

OFFICE OF INSPECTOR GENERAL
City of Chicago



REPORT OF THE INSPECTOR GENERAL'S OFFICE:

***CHICAGO FIRE DEPARTMENT
FIRE AND MEDICAL INCIDENT RESPONSE TIMES AUDIT***

OCTOBER 2013

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To the Mayor, Members of the City Council, City Clerk, City Treasurer, and residents of the City of Chicago:

The City of Chicago Office of Inspector General (OIG) has completed an audit of the Chicago Fire Department's (CFD) fire and medical incident response times for calendar year 2012.

Fire and medical emergency response is the core service provided by CFD, which is the second largest fire department in the nation. CFD firefighters and paramedics are first responders to Chicagoans' calls for help in emergencies. Their prompt response is critical to the protection of public health and safety through emergency medical response and fire suppression services, which save lives and protect people and property from greater harm.

The OIG audit determined that CFD was not meeting the response times for National Fire Protection Association (NFPA) Standard 1710 that it had historically claimed to meet or exceed. It also found that CFD's internal reports lacked the elements necessary to accurately assess whether the Department was in fact meeting or exceeding the national standards it claimed to be meeting.

CFD agrees that it is not strictly meeting NFPA standards. It argues that NFPA standards are useful as guidelines rather than stringent rules for fire departments. The OIG does not have an opinion about the usefulness of NFPA standards, but simply used the benchmark that CFD itself had publicly attested to meeting or exceeding. I commend CFD's commitment to clarifying its public accounts of standards and achievements in the future. It is imperative that the residents and City management have accurate, reliable measures of performance, especially in matters of public safety.

I hope the audit results will be useful to the Mayor's Office, City Council, and CFD in the shared effort to clarify CFD's performance metrics and improve the accuracy and integrity of its performance reports, as well as provide a baseline analysis for efforts to increase the efficiency and effectiveness of the services provided to residents.

CFD has stated that it is interested in working with the OIG on this issue in the future. We look forward to this possibility and to pursuing open and positive communication with CFD in all of

our audits. We thank CFD as well as the Office of Emergency Management and Communications for their cooperation during this audit.

Respectfully,

A handwritten signature in blue ink, appearing to read 'J. Ferguson', with a stylized flourish at the end.

Joseph M. Ferguson
Inspector General
City of Chicago

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Acronyms

| | |
|------|---|
| ALS | Advanced Life Support |
| BLS | Basic Life Support |
| CAD | Computer Aided Dispatch |
| CFD | Chicago Fire Department |
| EMS | Emergency Medical Services |
| NFPA | National Fire Protection Association |
| OEMC | Office of Emergency Management and Communications |
| OIG | Office of Inspector General |

I. EXECUTIVE SUMMARY

The Office of Inspector General (OIG) performed an audit of the Chicago Fire Department's (CFD) response times to fire and Emergency Medical Services (EMS) incidents for the calendar year 2012.

The objectives of the audit were to determine if:

- CFD's response time goals are equal to or better than the national standards for fire and EMS incidents.
- CFD's analysis of its response times allows the Department to determine its compliance with national standards or some other goal determined by the Department.
- CFD is meeting the national standards on a citywide basis as well as in each ward and community area.

Based upon the results of our audit, we concluded that:

- CFD has no documented, formal departmental goals for response time.
- While CFD does analyze response time data, CFD's own analysis does not allow it to determine if it is meeting the National Fire Protection Association (NFPA) Standard 1710 ("national standards"), as it claims.
- Nine percent of fire incidents and six percent of EMS incidents had incomplete time data in the Computer-Aided Dispatch (CAD) system.
- CFD did not meet the national standards for fire or EMS response time citywide in 2012.
- CFD did not meet the national standard for medical incidents in any of the 50 wards.
- CFD met the national standard for fire incidents in 7 of the 50 wards.

CFD has asserted that it meets NFPA national response time standards. Our audit found that CFD does not in fact apply the actual national standard, opting instead to calculate a cumulative average only. When the actual national standards are applied, CFD did not meet the standards for response time citywide.

CFD's reference to and assessment of its own performance relative to national standards reflects its consideration of response times as a critical measure for achievement of its public safety mission. It is therefore imperative that CFD formalize its response time goals and accurately measure the extent to which it meets those goals. We hope this report serves its efforts to do so in the future.

The specific recommendations related to each finding, and CFD's response, are described in the "Audit Findings and Recommendations" section of this report.

II. BACKGROUND

A. Chicago Fire Department

The Chicago Fire Department is the second largest fire department in the nation. The Department had a total 2012 budget of \$565 million and 5,143 full-time equivalent positions, of which more than 4,900 were devoted to providing Fire Suppression and Emergency Medical Services.¹ There are 92 fire stations throughout the city, which house 96 engine companies and 61 truck companies.² In addition, there are 60 Advanced Life Support (ALS) and 15 Basic Life Support (BLS) ambulances citywide.³ CFD receives over 500,000 calls for service per year for emergency assistance.

B. Chicago Fire Department Emergency Call Response Process

An incident begins with a call being placed to 911. In Chicago, the call is first received into the Office of Emergency Management and Communications (OEMC) by a police operator. If the incident is determined to be a fire or medical emergency, it is transferred to an OEMC fire operator. Once the operator has enough information to understand the emergency, the incident is sent to OEMC dispatchers for execution. A dispatcher determines what companies will be needed to respond to the emergency, identifies available companies closest to the incident, and then dispatches the companies that will achieve the shortest response time. After the incident is dispatched, the dispatched company acknowledges the call through a computer terminal in its firehouse or vehicle. The responding company continues to update its status by either radio or mobile computer terminal in its vehicle when the company departs for the incident and when it arrives on scene. Each status update is digitally time stamped and captured in OEMC's Computer Aided Dispatch (CAD) system.

C. National Fire Protection Association Standard 1710

In 2001, the National Fire Protection Association established standards for fire and medical responses known as NFPA Standard 1710 ("NFPA 1710"). Among other standards, NFPA 1710 includes response time goals for various stages of response to an emergency incident. According to the NFPA:

¹ City of Chicago, "2013 Budget Overview," 97, accessed August 7, 2013, http://www.cityofchicago.org/content/dam/city/depts/obm/supp_info/2013%20Budget/2013Overview.pdf, and City of Chicago, "2012 Budget Overview," 100.

² An engine company relies on a "motorized apparatus that has a pump, and a 500-gallon water tank and hose—often called a pumper"—while a truck company utilizes "a motorized apparatus that has a large mounted hydraulically raised 100-foot ladder. The truck also carries smaller ground ladders and varied equipment for specialized functions." City of Chicago, "CFD Definitions," accessed August 13, 2013, http://www.cityofchicago.org/city/en/depts/cfd/supp_info/cfd_definitions.html.

³ As defined in Illinois's Emergency Medical Services (EMS) Systems Act, "'Advanced Life Support (ALS) Services' means an advanced level of pre-hospital and inter-hospital emergency care and non-emergency medical services that includes basic life support care, cardiac monitoring, cardiac defibrillation, electrocardiography, intravenous therapy, administration of medications, drugs and solutions, use of adjunctive medical devices, trauma care, and other authorized techniques and procedures [...]. 'Basic Life Support (BLS) Services' means a basic level of pre-hospital and inter-hospital emergency care and non-emergency medical services that includes airway management, cardiopulmonary resuscitation (CPR), control of shock and bleeding and splinting of fractures." 210 ILCS 50/3.10 (a) and (c).

That standard was the first organized approach to defining levels of service, deployment capabilities, and staffing levels for substantially career fire departments. Research work and empirical studies in North America were used by the Committee as a basis for developing response times and resource capabilities for those services, as identified by the fire department.⁴

Subsequent versions of NFPA 1710 reflect the NFPA Technical Committee's efforts to refine various aspects of the document including the standardization of terminology and definitions.⁵ While NFPA 1710 is not a legal requirement, it is followed by many cities across the country including Los Angeles, Houston, Dallas, San Francisco, and Boston.⁶

For purposes of this audit, the NFPA response segments relevant to CFD (not OEMC) operations are:

- **Turnout Time:** defined in NFPA 1710 3.3.53.8 as “the time interval that begins when the emergency response facilities (ERFs) and emergency response units (ERUs) notification process begins by either an audible alarm or visual annunciation or both and ends at the beginning point of travel time.”
- **Travel Time:** defined in NFPA 1710 3.3.53.7 as “the time interval that begins when a unit is en route to the emergency incident and ends when the unit arrives at the scene.”

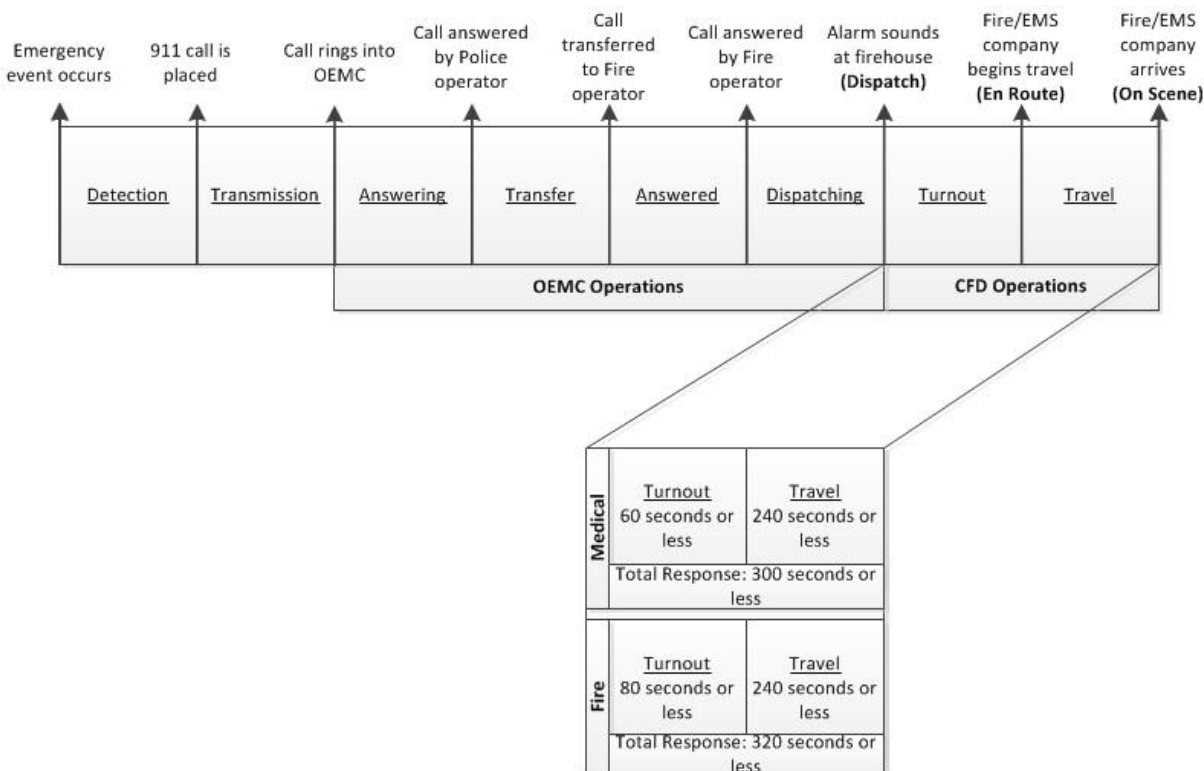
⁴ NFPA 1710: Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments, 2010 Ed. (USA, National Fire Protection Association, 2010), 1710-1.

⁵ NFPA 1710: Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments, 2010 Ed. (USA, National Fire Protection Association, 2010), 1710-1.

⁶ Bryan Collins, “NFPA 1710: A Compliance Analysis of the Moraga-Orinda Fire District (MOFD),” 44 (a paper completed for the U.S. Fire Administration's National Fire Academy course in Executive Analysis of Fire Service Operations in Emergency Management, May 2007), accessed August 20, 2013, <http://www.usfa.fema.gov/pdf/efop/efo40505.pdf>

The NFPA response time goals for those segments are (i) 80 second turnout time for fire incidents, (ii) 4 minute or less travel time for first responders to fire incidents, (iii) 60 second turnout time for EMS incidents, (iv) 4 minute or less travel time for BLS medical incidents, and (v) 8 minute or less travel time for ALS medical incidents if BLS arrived within 4 minutes. The standard further requires that the fire department establish a performance objective of not less than a 90% achievement rate for each of the turnout and travel times stated above (NFPA 1710 4.1.2.4).

The following diagram illustrates the incident response stages described above and the NFPA response time standards applicable to the stages examined in this audit.



