS services.

The findings of this report, which the Controller’s Office developed by using performance measures, suggest the resources used for the EMS program in Philadelphia are seriously strained. PFD management needs the support of the City administration to take immediate corrective action.
SUGGESTIONS FOR BETTER MONITORING EMS PERFORMANCE

Opportunities exist to improve the PFD’s (as well as other City agencies) measurement, use, and reporting of performance results. Although for this report the City Controller’s Office focuses on recommendations specific to EMS operations, the Administration can apply the concepts across all City departments, boards, and agencies. We strongly encourage PFD management and the City Administration to develop accurate performance information, which should be used and presented in a meaningful manner to enable all stakeholders to make more informed decisions about how resources are being applied. In achieving an effective measurement system for its EMS function, we recommend that the PFD:

- **Affirm the mission and purpose of the EMS operations [21106.13].** In accomplishing this recommendation, PFD management must determine the need or needs that the EMS program must meet, along with the intended target population. The purpose of the EMS program is important because the measurements chosen to measure results should be associated to the mission and purpose of the program. The intended needs are significant because they will drive the measurements selected to assess how well the needs are being delivered. Finally the intended population is important to assess the extent of need and whether only those intended are being served by the EMS program.

- **Identify intended users and uses of performance information [21106.14].** Users of EMS performance information, which may include, for example, City Council members, the mayor and his executive staff, the PFD Commissioner, managers, and employees, as well as special interest groups and the public, know best what measures they find helpful. Members of City Council and the mayor need measures that provide them with the “big picture,” whereas managers at operating levels want measures in more detail. As to the uses of performance information, there are a number of them, which include accountability, management control, budgeting and funding, decision-making, and continuous improvement, that is, identifying opportunities for improvement.

- **Identify what to measure [21106.15].** Management should identify measures related to the mission, goals, and objectives of the EMS program. Identifying what other cities use to measure EMS performance and then sitting down with the intended users of those measures in Philadelphia should enable PFD to reach a consensus on what to measure. Measurement areas should focus on the resources applied, the work produced and/or services delivered, and the results achieved.
• **Develop performance measures [21106.16].** Once management has identified what aspects of performance to measure, it will need to develop a measurement system. This will require it to (1) select a feature to measure and a unit of measure (for example, the number of EMS runs, full response time, UHU, the cardiac survival rate); (2) identify the data needed and its sources; (3) establish a method for collecting the data, and (4) prepare the measures. In developing performance measures it is also important that the underlying data be accurate, complete, and reliable.

• **Choose benchmark comparisons [21106.17].** When measuring performance, management needs to choose a comparative benchmark that provides users with information to judge the adequacy of measured and reported performance. Only showing a current level of performance, such as average EMS response time, is insufficient, as it provides no criterion to assess whether the level of performance is satisfactory. Common types of benchmarks include: trend data, goals and targets, accepted norms and professional standards, intra-program comparisons, external entities, and customer expectation and desires.

• **Identify needed explanatory information [21106.18].** Explanatory information — such as background information, what the measures show, reasons for changes in performance, and the consequences of good and poor performance — is essential when management reports on performance, especially to external users. It provides users with the necessary information to interpret the measures.

• **Report the measured results [21106.19].** PFD management and the City administration, needs to find the best way to present EMS and other agency performance results. It should consider an appropriate combination of graphs, charts and other forms of visual aids so that users who may not be skilled or comfortable with numbers are motivated to read and interpret the data.
This report, initiated under the Office of the Controller’s authority to examine city operations under Section 6-400 of the Home Rule Charter, provides information on the effectiveness of the PFD’s response time to 9-1-1 calls for medical emergencies. In our opinion, response time is but a single indicator that measures the effectiveness of an EMS System. Other more clinical indicators, such as the survival rate of cardiac arrest patients or the rate of intubation success are also valuable in judging the overall effectiveness of the system.

The Controller’s Office was unable to evaluate the more clinical performance indicators among patients transported by PFD ambulances because the department does not accumulate such statistics. Moreover, we were precluded from developing our own measures because the department would not allow us access to its patient care records, asserting that these records were protected health information under the Health Insurance Portability and Accountability Act (HIPA). Such records would have been useful in identifying patients with serious emergency conditions that we then could have pursued to determine a clinical-type outcome.

Accordingly, the Controller’s Office focused on response time, which EMS experts point to as being the most widely used operational measure to assess system performance from a user’s perspective. Research indicates that EMS customers generally perceive value in a rapid intervention of someone in need of medical assistance. According to experts, long response times often negatively affect scene interactions and perceptions of care. They are frequently the cause of public complaints.

