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Proposed License Renewal for the Prairie Island Independent Spent Fuel Storage Installation

Comment On: NRC-2013-0251-0001

Proposed License Renewal of the Prairie Island Independent Spent Fuel Storage Installation

Document: NRC-2013-0251-DRAFT-0003

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Submitter Information

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Name: Anonymous Anonymous

Submitter's Representative: Thomas P. Harlan, Esq.

Organization: City of Red Wing

General Comment

Please see attached.

Attachments

Bladey121913

Bladey122013

RWFD Master Plan

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December 19, 2013

Ms. Cindy Bladey
Chief
Rules and Directives Branch
Division of Administrative Services
Office of Administration
Mail Stop: 3WFN 6A44
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Ms. Bladey:

Re: City of Red Wing's Comments to the Draft Environmental Assessment for the Proposed 40-year License Renewal of the Prairie Island Independent Fuel Storage Installation in Red Wing, Minnesota
Docket ID NRC-2013-0251

As you are aware, this firm represents the City of Red Wing, Minnesota (the "City") with respect to the above-referenced matter. We submit these comments on behalf of the City to the Nuclear Regulatory Commission (the "NRC" or "Commission") in response to the Draft Environmental Assessment (the "Draft EA") prepared by the Commission as part of the relicensing of the independent spent fuel storage installation (the "ISFSI") located outside the Prairie Island Nuclear Generating Plant (the "PINGP"). These comments by the City should be read in conjunction with its comments to the Commission on the draft Environmental Impact Statement (the "Draft GEIS") currently being completed. A copy of the City's comments to the Draft GEIS are attached hereto. The City thanks the Commission for the opportunity to submit comments to the Draft EA and looks forward to working with the Commission, its staff, and consultants to address the very important issue of the relicensing of the ISFSI of the PINGP.

BACKGROUND

The City is the host community to the PINGP, which is a dual reactor 1118 MW facility. Immediately adjacent to the PINGP, sits approximately twenty-nine (29) individual dry casks in which are stored spent nuclear fuel rods. In addition, the PINGP spent fuel pool, like all others, contains spent fuel that has been unloaded from the reactors and is waiting to be transferred and stored in certain specifically designed casks. It is anticipated that at the end of the life of the PINGP, which is currently scheduled in 2033 and 2034, and following the

appropriate holding or cooling off period for the rods, there will be approximately ninety-nine (99) casks located on the ISFSI.¹ Like the PINGP, the ISFSI is within the City's limits.

The City and Northern States Power Company d/b/a Xcel Energy (the "Company") have worked together over the years to first site and thereafter solve many of the issues associated with the PINGP. The City has been supportive of the Company and its efforts to maintain not only the PINGP but the ISFSI in a reasonable and safe fashion. However, the City, like many other host communities, is now facing a scenario that it did not, under any set of circumstances, envision: the failure of the Federal Government to honor its contractual agreement with the Company and remove the spent fuel from the PINGP to either an interim storage facility or a long-term or permanent repository.

The City is uniquely situated to provide input on the Draft EA. The City, in all respects, is a first and primary responder to any incident at the PINGP or the ISFSI. It is obligated, under both federal and state law, to provide reasonable assurance that it has the necessary facilities and infrastructure to meet and respond to any incident at either facility. The City, to honor this social compact, is obligated to maintain a steady state of readiness through an investment in and maintenance of the necessary equipment and personnel, as well as the necessary buildings to locate the same. The City has and continues to do so despite the continued reduction of revenue to the City from the Company for taxes on the PINGP. The City, in turn, has been forced to shift this burden to its other taxpayers who, since 1996, have seen their property taxes increase over 188%. This is a burden that they cannot continue to bear.

THE DRAFT EA AND CITY'S COMMENTS

According to the Draft EA, there has not been a determination whether a final EA should be issued or if the Commission, for purposes of the relicensing of the PINGP ISFSI, can meet its obligation with a FONSI. The City does not believe that a FONSI is warranted or can be supported. The Draft EA, with its intermittent narrow and expanded focus on the various factors that are to be evaluated for such a determination, fails to take into account crucial, material information.

This includes, without limitation, a truly comprehensive review of the immediate and cumulative impacts of the continued storage of spent fuel. Like the Draft GEIS, the Draft EA artificially segregates issues and analysis deferring to other reports or studies. As detailed below, these reports and studies were completed outside of the newly recognized reality:

¹ The precise number of casks that will hold spent fuel has not yet been determined since the PINGP is using a different fuel assembly that burns hotter and longer in the reactor and thus requires replacement or refueling at a different rate. Accordingly, the number of casks originally calculated as being necessary for end of life storage of spent fuel may be lower or higher depending on often refueling occurs and how many fuel assemblies can be placed into the casks. Though the casks are larger to accommodate the larger fuel assemblies, it is unknown if the new casks will hold the same number of spent fuel assemblies as the casks that are currently being used. In addition, as noted by the PINGP's owner and operator, Northern States Power Company d/b/a Xcel Energy after the decommissioning of the PINGP, low level nuclear waste will continue to be stored on-site until the same can be disposed of properly. It should be noted that this low level nuclear waste is the responsibility of the generator (i.e. the Company) to dispose of – not the Federal Government.

spent fuel storage is going to continue indefinitely at the ISFSI and other storage facilities around the country. With this understanding, the City believes that the relicensing of the PINGP ISFSI for an additional forty (40) year period will have a material impact on the City, as well as the general area in which it provides services.

In presenting its comments, the City will break these out into two (2) categories. The first category is general comments. This is an overview of the Draft EA in certain areas and an analysis of where the same is deficient. This will also include, but not be limited to, a review of assumptions made by the Commission in preparing the Draft EA. The second category will address specific points within the Draft EA itself with a discussion on what could or should be supplemented. This also includes a discussion on missing items and follow-up in order to make the Draft EA more complete.

The import of these two categories of comments leads to the un rebuttable conclusion that an EA, in complete form, is necessary in order to evaluate the relicensing of the PINGP ISFSI. The proposed action of relicensing the ISFSI for another forty (40) years does have a large and significant impact on the human and material environments that surround the ISFSI.

A. General Comments.

1. The Draft EA assumes that past experience of storage and the robustness of the equipment that comprises the ISFSI are sufficient. The Draft EA, like the Draft GEIS, makes a number of assumptions to reach a presumptive conclusion that the continued storage of spent fuel is safe and does not pose a risk. This conclusion is simply not supportable.

- a. Experience.

The Draft EA relies upon and references the experience associated with dry cask storage. This experience must be discounted because the Commission, like the industry as a whole, is learning in real time. When the PINGP, or any other nuclear power plant was built, there was no consideration given to dry cask storage, or, for the PINGP, that spent fuel would still be on site in 2013 – 25 years after it was to be removed and 40 years after operations started. Rather, there was a belief that there would be, this time, not only the development of a permanent depository but the removal of the spent fuel from the PINGP. This removal was to start in 1987 and, given a PINGP's queue position, would be complete by today.

The experience for the ISFSI is one garnered by necessity not plan. When it became apparent that spent fuel was not going to be removed from the PINGP in a timely fashion, there were accommodations made to increase storage of spent fuel assemblies in the spent fuel pool. After a decade or two of racking and re-racking spent fuel rod assemblies, the Company in the early 1990's was forced to move to dry cask storage. That "temporary storage" has continued for over 20

years in casks that were not designed to be transfer casks or permanent storage casks, but simply temporary storage casks. But for how long? What was the original thought behind that storage? Thus, the experience the Commission cites is being realized by each passing day, not by a process that has been completed and is now being repeated. The Commission, like the City, finds itself in a position that it never anticipated and is struggling to determine how to best address the issues associated with continued storage. Experience, then, is not a factor the Commission can rely upon.

In fact, experience would lead to the opposite conclusion: storage will not be limited to 40 years or any other time frame. Rather, it is permanent. The City uses the word permanent because there is no other time frame that will apply. It is unknown when the spent fuel will be removed. Any indicators that this removal will occur in the near future have been removed or not acted upon. Yucca Mountain has been removed as a solution and there is no action on any resolution suggested by the Blue Ribbon Commission Report. Removal is no closer today than it was in 1973 when operations at the PINGP commenced.

On many levels, patience with the creation of a solution has been exhausted. Nowhere is this more obvious than in the Federal courts. The deference given to the Commission and the Department of Energy has simply evaporated over the issue on the Waste Confidence Rule and the continued collection of fees for permanent storage. The Federal courts, like the stakeholders, have lost confidence a solution is imminent and no longer have the patience to pretend this is so.

Experience, then, instructs that no solution on permanent storage or removal is forthcoming. With that reality, the experience associated with the unintended practice of spent fuel storage in casks at the ISFSI or anywhere else is not a substitute that the Commission can rely upon in the Draft EA.

b. Robust Equipment.

The Draft EA, as a corollary to experience, cites to the robustness of the TN-40 casks and the newly authorized TN-40HT casks as being a reason storage is or should not pose a risk. However, it does not have any analysis of the casks themselves by the manufacturers of the same. There is no discussion of the manufacturer's warranty of the casks that are being used or useful life associated with the same. Instead, the Draft EA, like the Draft GEIS, simply draws its own conclusions without any further support.

It would seem obvious that the manufacturer's statements/information/limitations of the equipment being used would be included in the Draft EA. This is especially true where the Draft EA's very purpose is to evaluate whether continued storage will have an impact on the natural and socioeconomic

environments in which the ISFSI is to be located. However, the Draft EA does not even give a perfunctory analysis or treatment of any comments by the manufacturer.

The Draft EA also ignores any information associated with the components of the equipment being used at the PINGP ISFSI. The TN-40 and TN-40HT casks are iron and concrete. There is no analysis on whether these components will degrade over time or, if so, how the same can be maintained. This is particularly important given the analysis of the Department of Energy in the Yucca Mountain Environmental Impact Statement and its use and reliance upon a concrete study done in St. Cloud, Minnesota. This concrete study is neither mentioned nor in any way included in a Draft EA.

Finally, in addition to the lack of experience cited above, there is no experience with the TN-40HT cask and the new fuel rods. The TN-40HT cask, in fact, did not even go into production until 2009. Its purpose was to store the new fuel assemblies that were to be (and are now being) used at the PINGP. These fuel rod assemblies burn hotter and longer than the rods that were previously used. There simply is no experience with them. The Draft EA, then, should not rely on assumptions of experience and robustness of the equipment used where none exists.

Instead of these assumptions (which mirror nuclear industry assumption that nothing will go wrong-until it does), the Draft EA should specifically work through the characteristics and qualities of the casks. This should be done in light of the manufacturers' warranties, the past statements on the use/durability of the casks (especially when these were first being put in place) and the anticipated storage life of the same. This last point should also include reference to the Draft GEIS and its storage timelines.

2. The Draft GEIS is essentially ignored. The purpose of the Draft EA is to examine site specific impacts associated with the PINGP ISFSI. In doing so, the Draft EA, at different parts, references the Draft GEIS being completed and its general coverage of certain issue outside of the scope of the Draft EA.

The problem is, of course, the Draft GEIS is just that: a draft. It is not complete and will not be complete in time for the analysis under the Draft EA. As such it is impossible for the Draft EA to incorporate this incomplete document into its own analysis or to utilize that to support a FONSI determination.

This is a fatal flaw in the Draft EA and runs contrary to the Commission's own directive that re-licensing activities reliant upon the old Waste Confidence Rule be put on hold. With the purported interplay between the Draft EA and Draft GEIS, the Draft EA and any determinations regarding the same must be put on hold.

The lack of interplay between the Draft EA and the Draft GEIS also represents a fundamental flaw in the scope of analysis by the Commission as it relates to the PINGP and ISFSI, in particular, and the continued storage of spent fuel, in general. There is, between the two, an unnatural segregation of scope and responsibility so much so that two rarely cross over to provide any substantive analysis.

Comprehensive analysis is avoided not only through this segregation but also through various assumptions and reliance upon other reports that were done years ago. These reports may no longer be reliable. The reason for this potential lack of reliability is three-fold: first, the Commission, along with everyone else, is learning in real time. The date(s) for removal of the spent fuel have come and gone, and the systems for storage were developed out of necessity rather than design. Second, these reports all, in part, may have been created in reliance upon or with the old Waste Confidence Rule in mind. Since that Rule is no longer effective, these reports may likewise be tainted. Third, if the directive of the Draft GEIS is to be fully implemented then the past reports/analysis must be viewed in light of the no-build scenario. That directive must find its way into the Draft EA.

The reality is that the spent fuel generated by the PINGP is going to be permanently stored at the ISFSI within the City's limits. There is, and has been, no substantive plan by the Federal Government to remove this waste. There is simply no long-term solution and the limited forty (40) year of the license does not give the Commission a fair and full analysis of the real impacts of continued storage. Likewise, the Draft GEIS excludes any analysis to site specifics and instead simply discusses generalities. It too, as is stated by the City in its comments to the same, is for the purposes of continued spent fuel storage, flawed.

3. There is insufficient analysis on negative impact of continued storage. The Draft EA, in part, does not provide sufficient analysis of the negative impacts of continued storage. Instead it focuses solely on the positive impact in the form of continued employment, growing housing, and continued taxes. It does not contain a complete analysis of the chilling effect of continued storage. While the Draft EA does, in part, address this issue relative to the Prairie Island Indian Community (the "PIIC") it does not do so with respect to the City. In order to have a full evaluation of the impact during the next forty (40) years, the Draft EA must fairly consider the nature of the items being stored within the City limits: some of the most toxic material known to man.

The chilling effect must be analyzed through, among other things, the impact on the City's growth and its land use in the future.

4. There is no analysis on PINGP closure.

The Draft EA also does not fully evaluate the timing of what is to occur with the PINGP and the ISFSI over the next relicensing period. In the Draft EA, relicensing for the ISFSI is evaluated for an additional forty (40) years.² This extends the ISFSI license to 2052. However, by 2033 and 2034, respectively, the PINGP as a nuclear generating electrical plant, will cease operations. What does this mean? What will be the impact on the City from a tax revenue standpoint? What will be the impact on the City to continue to maintain the necessary readiness to respond to an incident? Is it possible for the City to reduce its readiness because of the purported robustness of the equipment used in the ISFSI?

The answer to this last question is, of course, no. The City must be ready for any incident, radiological or non-radiological, regardless of whether the same comes from plant operations or continued storage³. As is noted by the Draft EA, in section 4.3, the City will face the same “financial burdens such as expenses associated with participation and PINGP-related actions, emergency planning, and steps required in the event of an accident [e.g. educating the public on risks and procedures; maintaining special medical supplies (iodine tablets), equipment, in trained professionals] would also not change and would continue to impact, in the same manner, communities within the ROI.” Draft EA, section 4.3, pg. 4-4. The Draft EA does not evaluate this statement any further nor analyze what it would mean to the City. This must be included in order to fully evaluate the immediate and cumulative impact on the socioeconomics associated with continued storage for an additional 40 years.

As provided in more detail below, the impact of continued storage on the City is large and significant. The Draft EA must include and further develop this analysis.

B. Specific Draft EA Comments.

With respect to the specific comments on the Draft EA, these are organized by the appropriate section within the Draft EA. In addition, please note that some of the comments refer to a report that is attached to these comments as well as documents that are outside the same.

² Indeed, the best approach is to relicense the ISFSI for 20 years, not 40 years. By limiting the relicensing to 20 years, the next relicensing will occur at a time contemporaneously with the termination of the PINGP's operation. By coordinating the expiration of the license for the ISFSI with the cessation of operations of the PINGP, the Commission will have the ability to fully examine the impact of the closure of the PINGP and the true costs and requirements of continued storage at the ISFSI.

³ It should be noted that numerous spent fuel assemblies will still be in the cooling pool since the same will be too radioactive to transfer to dry cask storage. This factor, as well as the closing of the plant, was not addressed in the Draft EA.

1. The concept of the affected environment is too narrow. In section 3.0 of the Draft EA, the Commission lists, as the affected environment, the one that “currently exists at or around the PI ISFSI. The existing conditions that have shaped the environment or at least partially the result of past construction and operation of PINGP 1 and 2 and the PI ISFSI.” Draft EA, Section 3.0, page 3-1. This definition is too narrow for a number of reasons.

First, the purpose of the Draft EA is not to evaluate the affected environment in a static fashion but to do so dynamically and over the period of the purposed relicensing timeframe. It does not do so. The proposed relicensing runs to 2052 or 2053. The City will grow and expand during this time. To limit the affected environment to the area that currently exists at or around the ISFSI does not fit within the purpose parameter of the Draft EA.

Second, the Draft EA does not take into effect the negative impact that continued storage of spent fuel will have on land use in the surrounding areas. As is acknowledged in the 2011 Blue Ribbon Commission Report, spent fuel has a well-deserved stigma attached to it. It is, by definition, some of the most toxic material known to man. The radioactivity of the spent fuel is so intense that exposure to it at a different time frame may cause immediate death. Draft EA, Section 4.0, page 4-20, fn. 1. The continued storage, then, of spent fuel in casks within the City will have a negative impact on its development and/or land use well into the future. Accordingly, the concept of land use and the impact on land use must include this negative stigma.

Finally, the narrow description provided in section 3 is, in part, contradicted by the Draft EA’s later analysis of land use of the PIIC. While admittedly, the use of land by the City will be different than the use of land by the members of the PIIC, the psychological impact is the same: people do not want to locate their homes or businesses next to dry cask storage. The Draft EA must include an analysis of the negative impact on land use continued storage would have on the City – especially since the ISFSI will remain in the City’s limits. This analysis would include, but not be limited to, an analysis on the stunted growth of the City, as the host community, and what this would mean to businesses that are already located there. This could also extend to an analysis on the lost taxes or revenue that would flow to the City from the same.

2. Section 3.3, demography and socioeconomics, is too narrow.

Section 3.3, which broadly covers a number of different socioeconomic issues, fails to appropriately identify or analyze the same in depth. The

result, then, is that the impact of continued storage is not effectively evaluated.

- Local Finance. On page 3-8, the Draft EA describes local finance. This only addresses payments to the City by the PINGP in the year 2010. There is no historical data about how these payments have declined over time, how the tax burden has shifted to other tax payers in the City since 1996, or how this declining revenue has impacted the City.

Likewise, there is no discussion of how the changes to the state tax code for utility companies in Minnesota have resulted in a 26% reduction in taxes to the City or how the PINGP and the ISFSI can use state tax exemptions to shield improvements, upgrades and maintenance from being taxed.

Finally, the concept of local finance does not take into account what taxes will be paid to the City after the PINGP ceases operations in 2033 and 2034. There is a possibility that the ISFSI will be taxed in such a limited fashion that it will be the equivalent of a parking lot. The Draft EA must be amended to reflect the history and decline of tax revenue and the impact of the same. This is information that both the City and the Company should provide to the Commission. While some of this may be found in the documents filed in the Company's Certificate of Need proceeding before the Minnesota Public Utilities Commission for additional dry cask storage in 2008, that information is no longer fully reliable and needs to be updated and/or revised in light of changed circumstances.

- Utilities and Services. Under utilities and services, the Draft EA goes to great length to discuss the police department that is maintained by the PIIC and how it will respond to incident at the PINGP or the ISFSI. This analysis exhibits a lack of understanding on what is necessary to respond to an incident at a facility that uses and stores nuclear fuel.

As noted by the Draft EA, the PIIC has developed and maintained its own private police force and the City has a mutual aid agreement with the PIIC regarding that force. However, the City has a mutual aid agreement with virtually every local municipality and county in a forty (40) mile radius of its borders. This is done for two (2) purposes: first, to ensure that this continuity in providing services to the citizens of that area, and second, to ensure that those entities, in the event that the City needs additional

support, will come to their aid and have the jurisdiction to do so.

But before any mutual aid agreement is invoked and a response from the PIIC or any other community requested, the City for all incidents within its borders, must first respond, assess and then request that aid be provided. This is fundamental to the jurisdiction of the City and instrumental under all of the mutual aid agreements it has in place-including the mutual aid agreement with the PIIC.

With respect to the necessary equipment and facilities and personnel required to respond to an incident at the PINGP or the ISFSI, it should be pointed out that the PIIC does not have any ambulance, paramedic or fire services. In fact, the PIIC, like the other residents in the 462 square miles around the City of Red Wing, rely upon the City to provide those services. The PIIC does not have an emergency coordinator nor are its facilities designated by the state and federal governments as being the facilities in which to coordinate a response.

It is the City that signs off and provides reasonable assurance to the State of Minnesota and to the NRC that an emergency preparedness plan is in place and that, in the event of an incident, an appropriate response will be provided.

Accordingly, the section on utilities and services must be modified to reflect that the City, in all respects, is the primary and first responder. It provides the necessary public safety services to respond in the event of an incident and the PINGP or ISFSI. While the PIIC may assist in this process, its assistance will be limited to only police and not to any of the other fire or ambulance or paramedic services that will more than likely be necessary in the event of an incident.

3. Under Section 3.11, there needs to be a discussion of Emergency Preparedness. Section 3.11 addresses public and occupational health and safety. It identifies, in very general terms, certain incidents and concludes that there is or would not be a likelihood of any release from the systems being used. The Draft EA, again, relies on the robustness of the casks that contain the spent fuel as being able to withstand the incident.

Simple reliance on the robustness of the casks is insufficient. The Draft EA should have a separate section on Emergency Preparedness to address the issue of what if the containers or casks would break down. Included within this Emergency Preparedness section would be an analysis of the

TN-40 and TN-40HT from the manufacturer's perspective including, but not limited to, the precise makeup or composition of the casks, the warranty period, as well as a useful life.

In discussing the Emergency Preparedness plan, the Draft EA should analyze what that currently entails with respect to the continued operation of the PINGP as well as what that will look like once that operation ceases. In other words, in 2033 and 2034, respectively, what will the Emergency Preparedness plan look like or be required? Emergency Preparedness is an absolute necessity. The NRC, for operations of the PINGP and the ISFSI, requires reasonable assurances that such a plan is in place and that there will be a response in the event of an incident. It also conducts annual exercises to evaluate the same.

In the Certificate of Need proceeding for the Minnesota Public Utilities Commission regarding expanded storage of spent fuel outside of the PINGP, the Minnesota Public Utilities Commission (the "Minnesota PUC"), upon the recommendation of the administrative law judge, placed a condition on the Company's license. The Minnesota PUC also requires that the City provide reasonable assurances that it can meet the requirements of the Emergency Preparedness Plan for the PINGP and ISFSI. The Draft EA should be modified to reflect these circumstances.

4. Under Section 4.1, Land Use, the Draft EA must expand beyond the physical imprint of the ISFSI. Section 4.1 of the Draft EA limits the impact on land use to the specific area that compromises or is next to the ISFSI. In other words, there is no analysis, whatsoever, on the chilling effect that the continued storage would have on the natural development and growth of the area around the ISFSI for the City.

The analysis of land use under the Draft EA must be expanded to include an analysis of future land growth in the next 40 years. As previously noted, the PINGP and ISFSI are both within the City's limits. It is a natural and progressive process that will lead the City to develop in and around the area that both of these are currently located. The chilling effect of continued storage must be considered.

This area would not be available for growth and could have the effect of stagnating growth within the City. The EA should note that the City, in many ways, is geographically restricted on how it can grow: with the Mississippi to the east and bluffs and other hills to the south and west, the natural growth pattern is to the north. While this has occurred along Highway 61 running to the north, it is only natural that the area between Highway 61 and the river be made available for and be used by new businesses. This is precisely where the ISFSI is located.

Not only is this analysis necessary in order to fully address the impact of continued storage, it is fair given the additional scope of review provided by the Draft EA regarding land use by PIIC. Specifically, on page 4-2, and carrying over to 4-3, the Draft EA addresses the use of the land by the members of the PIIC. The language describes, in essence, the chilling effect that continued storage would have on the use of their land adjacent to the ISFSI. The City too will suffer from the continued presence of the ISFSI as it relates to the development of the land around the same. Accordingly, fairness dictates that this be included, from the City's perspective, within the Draft EA.

5. Section 4.3, Socioeconomics, must be modified to address the City as first responder and its role regarding the same, taxes and change the impact from small to large. Section 4.3, which addresses socioeconomics, cites to a number of factors to reach the conclusion that "no change (direct or indirect) to the local economy would result from the proposed action and thus the potential socioeconomic impacts will be SMALL and, thus, would not be significant." See Draft EA, Section 4.3 at p. 4-4. In support of this conclusion the Draft EA cites to the burdens of a first responder, the impact of any taxes being paid to the City, as well as the financial burdens for continued emergency preparedness. After these factors are appropriately weighed, it is clear that the proposed action of continued storage will have a significant and large impact..

- a. City as first responder.

Section 4.3 at the outset fails to appropriately recognize the role of the City as the first responder. It is the City that provides reasonable assurances to the State and Federal government that it will respond to an incident at the PINGP or ISFSI.

The PIIC makes reference to the fact that it is a de facto host community and that it is a first responder to any incident due to its police department. While the PIIC has also been and continues to be materially impacted by the storage of spent fuel, the assertion of host city and first responder are not supportable. The spent fuel has and will continue to be stored within the City limits. The City has, and will continue to be, obligated to respond to any incident at the PINGP and/or ISFSI using all of its reserves. The City and its citizens has and will continue to be obligated to pay for this heightened and exaggerated state of preparedness necessary to respond to such an incident.

While the PIIC has only recently developed and maintained a police force, it has not invested in ambulance, fire trucks, or other buildings, personnel

or equipment. Rather, the PIIC, like many others in the region, depends upon the City to provide these services in the event of an incident, including one at either the PINGP or Treasure Island, the casino that the PIIC owns and operates on its own tribal land. While the PIIC police department will undoubtedly enforce the law and respond when requested by the City, it cannot meaningfully respond to an incident that involves a fire, a breach to any of the containment facilities, or an injury that results from the same. Nor does it have (or can provide) any coordination of the delivery of any of these services. This too is provided by the City.⁴

b. The City's Responsibilities and Capabilities.

The Company and PIIC are not the only group or entity that rely upon the public safety services of the City. The City serves over 64 square miles of coverage for its fire safety services and over 462 square miles of coverage for its ambulance services. This extended area includes an area just south of Hastings, Minnesota to north of Lake City, Minnesota, and then east into Wisconsin.

In 2008, the City had an independent study completed to assist it in assessing its ability to provide public safety services. This report, which is referred to as the 2008 Public Services Report (the "Report"), concluded that the City needs to increase its public safety services in order to effectively serve the City and other areas that it is responsible for serving. A copy of the Report is attached hereto. The Report recognized not only the wide range over which the City provided services, but also recognized the widely scattered high risks within the City including targets such PINGP and the PIIC Treasure Island Casino. Indeed, each of these were specifically identified and described in detail.

The Report recommended that the City add two additional fire stations, increase its full time and full time equivalent fire/ambulance services by 36 fire fighters, and purchase the necessary equipment to support the same.⁵ The City has not implemented any portion of the recommendations

⁴ The PIIC also stated that it expends "considerable financial resources participating in state and federal regulatory proceedings for the PINGP units 1 and 2 and the ISFSI (federal only). There is no other governmental entity (e.g. City of Red Wing, Goodhue County, or the State of Minnesota) participating in these proceedings at the same level as a PIIC." Draft EA, Section 4.3, p. 4-4. While it is true that the PIIC has participated in certain proceedings, it should be noted that it is prohibited from participating in others. The agreement the PIIC and the Company reached regarding the storage of spent fuel prohibits the PIIC from participating in certain proceedings in exchange for payments in the future. In addition, the PIIC has chosen not to participate in lobbying the Minnesota legislature for changes to some of the underlying laws regarding the continued storage of spent fuel in the state of Minnesota. This includes, but is not limited to, the changes to the calculations for the decommissioning of the PINGP and how ISFSI should be accounted for as part of the same.

⁵ Interestingly, one of the additional fire stations was to be located close to the Treasure Island Casino in order to service the high number of calls that originate from that facility.

of the Report. In fact, the City went in the opposite direction: it developed a plan to reduce its expenditures of public safety services. The plan included, but was not limited to, a plan for not filling open positions; cutting or freezing expenditures (such as, for example, the proposed increases recommended by the Report); and cutting positions, including positions in public safety. As a result of this plan to reduce expenditures and other changes that have been implemented to date, the City's ability to continue to provide the critical and necessary public safety services has been compromised.

c. Revenues to the City will decrease but its obligations and financial burdens will remain the same.

Section 4.3 also fails to take into consideration that during the time frame of the proposed action, the PINGP will cease operations. This cessation of operations will have a significant impact on the taxes the Company pays to the City. Property taxes paid by the Company on the PINGP have decreased from approximately \$23.4 million dollars in 1996 to \$10.7 million dollars in 2010. It is anticipated, by the Company, that these amounts will steadily decrease over time. Application for License for Additional Dry Cask Storage to the Minnesota Public Utilities Commission, Exhibit J, page 2-28. There are many reasons for this decrease. First, the general age of the PINGP itself has resulted in a reduction in the overall taxable base upon which taxes are calculated for the Company. Second, in 2006, effective for the calendar years 2008, 2009 and 2010, the Minnesota Department of Revenue established amended rules regarding how the PINGP's property and equipment would be assessed and valued for property tax purposes. The result of these amended rules provided the Company with a tax break for its power generating facilities, including the PINGP.

To address the deficiency created by the Department of Revenue changes, the state passed a measure called Utility Valuation Transition Aid. The sole purpose of this statute was to make up for the deficiency between the amounts that would have been paid under the old Department of Revenue rules and those that are now being paid utilizing the amended rules. Utility Valuation Transition Aid expired in 2011.

Finally, the Company has continued and expanded its use of pollution control property tax exemptions. The State of Minnesota, in recognition of the generation of electricity from "green alternatives", has afforded the Company, and other electricity generators, exemptions for many of the improvements, replacements and upgrades to various generating facilities. This includes the PINGP. The PINGP is exempt because it does not emit carbon as a byproduct of its operations and thus is considered a green

alternative for a generation. Indeed, it is possible for Xcel Energy to declare all of its spent fuel casks as being pollution control equipment and therefore exempt from property taxation.⁶ Accordingly, the amount of reduction in the payment of property taxes following cessation of operations at the PINGP will be significant.

During the course of the Certificate of Need proceeding, the Company introduced evidence that a planned power uprate of the PINGP would more than offset any of its acknowledged reduction in property taxes. The Company reasoned that the improvements to the facility, which were projected to be in the hundreds of millions of dollars, would result in a significant increase in property taxes that would be paid to the City.⁷ However, the Company has since abandoned its plans for the power uprate. While there has been investment into the PINGP, it is unknown what impact this would have on tax revenues to the City. Regardless of any temporary increase this may bring, as the Company itself has acknowledged in its Environmental Impact Statement in support of its application to relicense the PINGP, there will be a continued and steady reduction and payment of property taxes to the City over the remaining life of the PINGP. And in 2033 and 2034, it will be reduced dramatically.

⁶ This statement came on the cross-examination of Joseph Rheinberger, an expert appearing on behalf of the Company during its Certificate of Need proceeding for the Minnesota Public Utilities Commission. However, the City has since learned that the Company, many years ago, agreed to not declare the casks as being exempt from taxation as pollution control devices. However, with the changes on how property taxes are calculated under the new Department of Revenue rules, it is uncertain if the casks, and the underlying ISFSI, will be considered anything other than an empty undeveloped field owned by the Company. Spent fuel, and the storage of the same, is not considered as an externality in the production of electricity.

⁷ In addition, the Company argued that any incremental costs to the City to support an emergency response plan are reimbursed under Minn. Stat. § 12.14. The evidence presented by the Company was not credible. The Company's witness had neither operated nor managed an emergency response program, or had he researched, examined, applied for or reviewed the kind of expenditures that are approved under Minn. Stat. §12.14. The Company's witness, in fact, had no experience with either an emergency response plan, in general, or the one for the ISFSI, specifically, or Minn. Stat. §12.14.

The Company also argued that any loss of revenue to the City would be made up by Utility Transition Aid. This program expired in 2011.

Finally, the Company argued that the emergency response plan will remain effective due to the Company's own fire brigade and mutual aid agreements between the City and other local governmental entities. Regarding the fire brigade, the Company could not establish, one way or another, whether that brigade would be available in the event of an incident. The makeup of the brigade are Company employees who may be busy attending to their own job responsibilities in the event of an incident.

Regarding mutual aid, the Company, again, presented it through a witness who had no experience or understanding of the same. Moreover, mutual aid is not a substitute because it involves the request and response of other cities and municipalities who may or may not have the same equipment or even be able or willing to respond to a request for mutual aid. In short, all of the arguments presented by the Company, including their argument for additional revenue as part of a planned power uprate, cannot be supported. In short, it is the City and its emergency response plan that is key to responding to any incident.

“Despite this reduction in the payment of property taxes, the City, as the first responder, will be obligated to maintain its continued state of readiness to respond to any incident at the PINGP. Indeed, as the Draft EA acknowledges, the “financial burdens, such as expenses associated with participation in PINGP related actions, emergency planning and steps required in the event of an accident [e.g. educating on risks and procedures; maintaining special medical supplies (iodine tablets), equipment and trained professionals] would also not change and would continue to impact in the same manner communities within the ROI.”

This begs the question: How is this gap going to be filled? The other citizens of the City have already seen a 188% increase in their property taxes from 1996 to present. The City cannot go to them again. The state’s supplemental fund for incremental financing (Minn. Stat. 12.14) does not allow the City to tap it for new firehouses, equipment, or to pay full time employees. There is no additional revenue coming from the PINGP as the result of a power uprate and, as the Company acknowledged, the tax rate will continue to decrease over the life of the PINGP.

Based on all of these factors, the potential socioeconomic impact of the proposed action is large and the Draft EA should be amended to reflect the same.

6. Under Section 4.11, an Emergency Preparedness Plan should be addressed. Under Section 4.11, the Draft EA goes to great lengths to discuss a number of potential incidents that may impact the ISFSI. For each of these, it concludes, based upon experience and the robustness of the casks used, that there is a small likelihood that there will be any release or threatened release from the same.

But what happens if there was a release? What happens if the systems are not as robust as the Draft EA assumes they are going to be? This is where it is appropriate to evaluate emergency preparedness or an emergency response plan. The lack of an effective response to an incident at the PINGP or the ISFSI, whether that incident is radiological or non-radiological, may result in that incident spiraling out of control. There will not be effective suppression, containment or mitigation.

An example of necessary effective emergency preparedness or an emergency response plan would be in response to the fire scenario presented in the ISFSI on page 4-16 of the Draft EA. There, assuming a 757-L is a Boeing 757 plane, the presumption set out are simply unrealistic. First, the jet fuel from a plane would burn much hotter and much longer, assuming that there was material from the plane that would

burn as well. The assumption regarding a 12 or 15 minute burn or a limited temperature burn from this type of activity are not realistic.

Second, the fire would not go out on its own but would do so only when properly suppressed (i.e. through firefighting equipment). Third, the fire would not be contained in the ISFSI but would spread out over the debris field created by the aircraft. Indeed, part of this debris field may contain casks that are displaced by the incoming, or as the Draft EA states "bounding 757-L", aircraft.

An effective mitigation method to this scenario is to invoke the emergency response plan in place with the City. This emergency response would include, but not be limited to, fire and ambulance to suppress fire and minimize any impact or, if there has been an impact or release, to contain the same. The ambulance can address any injury suffered by any ISFSI personnel or any other parties that may have been injured by the inbound 757-L.

An emergency response is crucial to contain and mitigate this or any other incident at the ISFSI. This fact is recognized by the Commission in its requirements to obtain a license to operate an independent spent fuel storage system with or without plant operation. It was recognized by the Company in its Application for Additional Dry Cask Storage to the Minnesota Public Utilities Commission (the "Application"), and by the Environmental Impact Statement (the "State EIS") completed by the Minnesota Department of Commerce in connection with the Company's Application. In fact, the State EIS specifically referenced an effective emergency response plan and concluded that without one, or an effective response to an incident (radiological or non-radiological) could result in that incident spiraling out of control. State EIS, Chapter 2, pgs. 22, 27, 33-35. This will have a negative impact on the human and natural environment. *Id.* The Draft EA, to be effective, needs to be modified to likewise evaluate the need for an emergency response plan, an effective response to an incident and the impact if an effective response is not provided.

The socioeconomic environmental impacts of a lack of response, and the cause associated with the same, are simply too significant for the Draft EA to ignore.

The inclusion of an analysis of an emergency response plan or emergency preparedness is also, as briefly mentioned before, part of a fabric of oversight by the Federal and State Governments of the PINGP. Specifically, each of them require, whether as part of general operations of the PINGP or, when those operations cease, as part of the licensing of the

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ISFSI, verification, through reasonable assurances from the City, that an emergency response plan or emergency preparedness is adequately in place. With this requirement, it makes sense that the EA also include an analysis in order to appropriately weigh the impact of continued storage on the natural and human environments that surround the ISFSI.

CONCLUSION

As set forth above, the Draft EA must be completed and modified. Unless this occurs, the Draft EA fails its essential purpose.

If there are any questions or if additional information needs to be provided, please do not hesitate to contact me or anyone at the City.

Very truly yours,

MADIGAN, DAHL & HARLAN



Thomas P. Harlan

TPH/kk

Enclosures

cc: The City of Red Wing, Minnesota (via e-mail)

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December 20, 2013

Ms. Cindy Bladey
Chief, Rules, Announcements, and Directives
Branch (RADB)
Office of Administration
Mail Stop: TWB-05-B01M
U.S. Nuclear Regulatory Commission
Washington DC, 20555-0001

RE: Consideration of Environmental Impacts of Temporary Storage of Spent Fuel
Docket No.: NRC-2012-0246
Comments of the City of Red Wing, Minnesota on the Draft Generic
Environment Impact Statement

Dear Ms. Bladey:

This firm represents the City of Red Wing, Minnesota (the "City") with respect to the above-referenced matter. We submit these comments on behalf of the City to the Nuclear Regulatory Commission (the "NRC" or "Commission") in response to its request for feedback or comments on the Draft Generic Environmental Impact Statement (the "Draft GEIS") that was prepared by the Commission in support of or as a substitute for its Waste Confidence Rule. The City has also submitted comments on a Draft Environmental Assessment (the "Draft EA") that has been completed as part of the re-licensing of the independent spent fuel storage installation for the Prairie Island Nuclear Generating Plant. Those Draft EA comments should be read in conjunction with and the City hereby incorporates the same into this letter. The Draft EA comments are attached hereto and incorporated herein.

At the outset, the City thanks the Commission for the opportunity to submit comments on the Draft GEIS. The City looks forward to working with the Commission, its staff, and consultants to address this very important issue of the storage of spent fuel from nuclear reactors across the United States.

By way of background, the City is a host community to the Prairie Island Nuclear Generating Plant (the "PINGP"), which is a dual reactor 1118 MW facility. Immediately adjacent to the PINGP, sits approximately thirty-one (31) individual dry casks in which are stored spent nuclear fuel rods. In addition, the PINGP spent fuel pool, like all others, contains spent fuel that has been unloaded from the reactors and is waiting to be stored or transferred into the casks. It is anticipated that at the end of the

life of the PINGP, which is currently scheduled in 2033 and 2034, and following the appropriate holding or cooling off period for the rods, there will be approximately one hundred (100) casks located on the independent spent fuel storage system (the "ISFSI").¹ This does not include any casks or other storage systems for other classes of waste originating from the decommissioning of the PINGP.

The operator of the PINGP, and the associated ISFSI, is Northern States Power Company d/b/a Xcel Energy (the "Company"). The City and Company have worked together over the years to first site and thereafter solve many of the issues associated with the PINGP. The City has been supportive of the Company and its efforts to maintain not only the PINGP but the ISFSI in a reasonable and safe fashion.

However, the City, like many other host communities, is now facing a scenario that it did not, under any set of circumstances, envision: the failure of the Federal Government to honor its contractual agreement with the Company and remove the spent fuel from the PINGP to either an interim storage facility or a long-term or permanent repository. Despite any other contention or disagreement with the Company, the City stands resolute with the Company that the continued storage of spent fuel outside of the PINGP is not a workable solution. With no plan or process in place for its removal, storage, which was to be short (if at all), has become, for all practical purposes, permanent.

The City, as the host city to the PINGP and the ISFSI, is uniquely situated to provide input on the Draft GEIS by the Commission. The City, in all respects, is a first responder to any incident at the PINGP or the ISFSI. It is obligated, under both federal and state law, to annually provide reasonable assurance that it has the necessary facilities and infrastructure to meet and respond to any incident at either facility. The City, then, is obligated to maintain a steady state of readiness through its investment in and maintenance of the necessary equipment and personnel, as well as the necessary buildings to locate the same, in order to meet its obligations. It has and continues to do so despite the continued reduction of revenue to the City from the Company for taxes on the PINGP. The City, in turn, has been forced to shift this burden to its other taxpayers who, since 1996, have seen their property taxes increase over 188%.

Thus, the City is uniquely qualified to provide comments to the Draft GEIS. In addition, as outlined below, the actual ISFSI is located within the boundaries of the

¹ The precise number of casks that will hold spent fuel has not yet been determined since the PINGP is using a different fuel assembly that burns hotter and longer in the reactor and thus requires replacement or refueling at a different rate. Accordingly, the number of casks originally calculated as being necessary for end of life storage of spent fuel may be lower or higher depending on when refueling occurs and how many fuel assemblies can be placed into the casks. Though the casks are larger to accommodate the larger fuel assemblies, it is unknown if the new casks will hold the same number of spent fuel assemblies as the casks that are currently being used.

City. Thus, the City is and will continue to be impacted by the spent fuel that is located in the ISFSI.

In providing its comments to the Draft GEIS, the City breaks these comments into three (3) separate categories: the scoping of the Draft GEIS itself, including but not limited to, a fundamental premise of the Waste Confidence Rule is to cessation of operation of a nuclear power plant; an overview of the Draft GEIS and, the specific comments to the Draft GEIS.

