EXECUTIVE SUMMARY

Between November 1996 and April 1997, the New York City Fire Department initiated four major experiments in Emergency Medical Service (EMS) ambulance deployment and dispatching. At least three of these experiments failed and have been entirely or partially discontinued – but not before ambulance response time was seriously compromised and patients' lives were jeopardized by the resulting delays.

These problems could have been avoided if the Fire Department had sought the advice of experienced emergency medical service managers before carrying the experiments out. The managers who joined the Fire Department staff when EMS and the Fire Department merged could have pointed out obviously problematic aspects of the experimental programs. Alternatively, the Fire Department could have consulted with EMS experts on the staffs of New York City healthcare facilities.

Under the agreement that merged the Fire Department with EMS, the Mayor was required to empanel a committee of independent EMS experts – if it had been consulted, that committee could have helped Fire Department officials to avoid the missteps they took. The directors of the emergency medical services in other major cities could have advised the Fire Department, as could the experts in emergency management working for the federal government.

Unfortunately, this report finds that the Fire Department has failed to produce an adequate analysis of these experiments or develop a process that would prevent such errors in the future. Moreover, while the Fire Department eliminated the worst aspects of these failed programs, it has left in place other changes that continue to impair the efficiency of its delivery of timely emergency medical services.

New York City operates the biggest and busiest emergency ambulance service in the U.S.[1] A centralized 911 operation coordinates and dispatches a fleet of some 250 ambulances. The size and complexity of the City's ambulance system puts it in a class by itself; it responds to more emergency calls than the next five busiest systems – Chicago, Los Angeles, Washington, D.C., Houston and Philadelphia – combined.[2] During NYC-EMS's 26 years as part of HHC, it acquired the largest fleet of ambulances and the largest emergency medical service staff in the U.S. The

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[1]This municipal ambulance system developed from what had been an informal ambulance network operated by the City's many public hospitals. The network of hospital-based ambulances was unified under Citywide management in 1969 as the NYC Emergency Medical Service (NYC-EMS), an operating arm of the Health and Hospitals Corporation (HHC).

[2]NYC-EMS responded to 1,016,451 calls in the year ending June 30, 1997. The latest call totals for each of the next five busiest systems are: Chicago - 233,000; Los Angeles - 225,000; Washington, D.C. - 170,000; Houston - 162,000; and Philadelphia - 150,000.

number of vehicles and the City's size posed unique problems in deployment and communications, which were solved with effective programs, including a fleet consisting of two kinds of ambulances, each kind carrying a crew and equipment best suited for response to a particular class of medical emergency, all deployed through an efficient method of positioning the ambulances around the City to minimize the time needed for an ambulance to transport a patient to an hospital.

In March 1996 almost all of the resources and staff of NYC-EMS was separated from HHC and merged with the New York City Fire Department as its Bureau of Emergency Medical Service (Bureau of EMS).

The idea of merging NYC-EMS into the Fire Department had been debated for years, [TK QUOTE FROM PRE-MERGER HEARINGS] but by the time the merger took place there was little public opposition to the change. [TK – FDNYS promised impact] In agreeing to tranfering EMS to the control of the Fire Department, the City Council relied on the Mayor's assurance that the merger would "significantly improve the delivery of high quality ambulance and pre-hospital emergency medical services in New York City."[3] In order to avert any possible adverse effect that Fire Department control of EMS might have, the Mayor agreed to "create a committee comprised of medical experts and physicians to advise the Fire Commissioner regarding matters related to the ... effect of [the] merger on patient quality of care."[4]

During its first seven months of managing EMS, from March to October 1996, the Fire Department substantially increased the number of on-duty ambulances, but otherwise operated EMS according to the procedures that it inherited from HHC. The increase did not require the purchase of additional ambulances, but was achieved by operating some ambulances on extra "tours" (in the City, an ambulance "tour" is an eight-hour shift for an ambulance and its two-person crew). Based on the experience of HHC, Fire Department officials expected that EMS performance would improve in proportion to the number added tours. For example, when HHC increased the number of ambulance tours by 25.1 percent between 1988 and 1994, ambulance response time improved by 26.5 percent over that period. During the following two years, when HHC decreased the number of ambulance tours by 1.2 percent, response time deteriorated by 2.5 percent.

During those first seven months, with a 10.5 percent increase in the number of on-duty ambulances, the Fire Department improved response time to life-threatening emergencies[5] by approximately eight percent.[6] After that initial boost in performance, however, response time leveled

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[3]Memorandum of Understanding between Mayor Rudolph W. Giuliani and the City Council, (February 2, 1996), p.1.

[4]*Id.*, p.6.

[5]To make the best use of its resources, EMS categorizes all calls for assistance as either potentially life-threatening or non-life-threatening, depending on the nature of the emergency. Life-threatening conditions are given priority. Average response time is calculated from computerized records of ambulance operations.

[6]The improvement in response time in this period can only be estimated from the statistics released by the Fire Department, which do not include the average response time at the time of the merger.

off. Rather than increase the number of ambulances, the Fire Department looked for other ways to improve performance.

The Fire Department began its first EMS experiment on November 17, when it began to operate sport-utility type vehicles which are equipped like ambulances but lack the capability to transport a patient. The sport-utility vehicles, called Advanced Patrol Response Units (APRUs) and widely known as "paramedic jeeps," were intended as a supplement to the ambulance fleet, but less than a month after they were first put in service the Fire Department began to decrease the number of on-duty ambulances. From December to March, the Fire Department steadily decreased the number of ambulance tours, until it stood at just 1.4 percent above the number at the time of the merger.

The reduction in the number of on-duty ambulances from their September peak did not affect the official response time statistics because the Fire Department had changed the definition of response time when it began to deploy paramedic jeeps. Up until November 1996 "response time" referred exclusively to *ambulance* response time, because all of the City's emergency medical response vehicles were ambulances. After November, response time was calculated from the time of arrival of the first EMS vehicle on the scene, whether ambulance or paramedic jeep.

On January 6, 1997, the Fire Department began to conduct a second experiment with EMS. It began to change ambulance dispatching systems by switching from voice dispatching to "silent dispatching" of ambulance crews.

While the first two experiments were still in progress, on April 28 the Fire Department began to conduct two more experimental programs. It changed the positioning of on-duty ambulances by removing them from 240 street-corner locations throughout the City and relocating them to only 60 "battalion-based deployment" locations. Also on April 28, the Fire Department changed the computer program for selecting the best ambulance to dispatch.

Rather than testing them in just one neighborhood or borough, the Fire Department rolled out three of these unproven programs for City-wide trials. This ill-advised approach had adverse effects on the efficiency of the EMS program:

- The April experiments caused a sharp across-the-board deterioration in ambulance response time. After achieving an average response time of eight minutes six seconds to life-threatening calls during the previous nine months, the average for April 1997 rose to eight minutes 30 seconds. In May the average increased to eight minutes 37 seconds. Then in June the average hit eight minutes 48 seconds – an 8.6 percent increase over the average for the nine prior months.

- The experiments resulted in a sharp reduction in ambulance availability: during April, May and June there was no ambulance available to be immediately dispatched to calls concerning life-threatening emergencies at a rate that was 20.1 percent higher than the

previous nine months. (When there is no available ambulance, the call is "held" until an ambulance becomes available to respond.)

- During April, May and June an average of 133 life-threatening calls had to be held every day, compared to a daily average of 98 for the previous nine months. Not only did the number of held calls shoot up, but also the average time needed to dispatch an ambulance to such held calls was 33.3 percent greater in those three months than in the previous nine, going from four minutes 12 seconds to five minutes 36 seconds.

- On 834 occasions during May and June, it took more than 26 minutes for an EMS vehicle to respond to a life-threatening emergency, a great increase in the number of calls receiving such a tardy response.[7]

The deterioration in statistical measures of the quality of EMS service in the City indicates that these program changes put public health and safety at risk, and the Public Advocate's Office has received reports of several instances in which these program changes deprived New Yorkers of critical medical care during an emergency situation:

- One EMS worker reports that when a call came in concerning an unconscious 35-year-old diabetic in Williamsburg, Brooklyn, an experimental computer dispatching program reported "no paramedic ambulance available" to answer the call, even though such an ambulance was available eight minutes away. No ambulance could be dispatched until the dispatcher obtained a supervisor's permission to manually override the computer

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[7]The Fire Department's statistical summaries of ambulance operations do not include the information to make a precise comparison to earlier periods because the summaries report the monthly number of life-threatening emergencies that receive a delayed response, and report the length of time needed to respond to the call that is slower than 90 percent of all of the delayed responses. The response time of the remaining ten percent of the calls receiving a delayed response is at least as long or longer than this time. In May 1997 418 life-threatening calls received a response that took at least 26 minutes 14 seconds; in June the response time to 416 calls was at least 26 minutes 52 seconds. The May and June figures show a marked deterioration when compared to the monthly number of calls in the 90th percentile and the shortest time needed to respond to one of those calls in the ten prior months:

	Calls in the 90th percentile	Minimum response time
July 1996	353	20:41
August 1996	358	21:58
September	314	20:44
October	322	20:08
November	415	22:12
December	431	23:31
January 1997	288	20:23
February	261	20:00
March	329	21:52
April	373	24:08

program. When an ambulance arrived 19 minutes after the call had been received, the victim was dead.

- [Another EMS worker reports that?] "no ambulance was available" to respond to a call concerning a potentially life-threatening case of internal bleeding. The call was "held" for an hour and 56 minutes, and the first ambulance arrived on the scene two hours and five minutes after the call was received.

- [Still another EMS worker reports that?] the computer program reported "no ambulance was available" to respond to a call concerning a potentially life-threatening allergic reaction. After 21 minutes the dispatcher manually overrode the program and assigned the call to an ambulance that needed to travel 17 minutes to reach the scene, for a total waiting time of 38 minutes.

- [Similarly, another EMS worker reports that?] the computer program reported "no ambulance available" to aid an elderly patient with a fractured hip. After an hour and six minutes the dispatcher overrode the program and assigned the call to an ambulance that had to travel for 21 minutes to reach the patient.

Response time partially recovered from its 3-month crisis after the Fire Department abandoned the worst aspects of the battalion-based dispatching system, but the improvement was not enough to bring response time down to the levels it had reached prior to the initiation of that system.

Comparing the third quarter of 1997 – the first full quarter after the abandonment of the experiments' worst aspects – to the same 3-month period a year earlier, there was an across-the-board deterioration in response time: average response time to life-threatening calls was 8 minutes 18 seconds, a 5 percent deterioration from the average response time of seven minutes 56 seconds during the same 3-month period a year earlier; average response time for calls of the highest priority (segment 1) was up by 28 seconds (8 percent) to six minutes 20 seconds; every other priority level also showed an increased response time.

Experiment No. 1. "Silent dispatching."

Throughout the nation, ambulances are radio-dispatched over shared frequencies, permitting ambulance crews to give feedback to the dispatchers about their location and availability. This January the Fire Department conducted an unprecedented experiment by dispatching ambulances entirely through computer terminals in each vehicle, instead of using two-way radios. This "silent dispatching" forced dispatchers to make assignments without knowing the current location of all available ambulances and prevented better-positioned ambulance crews from volunteering for assignments. Result: the closest ambulance didn't always respond. Dr. Wallace Carter, director of Bellevue Hospital's emergency medicine residency program, told the Public Advocate's Office that silent dispatching "was a big problem."

- Bureau of EMS personnel have told the Office of the Public Advocate that silent dispatching frequently caused errors that adversely effected patient care. An EMT stationed in Brooklyn:

  > "I was sitting on this corner when there was a cardiac arrest case four blocks away – I don't know why we didn't get the call, but it was given to a unit out on Surf Avenue [about three miles away] and we never heard anything about it until the end of our tour. The guy died before they could get him to the hospital. If it had gone out on the radio we could have taken it and he might have lived."

- While one NYC Fire Department official told a Public Advocate Office staff member that Nassau County uses silent dispatching, a Nassau County official explained to the Public Advocate's Office that its silent communication system is only supplemental to its audible system. All ambulance dispatching in Nassau County is done audibly, by means of shared radio frequencies, the method that the Fire Department tried to eliminate. The only large U.S. city not using shared-frequency dispatching is Chicago, where – unlike in New York City – all emergency vehicles are equipped with automatic vehicle locators, which, in conjunction with a signals to and from a global positioning satellite keeps dispatchers informed of every vehicle's exact location at all times. Officials in several cities explained the advantages of radio dispatching and could not understand why anyone would adopt a silent system.

- "Silent dispatching" was abandoned after four months, but not before it had produced casualties, such as a Staten Island cardiac arrest victim who could have been picked up by an ambulance that was two blocks away but had to wait for the arrival of an ambulance that had to travel two miles to reach him.

Experiment No. 2. Battalion-based deployment.

Under the long-standing "cross-street location system," ambulances are positioned – when not responding to a call – within one of approximately 240 response areas, some of which are as small as a few blocks across. The Fire Department decided to centralize the ambulances by stationing three to five ambulances at each of only 60 locations, a system that the Fire Department calls "battalion-based deployment." As a result of battalion-based deployment, ambulances are not as widely dispersed as formerly and may need to travel farther to reach the scene of an emergency.

- The impact on response time was particularly serious in Queens, the largest of the boroughs, where distances ambulances had to travel from their new battalion stations were longest. After the ambulances were centralized at 20 Queens locations, average response time to life-threatening calls went up 9 percent; the frequency with which life-threatening calls had to be "held" because no ambulance was immediately available to respond rose by 89 percent; the average length of time before an ambulance was available for dispatch to a life-threatening call that had been held went up 22 percent. As a result, the Fire Department abandoned battalion-based deployment in Queens after 15 weeks. The Queens ambulance fleet was decentralized from 20 locations to 56.

- In Manhattan, where battalion-based deployment is still in force, the only ambulance station that now serves the northern end of the island is at 184th Street and Broadway, more than two-and-a-quarter miles from the north end of the battalion's response area. One of the ambulances that is now positioned at 184th Street and Broadway was, under the cross-street location system, positioned a mile farther north, many tens of seconds closer to the northern end of its primary response area.

- Veteran EMS dispatchers call the Fire Department's battalion-based deployment experiment "a disaster," which has been "endangering people's lives," and is "threatening to the life and well-being of New Yorkers." As one veteran EMS dispatcher put it: "My skin crawls when I think about battalion-based deployment. We had a system that worked – it might have stood some improving – and they threw a monkey wrench in it."

Experiment No. 3. Battalion-based computer dispatch.

On April 28th, the Fire Department instituted a new computer program for designating the nearest available ambulance. It also put severe restrictions on the authority of dispatchers to override computer recommendations and to supplement the computer's information with their own knowledge of actual ambulance locations.

Under battalion-based dispatching, each ambulance was assigned to one of nine geographic areas called a "division." Whenever an ambulance traveled outside the boundaries of its division, it was considered "off-service," with the result that the dispatch computer would not recommend it for an assignment even if it was free to take one near its current location. Under the old dispatch system, the dispatch computer would recommend any available ambulance for any nearby assignment.

- Reportedly, this experimental computer program would not assign to a Manhattan cardiac arrest victim a Brooklyn-based ambulance that was "only blocks away" after delivering a burn victim to [tk] Hospital in Manhattan. According to one dispatcher, a dispatcher who "happened to be aware of the proximity of the Brooklyn unit .... could not immediately assign the unit, however, as he had been able to do under the old system. Instead, he had to track down a supervisor and request permission. He received permission. But way too much time was lost in the transaction."

