Backup 911 Dispatch Center needs for the City of San Diego

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CERTIFICATION STATEMENT

I hereby certify that this paper constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I have used the language, idea, expression, or writings of another.

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Abstract

The problem was that the City of San Diego Fire-Rescue Department did not have a physical backup 911 dispatch center. The purpose of this report was to determine if there should be a physical backup dispatch center for San Diego Fire-Rescue Department and if so, what would be the options to put a backup center into operation.

The research method conducted was descriptive in order to answer the following questions: Should an existing fire/EMS dispatch center have a physical backup location, why or why not? What should a physical backup location to an existing dispatch center consist of? What are the options for utilizing existing locations within the County of San Diego that could be used as a physical backup location to the existing dispatch center? And what backup system could exist that would provide redundancy and dependability without having a physical backup location.

The research procedures were carried out by conducting a literature review, surveying 67 other communities for backup dispatching practices, looking at regional and city resources for backup locations, investigating technology solutions, and conducted interviews with key subject matter experts.

The results indicated a need for a backup system to the dispatch center. The research indicated that this need is most often, but not always, satisfied by a physical location. The research indicated that a multi-pronged approach would work best. In researching and interviewing key players it was decided the best approach would be to fully equip a mobile communications trailer, contract with a private 211 center, and outfit a space adjoining the City Emergency Operations Center.

The recommendations included developing protocol and procedures; entering into a MOU with the 211 center; outfitting the trailer and Emergency Operations Center site; and training and full deployment of all three locations at separate times.

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Introduction

911 Dispatch Centers have become an integral part of the emergency response network. Response selection and routing has become increasingly dependent on computer aided dispatching. Incident information from the public is captured electronically and transferred to the first responders through a voice system, or more frequently, by a mobile data computer. Centralized ordering of resources has also become the norm. When a unit is at scene and they need equipment or personnel it is ordered through the 911 Dispatch Center. As this centralized dispatching and equipment ordering center has become integral to emergency scene mitigation, it is critical that the system is reliable and accessible. This requires the dispatching infrastructure to have redundancies built in to the system. While San Diego Fire-Rescue has redundancies built in to individual aspects of the computer aided dispatch (CAD) system and the radio dispatching system, there is no one complete backup system or location. The problem is that the City of San Diego Fire-Rescue Department does not have a physical backup 911 dispatch center.

The purpose of this report is to determine if there should be a physical backup dispatch center for San Diego Fire-Rescue Department and if so, what would be the options to put a backup center into operation. There are currently backup plans for the software and hardware of the various components of the dispatch center but no one location or complete system if the current location is inoperable. The research conducted will be descriptive in nature and will utilize phone interviews with neighboring jurisdictions, surveys of like departments, and direct

interviews with San Diego Fire-Rescue Dispatch Center Manager, her staff and other subject matter experts. Research of current and past practice both locally and nationally will also take place to assist in answering the questions. The questions are: (1) Should an existing fire/EMS dispatch center have a physical backup location, why or why not? (2) What should a physical backup location to an existing dispatch center consist of? (3) What are the options for utilizing existing locations within the County of San Diego that could be used as a physical backup location to the existing dispatch center? And finally, (4) What backup system could exist that would provide redundancy and dependability without having a physical backup location.

Background and Significance

The San Diego Fire-Rescue Department has managed its own Dispatch Center since the mid-1970s, prior to that time it was collocated with the San Diego Police Department. The San Diego Fire-Rescue Dispatch Center is a Secondary Public Safety Answering Point. What that means is that all 911 calls are first routed to a Primary Answering Point who then determines the responsible agency and reroutes the call. In the case of San Diego the Primary Public Safety Answering Point for all areas within the City of San Diego is the San Diego Police Dispatch Center and for all cell phones and on highways it is the California Highway Patrol. San Diego Fire-Rescue Dispatch Center also serves as the Secondary Public Safety Answering Point for the cities of Chula Vista, National City, Imperial Beach, Poway, and unincorporated San Pasqual Valley (Figure 1). This service encompasses approximately 440 square miles and serves roughly 1.7 million permanent residents (http://www.census.gov/). In addition the Emergency Medical

Service Provider, Rural Metro, manages all of the 911 medical dispatches and inter-facility transfers out of the center. This means that on a typical day the center manages 86 staffed frontline first responder rescue vehicles (engines, trucks, battalion chiefs) and 30 or so ambulances for an average daily call volume of over 300 dispatches. The Dispatch Center is centrally located in the Kearney Mesa neighborhood of San Diego (Figure 1). San Diego City is a charter city of approximately 1.3 million people and is located in the extreme south end of the State of California. The San Diego Fire-Rescue Department is a full-service, all-risk department with 47 type I engines, 12 trucks, 2 Heavy Rescues all staffed 4 person within 7 battalions. In addition there is a Haz Mat team, Bomb squad, 2 helicopters, arson investigators, USAR Task Force 8, fire prevention, 2 fire boats, 7 rescue boats, lifeguard division, and Dispatch Center. There are approximately 840 sworn firefighters, 90 full time lifeguards, 300 seasonal guards, and 200 civilian staff. The Dispatch Center is staffed by civilian employees. The San Diego Fire-Rescue Department has an annual budget of approximately $220,000,000.

The County of San Diego has three Fire/EMS dispatch centers and they operate countywide CAD to CAD in a borderless fashion. What this means is that when a call is sent to the secondary Public Safety Answering Point, Dispatch Center, the center enters the call into the CAD system and the closest unit is dispatched regardless of jurisdictional boundaries.

The San Diego Dispatch Center is a large Secondary Public Safety Answering Point that relies heavily on sophisticated software. As such it would be detrimental to the citizens of the City of San Diego if the San Diego Fire-Rescue Department was unable to dispatch or control their units. Currently there is no physical location identified as a backup for the center. The organization and the City of San Diego do not have an identified plan in case the existing system

fails. In the Executive Fire Officer Program fourth year class, Executive Leadership (R0125), the book The Practice of Adaptive Leadership is discussed. “Many organizations get trapped in their current ways of doing things, simply because these things worked in the past” (Linsky et al., 2009, ereader 19%) In this book the practice of leading an organization forward should occur in conjunction with ensuring core competencies and not be limited by what worked in the past but what is needed for the future.

The United States Fire Administration has five operational objectives. Within these objectives a number are aligned with this problem but number five is the closest. Number five on the list is that the United States Fire Administration will respond to emergent issues. With first responders becoming dependent on technology it is becoming increasingly important to build redundancies into this technology. In addition, resources are becoming more and more specialized. As these resources become more specialized it is necessary to track them and dispatch them efficiently. The emergent nature of this situation is the increasing reliance on technology and building redundant systems in order to ensure the access to the technology, in this case through the availability of the Public Safety Answering Point, by first responders.

Literature Review

In order to understand what has been discovered and published dealing with backup systems and locations for Public Safety Answering Points a literature review needs to be conducted. In the literature review, the researcher will first look to see if publications discuss utilize a physical backup location for a Public Safety Answering Point. Secondly, if physical locations are discussed, what should that physical backup location consist of? Locally, are there

public documents describing locations within the County of San Diego that could be used as a physical backup location? And finally, what backup system could exist that would provide redundancy and dependability without having a physical location.