Source: OIG Analysis of OEMC and CFD Operations

D. Chicago Fire Department Performance Reporting

In the 2011 Mayoral Transition Report, CFD reported that its “response time to structural fires remains below the nationally recognized standard of four (4) minutes established by the National Fire Protection Association.”⁷ The report also stated that “the estimated average [EMS] response time for 2010 is approximately four (4) to eight (8) minutes and the CFD will strive to maintain its 2011 performance target of six (6) minutes.” CFD officials explained to the OIG that while the Department compares its performance to NFPA standards, CFD does not measure turnout

⁷ City of Chicago, “2011 Mayoral Transition Report,” March 8, 2011, 149, accessed August 9, 2013, <http://www.cityofchicago.org/content/dam/city/narr/Transition%20Reports/TransitionReport.pdf>. As explained in Finding 1 below, while CFD reported a performance target for 2011 in the Mayoral Transition Report, the Department has no formalized performance goals in its directives, orders, or policies.

and travel times separately, per NFPA 1710. Instead, the “response time” measured by CFD represents the full interval between Dispatch and On Scene illustrated above.⁸

⁸ See Methodology and Finding 4 for more discussion of these measures.

III. OBJECTIVES, SCOPE, AND METHODOLOGY

A. Objectives

This report focuses on the Chicago Fire Department's response times to fire and medical incidents for the calendar year 2012.

Our objectives were to determine if:

- CFD's own response time goals are equal to or better than the NFPA national standards for fire and EMS incidents.
- CFD's analysis of response times allows it to determine compliance with the national standards or its own goal.
- CFD is meeting NFPA response time standards citywide 90% of the time.
 - a. Fire response time of 320 seconds or less⁹
 - b. EMS response time of 300 seconds or less¹⁰
- CFD is meeting NFPA response time standards in each ward and neighborhood 90% of the time.
 - a. Fire response time of 320 seconds or less
 - b. EMS response time of 300 seconds or less

B. Scope

The scope of our audit included Fire and EMS calls for service between January 1, 2012 and December 31, 2012.

Because our scope was limited to the activities of the Chicago Fire Department, we did not audit the segments of response time for which OEMC is responsible, such as 911 call answering time.

In accordance with Government Auditing Standards chapter 7.11 we are also reporting that there was an excessive delay of nearly three months in receiving requested data from OEMC.

C. Methodology

CFD does not measure turnout and travel time separately as specified in NFPA 1710, but measures "response time," which represents the full interval between Dispatch and On Scene. Therefore, to assess whether CFD's response times met the combined total time for the otherwise separate turnout and travel outlined in NFPA 1710, we compared CFD total response times (turnout plus travel time) for each "call for service incident" to the national standard and calculated the percentage of time during 2012 in which response time met the national standard.¹¹

⁹ Since NFPA does not have a standard for "response time" as CFD defines it, we combined the NFPA standards for an 80 second turnout time and a 240 second travel time for a "response time" of 320 seconds.

¹⁰ Since NFPA does not have a standard for "response time" as CFD defines it, we combined the NFPA standards for a 60 second turnout time and a 240 second travel time for a "response time" of 300 seconds.

¹¹ We excluded incidents with incomplete Dispatch or On Scene Times from this analysis. Additionally, we excluded administrative incidents—for example, fueling of fire trucks and testing of fire alarms—from this analysis.

For all objectives, we interviewed senior officials from CFD to gain an understanding of the Department's response time goals and outcomes. Additionally, we asked the officials for written documentation related to those goals, such as orders, directives, or policies. Finally, we conducted a walk-through of the operations at OEMC in order to observe how 911 calls are received, routed, and dispatched.

We assessed the reliability of the CAD data by: (1) performing electronic testing of required data elements; (2) reviewing existing information about the data, the query and the system that produced them; and (3) interviewing agency officials knowledgeable about the data. CFD also performed its own analysis of a statistical sample of incidents to assess the reliability of the data. In doing so, CFD found inaccurate CAD data for a small percentage of incidents.¹² However, we determined that these incidents did not have a statistically significant impact on our overall results.¹³ We therefore determined that the data were sufficiently reliable for the purposes of this report.

D. Standards

We conducted this audit in accordance with generally accepted Government Auditing Standards issued by the Comptroller General of the United States. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

E. Authority and Role

The authority to perform this audit is established in the City of Chicago Municipal Code § 2-56-030 which states that the Office of Inspector General has the power and duty to review the programs of City government in order to identify any inefficiencies, waste, and potential for misconduct, and to promote economy, efficiency, effectiveness, and integrity in the administration of City programs and operations.

The role of the OIG is to review City operations and make recommendations for improvement.

City management is responsible for establishing and maintaining processes to ensure that City programs operate economically, efficiently, effectively, and with integrity.

¹² CFD reviewed a statistical sample of 139 incidents and expressed concerns about 30 unique incidents. The Department provided evidence for 6 incidents (or 4 %) showing that the CAD data was inaccurate. CFD questioned the accuracy of 24 additional incidents but did not provide evidence demonstrating their inaccuracy.

¹³ With 95% confidence, the overall expected accuracy of the data is between 90.8% and 98.4%.

IV. FINDINGS AND RECOMMENDATIONS

Finding 1: CFD Does Not Have Documented Response Time Goals

CFD reported to the OIG that it has no orders, directives, or policies mandating response time goals, but it does review response times for compliance with standards set by NFPA. We also found evidence of CFD historically comparing its total response times (turnout plus travel time) to NFPA 1710 in the 2011 Mayoral Transition Report (see the Background section of this report), and in documentation from CFD Performance Management Meetings held in 2009 reflecting “average”¹⁴ response times.¹⁵

NFPA 1710 4.1.2 states that:

The fire department organizational statement shall provide service delivery objectives, including specific time objectives for each major service component (i.e., fire suppression, emergency medical services (EMS), special operations, aircraft rescue and fire fighting, marine rescue and fire fighting, and/or wildland fire fighting) and objectives for the percentage of responses that meet the time objectives.¹⁶

While CFD does review its performance with reference to NFPA 1710 response time standards, CFD is not in compliance with the NFPA standard for setting and documenting response time goals. A formal written statement of service delivery goals would demonstrate the Department’s commitment and promote greater accountability to achieving those goals and measuring its performance.

Recommendation:

We recommend that CFD formally document its response time goals, per NFPA 1710 4.1.2.

Management Response:¹⁷

“The IGO recommends formally putting in writing service delivery goal numbers in order to ‘demonstrate the department’s commitment’ to achieving response times in accordance with certain guidelines mentioned in NFPA.

¹⁴ As with CFD’s combined “response time” measure, “average” response times is a variation from the standards set forth in NFPA 1710 and in fact is not recommended as a measure by the Commission on Fire Accreditation International (CFAI), as is noted in Finding 2.

¹⁵ Performance management meetings with City departments were held from 2008-2011. Departments were required to make presentations based on their performance trends, actions taken as a result of analysis, and other issues or challenges.

¹⁶ The “organizational statement” referenced in NFPA 1710 4.1.2 is defined in NFPA 1710 4.1.1 as a “written statement or policy that establishes the following: (1) Existence of the fire department; (2) Services that the fire department is required to provide; (3) Basic organizational structure; (4) Expected number of fire department members; [and] (5) Functions that fire department members are expected to perform.”

¹⁷ See Appendix D for CFD’s complete response letter.

First, as described above,¹⁸ CFD has documented formal EMS response goals in its plan as mandated by the IDPH. CFD has been in compliance with these goals since the time of the Plan's approval in 2000.

The CFD has formal written rules, procedures, and training protocol on fire suppression already in place, but disagrees with putting time goals for fire suppression response time in writing and potentially encouraging reckless behavior to meet an arbitrarily set time goal such as NFPA, absent a legal requirement. The IGO and the CFD are in agreement in that neither entity advocates advising CFD personnel to drive faster to an incident to reduce response times.

Ultimately CFD's priority is twofold: ensuring that all emergency response vehicles take the most direct route to an emergency incident in the safest, possible manner. These goals are reflected in two (2) different documents currently maintained by the CFD including:

- The Defensive Training Manual*
- The Rules, Regulations, Practices and Procedures of the Chicago Fire Department*

While CFD disagrees that it should formalize fire suppression response time goals for safety reasons, CFD does compare its response times to the National Fire Protection Association (NFPA) guidelines. CFD acknowledges that it does not meet the strict reading of the NFPA guidelines employed by the IGO in their audit but strongly believes that its measurement of average response times is a reliable and appropriate measure in line with methods employed by other major cities. However, CFD appreciates the IGO's view that there may be some confusion in previous CFD materials regarding its adherence to NFPA guidelines, and will accordingly ensure in all future literature and communications that it clarifies its usage of NFPA guidelines as that of a tool for comparison only."

OIG Response to Management Response:

1. CFD did not provide documentation reflecting the existence or application of fire or EMS response time goals other than the NFPA standards, despite repeated OIG requests during the audit process. As CFD notes elsewhere in its response to the audit, it accepts responsibility for not providing this information during the audit process.¹⁹
2. CFD provides no substantiation for its claim that response time goals—not requirements—will threaten traffic safety any more than already occurs as a result of ordinary course emergency response imperatives.
3. CFD's claim of potential impairment of traffic safety through the utilization of fire response time goals is belied by its post-audit disclosure of its use and claimed compliance with state-mandated response time goals for EMS.

¹⁸ See CFD's complete response letter in Appendix D.

¹⁹ See the fourth page of CFD's complete response letter in Appendix D.

Finding 2: CFD's Analysis Does not Allow the Department to Determine Its Compliance with National Standards

CFD officials reported to the OIG that the Department always meets or exceeds the national standards for response times. CFD currently receives a weekly report from OEMC that shows citywide average response times for first responders to fire and EMS calls.²⁰ The OIG asked CFD for the parameters that are used to create this report but CFD did not provide them. Because of this, we were unable to determine whether the average response time report is accurate or reliable.

Furthermore, average response time is not a measurement contained in NFPA 1710. The standard states that “the department shall establish a performance objective of not less than 90 percent for the achievement of each turnout time and travel time objective” (NFPA 1710 4.1.2.4). In other words, the standard does not state that the *average* response time should be at or below the target response time, but rather that responses to at least 90% of incidents should be at or below the target response time. Such measurement of the percent of a population that meets a given criterion is called “fractile” measurement.

CFD officials stated that they believe average response time is a better measure because it takes into account the outliers. However, the Commission on Fire Accreditation International (CFAI) recommends against using averages as a measure of response time and instead promotes fractile measurement:

For nearly 50 years, fire agencies have been talking about their average response time. This is an inadequate statistical reference. As discussed earlier, a few isolated abnormal response times will skew the average, giving an inaccurate picture of the agency's overall response time.[...] In early CFAI documentation it was suggested that fractile goals were more relevant in defining an expected response goal for fire and EMS response times instead of using averages.²¹

By using average response time, which is a measurement of response time not contained in NFPA 1710, Department officials cannot truly know if or substantiate that they are meeting or exceeding the national standards as they have previously stated.

Recommendation:

We recommend that CFD suspend all internal and external reporting that states it is in compliance with NFPA 1710 until such time as it conducts analysis to determine if at least 90% of responses meet the response time goals. Such an evaluation should be done annually, as recommended in NFPA 1710 4.1.2.5.

²⁰ According to CFD officials, this report is cumulative and provides average response times for the year-to-date. NFPA 1710 4.1.2.5 requires fire departments to produce annual reports evaluating their response time performance.

²¹ Commission on Fire Accreditation International, Inc., “Creating and Evaluating Standards of Response Coverage For Fire Departments,” 4th ed. (Chantilly, VA: 2003), ch. 5 p. 10, accessed August 20, 2013, <http://www.riskinstitute.org/peri/images/file/cfaimanual.pdf>.

We further recommend that the analysis be conducted by ward or community area so the Department can determine if its equipment and personnel are positioned appropriately to meet target response times across the city.

Management Response:²²

“As stated previously, there are no official national standards for fire department response times and the NFPA in its own documentation recognizes that its response standards must include flexibility and allow for differences in each fire department. NFPA 1710, section A.1.4.

Nonetheless, CFD monitors its own response times to make sure its operations are running safely and efficiently using CAD data. CFD reviews CAD data in order to calculate average response times as an early alert system during an internal weekly audit. While the CAD data is subject to human error, that human error often artificially lengthens the response times instead of shortening them. (This is a primary reason why CFD has concerns with IGO using CAD as their only source of data for their audit of all 2012 runs, as relying on CAD data alone in calculating average response times for such an extended period of time more likely than not has artificially lengthened the average response times.)

For example, the CAD system depends on drivers pressing an ‘on scene’ button. If the driver forgets to press the button, the actual response time will be shorter than the recorded response time. In addition, due to the large number of each week’s sample size, an average of response times is an appropriate measure of total performance. (Per basic math concepts, the larger the sample size, the more accurately an average will account for what is being measured.) If in a given week the averages change in a way that appears at all significant, the CFD will take a closer look at the events of the week, running event queries, pulling two-way radio traffic and looking at ‘after event’ documentation in order to investigate and determine the cause of any outlier response times. For these reasons, CAD data is a sufficient early alert system for detecting outliers in average response times.”