The impact on response time was so serious that the Fire Department had to abandon major aspects of the program after just two months. The modifications that the Fire Department made in response to the system's failure have restored many important aspects of the dispatching system to its proven pre-Fire Department design.

Unfortunately, the Department has retained its ambulance identification system, which encumbers the dispatching process. Under battalion-based dispatching, the Fire Department has assigned a new radio designation number to each ambulance, designations that slow dispatching operations because they give dispatchers little of the information that had been instantly accessible to them as part of the old designations. For example, under the former system all ambulances based in Manhattan had radio designations beginning with "1." The Bronx was "2," and so on. The second number in the old radio designations gave a straightforward indication of the part of the borough the ambulance was stationed in; Manhattan was divided into nine dispatch sectors, numbered consecutively from south to north. The new radio designations include a completely arbitrary indication of each ambulance's base, that is, the battalion number of each ambulance. The numbers assigned to the 55 ambulance battalions skip from borough to borough, without an geographical basis; for example, Battalion 23 is in Staten Island, 24 is in the Bronx and 25 is in Manhattan. According to a veteran EMS dispatcher:

> "With the old numbers I knew a lot about a 'truck' if I knew its number. Anyone who had been on the job for a week could automatically tell where an ambulance was from

within a dozen blocks. Now I need to check those stupid battalion numbers on a g-- d-- ed crib sheet."

Experiment No. 4. New paramedic vehicles.

As noted above, the Fire Department has begun to employ a new kind of emergency medical response vehicle which is equipped like an ambulance but does not have a compartment to transport a patient to a hospital. These paramedic jeeps, or APRUs, were first put into service by the Fire Department in November 1996. Paramedic jeeps *can* serve valuable functions: they can deliver EMS supervisors to locations where supervision is needed; they can deliver medical assistance to a patient who does not urgently require transport; and when they are accompanied by an ambulance they can deliver medical assistance to patients who need transport to an emergency room.

The use of paramedic jeeps to provide medical assistance can be extremely inadequate, however, where a life-threatening trauma or life-threatening illness requires treatment in an emergency room rather than in the street if no ambulance is available to provide patient transport.

New York City has a chronic shortage of on-duty ambulances; every day some 100 life-threatening calls are put on hold because no ambulance is available to respond at the time the calls come in. As a result, paramedic jeeps are frequently dispatched *in place of* ambulances, and urgently needed transport is delayed until an ambulance becomes available and can reach the scene.

- Reportedly, when a subway token clerk was shot by a robber at the Vernon Boulevard station in March 1997, a paramedic jeep that had been assigned to replace a paramedic ambulance during the pre-dawn shift came quickly but there was a 20-minute delay in sending an ambulance. The clerk died.

- In May there was a 44-minute delay in sending an ambulance to the assistance of a child with a potentially life-threatening allergic (anaphylactic) reaction, according to [tk]. Paramedics in a jeep reached the boy in 24 minutes, but they had to wait another 20 minutes for an ambulance that could take him to an emergency room.

- "We get backup [from an ambulance] most of the time," a paramedic jeep crew member told our investigator, "but every tour we have at least one job with no backup. Sometimes we can stabilize the patient and wait with no problem, but too often we are stuck waiting for transport with someone who needs to be in a surgery."

Recent Fire Department statistics do not distinguish between ambulances and paramedic jeeps, but the Fire Department reported specifically on paramedic jeep operations up until March 1997. During the first six months of the paramedic jeep program, the Fire Department cut 40 daily

ambulance tours and initiated 66 paramedic jeep tours. Thus, between October 1996 and March 1997, the increase in paramedic jeep tours resulted in a 4.7 percent increase in EMS tours by all kinds of vehicle, but ambulance tours were reduced by 7.2 percent.

As Jonathan Best, past president of the National Association of Emergency Medical Technicians (and a former NYC-EMS paramedic), told the Public Advocate's office: "The end objective of the system is to take the patient to the hospital, so replacing some ambulances with APRUs has a big downside because New York [City] doesn't have a sufficient number of ambulances to begin with." And as Bellevue Hospital's Dr. Carter further explained: "If you're adding APRUs it makes sense, but if you're replacing ambulances, it makes no sense at all... if you get the medics on-scene in two minutes and you wait 30 minutes for an ambulance, how is that better?"

- The Fire Department has not been able to cite any significant experience or precedent for using paramedic jeeps as they are in New York City. A Fire Department official told a Public Advocate staff member that the agency's paramedic jeep program is modeled on programs in Chicago, Nassau County and Los Angeles County. Officials in Chicago and Nassau County told the Public Advocate's Office that they have no paramedic jeep program of any kind. Los Angeles County operates an EMS service based entirely on paramedic jeeps, fire trucks and helicopters, with a private ambulance fleet under contract to transport patients to emergency rooms, a completely different mode of paramedic jeep operation than New York City's.

Result: Fire Department experiments compromised patient care.

The Fire Department's experiments disrupted the operations of EMS, causing a large increase in the average length of time needed for an ambulance to reach the scene of an emergency. In every case where the disruption caused a delayed response, patient care was potentially compromised. Called upon to respond to approximately one thousand life-threatening calls every day, the delays have caused, and continue to cause, New Yorkers incalculable harm.

- *The Mayor's Management Report* (MMR)[8] for the year ending June 30, 1997 (Fiscal Year 1997), shows an eight minute and 14 second EMS response time to life-threatening emergencies, an eight percent improvement over the prior year. But closer analysis of unpublished Fire Department statistics reveals that response time had averaged *eight minutes and six seconds* during the first nine months of the fiscal year (before the initiation of the battalion-based experiments) and had risen to an average of eight minutes 38 seconds during the last three months of the year, pulling the annual average up by eight seconds.

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[8]The most recent MMR, which reports on the City's fiscal year 1997 (July 1, 1996 - June 30, 1997) was published in September 1997 by the Mayor's Office of Operations.

- By October 1996, prior to initiating its deployment, dispatching and fleet composition experiments, the Fire Department had, by merely increasing the number of on-duty ambulances, made a substantial reduction in the average response time in life-threatening cases. "If the City had continued to expand the ambulance fleet and not diverted resources to crazy experiments, we could have cut it to less than seven minutes by now," one City EMS manager told our investigator.

- As noted above, the Fire Department's treatment of paramedic jeep response statistics tends to cause a misleading reduction in response time figures because the Fire Department's statistics do not distinguish between the arrival of an ambulance at the scene of an emergency and the arrival of a paramedic jeep.

The Mayor and the Fire Department are violating key terms of the agreement under which the Fire Department took over the management of EMS.

In a 13-point Memorandum of Understanding (MOU) with the City Council, on which the Council conditioned its approval of the Fire Department's takeover of EMS, the Fire Department agreed to "increase by 10% the number of ambulances currently available" within six months. Also as part of this agreement, the Department said it would provide to the City Council by March 1997 a detailed report on the performance of EMS and the effects of the merger on patient care, including 12 specified statistical indicators, and it would establish a committee of independent medical experts to advise the Fire Department on its management of the EMS program. **[is "advise" correct?]**

- The Fire Department has failed to honor both the letter and the spirit of its commitment to make a 10 percent increase in ambulance tours six months after the merger. Six months after the merger the Fire Department had increased the number of ambulance tours by only TK percent; even though the Fire Department did achieve the 10-percent goal a month later (when it operated 10.5 percent more tours than before the merger), just two months later it began to cut the number of ambulance tours, as though the commitment to increase the number of tours *within* six months was not also a commitment to continue to operate at that level in the future. A year after the merger, the Fire Department was conducting only 1.4 percent more ambulance tours than before the merger.

- More than 18 months after the merger, the Fire Department has failed to provide the promised report on patient care, and its abbreviated report on EMS operations failed to include five of the 12 promised statistical indicators.

- The Fire Department failed to convene a meeting of the committee of independent medical experts until December 1996 – eleven months after the Memorandum of Understanding was signed, and the Department has failed to respond to the request by the

Public Advocate's Office any information on any subsequent meetings of this expert panel that might have been held.

RECOMMENDATIONS

- The battalion-based deployment experiment should be ended citywide. Changes in the deployment system should be made only in consultation with independent experts, and care should be taken to avoid changes that may decrease EMS effectiveness. If changes of a highly experimental nature are to be made, they should be tested in a small area, with the results of the test released for public review before the proposed change in implemented throughout the entire City.

- The battalion-based dispatching experiment should be abandoned completely, not partially. Changes in the despatching system should be made only in consultation with independent experts, and care should be taken to avoid changes that may decrease EMS effectiveness. If changes of a highly experimental nature are to be made, they should be tested in a small area, with the results of the test released for public review before the proposed change in implemented throughout the entire City.

- When the Fire Department initiates changes in EMS policies or programs, it should at the same time put into place systems to measure and evaluate the effects of the changes.

- The Fire Department should develop criteria for the deployment of paramedic jeeps in consultation with independent experts.

- The Fire Department should make public any statistical information concerning ambulance operations that it collects.

- The Fire Department should revise its statistical indicators to distinguish between the operations of ambulances and paramedic jeeps. In particular, it should disclose statistics concerning the impact of paramedic jeeps on the length of time required to deliver patients to hospitals.

- The Fire Department should immediately come into compliance with all the terms of the Memorandum of Understanding with the City Council. In particular, it should publish all the statistical indicators called for and convene meetings of the committee of independent medical experts on a regular, monthly basis to deliberate on the effect of the merger of the Fire Department and EMS and to review and comment upon any proposed major changes to the EMS program.

I. EXPERIMENT NO. 1: "SILENT DISPATCHING"

For the first nine months after the Fire Department took the ambulances over, no changes were made in the dispatching system that had been inherited from NYC-EMS. Then on January 6, 1997, the Fire Department initiated a dangerous and harmful modification of the EMS dispatching system.[9] The experimental system was known officially as Mobile Data Terminal (MDT) Dispatching; it was generally called "silent dispatching" by Bureau of EMS personnel. Silent dispatching was introduced as a pilot program in Queens and had been installed in all five boroughs by April. By the beginning of May the mounting number of dispatching errors apparently convinced Fire Department officials that the experiment was a complete failure. It was quietly abandoned after four months.

Even though the silent dispatching experiment failed and Fire Department officials reversed themselves, it is important to review the experience for several reasons.

First, Fire Department officials have never acknowledged making a dangerous and harmful mistake; if a repetition of such an error is to be avoided, it must be analyzed and understood. Fire Department officials have even avoided acknowledging a mistake by refusing to declare a return to the old, pre-silent dispatching, system. Instead, Fire Department officials announced a "revision" of silent dispatching; the detailed notice of the revision eliminated every aspect of the MDT dispatching system but one.[10]

Finally, even though silent dispatching is no longer Fire Department policy, [some EMS workers report that?] Bureau of EMS dispatchers occasionally follow silent dispatching procedures. Silent dispatching techniques were counterproductive even when they were official policy; using them in the absence of such a policy is great cause for concern.

It is also important to review the silent dispatching experiment because it is an example of a wider problem, a tendency on the part of Fire Department officials to mechanically apply their experience with fire trucks to ambulances, with serious adverse effects on the New Yorkers who require emergency medical assistance.

Silent dispatching is a system for giving instructions to a single ambulance crew by sending a message to a computerized mobile data terminal (MDT) located in the cab of the ambulance. It is "silent" because the instructions are delivered only via the MDT screen without any audible instructions delivered over the ambulance radio. Its lack of audible radio messages makes it similar to the way fire dispatchers communicate with fire companies.

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[9]Bureau of Fire Communications Division Memorandum #97-01.

[10]Fire Department, Bureau of EMS, "Operations Order #97-045A," May 1, 1997, p.1.

A. NYC-EMS dispatching method

When the Fire Department took over NYC-EMS in March 1996, it took over the NYC-EMS communications center in Maspeth, Queens. At the communications center, EMS call-receiving operators (CROs) receive all calls to 911 that concern medical emergencies. The CROs – who are all experienced EMTs or paramedics with additional training in obtaining information from medically inexperienced (and often panic-stricken) individuals – interview the caller to determine the nature of the injury or illness and the condition of the person needing emergency assistance.

Based on that information, the CRO assigns the call to a "calltype," such as "arrest" (cardiac arrest) "obcomp" (obstetric complications), "unc" (unconscious patient), "ampmaj" (major amputation – not a finger or toe), "burnma" (major burns) or "pedstr" (pedestrian struck by a motor vehicle). The calltypes are grouped into eight priority levels, called "segments," with the highest priority calls assigned to segment 1. Calls that are deemed to involve life-threatening conditions, that is, posing an immediate threat of death in the absence of medical assistance – all fall into segments 1, 2 or 3.

The CRO types the information about the call – usually including a narrative such as: "70-year-old male with history of heart disease, has been having chest pain for 2 hours" – into a computer, which alerts the EMS dispatcher who is handling calls for the location of the patient. These initial stages of EMS call-handling have been left unchanged by the Fire Department.

In January 1997, the Fire Department made its first modification of the ambulance dispatching system by changing the way dispatchers communicated with ambulances. This change in dispatching can best be understood in the context of a description of the original dispatching system.

The NYC-EMS system – radio dispatching over a shared dispatch frequency – is used by emergency medical services and by police departments in almost every jurisdiction in the U.S. The basic system is this: when a dispatcher has a call to assign to an ambulance, a computer-aided dispatch (CAD) program identifies and ranks nearby ambulances as "first recommended," "second-recommended," etc. The dispatcher then hails one of the recommended vehicles (usually the first-recommended) over a radio frequency that is used by every vehicle in the jurisdiction (or in a particular section of the jurisdiction[11]) and informs the vehicle's crew that it is being dispatched to a certain location to give aid in a situation that the dispatcher describes briefly.

For example, a dispatcher might say: "Unit 10, you have a cardiac arrest at Broadway and Wall." Every vehicle on the same dispatch frequency hears the dispatcher making the assignment, and every vehicle also hears the response from "Unit 10," which includes a description of its present location and any factors that might delay a response, such as unusual traffic conditions.

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[11]New York City ambulances use nine different dispatch frequencies – one for Queens, two for the Bronx, three for Manhattan (North, Central and South), and three for Brooklyn, one of which also covers Staten Island.

Based on the messages exchanged by the dispatcher and "Unit 10," another ambulance crew -- which has, as a matter of routine, heard the messages – may conclude that it is in a position to respond more quickly than the assigned vehicle. In such case, the crew of the better-positioned vehicle is required to inform the dispatcher of its location and availability. Every vehicle on the dispatch frequency hears this additional information, so yet a third vehicle nearby might call in to the dispatcher with its location. With the additional information about the location and availability of other vehicles, and with the dispatcher's knowledge of the overall status of all the ambulances in a dispatch area, the dispatcher makes the final decision about which vehicle to send to the call.

Shared-frequency dispatching is the norm because the dispatcher's initial, computer-assisted effort to identify the closest available ambulance is based solely on the information that is available to the computer, which may not be completely current at the moment the call comes in.