In Erie Pennsylvania they have decided it is important to have a physical backup location. “Preparedness through redundancy is a critically important public safety tenet, ensuring uninterrupted 24-hour operations. Every primary system we use here in the Public Safety Building has a back-up system: 9-1-1 phones, computer-aided dispatch (CAD), radios and Canopy infrastructure, electrical power distribution, and dispatch consoles, to name a few. Just as system redundancy is important, so too is facility redundancy. In case of a casualty to this building, we need an off-site back-up dispatch center.” ("Erie County’s Backup Dispatch," 2013, para. 1) In a corner of the Maritime Museum the County installed a backup center. “In a corner office on the third floor, we created a 5-console, back-up dispatch center with the same systems and functionality used today in the Public Safety Building.” ("Erie County’s Backup Dispatch," 2013, para. 2) they typically staff their Dispatch Center with 8 to 10 employees but felt the backup activity could be sufficiently managed with 5 work stations.

The regional dispatch center in Reno County Kansas has been accessed to great effect on a number of occasions. “The regional 911 backup dispatch center, at Hutchinson Community College's campus near Yoder, played a key role amid April 14 storms when dispatchers from Reno, Rice, Pratt, Harvey and Barton counties were stationed there. Storms had damaged the Rice County Law Enforcement Center, so all of Rice County's 911 calls were transferred to the 911 backup dispatch center through April 15” (Grey, 2012, p. 1)

When the community located the center they used an already purposed building on the community college campus and outfitted it with all of the resources it needed to function as a backup center. Fully equipping the center allowed for immediate use of the facility after the roof was blown off of their existing facility. “The proposed project includes $214,000 to replace computers and servers at the center, and $159,000 for 21 radios and a new "voice logger" to record phone and radio traffic, she said. The "tri-band" radios - adaptable to VHF, UHF and 800 megahertz systems - are helpful during disasters since some agencies operate on different systems.”(Grey, 2012, p. 1)

When Isabella County in Michigan suffered a lightning strike to their Public Safety Answering Point they decided to collocate a backup center with the local Police Department and Public Works at the local College. “Griffis said in a report to the Isabella County Commission’s criminal justice committee that he is working with Central Michigan University Police to create a backup 911 center at the campus police department that will be mutually beneficial” (Field, 2013, p. 1) The cost of the project was around $70,000 and was deemed critical after a lightning strike caused the center to work at half speed for over 8 weeks until the equipment could be repaired.

The El Paso area has determined that a new backup dispatch center is needed in their community. “The new center will be larger than a cramped backup facility the authority now owns but has rarely used. In the new center, complete with a backup power system, dispatchers will be able to take calls and communicate on police radios after a disaster.”(Handy, 2012, p. 1) The center is going to cost in excess of $3.5 million and “is needed for backup when other

dispatch centers in El Paso or Teller counties have planned or emergency shutdowns." (Handy, 2012, p. 1)

Consolidating dispatch centers can add efficiencies and provide for a backup location. In an article on consolidating dispatch centers the difficulty of the task of consolidation is brought up as is the efficiencies and savings associated with such a move.

> "Initial startup costs can be daunting. In most cases, all equipment must be either replaced or upgraded, and the existing dispatch centers do not have the physical space and system capacity to accommodate all the agencies to be consolidated. A significant investment is required to design and build a facility that will meet the needs of the public safety agencies. These initial costs are typically in the millions of dollars.
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> In addition, the agencies will needed to seek funding, and may encounter concerns that a consolidated dispatch center will not be able to serve the local community and provide the "personal touch" that the individual centers provide. Through our work, we have learned that lack of political lobbying will be related to such perceptions as:
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> - personal contact will be lost between officers, firefighters and the dispatchers
> - political control over the dispatch center will be lost
> - community relationships will deteriorate,

- consolidation may result in loss of specific community knowledge
- accountability may be less clear or lost
- there may be a need to continue to provide personnel to perform the "other duties" a dispatcher normally performs.

> While these concerns are real, they are difficult to measure and even more difficult to address. We have found that it is very helpful to encourage police chiefs, fire chiefs, city managers, and dispatch supervisors to visit consolidated dispatch centers and see first-hand how they have addressed these concerns and continue to provide the "personal touch."
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> The unwillingness to give up control reflects the reality that an agency "owns" its dispatch center and can directly influence what does and does not happen in the facility. Typically, dispatch services are budgeted and staffed under a single public safety department and, if other agency's services are provided, they are usually either contracted out of the primary department dispatch or simply provided within budget. This arrangement gives a chief a significant amount of influence and control over dispatch center operations that they are unwilling to give up. (Currier & Dye, 2011, p. 1)

In addition the article discusses the importance of planning for and having, a backup system. There is no shutting down once a system is in place. "Finding an adequate backup facility can be challenging for a single agency, however, some consolidated centers become so large that a

backup facility is simply not available. When considering consolidation, the back-up provisions, including power supply and public communications in the event of service interruptions, must be planned from the beginning." (Currier & Dye, 2011, p. 1)

Lycoming County runs a Dispatch Center for a similar size of fire and EMS units as the San Diego Fire-Rescue Department. "Lycoming County Communications Center has been proudly serving residents since 1976. The Center provides a state-of-the-art Communications System for Lycoming and Sullivan Counties, dispatching 44 Fire Departments, 26 Ambulance Service, 3 Paramedic Services, 17 Quick Responder Units, 11 Police Departments and 52 EMA Coordinators." (http://www.lyco.org/PublicSafety/911Center.aspx) Their center has redundancy built in with their repeater and voice systems and they maintain a physical backup location. Their backup center however is not as well equipped as their primary dispatching location. "The Communications Center also maintains a 9-1-1 Back-up Center. The back-up Center has limited capability in comparison to the primary center. Dispatching for Police, Fire, EMS and EMA can be done from the back-up center. 9-1-1 calls as well as routine calls can also be answered from the back-up center."(http://www.lyco.org/PublicSafety/911Center.aspx)

Saratoga County found that a backup Dispatch center was needed after they experienced problems during a blackout. "The consoles would be available if the jails dispatch center went out of service, as happened for about 45 minutes during the blackout because the jails generators went down" (Williams, 2003, p. 14). The local Fire Administrator suggested looking at a mobile solution. Applying for a Federal Grant to purchase a van equipped to do dispatching. A van would qualify as a physical location change.

As to the need of having a physical backup center Milwaukee County recently had a fire that knocked out there Dispatch Center. “The Milwaukee County Courthouse and Public Safety Building will be closed Monday and Tuesday, after a fire Saturday knocked out power, caused more than a half-million dollars in damage and forced county dispatchers to move to Waukesha County to field 911 calls.”(Luthern, 2013, para. 1) this is an example of a public safety answering point that needed to move locations as opposed to just having backup systems at the primary location. Due to the destruction of the physical location, Milwaukee needed to move the dispatchers to a new location.

A backup contingency for a secondary public safety answering point could be satisfied in a consolidated backup center or by using or sharing an existing center. In a study conducted to consolidate services in Ohio it was reported that there are different scenarios with different commitments and outcomes that are possible. (The Center for Public Management Maxine Goodman Levin College of Urban Affairs Cleveland State University [Cleveland State University], 2011, p. 7) The study focused on the consolidation of front line public safety answering points but the lessons can be applied to backup centers. One recommendation was that the consolidated center should: “Have another (such as a neighboring center) serve as backup. This is a better alternative than maintaining equipment in another building that lies unused.” (Cleveland State University, 2011, p. 24)

In the small community of Des Plains the regional communications system disbanded but the local community realized they still needed a backup center in case of failure of the main public safety answering point. “City officials wish to continue having a back-up dispatch center

in Niles, which will have to be staffed. It will provide seamless 911 and dispatching services should the main center at Des Plaines City Hall become incapacitated by a fire, building damage, equipment failure, or system updates. The Niles center also will handle call overflow from Des Plaines during emergencies such as blizzards, tornadoes and other high-volume periods. It also could be used to train new dispatchers or to retrain experienced dispatchers on new skills."(Daily Herald staff report, 2013, para. 3) This was accomplished by contracting with a neighboring department and utilizing their existing unstaffed center through a contract where they provided ongoing maintenance and a low stipend. "Des Plaines will pay Niles $1 per year not including maintenance and operational costs — estimated at $215 per month — to operate the backup dispatch center for an additional year."(Daily Herald staff report, 2013, p. 4)