1. **Scoping.** While the City understands that the scoping decision for the Draft GEIS has been completed, there was never an opportunity to respond *after* the scoping decision for the Draft GEIS was finalized. In other words, while parties had an opportunity to weigh in, as the City did in its January 2, 2013, Comment Letter (which is identified as Document No: 291), there was no period or timeframe for comments after the parties comments were considered and required. While the City focuses its comments below on the scoping decision, these comments also apply to the Draft GEIS and should be considered equally with the same.

(i). **The Waste Confidence Rule Should Start After Spent Fuel is Placed In Dry Storage.** Throughout the scoping decision and the Draft GEIS, the timeframe being analyzed by the NRC commences with when a particular plant ceases operation. In other words, the NRC is expressing its confidence the waste can safely be stored for a period of time after a plant ceases operation.

This timeframe misses the mark. The origin of the Waste Confidence Rule stems from the failure of the Federal Government to remove spent fuel to a temporary or permanent repository after an appropriate cooling period. The Waste Management Rule was recognition that spent fuel had to be stored on site for a period of time and an expression by the Commission that such storage could be accomplished safely for a set and re-set period of time. The origin, then, of the confidence for the storage of spent fuel had nothing to do with the continued operations of the plant which generated the fuel that needed to be removed. Rather, it was an expression that it could be safely stored at the plant until such time that temporary or permanent repository could be found.

An analysis that starts upon cessation of operations of a power plant that generates a spent fuel also provides a false mark for the storage periods being analyzed in the Draft GEIS. For example, at the PINGP storage in dry casks began in 1993. The plant, however, will not cease operations until 2033 and 2034, respectively. Accordingly, storage in dry casks will be ongoing for over forty (40) years prior to the PINGP's cessation of operations. Applying the logic of the Draft GEIS, replacement would not occur until one hundred (100) years after the PINGP's cessation. This would mean that the casks, first filled in 1991, would be over one hundred-forty (140)

years old before replacement of the same would occur. This is inconsistent, the presumption that dry casks need to be changed every one hundred (100) years.

Accordingly, the best mark to start or use is the timeframe that spent fuel goes into dry cask storage. This timeframe would not include mandatory time it has spent in the spent fuel pool to ensure that the fuel assemblies have sufficiently cooled for handling and radio activity.²

(ii). Mitigation Through Emergency Preparedness/Emergency Response Needs to be Included. In order for the EIS to meet NEPA, an analysis of mitigation through emergency preparedness and/or emergency response must be included. The core concept of NEPA is to evaluate a certain activity and its potential impact on the human and natural environment. As part of that, there are a number of alternatives that are examined including how certain adverse impacts may be avoided. The inclusion of possible mitigation measures serves one of NEPA's basic functions. *See Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 351-52, 109 S.Ct. 183 (1989).

Mitigation is defined as measures that are intended to avoid and, minimize, rectify, reduce, or compensate for environmental impacts. *See* 40 CFR § 1508.20. Not only is a federal agency, or in this case, the NRC, obligated to discuss possible mitigation measures as part of the scope of its Draft GEIS but it should discuss alternatives to the proposed action and the consequences of the same and as alternatives. In other words, it needs to address how mitigation plays out in the Draft GEIS. *See* 40 CFR § 1505.

The purpose of the Draft GEIS is to evaluate the impact of continued storage over the stated periods of time. It is also to evaluate, as it does to a great extent with spent fuel pools, the impact of potential release into the environment and the impact it would have on the human and natural environments. The general discussion of the robust nature of the storage systems is not a substitute for evaluating mitigation. Indeed, it is the systems themselves that must be evaluated for release and potential release – and then mitigation as a result of that activity.

Mitigation here comes in the sense of a response and effort to contain or potentially stop any release. The emergency preparedness of any first responder is required as part of the reasonable assurance that each is required to provide annually.

Accordingly, the failure to include a complete discussion and analysis of mitigation, which would include emergency preparedness and certain base levels for the same, defeats the very goal the NRC set out to accomplish: the creation of an EIS

² This argument assumes, and the NRC should require, that spent fuel is moved to dry storage in a commercially reasonable timeframe after the same has sufficiently cooled in a spent fuel pool. The NRC should limit spent fuel pool storage.

that meets NEPA qualifications.³ Mitigation and an evaluation of emergency preparedness need to be included in the Draft GEIS.

2. **Overall Draft GEIS Review.** In addition to the generic comments set forth above, the City has provided an overall view to the Draft GEIS that addresses its perceived deficiencies. These deficiencies lead, in the opinion of the City, to a lack of analysis which results in the failure of the NRC to meet its obligations under NEPA. In addition, these deficiencies create inconsistencies in the Draft GEIS itself and leave it open to challenge.

(i). **The Draft GEIS Provides and Incomplete Analysis on the Impact of Taxes from Continued Storage.** In evaluating the impacts of continued storage, the Draft GEIS simply concludes that tax payments will continue. While it does, in some sense, appropriately defer this analysis based on local and state taxing ordinances, regulations, and codes, it does not appropriately or discuss the impact that a reduction in taxes will have as there is a switch from plant operation to storage only. It does not evaluate what impact this will have on the host community and its ability to maintain the necessary public safety services to respond to an incident at the storage facility. That host community will still be obligated to respond to an incident but not receive the same tax revenue to do so. As noted by the NRC in the Draft EA, the financial burden on first responders such as the City of Red Wing is not going to diminish over time. Draft EA, Section 4.4, page 4-3. It is going to stay the same as long as the spent fuel is stored on site. How does this burden impact the City and other host communities? What will happen when there is the precipitous drop in revenue to them generated by the power plants? These issues related to revenue need to be further evaluated.

The Draft GEIS Does Not Evaluate the Chilling Effect on the Local Economy. The Draft GEIS, while evaluating the positive impact that continued storage will have on the local economy, does not evaluate the chilling effect of the same. As set out before, the City finds itself in the untenable position of continuing to be a host community for the spent fuel that has been generated by the PINGP. Based on what is currently known, as well as past experiences and statements by the Federal Government, the City believes that this hosting or better yet storage will go on indefinitely. This will have a chilling effect on the City's economy and its development. It will impact its ability to grow in the area where the spent fuel is stored, including any adjacent parcels. The chilling effect will also extend to the City's ability to attract new businesses and to otherwise present itself in a positive

³ It could be said regarding the new Waste Confidence Rule that is being proposed: the only true measure of confidence is to include an analysis about what will happen in the event of an incident, whether radiological or non-radiological, at a storage facility. To be confident that nothing is going to happen and no response will be needed is not confident or reassuring at all. It is naïve. The probability may be small but if there is an incident and no appropriate response, the results will be catastrophic.

fashion. All of this will stymie the City's ability to naturally develop and compete with other cities to attract and maintain businesses.

This chilling effect of continued storage was noted by the Blue Ribbon Commission and served, in part, as a basis for its recommendation that temporary storage be developed. The Blue Ribbon Commission recognized that cities such as the City of Red Wing were, in many ways, hostages to the spent fuel: their futures were tied to the uncertainty of continued storage. The chilling effect was also noted in this Draft EA as it relates to the Prairie Island Indian Community (the "PIIC") and its use of the land adjacent to the spent fuel storage area. The City, as noted in its comments to the Draft EA attached hereto, contends that this analysis should extend to the City's land use and development. This point needs to be further developed within the scope of the Draft GEIS so that a true evaluation on the impact to the human environment is addressed.

(ii). The Draft GEIS Lacks any Reference to Manufacturers' Requirements for the Storage Systems. The Draft GEIS assumes that there will be dry cask storage after (or during) the one hundred (100) year period following cessation of plant operations. The Draft GEIS further assumes that these robust systems of storage will be adequate for that time though, after 100 years, they will need to be transferred into a second storage cask or a cask that may be used for transfer.⁴

Despite these assumptions, there is no reference to any manufacturers' analysis on the useful life of the casks. Nowhere is there any reference to any warranty that is provided or other information that would tend to support the conclusions that are reached within the Draft GEIS on storage. There is no reference to any experiences to date on attempted transfer. There is not a sufficient period of empirical evidence that would otherwise support the conclusions reached by the Draft GEIS. Simply put, there has not been storage over the stated period times that would support the same conclusions. Rather, the Draft GEIS makes and relies on these assumptions being made without any substantive analysis or support.

In order to support the conclusions set forth within the Draft GEIS, manufacturers' information must be included. The Draft GEIS must also set out what historically has been said about storage and the use and limitation of the current storage systems.

(iii). The Assumption of Institutional Control Needs to be Removed. A principle assumption throughout the Draft GEIS is that there will be institutional control to meet the necessary obligations for long-term storage of spent fuel. At its

⁴ As noted previously, the confidence expressed in the 100 year timeframe for storage is inconsistent with the base line assumption that storage will start on the day that a plant ceases operation. Storage starts the day the spent fuel assemblies are transferred to the dry cask storage.

core, this assumption concludes that the corporations and limited liability companies that generating the spent fuel will have sufficient funds to meet the requirements for long-term storage and that the regulations promulgated and enforced by the Commission will be enough to ensure safety, maintenance and good storage procedures. There is nothing in the Draft GEIS, other than this statement, to support this conclusion.⁵

Unlike decommissioning funds, which are required to be set aside in order to decommission a power plant or return it to its natural habitat, there are no such funds for the handling and storage of spent fuel. Likewise, there is no assurance that an entity will even be viable in 100 years. This assumption of institutional control must be addressed – and removed.

3. Specific Comments on the Draft GEIS. In addition to the more generalized comments set forth in Sections One and Two above, the City submits the following specific comments to the Draft GEIS. In doing so, the City will identify a section, page number and line in which its comments are focused. This will allow for ease of reference for the NRC staff. The City's comments are as follows:

A. Executive Summary.

1. Under section ES.2, page xxiv, lines 5-7, the Draft GEIS needs to include a mitigation analysis (including emergency preparedness) to meet its NEPA requirements. The failure to do so is an assumption that there will not be an incident at any storage facility, wet or dry, for which a response will be required. This assumption is not appropriate in an environmental impact statement and, fundamentally, defies common sense. There must be a mitigation analysis.

2. Under section ES.9, page xxvii, lines 10-21, the Draft GEIS sets forth some of the assumptions that were made in preparing the same. As described below, these assumptions have no empirical or other evidence to support the validity of the same. Rather, the conclusions/assumptions are based upon the experience of the NRC and its continued management of the nuclear industry. However, as the NRC has noted, the Draft GEIS, is in response to the unique set of facts that the NRC is facing relative to spent nuclear fuel. The experience that purportedly is being relied upon is not experience realized through completion of a similar exercise and then repeating that same task but rather is garnered in real time. That is not the

⁵ Interestingly, as is described in more detail below, the Draft GEIS focuses on oversight and regulatory control on being controlling and providing the basis for an assumption of institutional control. It does not because it presumes there is an entity to oversee and regulate. The real issue is not an entity to control, it is the availability of the funds to ensure that the activities necessary to ensure storage, transfer and transport are completed.

definition of experience. Accordingly, any assumption, in keeping with basic NEPA principles, should be supported in an articulable way.

3. Under section ES.12, page xxxi-xxxii, under table ES-1, there is no articulable public safety component and how it would play into various affected areas identified in the Draft GEIS. In addition, consistent with the general objections, the narrowness of the affected area, as defined in the Draft GEIS, is too narrow to effectively analyze the impact of continued storage on both the human and natural environments. Public safety has to be included in the analysis and the analysis itself must be expanded to include indirect impacts of continued storage.

4. Under section ES.13, page xxxiv, lines 15-27, the Draft GEIS concludes that the impact of continued storage would be small under the various scenarios that it is analyzing. However, the analysis does not weigh the chilling effect that continued storage will have, the drain on public safety services as first responders (like the City) are required to maintain the necessary readiness to respond to an incident or are any of the other factor that will have a negative impact on the development and growth of the area surrounding the ISFSI.

The simple notion that the socioeconomic impact, as determined by the number of workers, the construction on any ISFSI replacement or its ongoing operations, by itself, is a measure of the impact of continued storage would have upon cities and other areas simply falls short of any meaningful analysis. One of the fundamental NEPA mandates is to evaluate how the proposed action, in this place long-term storage, would have a *negative* impact upon the human environment in which it is based. Part of that human environment consists of the socioeconomics of the area surrounding the storage. As such, an appropriate analysis would not be limited to just the direct impact (e.g. the number of workers at the storage facility), but would be the indirect impact – especially in the unique circumstances presented by stored, but continuing, radioactive material.

5. Under section ES13.1.15, pages xli and xlii, lines 21-34, and 1-11, respectively, lower level waste management or disposal of the same is assumed to be available. However, as described in more detail below, this presumption may prove to be false since currently there are very limited options for the disposal of low level waste. With the continued radioactivity in these wastes, there is a possibility that there may not be a private facility open or one that would accept certain levels of waste unless this was supported by the Federal Government. This analysis must be supplemented and described in more detail.

6. Under section ES13.2.16, page lvii, lines 5-29, in that portion of the executive summary which addresses away from reactor storage sites, the analysis on transportation misses the mark. There needs to be an analysis on the risks associated with that process including but not limited to a discussion of the various canisters that are to be used for such transportation, the transfer into those casks and the risks of the transport.

7. Under section ES.16.2, page lix, lines 15-35, there is no reference whatsoever to any mitigation, emergency response or emergency preparedness. All of these factors must be included within in an analysis of the spent fuel fire – or any other analysis of an incident or threatened incident. To merely rely on general statements of the robustness of the container or “mitigation measures implemented by licensees as a result of NRC orders” are insufficient. This does not analyze any impact of the proposed action because it assumes there will be no impact of the proposed action. This assumption, then, foregoes any analysis under NEPA. The Draft GEIS should set out the necessary mitigation to control or contain any incident.

B. Introduction.

1. Under section 1.2, page 1-4, lines 17-21, the language regarding the timeframe in which the continued storage should be analyzed must exclude any language relative to the end of a reactors license life for operation. The appropriate timeframe for beginning the analysis on storage is the date in which the spent fuel is actually stored. This analysis shall be separate and distinct from any licensing and further separate and distinct from any operations or decommissioning.

2. Under section 1.3, page 1-5, lines 16-21, the Draft GEIS should add that past licensing has been based, in part, on the Waste Confidence Rule. This Waste Confidence Rule was done or completed without the benefit of an EIS or any determination of long-term impact. There was simply the assumption that continued storage was safe. As it currently exists, the Draft GEIS is exactly the same. The City hopes it comments are appropriately weighed so that any final report avoids this flaw.

The Draft GEIS should also add while the NRC has experience with licensing and spent fuel storage from the 1950's, dry cask storage has not extended back that far and the technology associated with higher burn rates for fuel assemblies has changed. A Draft GEIS should specifically reference that the storage being determined by the Draft GEIS was never contemplated and therefore is unique in both analysis and application.

This also applies to the various reports the Draft EIS cites to and relies upon. Those reports may be based upon assumptions of experience or that the Commission, as contemplated by the old Waste Confidence Rule, will simply remove the fuel in a stated period of time. Thus, while there is an analysis of some aspect of storage, the equipment or components used and various threats to the same, there is not an inclusion of a specific time element and the natural decay or degradation of the examined equipment or components. The Commission must be careful in its reliance on these types of reports – as well as the assumptions in the Executive Summary or its risks concluding, without analysis, that continued storage need not be analyzed.

3. Under section 1.8.2, starting on page 1-12 and continuing to 1-13, the entire section should delete any reference to the storage timeframe including operations of the plant. As noted before, the continued operation of the plant is separate and distinct from storage.

4. Under section 1.8.3, starting on page 1-13 and carrying over to 1-17, the Draft GEIS makes a number of assumptions that are then carried forward throughout the document. These assumptions are, in many ways, not supported by any substantive evaluation, analysis or any other empirical evidence. There is no reference to any report, study, or other governmental or non-governmental review. As such, these assumptions, rather than support and provide depth to the Draft GEIS, pull away from it and create opportunities to challenge the same for failure to meet NEPA requirements. These assumptions are as follows:

- On page 1-14, lines 13-18, there is an assumption regarding normal life of the storage facilities. This assumption is based upon the knowledge and experience with structure and operation of these storage facilities. This assumption does not, in any way, reference the manufacturers' information on the casks including, without limitation, any warranties or anticipated life. Rather, it is based solely upon the NRC's experience with the same. This assumption does not pass muster since the NRC does not have any experience relative to the lifetime of the structure to store the spent fuel. A full evaluation of the proposed storage facilities needs to be provided.
- On page 1-14, lines 19-22 and carrying over to 1-15, lines 1-5, there are assumptions on institutional control. The assumption with institutional control is that the Federal Government will somehow provide safe storage of spent fuel through regulation. However, that is not what is happening in the field. The obligation to temporarily store spent fuel belongs to the generator of that fuel.

Even corrected, the assumption of institutional control misses the mark. There is no reference, whatsoever, to how the generators are going to pay or provide for safe storage or whether these corporate entities are even going to exist. This assumption must be removed.

- On page 1-15, lines 6-15, the assumption regarding institutional control continues. Again the Draft GEIS solely focuses on Federal control. This is not the Federal Government's obligation. Institutional control needs to be analyzed through the generators and the measures in place to ensure responsible storage and maintenance.

- Page 1-15, lines 16 and 17, reference is made to a dry transfer system and the construction of the same to facilitate spent fuel transfer and handling. Like the assumption of the storage facilities, there is no empirical evidence whatsoever with respect to the construction or operation of a dry transfer system (the "DTS"). The industry has no experience in building a DTS or, more importantly, transferring spent fuel or fuel assemblies from one cask to another. Will the spent fuel assemblies be intact enough to transfer in 100 years? The only experience to date does not support this supposition. The use of a DTS and the acceptability of the casks for the same must be more fully developed and cannot simply be an assumption.

- On page 1-16, lines 1-4, the Draft GEIS contradicts itself by indicating that storage in a single cask can go beyond the one hundred (100) year cycle. There is no experience or evidence to support this assumption. There is no evidence to support that casks can even last 100 years. This assumption must be removed.

- On page 1-16, lines 10-12, there is an assumption on aging management. This assumption should be blended into institutional control and measured from the stand point of a generator's ability to provide systems and appropriate funding for age management of the storage systems. Again, this assumption is made without any empirical evidence or support that generators would have the necessary funds and capabilities to ensure maintenance and safety.

- On page 1-16, lines 32-36, there is an assumption that a DTS is going to be replaced once during the life cycle of storage. This assumption is premised upon the robustness of the storage casks themselves and the ability of the generator to properly maintain the same. This assumption therefore is faulty because it is built on two other assumptions for which there is no experience or information to support the same.

- On page 1-17, lines 16-20, there is assumption that sufficient low-level waste will be disposed of properly. This assumption is false. The industry today is facing difficulty in disposing of low-level waste and it is anticipated that low-level waste will be stored at the facility until such time that it is disposed of properly. Because of this storage alongside of spent fuel, the assumption must be removed and properly analyzed within the scope of the Draft GEIS.

C. Generic Facility Descriptions and activities.

1. Under section 2.1.1.2, page 2-5, lines 10-13, the assumption regarding decommissioning and removal of spent fuel within sixty (60) years should be modified. Rather, the assumption should be that spent fuel should be moved to dry cask storage as soon as commercially reasonable. In no event, this should exceed five (5) years after the same has sufficiently cooled.

2. Under section 2.1.2.2, page 2-14, lines 1-9, the Draft GEIS should clarify, at the outset, that it has not designated any casks for transportation. Accordingly, prior to transportation, all spent fuel should be required to be transferred to transportation casks.

3. On page 2-14, lines 25-28, the Draft GEIS should indicate, in some fashion, that there are certain minimum requirements associated with storage. This should include statements regarding emergency preparedness and a specific analysis of the same.

4. Under section 2.1.4, pages 2-19 - 2-21, the Draft GEIS addresses a DTS. The Draft GEIS should be modified to include a statement that a DTS is going to be necessary based upon the assumptions within the Draft GEIS. Not only is it going to be necessary based on these assumptions, but it will be required once interim storage or permanent disposal becomes an option. None of the casks currently used for storage are approved for transport and therefore the concept of a DTS is necessary. The Draft GEIS should also reference that one may be needed earlier if there is an incident involving a breach of the storage system. What happens in the interim when the DTS is being constructed? Is there a spent fuel pool or other containment facility? This needs to be addressed.

D. Affected Environment.

1. As an overview, the Draft GEIS is flawed because it does not address a broader scope of the affected environment. Indeed, it looks solely at direct impacts (employment, transportation, and land use of the storage system

itself) and does not consider a broader indirect impact on the local community that hosts spent fuel or the surrounding area. The view on the affected environment should mirror the more expensive view taken in the Draft GEIS when an examination of social justice is provided. There, there is a more detailed and specific analysis of the impact of continued storage on minority, low-income, and other vulnerable communities.

The failure to have a broader view in the Draft GEIS diminishes the impact of continued storage on the other stakeholders. Accordingly, the analysis should be broadened or it will not fully evaluate the impact of the proposed action on the human environment.

2. Under section 3.1, page 3-1 and carrying over to 3-4, the Draft GEIS addresses land use. However, as set forth above, the focus is too narrow. For example, the PINGP is located within the City's limits. The PINGP's spent fuel, wet or dry, is also temporarily stored within the City's limits. It is not outside, not near, nor close to but located specifically within the City's limits. The continued storage of spent fuel will have a material impact on the development of the City in both the short-term and long-term timeframes. It will be the center of a dead zone that will have little if any commercial activity and will disproportionately use public safety services. Moreover, and more appropriately for land use, it will have a chilling effect on the ability of the City to develop the area around it because of the continued stigma associated with the radioactivity, the spent fuel assemblies, and the uncertainty of disposal and, for purposes of the Draft GEIS, storage. The concept of land use must be expanded.

3. Under section 3.2, pages 3-4 – 3-8, the Draft GEIS is woefully deficient in its analysis of the socioeconomics associated with continued storage. The Draft GEIS focuses only upon the direct impact that continued storage will have and not on the indirect impact associated with the continued storage. This includes but is not limited to the chilling effect that it will have on other land development in that area. This, in turn, will have a fall out related to employment and income, taxes, demography, and housing that this development would naturally bring. The continued storage will also disproportionately utilize public safety services because the City will have to maintain the necessary preparedness to respond to an incident at the storage facility. This burden is unlike any other that the City would have to maintain for a normal commercial operation within the City limits.

Continued storage will not provide sufficient taxes that would otherwise offset the need for the heightened public safety services and the necessary emergency preparedness associated with the requirements of

responding to an incident. All of these factors need to be addressed and weighed.

4. Under section 3.2.2, page 3-6, lines 5-24, the Draft GEIS identifies a number of instances where there is continued tax payment for storage facilities after plant operations cease. The Draft GEIS analysis must continue to analyze what impact this reduction of tax payments has on public safety services and how that is spread throughout the community. As noted in the Draft EA, the financial burden on the host cities will not lessen – but the revenue from property taxes will decrease. What is the impact of this? Can there be a lower level of public safety services provided?

In doing so, the Draft GEIS should also address the necessary emergency preparedness and the costs associated with the same. This is a direct material impact that continued storage has on hosts communities such as the City and it must be analyzed under the Draft GEIS.

5. Under section 3.3, page 3-10, lines 31-37, the Draft GEIS should be amended to reference that the PINGP is located within the City limits.

6. The Draft GEIS, on page 3-41, should include a new section on mitigation. Mitigation is a specific and necessary requirement for an appropriate NEPA analysis. This section would include, but not be limited to, a general description of the necessary emergency preparedness steps and requirements.

This can relate back to the impact of the ISFSI or storage system on the host community.

The failure to include any analysis, mitigation efforts, or even to address it, is a fatal shortcoming of the Draft GEIS.

E. Environmental Impacts of Reactor Continued Storage of Spent Fuel.

1. The opening section of Chapter 4 should be modified to reflect the prior comments set forth in this letter. This should include, but not be limited to, modification of the timeframe in which the analysis should take place, modification of the assumptions set forth in section 1.8.3 and further expansion of the analysis to include both direct and indirect impacts of the proposed action. Finally, chapter 4 should be amended to include a discussion on mitigation, emergency preparedness, and other impacts that a host community would be facing.

2. Under section 4.1, page 4-4 to 4-6, land use, the analysis for all time frames should be expanded to include an analysis of the chilling effect that continued storage would have on development. This would include, but not be limited to, actual land use, development of roads, sewer and gutter, as well as actual land development itself. The Draft GEIS does not, in any way, take into account the stigma associated with continued storage.

3. Under section 4.2, pages 4-6 – 4-8, the Draft GEIS should be modified to include a discussion on the indirect socioeconomic impacts of continued storage. This would include, but not be limited to, the inability to develop the land around the storage facility, decreased taxes, the continued requirement to maintain heightened public safety services and the other impacts associated with the same. There is nothing within the Draft GEIS that addresses the socioeconomic impact that this would have on an area.

4. Under section 4.12, page 4-47, lines 33 – 37 and carrying over to page 4-48, lines 1 and 2, there is reference to the rule making for certification of the cask design. It describes the various environmental requirements that are met for the same. The reader is left with a distinct impression that there was not, for the cask design, an EIS or EA completed. Despite this, the Draft GEIS indicates that it is simply relying on the same.

This reliance is inappropriate. The cask itself will be the storage vehicle for spent fuel, and as such, the analysis of the cask itself must be included within the Draft GEIS.⁶ As stated before, this analysis should include but not be limited to information from the manufacturers as to warranty and anticipated life, the original estimates for the casks and other information.

5. Under section 4.15.2.1, starting on page 4-58 and carrying over to page 4-59, the Draft GEIS discusses low-level radioactive waste that is going to be created as a result of continued storage. The underlying presumption, again, is that this low-level waste is going to be properly disposed of by the industry. This assumption, as stated before, may not be accurate. Currently, there are some facilities for the storage of low-level waste until a permanent depository can be created. However, this is not available for all generators and therefore must be stored until a facility is made available.⁷

⁶ This is a bit ironic since there is an underlying assumption that the storage system (i.e. cask) is so sturdy and robust there will not be a release from the same.

⁷ Interestingly enough, the Draft GEIS, consistent with current practice, assumes that the responsibility for the disposal of low-level waste lies with the generator and assumes that the industry will take care of this particular issue. Yet, for purposes of institutional control, the Draft GEIS substitutes in the Federal Government for the generator and its obligations to maintain storage until such time that the spent fuel is retrieved for either interim or permanent disposal. To be consistent, the Draft GEIS should analyze institutional control with the generator being the institution.

6. Under section 4.17, starting on page 4-64 and carrying over to page 4-66, the Draft GEIS addresses public and occupational health. The Draft GEIS should be modified to include an analysis regarding mitigation. There is nothing to establish or support that there would be any mitigation in the event of an incident. The inclusion of this must be analyzed in order to meet NEPA requirements.

7. Under section 4.18, starting on page 4-67 and carrying over to page 4-83, there is an analysis of the environmental impacts and postulated accidents. On page 4-68, lines 1-9, there are discussions of "additional measures... designed to mitigated the consequences of failures in the first line of defense." The discussion goes on to reference emergency preparedness plans and protective action measures. And that is it. There is no further analysis. In order to meet NEPA requirements, the emergency preparedness plans and other proactive measures must be more fully discussed and explored. These are, as acknowledged in the Draft GEIS, the mitigating measures used in a failure of the containment vessel.

8. Under section 4.20, starting on page 4-90 and carrying over to page 4-91, Table 4.2 should be modified to reflect the changes in the analysis set forth by the City in this letter. In particular, land use and socioeconomics, for all timeframes, should be modified from small or moderate to large. Likewise, public and occupational health should be modified from small/moderate to large for all timeframes.

5. **Cumulative Impacts**

A. **Overview.** The deficiencies cited by the City with the Draft GEIS previously set forth in this letter carry forward and manifest themselves in the analysis of the cumulative impacts of continued storage. These include, without limitation, the failure to analyze the indirect impact of continued storage, the failure to address mitigation and emergency preparedness, the continued reliance upon the assumptions set forth in section 1.8.3 as well as the absence of any discussion on the chilling effect that continued storage will have upon future development in the area.

It is this last deficiency that is particularly poignant in the Draft GEIS's analysis of cumulative impacts. For the City, the cumulative impact is quite simple: continued storage of radioactive material, for short or long-term, will not allow for the natural growth and progression of the City. Development in that area will either lag or become unrealized since no one will want to be located next to the storage facility. The facility, itself, will have a disproportionate drag on public safety services since readiness demands that

the City be prepared for an incident involving a radiological release. At that same time, the tax revenue from development that could normally offset this obligation would decrease or not materialize at all thereby shifting the burden of public safety costs on the other citizens of the City especially after the PINGP ceases operations.

Despite these clear impacts, an analysis of these in the Draft GEIS is missing. In order to fully complete an analysis of the cumulative impact of continued storage to satisfy NEPA requirements, this analysis must be included in the Draft GEIS.

B. Section 6.3.1, page 6-4 and running through 6-8, identifies general trends and activities upon which the cumulative impacts are analyzed. These trends, while identified and supportable, are insufficient for analysis. The primary reason for the deficiency is that they do not take into account the chilling or negative effect that continued storage of spent fuel has or will have on an immediate area. So while table 6-1 can provide guidance on positive future events there is no guidance on the negative aspect of continued spent fuel. This too needs to be identified and evaluated within the scope of the Draft GEIS.

C. Under section 6.4.1, starting on page 6-10 and going to 6-11, the Draft GEIS analyzes land use using the aforementioned general trends and activities. Nowhere does it reference the fact that there may be no development and that continued storage will be a deterrent to development. This analysis must be amended.

D. Under section 6.4.1.3, the Draft GEIS concludes that cumulative impact of continued storage on land use will be small. The City believes there is insufficient information to come to this conclusion especially when the Draft GEIS does not analyze the chilling effect of continued storage. The cumulative impact should be changed from moderate to large after the analysis described above on the negative impact of continued storage is completed.

E. Under section 6.4.2, starting on page 6-12 going through 6-15, the Draft GEIS analyzes cumulative trends and their impact on socioeconomics. Like previous sections within the Draft GEIS, there is no reference to the negative impact of continued storage. There is no reference to the costs associated with the emergency preparedness, the shift of the burden for the preparation of the same, the decrease in taxes, the inability to develop land around the spent storage system and the inability to adequately pay for street, sewer, water for such development, among other things. All of these factors need to be appropriately weighed and set forth in this section.

F. Under section 6.4.14, starting on page 6-45 and running to 6-50, the Draft GEIS analyzes the cumulative impacts of waste management. Its analysis must be modified to include, or at least account for, the fact that there may not be a facility available at any time in the near future to handle the waste generated by continued storage. The alternative, of course, is that even after removal of the spent fuel the low-level radioactive waste will continue to need to be stored and paid for by the generator.

G. Under section 6.4.16 and 6.4.17, running from pages 6-53 – 6-57, an analysis of mitigation needs to be set forth. Mitigation is a necessary NEPA component that must be addressed. A failure to do so is a flaw that may result in a challenge to the Draft GEIS or the GEIS in its final form.

6. **Summary of Environmental Impact.**

A. **Overview.** The summary of environmental impacts, overall, needs to be modified to include the City's recommended modifications to the Draft GEIS. In addition, the summary should, as a separate section under the same, include an analysis of mitigation.

B. Under section 8.1, starting on page 8-2 and running to page 8-5, the Draft GEIS sets forth a number of tables that summarize the impact from continued storage both at a reactor and away from a reactor. These tables should be modified to reflect comments of the City and to increase the impact on land use, socioeconomic and other areas from small to moderate or large. Moreover, each of these should indicate that the impact is going to be site specific and will be dependent upon the immediate surrounding area. Again, for the City, with a location of the PINGP and the storage within the City limits, the impact on all of these will be large.

C. Under section 8.4, starting on page 8-9 and continuing to 8-10, the productivity analysis needs to be expanded. This expanded analysis would include an evaluation of the long-term impact on productivity where there is an indefinite storage at a site. There is an indirect impact or chilling effect that continued storage will have on the natural development of the area around it. There will also be opportunity costs for the City (or any other entity that continues to provide first responder services) associated with the costs of continuing to maintain an emergency preparedness plan. These costs must be analyzed or at least put forth for an analysis in section 8-4.⁸

⁸ This analysis would also find its way back into the cost benefit analysis set forth in chapter 7 of the Draft GEIS.

D. Under section 8.7, page 8-12, the Draft GEIS, and the NRC recommendation, is to select the proposed action. The City agrees with this recommendation. However, the necessary changes in the Draft and Final GEIS, as described by the City, should be included.

7. **Miscellaneous.**

A. Miscellaneous is intended to cover the exhibits or appendix attached to the Draft GEIS. Again, the comments of the City set forth above should be considered in light of these and incorporated in the suggested changes below.

a. **Appendix B**

i. Appendix B addresses the technical feasibility of continued storage and repository availability. The technical feasibility of continued storage is based upon a series of underlying assumptions and conclusion about the robustness of the storage facilities. These assumptions, among other things, fail to include any sort of analysis from the manufacturer in the form of warranties or recommended useful life. Moreover, again, there is no discussion of mitigation which is necessary to address the steps associated with an incident to contain any adverse environmental impact.

ii. Under section B.3.2, the Draft GEIS addresses technical feasibility of dry cask storage. Within its analysis, it includes a discussion of the "robust design of dry cask storage systems." As state above, this assumption has no support for the time frames being analyzed.

iii. Under section B.3.3, there is analysis of the regulatory oversight of wet and dry spent fuel storage. In this analysis, there is an assumption of institutional control through regulatory oversight and license compliance. Institutional control goes beyond oversight and must include an analysis, or at least a description, of the entities that are to be providing the structures, systems and programs for responsible storage before a permanent repository can be found. In addition, the analysis must identify where the funds will come from to properly ensure these items are completed.

b. Appendix E

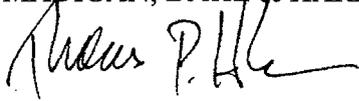
i. Appendix E provides an analysis of spent fuel pool leaks. However, it does not contain any analysis of mitigation including a description of the emergency preparedness or what will be required in the event of a pool leak. In short, the Appendix does not provide the necessary support for an appropriate NEAP analysis on mitigation.

The City again would like to thank the NRC staff and all those responsible for this important undertaking. The City looks forward to continuing to work with the NRC and all of its staff to address this very important issue.

If the City can provide any further information or expand upon the comments set forth herein please do not hesitate to reach out and contact me.

Very truly yours,

MADIGAN, DAHL & HARLAN, P.A.



Thomas P. Harlan
TPH/kk

cc: The City of Red Wing, Minnesota

Red Wing Fire Department

Fire and EMS Master Plan



April 2008



Emergency Services Consulting inc.

Red Wing Fire Department

Fire and EMS Master Plan

Prepared with the assistance of:

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Executive Summary

This report details a Fire and Emergency Medical Services (EMS) Master Plan for the Red Wing Fire Department, Minnesota, and is offered in response to a request from the City of Red Wing for Emergency Services Consulting inc. (ESCI) to evaluate the fire department's current operational stability and any potential improvement in efficiencies that may be available, as well as the development of options in regards to future delivery of services for foreseeable future. The first section is an in-depth assessment of the agency, its management, assets, operations, and service delivery. The second section of the report provides a thorough and detailed evaluation of the fire and EMS risks facing the City and projects how population growth and demographics in the community will affect fire and EMS service demand. Section III, the final section of the report, offers strategies that ESCI believes to be feasible for implementation in order to improve effectiveness and efficiency in all areas of service delivery for many years to come.

Staff members from Red Wing Fire Department and numerous city officials and committee members have provided a great deal of written and verbal information to the project team. Many staff members have been generous in their effort to provide us with accurate and complete information. We are grateful for their able assistance and cooperation throughout this process.

ESCI recognizes that information, by its very nature, is often incomplete as it changes from moment to moment. Every effort has been made to compile data that is as comprehensive and as accurate as possible. The information gathering process included a broad evaluation checklist of the organizational units, measuring results against acceptable industry standards and best practices. Whenever possible, ESCI made quantifiable comparisons to other fire service organizations. Checklists and documentation were followed up by one-on-one interviews with key staff members.

Section I

This section provides an in-depth evaluation of the agency and describes its governance, management, staffing system, current resource deployment, service delivery performance, and support programs. In addition, the agency's facilities and apparatus were inventoried, reviewed, and evaluated.

The evaluation found the department operating with an expected level of effectiveness given the level of staffing and condition and placement of apparatus as discussed below. The single service delivery facility was noted to be in good condition and well suited for the functions contained within. Front-line apparatus were evaluated according to criteria developed by ESCi and each piece of equipment were graded and placed into categories as noted below.

- Excellent – Two apparatus were rated in this category
- Good – Two apparatus were rated in this category
- Fair – Two apparatus were rated in this category
- Poor – Three apparatus were rated in this category
- Serviceable – No apparatus were rated in this category

Current workload analysis identified no unusual or unexpected service demand for a community of this nature. Workload history showed a slight decrease in fire responses and a variable, but generally increasing, number of responses to EMS incidents as well as all calls other than fires and EMS responses, such as alarms and service calls. Although the department has not adopted a formal response time performance objective, the department has informally set a goal of arriving at 90 percent of all calls within four minutes after the apparatus is en route. Department policies also specify that the turnout time for personnel should be 60 seconds or less for fire calls and 30 seconds or less for EMS calls.

Based on ESCi's analysis of turnout and travel time, the two components that are combined to equal total response time, the department's actual response performance for fire calls during 2007 was 10:36 at the 90th percentile, with an average response time of 5:29. The 90th percentile response time for EMS calls for 2007 was calculated at 14:56, with an average of 6:41.

Section II

This section provided a community risk analysis, based on occupancy types and density, and is presented in a graphical representation. As with population information, the community risk analysis is another building block on which the special and target risk hazards models are based. The community contains predominantly low to moderate-risk residential and light commercial uses, but also contains widely scattered high risks, such as manufacturing and institutional occupancies. In addition, several target hazards, such as the Prairie Island Nuclear

Generating Plan and the Treasure Island Casino are identified and discussed.

In order to develop service demand projections, this section offers population growth forecasts based on census and development data. ESCi multiplied these projections by a forecasted incident rate derived from incident per capita rates to identify workload potential through the year 2030. The results of the analysis show that overall call volume will increase over the next two decades to nearly 3,000 calls by 2030, with EMS accounting for over 80% of the demand for service.

Section III

The final section of this report considers the data analysis completed throughout the evaluation of the department and Master Planning Process and offers the long-term recommendations.

In light of the fact that the department currently has only an informal response time performance objective that is unrealistic in light of current performance, ESCi analyzed the community for the purpose of determining reasonable performance objectives to be used for future service delivery planning. Within this section of the study, ESCi proposes new service performance standards for each of three service delivery zones: urban, suburban, and rural. The objectives are based on currently accepted standards within the fire service and emergency medical communities. These proposed response performance objectives increase in time intervals in relation to the characteristics and risk of each service delivery zone, as well as distance from the fire stations.

These performance standards should be reviewed and accepted by the City's elected and appointed officials and the towns or townships that they serve since they form the foundation for the future deployment of emergency services in the collective jurisdiction and, thus, the resulting levels of service to be anticipated by the taxpaying citizen. The following table illustrates the response performance criteria for the service delivery zones. These response time objectives include a 1:30 turnout time.

Proposed Service Delivery Zones Response Time Objectives

Zone	Coverage (%)	Minutes
Urban	90	06:30
Suburban	80	07:30
Rural	80	11:30

The objectives apply to the first-due response unit, such as an engine or ambulance. It is suggested that the suburban and rural percentile goal is reduced to the 80th percentile based upon the attainability of this standard in consideration of the community risk in these areas.

Using these performance objectives, ESCi was able to use travel time and service demand models to design future deployment strategies that would meet or exceed the performance objectives. This resulted in a series of recommendations for future facilities, apparatus, and staffing, as listed in the following summary.

Facilities

- Construct a station on the west side of Red Wing near the intersection of US 61 and State Hwy 19
- Enter into an agreement with the Prairie Island Indian Community to make use of the existing facility to house fire suppression apparatus and personnel as listed. In the alternative, an additional station is recommended for construction on Prairie Island

Apparatus

- **Station One**
 - Engine 1
 - Truck 1
 - Medic 1
- **Westside Station**
 - Engine 2
 - Medic 2
- **Prairie Island Station**
 - Truck 2 ('quint' apparatus)

Staffing

- Station 1, three career personnel staff the engine, three personnel staff the truck, and two personnel staff the ambulance
- Westside Station, three career personnel staff an engine and two personnel staff an ambulance
- Prairie Island Station, three career personnel staff a truck

This section of the study also contains a summary of 67 short and mid-term recommendations that represent potential improvement strategies for the more immediate future, typically a one to

three-year period, conveniently categorized by relative priority. In addition, the report contains extensive discussion on the sustainability of the department's paid-on-call staffing program.

Additional Observations

During the process and development of this report, the project team, in conjunction with the Fire Study Committee, conducted a public input meeting during which a presentation of initial finds was made. Although not intended to be an all-encompassing report of findings, the primary intent of the meeting was to gain understanding from the community as to its future expectations from Red Wing Fire Department. Turnout for the meeting was dominated by those with vested interests in the fire department, but several valuable pieces of information were collected and further evaluated and used in the production of this report and the recommendations contained therein.

As a supplement to this Master Plan, ESCi conducted an employee survey to determine the overall satisfaction of the personnel with certain aspects of department operations. An excellent survey return rate of 93 percent was achieved. Issues related to staffing, training, fire prevention, public education, equipment and station deployment were intensely reviewed by the staff, and their observations were taken into consideration in the development of the report. The ESCi project team would like to pay a special thanks to the personnel of Red Wing Fire Department for providing honest and candid comments in response to the survey.