OIG Response to Management Response:

1. CFD acknowledges using CAD data to monitor its own response times, although it provided no documentation of the parameters for its weekly CAD reports despite requests from the OIG.
2. The average measure CFD purports to use to monitor response times (i) does not comport with the NFPA fractile measure; (ii) is therefore not susceptible to comparison with the NFPA fractile measure; and (iii) as noted above by the Commission on Fire Accreditation International, is an inadequate measurement of performance because, “a few isolated abnormal response times will skew the average, giving an inaccurate picture of the agency’s overall response time.”
3. CFD’s purported use of CAD data as a “sufficient early alert system for detecting outliers in average response times” is belied by CFD’s lack of awareness of significant outliers found in the 2012 CAD data by the OIG during the audit, thus demonstrating the mathematical truism that averages, by their very nature, do not reveal outliers.

²² See Appendix D for CFD’s complete response letter.

Finding 3: Not All Incidents Have Complete and Accurate Time Data

Incident data obtained from OEMC showed that CFD responded to 77,262 fire incidents and 310,118 medical incidents in 2012.

We found that 7,221 or 9% of fire incidents and 17,933 or 6% of medical incidents lacked an On Scene time. None of the incidents lacked a Dispatch time.

The Department stated that incomplete time data could be a result of the CAD system not receiving the signal from the responding company or the responding company not pushing their Fire Mobile Data terminal button to update their status.

In addition, CFD's policies and procedures do not specify at what point the responding company or the OEMC dispatcher must update the company's status (e.g., to record On Scene time), which has resulted in inaccurate time stamps for some incidents.²³

Without complete and accurate time data, the incident response times cannot be accurately calculated.²⁴ This will hamper the Department's ability to determine if it is meeting its goals, or the national standards.

Recommendation:

We recommend that CFD update its policies and procedures to specify the point at which the responding company's status should be updated either by radio or Fire Mobile Data terminal.

We also recommend that CFD continuously monitor the number of blank and inaccurate time fields and work toward achieving 100% completeness and accuracy in all data fields.

Management Response:²⁵

"The IGO is correct in that, used on its own, CAD data is not a complete and accurate picture of CFD response time data. Rather, it is one piece of the puzzle that may be used for short-term, early alerts, but is not appropriate as the single tool to be used for a comprehensive audit of response time data.

Dispatch of CFD resources in response to requests for service is the responsibility of the OEMC. The OEMC uses the CAD system to help communications operators make final dispatching decisions. The mobile terminals of the CAD are utilized on all frontline fire apparatus and were designed to work in an open-air environment (an open air environment is designed for minimal in-building penetration and use outside). The CFD has found, through interviews and practice, that the signals from pressing the CAD buttons in CFD vehicles are not consistently received by the CAD when transmitted from firehouses and certain parts of the city. This issue can lead to

²³ As noted in the Methodology section, the Department provided evidence for a small number of incidents showing that the CAD data was inaccurate—that is, the On Scene time stamps were complete but not correct.

²⁴ We omitted incidents with incomplete time data from the analysis described in Finding 4. As explained in the Methodology section, we determined that the data remained sufficiently reliable for purposes of the analysis.

²⁵ See Appendix D for CFD's complete response letter.

varied results that may make some otherwise accurate data 'appear' flawed. Additionally, as described in greater detail in a previous section, there are circumstances like a walk-in to a firehouse or a forgotten 'on scene' CAD button push that leads to CAD time results like 0.00 seconds or several apparatus having their CAD buttons pushed all at once by someone at the OEMC after a fire or EMS rescue has been long completed. These types of inconsistent CAD events or missing fields can appear inexplicable in a vacuum, and can often only be corroborated with the corresponding two-way radio traffic and after action queries.

The CAD has been in use since 1996 and is an incredibly helpful tool, but by no means is meant to be used as a standalone system. The CFD's two-way radio was and still is the primary communications method the CFD uses with the OEMC. The two-way radio is the most reliable method to send and receive information. It is also critical to the CFD's overall operation because it allows the CFD to provide urgent information to the OEMC, such as the travel direction of emergency vehicles, extent and location of the fire within a structure, the need for immediate rescue of civilians, any escalation of a fire, and any patient care/severity of injury information. Admittedly, for the purposes of this audit where the IGO wanted to look at an entire year—radio transmittals are not permanent, as audio records are only archived for 30 days pursuant to the Local Records Act retention schedule.

In order to thoroughly investigate the response time to any emergency incident, an analysis must be made of the CAD data, the radio traffic that occurred between CFD responding units and the OEMC, the OEMC Event Query report, and the CFD's NIFR report. Any CFD review or 'after action' exercise is always scheduled as soon as possible after an emergency incident, to ensure that all radio traffic is obtained and reviewed. Using CAD data that is over a year old that no longer has the corresponding radio traffic available such as the IGO did in their audit, can lead to an unreliable representation of what may/may not have happened during an historical emergency incident.

In the future, the CFD is open to participating in a forward looking audit with the IG for a 30 day period so that all data, including the CAD, two-way radio traffic, event query, and NIFR reports can be retained and reviewed, and a complete picture of response time can be obtained and fully analyzed."

OIG Response to Management Response:

1. CFD expressed no concerns about the use of CAD data to analyze response times until the OIG presented the audit results to CFD.
2. The CAD data used for the audit was validated by the OIG with the assistance and review of CFD in order to collaboratively assure sufficient reliability as an appropriate data set for performance analysis, as described in the Methodology section of the audit.
3. The OIG is open to working with CFD on a future audit using CAD data together with any additional CFD sources of information about fire and medical responses.

Finding 4: CFD Is Not Meeting National Standards for Response Time Citywide

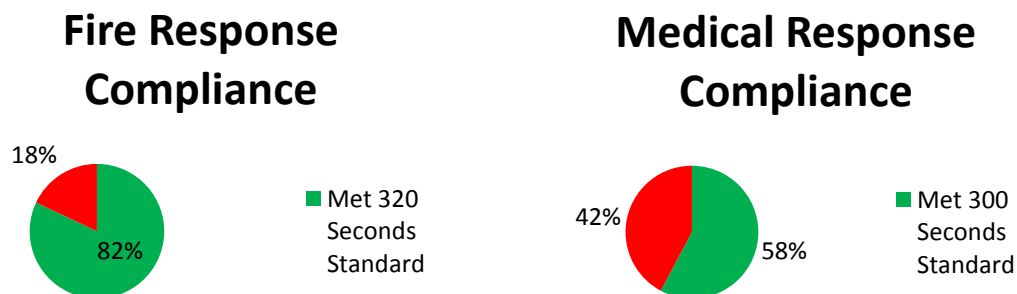
NFPA 1710 4.1.2.4. states that the fire department shall establish a performance objective of meeting response time standards no less than 90% of the time.

As defined in NFPA 1710, turnout and travel time are two distinct time intervals related to an emergency response incident and must be measured as such. CFD does not measure turnout and travel time separately but instead measures “response time” which represents the interval between Dispatch and On Scene (see Background section of this report). NFPA 1710 does not have a standard for “response time” as CFD defines it. As a result CFD cannot appropriately claim that it is in compliance with NFPA 1710.

To most proximately assess CFD’s “response time” measure in relation to the national standards, we combined the NFPA standards for an 80 second turnout time and a 240 second travel time for a total “response time” of 320 seconds for fire incidents. Likewise, we combined the NFPA standards for a 60 second turnout time and a 240 second travel time for a total “response time” of 300 seconds for medical incidents. To determine whether CFD’s response times met the aggregation of the response segment standards outlined in NFPA 1710, we compared CFD “response times” for each call for service incident to the combined national standard segments and calculated the percentage of responses that met that combined standard in 2012.

For fire incidents, CFD met the combined standard of a 320 second (5 minutes 20 seconds) “response time” 82% of the time in 2012. For medical incidents, CFD met the combined standard of a 300 second (5 minutes) “response time” 58% of the time in 2012. Therefore, CFD failed to meet the NFPA standard for achieving target response times at least 90% of the time citywide for both fire and medical incidents.

The charts below illustrate CFD’s compliance percentages for fire and medical incidents:



Source: OIG analysis of CFD data

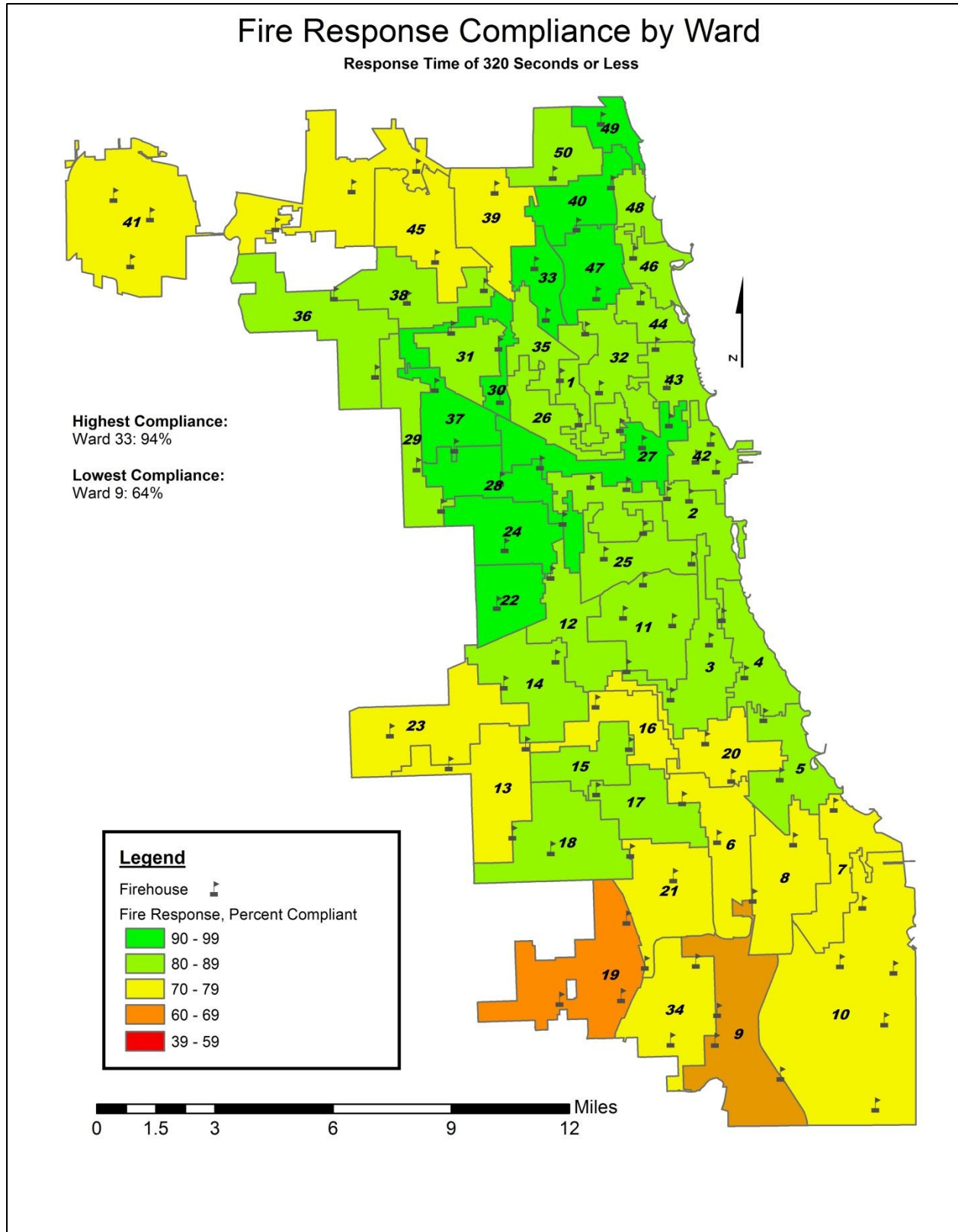
We also analyzed incident data by ward and community area to determine if the combined standards of fire response within 320 seconds and medical response within 300 seconds were met at least 90% of the time on a ward and community area basis. We found that CFD met the combined standard for fire incidents in 14% of the City’s wards (7 of 50), and did not meet the

standard for medical incidents in any ward in 2012.²⁶ Similarly, CFD met the standard for fire incidents in 19.5% of the community areas (15 of 77), and did not meet the standard for medical incidents in any community area.