In Allegany County they experienced a major power loss which required them to move into their backup dispatch center. "A power supply failure Thursday forced transfer of Allegany County 911 dispatching from its main facility at Constitution Park to its backup facility at Mexico Farms — but apparently without any interruption in service."(Alderton, 2013, para. 1) On of the things that made this a seamless transition is that this community used this center for 10 months when they were constructing their existing front line center. They also have the capacity to switch to numerous centers within the region if needed. "Bennett said the 911 system is designed to allow transfer of communications to its backup facility without affecting services. 'We used the backup facility for 10 months while our new dispatching center was being built,' said Bennett……... The state-of-the-art dispatching facility officially opened in April 2010. Bennett said that Allegany County 911 dispatching may also be easily transferred to emergency

centers in Mineral or Garrett counties, if necessary. ‘They are part of our loop,’ said Bennett.”(Alderton, 2013, para. 7)

Research question four is looking at what backup systems could exist that would provide redundancy and dependability without having a physical backup location. In reviewing a publication on emerging trends in 911 communications it was revealed that most Public Safety Answering Points do not support text messaging and are reliant on analog based hard wired phone lines. “The underlying systems for 911 calls today operate exclusively on analog technology, using an architecture of circuits and switches developed when AT&T was a regulated monopoly……systems for 911, unable to accommodate the latest advances in telecommunications technology, are increasingly outdated, costly to maintain, and in danger of failure.”(Moore, 2009, p. 1) In this government report the author discusses ways to make the system more robust and capable of providing backup through technological upgrades. “A network overlay for 911 systems can, for example, facilitate interoperability and system resiliency by bringing extra resources to devastated areas where 911 call centers are damaged or overwhelmed with calls.”(Moore, 2009, p. 2) The publication discusses several technological advances including the transition to an IP enabled emergency communications network and the implementation of Next Generation(NG) 911 which will not only implement the IP system but changes in: “operational procedures, training, funding models, and state-and possibly federal-regulations and laws”(Moore, 2009, p. 2) One interesting change proposed in congressional policy is “Designating radio frequency spectrum to provide connectivity to PSAPS, for example by using wireless technologies such as microwave transmission in place of fiber optic cables.”

(Moore, 2009, p. 4) This would free the Public Safety Answering Point from being ties to a specific location. One of the “Major features of the envisioned NG911 System that supports this goal are described as……..Geographic-independent call access, transfer, and backup among PSAPs and between PSAPs and other authorized emergency organizations” (Moore, 2009, p. 14) this would allow for use of other centers seamlessly and/or repurposing existing infrastructure to be utilized as a backup location in a much simpler fashion.

Part of the National Emergency Communications Plan calls for identifying alternate and/or backup capabilities in emergency communication plans. The plan also states that “System planning activities should account for the availability of alternative and backup communication solutions and redundant pathways to support communications if primary capabilities become unavailable.”(Department of Homeland Security [DHS], 2008) The advent of the 211 system has provided some system redundancy “Service levels and response times for all types of citizen-activated calls would benefit from a transition to IP-enabled networks and in many cases could share infrastructure with 911 networks.”(Moore, 2009, p. 29) many of these 211 call centers are privately run “ The WERT report issued after the September 11 attacks urged the national planning for emergency preparedness and response to include the mobilization of private-sector call centers”(Moore, 2009, p. 30) The 211 system in San Diego County is a privately run entity.

In reading some reports on the International Association of Fire Chiefs website there was a discussion on utilizing broadband service with a hardened delivery system and backing that up with a satellite based system. This could totally eliminate the analog system that is utilized in San Diego. If everything is web based and digital then a physical location becomes less

important. “The network must be hardened to public safety requirements……..redundancy is necessary…… if the network cannot provide connectivity then we need the capacity to communicate without the network. This means communicating in the simplex mode.”(Johnson, 2010, p. 2) “The network must have backup capabilities in the event of network loss. We envision satellite capability for the network to be available when a tower is disabled. Satellite can also cover remote areas that don’t have towers.”(Johnson, 2010, p. 2)

Procedures

This research began in March 2013 at the National Fire Academy’s Learning Resource Center. During this time a literature review was conducted as well as a review of past Executive Fire Officer Applied Research Projects. In addition, internet searches added numerous articles and information to answer the main questions related to the purpose of the research. Internet searches were performed using multiple search engines such as google.com, yahoo.com, and bing.com.

The intent of the research is to determine if there should be a physical backup dispatch center for San Diego Fire-Rescue Department and if so, what would be the options to put a backup center into operation. As this is a need and feasibility study the methodology used is descriptive research. The questions that are being asked are: (1) Should an existing fire/EMS dispatch center have a physical backup location, why or why not? (2) What should a physical backup location to an existing dispatch center consist of? (3) What are the options for utilizing existing locations within the County of San Diego that could be used as a physical backup

location to the existing dispatch center? And finally, (4) What backup system could exist that would provide redundancy and dependability without having a physical backup location.

From March 2013 through August 2013 an extensive online search was conducted in order to see how other jurisdictions have addressed the issue, look for comparisons and answers for to the research questions, and to see if there was a deficiency discovered. In addition if there was a deficiency discovered look to see if there are any innovative ways to mitigate.

In April 2013 the San Diego Fire-Rescue Dispatch Manager, Susan Infantino, was interviewed to discuss the current center backup plan and discover what, if any, changes she felt needed to occur to have continuity of operations. Other dispatching locations in the county were discussed, looking at capacity and security. Remote operations of dispatch staff and management/coordination was also discussed, this included the private 211 center and other PSAPs. A regional committee tasked with developing a plan to co-locate existing centers and combining operations was attended and notes taken.

In May 2013 the ability of the San Diego Dispatch Center to maintain continuity of operations was discussed during the annual review with the San Diego City Office of Homeland Security. An inquiry was made to the Project Officer II developing the City of San Diego's new fire stations if we can add adaptable space in the design of new stations to allow for temporary use as a backup dispatch center. Also discussed was the timeline of the new stations, the feasibility, and the increased cost of adding the additional square footage.

In June 2013 an online survey was developed using the website Surveymonkey.com. This Survey was sent out in the month of July 2013. They Survey was sent out to over 100 departments with 67 agencies completing the survey. The results were compiled (Appendix B) to determine where other departments access their dispatching needs, if they have a physical backup location, if so is the backup center used exclusively for that purpose and/or is fully equipped, and finally, if they do not have a physical backup location what plan do they have in case their primary center is inoperable.

In August 2013 research was conducted with Motorola to see if they had newer products that would allow for remote operation of a Dispatch Center. Later that same month an interview was conducted with the manager of the San Diego Fire Rescue Departments mobile Communications Trailer in order to evaluate the use of the trailer as an alternate dispatching location. Also in August the Homeland Security manager was interviewed in order to see if the current Emergency Operations Center location could be utilized as a backup public safety answering point.

Two of the limitations this study has are the lack of site surveys in other jurisdictions outside of San Diego County and the lack of technical expertise of the author. Time and money restricted the ability to go to different locales (Los Angeles, Phoenix, etc.) and see how they manage their Public Safety Answering Points and how they maintain their continuity of operations. The technical expertise was addressed with the reading of dispatching needs/protocol and interviewing technical experts but was a limiting factor in discovering the nuanced problems inherent with replicating a large, complex dispatch center. One mitigating effort was to not just

interview the Dispatch Manager, who has decades of experience in many of the practical aspects of the discussion, one time but too regularly check back when I had a question of a technical nature.