While no universally accepted response-time system requirement exists, we utilized eight minutes and 59 seconds (8:59), with 90 percent compliance reliability measured on a fractile, not average, basis. Fractile response time measurement includes a reliability factor (90 percent) and measures all time intervals between the time the 9-1-1 communication center receives a call and the time a properly equipped and staffed ambulance arrives on the scene.

We used the 8:59 target for two reasons: (1) it is the most widely used ambulance response-time standard, and (2) it is consistent with the response time recommended by the National Fire Protection Association (NFPA) when adjusted to include a one-minute call-processing time.

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17 This benchmark is the recommendation of Jay Fitch, PhD., an expert in EMS/public safety organizations, who has written several articles for the Journal of Emergency Medical Services publication.

18 See NFPA 1710, §5.3.3.4.2 which requires communities to “provide for the arrival of an ALS company within an eight minute response time to 90 percent of incidents. The NFPA standard excludes call-processing time intervals.
In evaluating the effectiveness of the PFD’s response time to medical emergencies, the Controller’s Office considered the entire time-line of events that can impact a 9-1-1 incident as illustrated in Appendix II. Our overall objectives for the review were (1) to determine the frequency with which the PFD “first responders” and ambulances meet the 8:59 criterion in responding to 9-1-1 medical calls for help, (2) to find out the causes of not meeting the criterion if significantly less than 90 percent, and (3) to develop recommendations for needed corrective action.

Additionally, as part of this review, we examined the PFD’s practices for monitoring and reporting on EMS system performance. Our objective was to determine whether key performance indicators being used to manage EMS operations were comprehensive for assessing accountability and achieving results.

To gain an understanding of the entire EMS process, we observed operating procedures at both the City’s PSAP located at Police Headquarters and the FCC, located at the Fire Administration Building. We surveyed management and staff at both facilities as to communication and dispatch protocol. We also interviewed PFD management, paramedics and EMTs located at various fire stations throughout the City.

To determine the frequency with which the PFD “first responders” and ambulances meet the 8:59 benchmark in responding to 9-1-1 medical calls, we requested and obtained the PFD’s computer assisted dispatch (CAD) files for fiscal years 2002 through 2006. We engaged the accounting firm of Goldenberg Rosenthal, LLP to compute response times (T-1 through T-5 as defined in Appendix II) for the entire universe of medical emergencies shown in the CAD files and then determine the frequency (reliability factor) with which PFD met the benchmark.\footnote{We had Goldenberg Rosenthal, LLP compute actual frequency rates of response times for “first responder” Engine and Ladder Companies, for fiscal year 2006 only. The firm computed the actual rates of response time for ambulances, for fiscal years 2002 through 2006.}

The firm did this work using computer-assisted audit tools (CAAT).

In computing the response times and frequency with which the PFD met the 8:59 benchmark, Goldenberg Rosenthal first identified the number of incidents classified as medical emergencies (vs. fire emergencies). It used this population of incidents to compute response times. Because with any given medical emergency call there may be more than one ambulance to begin a response,\footnote{Frequently, ambulances that initially respond and are en route are subsequently directed to stop responding because a closer ambulance becomes available. Additionally, for some incidents there may be multiple patients requiring transport to a hospital.} in computing response times, we directed Goldenberg to use the response time of the first ambulance to arrive at a hospital with a
transported patient. We believe this approach yielded the fairest assessment of the department’s best effort to respond to a call for assistance with the most appropriate ambulance.

Additionally, in computing response time for medical emergencies, the scope of our work was restricted because thousands of CAD records contained errors. Some records contained errors in the call-times, while others failed to show an on-scene entry for the incident. Additionally, in computing response times, we eliminated from the analyses those EMS incidents involving no ambulances. Table 4 shows a summary of the number of incidents used to compute response times in our work:

**Table 4: Number of Incidents Used to Compute Response Time**

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total CAD incidents</td>
<td>286,572</td>
<td>281,001</td>
<td>276,661</td>
<td>288,358</td>
<td>266,767</td>
</tr>
<tr>
<td>Less: CAD incidents classified as fire response</td>
<td>77,658</td>
<td>74,469</td>
<td>75,897</td>
<td>72,909</td>
<td>78,504</td>
</tr>
<tr>
<td>Unique incidents identified as medical</td>
<td>208,914</td>
<td>206,532</td>
<td>200,764</td>
<td>215,449</td>
<td>188,263</td>
</tr>
<tr>
<td>Incidents with call-time errors</td>
<td>-2,789</td>
<td>-1,335</td>
<td>-609</td>
<td>-698</td>
<td>-659</td>
</tr>
<tr>
<td>Incidents involving no ambulance</td>
<td>-16,413</td>
<td>-15,295</td>
<td>-18,119</td>
<td>-17,487</td>
<td>-13,111</td>
</tr>
<tr>
<td>Unique incidents involving an ambulance</td>
<td>189,712</td>
<td>189,902</td>
<td>182,036</td>
<td>197,264</td>
<td>174,493</td>
</tr>
<tr>
<td>Unique incidents with record errors</td>
<td>-45,617</td>
<td>-42,881</td>
<td>-43,194</td>
<td>-64,221</td>
<td>-47,974</td>
</tr>
<tr>
<td>Unique incidents used for computing response time</td>
<td>144,095</td>
<td>147,021</td>
<td>138,842</td>
<td>133,043</td>
<td>126,519</td>
</tr>
</tbody>
</table>