The ESCi project team began collecting information concerning the fire services system of the Red Wing Fire Department during December 2007. The compilation of that information and the preparation of this report have required nearly three months to complete. The team members recognize that the report contains a large quantity of information and ESCi would like to thank the personnel, both career and paid-on-call, along with the staff of the Red Wing Fire Department and the City of Red Wing for their tireless efforts in bringing this project to fruition. ESCi would also like to thank the various individuals and external organizations for their input, opinions, and candid conversations throughout this process. We sincerely hope that the information contained in this report is utilized to its fullest extent and that emergency services provided to the citizens of Red Wing and the surrounding areas are improved with this information.

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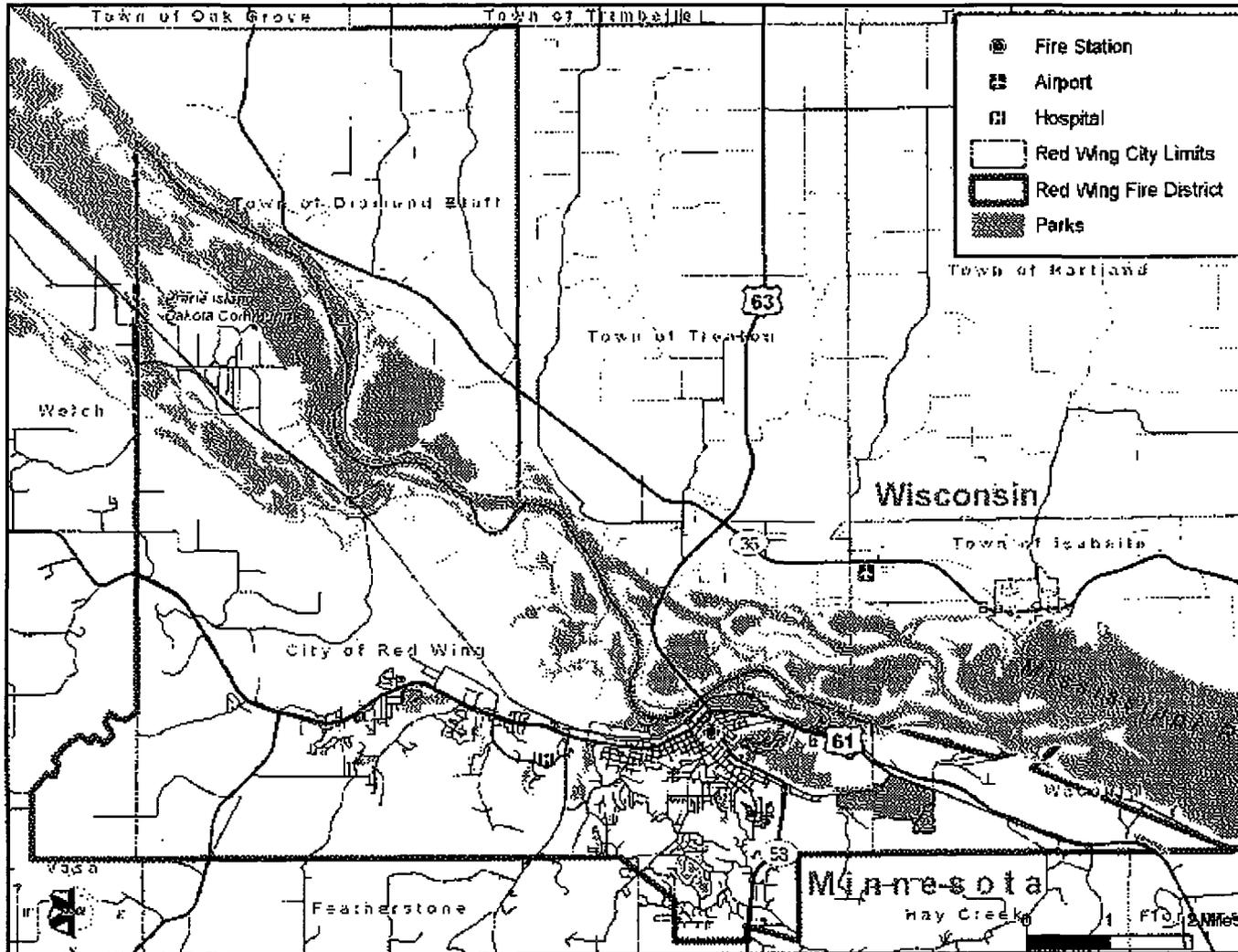
Section I – Evaluation of Current Conditions

Organization and Community Overview

The Red Wing Fire Department (RWFD) is a direct operating department of City of Red Wing (City) and provides fire protection and advanced life support (ALS) emergency medical transport services to the community. The department began providing services in 1857 as the Protection Hook and Ladder Company Number 1. Red Wing is situated in an area of bluffs and lowland along the Mississippi River about an hour south of Minneapolis and Saint Paul. The response area also includes the Indian community of Prairie Island, sovereign Native American land.

The Red Wing Fire Department operates out of a single facility within the downtown area of the City. Its rather unique 64.5 square mile service area extends beyond municipal and state borders. Service areas differ depending on services offered. For instance, the Red Wing Fire Department provides primary fire protection services to not only the City of Red Wing, but also to the Township of Wacouta to the east, and to the Town of Diamond Bluff, Wisconsin to the north. The following figure illustrates the location of the firehouse in relation to the primary fire service area.

Figure 1: Station Location and Primary Fire District



RWFD also provides primary emergency medical services (EMS) to a larger geographic area. This area encompasses 242 square miles in two states. The following municipalities or portions thereof, receive ambulance services from the RWFD:

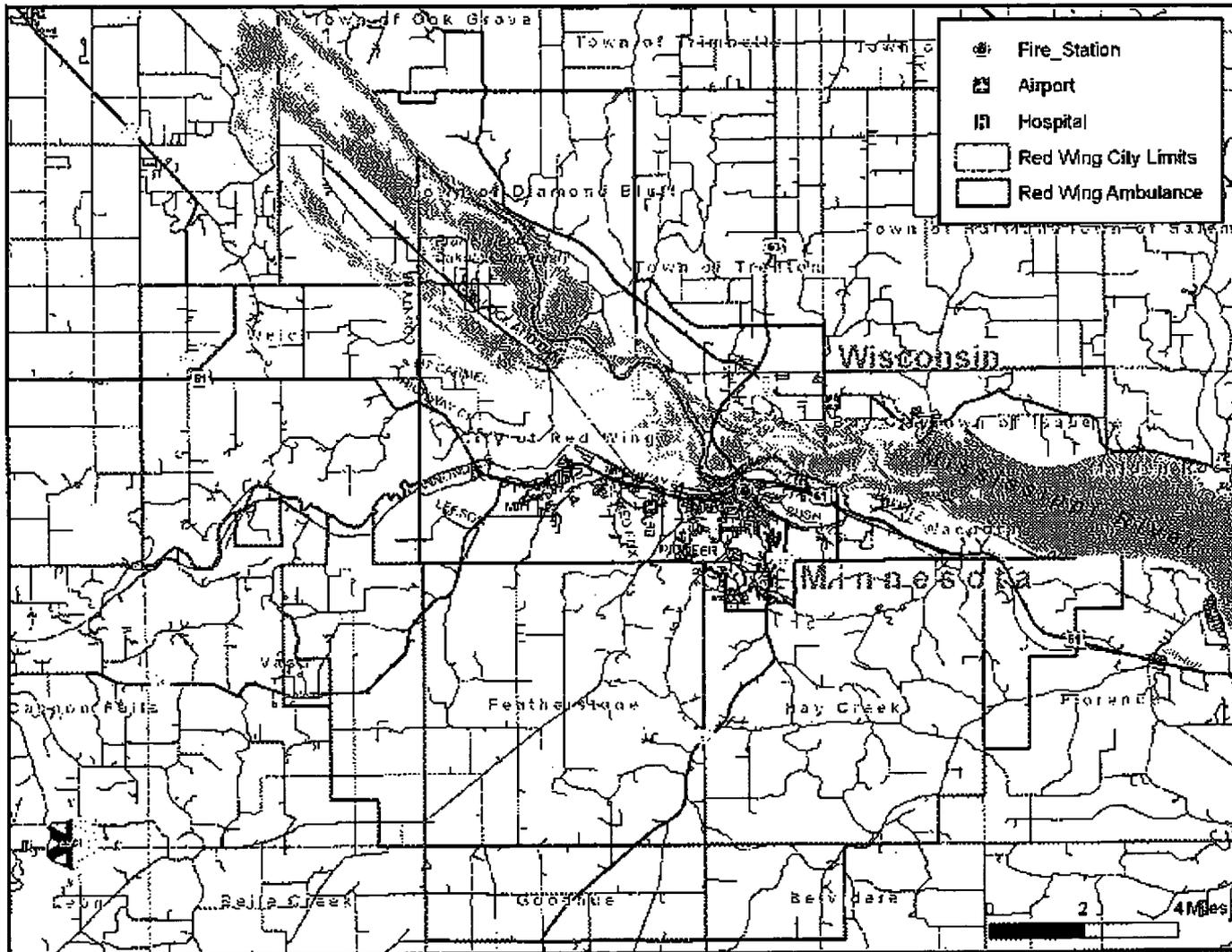
- City of Red Wing, MN
- Wacouta Twp., MN
- Welch Twp., MN
- Featherstone Twp., MN
- Hay Creek Twp., MN
- Town of Diamond Bluff, WI
- Bay City, WI
- Town of Isabelle, WI

...as well as portions of the following municipalities:

- Vasa Twp., MN
- Goodhue Twp., MN
- Belvidere Twp., MN
- Florence Twp., MN
- Town of Trenton, WI

The following figure illustrates the location of the firehouse in relation to the primary EMS ambulance service area.

Figure 2: Station Location and Primary Ambulance Service Area

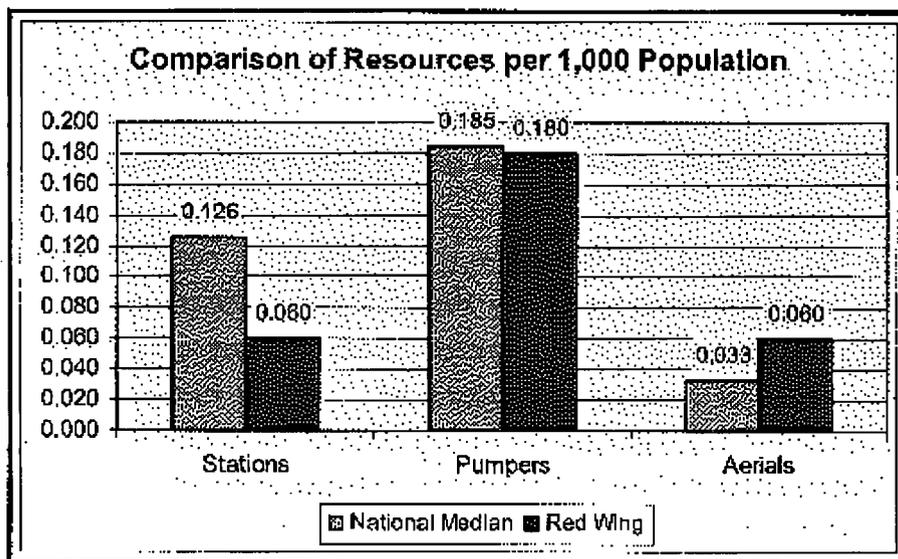


The department maintains a fleet of vehicles including three fire engines, one aerial truck, three ambulances, one wildland firefighting vehicle, one inspector's vehicle, and two boats. In addition, one engine is available in reserve, not typically used for front-line service.

There are 42 individuals¹ involved in delivering these services to the jurisdiction. The department's primary management team includes a fire chief, fire marshal, and three captains. A part-time secretary provides additional support services. Primary staffing coverage for emergency response is through the use of paid on-duty firefighters in the station, with additional response by on-call personnel. For immediate response, a typical minimum of five personnel are on duty at all times but occasionally, this number will drop to four for a period of up to four hours prior to utilizing the department's call-back procedures. Additional members carry pagers to receive radio calls for emergency response.

The following figure provides an overview of the department's fire suppression resources and compares these with the average rate of resource allocation in other communities of similar size within the same region of the United States.²

Figure 3: Resource Allocation Comparison



1 Current number at time of field research.

2 Comparison data from the National Fire Protection Association, *Fire Department Profiles 2005*.

The chart demonstrates that RWFD has a lower than median allocation of stations, with similar communities of its population typically having at least two stations. The department has a typical number of pumpers and aerials, though the national ratio indicates that some communities of similar population do not have any aerial device.

The department provides a variety of services, including fire suppression, advanced life support transport, vehicle extrication, operations-level hazmat response, surface and ice water rescue, rope rescue, and tactical (SWAT) medics for the Goodhue County Emergency Response Team. A regional hazardous materials response (hazmat) team from either Rochester Fire Department or Saint Paul Fire Department provides technician-level hazmat response through contract with the State of Minnesota.

The Goodhue County Public Safety Dispatch provides emergency call receipt and dispatch service. Enhanced-911 telephone service, computer-aided dispatch, and a multi-channel radio system are in place.

Service Area Population and Demographics

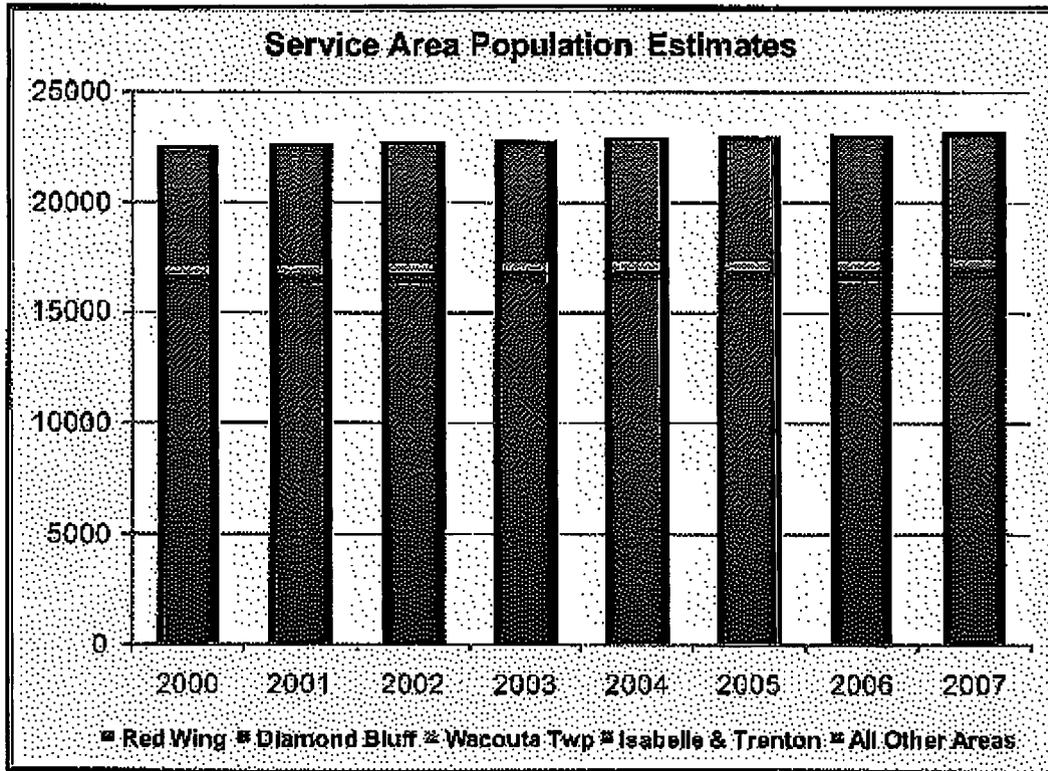
This section analyzes current demographic information on the population and housing characteristics of the fire and ambulance service area for the RWFD. Since the fire and ambulance service areas extend beyond the city limits, estimating total population served and historical growth can be challenging. This is especially true when these areas do not adhere to municipal lines or U.S. Census statistical areas such as census blocks or block groups.

Census block data,³ which closely coordinates with service area borders, was tabulated along with various municipal population figures that were estimated for the service area by the City's planning department,⁴ and were found to be accurate historically and for current estimates. The only discrepancy found for municipality estimates in Wisconsin was for the estimated population in the Town of Trenton. The population by census block for the portion of Trenton served by RWFD was 1,067 in 2000; this was extrapolated for estimates in the future. The following chart estimates the service area population for the collective service areas.

³ 2000 census data.

⁴ Parts of municipality were calculated as a percentage of population.

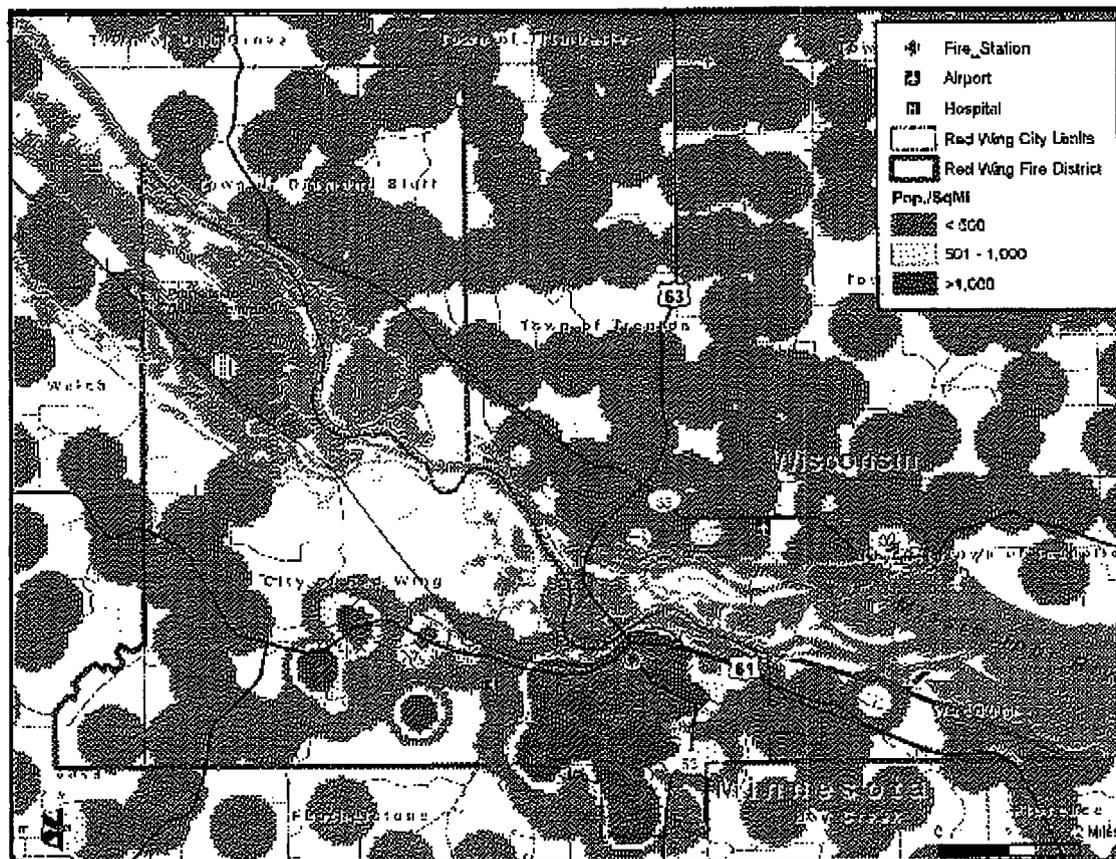
Figure 4: Service Area Population Estimates



Growth in population has been slight over the decade. It is estimated that the fire service area is home to 17,344 persons in 2007, while the ambulance service area population is estimated at 22,868. It can also be determined that the City accounts for 71.7 percent of the ambulance service area's (ASA) population and 95 percent of the fire service area's (FSA) population.

It is also useful to assess the distribution of the population within the service areas, since there is a direct correlation between population density and service demand. The following map displays the population density of the area, based on information from the U.S. Census Bureau.

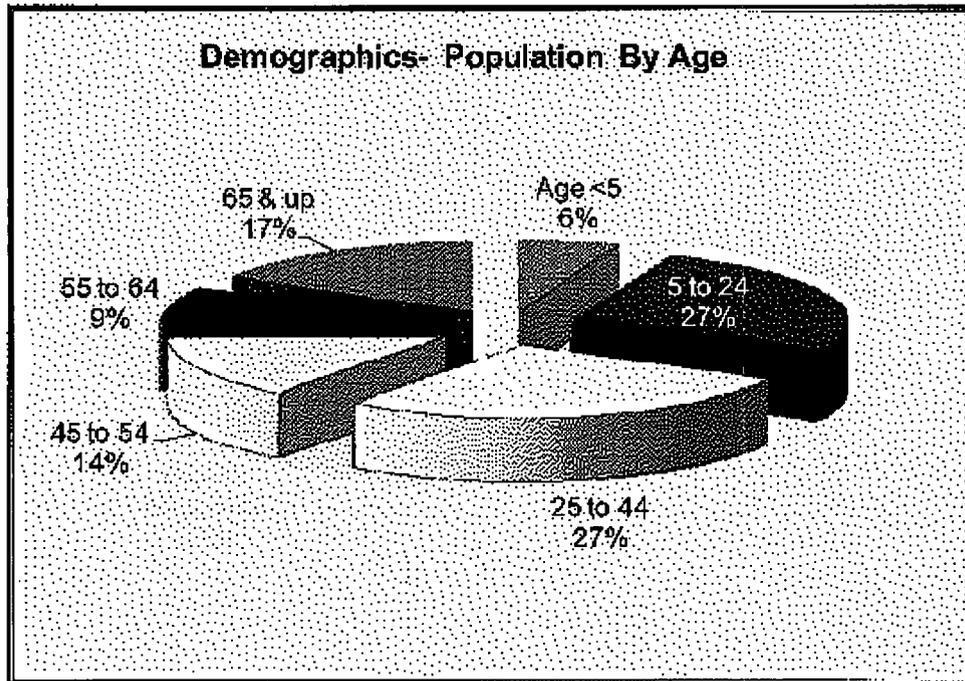
Figure 5: Red Wing Area Population Density



The department's population is concentrated within Red Wing city limits with areas outside of the City, considered rural as the population density is less than 500 persons per square mile. The location of the fire station is within the area of higher population density.

As one factor that influences emergency service demand, population composition with regards to age and socioeconomic characteristics needs to be examined. The following chart examines the population segmented by age groups.

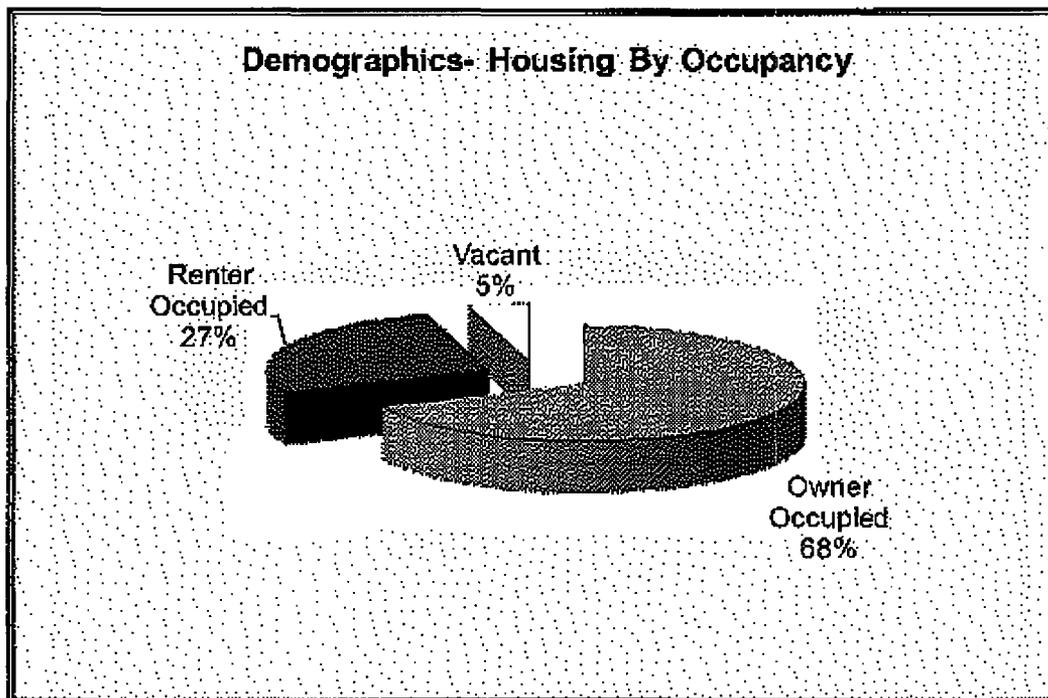
Figure 6: Red Wing Area Population by Age



As seen in the figure, 17 percent of the population is 65 years of age or older and six percent of the population is under five years of age, placing a total of 23 percent of the area's population within the significant target age groups that pose the highest risk in residential fire incidents. The median age in this area is 38.7, compared to 35.3 for the nation and 35.4 for the state. The rate of growth over the decade in the 50 and older categories present unique challenges to the fire service. As this group ages, they enter an age prone to medical incidents which can be expected to create a significant increase in service demand for emergency medical incidents as this age group increases in percentage of overall population.

The following chart relates to the housing characteristics of the service area categorized by occupancy types.

Figure 7: Red Wing Area Housing by Occupancy



The owner occupied housing is similar to the statewide figures and greater than national figures which indicates a favorable socioeconomic condition within the area. This is confirmed by a lower vacancy rate when compared to the state and national figures of between eight to nine percent. The rental housing, as a percent of total housing, is lower than the national rate but higher than the state-wide rate. This is not alarming in an urban area within a primarily rural state. Higher rental and vacancy rates within an area indicate negative socioeconomic conditions that correlate with higher service demands for emergency services; however, this is currently not the case in the Red Wing area. A median income of almost \$55,000 per year is similar to county and state medians.

Governance and Lines of Authority

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

The municipal corporation operates under a mayor-council form of governance, and the city council is provided with necessary power and authority to govern the provision of fire protection

and emergency services in the designated jurisdiction. As the governmental authority, the powers of the City include organizing a fire protection system, appointing officers and members, purchasing land and equipment, entering into contracts, issuance of bonds, and levying of taxes.

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

The fire chief is an appointed at-will employee and is not provided with a personal services contract. The council administrator provides an annual, formal, written evaluation of the chief's services as a means of documenting performance and establishing personal objectives.

The line officers include the fire chief. No other authoritative administrative personnel are in place. The fire chief takes complete charge of the career and paid-on-call personnel and apparatus, but delegates fire ground command to shift captains at every fire alarm and emergency drill. The chief is also responsible for annual inventory and incident operating guidelines as well as all operations within the department. No significant delegation of substantive administrative duties is evident. Line officers are selected based on an application and interview process conducted by the fire chief and representatives from the City's human resources department.

Foundational Policy

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

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

1. **Administrative Rules** – This section would contain all of the rules that personnel in the organization are required to comply with at all times. Administrative rules, by definition, require certain actions or behaviors in all situations. The city council would adopt or

approve administrative rules, since the chief is also subject to them. However, the council should delegate authority to the chief for enforcement on department personnel. The administrative rules should govern all members of the department: paid, volunteer, and civilian. Where rules and policies, by their nature, require different application or provisions for different classifications of members, these differences should be clearly indicated and explained in writing. Specifically, the administrative rules would contain sections which address:

- Public records access and retention
- Contracting and purchasing authority
- Safety and loss prevention
- Respiratory protection program
- Hazard communication program
- Harassment and discrimination
- Personnel appointment and promotion
- Disciplinary and grievance procedures
- Uniforms and personal appearance
- Other personnel management issues

2. Standard Operating Guidelines (SOGs) – This section would contain *street-level* operational standards of practice for personnel of the department. SOGs are different from administrative rules in that variances are allowed in unique or unusual circumstances where strict application of the SOG would be less effective. The document should provide for a program of regular, systematic updating to assure it remains current, practical and relevant. SOGs should be developed, approved, and enforced under the direction of the fire chief.

The RWFD policy manuals were given a basic review for quality and content. The manuals were fairly well organized, and it appears that a great deal of time went into writing the various policies and procedures in a professional and clear manner. Documentation in the City personnel manual includes the appropriate policies either required by law or focused on reducing the risk of civil liability. These include a sexual harassment policy, family medical leave, and disciplinary policy.

The incident operating guidelines that serve as the administrative policies of the department are maintained and were last updated in 2004, although material changes have occurred in the

execution of some policy issues without modification of written policies. There is no established process for revision.

The incident operating guidelines identify the legislative and regulatory requirements for the safety of the members, chain of command, apparatus of the company, and operational procedures for fire response and special operations. The guidelines are in need of revision due to the acquisition of new equipment and modification in administrative operations.

Again, following the recommended format discussed earlier, the incident operating guideline manual should be revised, updated, and where necessary, expanded to include a greater collection of guidelines for actual incident actions, including special hazard incidents such as technical rescue and hazardous materials releases. Several model documents are available through industry trade organizations. The resulting document should be considered for publication in a pocket-sized field guide format.

Recommendations:

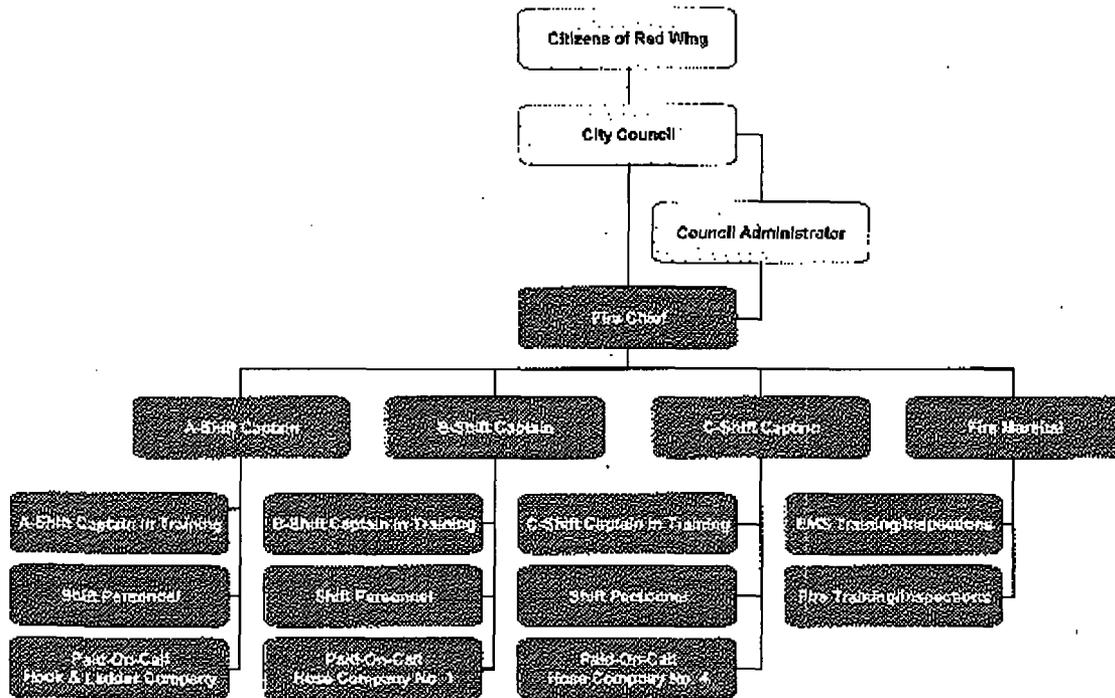
- The incident operating guidelines manual should be revised and updated, and should consistently be maintained in such a manner as to reflect industry best practice and current departmental procedures and processes.
- Additional topics should be considered for inclusion in the incident operating guidelines with incident-specific procedures that meet industry best practices.

Organizational Design

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

Figure 8 illustrates the current organizational structure of the department.

Figure 8: Red Wing Fire Department Organizational Chart



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

The span of control for any specific supervisor should range between three and seven. This is particularly important for a fire chief. Many times chief officers accept or encourage a span of control that greatly exceeds their ability to maintain good communication and leadership, often with good intentions, but just as often to the detriment of the department. The fire chief appears

to directly supervise four other individuals, including the three captains and the fire marshal, well within a reasonable span of control. The fire chief has been provided with the authority to suspend a member from duty and can recommend termination.

The City maintains a reasonably up-to-date set of job classifications and descriptions that accurately reflect the typical responsibilities and activities of the positions. The documents adequately describe primary functions and activities, critical tasks, levels of supervision and accountability, as well as reasonable qualifications.

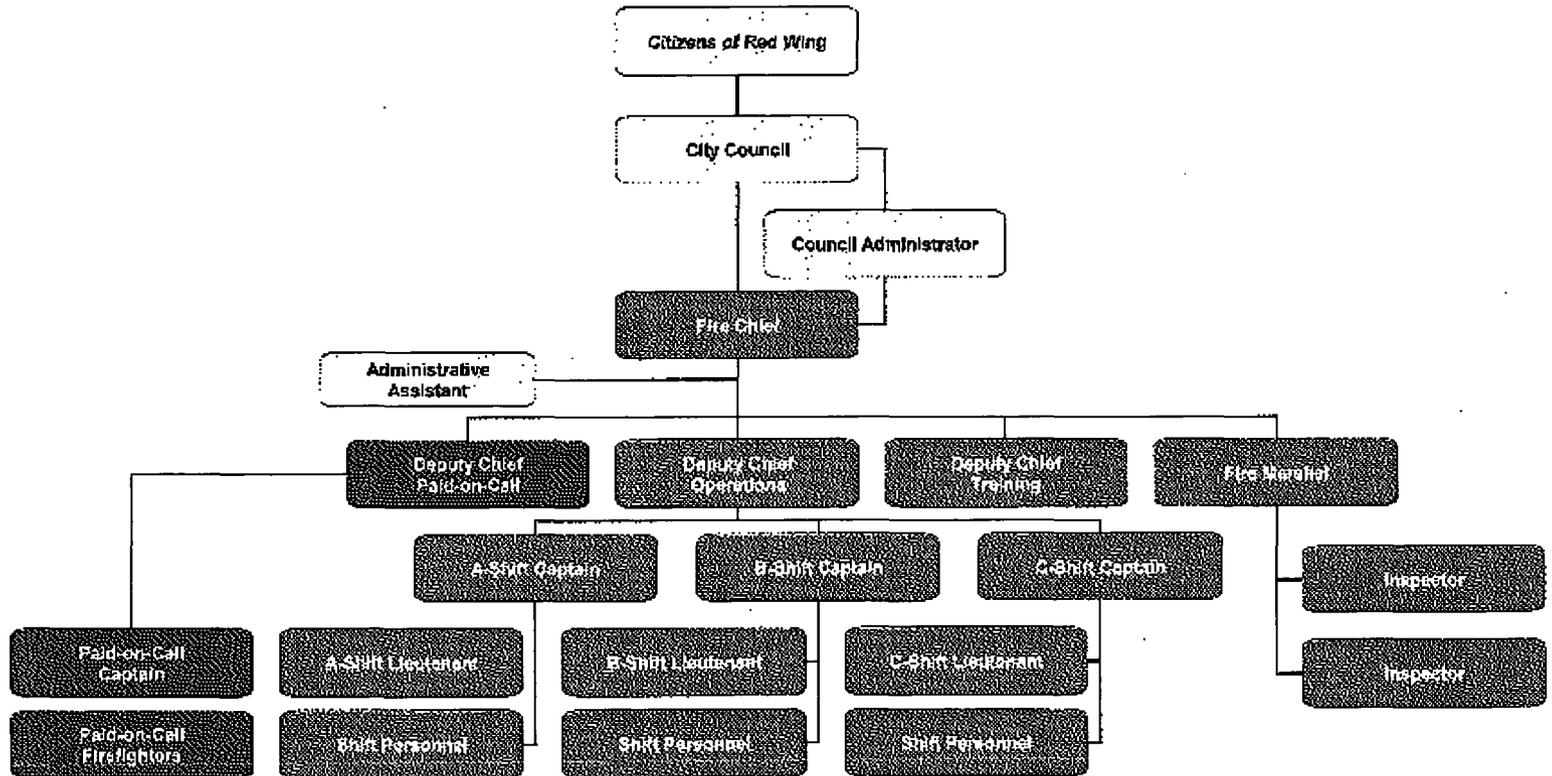
The department currently maintains collective bargaining agreements (CBA) with the firefighters and the captains under two separate contracts. The contracts clarify the salary, benefits, and many of the working conditions under which the employees in that classification will operate.

Although the organizational chart for RWFD is organized in a typical format for a career fire department, little authority or delegation lies with shift captains or other personnel. In small career departments, it is not unusual for shift commanders to have additional involvement in policy-level administrative functions, often assigned by areas of expertise. For instance, a shift commander might also be assigned to apparatus maintenance and capital, another might be assigned to oversee the emergency medical functions, while another oversees the department's training program.

In the case of RWFD, the shift commanders appear to handle operational functions only. In addition, the fire chief is the sole administrative or true policy-level officer, making him virtually a leadership team of one. The result is that, although the organizational chart does not visually depict it, the leadership structure is extremely flat in this agency. As the leadership structure of an organization flattens, it is not unusual for the organization's members to feel discouraged over a lack of involvement in decision-making, poor internal communications, inaccessibility to leaders and so forth.

The figure below illustrates the proposed organizational structure for RWFD. New positions and their associated duties and responsibilities will be discussed later in this report.

Figure 9: Proposed Organizational Chart



Recommendations:

- Consider alterations to the organizational structure to broaden the number of officers involved in decision-making and policy level issues.
- Develop a more representative *leadership team* to increase internal communication and improve the empowerment of the members, thus increasing *buy-in* and a sense of ownership in performance issues and outcomes.

Maintenance of History

The RWFD has informal levels of history retention programs in place. Of course, appropriate records of all municipal meetings are maintained in accordance with the laws of the state governing various types of public meetings and decisions involving public funds. The department is rich in history and maintains a formal history available both in the fire station and on the internet at the department's website. Maintenance and upkeep of the formal history and memorabilia within the station, including a 1925 Ahrens-Fox pumper, is not formally assigned to any one individual but, rather, is based on those having an interest in this area.

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

A well-produced annual report can serve to satisfy this need. In addition, an annual report is a wonderful communications tool to share the efforts and activities of the department with the public. The department does not currently publish or distribute an annual report of activities and accomplishments, failing to provide any specific historical record or measurement of its performance.

At a minimum an annual report should include:

- Brief history of the department
- Summary of events and activities during the report year
- Description of major incidents handled by the department
- Descriptions of new or improved services and programs



- List of people who served with the department during the year
- Awards received by the department or individuals
- Financial summary including revenues and expenditures, grants, etc.
- Statistical analysis, with trends, of key community service level indicators

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

Recommendation:

- The fire department should publish a formal annual report of activities including a summary of events and activities during the report year, a description of major incidents handled by the department, descriptions of new or improved services and programs, awards received by the department or individuals, and statistical analysis of key community service level indicators.

Finance and Budget

The City of Red Wing was incorporated in 1857 and, in that same year, the first fire department to service the area (Protection Hook and Ladder Company #1) was also organized. That early department has evolved throughout the last 150 years to become the Red Wing Fire Department, a fully recognized department within City local government. Fire department financial oversight is the responsibility of an elected city council and mayor who appoint a council administrator and fire chief, as well as several other *council officers* that serve at the pleasure of the council. Overall financial oversight for the City rests with the appointed City finance director.

As a recipient of state and federal financial assistance, the City is required to undertake a single audit performed by an independent audit firm. Standards governing single audit engagements require that the independent auditor report not only on the fair presentation of the financial statement, but also on the audited government's internal controls and compliance with legal requirements, giving special emphasis to internal controls and legal requirements involving the administration of federal awards.

Each year, the City conducts an audit and publishes an Annual Financial Report. The report is prepared using financial reporting requirements in accordance with the Governmental Accounting Standards Board (GASB) Statement No. 34, Basic Financial Statements and Management's Discussion, and Analysis for State and Local Governments. The most recent report was based on the fiscal year ending December 31, 2005, and no material deficiencies or reportable practices were noted by the independent accounting auditor, Abdo, Eick & Meyers, LLP.

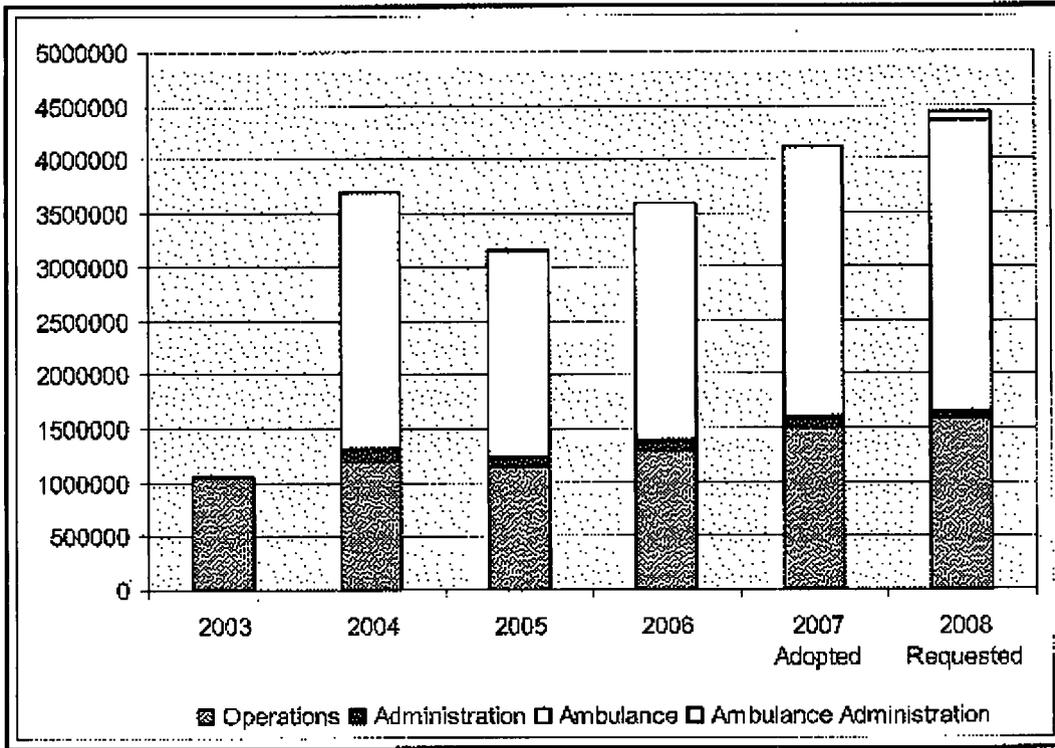
The City uses a one-year budget cycle to prepare the annual operating budget and capital improvement plan based on a January through December fiscal year. Red Wing uses a modified accrual basis of accounting and current financial resources focus for governmental funds. Under the modified accrual basis of accounting, revenues and other financial resources are recognized as accrued when they are billed. Expenditures are recognized when the fund liability is incurred rather than disbursed. This method of accounting is *generally accepted* in governmental operations.