Results

Question number one (1) asks: Should an existing fire/EMS dispatch center have a physical backup location, why or why not? In researching what other agencies have done most of the published material was found to recommend having a physical location. In both Saratoga County and Milwaukee County(Williams, 2003) (Luthern, 2013) it was found that catastrophic events shut down their main dispatch centers and in order to continue operations there needed to be a physical backup location. In both places the existing primary centers were unable to function due to fire of power failure. A similar issue happened in Allegany County when they experienced a power supply failure in their main 911 Dispatching Center forcing them to move to their backup facility. (Alderton, 2013) this was accomplished without disruption service. In the survey that was done of other firefighting agencies (Appendix B) over 89% of the respondents noted that their Public Safety Answering Point has a physical location identified. Of those that had a location identified over half of those had a location permanently dedicated to this purpose. (Figure 2)

In personal communications with the Communications Manager she expressed a need for a location to send her personnel in case the main center became inoperable or uninhabitable. She also expressed that there has already been failures in individual components of the computer

aided dispatch system and/or the radio and repeater system but never an overall failure of the whole system nor has a complete shutdown of the Dispatch Center location been required. (S. Infantino, personal communication, April 25, 2013) This is additionally covered in an Interim Chief Operating Officer of the City of San Diego briefing (Appendix C) where it is discussed that while individual redundancies exist to elements of the dispatching system, if the facility itself should become uninhabitable, there is no backup plan to maintain continuity of service. One of the considerations and limitations noted in that briefing is the current lack of funding to replace the physical location.

Question number two (2) asks: What should a physical backup location to an existing dispatch center consist of? The research conducted showed that many agencies used other agencies facilities or utilized an older retired center. (Alderton, 2013)(Daily Herald staff report, 2013). In the survey conducted (Appendix B) it was discovered that only 28.8% of the survey respondents operate their own Public Safety Answering Point. The most common selection for maintaining the dispatching duties for the departments surveyed was other agencies (43.1%). Of the 89% of the respondents who have a backup dispatching center over 54% have a backup center that is permanently dedicated to this purpose. For those that do not have a permanent backup center devoted solely for this purpose the predominant other use is as another agencies Public Safety Answering Point (34%). This means that most agencies in the survey who have a backup dispatch center have it permanently devoted to this task but only by a slight margin over 50%. Of those that use a facility that is primarily used for a different purpose utilize a neighboring dispatch center.

In the survey a question is asked as to if all of the equipment necessary to run the backup center is on site and ready for use. Unexpectedly it was found that over 73% of the respondents have a backup center full equipped. It was the researcher's opinion that it would be too expensive and time consuming to staff and maintain a fully equipped center. It was felt that this equipment would come from the main center or be served by portable equipment, trailer and/or laptops. One explanation is that 46% of the respondents utilize a multipurposed backup center, which depending on its full time use, would already have all of the equipment needed on site to fulfill its main function or mission.

Question number three (3) is: What are the options for utilizing existing locations within the County of San Diego that could be used as a physical backup location to the existing dispatch center? In personal communication with the current San Diego Fire-Rescue Dispatch Manager it was discussed that there is a 211 dispatch center relatively close to the existing San Diego Fire-Rescue Department Dispatch Center. The 211 center is a privately operated non-emergency information and support access point. Citizens can call this number to report non-emergency issues like lost pets or report abandoned vehicles. The 211 center could support the operations of the emergency center but their current operations could possibly need to be scaled back or eliminated. (S. Infantino, personal communication, April 25, 2013) As it is a private, albeit non-profit, agency there would likely be charges to outfitting and then operating the center, a contract would need to be entered into in advance to determine use and cost. As it is a non-emergency private entity the security of the facility would need to be increased to support long term use.

The City of San Diego operates an Emergency Operations Center (EOC) in the basement below Fire Station One. This location is where a prior Fire and Police Dispatch Center was located. In Discussions with Homeland Security, a division of the San Diego Fire-Rescue Department that manages the EOC, the possibility of using the center as a backup dispatching center was discussed. (G. Pack, personal communication, August 29, 2013) While the center could handle the use and has some of the requisite phone lines and data cables to operate, the major limitation is that during any large scale event that activated the EOC we would not be able to use it as a backup dispatch center. One potential solution proposed was to utilize a space adjoining the existing EOC in the same basement. This would require outfitting with power, equipment, desks, and phone/data lines. In the survey conducted, three of the ten respondents who did not have a dedicated backup center and wrote a comment, utilized their EOC as a backup center (Appendix B). After inspection of the facility there are some mitigating efforts that will need to take place prior to outfitting and occupancy. This includes some mitigation of asbestos and mold which might take some time to complete.

In the survey conducted 34% of the respondents utilize another agencies Public Safety Answering Point (PSAP) as a backup location to their front line dispatch center (Appendix B). In discussions with the Communications Manager it was discovered that there is a robust Regional Communications System (RCS) and that the CAD systems throughout the county can speak directly to one another. Also that we are able to switch all of the communications from the primary PSAP directly into the RCS. The problem is that the San Diego Fire-Rescue Dispatch

center is so large that there is no one other PSAP in the county that could house all of the operations.

Another option for an alternative location for a backup dispatch center is to build in a multipurpose space into new station construction. In May of 2013 discussions were held with the project officer for Fire-Rescue facilities for the City of San Diego (M. Abella-Shon, personal communication, May 15, 2013). The remodel/replacement of existing stations attempts to expand the stations to accommodate two crews. This is to allow for expansion as density and responses grow. If the existing station is on a small footprint, as many of San Diego Fire-Rescue's stations are, then it is difficult to include the square footage necessary to provide for a backup dispatch location (minimum 1000 square feet). It was discussed that with the new stations this would be more feasible. Currently the department is in the programing and design stage for Station 50. This station is fully funded and is projected to cost around 12 million dollars. To add an additional 1000 square feet to the structure it would cost $600,000.

And finally, question number four (4) is: What backup system could exist that would provide redundancy and dependability without having a physical backup location. In 2005 the City of San Diego pursued, and was awarded, a grant for a Communications Trailer. This trailer is located at San Diego Fire-Rescue Fire Station 47 and is utilized on major fires to facilitate incident communication. In discussions with the communications trailer program management the feasibility of using the trailer was discussed. The size of the trailer would require the parallel use of another facility. There also is no direct link to the computer aided dispatch and would require hooking into a wired location, the use of wireless, or satellite connections. A solution

presented was that there was a recent upgrade to a community center close to the trailer storage location. This upgrade to the electrical system (solar power, backup generation) designed in additional features for the trailer to be able to hook into the power system so it could be used in conjunction with the community center. This would need a Memorandum of Understanding (MOU) between the Fire and Park and Recreation Departments. This MOU would spell out the location, use, equipment needed (tables, chairs, etc.) and a cache of communications equipment in order to expand the trailers capabilities. In general the trailer could function as the radio side and the community center could provide the power, phone/data lines, and a physical location for the call taker side (M. Nilsen, personal communication, August 30, 2013). In the survey conducted there were no agencies that utilize a recreation center as a backup location. (Appendix B) Another option is to pair the Communications Trailer with its existing storage location or a different storage location where the on-site emergency crew could set the system up in place until technical experts can arrive to put the trailer in operation.