Source: Office of the City Controller based on the PFD’s CAD file.

To find causes that contributed to significant delays in response time, the City Controller’s Office examined the workload of ambulances and analyzed the trend in EMS call volume for the past five years through fiscal year 2006. In addition, we selected a random sample of 240 EMS runs made during fiscal year 2006. Prior to making our selection we stratified the population of runs into two subsets: (1) ambulance runs made in under nine minutes and (2) those that took longer. We selected EMS runs from each subset to ensure that both groups would be adequately represented in our purview. For each EMS run sampled, we obtained its CAD data record and computed the elapsed time from one T-event to the next (T1 to T-2; T-2 to T-3, T-3 to T-4….). We compared the actual elapsed time from one T-event to the next against its criterion as portrayed in Appendix II. Then for each segment of elapsed time, we computed the percentage of EMS runs that met the criterion. We present a summary of these results in Table 5 on the next page.
Table 5: Summary Characteristics of Sampled EMS Incidents for Fiscal Year 2006

<table>
<thead>
<tr>
<th>(hours:minutes:seconds)</th>
<th>FCC 9-1-1 Call Processing</th>
<th>Dispatch Time</th>
<th>Chute Time</th>
<th>Travel Time</th>
<th>On-Scene Time (Patient Treatment)</th>
<th>Transport Time to Hospital</th>
<th>PCR Prep &amp; Restocking Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average elapsed time</td>
<td>0:00:42</td>
<td>0:01:00</td>
<td>0:01:45</td>
<td>0:6:51</td>
<td>0:11:00</td>
<td>0:09:42</td>
<td>0:28:55</td>
</tr>
<tr>
<td>Shortest elapsed time</td>
<td>0:00:08</td>
<td>0:00:00</td>
<td>0:00:02</td>
<td>0:00:10</td>
<td>0:01:23</td>
<td>0:00:00</td>
<td>0:00:06</td>
</tr>
<tr>
<td>Longest elapsed time</td>
<td>0:03:56</td>
<td>0:11:58</td>
<td>0:10:51</td>
<td>0:29:45</td>
<td>0:42:24</td>
<td>0:32:52</td>
<td>0:53:20</td>
</tr>
<tr>
<td>Benchmark time (see Appendix II)</td>
<td>0:00:35</td>
<td>0:00:25</td>
<td>0:00:45</td>
<td>0:07:14</td>
<td>0:15:00</td>
<td>0:00:00</td>
<td>N/A</td>
</tr>
<tr>
<td>Average above (below) benchmark time</td>
<td>0:00:07</td>
<td>0:00:35</td>
<td>0:01:00</td>
<td>(0:00:22)</td>
<td>(0:04:00)</td>
<td>N/A</td>
<td>15.00</td>
</tr>
<tr>
<td>Percentage achieving benchmark time</td>
<td>52.44%</td>
<td>25.51%</td>
<td>18.11%</td>
<td>64.78%</td>
<td>74.79%</td>
<td>N/A</td>
<td>8.23%</td>
</tr>
</tbody>
</table>

Incident count¹²

| Incident count² | 246 | 244 | 243 | 246 | 242 | 241 | 243 |

Source: Prepared by the Office of the City Controller based on the fiscal year 2006 CAD database.

¹No benchmark time has been established for this interval

²Incident counts vary because the times needed to compute the intervals were not always indicated in the PFD CAD.

N/A – not applicable

It was impractical to research every run to determine the specific conditions that may have given rise to a response time that met or extended beyond the criterion target. Therefore, to understand conditions that cause elapsed times to be significantly longer or shorter than expected, the City Controller’s Office held focus-group meetings with paramedics and EMTs. The purpose of these meetings was to identify systemic procedures that may be contributing to good or poor performance. We selected participants for the meeting by first randomly selecting 100 employees from each of the two groups (EMTs and paramedics). We sent each of the sampled employees an invitation to participate in the group meetings. We then invited the first nine respondents from each group to participate in the focus group.