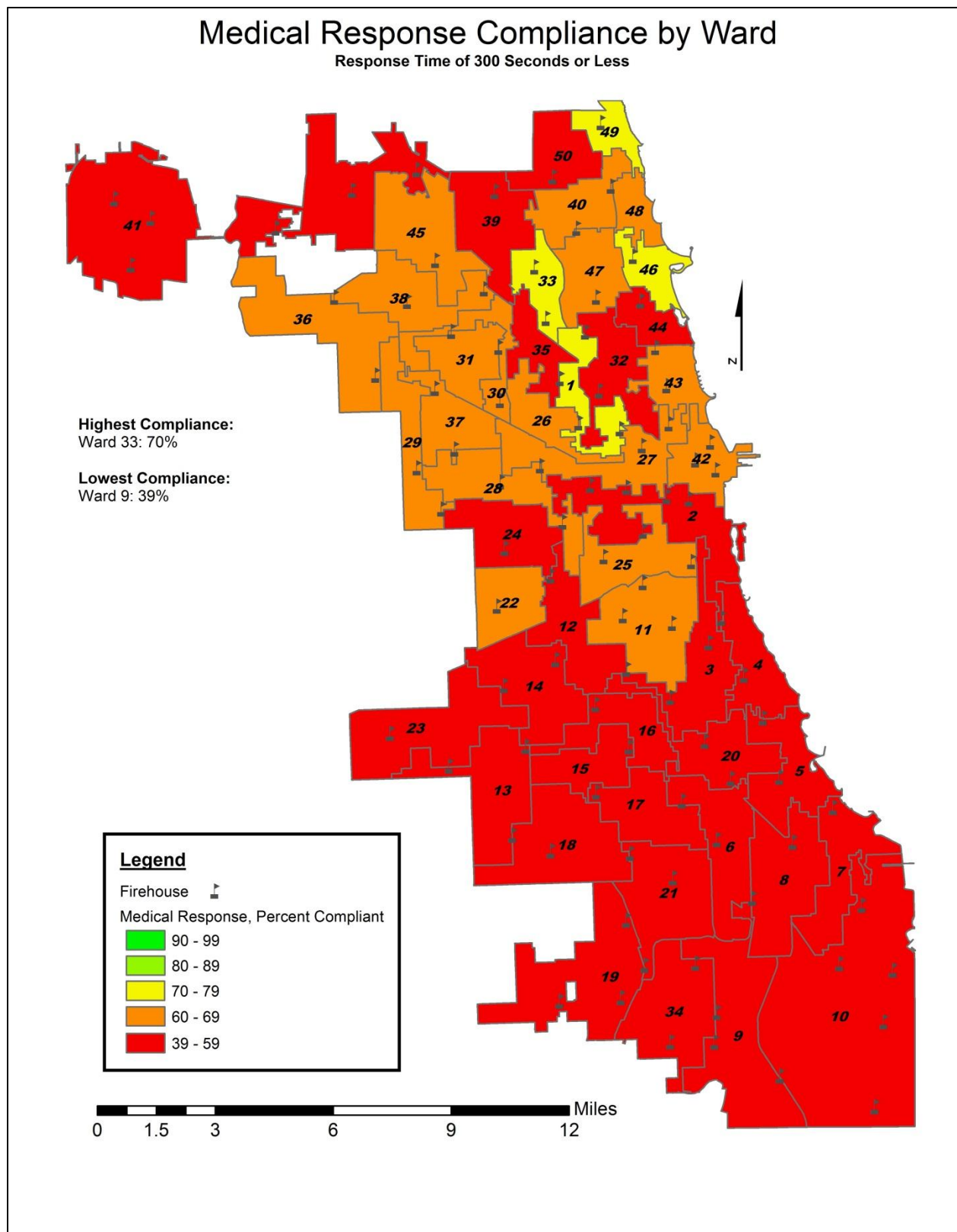
The following maps show compliance by ward and community area for fire and medical response times.²⁷

²⁶ OEMC could not geocode 8,192 fire incidents (11% of total fire incidents) and 53,322 medical incidents (17% of total medical incidents) into ward or community area so we could not include them in this analysis.

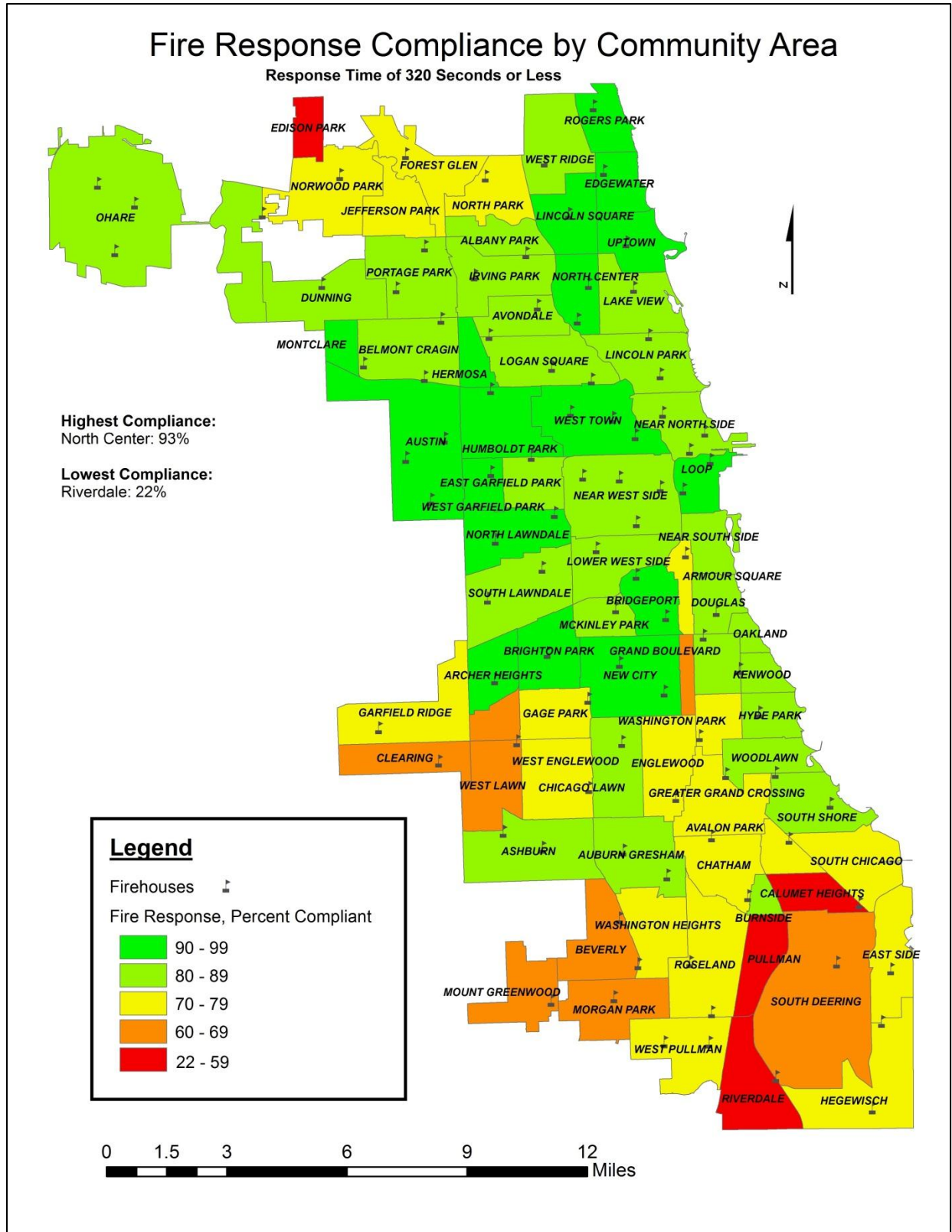
²⁷ Detailed compliance rates for each ward and community area can be found in Appendices B and C.



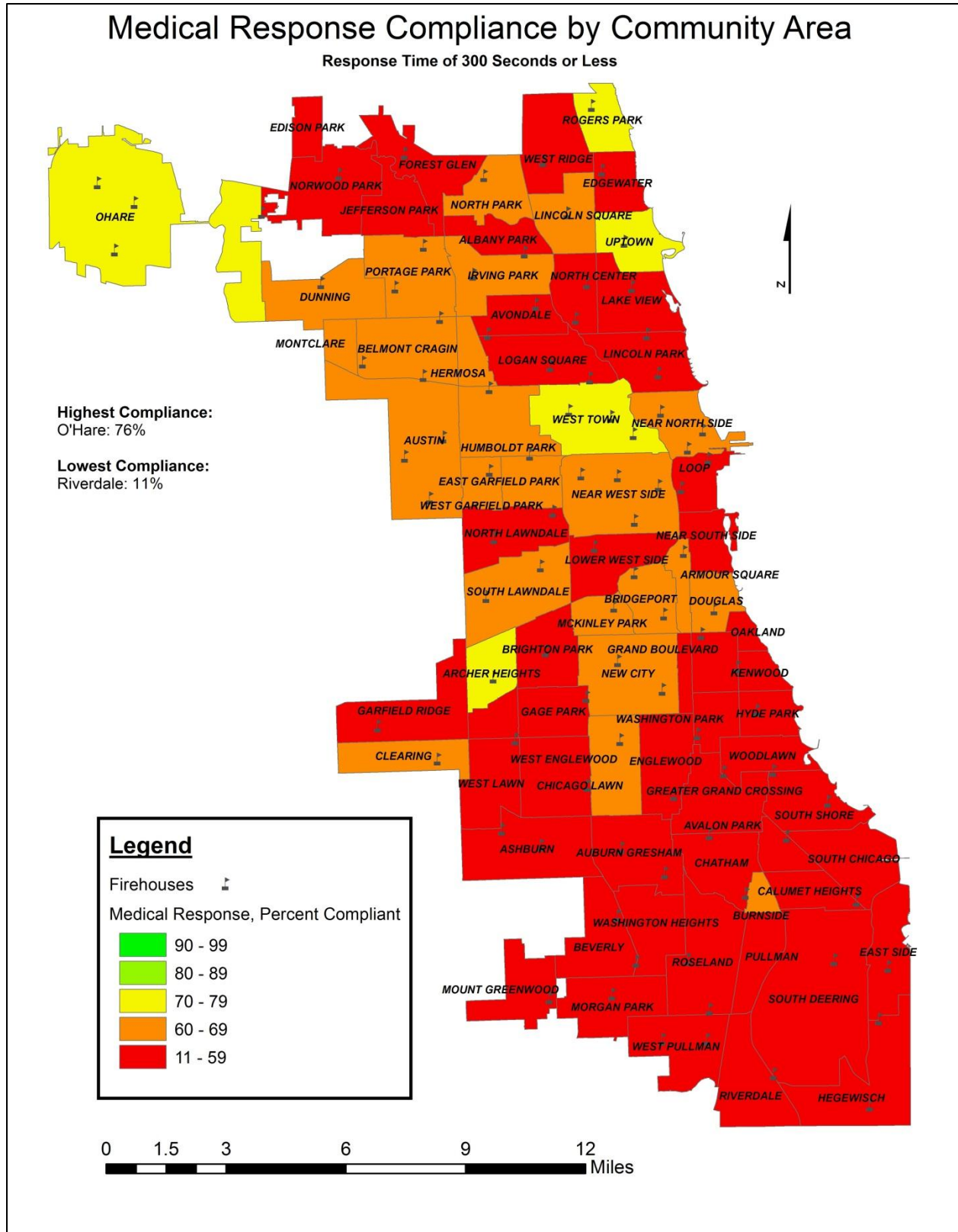
Source: OIG analysis of CFD data



Source: OIG analysis of CFD data



Source: OIG analysis of CFD data



Source: OIG analysis of CFD data

The OIG also performed an analysis by month to determine if seasonality could have affected response times. Our analysis showed seasonality had little to no impact on response times for both fire and medical incidents.²⁸

CFD management stated that many factors can contribute to extended response times such as poor road conditions, train crossings, and traffic congestion.

Recommendation:

CFD expressed concerns regarding any recommendation that would encourage fire and EMS companies to drive faster in order to decrease response time. We agree with the Department that such a recommendation is not appropriate. However, other operational factors could be contributing to increased response times such as a lack of ambulances and paramedics, location of fire houses, or aging equipment. Therefore, we recommend that CFD conduct a thorough data-based analysis to identify causes that are preventing them from meeting the national response time goals and ways to improve its operational efficiency. Additionally, to the extent the Department intends in the future to use NFPA 1710 as a performance standard and benchmark, we recommend the Department immediately create and implement an action plan that will ensure verifiable compliance with NFPA 1710 standards.

Alternatively, CFD could conduct a study to determine if the unique characteristics of the city prevent it from meeting the response time goals contained in NFPA 1710 and could recommend choosing other response time goals.²⁹ The Department should then perform an annual analysis of incidents to determine if it is meeting the alternative goals.

Finally, we recommend the Department evaluate turnout and travel time separately from total response time to better identify and understand areas that need improvement as well as to be in compliance with NFPA 1710.

Management Response:³⁰

“CFD acknowledges that it does not meet the strict reading of the NFPA guidelines for fire suppression response times employed by the IGO in their audit, but does believe that its measurement of average response times is a reliable and appropriate measure in line with methods employed by other major cities. Furthermore, what is advised by the NFPA for EMS is not actually the most applicable standard, as the Illinois Department of Public Health (IDPH) is the regulatory agency for EMS response time, trumping the NFPA’s guidelines. IDPH has reviewed and approved CFD’s EMS response time goal of six minutes as appropriate as part of CFD’s overall EMS Plan.

²⁸ See Appendix A for seasonality analysis.

²⁹ In February 2011, Citygate Associates, LLC, a consulting company hired by the City of San Diego, issued a report titled Fire Service Standards of Response Coverage Deployment Study for the City of San Diego Fire-Rescue Department. The report suggested changing San Diego’s medical response performance goals to account for unique characteristics of the City.