> "The communications equipment purchased, as part of this unit, was also specified and developed to be "expeditionary." As such, most of the equipment can be removed and deployed at remote locations away from the trailer. The unit also includes several basic planning tools incorporated into the chassis. The cadre considered numerous diverse deployment models for this communications unit. Each time we developed one model, the options for another would intentionally present itself.
>
> This unit has the capabilities to accomplish the following:

- Serve as a fully functioning communications and dispatch center using the VIPER interop radio system and associated laptops, and/or portable CAD equipment directly from dispatch.
- Replace damaged infrastructure by deploying portable repeaters and providing phone and data service to affected areas independent of ground based systems." (Nilsen, 2012, para. 3)

The unit is limited in the number of workstations and has power limitations. There are at maximum 5 workstations possible and if unsupported by electrical infrastructure the trailer can function for on to two days before needing to be refueled. (Appendix E) this option would need the support of a land based facility to do extended dispatching. Some of the equipment needs are currently maintained at the communications center, these would need to be relocated or additional units purchased in order to put this option in operation.

In an interview with the Communications Manager the question of outfitting a core group of dispatchers with mobile platform and during a shutdown of the main center having them work out of their private residence was discussed (S. Infantino, personal communication, April 25, 2013). The command and control of the dispatchers would be difficult. 911 dispatching relies on the coordination between the call takers and the radio dispatchers, this would be impossible if they were in different locations. Ensuring the workforce would be ready and prepared to backup would be problematic, one other unexpected concern is negotiating the pay and benefit increases with the Union representing the dispatchers for this change in working conditions.

The equipment to make this task easier was researched. Motorola makes a new console that connects through the internet without any extra hardware and then connects direct to the radio channels. “MCC 7500 consoles connect directly to the IP network without interface boxes, digital voice gateways or backroom electronics…..Conventional channels link to the IP network and use the same audio transport as trunked audio”(Motorola, 2013, p. 2) this console still allows you to centrally control the functions and personnel as the manager can access all of the units at the same time and see real time what is occurring, all that is needed is an internet connection. “Access to the system manager from multiple remote locations via standard IP methods means users can still have convenient access while enjoying the benefits of centralized management.” (Motorola, 2013, p. 3)

Discussion

In the literature that was reviewed there was an almost universal expectation that a physical backup center for dispatching is desired. From the interviews conducted of key members of the dispatching and management structure they all felt that San Diego Fire-Rescue needs a physical backup location. In the survey of other fire departments 89.6% of the respondents have a physical location identified as a backup for their primary dispatching center (Appendix B). In El Paso, TX the government spent over 3.5 million dollars developing a completely equipped backup center for the region. “‘The current center gets very cramped,’ Grayson said. ‘We want the new center to be one that’s used in case other dispatch centers are not available, and for training.’”(Handy, 2012, p. 1) In Allegany County they experienced a power failure that required them to move to their backup center. “All commercial and 911

dispatching lines were temporarily transferred to the Mexico Farms site until repairs at the 911 center could be completed sometime Saturday. Bennett said the failure of a power supply unit in a console triggered failure of four other power supply units that, in turn, 'took out the whole system. This is the first time we ever had a problem of this magnitude, but it's not uncommon for us to have a technological problem. We have a tremendous amount of technology in the building,' he said. We're prepared for it. That's why we have a backup facility.'"(Alderton, 2013, p. 1)

In Saratoga County when they experienced a blackout that shut down the dispatching operations one solution suggested was to purchase a mobile unit that could be placed in a van and function as a backup location (Williams, 2003). This is much the same recommendation that was made internally by Chief Nilsen, the Communications Trailer Program Manager. He suggested that the trailer could function not only as incident support but as a backup to the primary dispatch center. "Serve as a fully functioning communications and dispatch center using the VIPER interop radio system and associated laptops, and/or portable CAD equipment directly from dispatch." (Nilsen, 2012, p. 1)

Many agencies neighboring dispatch centers as a backup to their own. They also utilize a consolidated approach with other agencies not only to manage their primary PSAPs but as backups to their main centers. (Field, 2013) This was also seen in the survey data where 71.2% of the respondents did not directly manage their own PSAP with 43.1% being controlled by another agency, 39.2% by their jurisdictions police department, and 21.6% in a joint powers agreement.

The implication to the City of San Diego from this study is that it is clear that industry standards and the desire to maintain a continuity of operations necessitate a backup plan for the City's Dispatch Center. While the data clearly points to a redundancy of services there appears to be no one perfect system. The backup system used in most jurisdictions is driven by cost and availability of options. The primary way this is done nationally is to have a physical location identified and to have it equipped with the tools needed to dispatch. This report has outlined various ways that redundancy is achieved throughout the country in dispatching operations. It has also researched different ways that backup and redundancy can be achieved locally by the City of San Diego's emergency medical service and Fire PSAP.

If the City fails to provide a plan of action to provide redundancies both in location and systems the continuity of dispatching operations has the potential to fail, this is unacceptable. While a physical backup location is the most common default in securing redundancy to operations, the student feels that a three pronged approach, utilizing a combination of options, might work best for the City of San Diego.

Recommendations

The problem that exists is that the City of San Diego Fire-Rescue Department does not have a physical backup 911 dispatch center. The purpose of this report is to determine if there should be a physical backup dispatch center for San Diego Fire-Rescue Department and if so, what would be the options to put a backup center into operation. The research clearly pointed to a physical location as being a good solution for backing up an existing center. The research also

provided other options that can increase San Diego City's flexibility and redundancy. There are three solutions that have presented themselves in the research in order to best solve the identified problem.

The first of the three solutions should be to fully outfit a mobile dispatching solution. This would enable a rapid deployment of dispatching capacity that could be put into service in a number of locations. This solution would provide flexibility of location and rapidity of implementation but could only backup the main system for short periods of time. The second solution would be to enter into an agreement with the private 211 system operator. This would provide a fully outfitted center immediately that could be put into operation for an extended period of time. The third solution is to mitigate the habitation issues in the current space adjoining the City of San Diego's Emergency Operations Center and outfit as time allows.

The reason all three of these were selected is that each one presents some logistical and operational concerns, with no one solution solving all of the issues. Some of the concerns are:

1. The trailer cannot fully support all operations of the dispatch center without additional location and resources provided.
2. This mobile consideration is flexible and easy to place in operation but will be difficult to support for a long duration due to fuel and habituation issues for the staff.
3. The trailer option would be difficult to provide security and control. There would need to be police security provided for the full operational period as the trailer is not a hardened resource.

4. The 211 center is a privately run enterprise and has a mission separate from providing 911 dispatch, some of those issues might be difficult to resolve in the MOU.
5. The 211 center is not in a hardened protected location, 24 hour security would need to be provided.
6. Unsure on the cost, this would have to be worked out in the agreement.
7. The EOC site is secured, protected and city owned but needs mitigating work before it can be occupied.
8. When the EOC was last used as a dispatch center it used VHF radios, could possibly need repeaters to operate the 800 MHZ radio system dispatch.
9. Limited access to parking in the downtown area, might be difficult to access during major emergency.

There are some specific steps that should be taken by San Diego Fire-Rescue if they choose to move forward with these recommendations, they are:

1. Develop procedures and protocol for placing the communications trailer into operation as a backup dispatch center.
2. Purchase the necessary equipment to run all of the radio and computer aided dispatch. Relocate existing equipment as necessary.
3. Train and then test the backup system utilizing the communications trailer and adjunct facilities by placing them into operation.
4. Develop and enter into a memorandum of understanding with the private 211 center to utilize their space as a backup center.