The City maintains a capital improvement program (CIP) for all capital purchases and projects. The plan is for projects that are classified as major improvements other than routine maintenance or replacement of small equipment under a specified value. The projects are reviewed and prioritized by the city council. When funds are available, the council makes the final decision on which projects are implemented. The CIP represents a five- to ten-year moving window updated annually.

The fire department's operating budget is funded primarily from the City's general fund, although significant amounts of revenue are generated from EMS billing activities. The following figure shows a historical comparison of the fire department's expenses for the past six years plus the requested budget for fiscal year 2007-2008.

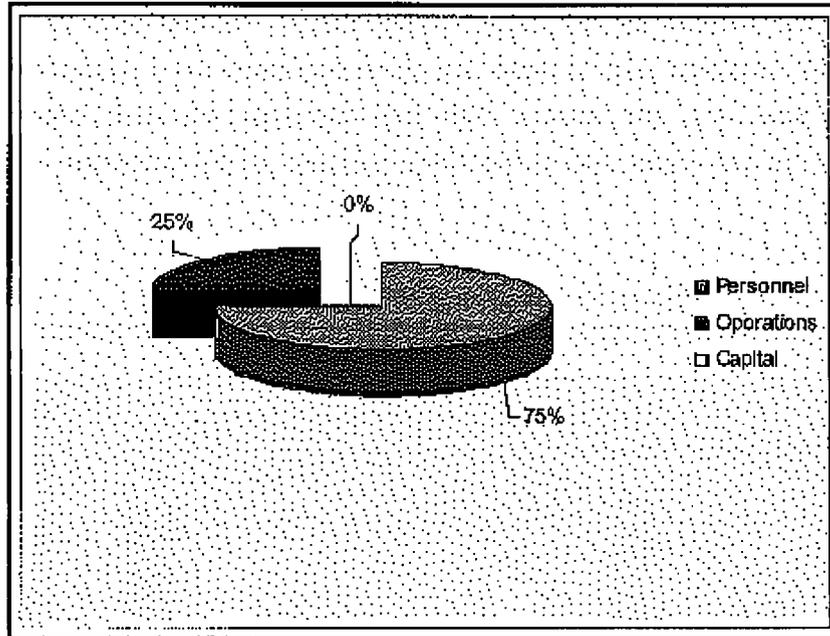


Figure 10: Expenditures Comparison, 2000-2008



Like most career emergency services agencies, a vast majority of the organization's expenditures are attributable to personnel. For ease of illustration, the historical budgets for RWFD have been grouped into three primary categories - personnel, operations, and capital. The figure below illustrates how the departmental budget was allocated among the various expenditure categories for the most recent complete fiscal year, 2006.

Figure 11: Service Cost Allocation, Fiscal Year Ending 2006⁵



A breakdown of the annualized RWFD baseline budget is detailed in the following table.

Figure 12: Baseline Budget and Public Cost, 2007

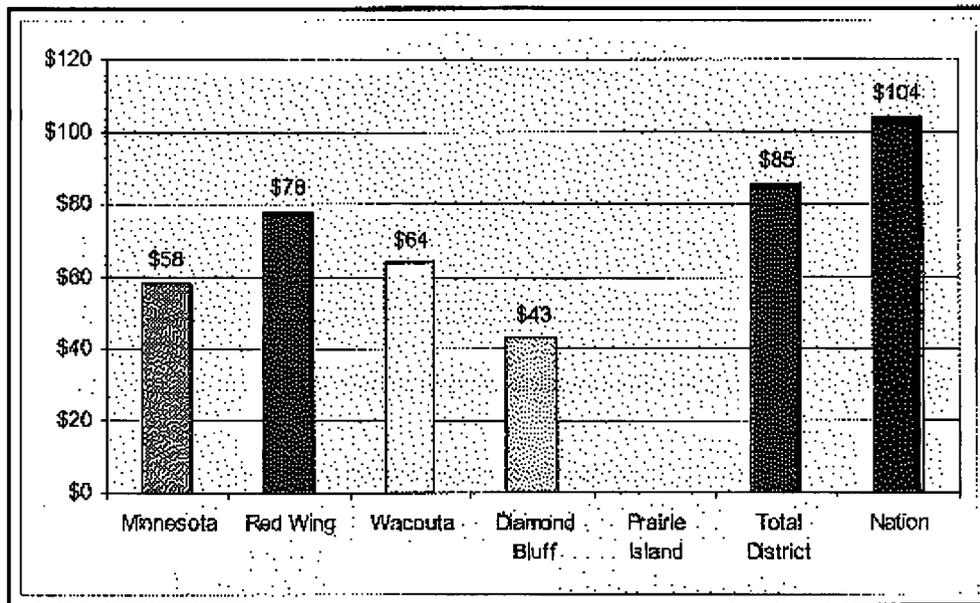
Calculated Public Cost, 2006	
Expenses	Amount
Fire Operating Expenses	\$1,386,304.00
Ambulance Operating Expenses	\$2,202,537.00
Total Baseline Expenses	\$3,588,841.00
Revenues	
General Fund	\$1,229,510.00
Ambulance Revenue	\$2,359,331.00
Total Baseline Revenues	\$3,588,841.00
Assessed Value of City	\$1,543,126.00
Calculated Tax Support	\$1,229,510.00
2006 Population Estimate (City)	15,754
Cost per Capita (City)	\$78.04

The table illustrates that fire protection and emergency medical services within the City currently cost the equivalent of \$78.04 per capita. Population is an important component of the fire

⁵ No capital expenditures were realized during FY 2006. Ambulance bad debt (FY 2006 \$946,045.00) is listed as a budgeted expenditure, but is not included in total expenditures not here.

protection equation. The trouble with accepted jurisdictional populations is that such numbers frequently do not account for our highly mobile culture. Factors such as transportation, commerce, and recreation tend to make the given population for a region fluctuate widely depending on time, day, and season. With that disclaimer, the chart below illustrates a comparison of the per capita cost of the City's provision of fire protection and emergency services.

Figure 13: Comparison of Tax Cost per Capita



Source: Governing Sourcebook, Red Wing Finance Department

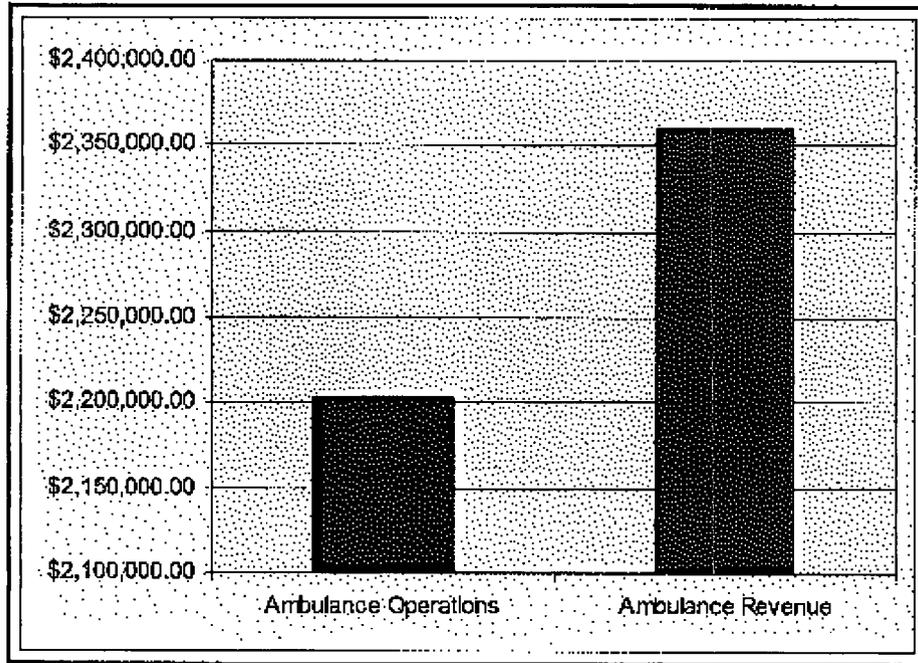
The figure above breaks out the service areas of Wacouta and Diamond Bluff, since these areas are covered through contractual agreements, and those residents don't pay ad valorem taxes to Red Wing for fire protection services.

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

The department provides both emergency and non-emergency responses throughout the City as well as a large portion of Goodhue County, surrounding Red Wing. The figure below

illustrates the costs associated with the ambulance division operation compared to the revenues that the operation generates.

Figure 14: EMS Cost to Revenue Comparison



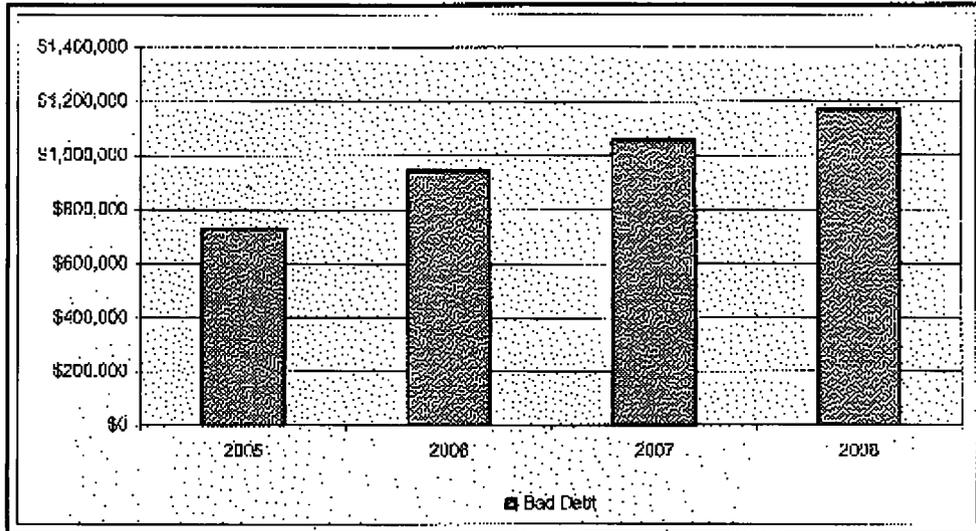
The revenue noted in the figure above is generated through a fee for service methodology as outlined below.

Figure 15: Current Ambulance Fee Schedule

Response Level	Resident	Non-Resident
ALS1 Non-Emergency	\$865.00	\$940.00
ALS1 Emergency	\$1,285.00	\$1,360.00
ALS2 Emergency	\$1,675.00	\$1,750.00
ALS1 Out-of-Town	\$1,535.00	\$1,610.00
ALS2 Out-of-Town	\$1,925.00	\$2,000.00
Treatment without Transport 1	\$0.00	\$0.00
Treatment without Transport 2	\$530.00	\$605.00
Treatment without Transport 3	\$780.00	\$855.00
ALS Intercept	\$425.00	\$425.00
Mileage	\$17.00	\$17.00
Wait Time	\$75.00	\$75.00
Extraordinary Service Charge	\$75.00	\$75.00
Extrication Charge	\$500.00	\$500.00

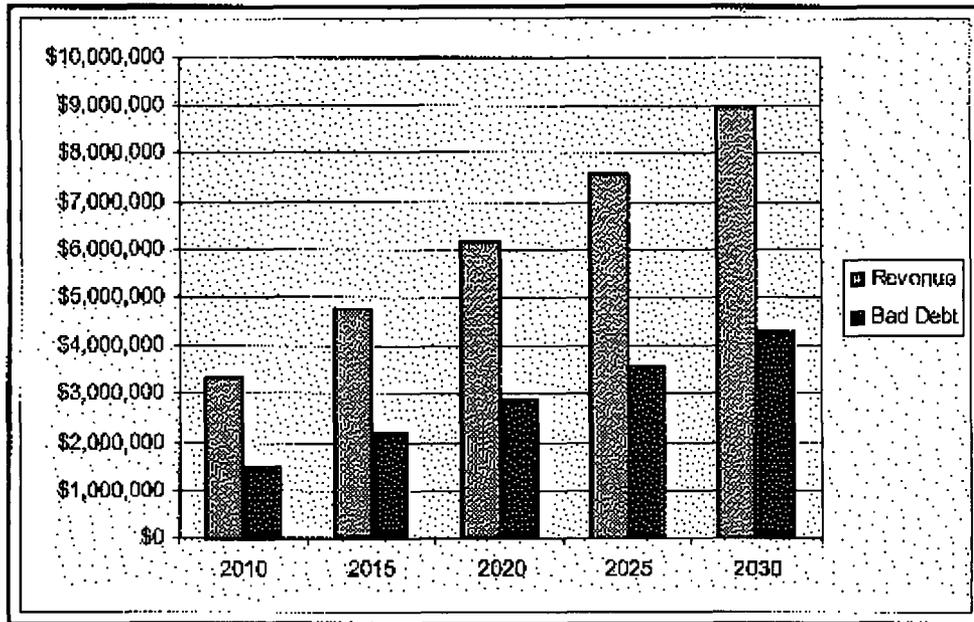
In the case of Red Wing, the ambulance division is self-supportive, even with a sizeable bad-debt expense as noted below.

Figure 16: Historical Bad Debt Write-Offs



Based on the historical data provided by the City in regards to ambulance operation expenditures and revenues, although the trend of bad debt expenses is increasing, so is the total amount of revenue generated from these activities. The chart below is a projection of revenues as compared to bad debt expenses through 2030.

Figure 17: Projected Revenue Growth Compared to Bad Debt



It should be noted, however, that RWFD cross-staffs their fire apparatus and EMS apparatus with the same personnel. Allocating some personnel costs to the EMS division is appropriate but, since EMS calls make up a large percentage of the total department volume, identifying the actual cost of EMS operations is extremely difficult.

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Management Components

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

Mission, Vision, Strategic Planning, Goals, and Objectives

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

The City has completed a comprehensive strategic planning process. Components of that plan apply to the RWFD. However, the fire department itself has not formally conducted strategic planning processes specific to the fire department and involving its staff. RWFD does have an adopted mission statement, with some organizational visions for the future identified. The mission statement is currently undergoing revision by department members. However, member value statements do not exist, nor are department goals and objectives formally established to direct organizational effort.

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

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

Recommendation:

- Consider conducting a customer-centered strategic planning process involving the internal stakeholders of the department, as well as opportunity for involvement by the general public or other customer representation.

Availability of SOGs, Rules, Regulations, and Policies

As discussed previously, departmental management policies exist. Regardless of the quality or condition of such policies and guidelines, their availability and familiarity to workers is critical.

Department members indicate that administrative policies or rules and regulations are available in the workplace, but are not currently distributed individually. This practice is encouraged, since easy access to such policy is important and reinforces its importance. Electronic distribution is now a convenient means of accomplishing this.

Incident operating guidelines have been distributed adequately in support of their purpose. Members have access to the operational guidelines for reference during training sessions and drills and can study them at their leisure. This encourages the daily use and application of the guidelines and ensures that outdated ones are brought to the attention of management as early as possible.

Critical Issues

It is extremely important that there be a clear understanding of critical issues facing the department. Without such an understanding, department leadership cannot be prepared to face these issues. In addition, the enunciation of critical issues to employees and members increases their awareness of the organization's priorities and assists them in becoming focused on solutions.

A further exploration of critical issues should be completed during strategic planning processes, but for now, the following issues should be given serious consideration for inclusion in the final list. These are items that have been identified by the officers of the departments as issues with significant potential for impacting the success of the organization and the effectiveness of its service. In the RWFD, they are:

1. Maintaining adequate staffing to handle the risk and demand of the community
2. Outdated apparatus in need of replacement
3. Inadequate response time to certain geographic areas of the City or during periods of high workload

As with critical issues, it is important for any agency to have an appropriate level of future thinking. This permits an agency to identify what external challenges may present themselves to the organization in the coming years. This awareness of future challenges ensures that the department does not miss out on opportunities or blindly stumble into crisis unprepared.

Again, further exploration of future challenges should be part of a complete strategic planning process, but the following items have been identified by department officers as external challenges likely to be faced by the agency in the coming few years.

1. Impact of aging population on ambulance service and ambulance funding
2. Public expectation for broadening services of the fire department, particularly in public health delivery
3. Sustainable and adequate funding in the face of continuation in the escalation of business costs

Internal and External Communications

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

Regular officers meetings have been initiated in this agency. Such meetings can be used to encourage the sharing of ideas, issues, and concerns, and encourage the teamwork approach to overall department management that was recommended earlier. Though the captains perform a verbal review of the meetings with their shift, minutes or summaries of regular officer's meetings are not regularly made available or distributed for review by all organization members. Such an effort is recommended, as it encourages consistency in internal communications, and permits members to share ideas on issues involving departmental issues, enhancing a feeling of empowerment among personnel.

Written, formal memorandums are regularly utilized for distribution of information, ensuring that all members receive critical data in an organized and consistent fashion. Email is also used extensively for this purpose. These processes provide a critical record of internal communications that are important to organizational efficiency. However, no specified or formal system is in place for distribution of written information. The lack of such a system could permit some personnel to miss some communications and lead to misunderstanding or inconsistency in the awareness level of personnel. When certain types of critical memos or policies are released, a system should be in place for verification of the distribution to all personnel. This system would provide a record of confirmation that the information was received and improves accountability. Such a system is not currently used.

Aside from an annual department social gathering and the training sessions, opportunities such as open personnel meetings or forums are rarely held for the purpose of exchanging and discussing concerns, ideas, or issues directly with management staff. These opportunities enhance the feeling of teamwork, open lines of communications, and encourage a feeling of ownership among the members. Some effort in this regard is recommended. Several departments have successfully used a quarterly *Chief's Breakfast*, open to all members, for this purpose.

A City employee newsletter, called "*The Scoop*", has been initiated and provides an excellent opportunity for distribution of agency news and information. Departmental bulletin boards are adequately controlled and organized, with information being sorted and updated on a regular basis.

Departmental business email addresses have been issued to appropriate personnel, offering an efficient and verifiable method of information distribution. Shift mailboxes are used to exchange important hard-copy documents and prevent missing or misplaced documents. Voicemail has been put in place for primary staff and officers permitting other members or the external customer to efficiently and quickly leave personal contact messages.

Various efforts are currently made to communicate with the public. The City publishes a community newsletter for distribution to every address within the city limits on a monthly basis. The newsletter permits the release of specific and detailed information, authored directly by the departments, to those served by City programs, and is an excellent tool for improved public

relations. A formal procedure has been established for handling complaints from the public and is intended to make certain such complaints are handled consistently, quickly, and with due process.

An active and useful website is currently maintained at www.red-wing.org providing an additional means of distributing information and communicating with the public. The site is kept up-to-date and provides contact information for major programs operated by the department.

In 2005, the City performed a public survey or questionnaire intended to provide customer feedback on service priorities, quality issues, or performance efforts. These surveys, when utilized appropriately, can provide valuable input for organizational planning. A current survey has been budgeted for 2008. Consideration should be given to establishing a citizen's advisory group that can meet occasionally with department management to provide the customer perspective to issues within the department and assist in planning efforts. This process encourages a close connection between agency management and the consumer of its services and also serves as an additional public relations tool.

Recommendations:

- A formal system should be put in place for distribution of written information. When critical memos or policies are released, a system should be in place for verification of the distribution to all personnel.
- An occasional open personnel meeting or forum, such as a quarterly *Chief's Breakfast* that is open to all members, should be considered to enhance the feeling of teamwork, open lines of communications, and encourage a feeling of ownership among the members.
- Consideration should be given to establishing a citizen's advisory group that can meet occasionally with department management to provide the customer perspective to issues within the department and assist in planning efforts.

Document Control and Security

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

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

The RWFD has a significant investment in facilities, apparatus, equipment, and other items, along with its financial assets. Protecting these assets is very important. The station is reported to be consistently locked and secure from unauthorized entry. Public access to the building is limited to business areas or when accompanied by an employee. Locks are electronic and operated by card keys. These can be deactivated, to prevent orphan keys and unauthorized entry. No security alarm systems are used to provide for automatic notification of unauthorized entry or break-in. However, a monitored fire alarm system provides early smoke and fire detection, as well as an additional life-safety measure for occupants in the event of a fire.

Department computers are programmed with password security on sensitive file access and software to provide an additional level of security and data integrity. However, the department should initiate an automatic *log-off* feature that activates when the computer is not used for several minutes, such as when an officer leaves suddenly on a fire call without logging off manually. Firewall protection is in place for computers accessing the internet and other outside servers. The protection is adequately up-to-date and capable of preventing most unauthorized network intrusions. Up-to-date virus protection software is utilized on all incoming email and files or operating systems are regularly scanned for undetected virus infection.

The agency does not maintain an up-to-date inventory of capital assets. This should be corrected and a process should be put in place to maintain this inventory, with new assets being logged and recorded at time of purchase. No business-related cash is routinely kept on the premises of the department, reducing or eliminating risks associated with burglary and theft. The use of petty cash has been eliminated. General-use credit cards, such as VISA™ or MASTERCARD™, are issued to key managers, but strict account controls, low credit limits, and zero liability fraud protection are in place. Written, formal purchasing policies and procedures are in place and are strictly enforced. Virtually all purchases require specific purchase orders (POs) with appropriate approval signatures and appropriation verifications.

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

Recommendations:

- The department should initiate an automatic log-off feature on computers to activate password protection when the computer is not used for several minutes, such as when an officer leaves suddenly on a fire call.
- The fire department should establish an up-to-date inventory of capital assets. A process should be put in place to maintain this inventory, with new assets being logged and recorded at time of purchase.

Reporting and Records

The department utilizes up-to-date records management software to enter and store incident information. The software is compliant with NFIRS (National Fire Incident Reporting System) standards and incidents are entered quickly and accurately. Training records are maintained on computer, permitting easy retrieval of accurate reports on training attendance, certification status, and subject matter. Code enforcement activities and occupancy records are maintained in an effective database to permit analysis of prevention activities, community risks, and trends. Maintenance records are kept only in rough hard-copy format, making collection and analysis of fleet management processes more difficult, but the public works department is in the process of initiating computerization.

Personnel records are complete and up-to-date, and maintained in a manner that protects private medical information. Records are maintained on employment history, discipline, commendations, work assignments, injuries, exposures, and leave time. Financial activities, including budgets, expenditures, revenues, purchase orders, and other encumbrances are kept in a financial records management software system permitting consistent and up-to-date monitoring of all financial activities and accounts.

The department uses a PC-based computer system, with Windows XP as its primary operating system, and all computers are networked to a municipal server. Dedicated data lines are available to municipal facilities throughout the City downtown complex, with dual redundant servers.

Personnel Management

Basic Personnel Management

An organization's people are its most valuable resource. Careful attention must be paid to managing that resource to achieve maximum productivity for the organization and maximum satisfaction for the individual. A safe working environment, fair treatment, and recognition for a job well done are key components of membership and job satisfaction.

Red Wing Fire Department is a standing department within the City's local government (See *Organization and Community Overview*). City and department policies and procedures, along with City ordinances, govern and/or enable their selection and hiring practices. Various rules, regulations, procedures, and handbooks are promulgated by the fire department to facilitate the fire department's personnel management process.

Personnel Policies and Rules

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

Disciplinary Processes

A formal progressive disciplinary process for employees should be clearly identified and available. The process should provide for various discipline levels focused on correcting unacceptable behaviors with the most reasonable actions considered appropriate and effective. The process under which discipline is applied should be clear and unambiguous.

A multi-level appeals process must be documented to afford the employee who feels aggrieved by an unreasonable disciplinary action, the opportunity to have his/her issues reviewed by an impartial party. Informal interviews with employees gave ESCi the impression that members feel organizational discipline practices are reasonable, fair, and consistently and equitably applied to all involved. The department has documented and clear disciplinary processes in place. They are prescribed in the City's personnel policies.

Ongoing Competency Evaluation

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

Physical competency is evaluated only through casual observation of personnel in their activities. This does not provide the department with solid information as to whether an individual remains physically capable of performing the rigorous tasks involved in emergency services. Physical competency testing should be conducted at least annually. The evaluation can mirror the entry physical capacity test but should, within limits, give some consideration for an individual's age. Competency testing involving common emergency scene tasks is also a common method of evaluation.

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

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

areas where they fail to perform as desired. A formal performance evaluation system should be implemented for all employees, not just career personnel, of the fire department as soon as practical and such evaluations conducted on a regularly scheduled basis.

Counseling Services

Emergency services bring otherwise ordinary people into life and death situations that sometimes end very tragically. Even though fire company personnel are trained responders, they do not have an impregnable shield that prevents them from being affected by traumatic events. Critical incident stress is a very real condition that affects all emergency service workers to some degree or another. It is how emergency workers deal with that stress that makes the difference. The trigger for significant psychological trauma may be a single event, or a series of events compounding on each other.

Progressive emergency services organizations have recognized the need to provide a support system for their personnel who are exposed to traumatic incidents. Critical incident stress interventions by this group are short-term processes only. Though normally sufficient to help emergency personnel cope with the event, on occasion longer-term support is needed. Failure to provide that support can ultimately lead to the loss of a very valuable member.

Employee assistance programs should be readily available for employees of the fire department as a long-term stress intervention tool. An employee assistance program can provide additional support for other life problems that may affect a member's motivation and work quality such as substance abuse, marital difficulties, financial complications, and the like. The costs are reasonable, and the potential payback significant. The City currently offers an Employee Assistance Program (EAP) as well as regional Critical Incident Stress Debriefings (CISD). Fire department administration and supervision should keep a close watch on department personnel to ensure that individuals are obtaining the assistance that is necessary.

Personnel Records

The maintenance of adequate and up-to-date personnel records is critical in every organization that depends on the effective performance of its people. The fire department maintains written and computerized records of its personnel at the fire station, as well as personnel records within the City's administrative offices within human resources.

Original application materials are retained in an attempt to create a full historical record of the employee's participation in the organization, from initial appointment to separation. Additional documents and records referring to assignments, promotions, commendations, discipline, and other personnel actions are maintained as well. Forms or other documentation pertaining to the member's performance, and reports describing details of accidents, other injuries, or injury-related incidents are maintained should future reference and cumulative evaluation or analysis be needed.

Records of health evaluations, exposures to hazardous substances or contagious diseases, and other medical records are on file. All medically related records, protected under federal privacy laws, are stored by the fire department and should be kept separate from routine personnel records. Access to these records should be on a need to know basis.

Promotions

Of concern to fire department line personnel is the absence of effective guidance on the promotional leadership and management within the department. The department relies on the traditional method of officer promotions, with only cursory review of the most basic qualifications.

The fire department should consider significant improvements in the definition of formal requirements and qualifications for promotion to higher positions of authority and responsibility. Consideration could be given to establishing promotion committees or boards, with representation from both inside and outside the fire department, to oversee the selection process, and to evaluate any assessment or qualification scores. The selections should be made based on merit and qualification.

Recommendations:

- Immediately initiate a program requiring all fire department operational employees to successfully complete on-going *NFPA 1582* medical examinations.
- Conduct annual physical competency evaluations of all fire department operational employees.
- Conduct an annual performance evaluation of all operational members and employees.

Staffing

Fire departments must provide adequate staffing in three key areas - emergency services, administration, and support. ESCI surveyed the RWFD to determine how the balance between the three areas is maintained, given the realities of available local resources.

Several standards address staffing issues. Specifically, the *OSHA Respiratory Protection Standard 29 CFR 1910, 134*; *NFPA 1710 Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations and Special Operations to the Public by Career Fire Departments*; and *NFPA 1720 Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments* are frequently cited as authoritative documents. In addition, the Center for Public Safety Excellence (CPSE) publishes a sample for the number of personnel suggested on the emergency scene for various levels of risk.⁶

Organizational Structure

Span of control, also known as span of management, is a human resources management term that refers to the number of subordinates a supervisor can effectively manage. Developed in the United Kingdom in 1922 by Sir Ian Hamilton, the concept of span of control evolved from the assumption that managers have finite amounts of time, energy, and attention to devote to their jobs. In his research of British military leaders, Hamilton found that leaders could not effectively control more than three to six people directly.

This generally accepted *rule of thumb* for span of control is still considered relevant today and applies not only to the military, but correspondingly to the fire service. It is important to note that all managers experience a decrease in effectiveness as their span of control exceeds the optimal level. In other words, the limitations implied by span of control are not short-comings of certain individual managers, but rather of managers in general. In addition, it is important to understand that span of control refers only to direct reports, rather than to an entire corporate hierarchy (all personnel in the fire company).

⁶ CPSE: formerly the Commission on Fire Accreditation International (CFAI).

"Extending span of control beyond the recommended limits engenders poor morale, hinders effective decision making, and may cause loss of the agility and flexibility that give many entrepreneurial firms their edge."⁷ RWFD is staffed with primarily career personnel supplemented by paid-on-call volunteer personnel.

Administration and Support Staff

One of the primary responsibilities of a fire department's administration and support staff is to ensure that the operational entities have the ability and means to accomplish their responsibilities on the emergency incident. Efficient and effective administration and support are critical to the department's success. Without sufficient oversight, planning, documentation, training, and maintenance, the operational entities of a fire company will fail any operational test. Additionally, like any other part of a fire company, administration and support require appropriate resources to function properly.

Analyzing the administrative and support positions of a fire department facilitates an understanding of the relative number of resources committed to this important function. The appropriate balance of the administration and support components to the operational component is critical to the success of the company's mission and responsibilities.

In addition to the *Organization and Community Overview* outlining the relationship of the fire department to the City, the following figures outline the corporate, administration, and/or support organizational structure and complement of the fire department.

Figure 18: Red Wing Fire Department Support Complement

Position	FTEs
Administrative Assistant	0.5
Fire Marshal	1.0
EMS Training/Inspector	1.0
Fire Training/Inspector	1.0
Total	3.5

Source: ESCI Worksheet

⁷ Hendricks, Mark. *Span Control* Entrepreneur, January 2001.

Emergency Services Staff

It takes an adequate and well-trained staff of emergency responders to put the appropriate emergency apparatus and equipment to its best use in mitigating incidents. Insufficient staffing at an operational scene decreases the effectiveness of the response and increases the risk of injury to all individuals involved. The following figures summarize the personnel assigned to street-level service delivery as provided by the department. The *Comparison of Firefighters per 1,000 Population* chart (Figure 20) provides benchmarks from data provided by the National Fire Protection Association.

The department has 40 emergency response personnel including 19 career personnel and 21 paid-on-call personnel. The population of RWFD's area is approximately 16,550. The ratio of volunteer (paid-on-call) firefighters per 1,000 population is 1.27. The ratio of career firefighters is 1.15 per 1,000 population. The volunteers per 1,000 population is slightly below the regional and national averages as indicated in Figure 20, but this is due to the complement of career firefighters, which is unusual in jurisdictions with similar populations, both regionally and nationally.

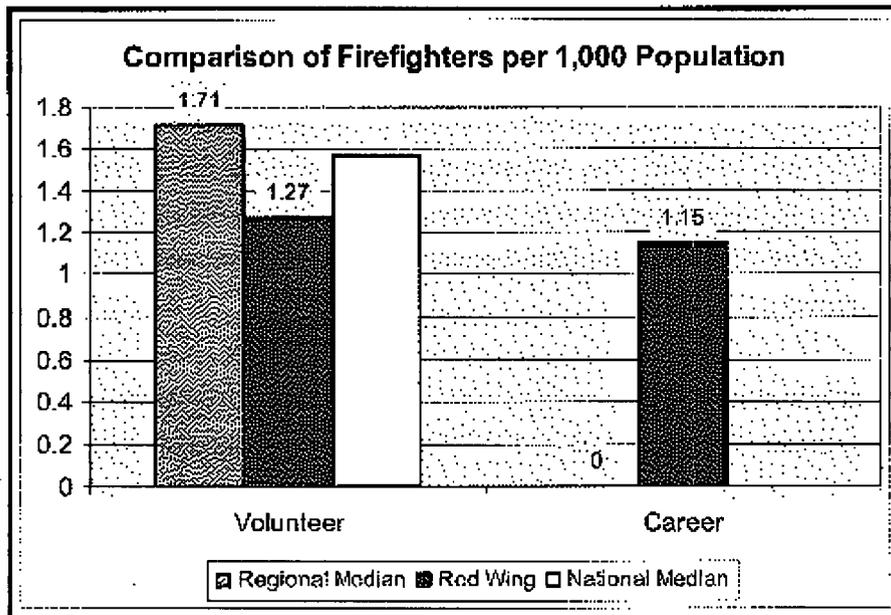
Figure 19: Red Wing Fire Department Response Complement

Position	Number
Fire Chief	1
Fire Captain	3
Firefighter	15
Paid-on-Call Captain	3
Paid-on-Call Firefighter	18
Total	40

Source: ESCI Worksheet

Although not included in information above due to position classification, the Fire Marshal and two training positions also participate in response and suppression activities, adding to the total number of response personnel.

Figure 20: Red Wing Fire Department Firefighters per 1,000 Population



Source: NFPA Worksheets

Critical Tasks and Staffing Performance

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

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

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

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

Figure 21: Sample of Critical Task Staffing by Risk

Minimum Firefighting Personnel Needed Based on Level of Risk				
Critical Task	Maximum Risk	High Risk	Moderate Risk	Low Risk
Attack line	4 (16-18*)	4	2	2
Search and rescue	4	2	2	
Vent/fallon	4	2	2	
Back-up line	2	3	3	
Pump operator	1	1	1	1
Water supply	1	1	1	
Utilities	1	1	1	
Command/safety	2	2	1	1#
Forcible entry	*			
Accountability	1			
Salvage	*			
Overhaul	*			
Communication	1*			
Chief's aide	1	1		
Operations officer	1			
Administration	*			
Logistics	1			
Planning		1*		
Staging		1*		
Rehabilitation	1			
Sector officers	1 (4*)			
High-rise evacuation	10-30*			
Stairwell support	10*			
Relief	*			
Investigation	*			
Totals	25-65*	17	13	3-4
# Can often be handled by the first due officer				
* At maximum and high-risk fires, additional personnel may be needed				

The fire service assesses the relative risk of properties and occurrences based on a number of factors. Properties with high fire risk often require greater numbers of personnel and apparatus to effectively mitigate the fire emergency. Staffing and deployment decisions should be made with consideration of the level of risk involved.

The level of risk categories used by CPSE relate as follows:

- Low risk – Areas and properties used for agricultural purposes, open space, low-density residential and other low intensity uses.

- Moderate risk – Areas and properties used for medium density single family residences, small commercial and offices uses, low intensity retail sales and equivalently sized business activities.
- High risk – Higher density business districts and structures, mixed use areas, high density residential, industrial, warehousing, and large mercantile structures.

The department has determined that 13-19 firefighters are required to resolve a moderate risk residential structure fire, 13-20 firefighters to resolve a moderate risk commercial fire, and 15-20 firefighters to resolve a high risk commercial structure fire. RWFD's low risk emergency task analysis ranges from four to eight firefighters for resolution. The CPSE staffing sample suggests that a low risk may be resolved with three to four firefighters, a moderate risk with 13 firefighters, and a high risk with 17 firefighters.

RWFD has experienced an average of seven firefighters responding to structure fires for calendar years 2006, based on their NFIRS reporting. Analysis reflects an experience, on average, of approximately 46 percent fewer firefighters responding to moderate risks than the staffing sample provided by the CPSE, and 52 percent fewer firefighters than the number indicated by the RWFD firefighter task analysis by risk. High risk responses have an even greater disparity and the low risk response is marginal. The analysis is further exacerbated by the fact that available data does not reflect when volunteer responders arrive in relation to the initial fire attack and/or incident resolution.

Figure 22: Red Wing Fire Department Task Analysis/Number of Firefighters

Task	RWFD Task Analysis #FF	CPSE Sample #FF	Average #FF Response
Low Rise Residential Structure Fire	13-15	13	7.00
High Rise Residential Structure Fire	13-19	17	
Moderate Risk Commercial Structure Fire	13-20	13	7.00
High Risk Commercial Structure Fire	15-20	17	7.00
Grass/Brush Fire	4	3-4	3.50
Automobile Fire	4	3-4	3.38
Emergency Medical Patient	4-5	3-4	3.96
Motor Vehicle Accident	10-12	3-4	3.94
Hazardous Materials ²	9-18	17	3.55

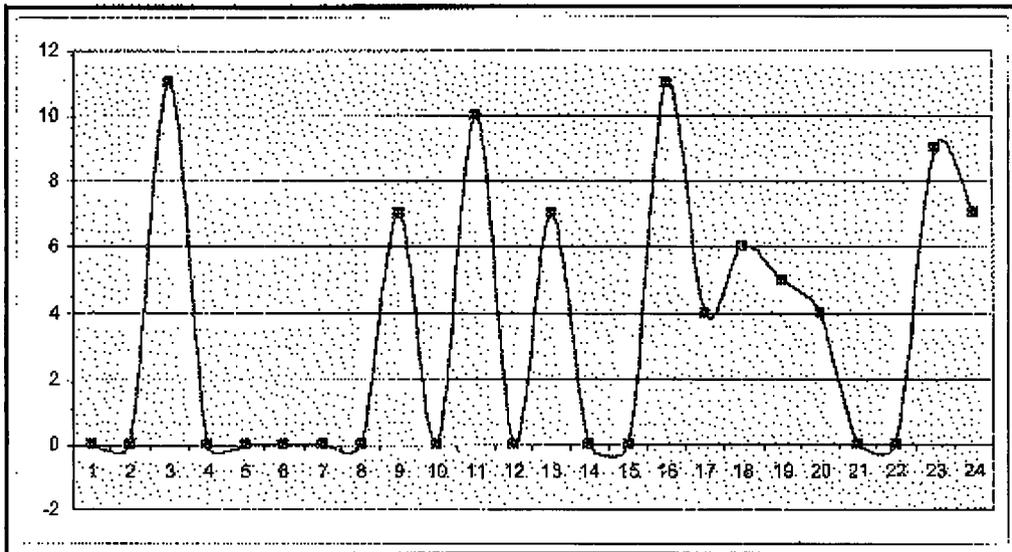
Source: RWFD Worksheets/NFIRS
²Supported by Regional Response Team

A more detailed analysis of incident response staffing was accomplished through the comparison of their incident staff response performances to national standards, and local and national task analyses and observations.

The data presented in Figure 23 through Figure 26 was derived from the National Fire Incident Reporting System (NFIRS) reports provided by the fire department for calendar year 2006.

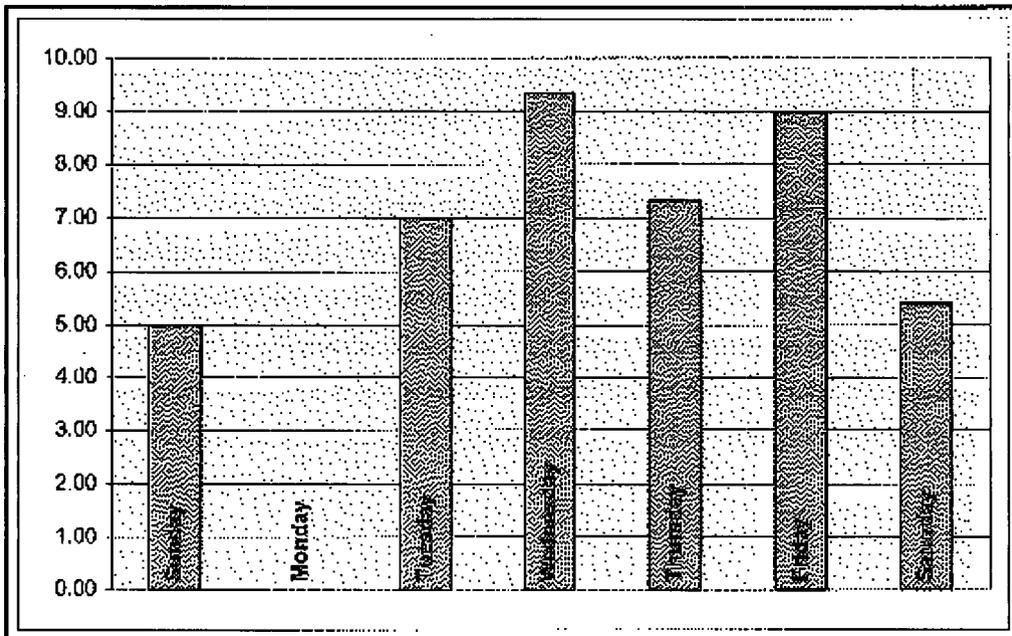
As indicated in the earlier table, RWFD provided an overall average of 7.00 firefighters per structure fire during 2006. The following figure illustrates how the average number of firefighters fluctuates throughout a typical day. The data is representative of calendar year 2006 and those hour segments showing no response in the figure had no structure fire activity to note. Based on hour of the day computations, the department provided a low average of four firefighters at the 5:00 p.m. and 8:00 p.m. hours, and a high average of 11 firefighters at the 3:00 a.m. and 4 p.m. hours.