To identify any systemic procedures that may be affecting performance of the call processing and dispatch processes, we surveyed dispatchers at the FCC. We sent all 48 dispatchers a survey questionnaire and received five responses.
To aid us in developing recommendations, we performed research on best practices. This research consisted of a review of professional articles written by EMS experts, as well as telephone interviews with some of the experts. We also conducted a survey of EMS operations in other major cities that included Austin, TX; Houston, TX; Miami, FL; Seattle, WA; Phoenix, AZ; Baltimore, MD; Columbus, OH; and Memphis, TN. When necessary, we contacted individuals who had completed the surveys for further clarification of their responses.

To determine whether key performance indicators being used to manage EMS operations were comprehensive for assessing accountability and achieving results, we identified the measures routinely used by PFD management and compared these to measures recommended by EMS experts. We did not audit any of the PFD’s reported indicators for accuracy, reliability, and completeness.

We performed our work from September 2006 through November 2007 in accordance with Government Auditing Standards issued by the Comptroller General of the United States. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.
Components of Response Time

<table>
<thead>
<tr>
<th>T-Time</th>
<th>Description of Interval</th>
<th>Elapsed Benchmark Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-0 to T-1</td>
<td>The length of time a 9-1-1 call is received at the PSAP to transfer to the FCC</td>
<td>&lt;30 seconds (90% reliability)</td>
</tr>
<tr>
<td>T-1 to T-2</td>
<td>Elapsed time from phone ring at FCC until call appears on the dispatcher’s computer screen. Includes the length of time the phone rings before FCC call-taker picks up, elapsed time to verify incident location and nature of the call, and transfer of call details to the dispatcher’s screen.</td>
<td>&lt;35 seconds (90% reliability)</td>
</tr>
<tr>
<td>T-2 to T-3</td>
<td>Elapsed time between the call appearing on the dispatcher’s screen until dispatched to the ambulance</td>
<td>&lt;25 seconds (90% reliability)</td>
</tr>
<tr>
<td>T-3 to T-4</td>
<td>Elapsed time between the ambulance receiving the call and going enroute to the call.</td>
<td>&lt;45 seconds (90% reliability)</td>
</tr>
<tr>
<td>T-4 to T-5</td>
<td>Time elapsed from ambulance going en route until arrival at the incident scene (travel time). Includes actual travel time from starting location to point of final destination (stopping at location of the incident).</td>
<td>&lt;434 seconds (90% reliability), Total T-1 to T-5 elapsed time 8:59 (90% reliability)</td>
</tr>
<tr>
<td>T-5 to T-6</td>
<td>Elapsed time between the ambulance arrival on the scene and departure for the hospital. Includes the length tending to the patient’s needs and preparing for transport to the hospital.</td>
<td>&lt; 15 minutes (90% reliability)</td>
</tr>
<tr>
<td>T-6 to T-7</td>
<td>Elapsed time between the ambulance departure from the incident scene and arrival at the hospital.</td>
<td>No established benchmark</td>
</tr>
<tr>
<td>T-7 to T-8</td>
<td>Length of time between the crew’s arrival at the hospital and their availability for additional assignments.</td>
<td>&lt; 15 minutes (90% reliability)</td>
</tr>
</tbody>
</table>

21 Fitch, J, PhD, “Strategic Deployment: Two Decades of Experience Provide Important Lessons on How to Deploy Emergency Resources” (JEMS, February 2002)
December 18, 2007

Mr. Alan Butkovitz  
City Controller  
City Controller’s Office  
1230 Municipal Services Building  
1401 John F. Kennedy Boulevard  
Philadelphia, PA 19102

Dear Mr. Butkovitz:

I begin this letter by thanking you and your staff for the detailed and thorough assessment of the Philadelphia Fire Department’s (PFD) Emergency Medical Services (EMS) response effectiveness. Obviously, the PFD does not currently have the resources to conduct such an audit. Your staff was courteous during their conduct of this analysis and took great effort not to disrupt our ability to provide life-saving emergency responses to those citizens who needed the PFD’s services. The PFD administration also appreciates your acknowledgement that the leadership of the PFD “has done an outstanding job at minimizing the extent of death, harm, and property loss resulting from fire.” This has only been accomplished through the efforts of our dedicated men and women who also deliver Emergency Medical Services with the same level of commitment.

The title of this report “Strained Resources are Major Impediment to Responding Timely” accurately describes the reality the PFD has been confronted with for several years, increasing demand and static resource levels. The current PFD leadership with the support of the Mayor and City Council was able to add much needed resources – 5 peak hour Medic Units- in fiscal 2006 that have had a significantly positive impact on service delivery as indicated by the improved UHU measurement. While the PFD is grateful for the additional resources, as your report clearly indicates, other changes in various areas can assist in improving service delivery.