One Bureau of EMS dispatcher explains the lack of precisely up-to-date information this way: "The [dispatch] computer's data is updated only when the ambulance's crew updates the communications center as to its location and that updated information is input into the computer. As a result, the computer's information about the location of the closest available ambulance is frequently incorrect. For example, the computer may 'understand' that a particular ambulance is unavailable because it was last 'heard from' when the crew was delivering a patient to a hospital. In fact, however, the ambulance may have completed that delivery, reported its completion of the delivery, and the data might not yet have been input before the computer issued its recommendation of the closest available ambulance. That ambulance might well be the closest available and the computer does not yet 'know' that."[12]

Radio dispatching over a shared frequency is used almost universally by emergency ambulance systems[13] because it is reliable and efficient and it gives dispatchers and ambulance crews up-to-the-moment knowledge of the locations of all available ambulances and the nature and location of potential assignments –and it gives the closest available ambulance the opportunity to volunteer to take an assignment even when that ambulance has not been selected by the dispatcher and the dispatch computer.

Shared-frequency radio operations are not obsolete holdovers from a less sophisticated technological era – they are a proven method to announce situations that require a quick response, obtain real-time feedback from multiple mobile units, identify the best-positioned unit for an assignment, and thereby achieve optimal response in a dynamic environment. Even high-tech air-

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[12]Affidavit of a Bureau of EMS dispatcher in *McAllen v. Marcos*, Index No. 104767/96 (filed in New York Supreme Court with the identity of the affiant kept confidential by the Court), June 6, 1997, p.4.

[13]Of the ten largest EMS systems in the U.S., radio dispatching is used by nine of them. The exception is Chicago, where every ambulance is equipped with an Automatic Vehicle Locator, which, by means of a signal from a Global Positioning Satellite, gives the dispatcher precise, up-to-the-minute information about each ambulance's location.

traffic-control operations are conducted using a radio frequency that is shared by all aircraft in the same flight pattern, for the same reasons.

Using a dispatch system that is based on up-to-the-minute information about ambulance locations is essential in New York City, because EMS ambulances are away from their assigned location more than 82 percent of the time.[14] For approximately 19 percent of the time (an hour and 30 minutes of an 8-hour shift) the typical Bureau of EMS ambulance is available for a call but is off-station because it is in transit, returning to its assigned location from a hospital or a supply depot.[15]

The result is a complex and ever-changing distribution of ambulances, some unavailable, some available on-station, some available but in transit, and some in the last stages of finishing up an assignment so that they can make themselves available almost immediately when circumstances require a quick response. The only way a dispatcher can learn the exact location and the exact status of each ambulance at any given moment is by exchanging information with multiple ambulance crews over a common dispatch frequency.[16]

B. How Silent Dispatching Works

Under silent dispatching, a dispatcher gets no feedback from ambulance crews. The dispatch computer selects an ambulance to take a call based on the information on hand. Once the ambulance has been selected the dispatcher sends a message to that ambulance's MDT, and only the assigned crew and the dispatcher know about the call. Other ambulances, regardless of their actual location or availability, cannot offer to respond to the call because they know nothing about it.

The MDTs were not a new addition to the City's ambulances; they had been installed in 1990 as the principal communications link between ambulance crews and headquarters. EMS dispatchers and ambulance crews had used them for more than five years to transmit detailed medical and logistical information, which would be useless to any other ambulance crew and/or should not be broadcast in audible form because it contains confidential medical data. Ambulance crews, in turn, use the MDT to notify the dispatch computer of their status: available for an assignment, on the way to an emergency incident, on-scene at an incident, transporting a patient, or returning to station after delivering a patient, etc. A Queens-based EMT explained:

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[14]The most recent ambulance utilization statistics available to the Office of the Public Advocate date from Feb. 2-8, 1997. During that week, the average ALS vehicle was on-station and awaiting assignment 17.19 percent of the time and the average BLS ambulance was on-station, awaiting assignment 17.68 percent of the time. Source: Fire Department, "Unit Performance Indication Report 02FEB97 - 08FEB97," pp. 411, 432.

[15]During Feb. 2-8, 1997, the average ALS was off-station but available for assignment 20.14 percent of the time and the average BLS ambulance was off-station but available for assignment 18.28 percent of the time. Source: *Id.*

[16]Fn. re Automatic Vehicle Locators TK.

> "It makes it a snap to let [the] communications [center] know what we're doing. We get a job and hit [the] 10-63 [button on the MDT]; that means we're rolling. When we get on-scene, we hit 10-88. When we're rolling to the hospital, we hit 10-82 and then 10-81 when we get there. When we leave the hospital, we're 10-98 and we go 10-99 when we get back to the base. But the MDT won't tell the dispatcher where we *are*, it just tells him where we *were* when we hit the button, and we never get to stay 10-99 for long."[17]

The MDTs do not transmit information about the location of an ambulance except by inference – if an ambulance crew uses the MDT to signal that it is "on-position," the dispatcher can infer that it is close to an assigned location; if it signals that it is "on-scene" the dispatcher can infer that it is at the location to which it was dispatched; if it signals that it is "returning-to-station" the dispatcher can infer that it is traveling from a particular hospital to its assigned location.

C. Silent Dispatching Drawbacks

Two months after silent dispatching was initiated in Queens, the Office of the Public Advocate began to receive complaints from Bureau of EMS personnel. "Over and over it happens," one veteran paramedic told the Office of the Public Advocate, "dispatchers give the jobs to the wrong units, because the computer isn't God – it doesn't know exactly where everyone is. People are getting hurt, and some of them are dying, because FDNY [i.e., the Fire Department, pronounced "fidney"] is convinced that, 'if it works fine for fire trucks, it'll work fine for ambulances, too.'"[18]

The Fire Department's switch to silent dispatching was "a big problem," according to Dr. Wallace Carter, the director of Bellevue Hospital's emergency medicine residency program, who served as a New York City EMS paramedic for eight years. "Silent dispatching works fine for fire trucks," says Carter, "because they are fundamentally stationary, and if they are not in the firehouse the dispatcher has a very good idea where they are. New York City ambulance crews spend three quarters of the time working with patients, moving from the street to the emergency room and back. It's a dynamic system, always changing, so the feedback from the field is essential to make intelligent dispatching decisions."[19]

If a dispatcher assigns a call to an ambulance that is farther from the emergency scene than another available ambulance, the resulting difference in response time could be the difference between life and death.

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[17]Interview of a Bureau of EMS EMT, who requested anonymity for fear of retaliation by Fire Department officials, August 4, 1997.

[18]fn [TK].

[19]Telephone interview of Wallace Carter, M.D., director, Bellevue Medical Center emergency medicine residency program, July 17, 1997.

An EMS Union official reports that one such incident may have contributed to the death of a Staten Island resident in April. Two emergency calls came in at about the same time from callers who were in the Arlington area, a few blocks from each other. One call was "a sick job," *i.e.*, a non-life-threatening illness, and the other was a cardiac arrest – a condition requiring immediate medical intervention. When the calls came in, two ambulances were available for assignment in that area. They were both Bureau of EMS ambulances, but their crews had different levels of training and they carried different equipment. They were typical of the two different varieties of ambulance that operate in New York City, called Advanced Life Support (ALS) ambulances and Basic Life Support (BLS) ambulances.

- About one-quarter of the municipal ambulances are ALS, with a crew of two state-certified paramedics who are trained and equipped to administer sophisticated emergency care – such as manual (as opposed to automatic) defibrillation or the insertion of a breathing tube or the administration of intravenous medication – before reaching an emergency room. If an ALS ambulance is available, it is dispatched to answer most potentially life-threatening calls, such as heart attacks, choking, drowning, and major burns.[20]

- About three quarters of the City's ambulances carry a crew of two state-certified emergency medical technicians (EMTs) who are trained to administer basic first aid, stabilize injuries, and perform lifesaving techniques – including cardiopulmonary resuscitation (CPR), splinting, bandaging, backboarding, shock management, defibrillation with an automatic defibrillator, and patient assessment. They provide a level of patient care known as Basic Life Support (BLS). BLS ambulances are dispatched to most kinds of calls, including all calls that are not potentially life-threatening and some calls – such as shootings and stabbings – that are life-threatening but are best responded to by quick transport to an emergency room rather than by treatment on the scene, such as gunshot or knife wounds.[21]

If an ALS unit is close to a cardiac arrest call, it is preferable over a BLS unit because the paramedics in the ALS unit can administer life-sustaining medication on the scene and continue to do so while transporting the patient to the closest emergency room. But if a BLS unit is so much closer

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[20]In emergency medical practice, "life-threatening" is defined as any condition that poses an immediate threat of death in the absence of medical assistance and thus requires an appropriately urgent response. The Bureau of EMS puts 24 situations in the "life-threatening" category: cardiac arrest, choking, anaphylactic reaction, difficulty in breathing, near-drowning, major obstetric complications, ongoing epileptic seizure, major trauma, unconsciousness, poisonous bites, major burns, electrocution, heart-attack symptoms in a conscious patient, major gynecological emergencies, internal bleeding, major injuries, respiratory distress, the delivery of a baby in an inappropriate place, a police officer shot or otherwise hurt, a pedestrian who has been struck by a motor vehicle, anyone who has been shot or stabbed, the amputation of anything larger than a finger or toe, and anyone who has jumped or fallen from a great height.

[21]In addition to the City-owned ambulances, the NYC-EMS system uses the services of similarly equipped ambulances belonging to voluntary (non-municipal) hospitals. Those private ambulances have regular EMS assignments to cover specified areas of the city for specific shifts, during which they are dispatched by the municipal 911 communications center.

to the patient that it can transport the patient to an emergency room in less time than will be required for the ALS unit to reach the patient's side, emergency medical protocol calls for the dispatch of the BLS unit[22] because there will be a shorter delay before the patient begins to receive definitive medical care.

In the Staten Island case, BLS ambulance 52B was within a few blocks of both patients and an ALS unit (51W) was approximately two miles away. The dispatcher silently dispatched the BLS unit to the patient whose life was not at risk and the ALS unit to the cardiac arrest. If the BLS unit's crew had known about the cardiac arrest call and the distance that the nearest ALS ambulance would need to travel, EMS regulations would have required the BLS crew to volunteer to take the cardiac arrest to the hospital and to leave the less-sick patient for the ALS unit or for another BLS unit. If the dispatcher concurred with the BLS crew's assessment that it could deliver the patient to an emergency room before the ALS unit would be able to reach the scene, the dispatcher would have the authority to give the call to the BLS crew. But silent dispatching prevented the BLS crew from knowing about the nearby life-threatening emergency, so the cardiac arrest victim may have had to wait longer than necessary to receive emergency care.[23]

Bureau of EMS personnel have told the Office of the Public Advocate that silent dispatching has frequently caused errors that adversely effected patient care. An EMT stationed in Brooklyn told our investigator: "Last [March] I was sitting on this corner when there was a cardiac arrest case four blocks away – I don't know why we didn't get the call, but it was given to a unit out on Surf Avenue [about three miles away] and we never heard anything about it until the end of our tour. The guy died before they could get him to the hospital. If it had gone out on the radio we could have taken it and he might have lived."[24]

As one paramedic stationed in the Bronx put it, "Silent dispatching means that you no longer hear many of the calls that are given out unless your unit is assigned to the call. You can be two or three blocks away from a job and never know that a call was there because you never heard it. That's happened many times already in the Bronx."[25]

Another disadvantage of silent dispatching becomes evident during multiple-casualty incidents. For example, if a bus collision or an explosion has resulted in an unknown number of victims, the first 911 calls can't accurately portray the number of victims; in that case a dispatcher would make an initial decision to dispatch one or a few ambulances until more information about the number of casualties was received. If the ambulances were dispatched silently, other ambulance crews in the

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[22]Fn re REMAC protocols TK.

[23]Interview of Kevin Lightsey, Local Union 2507 president, August 19, 1997.

[24]Interview of [a Bureau of EMS EMT, who requested anonymity for fear of retaliation by Fire Department officials], April 24, 1997.

[25]Telephone interview [of a Bureau of EMS EMT, who requested anonymity for fear of retaliation by Fire Department officials], April 25, 1997.

area would not receive any information to alert them to the possibility they would need to be dispatched to the same scene very soon.

If the first ambulances were dispatched by shared-frequency dispatch radio, however, the dispatcher's description of the incident would alert other ambulance crews that they might be soon dispatched to the same place. When an ambulance crew hears a radio call concerning a potential multiple casualty incident (directed to another ambulance) it will tend to become more alert and also to drive several blocks in the direction of the incident (ambulances that are stationed at street intersections can roam anywhere within a few blocks of that intersection). Then, if additional ambulances are needed, the crews are closer and in higher states of alertness. None of this happens when dispatching is done silently.

D. Dispatching in Other Cities

When asked about audible radio dispatching, emergency medical service officials from many jurisdictions advocated its use, even for vehicles that could be dispatched silently over MDTs. While most cities lack MDTs, ambulances in Los Angeles, Dallas, and Nassau County are dispatched by radio even though they are all equipped with MDTs.

The Nassau County Police Department operates a county-wide emergency medical service to supplement scattered hospital-based ambulance services and volunteer ambulance corps. The MDT-equipped County Police ambulances are dispatched by means of audible radio messages because, as Inspector Stephen McDonald, the commander of the Nassau County Police Department's communications division explained, "We prefer other units to know where, when and why a unit is being dispatched; it alerts all the units in the area to a potential concern and it enables all the units to give the dispatcher feedback."[26]

Inspector McDonald explained the need to dispatch ambulances by radio: "If one of our ambulances is returning to its station from a hospital, the dispatcher won't know exactly where the ambulance is at any given moment; using verbal dispatching, if the dispatcher assigns a job to one ambulance when another ambulance is actually in a position to respond faster, the closer ambulance will hear the dispatch call and alert the dispatcher that it is in a position to respond faster than the chosen ambulance." McDonald added, "It helps when the humans in the field sort things out."[27]

The City of Los Angeles Fire Department's Emergency Medical Service is the second largest EMS organization in the U.S. Its 90 ambulances are equipped with MDTs, but when the ambulances are not in their stations, they are dispatched by audible radio messages. The dispatcher attempts to select the closest available ambulance, but, according to Los Angeles Fire Department

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[26]Telephone interview of Inspector Stephen McDonald, commanding officer of the Nassau County Police Department Communications Department, July 16, 1997.

[27]*Id.*

Captain David Thompson, who is the LAFD's EMS Liaison Officer, "it happens fairly frequently that another ambulance is closer, and it calls in to say that it is available .... We expect our resources to notify dispatch if they are better-located to take a call."[28]

Even in Dallas, where every ambulance is equipped with both an MDT and an automatic vehicle locator, making it possible for the dispatcher to have completely up-to-date information about the location of every ambulance, dispatching is done over a shared radio frequency. "That way, the crews all hear everything going on and if they hear a call near them they call in to say they are near it," according to Dallas Fire Department EMS Captain Greg Courson. He stated that the feedback from ambulance crews results in better dispatch decisions "four or five times a day."[29]

Similarly, in Houston, the fifth largest EMS system in the U.S., ambulances are dispatched by radio. A Houston official noted that an available ambulance "would be expected to inform the dispatcher" if it was in a better position to respond to a call than the first-chosen ambulance.[30]

Philadelphia's EMS, the sixth largest in the country, dispatches its ambulances by audible radio messages. Whenever an ambulance crew is aware that it could take a call assigned to another ambulance, the crew "routinely tells the dispatcher they are closer," according to Michael Stanton, chief of EMS operations. "They go on the air and say, 'We're in the area, do you want us to take that in?' The dispatcher has the final say."[31]

The Los Angeles County Fire Department, which operates the ninth busiest EMS operation in the country, serving the county's suburban and rural areas (a land area that is more than 12 times the size of New York City), makes an extra effort to alert all units to all calls, by broadcasting audible radio dispatch messages twice. The EMS director, Chief Greg Bates, explained, "There's a real benefit to voice dispatching; we want the resources in the field to know what is going on right around the corner, and they wouldn't know if we weren't voicing these things."[32]

The Office of the Public Advocate asked the Fire Department whether it is aware of other dispatch failures resulting from silent dispatching.[33] Fire Department officials responded by sending

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[28]Telephone interview of Capt. David Thompson, City of Los Angeles Fire Department, September 2, 1997.