5. Develop policies and procedures for placing into operation one parameters are know from the contracting process.
6. Train and then test the backup system utilizing the 211 dispatching center.
7. Use City crews to abate the health hazards in the space adjoining the existing Emergency Operations Center.
8. Outfit the center with the necessary phone and data cables.
9. Purchase equipment as necessary to fully outfit the space in order to perform all of the functions of the existing PSAP.
10. Train and then test the backup system utilizing the adjoining space next to the existing Emergency Operations Center.
11. When this center is up and fully functional terminate the agreement with the private 211 system as it will no longer be needed. This could also be renegotiated and if only charged by use maintained as a third level backup.

These are the recommendations that were derived after research on the backup needs of the San Diego Fire-Rescue Department dispatching system. For future readers who wish to replicate some of all of these findings I would suggest that the research be conducted nationally and that the basis of the research take into account the specific needs of the region they serve. San Diego has some specific needs due the size of the operation and the difficulty/expense in building new facilities that often do not exist in other locales. This might drive one to conclude that in other areas building a stand-alone backup center might have greater support than it does in San Diego. Additionally, if the size of the operation is small enough then combining a jurisdictions backup

needs with an adjoining agencies primary center makes good sense. This option was precluded in this study due to the size of the operation and the burden it would place on the other agencies PSAP. In conclusion any future reader should look at all of the options under the lens of what solution can provide what their jurisdiction particularly needs to accomplish the redundancy necessary for their system.

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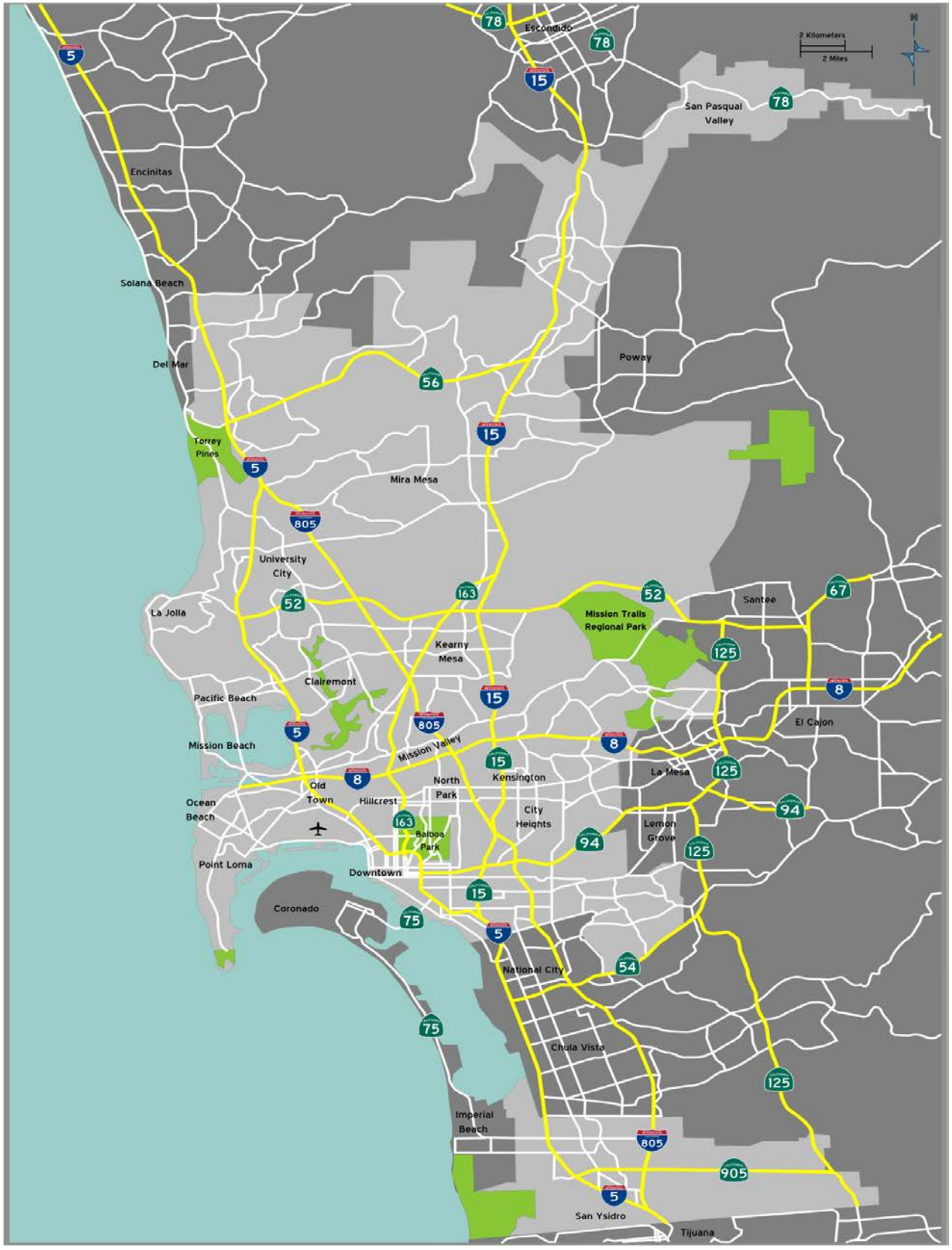

Escondido
San Pasqual Valley
Encinitas
Solana Beach
Del Mar
Poway
Torrey Pines
Mira Mesa
University City
La Jolla
Mission Trails Regional Park
Santee
Kearny Mesa
Clairemont
Pacific Beach
Mission Beach
Mission Valley
El Cajon
La Mesa
Kensington
North Park
Old Town
Hillcrest
Ocean Beach
City Heights
Lemon Grove
Balboa Park
Point Loma
Downtown
Coronado
National City
Chula Vista
Imperial Beach
San Ysidro
Tijuana
2 Kilometers
2 Miles
N