³⁰ See Appendix D for CFD’s complete response letter.

As discussed above, the CFD gets weekly average response time results based on total time from dispatch to 'on scene,' with thousands of emergency incidents resulting in a sample size big enough to create an accurate reflection of the true average. CFD uses these averages as a first-line tool for monitoring itself, as do many other large cities to monitor system performance. For example, New York City, which is also not technically compliant with NFPA 1710, shows an average response time of four minutes, as compared to Chicago's average of just under four minutes for suppression.

A. Ward or Community-Based Allocation of Fire Resources Would Unnecessarily Politicize Apolitical Public Safety Mission

The IGO also recommended CFD conduct an equipment/personnel audit by ward or community area. CFD strongly disagrees that emergency and fire suppression services should be allocated by ward or by any other political boundaries. The only way an authentic ward or community-area analysis could be conducted is if each ward/community had a firehouse centrally located in it, if the ward map never changed (which is occurring now), or, if the CFD didn't have firehouses that were located on the borders of more than one (1) ward, and, if firehouses only responded to incidents in their respective ward/community boundary.

In fact, neighborhood/ward boundaries are not factored in the dispatching of CFD equipment and resources in any way. The CFD's firehouses are laid out in a manner that gives each firehouse a first due response or 'still district' response, with a dynamic network of expanding and contracting coverage responsibilities that is based on several factors. Neighborhood/ward boundaries are not among these factors. For instance, a neighborhood like Edison Park that is surrounded on three (3) sides by suburbs might show a higher response time at certain times because all CFD-based support must come from the south of the neighborhood. The IGO would have to 'normalize' each neighborhood based on its location, with respect to borders, or perhaps Lake Michigan, as any city border will affect response from that direction, especially if the neighborhood/ward boundary has no firehouse in it.

To suggest that neighborhood/ward boundaries have a relationship to CFD operations unnecessarily politicizes an apolitical public safety mission. Additionally, while the IGO looks at neighborhood/ward boundaries it does not take consideration actual physical structures, expressways, airports, or industrial areas, which may be located within those boundaries and in many cases can affect response times. The IGO's attempt at establishing neighborhood/ward boundaries as an audit parameter potentially causes unnecessary and unforeseen consequences that could undermine the CFD's public safety mission. Further, this issue has never been a subject of complaint either in public forums or 311 City Services.

B. Firehouse Resources in Chicago are Allocated Appropriately throughout City

On the issue of CFD potentially adding more firehouses, the CFD looked at a study previously completed by the Rand Corporation of fire department response times. It says:

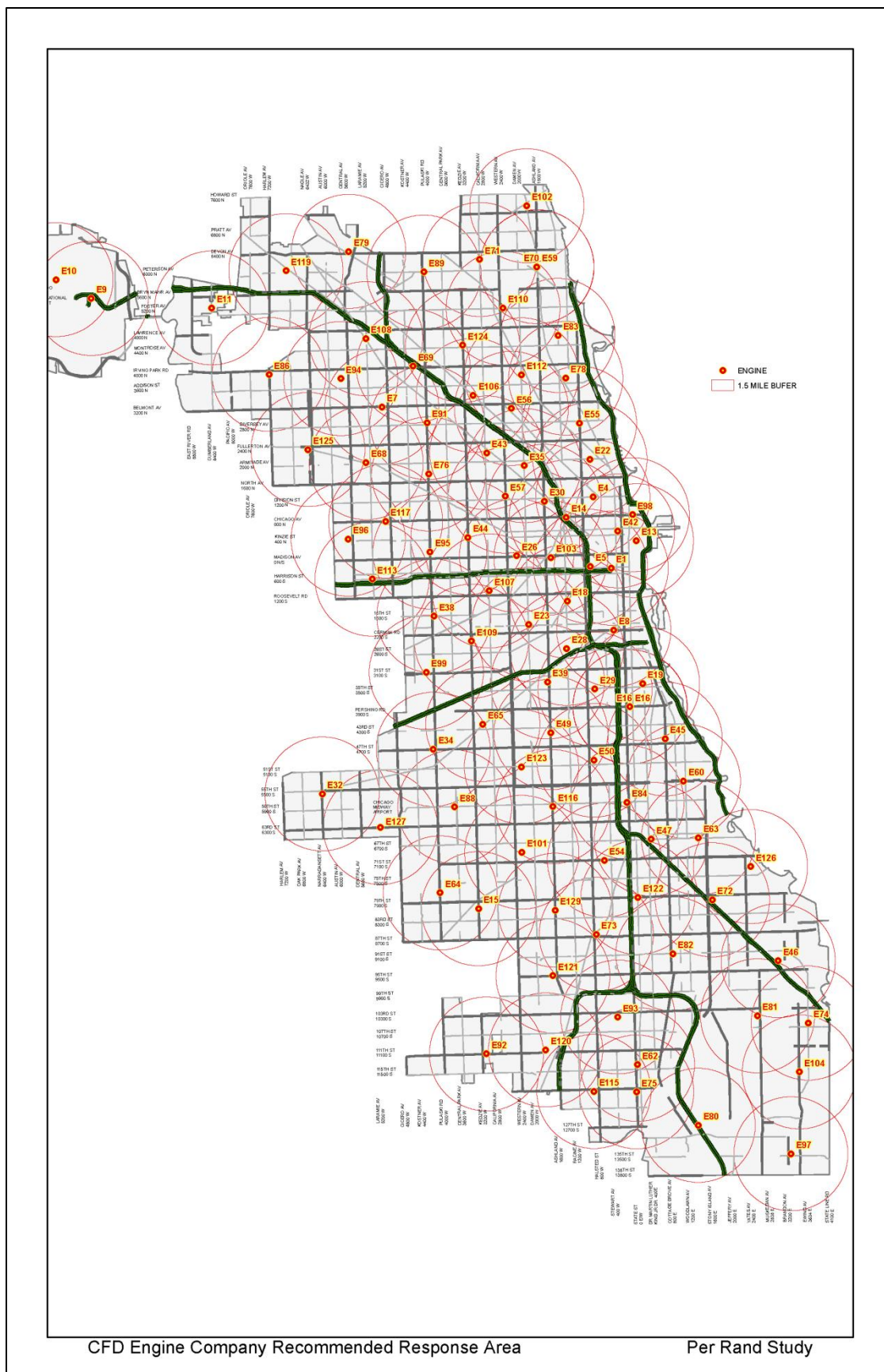
'In evaluating a community's public fire protection, one must consider the distribution of fire companies. Generally, expert criteria says that a built-upon area of a community should have a first-due engine company within 1.5 road miles of the protected properties and a ladder-service company within 2.5 road miles. Those benchmark criteria produce an expected response time of 3.2 minutes for an engine company and 4.9 minutes for a ladder-service company, based on the Rand formula.'

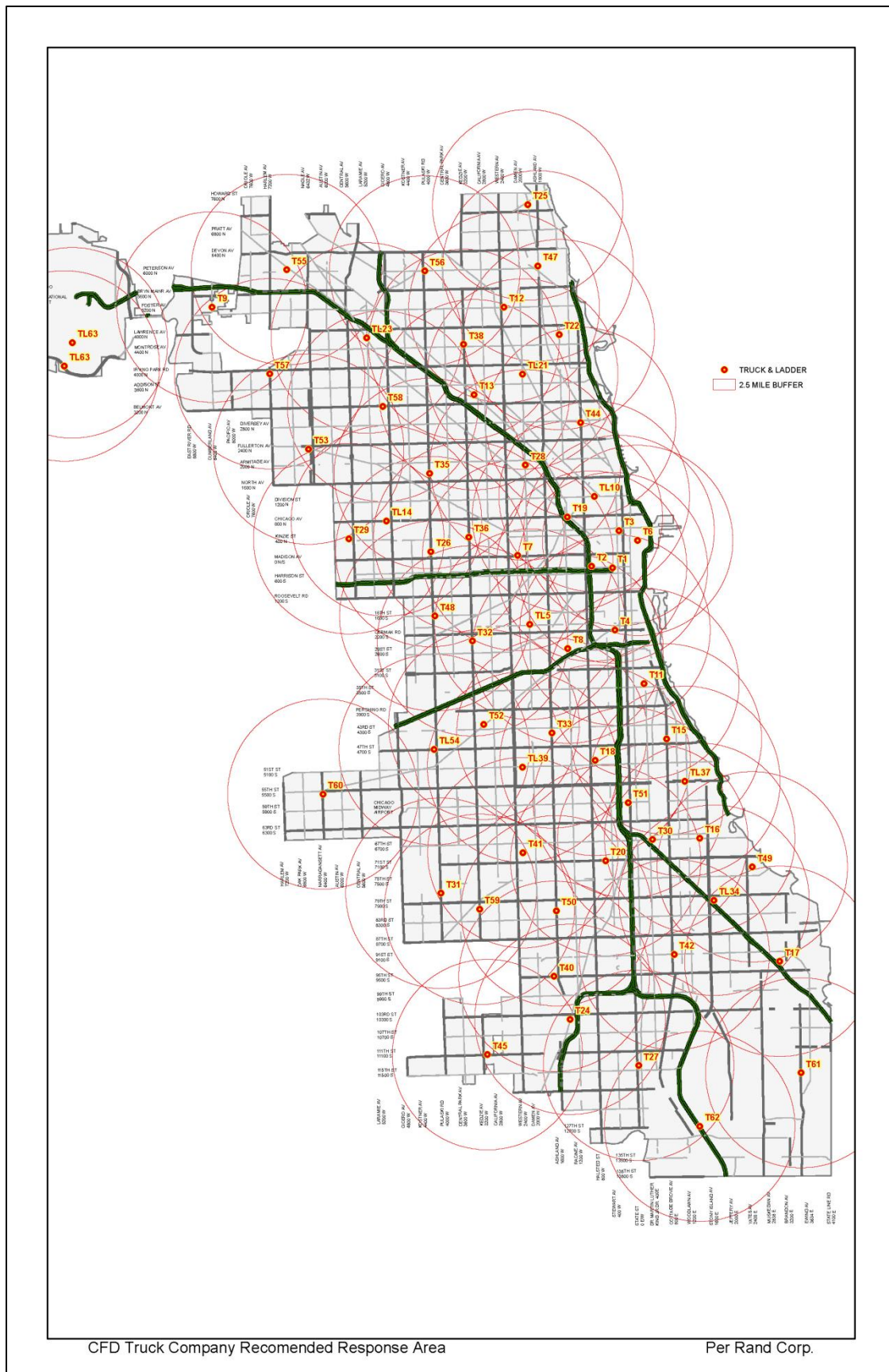
Rand conducted extensive studies of fire department response times and they concluded that the average speed for a fire apparatus responding with emergency lights and siren is 35 mph. That speed considers average terrain, average traffic, weather, and slowing down for intersections. Taking into account the average speed and the time required for an apparatus to accelerate from a stop to the travel speed, Rand developed the following equation for calculating the travel time:

- *$T = 0.65 + 1.7D$, where T = time in minutes to the nearest 1/10 of a minute and 0.65 = a vehicle-acceleration constant for the first 0.5 mile traveled.*
- *1.7 = a vehicle-speed constant validated for response distances ranging from 0.5 miles to 8.0 miles. D = distance*

Using this formula, the CFD mapped every current firehouse in the CFD, with a buffer of 1.5 miles. The CFD used the location of each of its truck companies and made a buffer of 2.5 miles, in accordance with the Rand formula for response. The resulting maps show that Chicago is well within distance limits to provide proper response times and that CFD's average reported time is, in fact, a reflection of the grid system that is used in the deployment of firehouses, regardless of ward or neighborhood."

(The following two maps are part of management's response.)