[29]Telephone interview of Captain Greg Courson, Dallas Fire Department, September 8, 1997.

[30]Telephone interview of Wes Warnke, Assistant Chief in charge of EMS, Houston Fire Department, September 5, 1997.

[31]Telephone interview of Chief Michael Stanton, Philadelphia Fire Department, September 5, 1997.

[32]The Los Angeles County Fire Department serves all of the unincorporated areas of the county plus some smaller cities that do not provide their own protection. Telephone interview of Chief Greg Bates, Los Angeles County Fire Department EMS director, September 5, 1997.

[33]"How many times, if any, has the response-time of a ambulance that was dispatched voicelessly via MDT been longer than the probable response time of another available ambulance that was not dispatched because its location or status was unknown to the dispatcher? If such events have occurred, please list them, and tell us whether FDNY has analyzed the impact of such instances on patient care and/or developed a method to prevent their recurrence." Letter from Public

copies of the Fire Department's proposal for the merger and its "One Year Progress Report" on the merger. When the Office of the Public Advocate called the Fire Department's attention to the fact that neither of the documents included any information about dispatch failures, Assistant Fire Commissioner Lynn Tierney told our investigator that, "we firmly believe that we have answered questions relating to those subjects in the mode that we are dictated to answer. We have supplied you with documents that include answers to your questions."[34]

The Office of the Public Advocate asked the Fire Department whether it has systematically collected information on the effectiveness of silent dispatching.[35] Fire Department officials failed to respond.[36] DO WE NEED THIS FN. OR CAN WE DELETE IT?

While the silent dispatching experiment was in progress, at least one Fire Department official tried to minimize the problems it was causing. Fire Department Bureau of EMS spokesman Assistant Chief Gustave Pappas stated in late March 1997, "We do know that sometimes an ambulance [that is not dispatched and is not informed of the call] may at times be closer, but in reality it doesn't happen that often."[37] Five weeks later the program was abandoned.

Where did the silent dispatching program come from, if no other jurisdiction uses it or plans to use it, except Chicago – where all EMS vehicles are equipped with automatic vehicle locator devices?

"Silent dispatching developed out of the way they dispatch fire trucks," commented EMT and paramedics union president Kevin Lightsey. Five months before the merger of EMS with the Fire Department, the Fire Department published "Enhancing Emergency Medical Care in New York City", which stated: "Secure communications (Alarm Teleprinter/Voice Alarm system) ensures that crews never miss a call because they did not hear it on the radio," which "[i]mposes fire service 'dispatch discipline' – less chance of a crew leaving their service area to respond to a job to which they are not assigned."[38] Clearly the idea for silent dispatching was an attempt to apply their fire-truck dispatching experience to ambulance dispatching.

When asked about the reason for having adopted silent dispatching, a Fire Department official told the Office of the Public Advocate that the technique is used by other jurisdictions, including

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Advocate Policy Analyst Jonathan Bennett to Lynn Tierney, Deputy Fire Commissioner for Intergovernmental Affairs, July 30, 1997, p.4.

[34]Telephone interview of Lynn Tierney, Assistant Fire Commissioner for Intergovernmental Affairs, August 14, 1997.

[35]"Does FDNY collect or maintain any statistics or other information concerning the frequency and/or severity of less-than-optimal dispatching operations resulting from voiceless MDT dispatch?" Letter from Public Advocate Policy Analyst Jonathan Bennett to Lynn Tierney, Deputy Fire Commissioner for Intergovernmental Affairs, July 30, 1997, p.4.

[36]Telephone interview of Lynn Tierney, Assistant Fire Commissioner for Intergovernmental Affairs, August 14, 1997.

[37]Telephone interview of Gustave Pappas, Assistant Chief, Fire Department, March 25, 1997.

[38]Fire Department, "Enhancing Emergency Medical Care in New York City," October 18, 1995, p. 22.

Nassau County.[39] But the commander of the Nassau County Police Department's communication division states, "That's not correct. We do have MDTs in all ambulances and police cars but we dispatch verbally over a radio frequency." Also, McDonald added, the Nassau police "do not anticipate doing away with the verbal part of the communication."[40]

This Fire Department official also asserted that silent dispatching reduces unnecessary noise on Bureau of EMS voice channels, leaving them free for communications that cannot go through the MDTs; speeds up and increases the accuracy of the dispatching operation because the dispatcher can use the computer to send out different calls simultaneously instead of having to complete an assignment to one ambulance before going on to the next one; and eliminates verbal ambiguities caused by the similar sounds of letters and words.[41] **[Did any other City comment on this?]**

Four months after the Fire Department began its silent dispatching experiment, Fire Department officials ordered dispatchers to return to their former practice of announcing all dispatch calls over a radio frequency monitored by all the ambulances in the dispatch district. After a 4-month radio blackout, ambulances were once again required to contact the dispatcher whenever they might be closer to an assignment directed to another ambulance.[42]

The Fire Department's Operation Order to change dispatch communications systems does not give any indication that the "new" system is not new, but a return to an old system. "They changed back because silent dispatching was deemed a total and complete failure," a veteran EMT told the Office of the Public Advocate, "but we never got a word of explanation either time."[43]

The only difference between the current method of hailing ambulances and informing them of their assignments and the system developed by NYC-EMS is that dispatchers do not announce the nature of the call over the radio -- dispatchers now tell ambulances crews "You have a job at" a particular location instead of "You have a cardiac arrest job at...." Even this change in dispatching procedure is detrimental to patient care, according to paramedics and EMTs, because they can only volunteer to take an assignment based on the location of the assignment and not the nature of the emergency. One paramedic stated:

> "Just the other day I was rolling RLS [driving with flashing red lights and siren] to a [low-priority] sick job and I heard another unit, back at [my own] base [about a mile away], get a job that was a block away [from the intersection I was driving through at the moment]; if I knew it was a [cardiac] arrest I'd have volunteered, but all the dispatcher

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[39]Telephone interview, Assistant Fire Chief Gustave Pappas, March 25, 1997.

[40]Telephone interview of Inspector Stephen McDonald, commanding officer of the Nassau County Police Department Communications Department, July 16, 1997.

[41]Telephone interview of Gustave Pappas, Assistant Chief, Fire Department, March 25, 1997.

[42]Fire Department, Bureau of EMS, "Operations Order #97-045A," May 1, 1997, p.1.

[43]Telephone interview of an Brooklyn-based Bureau of EMS EMT, who requested anonymity for fear of retaliation by Fire Department officials, October 9, 1997.

said was 'a job.' The crew [that received the assignment] got the message that it was a [cardiac] arrest over the MDT, but no one else could have known what was going down. Under the old system I would have known that it was a [cardiac] arrest and the dispatcher would have let me volunteer and then would have given the sick job to the ambulance that was back at the station."[44]

II. EXPERIMENT NO. 2: BATTALION-BASED DEPLOYMENT

In April 1997, while the silent dispatching experiment was still in progress, Fire Department officials initiated a second, two-part experiment – the complete restructuring of the system for (1) positioning ambulances around the City and (2) programming the computer that helps to dispatch them. The result was an across-the-board increase in response times and in the number of calls for which no ambulance was available. After two months of abnormally high response times, which were continuing to increase from month to month, the Fire Department abandoned the worst aspects of the dispatching system. After another six weeks of rising response times, the Fire Department "revised" the system in Queens to an arrangement that closely resembles the former system.

Until April 1997, the Bureau of EMS had used the deployment system it inherited from NYC-EMS, which was designed to distribute each of the two kinds of ambulances throughout the City in order to minimize the length of time needed for an appropriate ambulance to reach and transport any patient to a hospital emergency department. The system was known as "cross-street location" deployment. The new system, invented by the Fire Department, is called "battalion-based" deployment.

Under the old, "cross-street location" system, each ambulance was assigned to a primary area of response that might be a small, densely populated area, such as a small part of lower Manhattan, or a much larger, less-populated area, such as southern Staten Island. When available and not in transit, each ambulance was required to remain within a short distance of its "position," (usually a street intersection) in its response area. Some ambulances were positioned at hospitals, but because most response areas did not contain a hospital, most ambulances were positioned at street corners.

In order to locate ambulance positions as close as possible to the potential locations of emergencies, the positions were distributed widely. Most of the approximately 240 positions[45] had a single ambulance assigned to them.

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[44]Interview of Queens-based paramedic who requested anonymity for fear of retaliation by Fire Department officials, September 25, 1997.

[45]Fire Department, "Enhancing Emergency Medical Care in New York City," October 18, 1995, p. 19.

As noted above, the Advanced Life Support (ALS) ambulances carry a crew of two paramedics who are trained and equipped to administer sophisticated emergency care, while the Basic Life Support (BLS) ambulances carry a crew of two emergency medical technicians (EMTs), who are trained to administer basic first aid, stabilize injuries, and perform lifesaving techniques.

EMS dispatchers, using dispatch computers, would assign a call to the appropriately-equipped (ALS or BLS) ambulance whose primary response area included the location of the call. If no appropriate ambulance was available and on-position in a response area, the dispatcher, with the assistance the computer, would assign a call to the closest available appropriately-equipped ambulance. Depending on the priority of the call and the location of the closest available ambulance, some calls would be "held," that is, not immediately assigned, pending an additional ambulance becoming available in the area. Calls concerning life-threatening conditions (segments 1-3) would be held much less frequently than calls for less serious conditions.

New York City's 250 ambulances respond to more than a million calls per year, for an annual average of more then 4,000 calls per ambulance.[46] Each call involves five stages for the ambulance and its crew: traveling to an emergency scene; working at the scene; transporting a patient to the hospital, transferring the patient to the care of the hospital staff and returning from the hospital to "position." The time that is required to complete the first four stages, during which the ambulance is unavailable for another assignment, is known as "call time." On average, an City ambulance crew spends 45 percent of its shift on call time. The City's Basic Life Support ambulances are busier than its Advanced Life Support vehicles. The call time of the average BLS ambulance occupies about 48 percent of its shift;[47] for ALS ambulances the call time occupies about 42 percent of the shift.[48]

For the remainder of an average 8-hour shift, an ambulance (both ALS and BLS) is at its assigned location waiting for a call for an average of 17 percent of the time and off-position but available for assignment about 19 percent of the time.[49] The City's ambulances are off-position so much that, on average, when an emergency occurs, the ambulance with primary responsibility for the location will be on-position only 17 percent of the time.

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[46]During the 12 months ending June 30, 1997, EMS responded to 1,016,451 incidents. Mayor's Management Report, Fiscal 1997, Vol. II, p. 11.

[47]Fire Department, "Unit Performance Indication Report, February 10, 1997, p.432.

[48]*Id.*, p.411.

[49]*Id.*

A. The 'Duplication' That Wasn't

The experiment in battalion-based ambulance deployment was first proposed in 1995, in a Fire Department report that "recommends duplicating the model that works so well for fire coverage."[50]

Even though the Fire Department characterized its plan for ambulances as "duplicating" the deployment of fire trucks, a comparison of the two deployment plans reveals that there an enormous difference between the Fire Department's deployment of fire trucks and "battalion-based deployment" of ambulances.

What is the "fire coverage" model? There are 226 fire stations organized into 49 fire battalions, each of which is made up of a collection of fire companies. Each company (or, frequently, pair of companies) is housed at a separate fire station. All the companies in a battalion are in a single area of the City, at scattered locations throughout the battalion area. The companies in a fire battalion are under the command of a battalion chief.

Just as fire trucks are positioned in 226 stations throughout the City, under the old cross-street-location ambulance deployment system, some 240 ambulance "positions" were scattered throughout the City. The close correlation between the number of fire stations and the number of old ambulance positions is no accident; it reflects the need of both kinds of emergency service vehicle to be deployed as widely as possible.

But the Fire Department's "battalion-based" deployment model for ambulances ignores the need for the widest possible deployment. Under the Fire Department's plan, there are 55 ambulance battalions with three to five ambulances in each of them. In most of the ambulance battalions the vehicles are stationed at a single location, from which they are required to cover a response area at least three times the size of the response areas of the old cross-street positions.

Battalion-based deployment of ambulances has the same command structure as battalion-based deployment of fire trucks, but it bears no physical resemblance to fire-truck deployment, because the fire stations in a battalion are scattered throughout the battalion area, while the ambulances are centralized at a single location. This difference between "battalion-based" deployment system for fire trucks and the "battalion-based" deployment system for ambulances appears to have been disregarded by Fire Department officials.

By enlarging ambulance response areas and assigning three to five ambulances to them, Fire Department officials expected that at least one ambulance would always be available in each response area, because, as they explained "the ambulance crews *collectively* cover the entire battalion." The officials were certain that battalion-based deployment was the key to improving ambulance response

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[50]Fire Department, "Enhancing Emergency Medical Care in New York City," October 18, 1995, p. 20.

time, because it "achieves a consistent, predictable travel time" [emphasis in original].[51] Fire Department managers anticipated that the new deployment would "decrease response time during unit tour [*i.e.*, shift] changes" and "improve [over-all] response time."[52] But the facts proved them wrong.

B. Response-time Rises Suddenly and Sharply

The plan to shift Bureau of EMS ambulances to battalion-based deployment was put into effect Citywide, without any pilot-program trial, on April 28, 1997.[53]

The battalion-based deployment caused a sudden and sharp increase in response times and the number of calls that had to be put on hold because the dispatch computer could not recommend ambulances that were available and nearby but did not fit the program's criteria for assignment because of their battalion designation.

- Response time increased across-the-board each month after the experiment began. By June, average response time to a life-threatening call had lengthened by 44 seconds, a 9.1 percent increase over the average for the three months before the experiment (See Table 1, below).

- At every one of the eight priority levels (or segments), response time deteriorated significantly during the first three months of battalion-based dispatching. The magnitude of the deterioration time varied between segments, from a 32 second (6.5 percent) increase in segment 2 response time, to a 2-minute 30 second (23 percent) increase in the segment 8 average response time. Not only did the 3-month averages for response time increase dramatically, but each month was worse than the previous month.

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[51]Fire Department, "Enhancing Emergency Medical Care in New York City," October 18, 1995, p. 29.

[52]Fire Department Bureau of Fire Communications, EMS Dispatch Operations, Goals of the Battalion Based Model, no date.

[53]Fire Department, Bureau of EMS, "Operations Order #97-046" April 15, 1997 and "Operations Order #97-047," April 15, 1997.