Figure 23: RWFD Average Firefighters to Structure Fires by Hour



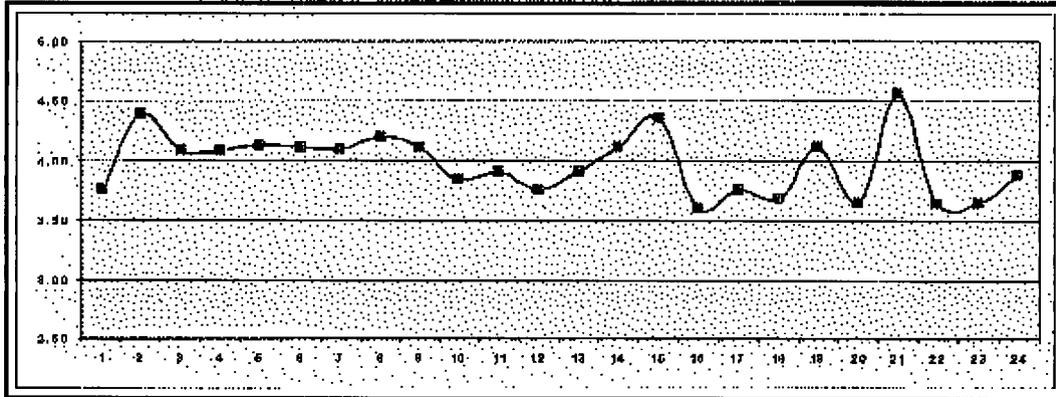
Based on day of the week computations, the low average for structure fires occurred on Sundays with five firefighters. The high average was Wednesdays at 9.33 firefighters.

Figure 24: RWFD Average Firefighters to Structure Fires by Day of Week



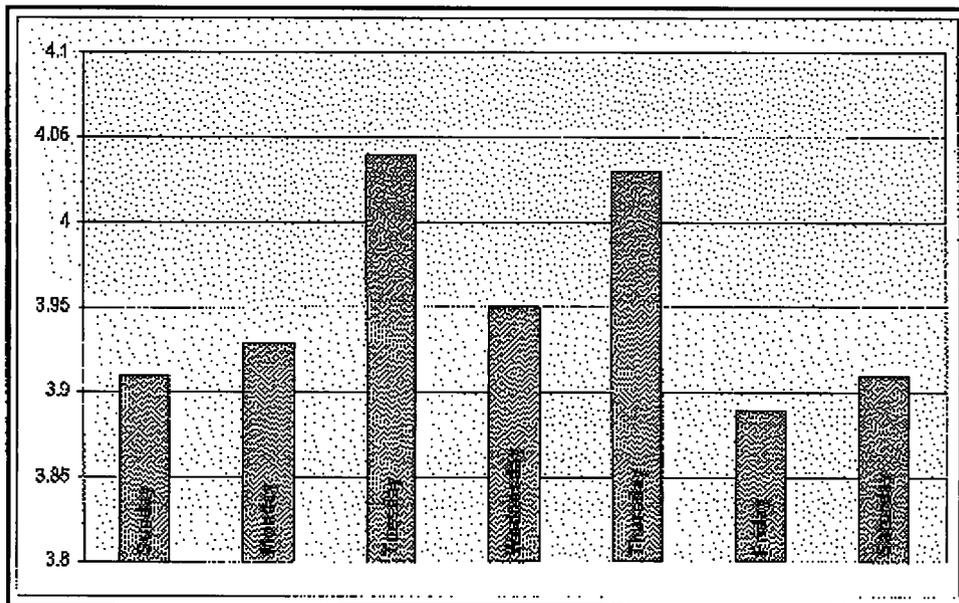
Based on hour of the day computations, RWFD provided an average of 3.98 firefighters to non-structure fire incidents. This determination includes a low average of 3.60 firefighters at the 3:00 p.m. hour and a high average of 4.56 firefighters at the 8:00 p.m. hour.

Figure 25: RWFD Average Firefighters to Other Incidents by Hour



Based on day of the week computations, the low average for incidents other than structure fires occurred on Fridays with 3.89 firefighters. The high average was Tuesdays with 4.04 firefighters.

Figure 26: RWFD Average Firefighters to Other Incidents by Day of Week



The National Fire Protection Association has issued response performance standards for fire departments. These standards, among other things, identify response time performance objectives for fire departments and target staffing standards. These peer standards are not legal mandates, but they can provide a useful benchmark against which to measure the fire department's performance.

Of significance to the staffing objective of this study, NFPA standards establish a response company as consisting of four personnel. The standard does not require that all four be on the same vehicle, but does expect that the four will operate as a single functioning unit once on scene.

There is another reason the arrival of four personnel is critical for structure fires. As mentioned earlier, OSHA regulations require that before personnel can enter a building to extinguish a fire at least two personnel must be on scene and assigned to conduct search and rescue in case the fire attack crew becomes trapped. This is referred to as the two-in-two-out rule.⁶ The only exception to this regulation is if it is known that victims are trapped inside the building.

Recommendations:

- On average, RWFD is not providing adequate staffing to moderate and high-risk incidents, particularly structure fires. The result of inadequate incident staffing is typically the failure to complete all critical tasks in a timely manner. The predictable outcome is undesirable fire spread and increased dollar loss. Additional incident staffing should be a critical goal of the department through better use of paid-on-call personnel and/or additional career personnel on duty.
- RWFD should consistently monitor its incident staffing performance to compare actual incident staffing to the critical task analysis. Where deficiencies are found, operational changes should be considered to correct the problem. Ongoing performance monitoring is a key to recognizing trends in incident staffing.

Application, Retention, and Recruitment

The application process, retention, and recruitment of personnel are critically important functions for emergency service agencies. This is especially critical for fire departments that rely on volunteer firefighters to supplement the career personnel. The community places a

⁶ 29 CFR 1910.134(g)(4).

tremendous amount of trust in fire department personnel. The need for a comprehensive, seamless, effective selection, retention, and recruitment process is paramount to maintaining a healthy, efficient, responsive fire company.

Applicants for career positions submit their written applications through Chippewa Valley Technical College's (CVTC) FireMedic program. CVTC places all applications of individuals that meet their minimum requirements into a pool of applicants for area fire departments. When positions become available, those individuals who have expressed an interest in RWFD are contacted and offered an interview through the City's human resources department. Upon completion of the interview, selected individuals undergo physical and drug testing prior to being offered employment. Once offered employment, personnel begin a training program orienting them to fire department operations. After the training program is complete, personnel are placed on regular shifts based on open positions. City personnel policies address a standard probationary period for all City employees.

Paid-on-call retention and recruitment is handled on a formal basis by the fire department through the City's human resources department. The paid-on-call staff is limited to 30 members, although only 21 are currently on the roster with no immediate plans to fulfill the council allocated positions. There are no current formal methods in place to market the department for public educational purposes related to recruitment of personnel. Typically, only informal notifications of community citizens are utilized to attract new paid-on-call personnel.

Retention and Recruitment

The American's with Disabilities Act (ADA) prohibits discrimination against individuals with physical disabilities, but permits employers to establish the physical standards that are required to perform the primary functions of any job safely and effectively. History has shown that the most effective method of avoiding a litigation suit involving ADA is through reasonable and consistent application of job/task-relevant pre-acceptance, appointment, and/or employment physical ability testing.

The United States Fire Administration and the National Volunteer Fire Council have recently released a comprehensive guide to volunteer recruitment and retention; *Retention and Recruitment for the Volunteer Emergency Services: Challenges and Solutions*.

"Among the challenges identified and addressed in the new guide are time demands, training requirements, increasing call volume, changes in the *nature of the business*, changes in sociological conditions, leadership challenges, federal legislation, internal conflict, higher cost of housing, aging communities, and effects of the decline in volunteers."⁹

The guide, among many things, addresses factors that are truly altruistic and are a large part of the cornerstone of the volunteer fire service. The fire service is a natural place for people to serve their local community.

"It would appear that these issues could be addressed and improved upon with strong leadership. The officer corps must realize the value of positive reinforcement for individual members and they must understand that constant criticism will tend to drive people from the organization. A healthy organization climate is one that constructively addresses issues that need correcting but also enthusiastically recognizes the positive contributions by individual members."¹⁰

Of note is a survey conducted and published in the report addressing "What makes members want to volunteer?" "What keeps volunteers serving?" and "What makes your members leave your organization?" A synopsis of these findings is outlined in the appendix.

As is typical of most public employment processes, RWFD chooses to set specific entry requirements for new personnel, accompanied by objective evaluation processes, and accepting those who fully meet these requirements.

Candidates who turn out to be unqualified or incapable of performing as expected are discharged through established, consistent methods (with appeal capability) during training and probationary periods. This method is far more objective and eliminates much of the risk of civil litigation in cases where someone feels aggrieved by a subjective termination or denial of membership.

To a large extent, RWFD competes for personnel resources with other departments. Additionally, according to department personnel, Red Wing has become a *training ground* for personnel that are seeking career positions in larger, busier, urban departments in or around the Twin Cities.

⁹ *Retention and Recruitment for the Volunteer Emergency Services: Challenges and Solutions*, 2007 (Second Edition), United States Fire Administration.

¹⁰ *Ibid.*

The fire department does not prioritize paid-on-call retention and recruitment when volunteer staffing continues to be a nationwide challenge and local economies continue to struggle with an increasing cost of providing fire protection for their communities.

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Capital Assets and Resources

Facilities

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

As previously mentioned, the fire department has millions of dollars worth of capital assets. These assets are necessary to provide service and must be maintained and replaced as needed. Maintenance and replacement plans should be created and maintained for facilities, apparatus, and other high value equipment. A funding mechanism should be established to ensure money is available to cover the cost of this effort.

While volunteer, career, and even combination departments have different facility requirements, there are basic needs each fire station has to address - quick response time and housing of staff, apparatus, and equipment. Everything else depends on a particular department's budget and needs. Fire station designs are unlike any other type of project, as there are many subtle elements and specialized systems that go into a fire station.

Inadequate facilities for housing firefighters and apparatus detract from the department's mission. Limited space can significantly impact the available options for resource assignment, hinder the ability to maintain a well-trained and fit workforce, and may affect volunteer and employee morale. In the case of this department, the design and construction of the fire stations are suitable for volunteer operations, as they exist today. However, consideration should be given to the ability of the facilities to support the functions and goals of the department, as it may operate in the future.

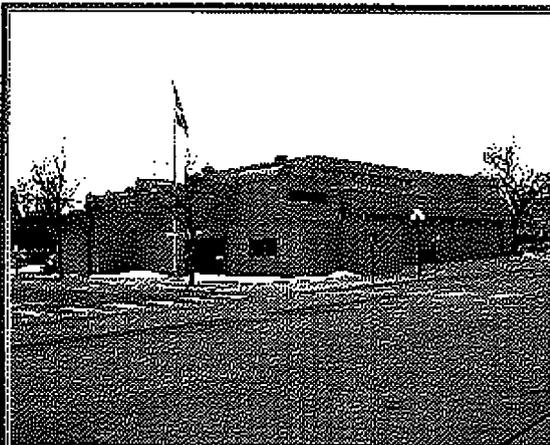
The primary functions that should take place within the fire station environment should be closely examined and adequate, efficient space for all functions should be provided.

Here are some examples:

- Housing and cleaning apparatus and equipment
- Administrative office duties
- Firefighter training
- Firefighter fitness
- Residential living that is gender compatible for on-duty career members where needed
- Adequate space and facilities for temporary residential capability for on-call volunteer members during periods of disaster or other civil emergency

While this list may seem elementary, the lack of dedicated space compromises the ability of the facilities to support any of these functions and can detract from its primary purpose for existing.

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



Station One

420 Plum Street

Built in 1983, this two-story, 23,500 square foot headquarters facility consists of one drive-through and six back-in apparatus bays. The structure is professional in appearance and blends well with the downtown government complex and surrounding area. Any specific issues or observations with this facility can be classified into the following seven categories.

<ul style="list-style-type: none"> • Design: 	<p><i>The facility is adequately sized for current use. It appears to be adaptable to future needs. Modest parking availability in the area.</i></p>
<ul style="list-style-type: none"> • Construction: 	<p><i>Masonry block and brick veneer with flat composition roofing. Natural gas, forced-air heating. Approximately 65% central air conditioning. Roof repair underway at time of site visit. No other issues noted.</i></p>
<ul style="list-style-type: none"> • Safety: 	<p><i>Apparatus exit to traffic appears safe and effective. Only 5 of 8 doors had operating safety stops. Building is 100% sprinklered. Fire/smoke alarm systems in place. Annual sprinkler system inspection not conducted since 2005. Pressure cylinders not properly stored near rear bay door, compressor room. Required breathing air certification was overdue at time of site visit. Diesel-powered back-up generator in place.</i></p>
<ul style="list-style-type: none"> • Environment: 	<p><i>Vehicle exhaust removal system in place and used. Underground storage tank present with electronic monitoring system. No other issues noted.</i></p>
<ul style="list-style-type: none"> • Code Compliance: 	<p><i>No code issues noted. Building may not be fully ADA compliant due to second floor access.</i></p>
<ul style="list-style-type: none"> • Staff Facilities: 	<p><i>Adequate space for working on and around apparatus. Co-od dorm area with privacy curtains. No issues noted.</i></p>
<ul style="list-style-type: none"> • Efficiency: 	<p><i>No issues noted.</i></p>

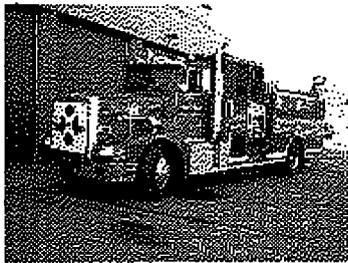
Recommendations:

- Fire station sprinkler system inspections should be conducted annually and inspection tags properly posted.
- Breathing air compressor is required to have regular air samples certified for compliance with OSHA requirements. Current certificate must be posted at the compressor. This should be corrected immediately.

Apparatus

The Red Wing Fire Department maintains a fleet of response vehicles that serve various functions for the City, ranging from transport ambulances to an elevating aerial platform. One third of the fleet has exceeded the anticipated front-line lifespan for its type. Average age of all apparatus related to this study is 15.7 years. Average condition of all fire apparatus is considered fair. The department and City need to consider apparatus maintenance and replacement to be a major priority in both the short and long-term to ensure continued reliability for emergency service use.

Each piece of heavy apparatus was given a basic review for condition and safety. The following paragraphs describe any notations made during this review. The apparatus condition ratings utilized by ESCI are provided in the appendix of this report.

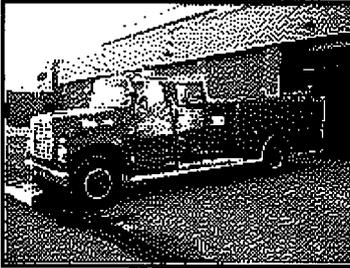


Engine 1

1996 Peterbilt/Custom Fire Apparatus Pumper

Seating Capacity: 5
Pump Capacity: 1250
Tank Capacity: 900
Condition: **Good**
Mileage: 57,500

Additional Comments or Observations: Corrosion evident on door frames and hinges, as well as chassis spring mounts and frame.



Engine 2

1972 Ford/ General Safety Equipment Pumper

Seating Capacity: 5-Open
Pump Capacity: 1250
Tank Capacity: 750
Condition: **Poor**
Mileage:19,613

Additional Comments or Observations: Large amounts of surface rust. Corrosion evident on frame, chassis spring mounts. Leaf helper spring mount rusted almost through. Gas appliance in non-vented compartment. Riding straps hanging from rear in conflict with department claim that tailboard riding is prohibited. Use of open cab is discouraged.

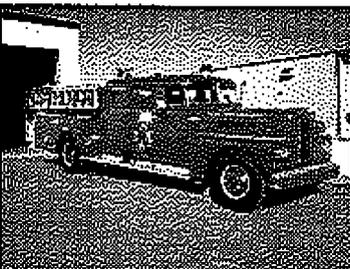


Engine 3

1985 Ford/Custom Fire Apparatus Pumper

Seating Capacity: 5
Pump Capacity: 1250
Tank Capacity: 1000
Condition: **Poor**
Mileage: 53,268

Additional Comments or Observations: Door frames rusted to crumbling. Pitting and corrosion on surface paint and running boards. Rust and corrosion evident on frame and chassis springs. Exposed wiring in non-vented compartment with gas appliance poses potential fire danger. Leaf helper spring mount rusted almost through.



Engine 4

1967 Pirsch Pumper

Seating Capacity: 5
Pump Capacity: 1250
Tank Capacity: 400
Condition: **Poor**
Mileage:23,473

Additional Comments or Observations: Reserve status at Ellsworth Fire Department building at Red Wing Airport. Frame and surface rust. Metal cracks and fatigue cracks evident. Rust reported in tank jeopardizes pump.

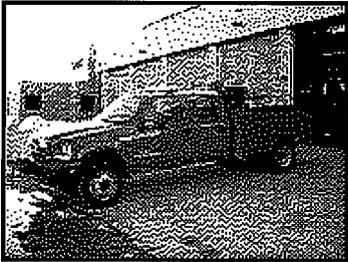


Truck 1

2003 Pierce 100 foot Aerial Quint

Seating Capacity: 6
Pump Capacity: 2000
Tank Capacity: 300
Condition: **Excellent**
Mileage: 4,012

Additional Comments or Observations: No problems noted.



Brush 1

2004 Ford F450 Wildland Unit

Seating Capacity: 5
Pump Capacity: 200
Tank Capacity: 300
Condition: **Excellent**
Mileage: 4,546

Additional Comments or Observations: No problems noted. Skid mount pump/tank unit.
Addition of class A foam injector would improve effectiveness.



Medic 1

2004 Ford Road Rescue Ambulance

Seating Capacity: 2
Pump Capacity: NA
Tank Capacity: NA
Condition: **Good**
Mileage: 114,107

Additional Comments or Observations: Equipped with SCBA, gas-driven hydraulic rescue combi tool, airbags, mini cutter, light cribbing. No problems noted.

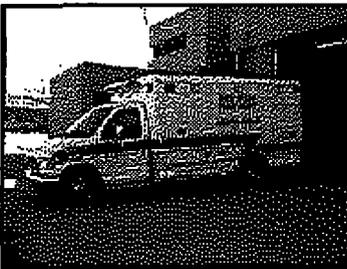
Medic 2



2000 Ford Road Rescue Ambulance

Seating Capacity: 2
Pump Capacity: NA
Tank Capacity: NA
Condition: Fair
Mileage: 183,000

Additional Comments or Observations: Not available for review



Medic 3

1998 Ford Road Rescue Ambulance

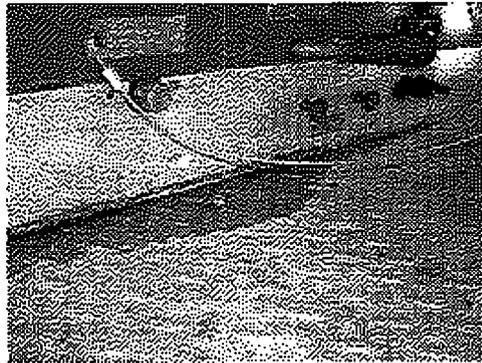
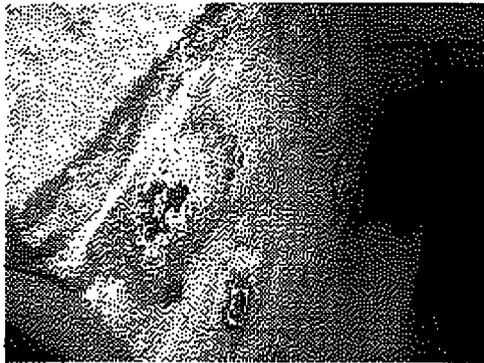
Seating Capacity: 2
Pump Capacity: NA
Tank Capacity: NA
Condition: Fair
Mileage: 167,249

Additional Comments or Observations: Slight surface rust evident. Some corrosion on springs and frame. High mileage. Equipped with electric-driven extrication combi tool.

It should be noted that the odometers on Engines 2 and 4 do not turn when the pump is in gear. This results in a potentially inaccurate account of true vehicle usage, particularly in the absence of a pump hour meter. As indicated in the apparatus condition reviews, the department only has one pumper that was evaluated to be in good condition. The older pumpers, Engines 2, 3, and 4 are all showing significant signs of rust and corrosion in the frame areas. The corrosion appears to be deeper than simple surface rust and is affecting functioning portions of the chassis and suspension system. All three of the vehicles have significantly exceeded their anticipated lifespan for a City fire department.

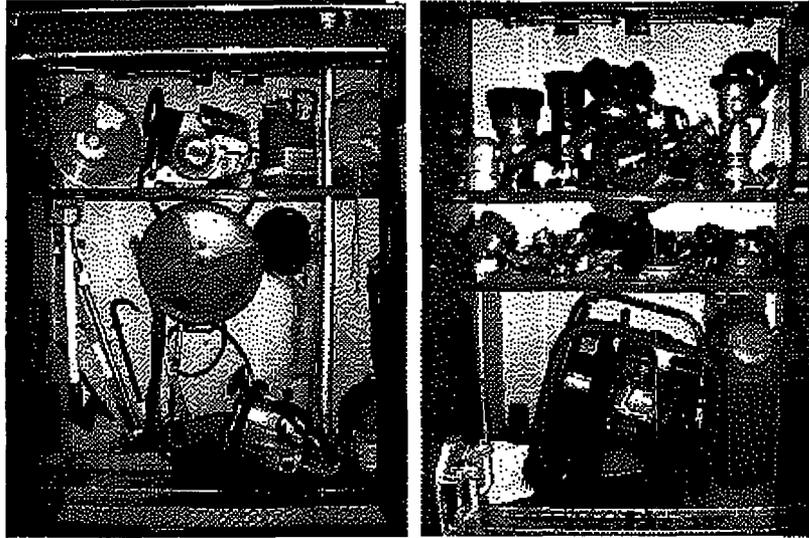
The following photos illustrate the type of rust damage found on Engines 2 and 3.

Figure 27: Photographs of Rust Damage



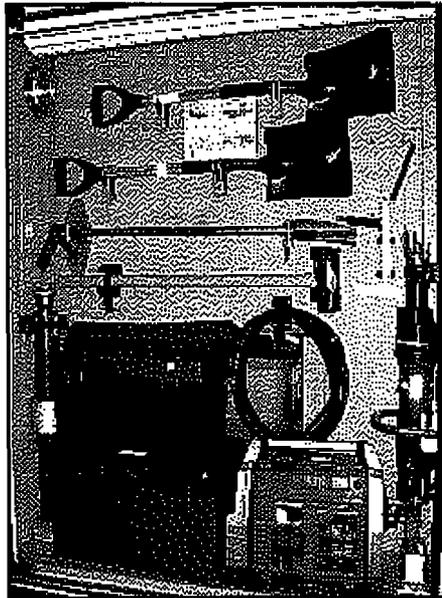
In addition, the observations by ESCi revealed compartments that were not being thoroughly cleaned and were poorly organized. Equipment was stacked and, in some cases, tangled or blocked in by other equipment. The following photos of RWFD apparatus compartments show these conditions.

Figure 28: Red Wing Fire Apparatus Compartment Conditions



An example of a well-organized pumper compartment is shown in the following figure.

Figure 29: Sample Pumper Compartment Organization



This level of organization and cleanliness may be difficult to achieve, given the age and condition of RWFD's apparatus, but it serves to provide an example of a vehicle that is

organized in such a fashion as to provide optimum deployment of contents under emergency conditions.

It was also noted that RWFD had various pieces of rescue and extrication equipment spread throughout several pieces of apparatus. It appeared that the equipment was placed in compartments based almost solely on where it would fit with little consideration to actual deployment during an emergency. If the department experiences a technical rescue situation, it may face the need to have numerous pieces of apparatus present in order to collect all the necessary gear and equipment. Given the limited manpower, this could present a challenge.

Obtaining a dedicated rescue vehicle to house all of this equipment might provide the ideal solution, but given the limited manpower available an appropriate short-term solution may be to review and inventory all equipment and consider a universal relocation scheme that collects the majority of rescue and technical services equipment by incident type. Consideration could also be given to specifying a *rescue pumper* as one of the next engines. These units are fire engines that have larger than usual compartments designed specifically for efficient deployment of rescue equipment to permit the truck to double as a light to medium-duty rescue truck.

Recommendations:

- Red Wing Fire Department should address the organization and cleanliness of vehicle compartments, with a specific focus on rapid deployment of equipment.
- Specific apparatus issues or concerns should be addressed as soon as practical.
- Several of the RWFD's apparatus have significantly exceeded their life expectancy and are, as might be expected, in poor condition. Replacement of these vehicles should be a department and City priority.
- Severe rust damage involving frame or suspension areas of apparatus should be inspected and, where appropriate, repaired immediately.
- Consideration should be given to universal reorganization of rescue and technical services equipment to ensure that multiple apparatus need not be dispatched simply to collect the necessary equipment to perform a rescue evolution.
- A future pumper replacement should consider the possibility of a rescue compartmentation design to facilitate its performance as both a pumper and light to medium-duty rescue truck.

Vehicle Replacement Plan

Fire apparatus are typically very unique and expensive pieces of equipment, often very customized to operate efficiently in a narrowly defined mission. A pumper may be designed such that the compartments fit specific equipment and tools, with virtually every space on the truck designated in advance for functionality. This same vehicle, with its specialized design, cannot be expected to function in a completely different capacity, such as a hazardous materials unit or a rescue squad. For this reason, fire apparatus is very expensive and offers little flexibility in use and reassignment. As a result, communities across the country have sought to achieve the longest life span possible for these vehicles.

Unfortunately, no mechanical piece of equipment can be expected to last forever. As a vehicle ages, repairs tend to become more frequent, parts more difficult to obtain, and downtime for repair increases. Given the emergency mission that is so critical to the community, this factor of downtime is one of the most frequently identified reasons for apparatus replacement.

Because of the large expense of fire apparatus, most communities have efforts in place to plan ahead for the cost of replacement. To properly do so, communities often turn to the long-accepted practice of establishing a life cycle for the apparatus that result in a replacement date being anticipated well in advance. Many communities then set aside incremental funds during the life of the vehicle so replacement dollars are ready when needed.

The City does not maintain a formal schedule that places all apparatus on any specified replacement cycle from date of primary service. Any such program typically works fine for the purpose of fiscal planning, but selecting the life cycle of apparatus can be very difficult. This decision is influenced by many factors:

- Actual hours of use of any specific piece of equipment can vary significantly in comparison to other similar apparatus even within the same fire department. Attempts to shuffle like apparatus among busy and slower fire stations to more evenly distribute hours of use have proven difficult. Frequent changes in apparatus create familiarity and training challenges. In addition, certain response areas may have equipment and tool requirements that are not in common with others.
- Actual hours of use, even if evenly distributed, do not necessarily equate to intensity of use. For example, a pumper making mostly emergency medical responses will not age

as rapidly as a pumper with a high volume of working fire incidents that require intense use of the pump or hydraulics. Likewise, road mileage can also be a poor indicator of deterioration and wear.

- Technology, which is increasingly a factor in fire equipment, becomes outdated even if the apparatus wear is not as significant. In some departments, crews at different fire stations deal with widely different technology on their pumpers based simply on age of the equipment. Like steam engines and modern electric locomotives, these differences can be significant, affecting everything from safety and lighting systems to automated digital pump pressure controls to injection foam generation.

NFPA 1901: Standard for Automotive Fire Apparatus is a nationally recognized industry standard for the design, maintenance, and operation of fire suppression apparatus. The issue of replacement cycles for various types of apparatus has been discussed in the standard's development committee for many years. In developing its latest edition, the committee calls for a life cycle of 12 years in front-line service and five years in reserve status for engines, and 15 years in front-line service and five years in reserve status for ladder trucks.

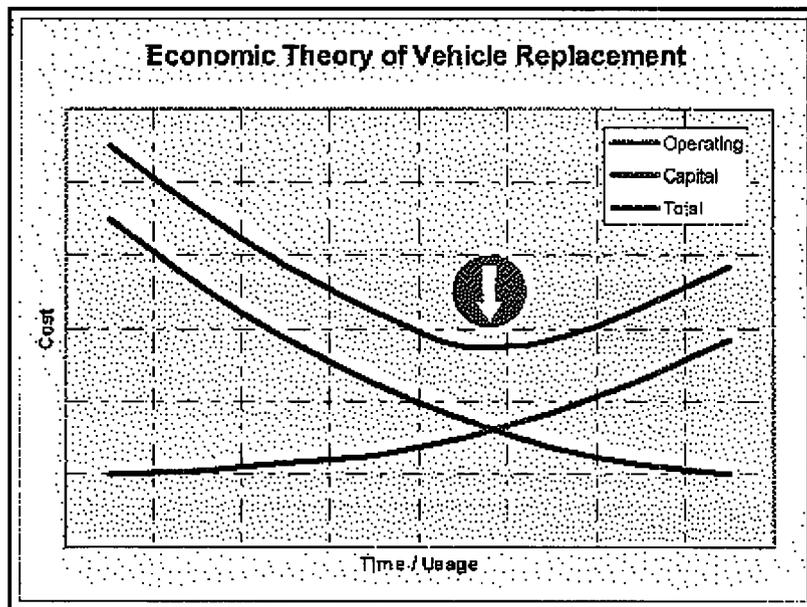
Does this mean that a fire engine cannot be effective as a front-line pumper beyond 12 years? A visit to many departments in the United States might prove otherwise. Small, volunteer fire departments with only a hundred or so calls per year often get up to 25 years from a pumper, though the technology is admittedly not up-to-date. Likewise, busy downtown city fire stations in some urban communities move their engines out of front-line status in as little as eight years.

The reality is that it may be best to establish a life cycle that would be used in the development of replacement funding for various types of apparatus, while applying a different method for actually determining the replacement date in real life in an effort to achieve greater cost efficiency where possible.

A conceptual model that may be used when a replacement cycle is considered is the *Economic Theory of Vehicle Replacement*. The theory states that, *as a vehicle ages, the cost of capital diminishes and its operating cost increases*. The combination of these two costs produces a total cost curve. The model suggests the optimal time to replace any piece of apparatus is when the operating cost begins to exceed the capital costs. This optimal time may not be a fixed point

but rather a range over time. The flat spot at the bottom of the total curve in the following figure represents the replacement window.

Figure 30: Economic Theory of Vehicle Replacement



Shortening the replacement cycle to this window allows for an apparatus to be replaced at optimal savings to the department. If the department does not routinely replace equipment in a timely manner, the overall reduction in replacement spending can result in a quick increase of maintenance and repair expenditures. Officials who assume that deferring replacement purchases is a good tactic for balancing the budget need to understand that two events may occur:

1. Costs are transferred from the capital budget to the operating budget
2. Such deferral may increase overall fleet costs

Regardless of its net effect on current apparatus costs, the deferral of replacement purchases unquestionably increases future replacement spending needs.

Given the City's service demand, a life cycle that is longer than the NFPA cycle is recommended for financial planning purposes. In a recent White Paper produced by the Fire Apparatus Manufacturer's Association, the authors surveyed 1,200 fire chiefs from across the

country in regards to apparatus condition and usage in an attempt to identify optimum usage and replacement criteria. Of those who responded to the survey, 30 percent were career organizations and 82 percent were serving populations less than 50,000. Of the total, 25 percent identified themselves as urban, while 46 percent identified themselves as suburban, and 48 percent identified themselves as rural. For comparison purposes, the suburban statistics were used here, representing non-metropolitan communities of mostly single-family residential, and light to moderate industrial and commercial development. The information in the figures below is an excerpt from that report, specifically focusing on career departments.¹¹

Figure 31: Average Apparatus per Department by Type

Apparatus Type	Average
Pumper/Engine	5.8
Aerial	1.5
Rescue	2.5

Figure 32: Estimated Life Expectancy (Active Service)

Apparatus Type	Average
Pumper/Engine	16
Aerial	19
Rescue	15

Figure 33: Estimated Life Expectancy (Reserve Service)

Apparatus Type	Average
Pumper/Engine	11
Aerial	10
Rescue	7

Figure 34: Estimated Total Service Life (Suburban Department)

Apparatus Type	Average
Pumper/Engine	27
Aerial	29
Rescue	22

This information corresponds to call volumes as indicated below. Call volume significantly below the noted averages would tend to lengthen the average service life of all vehicles.

¹¹ Lackore, Roger. *Fire Apparatus Duty Cycle White Paper*. Fire Apparatus Manufacturer's Association, Technical Committee. August 10, 2004.

Figure 35: Average Annual Call Volume

Apparatus Type	Average
Pumper/Engine	780
Aerial	520
Rescue	832

The information provided is intended to illustrate national trends and is in no way presented here as a standard to equipment replacement. When considering replacement of capital equipment, organizations must bear in mind the typical vehicle usage, climate factors that may shorten life expectancy and overall maintenance issues that tend to increase as vehicles age. With this in mind, the following figure is offered as a suggested replacement schedule for all current apparatus within the City.

Figure 36: Twenty Year Vehicle Replacement Plan

UNIT	YEAR	REPLACEMENT COST	ANNUAL FUND CONTRIBUTIONS	CURRENT CASH REQUIREMENTS	CURRENT AGE	LIFE EXPECTANCY	REPLACEMENT YEAR
Engine 1	1996	\$ 340,000	\$ 14,783	\$ 177,391	12	23	2019
Engine 2	1972	\$ 340,000	NA	\$ 340,000	36	23	OVERDUE
Engine 3	1985	\$ 340,000	\$ 14,783	\$ 340,000	23	23	OVERDUE
Engine 4	1967	\$ 340,000	NA	\$ 340,000	41	23	OVERDUE
Truck 1	2004	\$ 750,000	\$ 30,000	\$ 120,000	4	25	2029
Brush 1	2004	\$ 140,000	\$ 9,333	\$ 37,333	4	15	2019
Medic 1	2004	\$ 155,000	\$ 15,500	\$ 62,000	4	10	2014
Medic 2	2000	\$ 155,000	\$ 15,500	\$ 124,000	8	10	2010
Medic 3	1998	\$ 155,000	\$ 15,500	\$ 155,000	10	10	OVERDUE
TOTALS			\$ 115,399	\$ 1,695,725			

This chart shows that in order to maintain apparatus replacement funding needs for current resources, \$115,399 would need to be contributed to reserve funds each year. This is based on a continuation of the current number and type of apparatus that the fire department maintains. Also, given the age of apparatus in use today and based on the ESCI recommended replacement schedule, there would need to be \$1,695,725 available in apparatus replacement funds right now, with four of the vehicles being due or overdue for replacement.

It should be noted that the chart represents funding levels needed for a capital replacement fund that is both adequate and up-to-date, assuring cash is available for purchase at the expected time of replacement. This is not meant to exclude other funding methods from consideration. For instance, during time periods when the market provides low rates, lease-purchase programs can be financially efficient. It does, however, require the commitment of City and RWFD officials toward a scheduled apparatus replacement program.

Recommendation:

- A systematic replacement schedule should be established using a reasonable life expectancy for apparatus, by type and use, and a sustainable and reliable funding source should be established.

Support and Small Equipment

During the evaluation and review of the department's facilities and apparatus, the ancillary fire fighting and support equipment were also reviewed. Apparatus were equipped with typical complements of ladders, hose, hand tools, and other supplies. Much of the equipment appeared to be relatively old, with a few items in relatively poor condition.

It should be noted, however, that the 2002 inspection for the Public Protection Classification (PPC) by the ISO scored one of the department's engines and the ladder truck that were in service at the time more than 20 percent below their maximum allowable points due to insufficient equipment. While this condition appears to have been improved since that rating period, the department should remember that the PPC inspection is an *open book test*. The equipment requirements for maximum scoring are provided on request or retrievable from the ISO website.

Much of the more expensive equipment such as ladders and hose is also mandated by NFPA standards and is present on the RWFD trucks. It is often the small, relatively inexpensive items that are required by ISO for full scoring that are not kept on the apparatus. RWFD should review the ISO list for each class of apparatus and provide as much of the required equipment as possible.

A thermal imaging unit is available and assigned to Engine 1. According to interviews, a second thermal imaging unit is inexplicably kept in a locked office in the fire station, unavailable for response. During ESCI's evaluation, this issue was remedied and the second thermal imaging unit was placed into service on Engine 1 along with the initial thermal imaging unit. Automatic defibrillators are currently assigned to Engine 1, Car 1 (Command SUV) and Brush 1. Given that 45 percent of all firefighters that died in the line of duty in 2007 suffered heart attacks, ESCI recommends that all primary fire apparatus be equipped with an automatic defibrillator.

Small equipment can take a significant bite out of an annual budget. Small equipment can be quite expensive and has the additional challenge of often having its life limited by rapid technology improvements. For these reasons, a small equipment replacement plan should also be established. At this time, the fire department does not have such a plan. The department does, however, include at least some replacement funding in their annual budget for equipment that is known to be in need of replacement, but this is not done by a scheduled replacement plan.

The plan, like facilities and apparatus, should include a schedule of equipment covered, estimated life expectancy, replacement cost, and annual contributions required to replace equipment as needed. It is recommended that all equipment with a value of more than \$5,000, as well as groups of equipment with an aggregate value of more than \$5,000, be included in the plan. Examples include:

- Defibrillators
- Portable and mobile radios
- Computer equipment and systems
- Shop diagnostic and maintenance equipment
- Breathing apparatus
- Computer software (major systems)

Most fire departments think that their most valuable asset is the fleet of apparatus, and although the fleet is important, turnout gear should also be a major priority. According to interviews, RWFD continues to reassign some turnout gear that is as much as twenty years old. The department's turnout gear is rarely professionally measured or fitted and tends to be assigned on a *hand-me-down* basis. While it may be acceptable to reassign useable turnout gear, a fit assessment and any necessary tailoring should be conducted by a professional. Correct fit is

critical to firefighter safety. Gear that is twenty years old is well beyond its life expectancy and its use should be carefully reconsidered.

Statistical data indicates today's firefighter's health and safety are at a much higher risk due to exposure and the buildup of contaminants found in day to day fire situations. In the latest revisions to NFPA specifications 1500,¹² 1581,¹³ and 1971,¹⁴ the fire service has addressed the health and safety risks associated with contaminated turnout gear by requiring that protective clothing be cleaned at least once every six months. At this time, RWFD has an acceptable means of cleaning turnout gear in-house using an extraction-type washer.

The nature of firefighting and firefighting injuries has changed substantially over the years. Major departments are consistently reporting that less than two percent of calls involve structural fires. Concurrently, vehicle extrication and EMS calls are steadily increasing. In addition, NFPA statistics on firefighter fatalities show that stress is the leading cause of death. These two facts - the low percentage of calls involving structural fires and the high percentage of firefighter deaths and injury resulting from stress - suggest that fire departments should be focusing attention on stress reduction - in other words, on increasing firefighter mobility and comfort.

It is, therefore, important for the departments preparing to purchase new bunker gear to first perform a diagnostic of the environment in which its firefighters work. Such a diagnostic should consider the following:

- The number of calls made per year
- The percentage of calls that involve structural fires
- The percentage of calls that are EMS related
- The percentage of calls that involve vehicle extrication
- The distribution of calls between summer and winter
- The local climate (e.g. temperate & wet, cold or hot & dry, etc.)
- The department's fire attack procedures
- The physical conditioning and age of its firefighters

¹² NFPA 1500: *Fire Department Occupational Safety and Health Program*, 2007.

¹³ NFPA 1581: *Fire Department Infection Control Program*, 2005.

¹⁴ NFPA 1971: *Protective Ensemble for Structural Fire Fighting*, 2000.

The department should define the performance requirements of the materials they want in their bunker gear in relation to the environmental diagnostic. These requirements can be grouped as follows:

Requirements affecting garment life:

- Tear and abrasion resistance
- Resistance to ultra-violet (UV) degradation (strength and appearance)
- Resistance to molten metal splatter or burning embers
- Ability to be reused after exposure to high temperature
- Ability to be cleaned

Those requirements affecting firefighter safety:

- Ice-shedding ability
- Water absorption on the fireground
- Weight and increased mobility
- Visibility
- Thermal protective performance (TPP) of all the layers together in the garment
- Breathe-ability of the moisture barrier

It is important to remember that there is often a trade-off between performance requirements or characteristic. The fabric with the best thermal damage tolerance may have relatively poor UV degradation performance. And there is always a trade-off between price and performance - the higher the performance, the higher the cost.

Garment design is no less important than the fabrics that go into bunker gear. And like the materials' performance requirements, garment design requirements (or criteria) flow from the needs of the particular fire department's environment.

Recommendations:

- Maximize the space on all apparatus and, to the extent possible, equip for maximum PPC scoring from the ISO.
- All operating thermal imaging units should be assigned to response apparatus at all times. The devices are critical for firefighter safety and rescue.
- ESCI recommends that all primary fire apparatus be equipped with an automatic defibrillator.
- Develop and fund a small equipment replacement program that anticipates replacement schedules and builds necessary funding in order to spread cost over multiple years.
- Establish a record system for maintenance, uses, and repairs of small equipment.
- Conduct a complete annual inspection of all turnout gear ensembles used by RWFD personnel. Complete any repairs and check proper fit. Outdated or worn out gear should be replaced.
- Turnout gear should only be reassigned following a complete, professional fit assessment and any necessary tailoring to ensure safety.