FIGURE 2

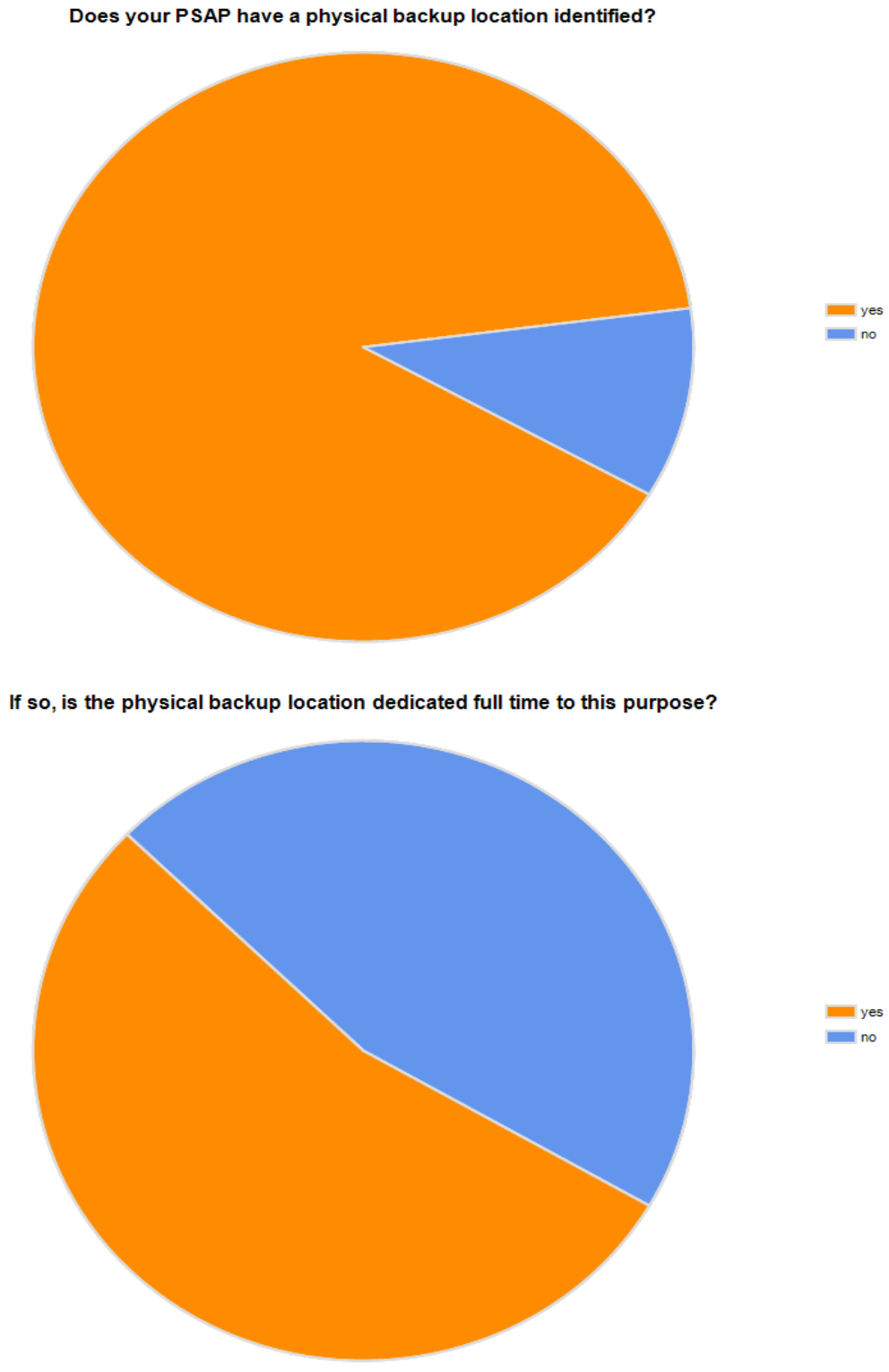
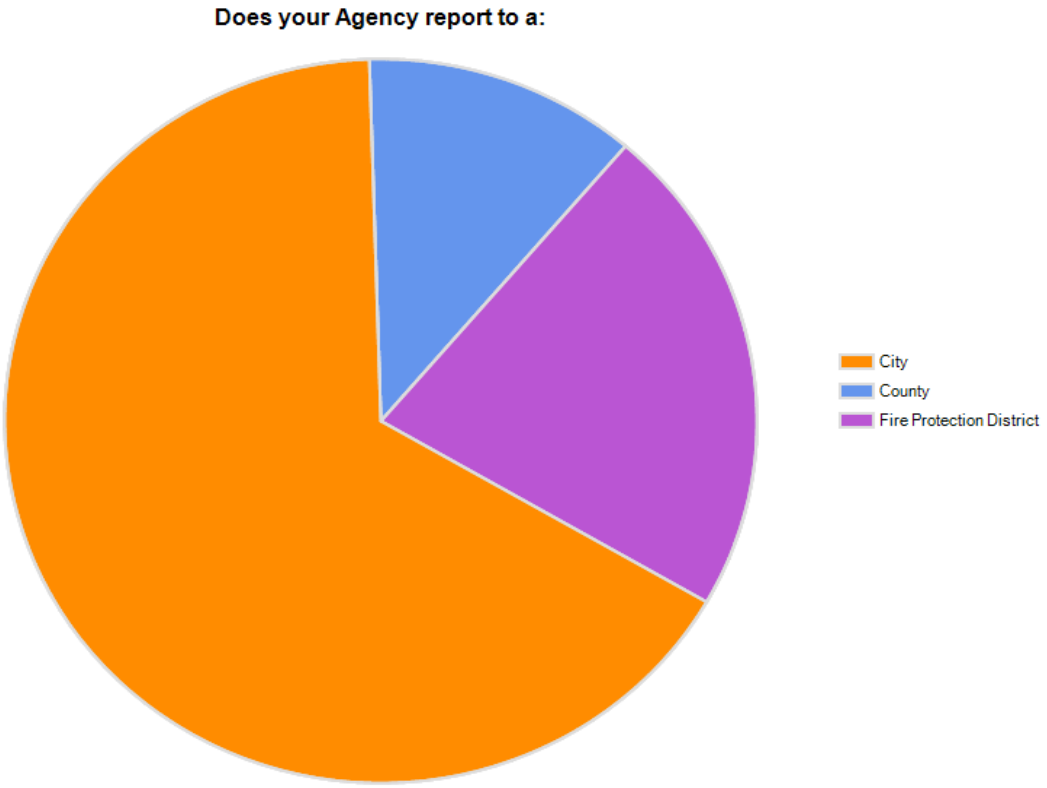
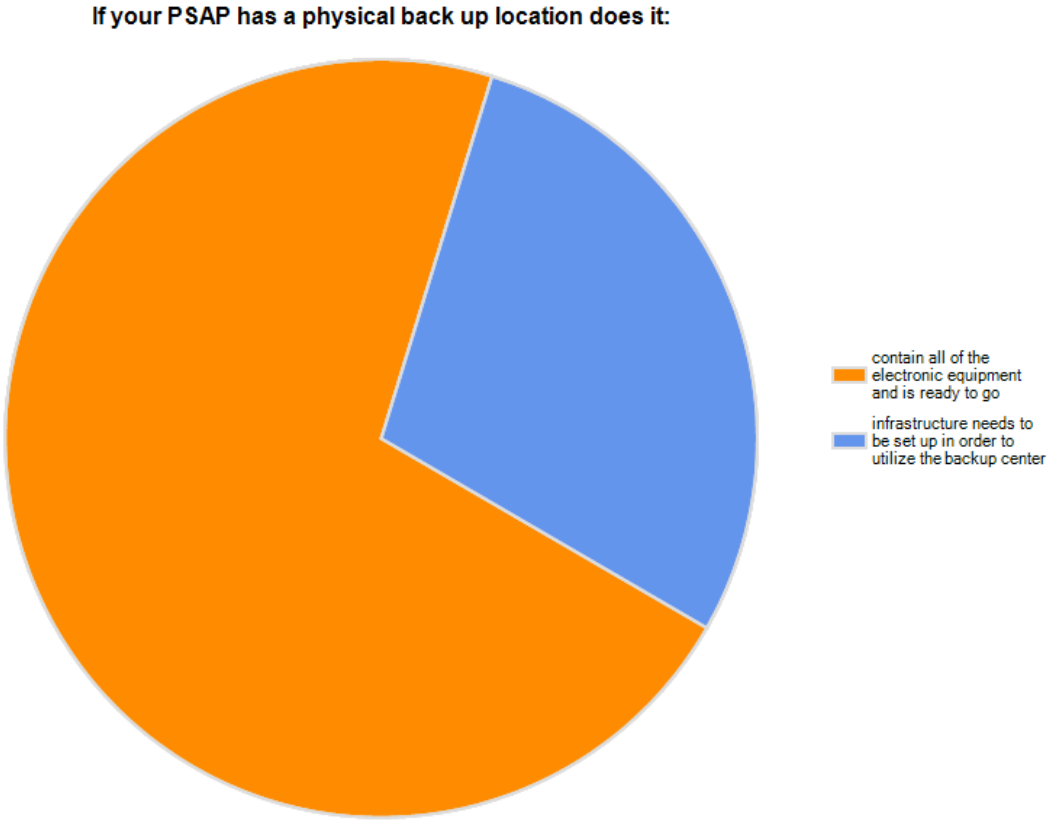

Does your PSAP have a physical backup location identified?
yes
no
If so, is the physical backup location dedicated full time to this purpose?
yes
no