TABLE 1: RESPONSE TIME –
BATTALION-BASED DEPLOYMENT'S EFFECT ON AVERAGE TIME TO RESPOND TO LIFE-THREATENING CALLS (SEGMENTS 1 - 3) AND TO ALL CALLS
JANUARY - MARCH 1997 TO APRIL - JUNE 1997

AVERAGE RESPONSE TIME BY SEGMENT AND MONTH

Segment	Jan - Mar avg.	April	May	June	Apr - Jun avg.	% change in 3-month avg.
1-3	8:04	8:30	8:37	8:48	8:38	+ 9.1%
1	**6:04**	**6:18**	**6:28**	**6:39**	**6:28**	**+ 6.6%**
2	8:10	8:36	8:39	8:50	8:42	+ 6.5%
3	**8:13**	**8:45**	**9:02**	**9:12**	**9:00**	**+ 9.5%**
4	10:10	11:39	12:09	12:27	12:05	+18.9%
5	**10:34**	**12:12**	**12:40**	**12:55**	**12:36**	**+18.6%**
6	10:53	12:27	13:03	13:17	12:56	+18.8%
7	**10:06**	**11:39**	**12:16**	**13:01**	**12:19**	**+21.9%**
8	10:51	12:48	13:27	13:48	13:21	+23.0%

- The number of "held" calls shot up, as did the length of time calls remained on hold. A 911 call is said to be "held" if there is no vehicle that can immediately take the assignment. In that case, the dispatcher holds the call until there is a vehicle that can take it. During the first three months of the experimental deployment system, the frequency with which life-threatening calls had to be held rose by 33 percent. During the first three months of the experiment, life-threatening calls that were held had to be kept on hold for an average of five minutes and 37 seconds, compared to an average of four minutes and five seconds during the previous three months, a 38 percent increase in holding time.

After a month of experience with battalion-based deployment, three Bureau of EMS dispatchers made sworn statements that the system is dangerous. One of them, who has worked as a dispatcher or dispatcher-instructor for NYC-EMS and the Fire Department's Bureau of EMS since 1985, said in a deposition that battalion-based deployment was "endangering people's lives."[54] Another Bureau of EMS EMT with ten years' experience as a dispatcher said that the new system

[54]Affidavit of a Bureau of EMS dispatcher in *McAllen v. Marcos*, Index No. 104767/96 (filed in New York Supreme Court with the identity of the affiant kept confidential by the Court), June 17, 1997, p.5.

had been a "disaster,"[55] According to another Bureau of EMS dispatcher with 13 years' experience, battalion-based deployment was "threatening to the life and well-being of New Yorkers."[56]

Two EMS paramedics, Richard J. Allen and Miriam Arnold, are seeking an injunction against the Fire Department's battalion-based deployment operation in connection with their lawsuit charging that the merger of NYC-EMS and the Fire Department is illegal.[57]

C. Repairing the Damage

In reaction to the deterioration in response times, the Fire Department ordered two major modifications in battalion-based deployment and dispatching. Two months after the experiment began, the Fire Department abandoned the worst aspects of the communications and dispatching aspect of the program (see the next section for details). After another six weeks the Fire Department redeployed the ambulances in Queens to positions based on the old, decentralized deployment system.

Based on the limited information that the Office of the Public Advocate has obtained concerning the results of these modifications, it appears that many of the indicators that had seriously deteriorated in the months immediately following the initiation of the new system showed improvement. But in the third quarter of 1997 (the most recent period about which the Office of the Public Advocate has obtained statistical information), almost every measure of response time continued to show some deterioration in comparison to the period before the Fire Department initiated its "battalion-based" ambulance experiments.

- During the first three months of the experimental deployment system, the average response time to life-threatening calls was eight minutes 38 seconds, compared to a eight minute and six second average response time during the nine months prior to the change – a 7 percent deterioration.[58] After the system had been revised, the average response time for such a call was eight minutes and 18 seconds.[59]

- During the first three months of the new system, the 90th percentile response time (the length of time needed for the response that was the quickest of the slowest ten percent of all the responses) for life-threatening calls rose by 9 percent, from 13 minutes (and no seconds) to

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[55]Affidavit of a Bureau of EMS dispatcher in *McAllen v. Marcos*, June 6, 1997, p.2.

[56]Affidavit of a Bureau of EMS dispatcher in *McAllen v. Marcos*, June 10, 1997, p.2.

[57]*McAllen v. Marcos*, State Supreme Court, New York County, Index No. 104767/96.

[58]Fire Department Bureau of EMS, "Citywide Executive Director's Report" monthly for July 1996 - June 1997.

[59]Fire Department Bureau of EMS "Citywide Executive Directors Report" for the quarter July - September 1997.

14 minutes and 11 seconds.[60] After the system had been modified to resemble the old dispatch method, the 90th percentile response time improved to 13 minutes 39 seconds,[61] which was still five percent longer than the time had been prior to the experiment.

The impact of battalion-based deployment can be seen in summaries of ambulance response time statistics, contained in the Bureau of EMS's "Citywide Executive Director's Report." The Office of the Public Advocate has requested copies of these reports from the Fire Department.[62] The Fire Department has made no response to the request after 12 weeks.

Nevertheless, the Office of the Public Advocate has obtained copies of some Fire Department statistics for 1997. (See Appendices A and B, following page TK.)

According to the Fire Department's statistics, the initial catastrophic impact of battalion-based deployment has been partially corrected, but even the most recent available response time statistics show that response times are worse than they had been just prior to the initiation of battalion-based deployment.

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[60]TK

[61]TK.

[62]"[W]e also request copies of the statistical section of the Citywide Executive Director's Reports for the period from March 1996 to the present, including number of records, number of incidents, mean response time, 50th and 90th percentiles, mean dispatch time, mean travel time, number of held incidents, and the number and distribution of no-unit-available incidents." Letter from Public Advocate Policy Analyst Jonathan Bennett to Lynn Tierney, Deputy Fire Commissioner for Intergovernmental Affairs, August 19, 1997, p.2.

TABLE 2. CHANGE IN AVERAGE RESPONSE TIMES
TO LIFE-THREATENING CALLS (SEGMENTS 1-3) AND TO ALL CALLS
JULY-AUGUST-SEPTEMBER 1996 TO JULY-AUGUST-SEPTEMBER 1997[63]

	-----1996------		----------1997----------						+%
	[redacted]	Oct-Dec	Jan	Feb	Mar	Apr	May	Jun	[redacted]	3rd qtr '96-3rd qtr '97
Segments 1-3	[redacted]	8:19	8:06	7:55	8:09	8:30	8:37	8:48	[redacted]	+4.4%
Seg 1	[redacted]	6:10	6:04	5:57	6:13	6:18	6:28	6:39	[redacted]	8.0
Seg 2	[redacted]	8:28	8:15	8:04	8:13	8:36	8:39	8:50	[redacted]	3.2
Seg 3	[redacted]	8:24	8:12	8:01	8:26	8:45	9:02	9:12	[redacted]	7.1
Seg 4	[redacted]	10:36	9:56	9:53	10:40	11:39	12:09	12:27	[redacted]	7.6
Seg 5	[redacted]	10:55	10:20	10:16	11:08	12:12	12:40	12:55	[redacted]	6.7
Seg 6	[redacted]	11:41	10:39	10:37	11:24	12:27	13:03	13:17	[redacted]	5.6
Seg 7	[redacted]	10:21	9:54	9:45	10:38	11:39	12:16	13:01	[redacted]	8.3
Seg 8	[redacted]	11:13	10:39	10:25	11:28	12:48	13:27	13:48	[redacted]	6.5

The Fire Department's battalion-based deployment system was supposed to improve response times, so any long-term deterioration – even a small one – is unacceptable. Moreover, the small deterioration noted in the official reports is an understatement of the magnitude of the problem, because the Fire Department has changed the meaning of response time.

Before the Fire Department increased the EMS fleet with "paramedic jeeps," vehicles that can respond to emergencies but cannot transport a patient to an emergency room, "response time" always referred to "*ambulance* response time," that is, the interval between when a call was received by EMS and when the first ambulance reaches the scene of the emergency. (For details of the paramedic jeep program, see "Experiment No. 4: Paramedic Jeeps" beginning on page 42.) Today, response time measures the time needed for *any emergency service vehicle* to arrive – including a vehicle that cannot by used for patient transport. In any case that urgently requires transport to an emergency room, the arrival of a non-transport vehicle on the scene is not comparable to the arrival of a transport vehicle. Cases in which response time is based on the time of arrival of a non-transport vehicle, even when urgent patient transport is needed and the first ambulance arrives more than 20 minutes later, play havoc with any effort to use changes in response time statistics as an indicator of EMS effectiveness.

Other aspects of response time suffered even greater increases in the period immediately following the installation of the new system, but, according to Fire Department statistics, some of the shortcomings have since been corrected.

[63]TK.

For example, during the first three months of battalion-based deployment, dispatchers had to hold the life-threatening calls at a rate that was 33 percent higher than under the old system. During January - March 1997, prior to battalion-based deployment, 9.2 percent of life-threatening calls were held; during the first three months of battalion-based deployment, 12.3 percent of such calls were held.[64] During July - September 1997, 9.5 percent of such calls were put on hold, a slight deterioration from the pre-experiment holding rate.[65]

D. What Went Wrong?

Why did battalion-based deployment play havoc with EMS effectiveness?

On average, New York City ambulances are off-position 83 percent of the time. That is, for that portion of the day a typical ambulance would be on a call or on its way back to its position from an emergency room, or otherwise occupied. During the remaining 17 percent of the day the typical ambulance is on-position and waiting for a call. But ambulances are available for assignment for almost one-quarter of the time they are off-position, because an ambulance becomes available for an assignment as soon as it leaves an emergency room to return to its position.

Under the cross-street location deployment system, most response areas were covered by a single ambulance of each type; since ambulances were off-position most of the time, the nearest available ambulance would more often than not be responding from outside its primary response area. This dynamic and fluid deployment of ambulances was quite different from the deployment of fire trucks, which are available and on-station approximately 90 percent of the time.

Battalion-based deployment of ambulances has increased response time because ambulances no longer are positioned as widely as possible throughout the City. Three or more ambulances that formerly had been assigned to widely separated street corners are now all assigned to a single base, with the result that much more than half of each battalion's response area is now farther from the closest ambulance "position."

For example, all the ambulances that under the old deployment system had been assigned to scattered locations in the north-western part of the Bronx are now stationed at West 230th Street and Tibbett Avenue. From that location, an ambulance would need to travel more than two-and-a-half miles to reach an emergency in North Riverdale.

Similarly, the only ambulance station that now serves the northern end of Manhattan is at 184th Street and Broadway, more than two and a quarter miles from the edge of the station's response area. One of the ambulances now positioned at this location was, under the cross-street

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[64]Fire Department Bureau of EMS, "Executive Director's Report" (monthly) January - June 1997.

[65]Fire Department Bureau of EMS, "Executive Director's Report" (quarterly) July - September 1997.

location system, positioned at Dyckman Street and Broadway, a mile farther north and a mile closer to the northern end of its new primary response area.

Fire Department officials were so confident that battalion-based deployment would improve Bureau of EMS effectiveness that they switched deployment methods for the whole City at the same time.

The Office of the Public Advocate has asked the Fire Department whether it has collected and analyzed information on the effectiveness of battalion-based deployment.[66] The Fire Department failed to respond.

Even without a formal evaluation system, the new program's effect on response time and the number of calls that had to be held was so counterproductive that the Fire Department abandoned it in Queens after 15 weeks.[67]

Battalion-based deployment had a severe impact in Queens, which has the largest land area of the City's five boroughs. Even with the deployment of paramedic jeeps and the resulting understatement of response time statistics, the figures were disturbing. Comparing the first three months under the experimental system to the three previous months, average response time to life-threatening calls went up 9 percent, from 8 minutes 18 seconds to 9 minutes two seconds; the frequency with which life-threatening calls had to be "held" because no ambulance was immediately available to respond rose by 89 percent (from 3.2 percent to 5.9 percent); the average length of time before an ambulance was available for dispatch to a life-threatening call that had been held went up 22 percent, from 5 minutes 50 seconds to 7 minutes six seconds.

Fifteen weeks after having concentrated its Queens force of approximately 53 ambulances and five paramedic jeeps into 20 locations, the Bureau of EMS re-redeployed them to 56 separate cross-street locations on August 10, 1997. As a result, approximately two-thirds of the land area of Queens now is closer to the nearest ambulance position than had been the case under battalion-based deployment.

The August 8 order to scatter ambulances throughout Queens at separate locations describes it as a "new pilot program" and gives no indication that it is has any connection to the old NYC-EMS deployment system. Unlike the order to begin battalion-based deployment, which included nothing about the need to evaluate the new system, the new order emphasizes that the purpose of the change "will be to evaluate the response performance of resources place at individual cross street locations,

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[66]"Has FDNY-EMS gathered statistical or other information that measures or reflects on the effectiveness of battalion-based deployment? If so, please describe what kind of information has been collected and how it is evaluated. Has FDNY-EMS reached any conclusions, including preliminary ones? Please provide any documents setting forth such conclusions." Letter from Public Advocate Policy Analyst Jonathan Bennett to Lorraine Giordano, M.D., Medical Director of the Bureau of EMS, August 21, 1997, p.5.

[67]Fire Department, Bureau of EMS, "Operations Order #97-096," August 8, 1997.

in lieu of several units placed at Battalion locations....This pilot will be regularly compared to past performance in the Battalion model, to ensure maximum performance of resources."[68]

The Office of the Public Advocate does not have access to a breakdown of ambulance statistics in Queens for the period since the Fire Department abandoned battalion-based deployment there.

III. EXPERIMENT NO. 3: BATTALION-BASED DISPATCHING

Battalion-based dispatching is the command-and-communications aspect of the Fire Department's "battalion-based deployment model." When battalion-based dispatching was inaugurated Citywide on April 28, 1997, the immediate result was a sharp deterioration in response time and a large increase in the incidence of calls to which EMS could not immediately respond because the dispatch program could not identify any ambulance available for the assignment. As weeks passed and ambulance operations became increasingly chaotic, it became clear that the new dispatching system was not simply going through a break-in period. Finally on June 27, the Fire Department gave up two of battalion-based dispatching's principal features. Ambulance dispatching operations improved, but remained worse than they had been before the changes were introduced in April.

Battalion-based deployment and battalion-based dispatching are not always linked. As noted above, Queens ambulances are now deployed according a cross-street location system at the same time that they are being dispatched according to a battalion-based system. Conversely, it would have been possible for the Fire Department to have re-positioned ambulances at centralized battalion locations without making major changes in the way the ambulances are dispatched. According to the Fire Department's plan, however, a new dispatching method was an important aspect of the new system.

When battalion-based dispatching was put into effect on April 28, 1997, there were five important differences between it and the old dispatching system:

- Under battalion-based dispatching, each ambulance is assigned to one of nine geographic areas called a "division." Whenever an ambulance traveled outside the boundaries of its division, it was considered "off-service."[69] Thus, the dispatch computer would not recommend it for an assignment even if it was free to take one near its current location. Under the old dispatch system, the dispatch computer would recommend any available ambulance for any nearby assignment.

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[68]Fire Department, Bureau of EMS, "Operations Order #97-096," August 8, 1997, p.1.

[69]Fire Department, Bureau of EMS, "Operations Order 97-047," April 15, 1997.

- In addition to disregarding ambulances that happened to be outside the boundaries of their division, the battalion-based computer dispatch program limits its search for an available ambulance to a smaller geographic area than under the former program. Consequently, at times of heavy activity the program is more likely to report "no ambulance available."