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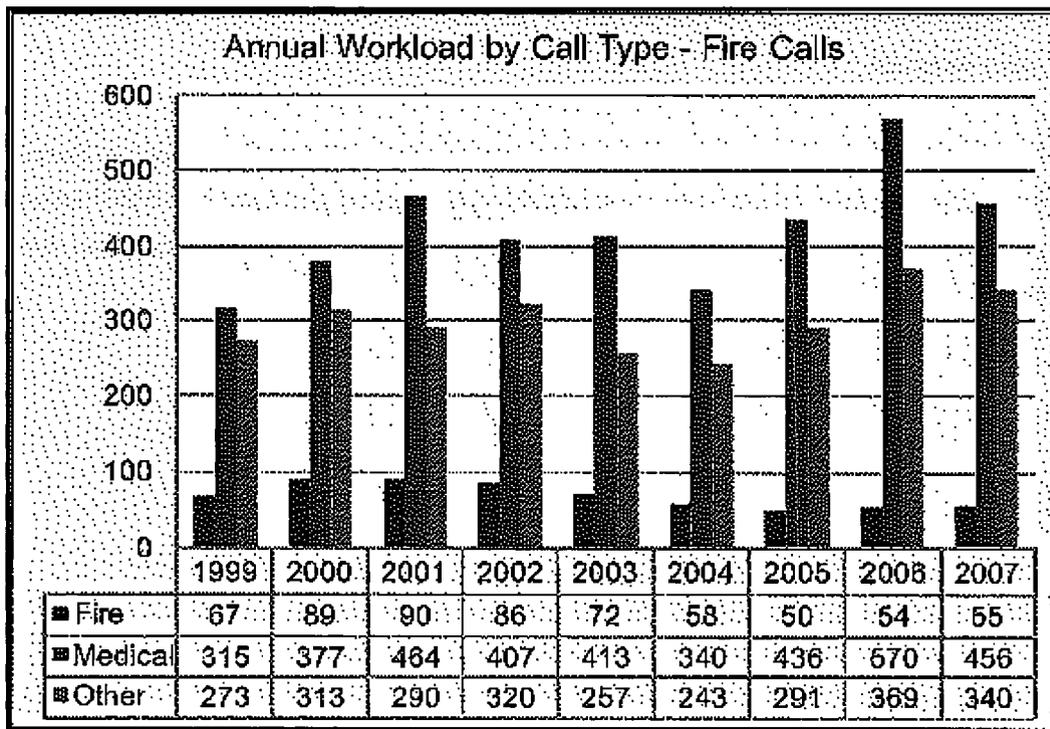
Service Delivery

In this section, an analysis of current conditions, as they relate to the fire department’s facility resources, service demand, and its performance is conducted.

Demand Analysis

The RWFD provided incident data for fire calls from 1999 through 2007 from its National Fire Incident Reporting System (NFIRS) database. Workload for the department has varied over the decade as depicted in the chart below. The chart categorizes the calls by actual fires, medical assists, and by all other types of calls such as fire alarms.

Figure 37: Workload Historical Data - Fire Calls



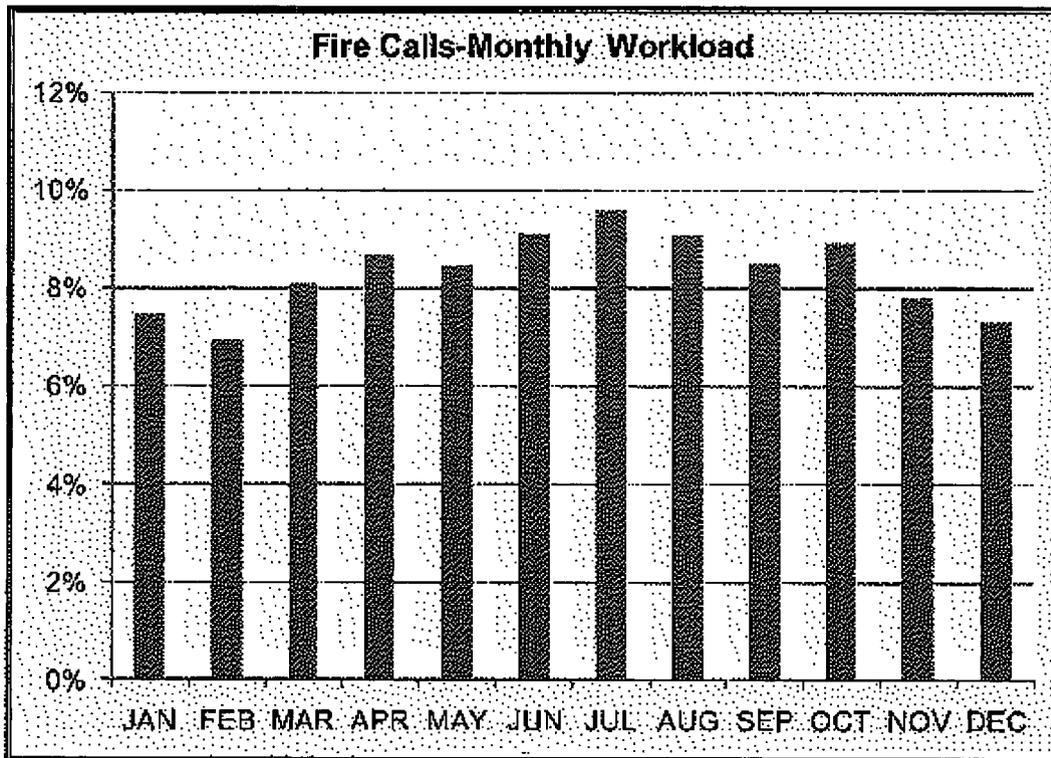
The bulk of the RWFD’s workload is handling requests for emergency medical aid. This is not unusual for fire departments who participate in either first responder or transporting capabilities. Ambulance calls are recorded in a separate database than fire calls. Many medical calls recorded in the fire database appear to be recorded in the ambulance calls database as well since a review of incidents in the dispatch center data for 2007 indicated 394 fire incidents. Separately, the ambulance database contained 2,311 calls in 2006 and 2,280 calls in 2007.

through the 17th of December. A data export from the dispatch center recorded 2,294 ambulance calls for all of 2007.

While neither of the ambulance databases categorized the calls by type or criticality, over one quarter of the ambulance calls within the last two year's were dispatched to the hospital's address. It is known that RWFD does provide interfacility transportation services, and that some of these calls may originate at the hospital, a nursing home, doctor's office, or a private residence. Most of these calls are not considered emergent; however there are times when they may require urgent transportation for medical procedures. Without a data field that determines which calls may be considered non-emergent, an assumption that the hospital originates all non-emergent interfacility transportation will be made. Although this is factored into the overall service demand analyses, for the purpose of a response time analysis, the calls at the hospital have been removed.

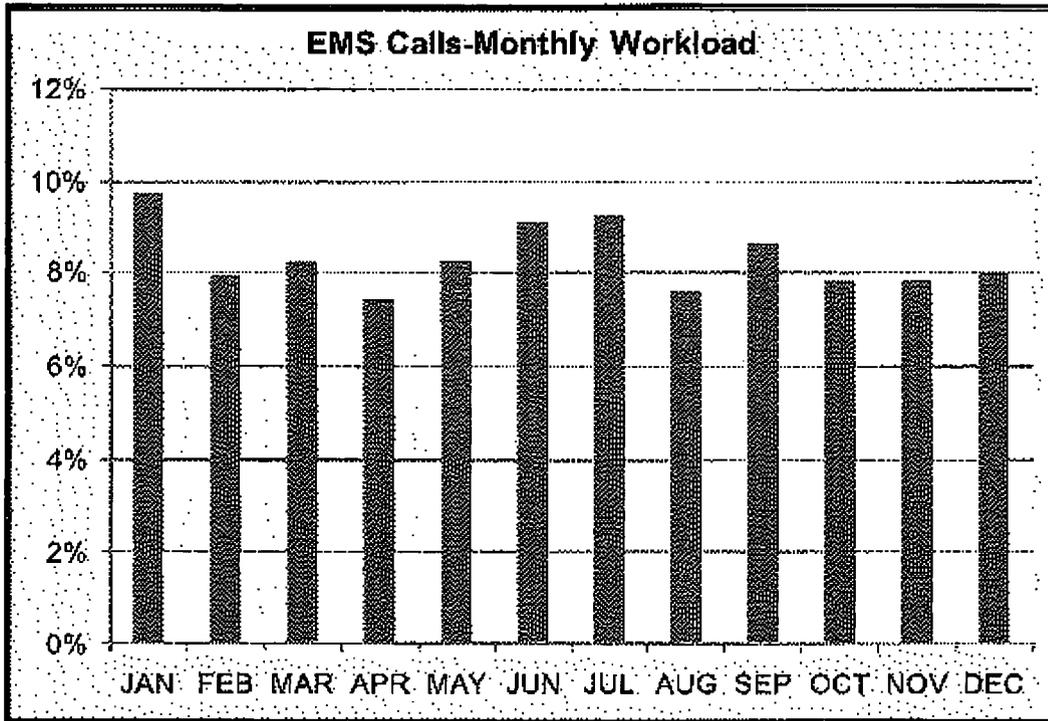
A review of incidents by time of occurrence also reveals when the greatest response demand is occurring. The following charts show how activity and demand changes for RWFD based on various measures of time. ESCi began by breaking down yearly workload into monthly increments.

Figure 38: Monthly Workload - Fire Calls



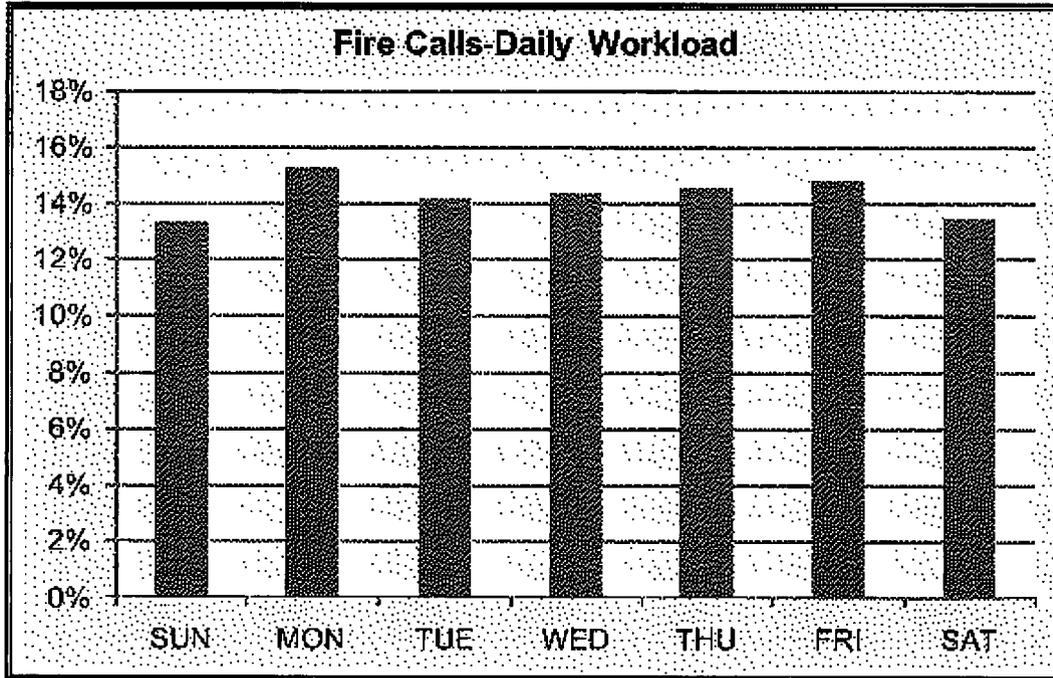
Monthly workload for fire calls appears rise during the spring months to peak during the summer, and begin to decrease in the late fall and winter months. Conversely, ambulance-related calls are higher in the early winter and during the summer months. Overall, ambulance calls are more consistent than fire call volume.

Figure 39: Monthly Workload - Ambulance Calls



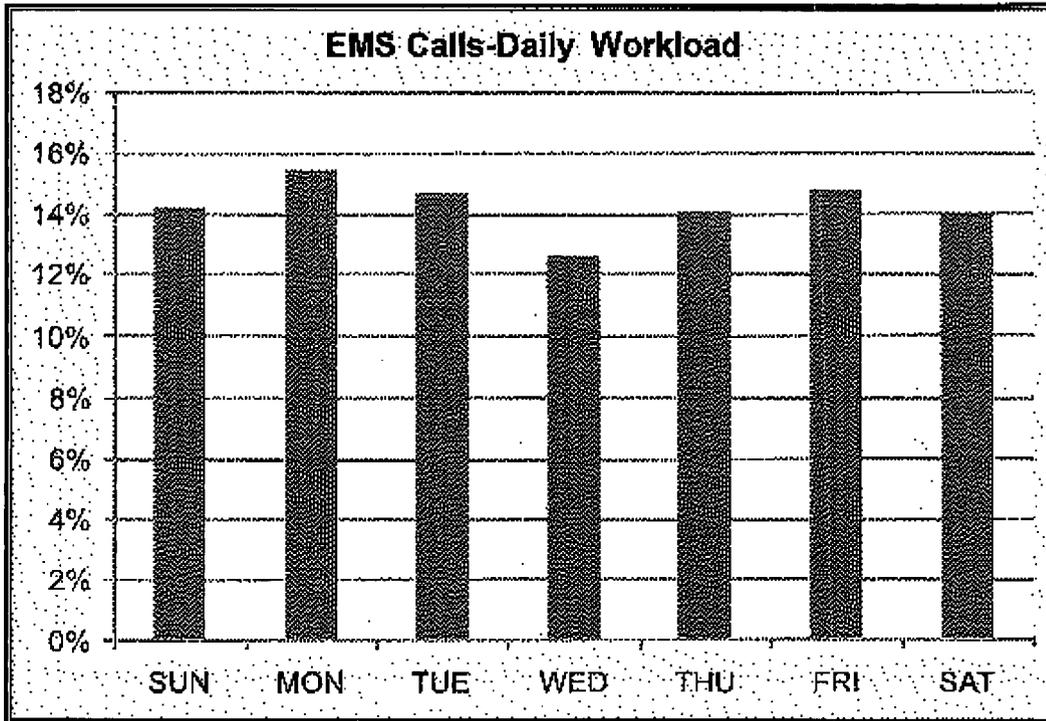
In further analysis, workload is examined by day of the week. It appears that fire calls are highest on Mondays, but relatively stable throughout the remainder of the week.

Figure 40: Workload by Day of Week - Fire Calls



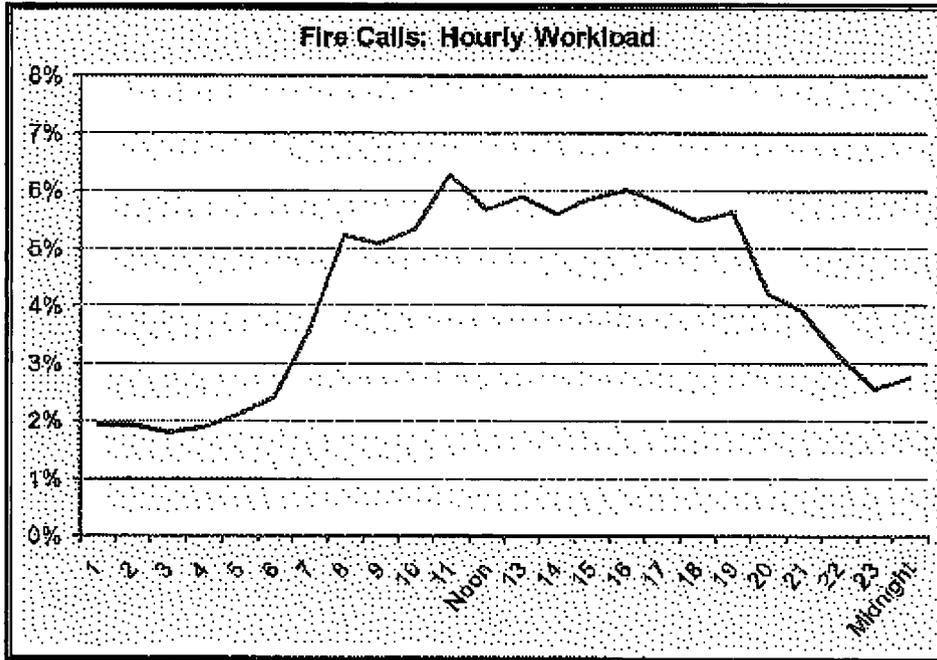
Ambulance calls incidents vary throughout the week with a high for the week on Mondays and a low on Wednesdays.

Figure 41: Workload by Day of Week - Ambulance Calls



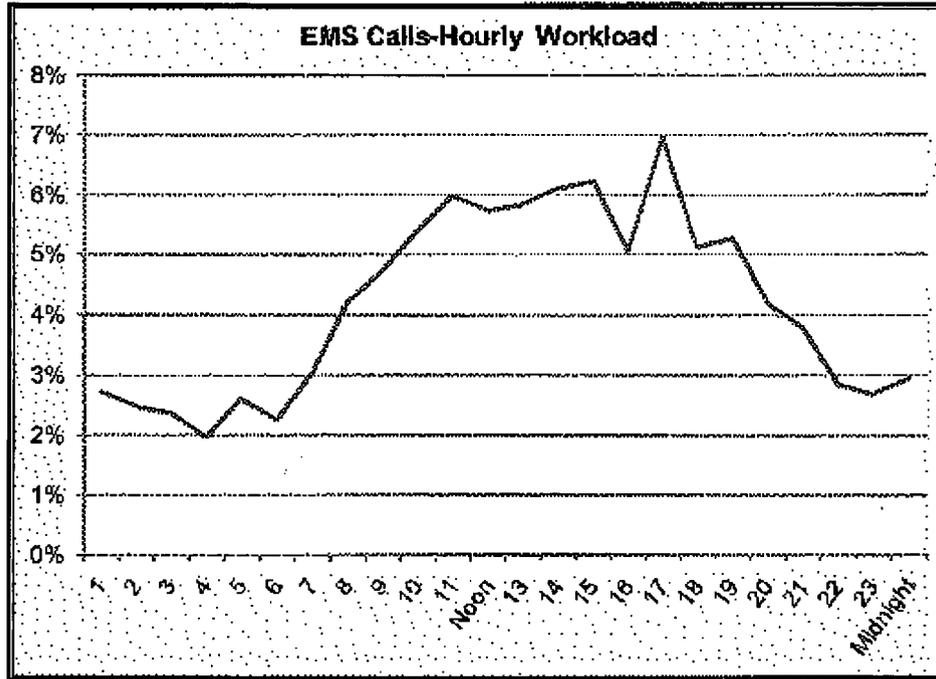
The final analysis of historical workload concludes with an examination of call types by hour of day. Peak activity hours can strain an under-equipped or under-staffed fire department. Understanding when peak activity occurs begins the process of developing deployment strategies and needs assessment.

Figure 42: Workload by Hour of Day - Fire Calls



Activity for fire calls begins to increase dramatically at 7:00 a.m., reaching peak volume during the 11:00 a.m. hour, and maintaining a high level of activity until 7:00 p.m., before gradually declining into the evening.

Figure 43: Workload by Hour of Day - Ambulance Calls

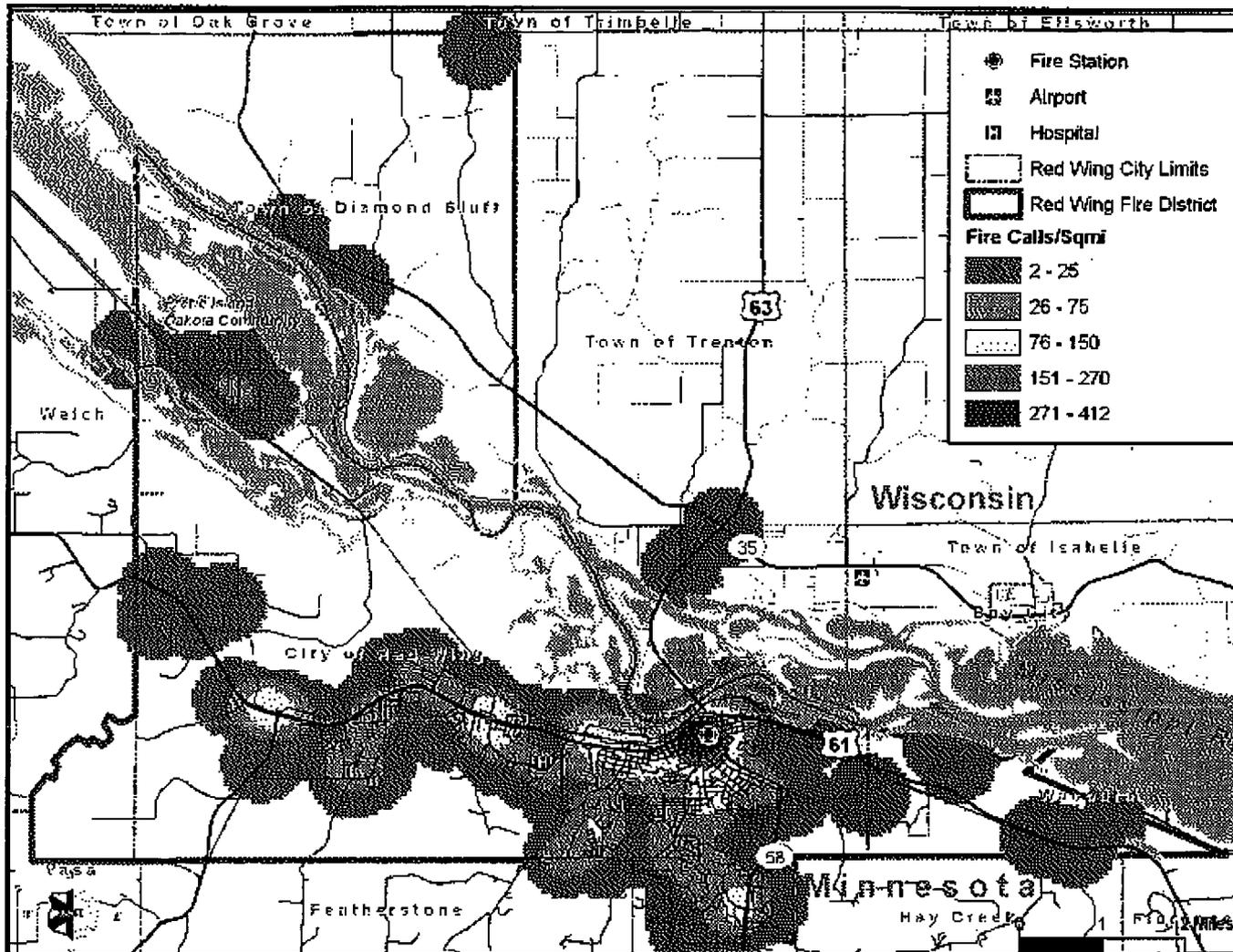


Ambulance calls are mostly reported between 10:00 a.m. to 8:00 p.m. The peak activity for ambulance calls occur in the afternoon hours.

Peak activity times can be reflected in response time performance in certain cases. The impact of response time on the outcome of emergency incidents has been exhaustively studied, both in the laboratory and in historical data, with predictable correlation between the two. Though seemingly intuitive, it is still useful to review how longer response times can have a negative effect on the ability to suppress fires, particularly in structures, or to successfully intervene in a life-threatening medical emergency. Response time performance will be examined in a separate section.

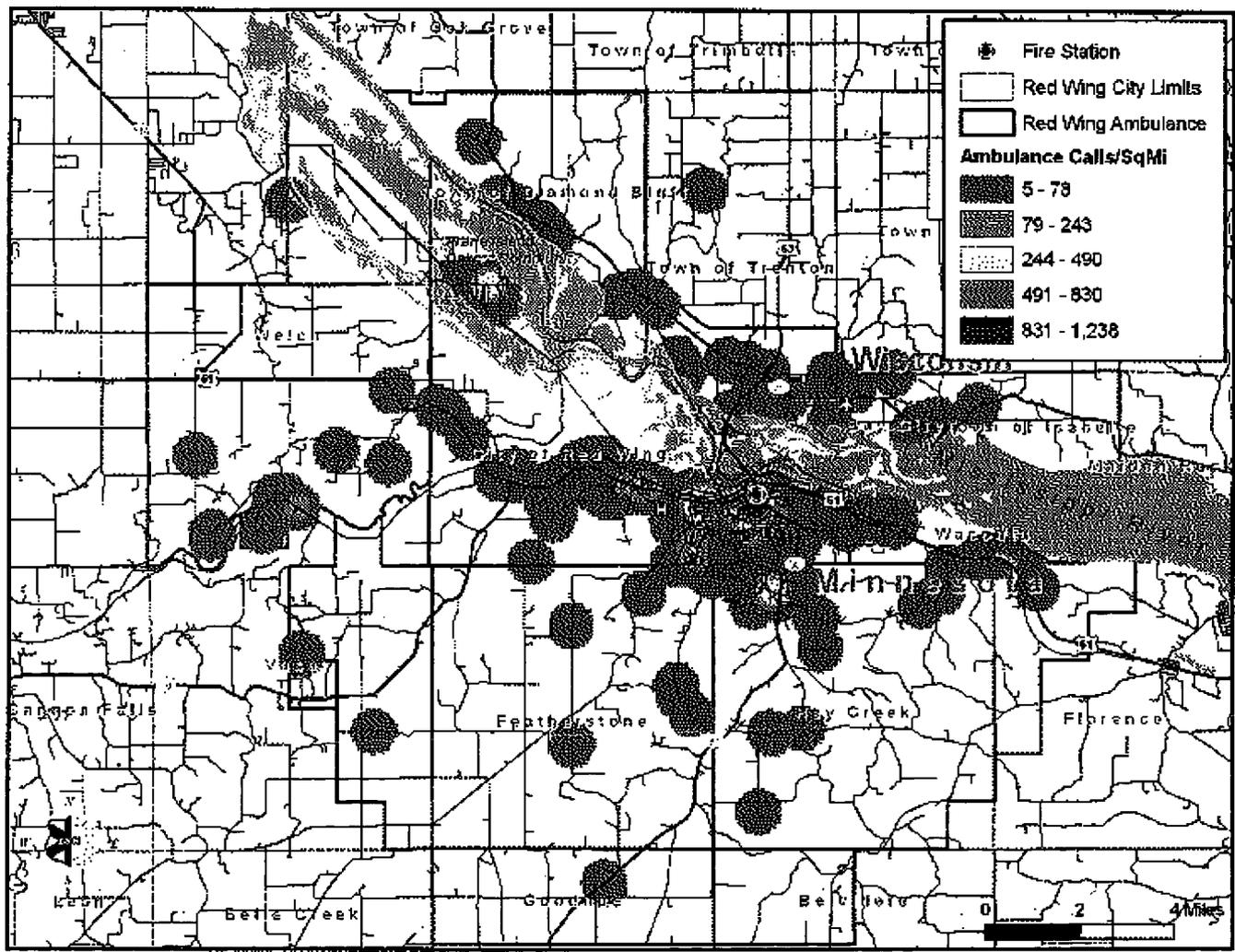
In addition to the temporal analysis of the current service demand, it is useful to examine geographic distribution of service demand. This will allow for assessing station location in comparison to the actual service demand within the area. The following map indicates the distribution of emergency incidents during 2007.

Figure 44: Service Demand Density - Fire Calls



Most areas of highest service demand for fire calls are located in areas of high residential population density. While the map above reflects all calls for service for RWFD, the following map illustrates the concentration of ambulance calls within the ASA that were handled by the fire department over the same time period. It illustrates that the majority of EMS incidents occur near the populated areas and within proximity of the fire station. Calls at the hospital were removed for this representation.

Figure 45: Service Demand - Ambulance Calls

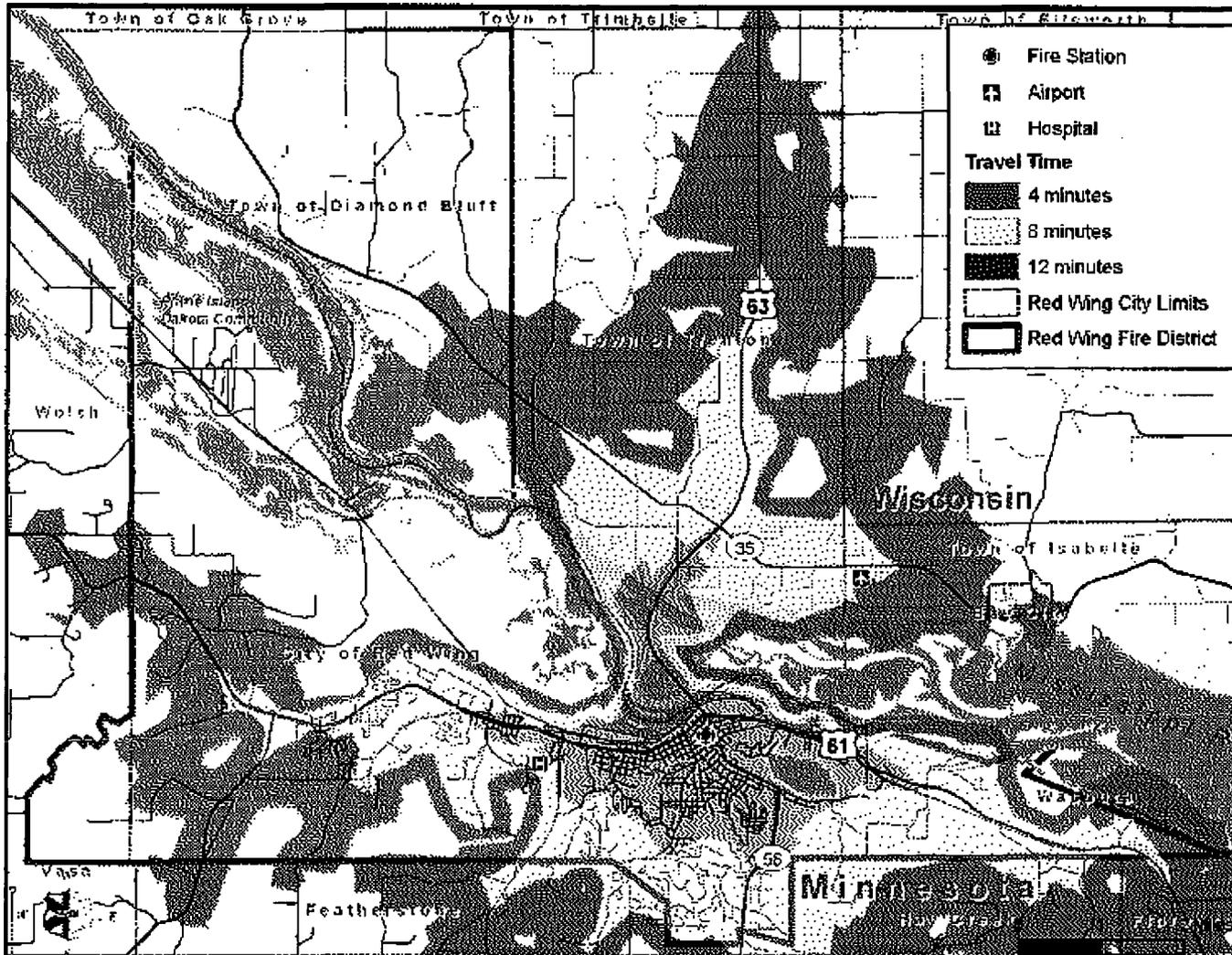


Similar to fire calls, the highest service demand was in the area of higher population density. Moderately high service demand can be seen in other areas on Prairie Island, near Pioneer Drive, near the ski area, and near the hospital. These may be high occupancy facilities or nursing homes which tend to have a higher demand for ambulance services than for fire services.

Distribution Analysis- Modeled Travel and Response Time

As indicated earlier, the RWFD operates out of a single facility within the City's downtown area. The following map demonstrates the travel time capability of emergency apparatus when they leave the firehouse. The extent of travel within four minutes is shaded in green, while the yellow shaded area represents distance of coverage after an elapsed eight minutes from the fire station. The red shaded area is the limit of coverage after traveling twelve minutes on the current road network. Adjustments to speed capability of the streets were made to account for negotiating turns and intersections with the apparatus, but no elevation data was available to account for hills and steep grades.

Figure 46: Travel Time Capability - Fire Service Area



The City's downtown area is well covered within four minutes of travel time and while much of the fire service area is within the modeled travel time capability, notable exceptions of Prairie Island and Diamond Bluff require additional travel time. When the travel time capability model is applied to the larger ambulance service area, the following figure illustrates that upwards of 20 minutes is required to reach most of its geographical extent.

Distribution Analysis- Community Fire Protection Insurance Rating

The Insurance Services Office (ISO) reviews the fire protection resources within communities and provides a Public Protection Classification™ (PPC) rating system from which insurance rates are often based. The rating system evaluates three primary areas - the emergency communication and dispatch system, the fire department, and the community's pressurized hydrant or tanker-based water supply. The overall rating is expressed as a number between 1 and 10, with 1 being the highest level of protection and 10 being unprotected or nearly so. It is also important to note that, according to the Insurance Services Office website information on the PPC™ minimum criteria, "...the ISO generally assigns Class 10 to properties beyond five road miles from a fire station."¹⁵

A community's PPC™ can affect decisions insurers make regarding the availability and price of property insurance. Many insurance companies make at least some use of the classification to price their policies, determine which coverage to offer, or to determine deductibles for individual homes and businesses. Regardless of the community's classification, individual insurance companies establish their premiums, not the ISO. The particular system that any given company uses when calculating premiums for property insurance may be affected by that company's fire-loss experience, underwriting guidelines, and marketing strategy. This makes it extremely difficult to generalize how any improvement or decline in the PPC™ rating will affect specific insurance policies or premiums.

The following figure shows how insurance premiums might vary for two typical structures under a couple of insurance companies' current rating schedules. While these figures are reasonable examples of the impact the PPC™ can make on insurance premiums, the value of the premium credits for the different PPC™ ratings will vary among insurance companies. This example chart was obtained from a report published by the League of Minnesota Cities entitled *The ISO Fire Protection Rating System*.

¹⁵ Information obtained from the Insurance Services Office website, www.isomitigation.com, on 3/5/2008.

Figure 48: Representative Insurance Premiums by Fire Protection Class

Representative Insurance Premiums		
Fire Class	\$150,000 Residence	\$1,000,000 Office Building
1	\$670	\$2,950
2	\$670	\$2,980
3	\$670	\$3,020
4	\$670	\$3,040
5	\$670	\$3,060
6	\$670	\$3,120
7	\$670	\$3,230
8	\$777	\$3,330
9	\$972	\$3,440
10	\$1,072	\$3,710

According to the report, there are some points to note regarding the chart:

- "In this schedule, no additional credit is given on residential property for a fire class better than 7. The reason has largely to do with the role that water supply plays in the ratings. Having a better water supply helps in fighting fires in larger commercial structures, and therefore is reflected in a better rating. But for most residential fires, a lesser water supply is actually needed, and having more than that available really doesn't help the fire department fight that particular residential fire any better. There's some variation among insurance companies (e.g., some might allow additional credit for class 6, others might lump classes 7 and 8 together for rating purposes, etc.), but this general pattern is fairly typical for residential premium structures.
- Not all insurance companies use the ISO classifications. This is especially true for residential coverage. Some companies have their own rating systems based on their own historical loss data for the area rather than on an evaluation of the fire protection in the area. Other insurance companies use their own systems for rating the fire protection for a particular property; a company might classify properties based on the individual property's distance from a fire station and water supply, for example."¹⁶

In its last rating, ISO gave the City¹⁷ a split rating of class 4/9. The split rating applies the lower of the two ratings to those structures within five miles of a fire station and within 1,000 feet of a hydrant or creditable water source. All others receive the higher rating.

¹⁶ League of Minnesota Cities, *The ISO Fire Protection Rating System*, www.lmnc.org on 3/5/08.

¹⁷ The ISO's PPC™ rating for the City of Red Wing does not apply to the contract service areas.

The ISO classification details indicate that the fire department received a credit of 26.38 out of a possible 50 points, while the community's water system received 32.09 out of a possible 40 points. The rating was conducted in April of 2002. Primary improvement areas noted for the fire department, at that time, included insufficient equipment on the ladder truck, insufficient ladder testing, poor distribution of stations, inadequate staff response to incidents, and insufficient documented training.

It should be noted, however, that since the time of this last ISO inspection, the department purchased a new ladder truck, and equipment issues related to that vehicle have likely been corrected. Evidence of current aerial ladder and ground ladder tests were provided to ESCi, indicating that this issue has also been corrected. Members, on average, are still receiving less training hours than would be necessary to achieve maximum credit in the PPC™, but the department is now using a more robust records management system and the documentation of training has likely improved since 2002, which may improve scoring in that area. No significant improvement in emergency incident staffing seems evident to ESCi since the 2002 rating, leading to the conclusion that scores in that area would not have improved significantly.

Station distribution remains the same as in 2002. Fire station distribution has a rating impact through engine and ladder company distribution credits found in Section 561 of the PPC™ schedule. It must be remembered that this section accounts for a four point maximum of fifty possible points for fire department credit, and is rarely the most effective means to pursue for PPC™ improvement. For example, the number of personnel available (Section 570) is worth 15 out of 50 points and firefighter training (Section 580) is worth nine out of 50 points. In a typical fire department, significant improvements in the quality, quantity, and documentation of training can result in greater credit improvements at much less cost than the addition of fire stations to improve credit under the distribution section.

While distribution credits in the PPC™ may not be the most important factor in the decision to add facilities, it is acknowledged that this issue does affect the community's rating classification and should be considered. The next few paragraphs of the report examine the travel coverage based on the ISO's PPC credentialing criteria.

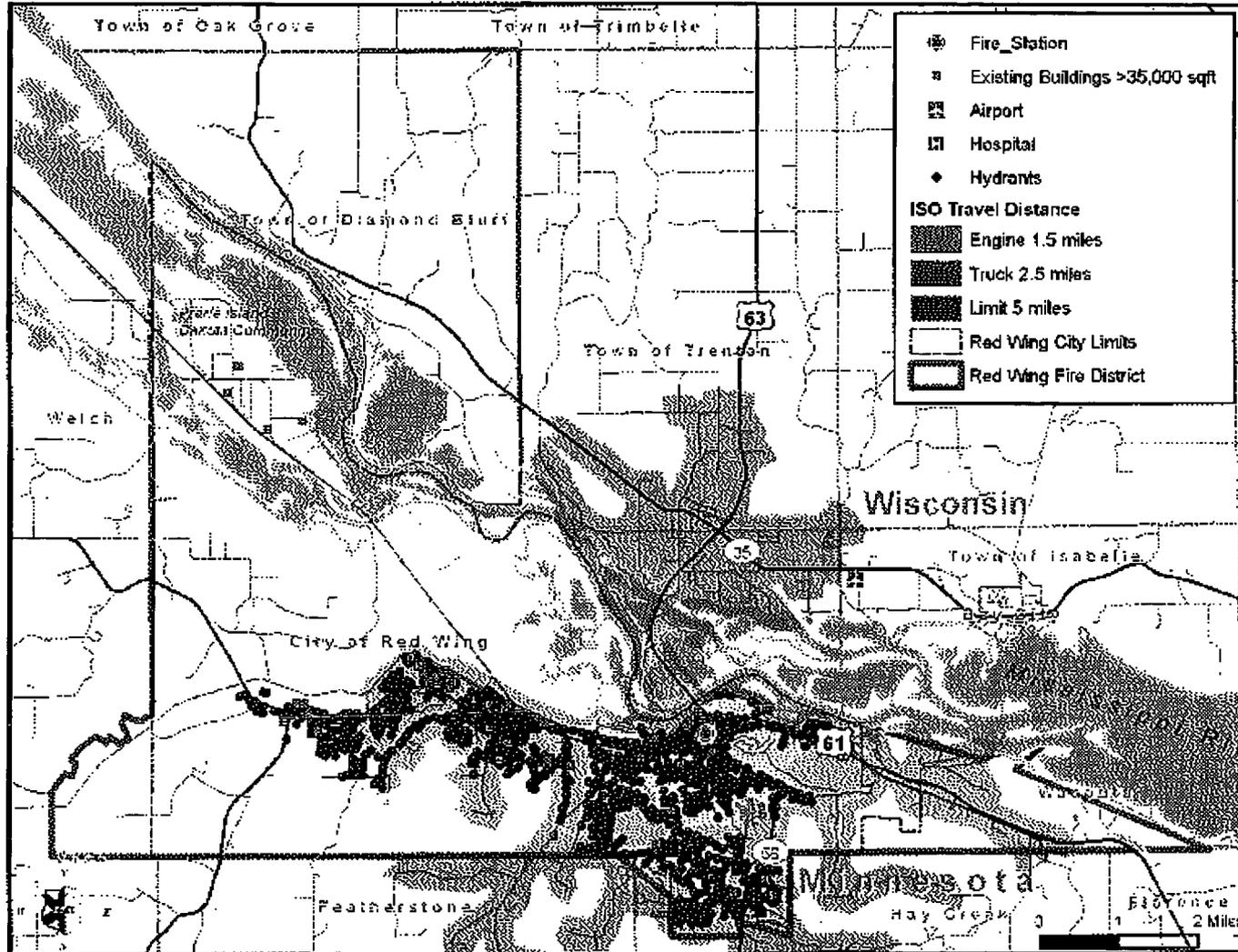
To receive maximum credit in this section, all *built-upon* portions of a community would need to be within 1.5 road miles of an engine company and 2.5 road miles of a ladder or service company. In order to determine the distribution of engine companies across built-upon areas, ISO reviews the response area of each existing engine and identifies the number of fire hydrants within those response areas. ISO analyzes whether there are additional geographic areas outside of the existing engine company response, where at least 50 percent of the number of hydrants served by the largest existing response area could be served by a new engine. For ISO purposes, the response area is measured at 1.5 miles of travel distance from each engine company on existing roadways.

In similar fashion, to achieve optimum credit for the number of truck companies, ISO reviews the response area of each existing ladder company and identifies the number of fire hydrants within those response areas. ISO analyzes whether there are additional geographic areas outside of the existing ladder response areas where at least 50 percent of the number of hydrants served by the largest existing response area could be served by a new truck, were one to be added.