I have reviewed your recommendations to improve the “effectiveness of the PFD’s response to medical emergencies” and discussed them with my staff. I am pleased to report that some of the recommendations reflect changes or processes that the Department has already adopted. Other recommendations have been previously identified by PFD management as potential solutions but will require additional collaboration with the administration, other city agencies, and the Firefighters/Paramedics Union, IAFF Local 22 to achieve successful implementation.
City Controller’s Office  
December 18, 2007  
page 2

In regards to the possibility of improving EMS service delivery, while it is important to note that your report acknowledges the “difficulty PFD management will encounter unless the underlying cause- a lack of financial resources” is addressed, we recognize that other factors could also alleviate the demand for service thereby diminishing the need for a substantial funding increase. However, the PFD management team will continue to seek additional financial operating resources while remaining open to making modifications to a system that has changed dramatically in recent years. As you point out, improving outcomes in service delivery will likely require a reallocation of resources, increased funding, or changes in the policies regarding the delivery of EMS. 

This report will be shared with all members of the department to start a discussion at all levels to ensure that all PFD personnel see the Department as it is viewed by others. It is also hoped that this discussion will help bridge the “cultural gap” that also acts as an impediment to improved service delivery and employee morale. 

It is my intention to use this report as a guide to measure the progress of the PFD to meet the challenges of effectively and efficiently delivering high quality EMS to all who dial 9-1-1 and rely on the appropriate response to their call for help. 

My responses to specific areas of the report are attached.

Sincerely, 

[Signature] 

Lloyd Ayers  
Fire Commissioner

Attachment: Philadelphia Fire Department - Management Response To Controller’s Assessment
# Philadelphia Fire Department

## Management Response to Controller's Assessment

### First Responder Response is Timely
The administration views the "first responder" program as a vital component of the service delivery system and will continue to support and enhance this segment of service delivery from the 90 units deployed strategically throughout the city. The 94 percent rate of achieving the standard is a key indicator of the Department's ability to get life-saving resources to the scene quickly.

### Ambulance Response Growing Worse
This assessment does not balance the indications that while an ambulance may have extended response times in some cases, where delays are anticipated the system compensates with "first responder" companies that have an excellent record of achieving the standard 94 percent of the time. As this report expressed and outcome results analyzed by the Department indicate well over half of the PFD's responses are deemed non-emergency after units arrive on scene. PFD statistics place the percentage of true ALS responses at about 20 percent of all EMS responses. The early intervention of BLS services provided by "first responders" is certainly one way to deliver needed service cost effectively.

### Impact of Slower Ambulance Response
PFD management believes that the value of "first responder" companies cannot be discounted in a system that has such a high level of BLS and non-emergency responses. The PFD is precluded from providing access to individuals' health information without written consent as per the HIPPA laws to persons not authorized. This position was not taken to in any way impede a thorough analysis of the EMS system.

### Why Ambulance Response Time Has Worsened
Many changes have occurred since the time frame utilized for the Controller's Report. Many of the changes have been implemented specifically to reduce the stress and fatigue levels of paramedics while also reducing the Department's reliance on overtime. Additionally, steps have been taken to recruit and ensure that adequate levels of paramedics who are residents of the city are available in the near future. The Department has forged relationships with all area paramedic training facilities and has identified 40-45 individuals scheduled to graduate at various times during 2008 who have expressed an interest in working for the City of Philadelphia, PFD, EMS. The Department has also helped the School District of Philadelphia develop and institute a Fire and EMS curriculum which is anticipated to begin producing graduates in 2008.

### Too Few Transport-Capable Ambulance Units
PFD management bases each ambulance's UHU on the actual number of hours that the unit is available to deliver service.
PHILADELPHIA FIRE DEPARTMENT
MANAGEMENT RESPONSE TO CONTROLLER’S ASSESSMENT

This is unlike the results utilized in the Controller’s report which bases the final UHU on the potential number of hours all ambulances could have been available to deliver service. By measuring in the manner it does, the Department is able to obtain actual data that assists in the decision making process regarding deployment and staffing.

The PFD’s target UHU is 0.65 or less with the current level of resources. An evaluation of the system on days where the average UHU is 0.65 or less indicates that rarely does the number of calls out pace the number of units available.

While the Controller’s Report indicates that the UHU used for the report is 0.42, it makes no reference to the demographics of the selected cities in comparison to Philadelphia in terms of an aging population and a population where approximately 25 percent of the residents exist below the poverty line.

Additionally, the Controller’s report indicates the target UHU other cities and some experts cite as acceptable, however, there is no mention in the report on the actual UHU’s achieved in any other city, and more specifically any city that matches Philadelphia’s demographics.