- The Fire Department took away from dispatchers their former authority to override the dispatch computer's recommendations, even when the dispatcher was aware that the recommendation could be improved upon. If the dispatcher wanted to override the computer's recommendation, he or she had to obtain the consent of a dispatcher supervisor.

- Under the old dispatching system, each ambulance had a radio designation number that contained important coded information that dispatchers and ambulance crews could interpret and use effortlessly. Bureau of EMS personnel could tell, from the 4-digit radio designation alone, which borough and section of borough an ambulance was stationed in, what kind of ambulance (ALS or BLS) it was, and which tour (shift) the ambulance belonged to. The new numbers that have been assigned for battalion-based dispatching do not directly identify the borough or area in which an ambulance is based and they do not identify the tour that the ambulance belongs to.

- Under battalion-based dispatching, the dispatch computer is programmed to give a disproportionate number of assignments ambulances with lower digit designations and at the same time leave ambulances with higher digit designations idle for a disproportionally larger part of each tour.

Each of these differences has caused problems in ambulance dispatching efficiency.

A. The reasons for battalion-based dispatching's failure

The danger of battalion-based dispatching is explained in an affidavit filed in *McAllen v. Marcos* by a Bureau of EMS dispatcher with ten years' experience, which states:

> "Prior to April 28, 1997, the computer dispatching system worked as follows: The ambulances were assigned to one of 200 geographic locations, called atoms. Each atom had one or more ambulances assigned to it. When the computer provided recommendations of ambulances to be assigned, the recommendations were ranked in order of which ambulance units were closest to the call. The computer's search for the closest ambulance was of the atoms surrounding the area. Ordinarily, the dispatcher would assign the call to the ambulance that the computer indicated was closest....

"Under the old system...the dispatcher had significant authority to search for available ambulance units outside the recommendations provided by the computer and to make assignments not specifically designated by the computer, where circumstances warranted.

"Under the old system, dispatchers were instructed not to 'hold' calls. A call is a 'held' call when the dispatcher does not dispatch an ambulance in response to the call. Under the old system, the only instances in which a call would be held were those in which the computer showed that no unit was available and the dispatcher could not locate an available unit by other means. In my own experience, the instances in which calls were 'held' were few and those held for more than 10 minutes were rare.

"On April 28, the Fire Department initiated its new 'battalion-based' system. Under the new system the computer has a different system for designating nearest available ambulance units, and the authority of dispatchers to override computer recommendations and to supplement the information provided by the computer with their own knowledge of the actual location of other units is severely circumscribed. The result has been an enormous increase in the number of held calls and an increase in the length of time those calls are held."

"....[T]he frequency with which the computer reports that 'no unit is available' has skyrocketed under this new system.

".... In addition, the length of time calls are held has shot up. Just last week, I was forced to hold a call for in excess of one hour. Finally, I contacted the Police Department and arranged to have a patrol car transport the caller to the hospital. Hardly ever before have I had such an experience."[70]

Another Bureau of EMS dispatcher, who has 13 years' experience, stated in an affidavit that:

"[D]ispatchers are not permitted to call upon a unit that is not recommended by the computer without the approval of a supervisor, and even then, permission is not readily granted .... I have direct knowledge of a situation in which a unit from Brooklyn had just delivered a patient to a burn unit in a Manhattan special treatment facility. A call came in for a cardiac arrest at a Manhattan location only blocks away from the unit that had just completed its patient delivery. The computer had no suggested units – it did not and would not indicate the availability of the Brooklyn-based unit because that unit was outside of the battalion area ... from which the call had come. The dispatcher happened to be aware of the proximity of the Brooklyn unit. He could not immediately assign the unit, however, as he had been able to do under the old system. Instead, he had to track down

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[70]Affidavit of a Bureau of EMS dispatcher in *McAllen v. Marcos*, Index No. 104767/96 (filed in New York Supreme Court with the identity of the affiant kept confidential by the Court), June 6, 1997, pp. 4-7.

a supervisor and request permission. He received permission. But way too much time was lost in the transaction."[71]

Limiting the search for an available ambulance can have dangerous or deadly consequences, according to Bureau of EMS paramedic dispatcher Richard McAllen, who has, in connection with his lawsuit, submitted examples of failures under battalion-based dispatching.[72]

- On April 29, 1997, the Bureau of EMS received a call concerning an unconscious 35-year-old diabetic in Williamsburg, Brooklyn.[73] According to the computer, there was "no ambulance available" under the restrictive battalion-based dispatch protocol, even though, according to McAllen, "medics [in an ALS ambulance] were available in the vicinity of Long Island College Hospital, eight minutes away [but] in another battalion." No ambulance was sent until the dispatcher obtained a supervisor's permission to manually override the computer program. When an ambulance arrived 19 minutes after the call was received, the victim was dead. "That was the first documented system failure where a patient's chances were reduced to virtually zero by a lengthy delay in paramedic response," says McAllen.[74]

- On May 3 the Bureau of EMS received a call concerning a potentially life-threatening case of internal bleeding;[75] "no ambulance was available" in the limited battalion-based response area for an hour and 56 minutes. Thus, an ambulance arrived on the scene two hours and five minutes after the call was received.

- On May 4 the Bureau of EMS received a call concerning a potentially life-threatening allergic (anaphylactic) reaction.[76] "No ambulance was available" in the limited battalion-based response area; 21 minutes after receiving the call the dispatcher assigned it to an ambulance that needed to travel 17 minutes to reach the scene, for a total waiting time of 38 minutes.

- On May 4 the Bureau of EMS received a call concerning an elderly patient with a fractured hip.[77] "No ambulance was available" in the limited battalion-based response area; an hour and six minutes after receiving the call the dispatcher went outside the

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[71]Affidavit of a Bureau of EMS dispatcher in *McAllen v. Marcos*, Index No. 104767/96 (filed in New York Supreme Court with the identity of the affiant kept confidential by the Court), June 10, 1997, pp. 4-5.

[72]*McAllen v. Marcos*, Reply Affidavit in Support of Order to Show Cause, June 18, 1997, Exhibit 3: "Sampling of NYC EMS emergency medical calls held under the FDNY Battalion Based Dispatch System."

[73]Computer Aided Dispatch No. 2826.

[74]Telephone interview of Richard McAllen, October 24, 1997.

[75]Computer Aided Dispatch No. 0140.

[76]Computer Aided Dispatch No. 0127.

[77]Computer Aided Dispatch No. 2940.

battalion-based dispatching protocol and assigned the call to an ambulance in another Fire Department division, which then needed 21 minutes to reach the patient.

B. Retreat from battalion-based dispatching

Fire Department officials made their first big retreat from battalion-based dispatching on June 27.[78] As had been the case when they gave up on silent dispatching, the official order for the change gives no indication that it is effectively a return to the pre-battalion-based dispatching system, but experienced Bureau of EMS personnel saw it as a "sign of failure." As one veteran paramedic described the June 27 order to our investigator, "they gave up 90 percent of the dispatching system because it was a disaster."[79]

The "revision" of battalion-based dispatching made two changes: it returned the dispatch computer to its former state of considering all available ambulances in the search for one to assign, including ambulances that are outside their division boundaries. It gave dispatchers the authority to query any ambulance as to its current location and availability, instead of requiring dispatchers to select an ambulance on the basis of each crews' last report, an authority that had been taken away when battalion-based dispatching was initiated.

The first revision is meant to eliminate the difficulty created by the battalion-based dispatching system's inability to give assignments to ambulances returning to base from outside their division boundaries. The second revision makes it possible for dispatchers to take the initiative in especially urgent situations and ask ambulance crews to give updated reports of their positions and availability, in contrast to the battalion-based dispatching policy of compelling dispatchers to make choices based on position reports that may be badly outdated.

Recent Fire Department statistics indicate that the great initial increase in number of held calls has been reduced. According to Bureau of EMS dispatchers and ambulance crews, however, more calls continue to be held than had been the case under the old system. "Up 'til this year I never saw so many calls put on hold, or calls holding for so long," an Queens-based EMT told our investigator. "It's got a little better since July, but it's still out of control."[80]

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[78]Fire Department, Bureau of Fire Communications, EMS Dispatch Operations, "Division Memorandum 97-47," June 26, 1997.

[79]Telephone interview of a Bureau of EMS paramedic who requested anonymity because he feared retaliation by Fire Department officials, October 17, 1997.

[80]Office of the Public Advocate interview of a Bureau of EMS EMT who requested anonymity for fear of retaliation by Fire Department officials, October 2, 1997.

"We're getting jobs [assignments] that have been holding for a long time, longer than before FDNY took over," an EMT in Brooklyn said. "I never saw so many jobs held for so long and FDNY doesn't seem to know what to do about it."[81]

We have been unable learn the reason for the lack of agreement between the statistics and anecdotal reports.

C. Continued Problems With the New Dispatching System

Fire Department statistics show that ambulance response time is still slower than it had been before the introduction of battalion-based deployment and dispatching. Comparing the most recent period for which the Office of the Public Advocate has been able to obtain Fire Department statistics (July, August and September 1997) to the same period a year earlier, there is an across-the-board deterioration in response time: average response time to life-threatening incidents is up by 4.4 percent, from 7 minutes 57 seconds to 8 minutes 18 seconds; the average response time for calls of the highest priority (segment 1) is up by 28 seconds to six minutes 20 seconds (an 8 percent increase); every other priority level also shows an increased response time, ranging from 16 seconds in segment 2 (3.2 percent) to 51 seconds in segment 7 (8.3 percent). (See Table 2, page 32, 42.)

As noted above, one of the difficulties inherent in battalion-based dispatching is the numbering system now used to identify the ambulances.

Under the old system, each ambulance radio designation number instantly gave Bureau of EMS personnel important information about the ambulance with that number. All ambulances based in Manhattan had radio designations beginning with "1." The Bronx was "2," Brooklyn "3," Queens "4" and Staten Island "5." The second number in the old radio designations indicated what part of the borough the ambulance was stationed in; Manhattan, for example, was divided into nine dispatch sectors, with sector one in the extreme south and sector nine in the extreme north, with the intervening areas numbered in order from south to north. The third part of the radio designation was a letter, indicating whether the ambulance was an ALS or BLS vehicle, the last part of the radio designation was 1, 2, or 3, indicating whether the ambulance was assigned to the first, second, or third shift.

An experienced dispatcher could use the information encoded in a radio designation to make important dispatch decisions quickly, because, as veteran paramedic Richard McAllen puts it: "Even a dispatcher who is not intimately familiar with the borough can tell at a glance [from the old radio designation] the ambulance's primary area of response."[82]

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[81]Interview of a Bureau of EMS EMT, who requested anonymity for fear of retaliation, September 13, 1997.

[82]Telephone interview of Richard McAllen, October 24, 1997.

For example, if two ambulances were available in the vicinity of a call at the southern end of Staten Island, but one of the two was away from its primary area of response at the north end of the island, the dispatcher could immediately discern which was which, and would give the call to the ambulance that was on location, so the other ambulance could return to its own response area. "With the old numbers I knew a lot about a 'truck' [in-house slang for "ambulance"] from its number – anyone who had been on the job for a week could automatically tell where an ambulance 'sat' [*i.e.*, was positioned] within a dozen blocks. Now I need to check those stupid battalion numbers on a g–d—ed crib sheet," one veteran Bureau of EMS dispatcher told our investigator.[83]

To make accurate dispatch decisions, dispatchers regularly need to know quickly an ambulance's primary area of response because EMS ambulances make frequent trips outside their primary response areas to deliver patients to special facilities for replantations, major burns and spinal injuries (as well as venomous bites and divers' decompression emergencies), which are not located in every borough.[84] Even major trauma cases often require extended travel within a borough, because three boroughs – Brooklyn, Staten Island and the Bronx – each depend on just two trauma centers, leaving large areas of each borough without facilities to treat major trauma cases, which include any patient who loses consciousness after a blow to the head, any patient with a penetrating wound (including gunshot or knife wound) to the head, neck, chest or abdomen, and any patient with two or more broken leg or arm bones.[85]

In contrast to the straightforward correlation between the old radio designations and geography, battalion-based radio designations include a completely arbitrary indication of each ambulance's base. The new radio designations use the battalion number of each ambulance to indicate where the ambulance is based. The numbers used by the Fire Department to designate the 55 battalions skip from borough to borough, without a geographical basis; for example, Battalion 23 is in Staten Island, 24 is in the Bronx and 25 is in Manhattan.[86] The new numbering system for ambulances was designed to correlate with Fire Department battalion designations, which are based on history, not geography.

In addition to the geographical confusion inherent in battalion-based radio designations, the new numbers also omit any information about the shift to which an ambulance belongs, information that is important to a dispatcher around the time of shift changes. Shifts are staggered to avoid

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[83]Interview of a Bureau of EMS dispatcher, who requested anonymity for fear of retaliation, September 3, 1997.

[84]The City's only spinal cord injury center is in Manhattan; its only venomous bite center and its only hyperbaric center (for divers' decompression emergencies) are in the Bronx; and its burn centers are only in Manhattan and the Bronx.

[85]Regional Emergency Medical Advisory Committee of New York City, "Prehospital Basic and Advanced Life Support Protocols" January 1996, Appendix, pp. 10-11.

[86]Manhattan is covered by battalions 1, 2, 4, 6, 7, 9, 10, 11, 12, 13, 16 and 25. Bronx battalions are 3, 14, 15, 17, 18, 19, 20, 24, 26, 27, 29, 55 and 56. Staten Island battalions are 21, 22, and 23. Brooklyn battalions are 28, 31, 32, 33, 35, 37, 38, 39, 40, 41, 42, 43, 44, 48, 57 and 58. Queens battalions are 36, 45, 46, 47, 49, 50, 51, 52, 53, 54 and 59.

coverage problems when they change. Due to the staggered shift changes, an ambulance from Tour 1 (the midnight-to-8am shift) and an ambulance from Tour 2 (the day shift) may be in operation simultaneously. If a dispatcher has a choice between two ambulances at 8am, knowing which of the ambulances is at the very end of its shift can help to avoid unnecessary overtime and crew burn-out. As one Bureau of EMS dispatcher explained to the Office of the Public advocate: "I know which tour the units in my own sector are on, so I can choose the right crew among them, but I can't possibly remember the tour changes of every ambulance passing through my sector, and it makes no sense to give a job to an ambulance right at the end of its shift when there's a fresh crew that could be on-scene just as fast."[57]

D. Assignment-rotation failure

Under the battalion-based deployment system, all the ambulances assigned to a particular location have similar radio designations – for example, the three ambulances stationed at Duane and Church Streets in Manhattan are designated A011, A013 and A014. If more than one of those ambulances is available for an assignment in lower Manhattan, the dispatch program will always select the ambulance with the lowest number, even if that ambulance has just returned from a job and A014 has not had any assignment for hours.[58] The result is that the ambulances with low-digit designations tend to get many more assignments than those with high numbers, even though they are identical ambulances waiting for assignment at a single location. Since ambulance crews usually take the same ambulance every time they work, the crews assigned to low-digit ambulances are doing a disproportionally large share of the work, apparently for no reason except that the dispatch program lacks the ability to give out assignments in rotation.

IV. EXPERIMENT NO. 4: PARAMEDIC JEEPS (APRUs)

As noted above, before the merger with the Fire Department, every emergency medical vehicle that responded to 911 calls in New York City was an ambulance, capable to transporting victims of trauma or sudden illness to an emergency room. Six months after taking the ambulance service over, the Fire Department began to replace some ambulances with vehicles that carry the same equipment as an ambulance, but lack the ability to transport a patient. The new vehicles are officially designated as Advanced Patrol Response Units, or APRUs. They are widely known as paramedic jeeps.