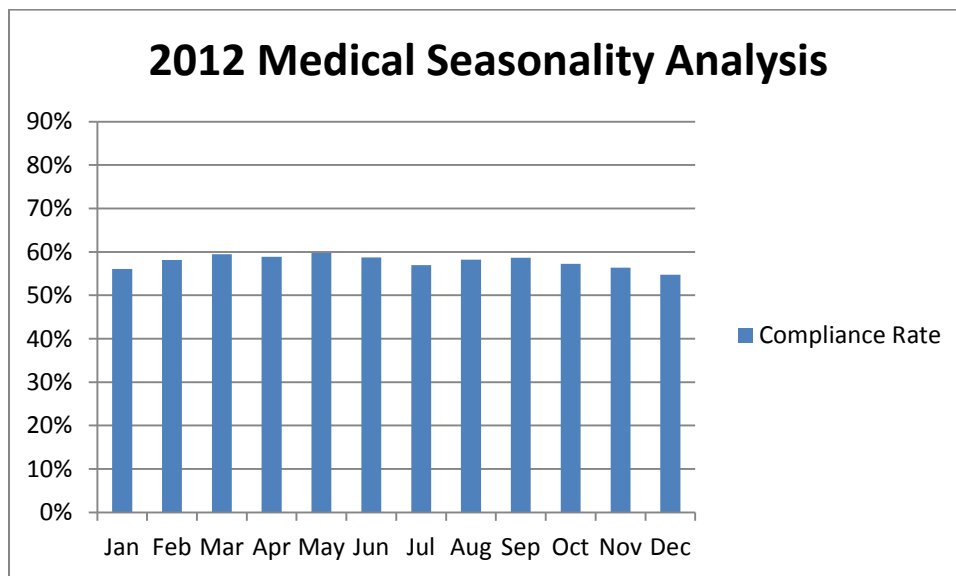
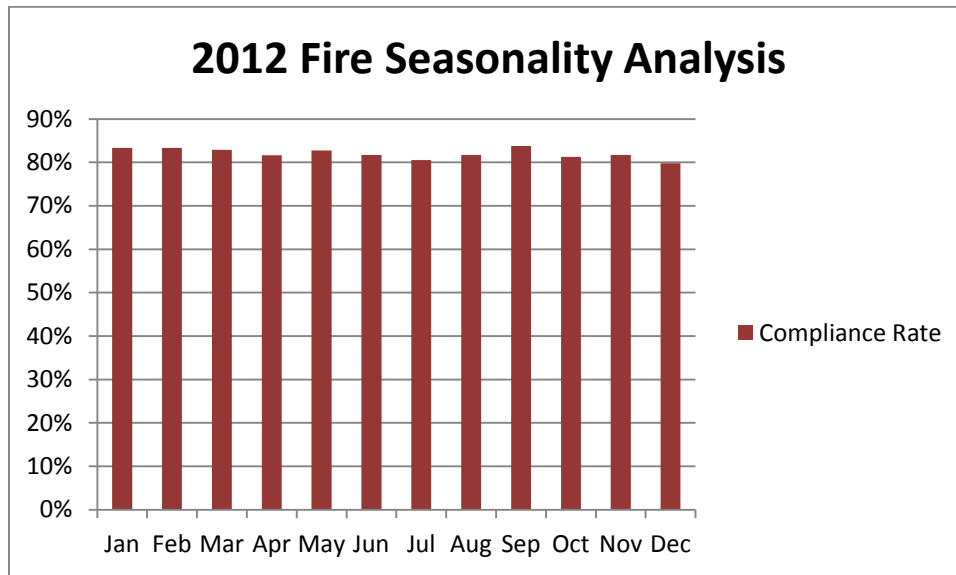




OIG Response to Management Response:

1. CFD's information and arguments do not respond directly to the OIG audit finding.
2. Although CFD executes fire and EMS response on a nearest available unit to incident basis, not a nearest firehouse basis, CFD's response to the audit's finding employs a formula designed to calculate response area around a firehouse, not response time to actual incidents.
3. The most fundamental customer metric is response time, not firehouse location.
4. CFD still districts are not a meaningful geographic frame of reference from a resident's perspective—wards and/or community areas are.

V. APPENDIX A: SEASONALITY ANALYSIS RESPONSE TIMES



Source: OIG analysis of CFD data

VI. APPENDIX B: WARD RESPONSE COMPLIANCE DETAIL

| Ward | % of Fire Response Compliance | % of Medical Response Compliance |
|------|-------------------------------|----------------------------------|
| 1 | 89% | 69% |
| 2 | 87% | 58% |
| 3 | 82% | 57% |
| 4 | 84% | 59% |
| 5 | 86% | 51% |
| 6 | 78% | 54% |
| 7 | 73% | 46% |
| 8 | 72% | 46% |
| 9 | 64% | 39% |
| 10 | 74% | 54% |
| 11 | 87% | 65% |
| 12 | 88% | 55% |
| 13 | 71% | 53% |
| 14 | 80% | 53% |
| 15 | 79% | 51% |
| 16 | 79% | 52% |
| 17 | 83% | 52% |
| 18 | 86% | 58% |
| 19 | 68% | 51% |
| 20 | 78% | 56% |
| 21 | 73% | 48% |
| 22 | 89% | 59% |
| 23 | 71% | 52% |
| 24 | 89% | 53% |
| 25 | 83% | 60% |
| 26 | 88% | 59% |
| 27 | 90% | 62% |
| 28 | 90% | 62% |
| 29 | 89% | 61% |
| 30 | 89% | 63% |
| 31 | 86% | 59% |
| 32 | 88% | 57% |
| 33 | 94% | 70% |
| 34 | 74% | 45% |
| 35 | 84% | 54% |
| 36 | 83% | 60% |
| 37 | 94% | 67% |
| 38 | 86% | 61% |
| 39 | 77% | 50% |

| Ward | % of Fire Response Compliance | % of Medical Response Compliance |
|------|-------------------------------|----------------------------------|
| 40 | 93% | 67% |
| 41 | 76% | 56% |
| 42 | 89% | 61% |
| 43 | 89% | 60% |
| 44 | 83% | 55% |
| 45 | 75% | 59% |
| 46 | 89% | 69% |
| 47 | 93% | 61% |
| 48 | 89% | 60% |
| 49 | 90% | 70% |
| 50 | 80% | 52% |

Source: OIG analysis of CFD data

VII. APPENDIX C: COMMUNITY AREA RESPONSE COMPLIANCE DETAIL

| Community Area | % of Fire Response Compliance | % of Medical Response Compliance |
|------------------------|-------------------------------|----------------------------------|
| ALBANY PARK | 81% | 54% |
| ARCHER HEIGHTS | 90% | 70% |
| ARMOUR SQUARE | 75% | 61% |
| ASHBURN | 84% | 57% |
| AUBURN GRESHAM | 84% | 56% |
| AUSTIN | 90% | 61% |
| AVALON PARK | 73% | 53% |
| AVONDALE | 86% | 54% |
| BELMONT CRAGIN | 88% | 67% |
| BEVERLY | 63% | 44% |
| BRIDGEPORT | 92% | 66% |
| BRIGHTON PARK | 90% | 56% |
| BURNSIDE | 83% | 66% |
| CALUMET HEIGHTS | 59% | 37% |
| CHATHAM | 78% | 52% |
| CHICAGO LAWN | 77% | 47% |
| CLEARING | 65% | 60% |
| DOUGLAS | 88% | 63% |
| DUNNING | 82% | 61% |
| EAST GARFIELD PARK | 86% | 61% |
| EAST SIDE | 77% | 55% |
| EDGEWATER | 89% | 59% |
| EDISON PARK | 49% | 32% |
| ENGLEWOOD | 78% | 50% |
| FOREST GLEN | 76% | 58% |
| FULLER PARK | 64% | 52% |
| GAGE PARK | 70% | 40% |
| GARFIELD RIDGE | 75% | 52% |
| GRAND BOULEVARD | 86% | 59% |
| GREATER GRAND CROSSING | 76% | 51% |

| Community Area | % of Fire Response Compliance | % of Medical Response Compliance |
|-----------------|-------------------------------|----------------------------------|
| HEGEWISCH | 76% | 52% |
| HERMOSA | 90% | 62% |
| HUMBOLDT PARK | 91% | 61% |
| HYDE PARK | 83% | 55% |
| IRVING PARK | 87% | 62% |
| JEFFERSON PARK | 72% | 58% |
| KENWOOD | 85% | 58% |
| LAKE VIEW | 84% | 57% |
| LINCOLN PARK | 88% | 57% |
| LINCOLN SQUARE | 92% | 67% |
| LOGAN SQUARE | 87% | 58% |
| LOOP | 90% | 55% |
| LOWER WEST SIDE | 83% | 58% |
| MCKINLEY PARK | 88% | 66% |
| MONTCLARE | 89% | 68% |
| MORGAN PARK | 67% | 45% |
| MOUNT GREENWOOD | 67% | 54% |
| NEAR NORTH SIDE | 88% | 63% |
| NEAR SOUTH SIDE | 81% | 48% |
| NEAR WEST SIDE | 88% | 62% |
| NEW CITY | 90% | 60% |
| NORTH CENTER | 93% | 57% |
| NORTH LAWNDALE | 91% | 54% |
| NORTH PARK | 79% | 61% |
| NORWOOD PARK | 76% | 53% |
| OAKLAND | 84% | 57% |
| OHARE | 82% | 76% |
| PORTAGE PARK | 88% | 63% |
| PULLMAN | 50% | 18% |
| RIVERDALE | 22% | 11% |

| Community Area | % of Fire Response Compliance | % of Medical Response Compliance |
|--------------------|-------------------------------|----------------------------------|
| ROGERS PARK | 90% | 70% |
| ROSELAND | 70% | 40% |
| SOUTH CHICAGO | 70% | 41% |
| SOUTH DEERING | 61% | 45% |
| SOUTH LAWDALE | 86% | 60% |
| SOUTH SHORE | 85% | 54% |
| UPTOWN | 92% | 70% |
| WASHINGTON HEIGHTS | 71% | 44% |
| WASHINGTON PARK | 76% | 57% |
| WEST ELSDON | 66% | 40% |
| WEST ENGLEWOOD | 87% | 60% |
| WEST GARFIELD PARK | 92% | 61% |
| WEST LAWN | 68% | 49% |
| WEST PULLMAN | 78% | 51% |
| WEST RIDGE | 81% | 53% |
| WEST TOWN | 90% | 70% |
| WOODLAWN | 85% | 56% |

Source: OIG analysis of CFD data

VIII. APPENDIX D: CFD RESPONSE TO OIG AUDIT



CHICAGO FIRE DEPARTMENT
CITY OF CHICAGO

THE OFFICE OF THE FIRE COMMISSIONER

To: Joseph M. Ferguson, Inspector General
The Office of the Inspector General

From: _____
José A. Santiago, Fire Commissioner
The Chicago Fire Department

Date: October 16, 2013

Re: The IGO's Preliminary Results of the CFD's Fire/EMS Response Time

The Chicago Fire Department (CFD) appreciates the IGO's efforts to analyze and audit the department's response times. Like any public safety agency, the CFD continuously looks for ways to efficiently and safely deliver emergency services. Due to the size and complexity of CFD, accurately measuring its response times requires a detailed understanding of its operations, equipment, staffing, dispatch and deployment procedures and the data collected to manage those operations. Though we disagree with the specifics of some of the IGO's findings, the Department shares the same goal of constantly measuring and improving response times to best serve the residents of Chicago.

CFD's response to the IG's audit of response times is divided into 8 sections:

1. Background: EMS and Fire Suppression Response Process
2. NFPA Standards for EMS and Fire Suppression Response Times
3. Illinois EMS Act & EMS Response Times
4. Response to IGO Finding 1: CFD Does Not Have Documented Response Time Goals
5. Response to IGO Finding 2: CFD's Analysis Does Not Allow the Department to Determine Its Compliance with National Standards
6. Response to IGO Finding 3: Not All Incidents Have Complete and Accurate Time Data
7. Response to IGO Finding 4: CFD is Not Meeting National Standard for Response Time Citywide
8. Conclusion

Background: Fire Suppression and EMS Response Process

The IGO's audit covers two different types of emergency responses: fire suppression and emergency medical services (EMS). To better understand response times and how they are measured, below is a

detailed description of the fire suppression and EMS response processes, from the time a call comes into the Office of Emergency Management and Communications (OEMC) through the time the engines and/or ambulances arrive on scene.

All 911 calls are first routed to a Police Communications Operator I, at the OEMC. If the caller is requesting emergency medical services (EMS) or reporting a fire, the call is transferred to a Fire Communications Operator I, who is also a licensed Emergency Medical Technician Dispatcher (EMTD). The EMTD is medically trained and able to triage the call in order to determine what level of care is needed, (e.g. a Basic Life Support (BLS) ambulance vs. an Advanced Life Support (ALS) ambulance) and provide pre-arrival instructions if necessary.

Information about the location of the incident is electronically forwarded to a second operator, the Fire Communications Operator II, who then uses the computer-aided dispatch system (CAD) to assist in determining the appropriate apparatus to send. Apparatus are often moving through the city, so the CAD offers a "dynamic" view of all available assets so the dispatcher can locate the apparatus that is physically closest to the incident at the time the call comes in. The physically closest apparatus may not be the apparatus that is permanently housed in that fire district or ward, but rather one that happens to be driving by.

The alarm terminal in the firehouse will emit a dispatch tone and the nature and location of the alarm will come over the alarm terminal with an automated voice. The officer or member "on watch" will press the "acknowledge" button, signaling to the OEMC that the alarm has been received. The officer "on watch" will then ring the bell in the firehouse to alert the crews to the alarm. As each driver heads to the apparatus, a print out of the alarm is given to him or her. The same information should now be displayed on the onboard computer terminal in the apparatus. Once the crew is in the apparatus, leaves the firehouse and is on the street responding to the alarm, the "enroute" button is pressed, thus signaling to the CAD that the unit is out of the firehouse and responding.

Upon arriving at the location of the alarm, the "on scene" button is pushed and the officer announces the arrival of the apparatus over the fire radio to the OEMC along with detailed information about the building or situation, as observed. Each time a button is pressed in the mobile terminal, the CAD sends back a confirmation. If that confirmation is not received, the company officer may retry or simply announce the status over the air and the OEMC will, at some point, manually update the CAD.