Low Morale Causing Discontent and Increasing Turnover

The PFD leadership is aware of the “cultural gap” that exists and has taken steps to limit the causes of negative feelings. These steps have included joint training, incident command training and forums specifically to provide paramedics an opportunity to air their grievances with management. Paramedics are relatively new in the PFD considering the long history the department has in being strictly a fire based emergency system. The Department will continue to ensure that greater opportunities exist for paramedics to fully integrate themselves into the PFD.

As indicated in the report the number of unfilled paramedic positions has diminished and as stated earlier, management recognizes the issues surrounding the residency requirement and has taken steps to overcome the shortage of paramedics in ways that meet the residency rules.

Indirect Access to 911 for Medical Emergency Adds Time to Response

In many instances the placement of a 911 call involves an incident which requires a dual response of both Police as well as a Fire / EMS unit. In a number of cases Police are requested to respond to provide security for an EMS unit in an unsafe environment.
PHILADELPHIA FIRE DEPARTMENT
MANAGEMENT RESPONSE TO CONTROLLER’S ASSESSMENT

It is therefore necessary for Police to initiate the interview. Police Standard Operating Procedure (SOP) dictates that as soon as a dispatcher establishes the incident is a Fire or EMS emergency, the call should immediately (32 sec. avg.) be transferred to the FCC. The Police dispatcher remains on the line until a determination is made as to a Police presence being required. Having a conference format for the interview process expedites the dual dispatch of both agencies.

In instances where a caller disconnects, SOP dictates the Fire dispatcher ascertain the location and nature of the incident from the Police Dispatcher, processes the incident for dispatch, and then would attempt to call back the caller for follow up information or pre-arrival instructions.

Incident location verification is required in the interview process. Simply stated, the caller may be reporting an incident at a location different from their physical location. For cellular calls the FCC currently receives Phase1 information (cell tower location); Phase2 location information will be present in a new CAD. However, if the FCC dispatcher requires this information, they can request it from the Police dispatcher on the line who is receiving Phase2 information at this time.

Due to the inherent emergency nature of a 911 call, in many instances callers are unable to articulate, or are uncooperative in being able to describe the incident. The FCC utilizes a nationally recognized, medically structured, and scripted screening program, known as the APCO Emergency Medical Dispatch Guidelines. This interview system uses customer service, calming oriented techniques in an attempt to elicit the condition of the patient, symptoms involved, and the basic nature of the event. This PFD call taking program, in use since 2000, has been submitted, approved, and certified by the State of Pennsylvania’s 911 overseeing authority, PEMA.

All dispatchers receive intensive, initial APCO training and certification. PEMA / State certification is also required for every dispatcher. Ongoing certification requires participation in the FCC’s continuing education program.

Again, with a police dispatcher involved in the interview process, if a security issue is detected, a Police response to the incident will be requested. In the report, statistical representations indicate a 45% increase in total runs 1999 through 2006.
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Call Volume, High
Turnover, and Frequent
Understaffing Plague the
FCC

The issue of the Fire Communications Center staffing is a condition not unique to the PFD. Personnel staffing and retention concerns are an issue across the nation, in jurisdictions small and large, through both Police, Fire, and EMS agencies. This fact has been recognized by the Fire Department for many years, and a number of unsuccessful attempts to bring about a schedule change has occurred in the past. The current PFD Administration successfully implemented this critical change on June 18, 2007. An innovative 12 Hr., steady shift schedule is now in place, currently in a pilot status, and under on-going review to evaluate staffing and performance factors. It is anticipated that this more attractive schedule will promote a higher retention rate, reduce sick usage, and promote a healthier, less stressful work atmosphere for dispatchers. The actual number for FCC dispatchers is 44. Currently the FCC has 40, with 4 vacancies. The Personnel Department has been attempting to secure a new trainee class of 6 dispatchers. This number will take into account the fact that 40 to 50% of new hires will not pass the probationary training requirements.

The report includes the subjective observations of some paramedics and EMTs to assess the experience level and performance of dispatchers. The report does not evaluate the APCO EMD program, or the FCC’s formalized training programs and processes as a measure for acceptable experience levels.

The report speaks to a turnover rate of 100% over the past 6 years. It is unknown how this calculation was derived. The great majority of the turnover occurs in the initial probationary period for trainees. This is in fact due to the stringent training requirements in place as a prerequisite to being placed in the 911 environment. The current longevity period for FCC personnel is at an acceptable experience level. For dispatchers, 27.5% have over 10 yrs. experience, 10% have 5-10 yrs., 42.5% have 2-5 yrs., and 20% 2 yrs. and under. Supervisory personnel have an average of 20 yrs. experience, and management personnel 27.5 years. Trainees now comprise 17.5% of FCC staff (not 26%).