In December 1996 the Fire Department began to cut back the number of ambulance tours (a "tour" is an 8-hour shift by one ambulance with a crew of two paramedics or EMTs; "tour" also refers to an entire shift – Tour 1 is the midnight shift, Tour 2 is the day shift and Tour 3 is the

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[57]Interview of a Bureau of EMS dispatcher, who requested anonymity for fear of retaliation, September 3, 1997.

[58]Fn. TK.

evening shift). By March 1997, the total number of ambulance tours had been cut by 40 per day, for a reduction of 7.2 percent over three months.

Before paramedic jeeps were first deployed in November 1996, the Fire Department conducted 554 ambulance tours each day. When the first paramedic jeeps were deployed on November 17, 1996, the paramedic jeep tours were supplemental to the number of ambulance tours, which remained unchanged.

CHANGE IN THE DAILY NUMBER OF SCHEDULED TOURS
BY CITY-OWNED AMBULANCES AND PARAMEDIC JEEPS
SEPTEMBER 1996 - MARCH 1977[89]

Date	Ambulance tours	Paramedic jeep tours
9/17/96	554	0
11/17/96	554	2
12/2/96	551	5
1/5/97	546	13
1/12/97	546	15
2/2/97	544	24
3/2/97	514	66

Between November 1996 and March 1997 the Fire Department reduced the number of ambulance tours by 7.2 percent. Counting the new paramedic jeep tours, there was a 4.7 percent increase in emergency medical service tours over the same period.

Since March 1997, the Fire Department has not published statistics that distinguish between ambulance tours and paramedic jeep tours, so the current number of ambulance tours is unknown to the Office of the Public Advocate.

We have received reports from Bureau of EMS paramedics and EMTs that the paramedic jeep program has been cut back sharply since the spring. As one Bronx-based EMT put it: "They have all but disappeared from the streets because they were sending them out on jobs without any backup, which often didn't do any good."[90] The Office of the Public Advocate has received similar reports from all boroughs, but we have not been able to obtain official confirmation.

Whatever the current size of the paramedic jeep program, it is important to review the way it was initiated and analyzed, because it is an example of the Fire Department's willingness to conduct major experiments that can have direct detrimental effects on New York City's residents and visitors.

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[89]Source: Fire Department, "Chronology of Changes to the Current Ambulance Schedule," March 10, 1997.

[90]Office of the Public Advocate interview, with a Bureau of EMS EMT who requested anonymity for fear of retaliation, August 16, 1997.

A. Rapid Transport Saves Lives

The mission of any emergency medical care organization is to reduce mortality and morbidity in that group of people who suffer sudden illness or trauma; the City's EMS achieves that objective by transporting such people to hospital emergency departments and administering all necessary care before reaching an emergency room.

The pre-hospital care given by a paramedic or EMT can make the diffetence between life and death, but regardless of whatever treatment the ambulance crew can administer, transport to an emergency room is an essential element in the response to almost any life-threatening medical emergency and to all such cases involving trauma. The governing medical protocols put great emphasis on the urgency of transport to an emergency room rather than on-scene treatment under certain circumstances:

- "For [major] trauma patients, immediate transport is a priority!"[91]
- "Traumatic cardiac arrest is a critical, life-threatening emergency and should be transported immediately [emphasis in original]."[92]
- "Decreased breath sounds and muffled heart sounds [in patients with chest injuries] indicate life-threatening chest injuries. The patient should be transported immediately."[93]
- "In patients in traumatic cardiac arrest, rapid transport is the highest priority!"[94]

Even though the Fire Department first deployed paramedic jeeps on November 17, 1996,[95] the first Fire Department Operations Order including any information about paramedic jeep operations was issued 16 weeks later on March 7, 1997,[96] according the Assistant Chief of EMS Robert McCracken. The March 7 order, which was one page long, was supplemented on March 24 by a six-page Operations Order,[97] which lays out – apparently for the first time – a complete set of guidelines for the use and deployment paramedic jeeps.

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[91]Regional Emergency Medical Advisory Committee of New York City, "Prehospital Emergency Medical Technician Basic Life Support Protocols," January 1996, p.17.

[92]*Id.* p.36.

[93]*Id*, p.39.

[94]Regional Emergency Medical Advisory Committee of New York City, "Prehospital Advanced Life Support Protocols," January 1996, p.31.

[95]Memorandum of March 27, 1997, from Robert A. McCracken, Assistant Chief of EMS to Gustave Pappas, Chief, Intergovernmental Affairs, p.1.

[96]Fire Department, Bureau of EMS, Operations Order 97-033.

[97]Fire Department, Bureau of EMS Operations Order, "Advanced Patrol Response Unit (APRU) Operations," March 24, 1997.

B. Deficiencies of paramedic jeeps

If the City had an adequate number of ambulances, it would be unusual for dispatchers to "hold" calls in life-threatening emergencies. In practice, the shortage of ambulances forces Bureau of EMS dispatchers to hold more than 100 such calls in an average day. And 50 times a day, day in and day out, more than 11 minutes pass before an ambulance becomes available and responds to life-threatening emergencies.[98]

If the Fire Department were deploying paramedic jeeps and leaving the number of ALS ambulances unchanged -- so that the jeeps were completely supplemental to the ambulance fleet -- the program might represent a cost-effective way to improve the delivery of emergency medical services, because a paramedic jeep is less expensive to purchase and operate than an ALS ambulance.

If such a program were properly implemented, it could increase Bureau of EMS effectiveness, because it could speed the arrival of paramedics (without compromising patient transport capability) in emergencies that require "dual response," *i.e.*, the dispatch of two vehicles, a BLS ambulance and a vehicle with a paramedic crew (ALS ambulance or paramedic jeep). Dual response is Bureau of EMS policy for certain kinds of call, whenever possible, including any call involving any of seven kinds of emergency -- cardiac arrest, choking, near-drowning, a fall from great height, epileptic seizure, major trauma, and internal bleeding. The objective of dual response is not extra transport, but to put an extra pair of emergency medical workers and their equipment on scene to render aid and prepare the patient for transport.

But even if that were the Fire Department's program, it would still be necessary to ask whether the City afford to procure paramedic jeeps instead of additional ambulances when the lack of ambulances routinely causes unacceptable delays in responding to 350 life-threatening emergencies per week?

Unfortunately, the Fire Department is not simply adding paramedic jeeps to the existing fleet of ambulances. After beginning to deploy paramedic jeeps, the Fire Department began to cut the number of ambulances back.

Deploying paramedic jeeps and reducing the number of ambulances could improve or impair Bureau of EMS effectiveness, depending on how the deployment was planned and carried out; if the additional paramedic crews were optimally deployed and dispatched, more patients whose condition calls for Advanced Life Support assistance would get it; but if the reduction in the number of ambulances resulted in life-threatening delays in delivering patients to an emergency room, the benefit of additional paramedic crews could be canceled out.

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[98]During July, August and September of 1997, Bureau of EMS dispatchers held 9,121 calls in segments 1-3; half of those calls had a response time of 11:01 or more. Source: Fire Department, "Executive Director's Report, July 1 - Sept. 30, 1997," (Oct. 3, 1997), Summary of Incidents Citywide, p.2.

Even though dual response is the Bureau of EMS rule for many emergencies, in practice there is frequently only one vehicle available when a dual response is required;[99] if that vehicle is an ambulance, the crew can transport the patient to an emergency room, but may have to render aid shorthanded before reaching the hospital; if the only available vehicle is a paramedic jeep, the paramedic crew can aid the patient at the scene of the emergency but must wait for an ambulance to arrive before transporting the patient to a hospital.

Is the Fire Department's paramedic jeep program improving the effectiveness of Bureau of EMS operations? Our investigation has not been able to answer this question, but, as noted above, Bureau of EMS paramedics and EMTs have told our investigator that the paramedic jeep program has been sharply cut back from its size in the spring of 1997

The Fire Department's decision to add paramedic jeeps to the City's fleet of ambulances has been questioned by experts in emergency medical care, including Dr. Wallace Carter, the director of Bellevue Hospital's emergency medicine residency program, and Jonathan Best, a former New York City paramedic and the past president of the National Association of Emergency Medical Technicians. As Best puts it: "The end objective of the system is to take the patient to the hospital, so replacing some ambulances with APRUs has a big downside, because New York City doesn't have a sufficient number of ambulances to begin with."[100] David Tauber, the director of the Advanced Life Support Institute and an expert in emergency medical service operations and training, told the Office of the Public Advocate: "They [Fire Department officials] were using a model that is used often in suburban and rural environments and applying it to the most urban environment of all, and that could be a problem."[101]

C. Paramedic Jeeps in Other Cities

One of the most troubling aspects of the paramedic jeep program is its lack of any historical or programmatic basis.

The Fire Department's blueprint for the takeover of NYC-EMS[102] does not mention paramedic jeeps or any other plan to deploy non-transport EMS vehicles. The Fire Department's two memoranda of understanding about the takeover (with HHC in January 1996 and with the City

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[99]The Fire Department does not publish statistics concerning incidents requiring dual response that do not receive it. An estimate of the number of such events can be derived from the frequency with which the shortage of ALS vehicles prevents the Fire Department from dispatching an ALS vehicle to a life-threatening call, which occurs approximately 400 times each day. "The Merger of EMS into the NYC Fire Department: One Year Progress Report to the City Council," April 9, 1997, Appendix A.

[100]Telephone interview, July 14, 1997.

[101]Telephone interview, October 9, 1997.

[102]Fire Department, "Enhancing Emergency Medical Care in New York City," October 18, 1995.

Council in February 1996) do not mention paramedic jeeps or non-transport EMS vehicles. The Fire Department quietly put the first paramedic jeeps in service in November 1996.

Fire Department officials say that usefulness of paramedic jeeps has been demonstrated in other parts of the country, and the Fire Department is taking advantage of other jurisdictions' experience. In April 1997 Fire Commissioner Von Essen testified in a City Council hearing that APRUs "are commonly used around the country;"[103] the Fire Department's Assistant Commissioner for intergovernmental affairs told the Office of the Public Advocate that the City's paramedic jeep program "is modeled after every other emergency medical system in the country," and that APRUs are used in Nassau County, Chicago, and Los Angeles county."[104]

Contrary to the Fire Department's assertions, only three of the biggest U.S. emergency medical services outside of New York City use paramedic jeeps. Two of the jurisdictions to which Fire Department officials refer as models for their paramedic jeep experiment – Nassau County and Chicago – have never used them.[105] Of the ten largest (after New York City) emergency medical services in the U.S., only three – Washington, D.C., Houston and Los Angeles County – use paramedic jeeps. Of them, only Washington, D.C., utilizes paramedic jeeps in a way that is similar to their use by the Fire Department, regularly dispatching them in place of an ALS ambulance.

Houston and Los Angeles County use paramedic jeeps very differently than does New York City. Houston operates five paramedic jeeps in addition to 52 ambulances, but they are "not normally dispatched as a medical unit," according to Wes Warnke, the assistant fire chief in charge of Houston's EMS. Chief Warnke told the Public Advocate's Office that the paramedic jeeps are used almost exclusively for EMS supervision, not patient care, except during a major emergency with multiple casualties, when they would be dispatched in lieu of an ambulance.[106]

Los Angeles County is unique among major EMS operations in that it operates no public ambulances, relying on a combination of 53 paramedic jeeps to provide emergency medical assistance and a fleet of private ambulances to provide patient transport in a land area that is twelve times greater than New York City. All Los Angeles County medics and EMTs are deployed in paramedic jeeps, fire trucks, or helicopters. The county contracts with a large private ambulance company to transport patients. Whenever County medics are dispatched, a private ambulance is simultaneously sent to the same location to provide transportation to a hospital. If the patient requires treatment in the ambulance, a County medic stays with the patient and a firefighter follows the ambulance to the hospital in the paramedic jeep.[107]

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[103]Transcript, Hearing of the City Council Committee on Public Safety, April 9, 1997, p.20.

[104]Telephone interview of Lynn Tierney, Deputy Fire Commissioner for Intergovernmental Affairs, March 25, 1997.

[105]Telephone interviews of Stephen McDonald, Communications Department Commander, Nassau County Police, July 16, 1997 and Larry Maltaitis, Chief Paramedic, Chicago Fire Department, July 17, 1997.

[106]Telephone interview of Wes Warnke, assistant chief in charge of Houston EMS, September 5, 1997.

[107]Telephone interview of Greg Bates, Battalion Chief, L.A. County Fire Department, September 5, 1997.

In an attempt to understand the origin of the paramedic jeep program, the Office of the Public Advocate asked the Fire Department whether it had gathered information on other jurisdictions' use of APRUs or had consulted about the use of APRUs with emergency medical service experts.[108] The Fire Department has not replied.[109]

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[108]"Has FDNY gathered any statistics or descriptions about the use of APRUs in other jurisdictions? Please provide any documents detailing such information. Have any EMS officials in other jurisdictions or other EMS professionals advised FDNY concerning the use of APRUs? If so, what are their names and what jurisdictions are they from?" Letter from Public Advocate Policy Analyst Jonathan Bennett to Lynn Tierney, Deputy Fire Commissioner for Intergovernmental Affairs, July 30, 1997, p.1.

[109]A Fire Department spokesperson stated: "we firmly believe that we have answered questions relating to those subjects in the mode that we are dictated to answer. We have supplied you with documents that include answers to your questions." Telephone interview of Lynn Tierney, Assistant Fire Commissioner for Intergovernmental Affairs, August 14, 1997.

D. Counting Paramedic Jeeps and Calling Them Ambulances

According to the most recent information that the Fire Department has released, which covers the period ending in March 1997, the Fire Department is using paramedic jeeps to replace ambulances.

Since March 1997, the Fire Department has adopted the policy of adding the number of paramedic jeep tours to the number of ambulance tours and calling the resulting total the number of "ambulance tours," even though many of those tours are not conducted by ambulances. For example, after the Bureau of EMS had *reduced* the number of ambulance tours and simultaneously increased the number of emergency service vehicle tours by adding paramedic jeeps, Deputy Fire Commissioner Edward M. Dolan stated "there are now 50 more ambulance tours per day...."[110]

Fire Department officials do not *always* refer to paramedic jeep tours as "ambulance tours;" at times they misleadingly refer to the number of "EMS tours," without explaining that the former one-to-one correspondence of ambulance tours and EMS tours is no longer true. For example, in April 1997 Fire Commissioner Von Essen told the City Council (accurately) that the Fire Department had increased "the daily number of EMS tours," but did not explain that more than 10 percent of the "EMS tours" were not conducted by ambulances.[111]

The increase in EMS tours, including paramedic jeeps, helps the Fire Department to reduce one of the most closely watched statistical indicators of EMS effectiveness – "response time" – because there are more Bureau of EMS vehicles available to respond to medical emergencies. But – as noted above – any comparison of current "response times" to times recorded previous to the November 1996 deployment of paramedic jeeps is inherently misleading. Formerly, "response time" meant "the time interval between the receipt of a call for emergency medical assistance and the arrival of an ambulance at the scene of the emergency." Today, "response time" is the interval between the receipt of the call and the arrival of a *paramedic jeep or ambulance* on the scene.