Information captured by the CAD is valuable for auditing response times and addressing other operational concerns. However, without two-way radio traffic and event queries, the CAD data alone can offer an incomplete picture of CFD's response to an incident, especially in the following common circumstances, which are just a few common examples:

- Example 1: the CAD data reflects a response time of "0.00 seconds." Since the CAD captures the time between the initial call and the pressing of the "on scene" button, it will reflect a response time of 0 seconds when a person walks directly into a firehouse and requests emergency services.
- Example 2: the CAD data reflects an unusually long response time. Occasionally a CFD apparatus will arrive on the scene of an incident but the first responders cannot locate the person needing assistance. This can occur if the address was stated incorrectly during the 911 call or if a friend or family member picked up a crime victim and drove them to the hospital after a 911 call was placed. In those instances, the CFD driver will wait to press the "on scene"

button until he or she has located the person requesting assistance. While tapes of radio traffic would establish that the CFD apparatus arrived at the designated scene within a few minutes, the CAD data would reflect a much longer response time.

- Example 3: the CAD data reports identical time for two different apparatus arriving at the same scene. When CAD data reflects identical response times for multiple apparatus (a near statistical impossibility), it often means the drivers forgot to press the "on scene" buttons and the CAD operator manually entered them at the same time after confirming with the drivers by two-way radio that they were on scene. These human errors by the drivers often result in an over-estimate of the response time by the CAD.

Because the CAD data can be an imperfect estimate (often an over-estimate) of response times, an audit would ideally also consider the two-way radio traffic recordings, interviews with frontline personnel, and CFD "after action documentation." Since tapes of two-way radio traffic are only kept for 30 days, the IGO was unable to review them for its audit of all of 2012.

Before responding to the specific findings of the IGO's report, CFD would like to briefly comment on two different standards for response times: the National Fire Protection Association (NFPA) for EMS and fire response and the Illinois EMS Act for EMS response times only.

NFPA Standards for EMS and Fire Suppression Response Times

In its audit report, the IGO describes the NFPA standards for fire and EMS response times ("Standard 1710") as a national standard and compares its calculation of CFD response times to that standard. CFD disagrees that Standard 1710 is used by other large municipal fire departments as a strict benchmark for their response times and strongly disagrees that it should hold its first responders to those strict standards. When responding to emergency fire suppression or EMS incidents, the CFD's priority is twofold: (1) ensuring that all emergency response vehicles take the most direct route to an emergency incident, and (2) that they respond in the safest possible manner. CFD believes that ordering its first responders to meet Standard 1710 would jeopardize that second goal.

To further explain its position, CFD offers the following background on the NFPA and standard response times.

The National Fire Protection Association (NFPA) is a nonprofit agency made up of vendors, manufacturers, consultants and other members of the fire community that developed guidelines for emergency response agencies, including fire suppression and EMS response times and staffing of fire apparatus. There are no official or legal national standards for fire department response times and the NFPA in its own documentation recognizes that its response standards must include flexibility and allow for differences in each fire department, especially large departments in dense, urban areas. Quoting the NFPA document 1710, section A.1.4, the CFD finds:

- "The authority-having jurisdiction (AHJ) determines what systems, methods, or approaches are equivalent or superior in performance.
- An AHJ should approach the assessment by reviewing the overall public fire protection and EMS system performance."
- The NFPA Assistant Director, Public Fire Protection Division, stated in an NFPA journal article that "1710 is a good planning document."

- The 1710 guidelines have been very controversial and even members of the committee who developed the guidelines have described them as “goals” and “ambitious.”

While the IGO makes reference to some cities following 1710, including Los Angeles, Houston and Boston, this statement may be somewhat exaggerated. The IGO is referencing a report about the Moraga-Orinda Fire Protection District, which substantively analyzed staffing levels and crew deployment. It concluded that many large departments are “meeting the standard” on staffing levels and “meet or exceed the [crew deployment] minimums spelled out in 1710.” The report only addressed whether these same departments are following the 1710 guidelines for response times in the attached Appendix B to the report, where the departments self-reported as generally following the guidelines by filling out a multiple choice survey. There is no indication that these cities treat Standard 1710 as a formal requirement for response times.

The NFPA guidelines for response times are not a “one size fits all” approach. By the NFPA’s own admission, those guidelines need to be flexible and account for the unique circumstances faced by individual fire departments. NFPA 1710, section A.1.4.

Illinois EMS Act & EMS Response Times

NFPA is not the only relevant standard by which to measure response times in Chicago. In fact, the CFD’s Bureau of EMS is authorized and regulated solely by the Illinois EMS Act. The EMS Act outlines responsibilities, standards, and operational mandates for the State Division of EMS, the EMS System (the four resource hospitals), and the CFD. Specifically, the Act required CFD to submit an EMS System Plan, in which CFD committed to responding with an EMS vehicle within six minutes.

Since the CFD was an active partner with the IGO during the audit process, CFD accepts responsibility for the fact that IGO did not review the EMS Act and CFD’s EMS System Plan prior to the IGO drafting its audit report. Below is more background on the EMS Act.

Regulatory authority over the delivery and response of CFD’s EMS services rests with the Illinois Department of Public Health (IDPH), and not NFPA 1710. The IDPH’s rules and regulations outline what the EMS System must do and mandate the standards to which the CFD is held. The EMS Act states that the EMS System (resource hospitals) must submit a program plan to IDPH and must appoint an EMS Medical Director who will continually monitor and supervise the system and have the responsibility and authority for total management of the system. This includes total authority and responsibility for the CFD and the delivery of its EMS services.

The CFD, based on the rules and regulations, is required to submit a program plan describing how it will respond to EMS calls. Pursuant to Section 515.810e of the EMS Act, CFD in its program plan committed to responding with a licensed EMS vehicle within six minutes. The CFD’s program plan was then submitted to IDPH for final approval.

The EMS System is required to monitor CFD’s compliance with the EMS Act, rules and regulations and the mandates CFD outlined in its own program plan. Ultimately, the IDPH is responsible for making sure the CFD is in compliance with the Act and the mandates. If the CFD were to violate any of these mandates, IDPH could do any of the following:

- Mandate the CFD to submit a plan of correction
- Suspend the CFD’s provider license

- Impose a fine

The CFD's Office of Medical Administration and Regulatory Compliance (MARC) is responsible for certifying that the CFD is in compliance with the EMS Act, rules and regulation and system mandates. The MARC section routinely performs quality improvement by reviewing EMS calls to assure compliance with the EMS Act and System standing medical orders.

IGO Finding #1: CFD Does Not Have Documented Response Time Goals

The IGO recommends formally putting in writing service delivery goal numbers in order to "demonstrate the department's commitment" to achieving response times in accordance with certain guidelines mentioned in NFPA.

First, as described above, CFD has documented formal EMS response goals in its plan as mandated by the IDPH. CFD has been in compliance with these goals since the time of the Plan's approval in 2000.

The CFD has formal written rules, procedures, and training protocol on fire suppression already in place, but disagrees with putting time goals for fire suppression response time in writing and potentially encouraging reckless behavior to meet an arbitrarily set time goal such as NFPA, absent a legal requirement. The IGO and the CFD are in agreement in that neither entity advocates advising CFD personnel to drive faster to an incident to reduce response times.

Ultimately CFD's priority is twofold: ensuring that all emergency response vehicles take the most direct route to an emergency incident in the safest, possible manner. These goals are reflected in two (2) different documents currently maintained by the CFD including:

- The Defensive Training Manual
- The Rules, Regulations, Practices and Procedures of the Chicago Fire Department

While CFD disagrees that it should formalize fire suppression response time goals for safety reasons, CFD *does* compare its response times to the National Fire Protection Association (NFPA) guidelines. CFD acknowledges that it does not meet the strict reading of the NFPA guidelines employed by the IGO in their audit but strongly believes that its measurement of average response times is a reliable and appropriate measure in line with methods employed by other major cities. However, CFD appreciates the IGO's view that there may be some confusion in previous CFD materials regarding its adherence to NFPA guidelines, and will accordingly ensure in all future literature and communications that it clarifies its usage of NFPA guidelines as that of a tool for comparison only.

IGO Finding #2: CFD's Analysis Does Not Allow the Department to Determine Its Compliance with National Standards

As stated previously, there are no official national standards for fire department response times and the NFPA in its own documentation recognizes that its response standards must include flexibility and allow for differences in each fire department. NFPA 1710, section A.1.4.

Nonetheless, CFD monitors its own response times to make sure its operations are running safely and efficiently using CAD data. CFD reviews CAD data in order to calculate average response times as an

early alert system during an internal weekly audit. While the CAD data is subject to human error, that human error often artificially lengthens the response times instead of shortening them. (This is a primary reason why CFD has concerns with IGO using CAD as their only source of data for their audit of all 2012 runs, as relying on CAD data alone in calculating average response times for such an extended period of time more likely than not has artificially lengthened the average response times.)

For example, the CAD system depends on drivers pressing an "on scene" button. If the driver forgets to press the button, the actual response time will be shorter than the recorded response time. In addition, due to the large number of each week's sample size, an average of response times is an appropriate measure of total performance. (Per basic math concepts, the larger the sample size, the more accurately an average will account for what is being measured.) If in a given week the averages change in a way that appears at all significant, the CFD will take a closer look at the events of the week, running event queries, pulling two-way radio traffic and looking at "after event" documentation in order to investigate and determine the cause of any outlier response times. For these reasons, CAD data is a sufficient early alert system for detecting outliers in average response times.

IGO Finding #3: Not All Incidents Have Complete and Accurate Time Data

The IGO is correct in that, used on its own, CAD data is not a complete and accurate picture of CFD response time data. Rather, it is one piece of the puzzle that may be used for short-term, early alerts, but is not appropriate as the single tool to be used for a comprehensive audit of response time data.

Dispatch of CFD resources in response to requests for service is the responsibility of the OEMC. The OEMC uses the CAD system to help communications operators make final dispatching decisions. The mobile terminals of the CAD are utilized on all frontline fire apparatus and were designed to work in an open-air environment (an open air environment is designed for minimal in-building penetration and use outside). The CFD has found, through interviews and practice, that the signals from pressing the CAD buttons in CFD vehicles are not consistently received by the CAD when transmitted from firehouses and certain parts of the city. This issue can lead to varied results that may make some otherwise accurate data "appear" flawed. Additionally, as described in greater detail in a previous section, there are circumstances like a walk-in to a firehouse or a forgotten "on scene" CAD button push that leads to CAD time results like 0.00 seconds or several apparatus having their CAD buttons pushed all at once by someone at the OEMC after a fire or EMS rescue has been long completed. These types of inconsistent CAD events or missing fields can appear inexplicable in a vacuum, and can often only be corroborated with the corresponding two-way radio traffic and after action queries.

The CAD has been in use since 1996 and is an incredibly helpful tool, but by no means is meant to be used as a standalone system. The CFD's two-way radio was and still is the primary communications method the CFD uses with the OEMC. The two-way radio is the most reliable method to send and receive information. It is also critical to the CFD's overall operation because it allows the CFD to provide urgent information to the OEMC, such as the travel direction of emergency vehicles, extent and location of the fire within a structure, the need for immediate rescue of civilians, any escalation of a fire, and any patient care/severity of injury information. Admittedly, for the purposes of this audit where the IGO wanted to look at an entire year--radio transmittals are not permanent, as audio records are only archived for 30 days pursuant to the Local Records Act retention schedule.

In order to thoroughly investigate the response time to any emergency incident, an analysis must be made of the CAD data, the radio traffic that occurred between CFD responding units and the OEMC, the OEMC Event Query report, and the CFD's NIFR report. Any CFD review or "after action" exercise is always

scheduled as soon as possible after an emergency incident, to ensure that all radio traffic is obtained and reviewed. Using CAD data that is over a year old that no longer has the corresponding radio traffic available such as the IGO did in their audit, can lead to an unreliable representation of what may/may not have happened during an historical emergency incident.

In the future, the CFD is open to participating in a forward looking audit with the IG for a 30 day period so that all data, including the CAD, two-way radio traffic, event query, and NIFR reports can be retained and reviewed, and a complete picture of response time can be obtained and fully analyzed.

IGO Finding #4: CFD is Not Meeting National Standard for Response Time Citywide

CFD acknowledges that it does not meet the strict reading of the NFPA guidelines for fire suppression response times employed by the IGO in their audit, but does believe that its measurement of average response times is a reliable and appropriate measure in line with methods employed by other major cities. Furthermore, what is advised by the NFPA for EMS is not actually the most applicable standard, as the Illinois Department of Public Health (IDPH) is the regulatory agency for EMS response time, trumping the NFPA's guidelines. IDPH has reviewed and approved CFD's EMS response time goal of six minutes as appropriate as part of CFD's overall EMS Plan.

As discussed above, the CFD gets weekly average response time results based on total time from dispatch to "on scene," with thousands of emergency incidents resulting in a sample size big enough to create an accurate reflection of the true average. CFD uses these averages as a first-line tool for monitoring itself, as do many other large cities to monitor system performance. For example, New York City, which is also not technically compliant with NFPA 1710, shows an average response time of four minutes, as compared to Chicago's average of just under four minutes for suppression.