Table 3 (pg.18) of the report does not accurately depict the current schedule/shifts. The in place FCC schedule has two shifts, 7am-7pm & 7pm-7am. Both shifts have a desired staff level of 1&9, minimum level of 1&7.
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Research, planning, and the development of the new schedule began in September, 2005. This process involved the extensive development of work rules and regulations, in negotiation and consensus with the Union and FCC members. Details were finalized in the spring of this year, and the schedule implemented on June 18, 2007. The necessity to make recommendations for appropriately staffing the new shifts has been identified. It was thought to effectively accomplish this, the initial pilot period of implementation should begin with the same staffing level in place as the old schedule. This was done to accurately analyze personnel needs by comparison, as well as operational factor changes.

Although a medical call does involve additional questioning, the scripted APCO EMD program is specifically designed to expedite the triage and dispatch determination process. This is not evaluated in the report.

The FCC does employ optimal as well as minimum staffing levels, to address requirements in a live, 24x7, 911 environment. It is felt that excessive sick usage, associated with the previous schedule, contributed significantly to optimal levels not being in place. Additionally, it is felt that more aggressively filling FCC vacancies will more positively contribute to optimal levels being achieved.

Lack of Priority Dispatch System
Impedes PFD from Timely Responding With the Most Appropriate Ambulance Unit

The PFD does prioritize EMS calls based on the APCO call screening program currently in place. When processed, a response or resource configuration is immediately assigned and dispatched. This decision is rooted in the premise that the exact nature and precise severity of a medical incident may not be fully discernible based on a conversation over the phone. The interview process is strictly designed to ascertain the condition of the patient, elicit symptoms involved, assign a chief complaint, and provide pre-arrival instructions if required. Only EMS personnel physically on scene can fully determine the exact nature and severity of an event.

Additionally, once an incident is dispatched, dispatchers and FCC supervisory personnel have complete latitude and discretion to alter or make changes to resources assigned to an incident based on conditions that may present.

Inadequate Technology Impedes Timely Ambulance Dispatches

The report states that the CAD system’s recommendation of a unit for dispatch “is generally of no use.” This is an inaccurate statement, in that the CAD recommendation is consistently and primarily used as the dispatch selection method,
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even though dispatchers enjoy the latitude of altering a
dispatch.

Currently, GPS is a stand alone application that is not meant to
be a dispatch tool for dispatchers, but rather serves as a tool for
the supervisor when the status and location of a medic unit is
in question, and radio communications are unsuccessful. A
GPS-CAD integrated solution to make response
recommendations has been identified as a specification in a
new CAD.

The PFD continues to evaluate and take innovative measures
to alleviate excessive radio communications. For example, in
March of this year the Department implemented a policy
where all Medic units communicate their routine status
changes electronically via their MDT’s to CAD. In April of
2005 the Fire Department constructed a third medic console
within the FCC. This position is now staffed when the
Department participates in Special Events which require
staffing of additional EMS special operations resources,
transport vehicles, and supervisors. This position is staffed
when additional units are deployed to the 911 system.
Transmissions such as HASTE, and Police requests are a very
necessary function, and fundamental to establishing a radio
communications system.

Ambulances Not
Equipped with Adequate
GPS

Although an electronic directions application is a desirable
future upgrade, the in place procedure, utilizing pre-assigned
ADC map grids to Box locations, is currently available to units
and provides an expedient process for gaining directions.

Resources Have Not
Kept Pace with
Changing needs of The
PFD

The PFD has increased the number of units, when possible,
based on available resources.
The administration attempted to address the changing
environment that the Fire Department is facing. The nature of
response calls had changed drastically since fiscal year 1990.
While structural fires were significantly reduced, from
approximately 4500 in Fiscal Year 1990 to 2141 in Fiscal Year
2006, emergency medical service (EMS) runs increased from
just over 100,000 runs in Fiscal Year 1990 to 209,654 in Fiscal
Year 2006. These numbers supported the decision of City
officials to shift resources from fire service to emergency
medical service. The fiscal health of the City requires that we
manage our existing resources efficiently, before we conclude
that the addition of resources is always the correct answer. In
an environment where we are concerned about the tax burden
placed on our residents, we owe it to the citizens to manage
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resources in the most effective manner possible. Not to do so
would be irresponsible on the part of this administration and a
disservice to the citizens of Philadelphia.