For ISO purposes, the response area is measured at 2.5 miles of travel distance from each ladder company on existing roadways. A ladder company is not required to have an elevating ladder or aerial device unless there are a sufficient number of buildings that would meet the three-story height and square footage limits. Other areas can receive similar credit for a service company without the requirement of an elevated device and can even receive partial credit for a service company if other apparatus, such as an engine, carries a complement of service company equipment.

The following figure illustrates the extent of the 1.5 mile engine company coverage, the 2.5 mile ladder/service company coverage, and the five mile coverage from the current Red Wing fire station. Also shown are the City's fire hydrants and buildings in excess of 35,000 square feet. Using geographic information systems (GIS) software in this manner permits the analysis of specific coverage capability under the classification criteria described above.

Figure 49: ISO Travel Distance Coverage



ESCI's analysis indicates that 28.9 percent of all hydrants are within the 1.5 mile distance for engine companies, while 48.9 percent are within the 2.5 mile limit for ladder/service companies. There are several large structures near Highway 61 on the west side of town that are outside the ISO recommended distance for a ladder company. Of course, the large or tall structures on Prairie Island are also beyond the 2.5 mile range of a ladder company. It is clear from this analysis that the distribution of engine and ladder/service companies from a single station in the City is significantly below the requirements for the maximum four point credit in the PPC™.

Of equal or greater concern is the fact that there are significant areas within the Incorporated City that are beyond five road miles from the fire station, the limit to which ISO will apply the PPC™ minimum criteria. Structures beyond this five mile limit will typically face a rating of Class 10, which can result in challenges when obtaining property insurance.

ESCI's analysis examined the number of structures outside the five mile limit. It was found that 9.7 percent of all structures (922/9495) were outside the five mile limit, including nine structures that were 35,000 square feet or greater.¹⁸ The analysis also indicated that there are three high-occupancy hazard facilities and three hazardous material locations outside the five mile limit.¹⁹ These include the casino and the nuclear power plant on Prairie Island, with the remainder being located near the intersection of State Highway 19 and US 61.

In an attempt to capture some idea of how much future development is outside the five-mile limit, ESCI analyzed the status of all property parcels, regardless of whether they currently contained a structure or not. ESCI determined that 12.36 percent of the City's land parcels were outside the five mile limit, 2.66 percent more than the percentage of structures. This suggests that many of the City's empty land parcels, available for future building, are outside the five mile limit. This includes the existing and proposed developments of Cannondale Court, Cannon Trail Ridge, Cannon River Bluffs, Bryan Cannon View, Charlson Crest, Westwood Hills, Red Wing Energy Park, Grandview Terrace, Mill Road Subdivision, Kingswood, and Highlands of Red

¹⁸ The originator of this dataset is the City of Red Wing. Structures (defined as buildings, garages, and sheds) were digitized from 1997, 2005, and 2007 color digital aerial photos (Goodhue County) at a scale of 1:400 ft. Parcel Information Number (PIN) and address information is associated with each structure. This dataset was created from October 2005-December 2007.

¹⁹ The originator of this dataset is the Pre Plan Summary Report provided by Fire Department Staff. Data attribute field TYPE was populated by the following code numbers: 1=Life hazard occupancies, 2=Hazardous materials occupancies, 3=High occupancy. This data was created for use by the Red Wing Planning Department in 2007.

Wing. ESCi could not differentiate exactly which structures or parcels are commercial versus residential, nor were we provided data on the financial value of these properties in the datasets.

Reliability Analysis

Workload and Reliability Rates

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

Unit hour utilization is an important workload indicator because it describes the amount of time a unit is not available for response since it's already committed to an incident. The larger the number, the greater its utilization and the less available it is for assignment to an incident. The highest unit hour utilization (UHU) figures for fire suppression units are typically around 0.20 with some studies indicating that unit failure rates²⁰ at this workload will begin to hit 10 percent.

Studies of fire-based medical units indicate that significant employee burnout can occur with 0.30 unit hour utilization. However in this case, the overall utilization is currently well below recommended targets for all incidents indicating that workload is not a factor in reducing response times if need be.

Figure 50: Unit Hour Utilization - Fire Calls

Unit	Fire Calls	Total Time	UHU
Engine 1	340	161:08:02	0.02
Engine 2	6	13:33:36	0.00
Engine 3	34	27:55:53	0.00
Medic 1	136	54:35:38	0.01
Medic 2	59	22:14:48	0.00
Medic 3	13	02:48:54	0.00
Unspecified	9	10:07:14	0.00
Ladder 1	5	08:06:36	0.00
T510	1	00:00:04	0.00
Brush 1	11	07:11:35	0.00

²⁰ The unit failure rate is the percentage of calls for which a unit is unavailable due to handling an existing call where it otherwise would have been dispatched as the primary unit.

As the previous chart indicates, Engine 1 handles the bulk of fire calls within the Red Wing FSA. Depending on call protocol, multiple apparatus may respond to a single incident which account for a total call amount to exceed the actual incident count. For ambulance calls, Medic 1 is often utilized for response.

Figure 51: Unit Hour Utilization - Ambulance Calls

Unit	Calls	Total Time	UHU
Engine 1	452	179:09:07	0.02
Engine 2	6	01:52:14	0.00
Engine 3	44	15:11:42	0.00
Medic 1	1207	659:55:19	0.08
Medic 2	488	263:45:16	0.03
Medic 3	126	68:20:45	0.01
Ladder 1	1	00:14:17	0.00

Call Concurrency and Resource Drawdown

Another way to look at resource workload is to examine the number of times multiple calls occur within the same time frame on the same day. ESCi examined the calls during 2007 to find the frequency that RWFD apparatus are handling multiple calls within any time frame. This is important because the more calls occurring at one time can stretch available resources and extend response times from distant responding available apparatus.

Figure 52: Call Concurrency Table

2007	Single	2	3	4	5
Fire Calls	386	6	0	1	0
	98.22%	1.53%	0.00%	0.25%	0.00%
EMS Calls	2052	218	20	2	2
	89.54%	9.50%	0.87%	0.09%	0.09%

As in most communities, the majority of calls happen singularly. However, as communities grow the propensity for concurrent calls increase. When the concurrency reaches a level to which it stretches resources to near capacity, response times begin to extend. Although multiple medical calls will cause drawdown, especially as concurrency increases, they usually occupy one unit at a time. Concurrent fire calls however, are of more concern as they may require multiple unit responses for each call depending upon the dispatch criteria. Typically, Other calls that are not actual fires nor medical calls have higher concurrency rates than fires, and depending on the dispatch criteria, may create periods of extensive resource drawdown.

It is also important to note that the area with the highest workload, and especially medical calls, typically has the highest rate of concurrent calls. This requires response units from other stations, to respond into this area. This reduces the reliability that an area is covered by its primary unit. The impact on station area reliability can be affected by several factors such as:

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

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

Response Time Standards

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

Before discussing the district's current performance, it is important to gain an understanding of the dynamics of fire and medical emergencies.

Dynamics of Fire in Buildings

Most fires within buildings develop in a predictable fashion, unless influenced by highly flammable material. Ignition, or the beginning of a fire, starts the sequence of events. It may take some minutes or even hours from the time of ignition until flame is visible. This smoldering stage is very dangerous, especially during times when people are sleeping, since large amounts of highly toxic smoke may be generated during early phases.

Once flames do appear, the sequence continues rapidly. Combustible material adjacent to the flame heats and ignites which in turn heats and ignites other adjacent materials if sufficient

oxygen is present. As the objects burn, heated gases accumulate at the ceiling of the room. Some of the gases are flammable and highly toxic.

The spread of the fire continues quickly. Soon the flammable gases at the ceiling reach ignition temperature. At that point, an event termed *flashover* takes place; the gases ignite, which in turn ignites everything in the room. Once flashover occurs, damage caused by the fire is significant and the environment within the room can no longer support human life.

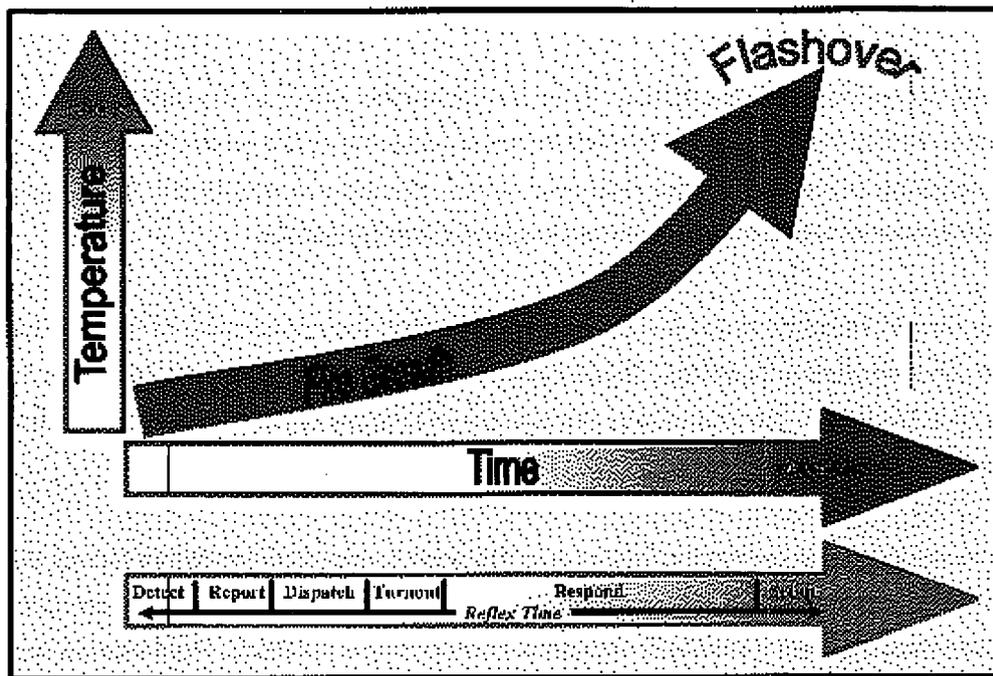
Flashover usually happens about five to eight minutes from the appearance of flame in typically furnished and ventilated buildings. Since flashover has such a dramatic influence on the outcome of a fire event, the goal of any fire agency is to apply water to a fire before flashover takes place.

Perhaps as important as preventing flashover is the need to control a fire before it does damage to the structural framing of a building. Materials used to construct buildings today are often less fire resistive than the heavy structural skeletons of older frame buildings. Roof trusses and floor joists are commonly made with lighter materials more easily weakened by the effects of fire. Light weight roof trusses fail after five to seven minutes of direct flame impingement. Plywood I-beam joists can fail after as little as three minutes of flame contact. This creates a very dangerous environment for firefighters.

In addition, the contents of buildings today have a much greater potential for heat production than in the past. The widespread use of plastics in furnishings and other building contents rapidly accelerate fire spread and increase the amount of water needed to effectively control a fire. All of these factors make the need for early application of water essential to a successful fire outcome.

A number of things must happen quickly to make it possible to achieve fire suppression prior to flashover. The figure below illustrates the sequence of events.

Figure 53: Fire Growth vs. Reflex Time



The reflex time continuum consists of six steps, beginning with ignition and concluding with the application of (usually) water. The time required for each of the six components varies. The policies and practices of the fire department directly influence four of the steps, but two are only indirectly manageable. The six parts of the continuum are:

1. **Detection:** The detection of a fire may occur immediately if someone happens to be present or if an automatic system is functioning. Otherwise, detection may be delayed, sometimes for a considerable period.
2. **Report:** Today most fires are reported by telephone to the 9-1-1 center. Call takers must quickly elicit accurate information about the nature and location of the fire from persons who are apt to be excited. A citizen well trained in how to report emergencies can reduce the time required for this phase.
3. **Dispatch:** The dispatcher must identify the correct fire units, subsequently dispatch them to the emergency, and continue to update information about the emergency while the units respond. This step offers a number of technological opportunities to speed the process including computer aided dispatch and global positioning systems.

4. Turnout: Firefighters must don firefighting equipment, assemble on the response vehicle, and begin travel to the fire. Good training and proper fire station design can minimize the time required for this step.
5. Response: This is potentially the longest phase of the continuum. The distance between the fire station and the location of the emergency influences reflex time the most. The quality and connectivity of streets, traffic, driver training, geography, and environmental conditions are also a factor.
6. Set up: Last, once firefighters arrive on the scene of a fire emergency, fire apparatus are positioned, hose lines stretched out, additional equipment assembled, and certain preliminary tasks performed (such as rescue) before entry is made to the structure and water is applied to the fire.

As is apparent by this description of the sequence of events, application of water in time to prevent flashover is a serious challenge for any fire department. It is critical, though, as studies of historical fire loss data can demonstrate.

The National Fire Protection Association studied data from residential structures occurring between 1994 and 1998 in order to analytically quantify the relationship between the growth of a fire beyond the room of origin and losses in life and property. As the figure below clearly indicates, fires contained to the room of origin (typically extinguished prior to or immediately following flashover) had significantly lower rates of death, injury, and property loss when compared to fires that had an opportunity to spread beyond the room of origin (typically extinguished post-flashover). Incidents in which a fire spreads beyond the room where it originates are likely to experience six times the amount of property loss and have almost nine times greater chance of resulting in a fatality.

Figure 54: National Data - Fire Growth to Life and Property Loss

Fire Extension in Residential Structure Fires 1994-1998			
Extension	Rates per 1,000 Fires		
	Civilian Deaths	Civilian Injuries	Dollar Loss per Fire
Confined to room of origin	2.32	35.19	\$3,385
Beyond room of origin	19.68	96.86	\$22,720
Beyond floor of origin	26.54	63.48	\$31,912

Emergency Medical Event Sequence

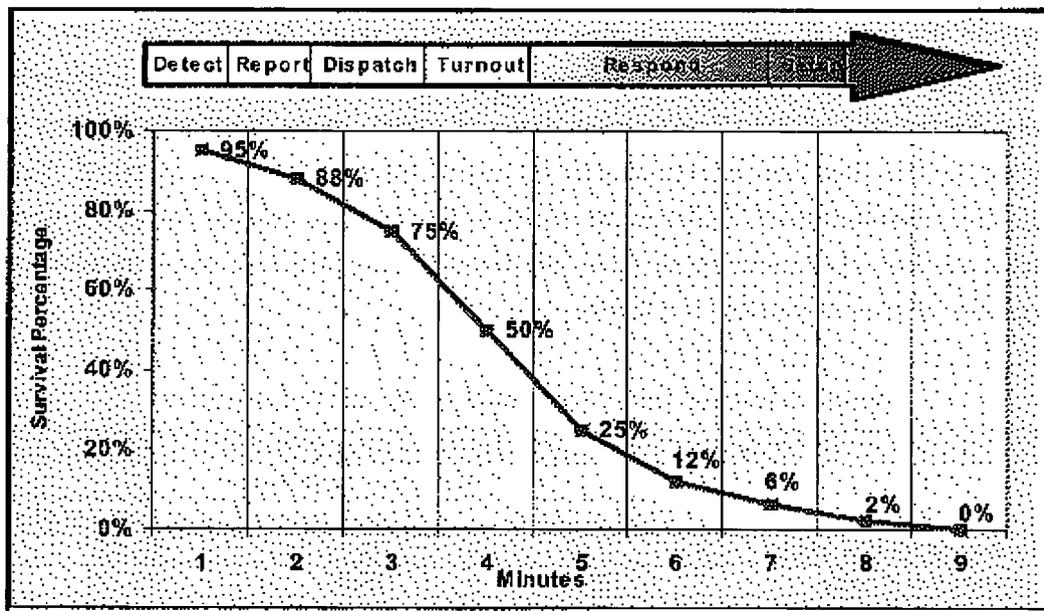
Cardiac arrest is the most significant life threatening medical event. A victim of cardiac arrest has mere minutes in which to receive definitive lifesaving care if there is to be any hope for resuscitation.

The American Heart Association (AHA) issued a set of cardiopulmonary resuscitation guidelines designed to streamline emergency procedures for heart attack victims, and to increase the likelihood of survival. The AHA guidelines include goals for the application of cardiac defibrillation to cardiac arrest victims.

Heart attack survival chances fall by seven to ten percent for every minute between collapse and defibrillation. Consequently, the AHA recommends cardiac defibrillation within five minutes of cardiac arrest.

As with fires, the sequence of events that lead to emergency cardiac care can be visually shown, as in the following figure.

Figure 55: Cardiac Arrest Event Sequence



The percentage of opportunity for recovery from cardiac arrest drops quickly as time progresses. Medical response stages are very similar to the components described for a fire response. Recent research stresses the importance of rapid cardiac defibrillation and administration of certain drugs as a means of improving the opportunity for successful resuscitation and survival. An Oregon fire department studied the effect of time on cardiac arrest resuscitation and found that nearly all of their saves were within one and one-half miles of a fire station, underscoring the importance of quick response.

People, Tools, and Time

Time matters a great deal in the achievement of an effective outcome to an emergency event. Time, however, isn't the only factor. Delivering sufficient numbers of properly trained, appropriately equipped, personnel within the critical time period completes the equation.

For medical emergencies this can vary based on the nature of the emergency. Many medical emergencies are not time critical. However, for serious trauma, cardiac arrest, or conditions that may lead to cardiac arrest, response time is very critical.

Equally critical is delivering enough personnel to the scene to perform all of the concurrent tasks required to deliver quality emergency care. For a cardiac arrest, this can be up to six personnel; two to perform CPR, two to set up and operate advanced medical equipment, one to record the actions taken by emergency care workers, and one to direct patient care.

Thus, for a medical emergency the real test of performance is the time it takes to provide the personnel and equipment needed to deal effectively with the patient's condition, not necessarily the time it takes for the first person to arrive.

Fire emergencies are even more resource critical. Again, the true test of performance is the time it takes to deliver sufficient personnel to initiate application of water on the fire. This is the only practical method to reverse the continuing internal temperature increases and ultimately prevent flashover. The arrival of one person with a portable radio does not provide fire intervention capability and should not be counted as *arrival* by the fire department.

In order to legally enter a building to conduct interior firefighting operations at least four personnel must be on scene. The initial arrival of effective resources should be measured at the

point in time when at least four personnel, properly trained and equipped, have assembled at the fire.

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

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

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

NFPA 1710

The National Fire Protection Association (NFPA) has issued a response performance standard for all or mostly career staffed fire Rescues. This standard, among other things, identifies a target response time performance objective for fire departments, and a target staffing standard for structure fires. Though not a legal mandate, *NFPA 1710* does provide a useful benchmark against which to measure the department's performance.

NFPA 1710 contains time performance standards for structure fire response as well as emergency medical response. Each will be discussed individually.

NFPA 1710 recommends that the first company arrive at the scene of a structure fire within five minutes of dispatch, 90 percent of the time. NFPA uses the 90th percentile rather than average. This allows an evaluation of a department's performance on the vast majority of its incidents.

The standard establishes that a response *company* consists of four personnel. The standard does not require that all four be on the same vehicle, but does expect that the four will operate

as a single functioning unit once on scene. The *NFPA 1710* response time standard also requires that all four personnel be on scene within the recommended five minutes, 90 percent of the time.

There is another reason the arrival of four personnel is critical for structure fires. As mentioned earlier, current safety regulations require that before personnel can enter a building to extinguish a fire, at least two personnel must be on scene and assigned to conduct search and rescue in case the fire attack crew becomes trapped. This is referred to as the *two-in, two out* rule. The only exception to this regulation is if it is known that victims trapped are inside the building.

Given RWFD's typical engine staffing, the time it takes for the second unit to arrive becomes very important in achieving the *NFPA* standard. If additional help is a considerable amount of time away, the fire will continue to grow rapidly contributing to significantly more damage to the property.

Finally, the *NFPA* standard calls for the arrival of the entire initial assignment (sufficient apparatus and personnel to effectively combat a fire based on its level of risk) within nine minutes of dispatch, 90 percent of the time. This is to ensure that enough people and equipment arrive soon enough to be effective in controlling a fire before substantial damage occurs.²¹

NFPA 1710 describes the following performances as meeting the structure fire response criteria of the standard:

- *Turnout time within one minute, 90% of the time*
- *Arrival of the first company within five minutes of dispatch, 90% of the time, or*
- *Arrival of the entire initial response assignment (all units assigned to the call) within nine minutes of dispatch, 90% of the time*

There are three time standards within *NFPA 1710* for emergency medical responses. They are:

- *Turnout time within one minute, 90% of the time*
- *Arrival of a unit with first responder or higher level of capability (basic life support) within five minutes of dispatch, 90% of the time*

²¹ See previous discussion about the *time/temperature curve* and the effects of flashover.

- *Arrival of an advanced life support unit, where this service is provided by the fire Rescue, within nine minutes of dispatch, 90% of the time*

Many departments in the United States serve rural communities such as in Goodhue and Pierce Counties. In these communities, the fire districts rely mostly on volunteer staff or a combination of paid staff, paid on call, and volunteers. In light of this, an alternative national benchmark to the stringent *NFPA 1710* standard has been established for communities with volunteer or mostly volunteer fire service departments. In many of these departments, the turnout time guideline is not necessarily achievable, since volunteer and on call members frequently respond from their homes, work sites, or other random locations. Because of this, and due to the scarcity of resources, *NFPA 1720* has longer total response time recommendations.

NFPA 1720

The NFPA issued a response performance standard for all, or mostly, volunteer staffed fire services. In recognizing that volunteer departments across the United States cover a variety of communities, the recommended standards are classified according to population densities.

- Population greater than 1,000 persons per square mile: ***Urban***
 - Within these types of communities, *NFPA 1720* recommends that the first company arrive at the scene of a structure fire within nine minutes of dispatch, 90% of the time
- 500-1,000 persons per square mile in population: ***Suburban*** time objective of
 - 10 minutes from time of dispatch, 80% of the time
- Less than 500 persons per square mile: ***Rural***
 - 14 minute response time, 80% of the time
- Greater than eight miles from a fire station: ***Remote***
 - No response time requirement

The standard establishes that a response company consists of four personnel. The standard does not require that all four be on the same vehicle, but does expect that the four will operate as a single functioning unit once on scene. The *NFPA 1720* response time standard also requires that all four personnel be on scene within the recommended time frame.

The RWFD has not officially adopted a response time performance standard. They have, however, adopted an informal goal to arrive at the scene of ninety percent of all calls within four minutes of being en route with the apparatus. Department guidelines also specify that the turnout time for firefighters be one minute for fire calls and 30 seconds for ambulance calls. This is an aggressive goal in consideration of RWFD resources, staffing, and geographic service area.

Recorded System Response Time Performance

Throughout this document, certain descriptive statistical measures are utilized which may not be familiar to all readers. In an effort to reduce confusion or the drawing of inaccurate conclusions, this section seeks to provide a brief explanation of these measures. The measures most often used which require clarification are the use of *average* and *percentile* measures.

Average

The average measure is a commonly used descriptive statistic also called the mean of a data set. It is a measure which is a way to describe the central tendency, or the center of a data set. The average is the sum of all the points of data in a set divided by the total number of data points. In this measurement, each data point is counted and the value of each data point has an impact on the overall performance. Averages should be viewed with a certain amount of caution because the average measure can be skewed if an unusual data point, known as an outlier, is present within the data set. Depending on the sample size of the data set, the skewness can be either very large or very small.

For example, assume that a particular fire station with a response time objective of six minutes or less had five calls on a particular day. If four of the calls had a response time of eight minutes while the other call was across the street and only a few seconds away, the average would indicate the station was achieving its performance goal. However, four of the five calls, or 80 percent, were beyond the stated response time performance objective.

The opposite can also be true where one call with an unusually long response time can make otherwise satisfactory performance appear unacceptable. These calls with unusually short or long response time have a direct impact on the total performance measurements and the farther they are from the desired performance, the greater the impact.

The reason to compute the average is because of its common use and ease of understanding that is associated with it. The most important reason for not using averages for performance standards is that it does not accurately reflect the performance for the entire data set. As illustrated above, one extremely good or bad call skewed the entire average. While it does reflect all values, it does not really speak to the level of accomplishment in a strong manner.

Percentile

With the average measure, it is recognized that some data points are below the average and some are above the average. The same is true for a median measure which simply arranges the data set in order and finds the value in which 50 percent of the data points are below the median and the other half are above the median value. This is also called the 50th percentile.

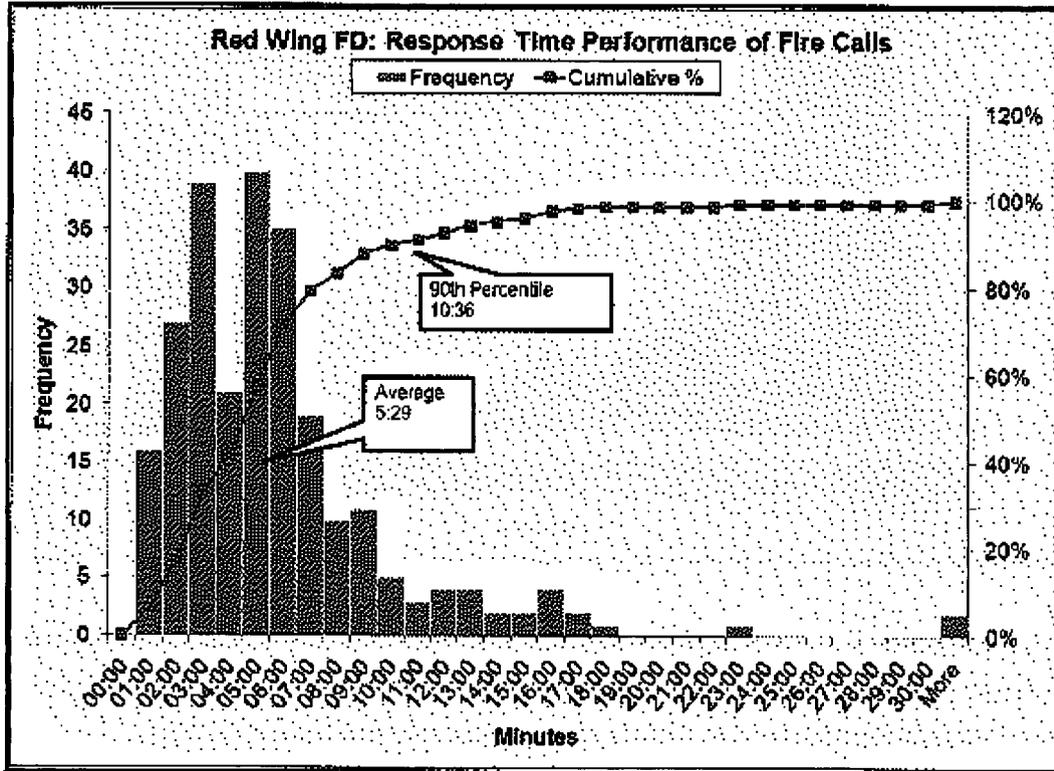
When you deal with percentages, the actual value of the individual data does not have the same impact as it did in the average. The reason for this is that the fractile is nothing more than the ranking of the data set. The 90th percentile means that 10 percent of the data is greater than the value stated and all other data is at or below this level.

Higher fractile measurements are normally used for performance objectives and performance measurement because they show that the large majority of the data set has achieved a particular level of performance. This can be compared to the desired performance objective to determine the degree of success in achieving the goal.

Total response time is the amount of time a resident or business waited until an apparatus arrived at the scene of emergency beginning when they first called the designated emergency number, often 9-1-1. It is made up of several elements which were discussed earlier (See *Response Time Performance Objectives*). Since the fire department has no influence on call processing time, fire departments are measured on response time from the time of dispatch to the arrival on scene.

The following charts illustrate the response time frequency for the RWFD over the last full year of data provided.²² For response time analysis, computer-aided dispatch data for 2007 from the communication center was used.

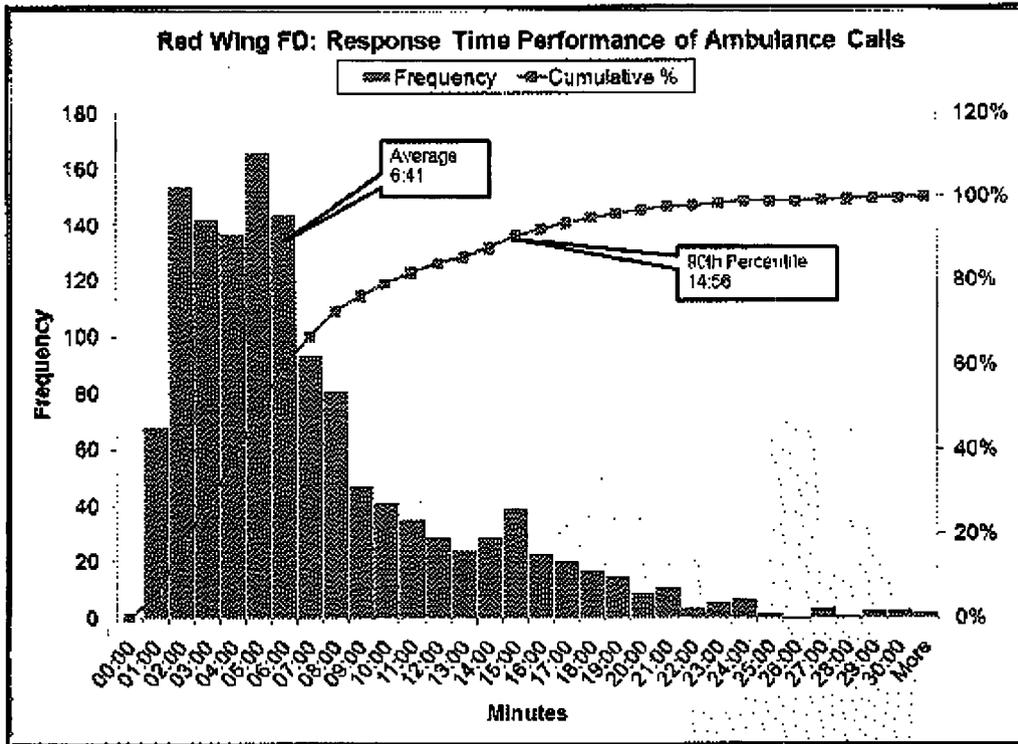
Figure 56: Response Time Performance History-Fire Calls



The most frequently recorded response times are both within three minutes and five minutes. However, instances of longer response times skewed the average to five minutes and twenty-nine seconds with 90 percent of all fire calls answered in less than ten minutes and thirty-six seconds. The following chart analyzes the response times for the ambulance calls.

²² Mutual aid calls and non-emergent calls (hospital address in ambulance call database) were removed from response time analyses as they were found.

Figure 57: Response Time Performance History - Ambulance Calls



The most frequently recorded total response time was within the five minute range; specifically the average of all calls is six minutes and forty-one seconds. Ninety percent of all calls are answered within a fourteen minute, fifty-six second response time across the ASA.

Response times can vary by time of day in reflection of service demand workload, traffic congestion, weather, and distance to the call from the station to name but a few. The average total response time for fire calls ranged from a high average of seven minutes and forty-five seconds for all calls between 12:00 and 1:00 p.m., to a low average of two minutes and thirty-four seconds for incidents between 3:00 and 4:00 a.m. The average total response time for ambulance calls ranged from a high average of eight minutes and forty-nine seconds for all calls between 6:00 a.m. and 1:00 p.m., to a low average of four minutes and forty-one seconds for incidents between 10:00 and 11:00 a.m.

Figure 58: Average Response Time by Hour of Day - Fire Calls

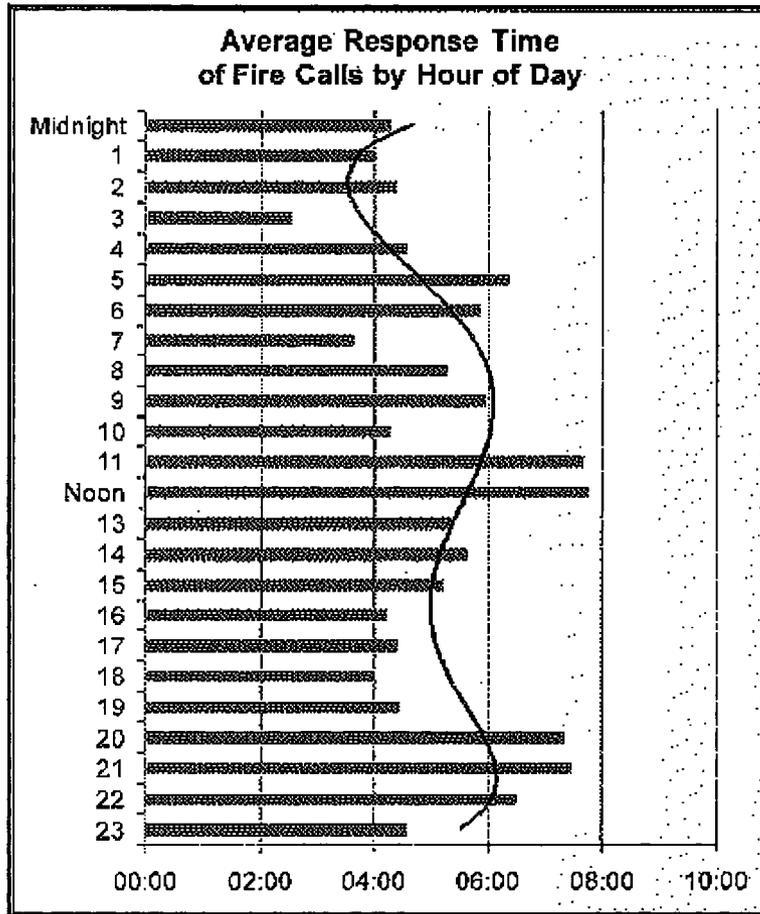
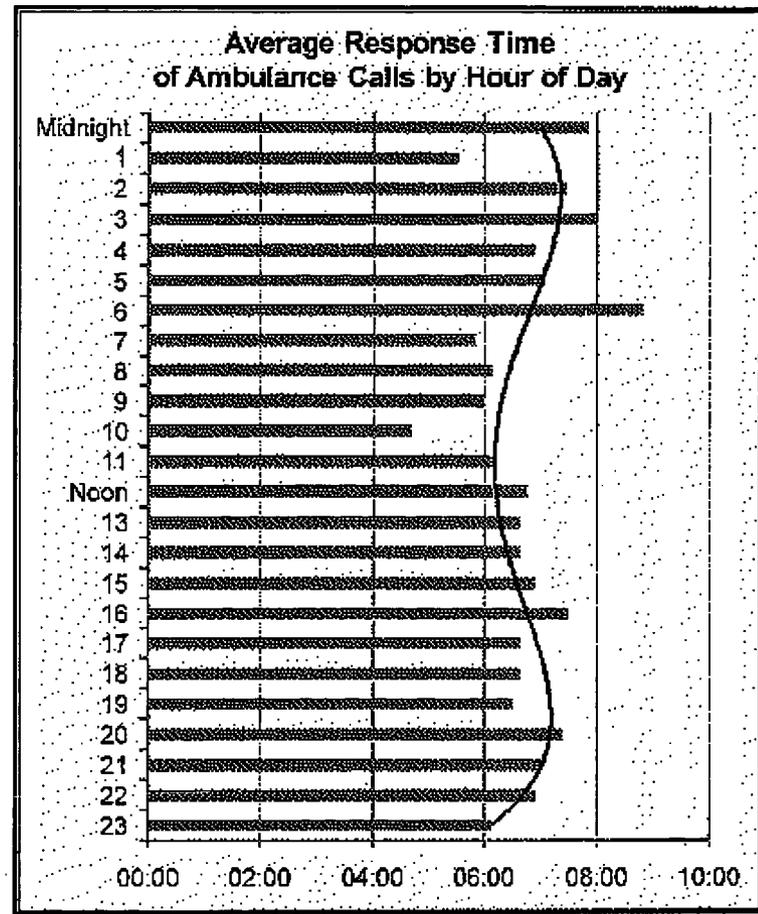


Figure 59: Average Response Time by Hour of Day - Ambulance



Average response time is one useful measure to determine how well geographic-based coverage is achieved. As discussed previously, more significant is how well the majority of emergency response demand is being serviced. One useful way to determine how well demand-based coverage is achieved is by determining maximum response time to a larger percentage of the incidents, in most cases 90 percent.

The 90th percentile response time for fire calls occurring within the RWFD ranged from a high of fifteen minutes and thirty-one seconds during the 12:00 to 1:00 p.m. hour, to a low of three minutes and fifty-one seconds between 3:00 to 4:00 p.m. The 90th percentile response time for ambulance calls ranged from a high of sixteen minutes and forty-two seconds between 12:00 to 1:00 a.m., to a low of seven minutes, forty-six seconds during the 10:00 to 11:00 a.m. hour. The following figure displays the 90th percentile response time performance by hour of day for these calls.

Figure 60: 90th Percentile Response Time by Hour of Day - Fire Calls

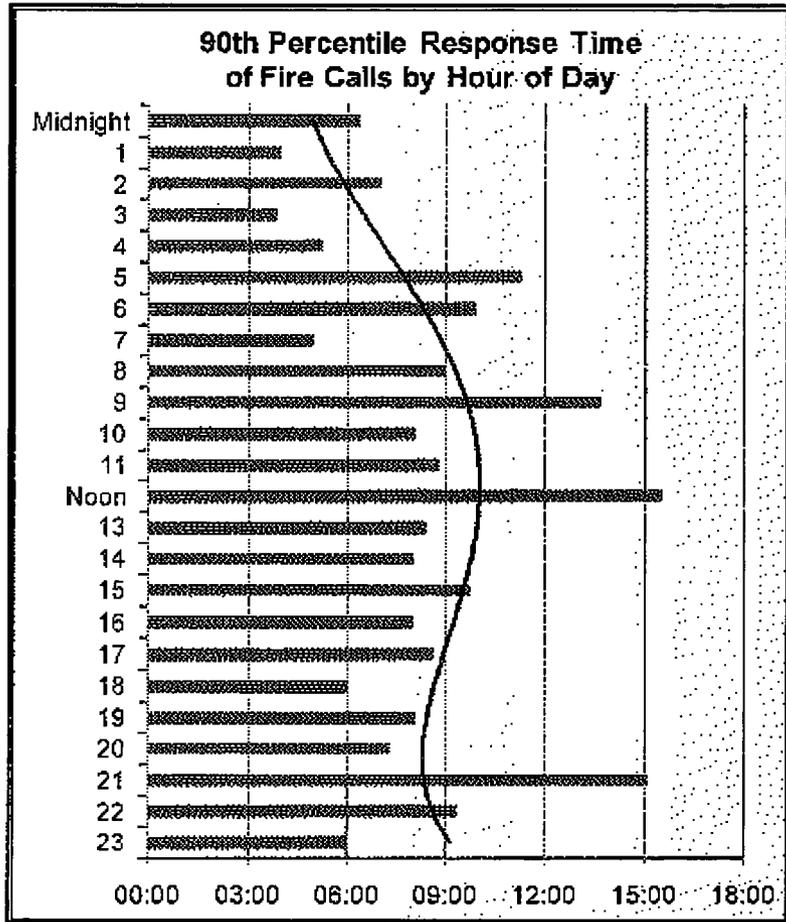
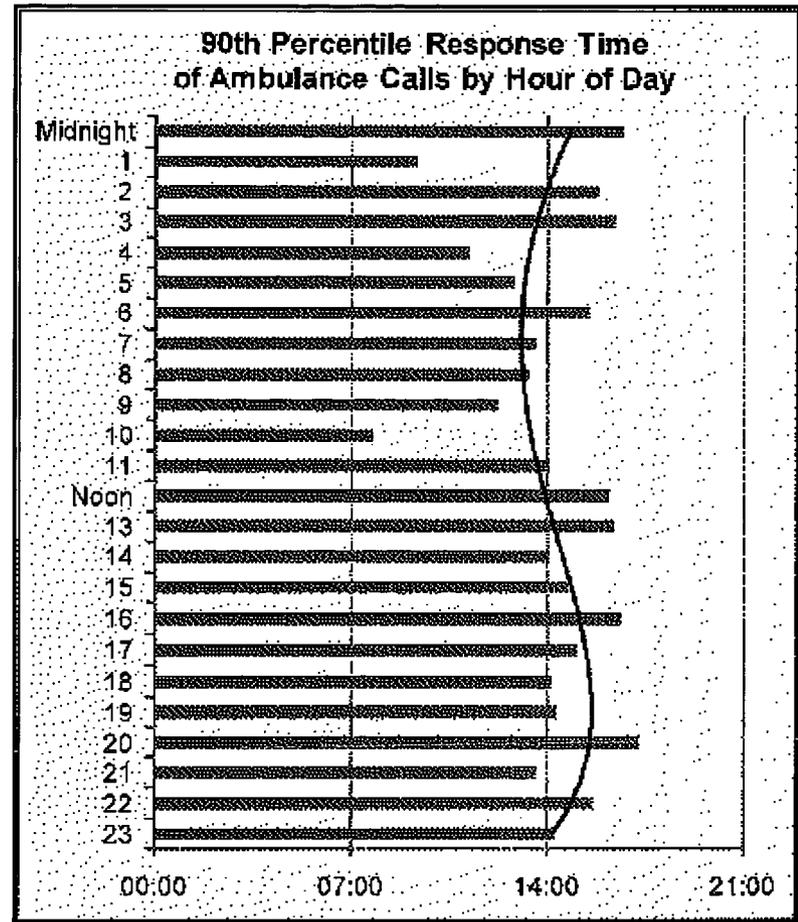
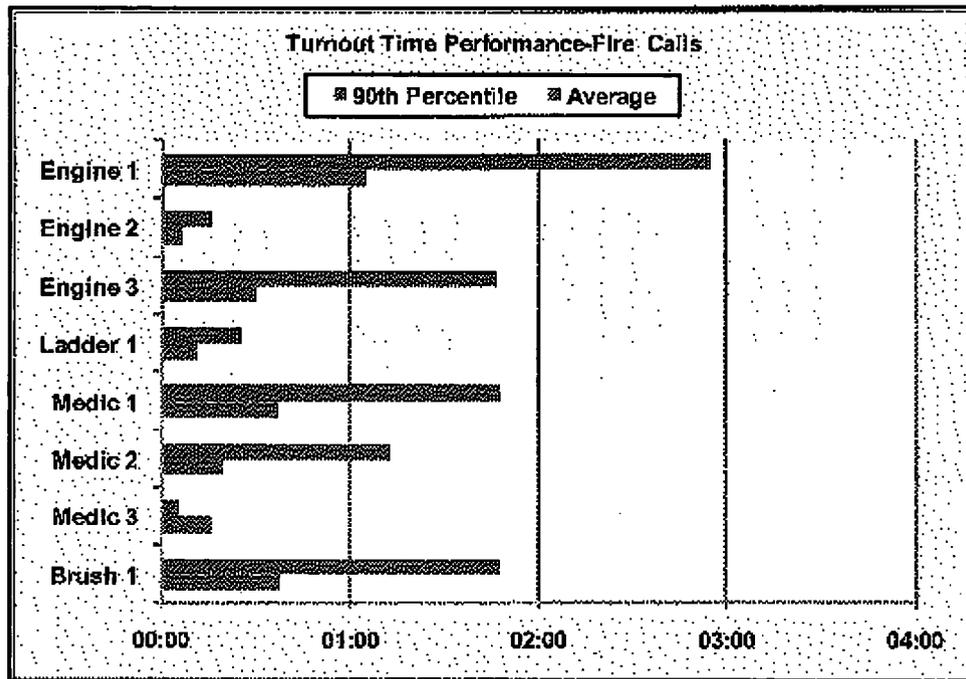


Figure 61: 90th Percentile Response Time by Hour of Day - Ambulance Calls



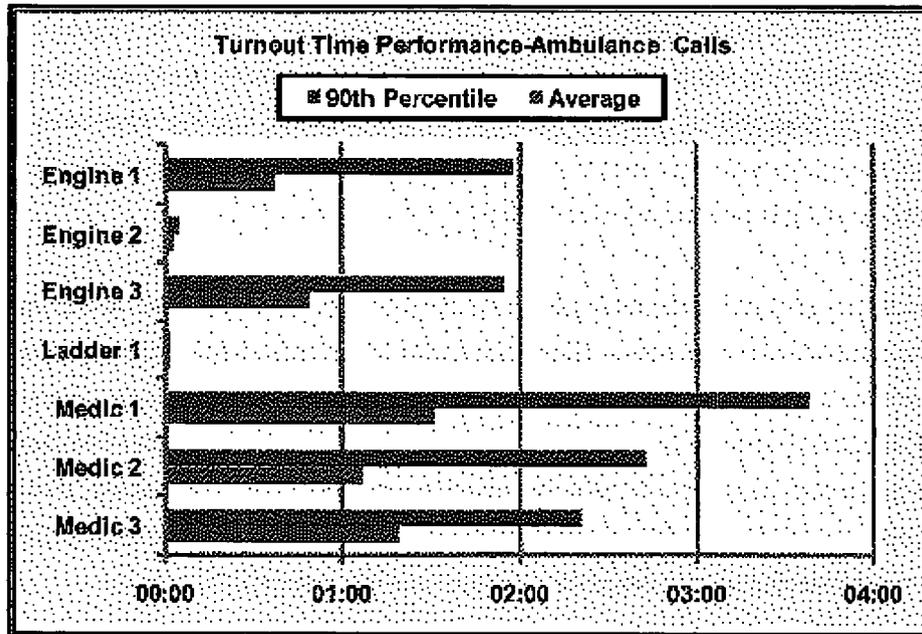
An important aspect within response time measures is the amount of time it takes responders to become enroute to the scene of an emergency once they are notified (dispatched) – the turnout time. The following chart illustrates the recorded turnout time in the database by apparatus identification symbol for fire calls that occurred within the last year.