A. Ward or Community-Based Allocation of Fire Resources Would Unnecessarily Politicize Apolitical Public Safety Mission

The IGO also recommended CFD conduct an equipment/personnel audit by ward or community area. CFD strongly disagrees that emergency and fire suppression services should be allocated by ward or by any other political boundaries. The only way an authentic ward or community-area analysis could be conducted is if each ward/community had a firehouse centrally located in it, if the ward map never changed (which is occurring now), or, if the CFD didn't have firehouses that were located on the borders of more than one (1) ward, and, if firehouses only responded to incidents in their respective ward/community boundary.

In fact, neighborhood/ward boundaries are not factored in the dispatching of CFD equipment and resources in any way. The CFD's firehouses are laid out in a manner that gives each firehouse a first due response or "still district" response, with a dynamic network of expanding and contracting coverage responsibilities that is based on several factors. Neighborhood/ward boundaries are not among these factors. For instance, a neighborhood like Edison Park that is surrounded on three (3) sides by suburbs might show a higher response time at certain times because all CFD-based support must come from the south of the neighborhood. The IGO would have to "normalize" each neighborhood based on its location, with respect to borders, or perhaps Lake Michigan, as any city border will affect response from that direction, especially if the neighborhood/ward boundary has no firehouse in it.

To suggest that neighborhood/ward boundaries have a relationship to CFD operations unnecessarily politicizes an apolitical public safety mission. Additionally, while the IGO looks at neighborhood/ward

boundaries it does not take consideration actual physical structures, expressways, airports, or industrial areas, which may be located within those boundaries and in many cases can affect response times. The IGO's attempt at establishing neighborhood/ward boundaries as an audit parameter potentially causes unnecessary and unforeseen consequences that could undermine the CFD's public safety mission. Further, this issue has never been a subject of complaint either in public forums or 311 City Services.

B. Firehouse Resources in Chicago are Allocated Appropriately throughout City

On the issue of CFD potentially adding more firehouses, the CFD looked at a study previously completed by the Rand Corporation of fire department response times. It says:

"In evaluating a community's public fire protection, one must consider the distribution of fire companies. Generally, expert criteria says that a built-upon area of a community should have a first-due engine company within 1.5 road miles of the protected properties and a ladder-service company within 2.5 road miles. Those benchmark criteria produce an expected response time of 3.2 minutes for an engine company and 4.9 minutes for a ladder-service company, based on the Rand formula."

Rand conducted extensive studies of fire department response times and they concluded that the average speed for a fire apparatus responding with emergency lights and siren is 35 mph. That speed considers average terrain, average traffic, weather, and slowing down for intersections. Taking into account the average speed and the time required for an apparatus to accelerate from a stop to the travel speed, Rand developed the following equation for calculating the travel time:

- $T = 0.65 + 1.7D$, where T = time in minutes to the nearest 1/10 of a minute and 0.65 = a vehicle -acceleration constant for the first 0.5 mile traveled.
- 1.7 = a vehicle-speed constant validated for response distances ranging from 0.5 miles to 8.0 miles. D = distance

Using this formula, the CFD mapped every current firehouse in the CFD, with a buffer of 1.5 miles. The CFD used the location of each of its truck companies and made a buffer of 2.5 miles, in accordance with the Rand formula for response. The resulting maps show that Chicago is well within distance limits to provide proper response times and that CFD's average reported time is, in fact, a reflection of the grid system that is used in the deployment of firehouses, regardless of ward or neighborhood.

Conclusion

The CFD greatly appreciates the effort put into this audit by the IGO as we work toward our shared goal of delivering the best possible services to Chicago residents. We are happy to continue this response time discussion with the IGO if there are any areas that they would like to further explore or would like additional information on. In particular, the CFD would like to offer the option of doing a forward-looking, intensive 30 day response time audit in cooperation with the IGO to allow for greater access to real time data, including two-way radio traffic, officer interviews, and CAD data.

The CFD's next steps will also include clarifying its written materials relating to response times and its use of NFPA as tool for comparison--but not a strict standard. The CFD greatly appreciates the IGO bringing this communications issue to its attention and will work quickly to rectify any confusing documents and ensure that all further communications articulates CFD's usage of the NFPA as a benchmark,

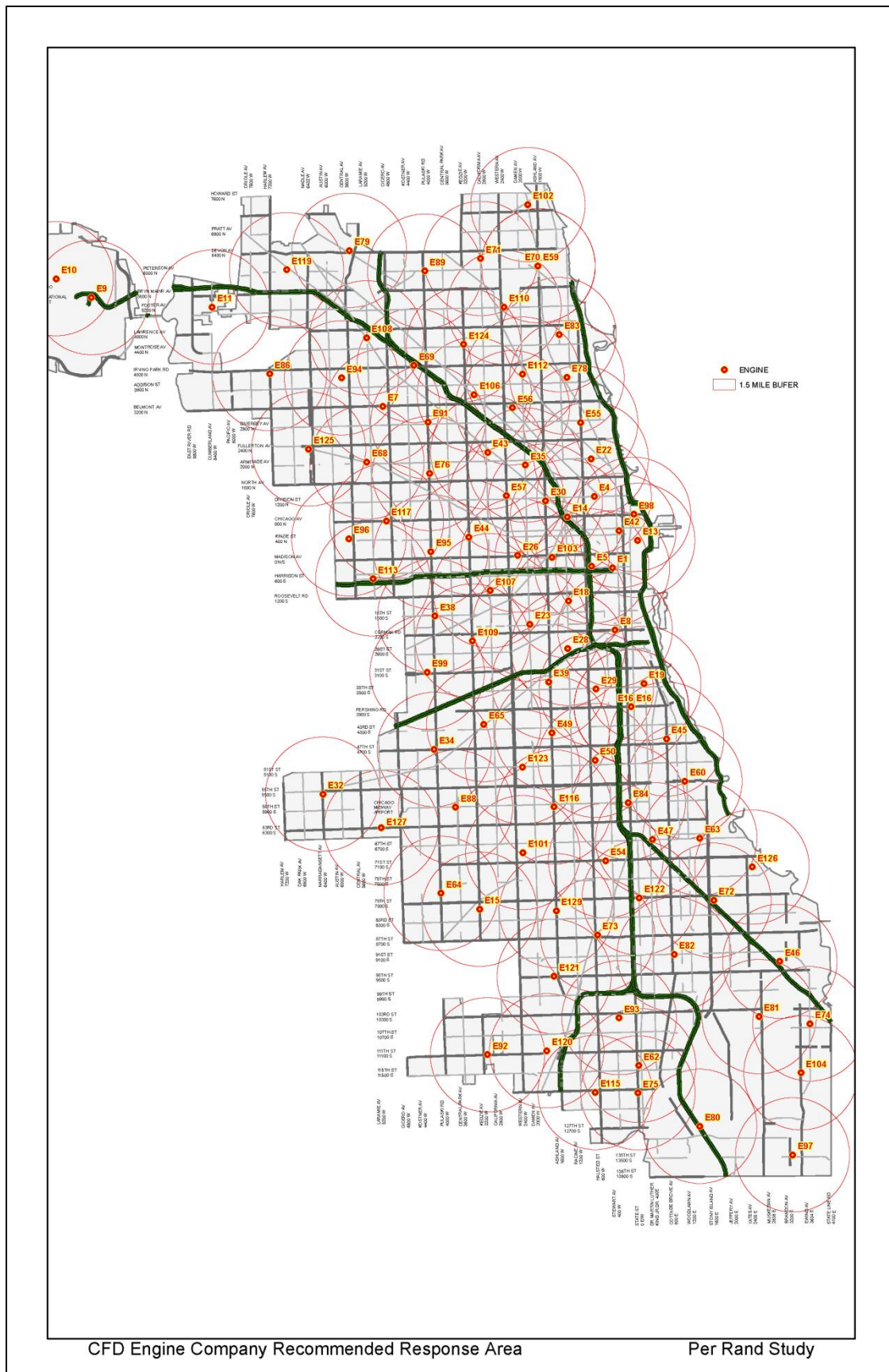
appropriately. Additionally, based upon what it learned from this audit, the CFD will be modifying its own internal audit procedures and will begin running reports every 30 days for those past 30 days, in addition to its weekly cumulative year to date average reports, and will explore using different measurement parameters.

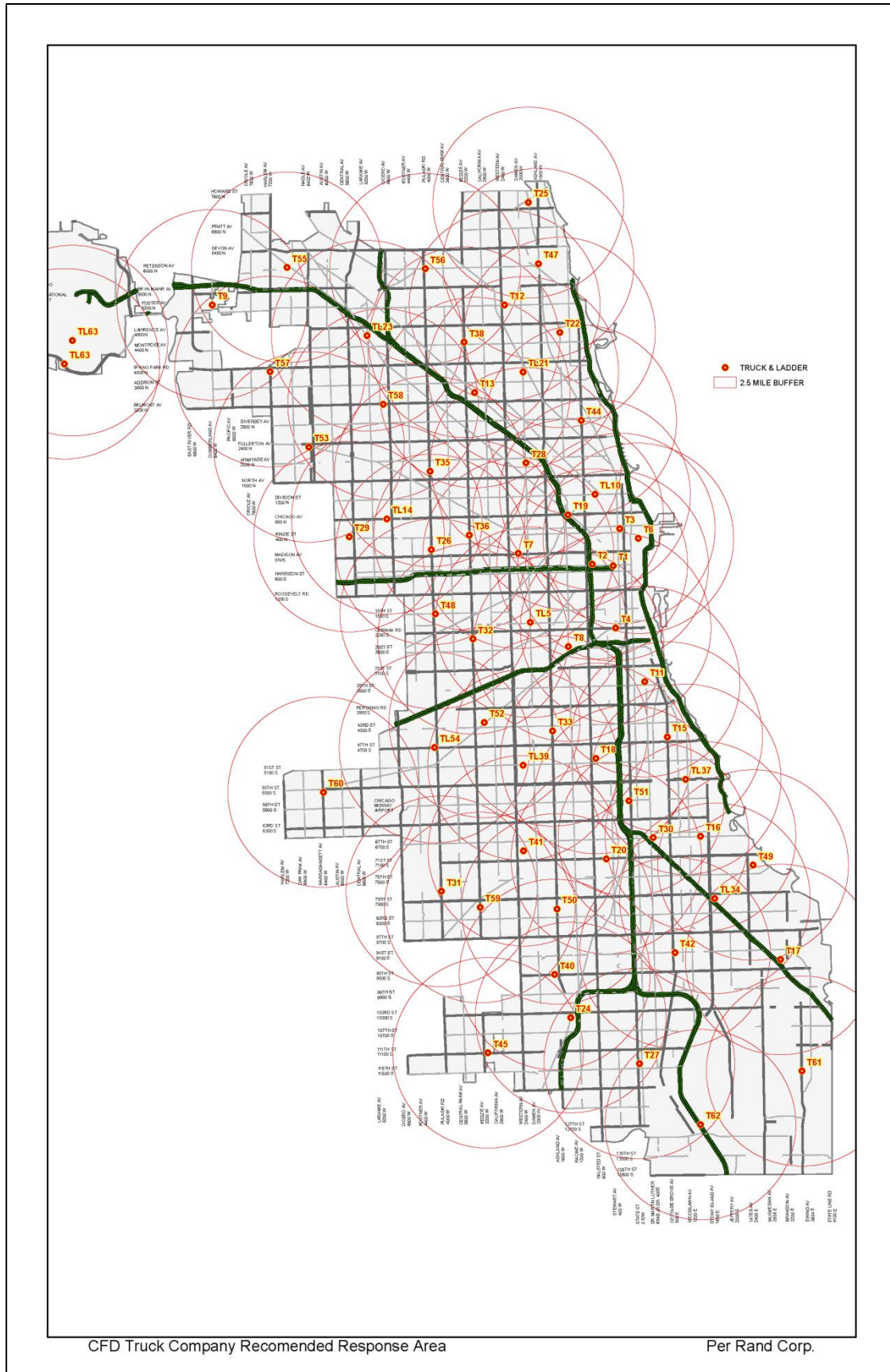
Finally, because the CFD is committed to delivering the best service it can, a thorough review of all of its response time policies will be conducted for possible updating. If and when updates are instituted, the CFD will couple those updates with additional emergency response training for all its members.

The CFD is dedicated to providing the best possible fire suppression and EMS services to the residents and visitors of Chicago. In 2012, the CFD responded to over 750,000 emergency responses. The CFD appreciates and is grateful for the ongoing support it receives from its residents and visitors and we pledge to continue to:

1. Build a department that better protects all people, in every neighborhood, in Chicago; and,
2. Do all we can to assure that we have the trust and confidence of every community in our city.

On a personal note, I am very appreciative and thankful for the men and women of the CFD, who put their lives on the line every day for those who live, work and visit this great city. If additional information is required, please do not hesitate to contact my office. Thank you for your attention to this matter.





CITY OF CHICAGO OFFICE OF THE INSPECTOR GENERAL

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