Our restructuring plan indicated that we would be replacing
four engine companies and four ladder companies with eight
medic units to meet the increasing demand on emergency
medical services. The Commissioner and Deputies of the
Philadelphia Fire Department completed a meticulous analysis
committed to ensuring that the closure of fire ladder and
engine companies would not affect service quality or
firefighter safety. Geo-coded maps were created that detailed
the location of all engine and ladder companies, and the
volume, distance and response time for calls. Fire Department
management used these maps to select the appropriate
companies for restructuring, to insure the restructuring would
not impact service or safety. The closures would not leave any
areas of the city unprotected; boundaries for each region have
been reconfigured to accommodate the closings and insure that
there is adequate and safe coverage. These closures would not
affect the number of companies and personnel responding to a
call, and the Fire Department would still meet the standard for
response time established by the National Fire Protection
Association for fire service.

While the plan was not implemented, the City was able to
work with City Council to add additional medic units. Four
medic units were added in Fiscal Year 2007 to help manage
the increasing demand of medical service calls. This was a
start to address the increasing demand, but we recognize that
more attention must be given to shifting resources within the
Fire Department to effectively address the burden on
emergency medical services.

Increase the
Number Transport-
Capable Ambulance
Units

The Department continues to analyze the key measurement of
UHU and will continue to strive to achieve a UHU of 0.65.
With the increase of Transport-Capable Ambulance Units in
fiscal 2006, the PFD experienced a decline in the UHU to 0.75
in the second half of fiscal 2007 (01/01/07-06/30/07).

Additional deployment modifications implemented in fiscal
2008 show an even more dramatic improvement. During the
first 23 weeks of fiscal 2008 the Department has achieved an
average UHU of 0.66.

PFD management will continue to seek additional revenue to
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expand as many units to 24/7 operation as needed to improve service delivery. A detailed cost analysis indicates that the full cost of initially staffing a full-time ALS ambulance is approximately $916,000 dollars. Therefore, it should not be ignored that to increase the PFD’s fleet of ambulances to 65 as suggested in the Controller’s report would initially cost approximately 20 million dollars with annual recurring expenses of 15 million dollars.

The PFD leadership recognizes that achieving this level of staffing would require a huge commitment from a City budget that is already strained. An analytical assessment of the number of resources needed during the hours of midnight to 0800 hours would indicate that this would not be a fiscally prudent utilization of limited financial resources.

Revised to the Extent Possible, the PFD Policy Providing a Response to Every 9-1-1 EMS Call

To revise the PFD response policy will require considerable input from the appropriate medical authorities as well as the City’s Law Department. The implications of changing the response criteria without a replacement resource available could prove quite detrimental to the citizens, the City and the PFD.

The related additional measures in this section all appear achievable but clearly will require the support of the Administration to implement. These items include implementing a 3-1-1 system and also enforcement of State Statutes. MOIS is currently laying the groundwork for a 3-1-1 system in Philadelphia.

Address the Growing Discontent Among EMS Personnel

The PFD has been addressing the “cultural gap” identified in several ways. The Fire Commissioner meets weekly with the Medical Director to stay abreast of current trends and specific issues impacting on EMS in general. The Deputy Commissioner for Operations meets jointly each week with the Medical Director and the Chief Officers and supervisors of EMS to assess conditions, identify problems, and develop solutions to day-to-day operational issues. This group also looks for longer term solutions that are within the control of the Department and that can have an impact on the individuals charged with delivering the life-saving medical interventions so many people rely on.

Additionally, there have been State of the Department meetings and others are planned in the future to improve this situation.
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All Chief Officers have had the opportunity to make budgetary recommendations and will always be included in the process to the greatest extent possible.

However, it is worth noting that more than 90% of the PFD budget is for salaries and there are strict mandatory staffing requirements for firefighters.

Deal With the Current Shortage of Paramedics

The Department is aggressively addressing the issue of paramedic recruitment in several ways. The Department worked with Central Personnel in 2007 to develop new hiring timelines that ensure there will be no waiting period for new paramedics to enter the Department. In this manner, smaller classes will be conducted as individuals become eligible. The Department has also increased its recruitment efforts with the area training centers and anticipates that in 2008 there will be upwards of 45 individuals potentially eligible to gain employment with the PFD.

The additional recommendations, such as dual staffed units (1 paramedic/1 FF EMT) has been discussed and is viewed as a possibility. The residency requirement is beyond our authority to reintroduce and will need the support of the Administration.

The Department has looked at the feasibility of Paramedic Engines and sees this as a real possibility if it is implemented appropriately. However, while this would get ALS service to the scene more quickly via the First-Responder Program, it does nothing to increase the most needed resource, as identified in the Controller’s report, units capable of transporting sick/injured individuals to a medical facility.

Determine the Feasibility Of Consolidating 9-1-1 Communications Operations

The feasibility of a joint 9-1-1 communications center has been discussed at the MDO level and may be a reality in the future but is not likely to be something that will provide any immediate relief to the current system.