There is a long and rational tradition of using "response time" to gauge EMS effectiveness, based on the reasonable assumption that – because all EMS vehicles were transport vehicles – there was a direct correlation between arrival on scene and delivery to emergency room. Paramedic jeeps that respond to emergencies without the near-simultaneous arrival of an ambulance negate that assumption.

Emergency medicine specialists state that the significance of the difference between "response time" as opposed to "delivery-to-emergency-room time" is contingent on the patient's condition – there are some life-threatening conditions for which "response time" is the more critical, because a paramedic can initiate on-scene treatment that is close to the equivalent as what could be done in an

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[110]Deposition of Edward M. Dolan in *McAllen v. Marcos, May 1, 1997.*

[111]City Council, City of New York, Transcript of the Minutes of the Committee on Public Safety, April 9, 1997, p.19.

emergency room. Other life-threatening conditions, including all life-threatening traumas (as opposed to illnesses), are not at all amenable to successful treatment outside of an emergency room.

The Fire Department's stated objective is to dispatch an ambulance to every call, and to dispatch a paramedic jeep, in addition, when the emergency requires the service of a paramedic. As Fire Commissioner Von Essen told the City Council: "Eventually ... APRUs will respond to all potentially life-threatening calls, backed up by [a BLS ambulance]."[112]

If the Fire Department were able to dispatch an ambulance to every call and an additional paramedic jeep to every potentially life-threatening call, then the paramedic jeep program would be an unqualified success. But the Bureau of EMS does not have enough ambulances to dispatch one to every potentially life-threatening call.[113] Because Fire Department statistical summaries do not distinguish between ALS ambulances and paramedic jeeps, we have not been able to ascertain the number of times that a paramedic jeep responded without an ambulance, but Fire Department policy would require the dispatch of a paramedic jeep if it were the only vehicle available to respond. As one Bureau of EMS paramedic lieutenant told our investigator:

> "We get backup [from an ambulance] most of the time, but every tour we have at least one job with no backup. Sometimes we can stabilize the patient and wait with no problem, but too often we are stuck waiting for transport with someone who needs to be in a surgery, 'stat' [*i.e.*, immediately]."[114]

Experienced Bureau of EMS dispatchers and ambulance crew members have told our investigator that such events are commonplace.

On occasion the time lag between the arrival of the paramedic jeep and the arrival of the backup ambulance is very significant. As Kevin Lightsey, president of the union that represents the Fire Department's emergency medical technicians and paramedics explained it to the City Council:

> "[T]o take a paramedic out of an ambulance and place him in an APRU ... and have these units respond to emergencies to treat patients to get them that expedient response, is all well and good. However, while the patient still has to wait sometimes 10, 20 possibly even as high as 30 minutes for an ambulance to transport him or her to the hospital..."[115]

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[112]Transcript, Hearing of the City Council Committee on Public Safety, April 9, 1997, p.21.

[113]During July, August and September of 1997, the Bureau of EMS received calls concerning more than 103,000 life-threatening incidents; in more than 4,550 of those life-threatening incidents, no ambulance was available to respond for more than 11 minutes. In more than 90 life-threatening incidents, the first emergency medical service vehicle (ambulance or paramedic jeep) took at least 22 minutes and 30 seconds to arrive at the scene of the emergency. Source: Fire Department, Bureau of EMS, "Executive Director's Report," Summary of Incidents, (01JUL97 - 30SEP97), October 3, 1997 p.2.

[114]Office of Public Advocate interview of a Bureau of EMS paramedic who requested anonymity for fear of retaliation, July 22, 1997.

[115]Transcript, Hearing of the City Council Committee on Public Safety, April 9, 1997, p.112.

Dr. Carter, director of the emergency medicine residency program at Bellevue, puts it this way:

> "If you're adding APRUs it makes sense, but if you're replacing ambulances, it makes no sense at all.... if you get the medics on-scene in two minutes and you wait 30 minutes for an ambulance, how is that better?....If you just analyze time to the scene, you're ignoring the length of time it takes to get them the an emergency room."[116]

Another critic of the paramedic jeep program is Richard McAllen, a paramedic who has served with the NYC-EMS and the Bureau of EMS for 24 years. "Paramedics have the training and equipment to treat many medical conditions on the scene, but there are times when the only way to save is a quick trip to an emergency room, especially for patients who have been shot or stabbed." McAllen cites the example of the March 24, 1997, death of subway token clerk Robert LeBright, who was shot by a robber in the Vernon Boulevard subway station in Long Island City, Queens. According to McAllen, a paramedic jeep responded but there was a 20-minute delay in dispatching an ambulance to the scene. Prior to the initiation of the paramedic jeep program, the crew that arrived in a paramedic jeep had been deployed in an ALS ambulance designated at "46W1."[117] The Office of the Public Advocate requested that the Fire Department provide information concerning Bureau of EMS activity in response to LeBright's shooting.[118] The Fire Department has failed to respond.[119]

McAllen has noted several additional cases in which there was a long delay between the arrival of a paramedic jeep and the ambulance that ought to have been simultaneously dispatched, with potentially serious consequences:

- On May 4, 1997, the Bureau of EMS received a call concerning a child with a potentially life-threatening allergic (anaphylactic) reaction. A paramedic jeep reached the scene in 24 minutes, but the jeep crew had to wait an additional twenty minutes for ambulance to transport the patient to an emergency room.[120]

- On May 4 the Bureau of EMS received a call concerning a patient with a potentially life-threatening case of pulmonary edema. A paramedic jeep reached the scene in eight

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[116]Telephone interview of Wallace Carter, M.D., director, Bellevue Medical Center emergency medicine residency program, July 17, 1997.

[117]Office of the Public Advocate interview, September 15, 1997.

[118]"Please provide the record of EMS activity in response to the March 24, 1997, shooting of Robert LeBright at the Vernon/Jackson subway station in Long Island City, including the times of calls for an EMS vehicle, the EMS vehicle dispatch record, the EMS vehicle arrival-on-scene record (broken down by type of vehicle), the time that the patient was delivered to an emergency room, and any evaluations or investigations of the incident." Letter from Public Advocate Policy Analyst Jonathan Bennett to Lynn Tierney, Deputy Fire Commissioner for Intergovernmental Affairs, July 30, 1997, p.2.

[119]Telephone interview of Lynn Tierney, Assistant Fire Commissioner for Intergovernmental Affairs, August 14, 1997.

[120]Computer Aided Dispatch No. 0176.

> minutes, but the patient had to wait another ten minutes for the arrival of an ambulance.[121]

A Brooklyn-based EMT told our investigator of a similar incident he had been involved in:

> One night my BLS ambulance was dual-dispatched with an APRU on a 'diffbreather' [difficulty breathing] job at Jefferson and Central. I was rolling, but I was flagged down for an injury. We're required to stop if we are flagged down, so I told the dispatcher I had been flagged, and they told the APRU they would send the 'next available.' It was an asthma attack that wouldn't break, but they had to wait for transport – that took about 20 minutes.[122]

An evaluation of the effectiveness of paramedic jeeps would require an answer to the question posed by Dr. Carter: "How often are they stuck on the scene?....If the Fire Department wants to evaluate APRUs they need to measure the length of time it takes to get them to an emergency room, not response time, because the use of APRUs changes the meaning of response time."[123]

In the absence of any certainty that paramedic jeeps improve Bureau of EMS patient care, evaluation of their performance ought to be a daily operation.[124]

V. THE FIRE DEPARTMENT'S FAILURE TO ABIDE BY ITS AGREEMENT WITH THE CITY COUNCIL

Before the Health and Hospitals Corporation (HHC) and the City Council would agree to separating NYC-EMS from HHC and putting it under the control of the Fire Department, two formal agreements were executed – a Memorandum of Understanding (MOU) between the City and

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[121]Computer Aided Dispatch No. 0460.

[122]Telephone interview of a Bureau of EMS EMT who requested anonymity for fear of retaliation, October 9, 1997.

[123]Telephone interview of Wallace Carter, M.D., director, Bellevue Medical Center emergency medicine residency program, July 17, 1997.

[124]Fire Department officials have refused to respond to this Office of the Public Advocate query: "Does FDNY gather statistical or other information that measures or reflects on the effectiveness of the APRU program? If so, please describe what kind of information
is being collected and how it is being evaluated. Has FDNY reached any conclusions, including preliminary ones? Please provide any documents setting forth such conclusions." Letter from Public Advocate Policy Analyst Jonathan Bennett to Lynn Tierney, FDNY Deputy Commissioner for Intergovernmental Affairs, July 30, 1997, p.2.

HHC,[125] and a Memorandum of Understanding between the Mayor and the City Council.[126] (See Appendix C, following page ?.)

In the MOU with the City Council, the Fire Department and the Mayor agreed to take thirteen steps to insure the continued effectiveness of NYC-EMS after it was transformed into the Fire Department's Bureau of Emergency Medical Services (BEMS).

Under the agreement, the Fire Department is required to:

- maintain the seniority pension rights of employees transferred from HHC to the Fire Department;
- create a distinct organization for the Bureau of EMS with leadership reporting directly to the Fire Commissioner;
- maintain existing EMS Critical Incident Stress Management Teams;
- retain HHC's practice of employing a physician as the Bureau of EMS director of medical training;
- maintain compliance with regional emergency medical service standards, policies and procedures;
- "create a task force comprised of representatives of the uniformed fire service and EMS Bureau personnel.... [which] shall provide the Fire Commissioner with recommendations" regarding promotion policies, training and the organizational structure of the Bureau of EMS;
- "increase by 10% the number of ambulances currently available in the system on each tour with six months" of the transfer;
- commit "to a goal of a response time in 90% of potentially life-threatening call of under six minutes for Basic Life Support Units... and a response time for Advanced Life Support Units to 90% of such calls in between eight and ten minutes," and also commit "to a goal of a response time in 90% of non-life-threatening call of under ten minutes;

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[125]Memorandum of Understanding between the New York City Health and Hospitals Corporation and the City of New York on the provision of ambulance and pre-hospital emergency medical services by the Fire Department of the City of New York for the benefit of HHC, (January 19, 1996).

[126]Memorandum of Understanding between Mayor Rudolph W. Giuliani and the City Council, (February 2, 1996).

- provide the City Council by March 1997 "with a written report detailing the performance of the EMS Bureau and the effects of the merger on the quality of patient care," including 12 specified statistical indicators.

In addition, the MOU requires the Mayor to:

> "create a committee comprised of medical experts and physicians to advise the Fire Commissioner regarding matters related to the quality of patient care provided by the EMS Bureau of the Fire Department and the effect of merger on patient quality of care and the overall operation of the EMS Bureau. The committee shall meet on a regular basis with the Fire Commissioner, the Chief of the EMS Bureau and the EMS Medical Director, [and, by March 1997] shall provide a written report to the Mayor and the Speaker of the City Council detailing the effect of the merger of EMS and FDNY on the quality of patient care."[127]

The Mayor and the Fire Department have reneged on the agreement by failing to fully implement four of the MOU's agreed-upon actions.

- The Mayor's committee of medical experts to advise about the quality of patient care under the Bureau of EMS did not meet until December 1996 – eleven months after the MOU was signed – and it has not produced the required report.[128] The Fire Department has failed to respond to our request for information about the committee, including a list of its members, the minutes of its meeting(s), and the date(s) on which it has met following its initial meeting on December 11, 1996.[129]

- The Fire Department has dishonored its commitment to make a 10 percent increase in ambulance tours six months after the merger. After six months the Fire Department had increased the number of ambulance tours by 3.9 percent –a shortfall of 30 tours each day. Even that less-than-agreed-upon increase was temporary. A year after the merger,

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[127]Memorandum of Understanding, (February 2, 1996), pp.6-7.

[128]Transcript, Hearing of the City Council Committee on Public Safety, Testimony of Fire Commissioner Thomas Von Essen, April 9, 1997, p.53.

[129]On July 30, 1997, the Office of the Public Advocate wrote to the Fire Department: "How many times has the FDNY-EMS medical advisory board that was set up under the Memorandum of Understanding met? On what dates? Please provide minutes of those meetings. Please provide a copy of any medical advisory board conclusions, resolutions, recommendations or reports concerning FDNY-EMS. Please provide a list of the members of the advisory board." Letter from Public Advocate Policy Analyst Jonathan Bennett to Lynn Tierney, FDNY Deputy Commissioner for Intergovernmental Affairs, p.4. Commissioner Tierney's reply [cite TK] consisted of copies of three FDNY publications, none which includes the requested information, and this statement: "We firmly believe that we have answered questions relating to those subjects in the mode that we are dictated to answer, we have supplied you with documents that include answers to your questions." Telephone interview, August 14, 1997.

the Bureau of EMS was conducting only 1.4 percent more ambulance tours than before the merger.[130]

- Just prior to the merger EMS achieved a 6-minute BLS ambulance response to 46 percent of potentially life-threatening calls and an 8-10 minute ALS ambulance response to 41 percent of such calls. The MOU established the following response-time goals: BLS response to nine out of ten potentially life-threatening calls in less than six minutes, ALS response to nine out of ten such calls in less than ten minutes and BLS response to nine out of ten non-life-threatening call in less than ten minutes, which represented very substantial improvements over pre-merger experience. In non-life-threatening calls, it achieved a 10-minute response time in 71 percent of the calls. For the Fire Department to achieve the objectives of the MOU for life-threatening calls, it would need to make a 96 percent improvement in BLS ambulance response time and a 120 percent improvement in ALS ambulance response time. For non-life-threatening calls it would need to achieve a 27 percent improvement over the pre-merger experience.

- But a year after the merger, and before the beginning of the battalion-based deployment experiment, the Fire Department had made little progress toward the goals it had committed to in the MOU, according to Fire Department statistics. The Department had improved 6-minute BLS ambulance response time by only 11 percent, from 46 to 51 percent of potentially life-threatening calls. ALS response times of 8-10 minutes improved by only seven percent, from 41 percent to 44 percent. Ten-minute responses to non-life-threatening calls – which had been achieved 71 percent of the time prior to the merger – were achieved in 76 percent of such calls a year after the merger, only a seven percent improvement.[131]

- The MOU also required the Fire Department to provide the City Council with a written report giving statistical information on twelve indicators of Bureau of EMS performance.[132] The Fire Department's written report, "The Merger of EMS into the NYC Fire Department: One Year Progress Report to the City Council," omits five of the indicators that had been agreed to in the MOU.

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[130]In the month before the March 1996 merger, NYC-EMS conducted a daily average of 507 ambulance tours. Six months later the Fire Department's Bureau of EMS conducted a daily average of 527 ambulance tours. A year after the merger the Bureau of EMS conducted a daily average of 514 ambulance tours and 66 paramedic jeep tours. "The Merger of EMS into the NYC Fire Department: One Year Progress Report to the City Council," April 9, 1997, Appendix A. FDNY Office of Intergovernmental Affairs, "Chronology of changes to the current ambulance schedule" dated March 10, 1997. In spite of these statistics supplied by FDNY, when Fire Commissioner Von Essen testified to the City Council on April 9, 1997, he asserted that "the Fire Department has increased the daily number of EMS tours by at least ten percent..." Transcript, p.19.

[131]"The Merger of EMS into the NYC Fire Department: One Year Progress Report to the City Council," April 9, 1997, Appendix A.

[132]Memorandum of Understanding (February 2, 1996), pp. 8-9.