FIGURE 2


Does your Agency report to a:
City
County
Fire Protection District


If your PSAP has a physical back up location does it:
contain all of the electronic equipment and is ready to go
infrastructure needs to be set up in order to utilize the backup center

Appendix A

Backup to Dispatch Center

1. Does your Agency report to a: City // County // Fire Protection District

2. What is the size of the community you serve? >100,000>250,000>500,000<1,000,000

3. Does your Agency manage its own Public Safety Answering point for fire/EMS calls? Yes//no

4. If not, who provides the service? Police // other Agency // Joint Powers Agreement

5. Does your PSAP have a physical backup location identified? Yes//no

6. If so, is the physical backup location dedicated full time to this purpose? Yes//no

7. If purposed to a different function normally what is that function? Other Agencies PSAP // Police // Library // Recreation Center // Fire Station // other

8. If your PSAP has a physical back up location does it: contain all of the electronic equipment and is ready to go // infrastructure needs to be set up in order to utilize the backup center

9. If there is not a physical location backup to your agency PSAP what is your plan in case your primary location is compromised

Appendix B

Backup to Dispatch Center

1. Does your Agency report to a:

	Response Percent	Response Count
City	**67.2%**	**45**
County	11.9%	8
Fire Protection District	22.4%	15
	answered question	**67**
	skipped question	**0**

2. What is the size of the community you serve?

	Response Percent	Response Count
<100,000	**59.7%**	**40**
<250,000	20.9%	14
<500,000	11.9%	8
>1,000,000	7.5%	5
	answered question	**67**
	skipped question	**0**

3. Does your Agency manage its own Public Safety Answering point for fire/EMS calls?

	Response Percent	Response Count
yes	28.8%	19
no	**71.2%**	**47**
	answered question	**66**
	skipped question	**1**

4. If not, who provides the service?

	Response Percent	Response Count
Police	39.2%	20
other Agency	**43.1%**	**22**
Joint Powers Agreement	21.6%	11
	answered question	**51**
	skipped question	**16**

5. Does your PSAP have a physical backup location identified?

	Response Percent	Response Count
yes	**89.6%**	**60**
no	10.4%	7
	answered question	**67**
	skipped question	**0**

6. If so, is the physical backup location dedicated full time to this purpose?

	Response Percent	Response Count
yes	**54.0%**	**34**
no	46.0%	29
	answered question	**63**
	skipped question	**4**

7. If purposed to a different function normally what is that function?

	Response Percent	Response Count
Other Agencies PSAP	34.0%	16
Police	17.0%	8
Library	0.0%	0
Recreation Center	0.0%	0
Fire Station	8.5%	4
other	**44.7%**	**21**
	answered question	**47**
	skipped question	**20**

8. If your PSAP has a physical back up location does it:

		Response Percent	Response Count
contain all of the electronic equipment and is ready to go		**73.8%**	**45**
infrastructure needs to be set up in order to utilize the backup center		29.5%	18
		answered question	**61**
		skipped question	**6**

9. If there is not a physical location backup to your agency PSAP what is your plan in case your primary location is compromised

	Response Count
	10
answered question	**10**
skipped question	**57**

Q9. If there is not a physical location backup to your agency PSAP what is your plan in case your primary location is compromised		
1	Our back-up is located in our EOC located at our Headquarters Fire Station.	Jul 16, 2013 8:49 AM
2	We are supposedly able to flip a switch and have our incoming lines transferred to an neighboring agency. We will then relocate our dispatchers to the backup location and dispatch via land line if available or Cell phone. It is not ideal by any means.	Jul 16, 2013 7:42 AM
3	N/A	Jul 16, 2013 5:08 AM
4	Mobilize our EOC located off site.	Jul 15, 2013 10:24 PM
5	There is none	Jul 15, 2013 7:50 PM
6	Report to other site and forward calls	Jul 15, 2013 2:59 PM
7	N/A	Jul 15, 2013 2:54 PM
8	Phone calls transferred to adjacent jurisdiction/PSAP or county-based PSAP.	Jul 15, 2013 1:08 PM
9	Wish for good luck and hope for nothing essential to happen	Jul 15, 2013 12:58 PM
10	Currently our primary backup is at the Local EMA adjacent to the EOC. We could roll to a new fire station which is closer and work off of Card Sets, Maps and Portable Radios, if the phones could be transfered.	Jul 15, 2013 12:52 PM

Appendix C

San Diego Fire-Rescue Department
Interim COO Brief
August 5, 2013

Category:	Fire Communications Center
Issue:	No Back-up Facility Available
Cause:	Lack of Funding
Background:	The Fire Communications Center (FCC) is the City's 9-1-1 call center for fire and EMS emergencies. FCC also provides contract dispatch services for the Chula Vista, Imperial Beach, National City, Poway and San Pasqual fire departments. FCC dispatches over 115,000 incidents per year. While there are redundancies built into the phone, computer and radio systems, there is no redundancy for the facility itself. Should the facility become uninhabitable due to damage or contamination, there is no backup plan to continue 9-1-1 call taking and provide emergency dispatching.
Operational Impacts:	Should the building itself become uninhabitable, there will be very limited capability to process 9-1-1 calls for services.
Corrective Action Needed:	Provide budgetary support to develop and fund a backup plan.
Fiscal Impact:	Unknown.
Council Action:	None at this time

Appendix D

Question for Dispatch Manager

1. Are you comfortable with current backup plan
2. What is the current backup plan
3. Are there redundancies to the dispatching system in the San Diego Dispatch Center
4. What other locations could house the current operation as a backup
5. Could we use the 211 center
6. Could we use other dispatch centers
7. Could we use the mobile trailer
8. Could we use multiple locations simultaneously
9. Could we dispatch from people's homes
10. Could we use the PD dispatch center
11. What equipment do we have to have on site in advance
12. What equipment could we store with individuals?
13. Could we use EOC

Appendix E

Questions for Communication Trailer Manager

1) How quick to deploy?

   The Communications Unit (COM1) is deployed by off duty personnel in its current configuration. Consequently, if properly maintained by Station 47 personnel, the unit can be deployed between 1-2 hours.

2) Required expertise to initiate operation?

   1 Class A licensed driver is currently required (this can be the same as the COMT and many of us have completed the Class A training for this reason)

   1 Qualified Communications Tech to deploy the Land Mobile Radio equipment and generic data connectivity.

   1 IT&C technician to configure, operate and update the data based technologies involving City Network systems.

Optional:

   1 Communications Unit leader for operating the unit as a functional Communications Unit

   1 Aircraft Base Operators to operate the unit as an air operations trailer

How many trained operators?

   See above

Driving requirements?

   See above

Power requirements?

   Self sufficient generator for short (1-2 days extended with refueling).

   50 Amp shore power (less is usable for the

Manage radio dispatch system?

Manage CAD?

How many workstations?

> Three workstations in the front portion, 1-2 in the rear portion which would work well as a dispatch supervisor room or technician room depending on the configuration

Run whole department off of existing trailer?

> The trailer is very capable of running all of the required voice radio traffic but its unclear how complete the CAD portion would be handled without further information.

If not what resources do you need to complete?

> The trailer is in need of additional equipment to ensure adequate data bandwidth to run the types of networks that a full CAD system would require, including updated computers with the CAD pre-installed and maintained. Some of this equipment has been submitted for approval but has yet to be purchased. The trailer can receive data from the city network via hardline IF those hardlines are not compromised by the same event that would prompt the implementation of this plan.
>
> Although the unit is capable of running the dispatch voice operations, the effectiveness the voice capabilities would be greatly enhanced with proper dispatch consoles that match the interoperability system the was purchased but never fully configured in the unit.