Figure 62: Turnout Time Performance - Fire Calls



Overall, the average turnout time for the department is fifty-six seconds. Ninety percent of calls have a responder turnout time of two minutes and nineteen seconds. The following chart details the turnout time performance for ambulance calls that occurred last year.

Figure 63: Turnout Time Performance - Ambulance Calls



Overall, the average turnout time for the department is one minute and fourteen seconds. Ninety percent of calls have a responder turnout time of three minutes and fifteen seconds.

Standard Response Protocols and Incident Management

RWFD has established standardized response assignments based on the type of call dispatched. However, the assignment of apparatus to an incident is highly dependent on which on-call company is considered *second due* for a structure fire. Following a traditional, but quite unusual, methodology, on-call RWFD personnel are trained primarily on only one specific apparatus. When a structure fire is reported, the on-call personnel that are responsible for that particular shift bring the apparatus for which they are trained. This may or may not be the apparatus most needed for incident management.

For example, a structure fire on one shift may receive the response of the ladder truck as the second due unit, regardless of whether the ladder is appropriate for the size and nature of the fire simply because that is the apparatus assigned to that shift's on-call responders. Likewise, a structure fire the following day, even if in a large or tall commercial structure, might not get a response from the ladder truck because that shift's on-call responders are not trained to drive and operate it.

This unusual methodology interferes with the department's ability to respond the most appropriate apparatus to each fire. As a result of this system, there is no specified apparatus response that is matched to the risk involved in the incident. During interviews within the department, members told ESCi that it was not unusual to wait a significant period of time for a ladder truck, even if it is needed early in the fire.

This methodology should be reconsidered. The system unnecessarily limits and constrains the value of the paid-on-call responders. Experience with other departments has indicated that on-call responders, even volunteers in small communities, can be successfully cross-trained to safely and effectively operate more than one vehicle. Doing so would enable the department to match the apparatus assignments with the specific structure type, occupancy, and size, thus matching resource to risk. Additional information on this issue will be found later in this report in the *future recommendations for integration of paid-on-call personnel* discussion.

There is a target staff assignment prior to apparatus responding to the scene of an emergency. This can vary, based on call concurrency and staff availability.

RWFD indicated that area maps are available in all apparatus. Maps include hydrant locations and main size. Alternate static water points have not been mapped.

The department maintains an on-duty shift officer schedule to ensure that an individual designated for incident command will be available.

RWFD officers report that the incident command system is not used on every incident, but is fully used on all major structure fires. The department has adapted their incident command systems to the National Incident Management System. An accountability system is in place, using *passport* tags integrated to the personal alarm safety system (PASS) devices.

Recommendations:

- Standardized alarm assignments should be established as department policy to provide the quantity and type of apparatus needed for the given risk presented by a particular incident type, as well as the correct number of staff to accomplish the critical tasks necessary to mitigate the emergency.
- Information available on the maps should be expanded to include location and layout of static water points or drafting locations.
- Incident command should be declared and ICS used on all incidents.

Mutual Aid Systems

There are numerous mutual aid agreements, both formal and informal, in place between the RWFD and surrounding agencies, through both local and statewide programs.

According to interviews, multi-agency training has been somewhat limited or non-existent in the past few years, with a lack of attention focused on developing interoperability with other agencies. For the most effective mutual and automatic aid programs, as well as maximum credit in the ISO fire protection rating system, multi-agency drills should be scheduled regularly. Ideally, these should occur at least once per quarter and be recorded as multi-agency training in all agency records. In addition to the ISO credit, these trainings will naturally lead to enhanced working relationships, more regional thinking, and perhaps cooperative planning, policy, and procedural development.

Overall, the mutual aid systems in place for Red Wing are reasonable and effective. No specific problems, issues, or concerns were raised by agencies with whom they interact.

Emergency Medical Services

The RWFD is the sole provider of advanced life support (ALS) transport emergency medical services (EMS) in the municipal limits of Red Wing, as well as for an enormous area surrounding the City as shown on previous maps. The agency also responds, when requested, into the state of Wisconsin.

As already indicated, the delivery of EMS to such a large area places a heavy load on a department that is already personnel stressed. In addition, the volume of EMS calls consumes a

majority of the available man-hours for suppression activities. Although no specific cases were brought to light during ESCI's visits to the area, it is plausible to expect that suppression activities could be jeopardized in the event a fire occurred while multiple EMS calls were already in progress. In addition, the number of EMS calls that are currently occurring is preventing the department from staffing suppression activities with enough personnel to satisfy either internal or external critical tasking minimums.

The department contracts with a local physician to provide medical oversight and to assist with quality assurance and control when necessary, although the department admits that very few of their ambulance calls are reviewed locally. Personnel did indicate that the State of Minnesota EMS Regulatory Board (EMSRB) periodically requests patient care reports (PCRs) in regards to specific types of calls, but the intent is for statistical purposes rather than quality assurance. The department should develop a formal quality assurance and control program to ensure that personnel remain proficient in their abilities and to assist the training department with developing a program based on areas of deficiency or limited exposure.

As previously mentioned, staffing of EMS units is accomplished through *cross-staffing* with suppression personnel. In essence, the same personnel respond on the ambulance or the fire apparatus depending on the type of call. Under this type of staffing system, a large fire, rescue, or hazardous materials response can jeopardize coverage of emergency medical incidents. Likewise, multiple simultaneous EMS calls occurring continuously will, and does, seriously limit the department's ability to assemble an effective response force for fires. The department should consider dedicating specific personnel to at least the first-out EMS unit rather than utilizing a cross-staffing methodology.

Recommendations:

- Develop a formal EMS quality assurance and control program.
- Consider dedicated and assigned staffing for at least the first-out EMS unit rather than cross-staffing with fire apparatus.

Training

Providing quality and safe fire and emergency services requires a well-trained force. Training and education of department personnel are critical functions for the RWFD. Without quality, comprehensive training programs, emergency outcomes are compromised and departmental personnel are at risk.

“One of the most important jobs in any department is the thorough training of personnel. The personnel have the right to demand good training and the department has the obligation to provide it.”²³

General Training Competencies

In order to ensure quality training is provided, it should be based on established standards of good practice. There are a variety of sources available for training standards. In concert with the State of Minnesota, the RWFD has selected the *Fundamentals of Fire Fighter Skills* manual (IAFC and NFPA) and the NFPA as its main sources of fire/rescue standards and materials. These references are considered industry standards. RWFD utilizes fire and rescue curriculums provided by the Riverland Technical College.

Emergency medical protocols, training manuals, and standards are prescribed by the department's medical director as required by the states of Minnesota and Wisconsin.

Training Facilities

Quality *hands-on* training occurs when simulations mimic real life emergencies. A formal classroom, equipped with basic audio/visual aid resources, is available for didactic training at the fire station.

The fire station parking area and other *makeshift* locations within the City are utilized for practical training evolutions. *Live burn* and smoke training are provided annually through the use of a mobile burn trailer and a mobile ventilation trailer provided by Riverland Technical College. Acquired structures are rarely available.

²³ Klinoff, Robert. *Introduction to Fire Protection*, Delmar Publishers. 1997. New York, NY.

Students are provided with all required reference materials for training programs and a basic library is maintained at the fire station. Training references, equipment, and props are generally not inventoried and a check-out procedure is not provided.

Training Staff

The department's training program is administered through two individuals (training specialists) reporting directly to the RWFD fire marshal, although one of the training specialist positions is currently vacant. These training specialists, working four ten-hour days per week, also accomplish inspections as a routine portion of their responsibilities. One training specialist has emergency medical service training as an ancillary duty, and the other has fire training as an ancillary duty. At this writing, the fire training specialist position is vacant by the incumbent's recent promotion to fire marshal. The fire marshal is currently fulfilling both responsibilities. RWFD should consider appointed a dedicated department training officer.

Dr. Gregory Kays is retained as the RWFD Medical Director working from the Fairview Red Wing Medical Center.

The RWFD currently utilizes nine in-house certified fire instructors. The departmental training program does not have clerical assistance. Administrative support must be accomplished by the training specialists as time and workload permits.

Entry Level Training

Entry level training for full-time, career personnel requires Minnesota Firefighter II, EMT-P, and Hazardous Materials-Operations certifications. Volunteer/paid-on-call personnel must possess Minnesota Firefighter II, EMS First Responder, and Hazardous Materials Awareness certifications.

All newly appointed personnel must successfully complete a one-year probationary period.

Ongoing Skills Maintenance Training

Once assigned to a response unit, personnel must routinely be provided with refresher training and continuing education to avoid degradation of skills learned during entry-level training and certification. Additionally, training and education must be provided to deal with emerging risks and changing service demands.

As part of the Dakota County EMS Consortium, the medical director accomplishes two site visits per year for incident report review and to provide orientation for protocol updates, and new equipment or medications. Peer review and/or *ride along* assessments are not accomplished. Quality assurance is basically handled on a reactionary basis should there be a complaint or reported lack of performance.

Paramedics must complete at least 72 hours of continuing education every two years as required by both Minnesota and Wisconsin. RWFD routinely provides services to both states. Minnesota State requires a review and inspection of EMS resources every two years including a review of a sampling of incident reports.

Paid-on-call (POC) personnel must complete at least 16 hours of continuing education every other year to maintain their EMS First Responder certifications. This is provided by an outside instructor.

All Hands Nights are scheduled in January and July of each year. These sessions are used to update personnel files, accomplish fit testing, respiratory and bloodborne pathogen requirements, survey protective clothing, and complete engine familiarization.

RWFD provides a three or four hour in-service training session each month for joint career and POC participation. The training topics are based on Fire Fighter II, and results in approximately 45 hours of scheduled training per year. POC personnel are compensated for this participation.

Figure 64: Annual Career and POC Single Company In-Service Training Schedule

Month	Topic/Hours
January	PPE, SCBA and TIC
	Three Hours
February	Firefighter Self Rescue
	Four Hours
March	Ropes and Knots/Ladders
	Three Hours
April	Forcible Entry/Ventilation
	Three Hours
May	Hose Testing
	Three Hours
June	Evasive Driving
	Three Hours
July	Basic Pump Operations
	Four Hours
August	Fire Hose/Fire Streams
	Three Hours
September	Live Fire Training
	Four Hours
October	Engine and Truck Company Operations
	Three Hours
November	Fire Behavior/Building Construction
	Three Hours
December	ICS/Accountability/Make-Up Training
	Three Hours

Source: RWFD Training Data

Career personnel must complete an additional 16 hours of in-service training in specialty topics that include confined space, ice rescue, wildland fire suppression, extrication, and fire boat operations.

Figure 65: Career Only In-Service Training Schedule

Month	Topic/Hours
January	Ice/Water Rescue
	Two Hours
April	Wildland Firefighting
	Two Hours
March	High Rise Operations
	Two Hours
May	Rope Rescue
	Two Hours
June	Fire Boat
	Two Hours
August	Confined Spaces
	Two Hours
October	Vehicle Extrication
	Two Hours
November	Vehicle Firefighting
	Two Hours

Source: RWFD Training Data

Career and POC personnel are expected to jointly attend approximately 45 hours of training per year. The monthly training topics typically involve 40 percent didactic instruction and 60 percent practical. Lesson plans are typically utilized for this training. A safety officer for practical/manipulative in-service training sessions is provided. Consistent officer advancement training is not provided.

RWFD typically does not participate in programs provided by the National Fire Academy. A regional disaster drill is usually conducted with the Prairie Island Nuclear Generating Plant each year, although (mutual aid) training has rarely occurred. Post-incident analysis sessions are conducted for major incidents.

RWFD provided an opportunity for 751.75 hours of training for calendar year 2006. A summary of this training resource is provided below.

Figure 66: Total Hours of Training CY2006

Topic	Hours
Incident Management	137.00
Hazardous Materials	106.50
PPE and SCBA	31.75
Fire Control	64.50
Apparatus	33.50
Prevention and Detection	17.00
Fire Equipment	13.50
OSHA	22.00
Certification	34.00
Preparatory	10.00
Airway Management	11.00
Trauma	14.00
Medical	17.00
Special Consideration	43.50
Operations	17.50
Other EMS	58.00
Confined Space	7.00
Ice	5.00
Heavy Rescue	2.00
High Level	10.00
Other Rescue	1.50
Administrative	1.50
Supervisory	7.50
Tour/Preplan	28.50
Other Fire	1.50
Other EMS Activities	37.00
Other	6.00
CPR	14.00
ACLS	11.50
PALS	23.00
TOTAL	751.75

Source: RWFD Training Data

During calendar year 2006, 43 RWFD members (21 POC and 22 career) completed 4,126.50 hours of training, for an average of approximately 95.97 hours of training per member for the year. While there are few resources available to determine the number of training hours a member should attend, the Insurance Services Office recommends that each member receive 240 hours of training annually. This should include dedicated officer training, multi-station training, and night training.

Pre-Promotion Development Training

National standards recommend that personnel demonstrate the skills and knowledge required of a more responsible position prior to being promoted within the organization. A pre-promotional review is provided to ensure candidates for promotion meet the minimum educational and certification requirements for the position. The promotional process is used to select the most qualified individual based on a demonstration of proficiency.

RWFD provides a limited pre-promotional development training process through its Captain-in-Training Program. While admirable, this process does not formally provide organized pre-promotional training to potentially or aspiring officers using a standardized curriculum or evaluation system for more than one individual per shift or for the POC cadre. The NFPA has set standards for fire rescue service positions and specialty skills; the fire officer standard is *NFPA 1021*.

Pre-promotion training programs should be developed, and completion required of personnel, prior to application for promotion. This training is best performed in an academy setting with consistency in instruction and ample opportunity for student/instructor interaction. Officers at the station can provide some of this training, but the majority should be in a more formalized setting. Then, as discussed earlier, the promotional process should effectively evaluate applicants to determine who best demonstrates the skills and knowledge required of the position. POC and career personnel qualifying for a promotional eligibility list may be utilized in the absence of an officer. This serves the department with an individual with proven skills and abilities and provides opportunities for candidates to gain experience.

Training Program Planning

Like any other activity, training and education of personnel should be conducted under a comprehensive plan. The plan should include a clear definition of the goals and objectives of the training program department-wide and a schedule and process to achieve them.

The RWFD should consider establishing a department-wide training committee comprised of all ranks and disciplines. The basis of the committee would be the training specialists, the medical director, and appropriate representatives of the POC and career personnel. This committee would serve as an advisory group to the training specialists and ensure all aspects of the

department were considered in the organization's ongoing training plan. A dedicated department training officer could serve as the chairperson for this committee.

The RWFD comprehensive training plan should include:

- Identification of performance standards for all personnel at the firefighter and officer level
- Enhanced, progressive minimum training certifications
- Provisions for periodic review of individual and company level performance
- Scheduled training to prevent skills degradation
- Scheduled skills improvement training
- Comprehensive training objectives for each training session planned
- Processes for evaluating the amount of learning that occurred

Currently, RWFD provides a different training program depending on whether an individual is POC or career, and whether or not an individual is assigned to an engine company or a truck company. In an effort to determine the reasoning behind this policy the only *justification* appeared to be based on the requirement to compensate training participants for the potential of increased training hours.

Enhancement of organization-wide service delivery capability wanes at this compensation justification, especially when the department could easily and economically increase their staffing resource for both engine and truck company responses on a daily basis.

With the exception of requiring advanced life support (ALS) certification for POC members, all members and employees should receive the same training so that they may participate in all engine and truck company responses. Should POC members achieve ALS certification, they should be encouraged to participate in ALS staffing.

Competency-based Training

Ongoing training should follow an identified plan based on demonstrated training needs. Such a plan is best developed as a result of periodic evaluation of the current skill levels of members (competency-based training).

Under a competency-based system, an evaluation of skill performance is conducted at scheduled intervals to determine if the person being evaluated can perform the task in

accordance with pre-determined standards. Those skills that are performed well require no additional training. Those skills not performed well are practiced until the standard is met.

This approach maximizes the time used for training. Further it ensures that members are performing at an established level. Specialty skills can be evaluated in the same manner with further training provided as needed. Ideally, the competency-based training approach is used on an ongoing basis. For example, each quarter different skills are evaluated on an individual-by-individual basis.

To institute a competency-based approach to training, all needed skills must be documented to describe the standard of performance expected. This would include all skills such as hose handling, apparatus operation, EMS procedures and protocols, use of equipment and tools, forcible entry, ventilation, tactics and strategy, and others.

To operate an effective ongoing training program, even under the competency-based approach, sufficient resources must be available to conduct skill evaluations and to assist with performance improvement training.

Training Records and Reports

RWFD training records are maintained on *Firehouse* training module software. The program is capable of providing reports showing the amount and subject of training received by each member. Regular management reports may be produced. This is an excellent resource for the RWFD to assist in developing long range training and education plans. *Image Trend* EMS reporting software package is being considered for the future.

Recommendations:

- Consider appointing a dedicated full-time department training officer.
- Consider appointing and implementing a training committee comprised of department representatives of all ranks and disciplines to advise the training specialists of all aspects of an departmental training plan.
- Develop and implement a comprehensive departmental training plan.
- Require that all POC and career personnel complete all in-service training so members may participate in both engine and truck company responses.
- Encourage POC members to achieve ALS certification and training so they may participate in ALS service delivery.
- Provide pre-promotion training for all potential promotional candidates.
- Provide ongoing skills maintenance and supervisory training for all officers.
- Consider enhancing the minimum training requirements for firefighters, paramedics, and officers.
- Consider developing and implementing a competency-based training program.
- Design and implement a scheduled training program with neighboring, mutual aid fire and emergency services companies.

Fire Prevention and Education

An aggressive risk management program, through active fire prevention, is a fire department's best opportunity to minimize the losses and human trauma associated with fire. Robert Klinoff, author of *Introduction to Fire Prevention*, 2007, outlines the perspective as follows:

"One of the true measures of a fire department's effectiveness is the amount of loss experienced in the community or jurisdiction. If hazards and unsafe acts can be reduced, there will be a resultant reduction in the area's fire experience...In order to reduce the losses due to fires, effective, focused fire prevention effort must take place."

A fire department should actively promote fire resistive construction, built-in warning and fire suppression systems, and an educated public trained to minimize the risk to fire and health challenges and to respond effectively when faced with an emergency.

Code Administration

Commensurate with Chapter 3, General Administration, Section 3.01, Departments and Offices of Administration, of the City Charter, "The Council shall appoint a...chief fire official...as required by state and federal law."

"The Council shall make such other rules and regulations as may be necessary or proper for the efficient and economical conduct of business of the City...in the form of an ordinance, an Administrative Code..."

Chapter 2, City Code, Section 2.01, Administration and Departmental Organization, Subd. 3, establishes the Department of Fire and Ambulance Service. Subd. 9 reads as follows: "The Department of Fire and Ambulance Service shall be headed by the Fire Chief with responsibility for the prevention of fires and the protection of life and property against fire and for the proper and efficient operation of an ambulance service."

Ordinance No. 348, effective 3-26-04 adopts City Code, Section 10.24, Minnesota State Fire Code, Subd. 1. Adoption. "The Minnesota State Fire Code is hereby adopted as though set forth verbatim as though set forth verbatim herein. One copy of said Code shall be marked City of

Red Wing-Official Copy and kept on file in the office of the Fire Chief and open to inspection and use by the public."

The Minnesota State Fire Code provides for the fire chief and qualified delegated representatives to administer, apply, and enforce the code in the City.

The Minnesota State Fire Code adopts the 2008 Edition of the International Fire Code with amendments. Because RWFD has contracted with the Diamond Bluff Township for fire protection, they enforce the National Fire Protection Association, Fire Prevention Code, NFPA 1, in that jurisdiction as well.

The fire chief, fire marshal, and the inspector/training specialist are Minnesota certified inspectors and may administer and enforce the fire code. Currently, there is an inspector/training specialist vacancy and a new fire marshal. The previous fire marshal has transferred to operations and the inspector/training specialist vacancy has not been filled.

The fire marshal and the two inspector/training specialist positions, under the fire chief, are responsible for inspections, plan reviews, public fire education, system tests, and fire investigations. In-service station personnel do not routinely participate in the inspection/code enforcement program. The fire marshal also serves as the RWFD safety officer.

New Construction Review

The fire marshal contracts with Fire Protection Services to review fire protection system plans for the City. During CY2006, seven fire sprinkler and fire alarm system plans were reviewed and initial acceptance test completed. The City collects a fee of \$100 or two percent of the job value (whichever is greater) for this service, but it does not become part of the fire department budget.

Building and site plan reviews are conducted by the City building official. While the fire department enjoys a good relationship with the building official, the department is not involved in this review or occupancy process. Should the fire department have a concern with a particular review or fire code compliance matter, they must contact the building official to prohibit the issuance of a permit. With the exception of fire protection systems, the fire department does not have a formal *sign off* or approval for the issuance of an occupancy permit.

Automatic Fire Sprinklers

While excellent response time performance by the fire department is vitally important, as well as is the role of smoke detectors in preventing mortality and morbidity from fire, the most effective method to protect property from fire is the fire sprinkler system. Fire service resources cannot be provided to match the level of protection provided by this technology. The cost would simply be too high. The best opportunity to apply water to a fire prior to flashover is through the use of built-in fire sprinkler systems in homes, businesses, and other buildings. Their advantage is that they not only detect the fire, but also apply water well before flashover. Innovations in residential fire sprinkler design have dramatically reduced their cost. The RWFD should consider pursuing legislation to require the installation of approved fire sprinkler systems in all new structures including residential properties.

Fire Safety Inspections

The primary purpose of any code enforcement effort is to decrease community risk. This means eliminating potential sources of ignition or fire spread, as well as assuring proper and safe egress for occupants in the event of an emergency. Property inspections, to find and eliminate potential fire hazards, are an important part of the overall fire protection system. These efforts can only be effective when completed by individuals having the proper combination of training, experience and motivation and when completed in an appropriate frequency. The figure below indicates the number of inspections completed by RWFD during 2006.

Figure 67: RWFD Fire Inspections - 2006

	2006
Fire Inspections	324
Re-Inspections	132
Total	456

Source: Fire Marshal Yearly Report

The recommended frequency for commercial fire safety inspections varies by the type of business, but is generally recommended to be completed annually. While an annually recurring inspection frequency may be a challenge for many fire departments to maintain, it does serve to point out the accepted national practice of classifying occupancies by hazard (risk) and adjusting inspection frequencies accordingly.

The fire marshal has a target goal of inspecting high occupancy properties annually, and all other properties every two years. Currently, the fire marshal believes the City has approximately 600-650 inspectable properties on file (computerized). There are another 40-50 old hard copies of inspectable property files that are not yet computerized.

These estimates place the total number of inspectable properties in the City at approximately 700. Statistics for 2006 provided by the fire marshal indicate the department initiated 324 property inspections. That amounts to approximately 46.29 percent of the estimated 700 inspectable properties.

The fire marshal was unable to delineate the number of 2006 inspections by low, moderate, or high hazard, except to confirm that high occupancy properties are inspected annually. In any case, if all properties were inspected annually, it would require approximately 700 initial inspections. This is an extremely conservative observation as annual property inspections are associated with low hazard occupancies.

In addition to the obvious life safety risk implications for citizens and firefighters due to not completing a city-wide inspection program based on risk, this omission could present a significant liability should a questionable fire scenario present itself in a property that has not been inspected or that had not been inspected for a long period of time.

Estimating the number of personnel needed to achieve inspection frequencies listed above is possible, but only if the number of inspectable occupancies and their relative hazard level is known. The most immediate resolution to this challenge is the utilization of in-service suppression personnel in the department's fire safety inspection program. The certification and recertification of company officers not already possessing fire inspector certification could be readily incorporated into the department's training program.

Once an in-service inspection program was implemented, company personnel could incorporate pre-incident planning and building familiarization into the inspection program. Many jurisdictions utilize a *life safety* inspection approach where those code requirements directly affecting life safety in a facility, in case of fire, are emphasized. This would ensure detection/suppression systems were operational, egress was open, and exits were clear, to name a few. In-service

personnel could accomplish many of the less complicated inspections leaving the more high-risk, more complex inspections to the fire marshal.

Often, reluctance by operational personnel to participate in an in-service fire safety inspection program comes when the program is improperly planned and/or managed. Operational personnel must clearly understand what is expected of them, be properly trained to give them confidence to accomplish the program, and be provided clear instruction on *knowing what to do when they don't know what to do*.

Another approach to accomplishing Red Wing's inspection challenge is providing full-time inspectors. This is especially true considering the fact that the department's two inspector/training specialist positions conduct inspections on an ancillary basis to training.

The first task would be to confirm the number of inspectable properties together with the inspection frequency based on risk. With the estimate of more than 700 inspectable properties, and considering the fact that these properties would be divided into a frequency of quarterly, semi-annual, and annual based on their particular risk, the department could expect to accomplish a significant number of property inspections per year.

There are limited resources available as a guideline for the number of inspectors required to accomplish a given workload for a jurisdiction. Recently, the State of Texas has added an addendum to their ISO grading schedule to give credit for accomplishing fire safety inspections. This *Texas Addendum to the Fire Suppression Rating Schedule* provides a significant guideline regarding staffing resources needed to complete an effective fire safety inspection program. According to the Texas Addendum, one full-time inspector can be expected to complete approximately 480 inspections per year. Their computation is based on two-inspections per day, times 20 work days/month X 12 months. Once the fire marshal has confirmed the number of inspectable properties in the City by risk, the Texas model could be applied as an estimate of the number of full time inspectors required.

The inspection program needs improvement. There needs to be a defined objective for the frequency of inspections based on risk level. There needs to be a concerted effort to achieve this objective.

The fire marshal needs to:

1. Clearly identify the number of properties that should be inspected
2. Establish the frequency these properties should be inspected by level of risk
3. Identify the resources needed to conduct the inspections, re-inspections and other related activities
4. Enhance the current records management system so that the results of inspections can be recorded, re-inspections tracked, and next inspection dates identified to the responsible inspector
5. Ensure personnel are properly trained to perform the inspections they are assigned
6. Develop a results oriented reporting system that contrasts the fire inspection effort against the City's fire occurrence and loss experience

Fire station personnel can be utilized to provide fire inspection service within their station areas. They must receive comprehensive training to do this work to ensure best service and minimize the risk associated with improper inspections. However, this should not be at the expense of their primary mission.

Public Safety Education

The fire marshal's office provides public safety education programs to a variety of audiences (See activity chart below). Fire extinguisher training is provided to local businesses as requested. Fire safety presentations are given to local senior citizens in local high rise residences and the fire station is open during Fire Prevention Week in October to discuss various fire prevention and life safety topics. Fire safety presentations are made to local elementary schools including the causes of fires, use of 9-1-1, smoke detectors, and fire escape plans.

Figure 68: Fire Safety Presentations/Contacts CY2006

Presentation	Number of Contacts
Fire Extinguisher Classes	140
Fire Safety at Jordan Towers	100
Fire Department Open House	350
Sunnyside School	553
Burnside School	613
Concordia	27
RW Academy	60
St. Joseph	80
St. John's	50
Total	1983

Source: RWFD Fire Marshal

In addition, the fire marshal's office provides a variety of safety and fire prevention informational brochures, and safety guides.

Providing fire safety education to the public to minimize the occurrence of fire, as well as training the community in appropriate actions to take when faced with an emergency, is a particularly important fire protection strategy. Given the extended response times for fire service resources in parts of the City, prevention provides the best chance for minimizing the effects of hostile fire.

The fire marshal's office, given its limited resources, provides an admirable fire safety program. All segments of the population should receive education appropriate to their age and issues they face. There are a number of excellent programs that can be incorporated into an overall public education strategy that should be explored for implementation. Examples would be NFPA's *Learn Not To Burn* and *Risk Watch* programs.

Providing sufficient resources for delivery of safety education is necessary to ensure an effective program. Others will need to support the effort through delivery of programs. Personnel at fire stations are an excellent resource for programs delivered within their respective service areas. This is also an opportunity to expand program delivery resources through the use of community volunteers.

Finally, there should be some way to measure results of the effort. This would include expanding information tracked on each emergency incident to record whether human behavior

was a contributing factor to the emergency and whether citizens who were present took appropriate action when faced with the emergency.

Fire Investigation

The investigation of fires, explosions, and related emergencies is an integral part of providing life and fire safety to a community.

The RWFD fire marshal's office completes cause and origin investigations for the City. When company officers cannot readily determine the cause of a fire the fire marshal is notified. Currently, one of the inspector/training specialists possesses basic fire investigation training and the recently transferred fire captain possesses advanced training. The fire marshal has completed formal fire investigation training.

The Minnesota State Fire Marshal provides a regional fire investigation resource and must be notified of major property loss and fire fatalities. The RWFD fire marshal enjoys a good relationship with the Red Wing police department and utilizes their resources should an arrest be required.

Fire scene control practices, evidence collection and control processes, and juvenile fire setter intervention procedures are handled on an informal basis. Formal policies and procedures are needed in this area.

Figure 69: Fire Investigations - 2006

Type of Investigation	Number
Cause and Origin	5
Arson Investigations	1
Total	6

Source: RWFD Fire Marshal

Incident Information Analysis

The primary purpose for maintaining a record of emergency responses is to evaluate the effectiveness of fire service effort. This effort includes deployment strategies, personnel training, and particularly the effectiveness of fire prevention and public safety education programs.

Once this data is routinely collected, the fire marshal, in concert with the fire chief and other operations personnel, should use the incident records to determine what types of fires are occurring most frequently, the types of properties most often involved in fire, and causes of ignition, to develop targeted fire prevention efforts.

The *fire problem* in a community is addressed by a cycle of resources provided by the authority having jurisdiction. These resources include public education so the citizen is aware of hazards, how to prevent them, and what to do should they occur; engineering/code enforcement so fire and life safety is an inherent part of the community infrastructure and where there is a violation compliance is achieved; fire suppression so that when there is a failure in the education, engineering/code enforcement part of the cycle the emergency can be resolved; and fire investigation where the incident is documented, the cause determined accidental or intentional and steps taken so it will not happen again.

The results of fire investigations suggest public education needs and results, the need for code modifications and changes, fire department training, resources and deployment, and identification of the community's fire problem. RWFD makes an admirable effort, considering resources, to analyze their fire problem cycle and make organizational adjustments.

Recommendations:

- The fire marshal, in concert with the fire chief and operations personnel, should make use of emergency incident records to evaluate program effectiveness and develop programs and strategies targeted at frequently occurring emergencies.
- Consider including the RWFD (fire marshal) in the City's development authorization review process such that building permits must have an approval signature from the fire department prior to issuance.
- Consider making fees collected for fire code compliance inspections, reviews, and tests available to the fire department to fund the associated expenses.
- Determine the number of fire code inspectable properties in the City and develop an inspection schedule based on property risk.
- Provide dedicated fire code inspectors.
- Consider using fire station personnel to complete fire inspections.
- Establish and implement standard procedures for fire marshal notification, fire scene control, and evidence processing during fire investigations.
- Establish and implement standard procedures for juvenile fire setter intervention.
- Expand the scope and audience for the delivery of public safety education.
- Utilize fire station personnel and community volunteers to deliver public safety education programs.
- Consider pursuing legislation to require the installation of approved fire sprinkler systems in all new structures including residential properties.

Section II- Community Risk and Service Demand Projections

In this section, ESCi examines the risk to the community from fire, and the effect of population projections and community development on service demand for the fire department.

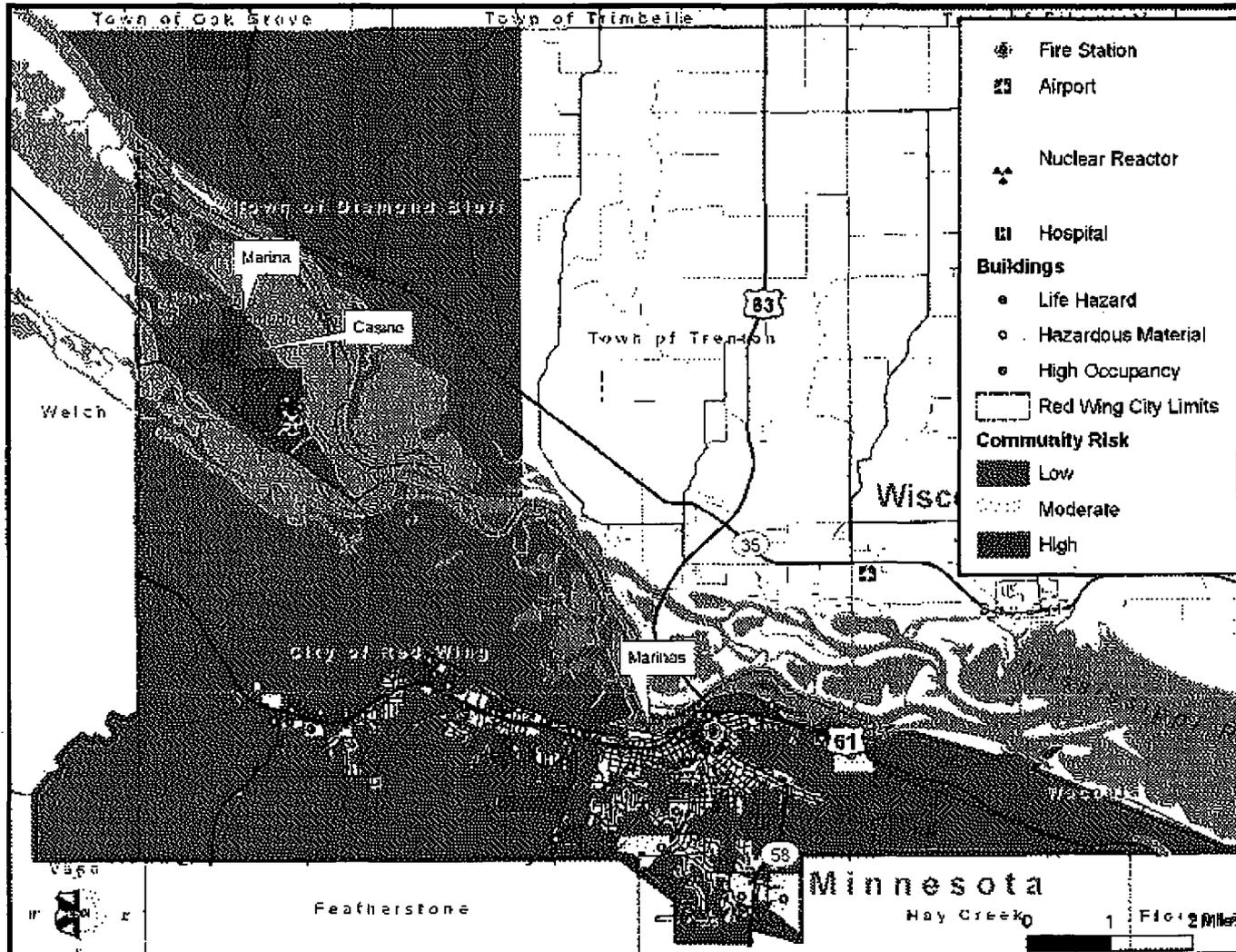
Community Risk

The fire service assesses the relative risk of properties based on a number of factors. Properties with high fire and life risk often require greater numbers of personnel and apparatus to effectively mitigate a fire emergency. Staffing and deployment decisions should be made with consideration of the level of risk within geographic sub-areas of a community.

The community's risk assessment has been developed based on potential land use within its anticipated future boundaries. These potential uses are found in the City's development plans and zoning designations. The following map translates land use (potential scale and type of development within geographic sub-areas) to categories of relative fire and life risk.

- Low risk – Areas zoned and used for agricultural purposes, open space, low-density residential, and other low intensity uses.
- Moderate risk – Areas zoned for medium-density single family properties, small commercial and office uses, low-intensity retail sales, and equivalently sized business activities.
- High risk – Higher-intensity business districts, mixed use areas, high-density residential, industrial, warehousing, and large mercantile centers.

Figure 70: Community Risk Assessment



The community contains mostly low risk properties. The predominance of highest risk is located in the City's central downtown core, and in certain non-residential developments along Highway 61. These properties include industrial, heavy commercial, mid-rise, mixed-use, institutional, and multi-family occupancies.

Certain facilities require special attention, which are noted on the previous map. They include facilities of especially high risk or community significance whose loss due to fire would be devastating and the risk to the assembly of lives in them is especially high. Among these are the Prairie Island Nuclear Generating Plant and the Treasure Island Resort and Casino.

Fire protection at the Prairie Island Nuclear Generating Plant is governed by CFR 50, Appendix R. As such, the facility is required to establish a Fire Protection Program, which was accomplished prior to approval of the facility's operating license. Administration of the Fire Protection Program is outlined in Prairie Island Nuclear Generating Plant Administrative Work Instruction 5AWI, a proprietary document used only as a reference in this report. To summarize, the document authorizes the appointment of a Fire Protection Coordinator who is responsible for all aspects of the plant's Fire Protection Plan including, but not limited to:

- Serving as "...focal point for all in-plant fire protection issues..."
- "...coordinating all fire-protection related activities in the plant"
- "...coordinating fire drills and determining their effectiveness"
- "...establishing coordination with the local fire department, including joint drill and training sessions to familiarize fire department personnel with plant access routes, layout, equipment, and special hazards"
- "...establishing and maintaining fire-fighting strategies"

In addition to the document referenced above, which covers the administrative actions related to fire protection, Plant Safety Procedures F5 addresses the actual procedures associated with actual fire prevention and suppression. This document outlines, among other items, the basic requirements for the on-site fire brigade, and identifies the roles and responsibilities of those members in the initial stages of fire attack. More importantly for the scope of this study, document F5 addresses emergency assistance from outside agencies, specifically RWFD. The following is an excerpt from the aforementioned document relating to how RWFD will interface with the fire brigade and other personnel from the Prairie Island Nuclear Generating Plant (PINGP).

"Upon arrival, the RWFD SHALL have the primary responsibility for extinguishing the fire. Prairie Island Brigade Chief SHALL provide personnel and direction to help accomplish this objective and SHALL be responsible to ensure that plant safety is not compromised. The RWFD may enter the building by the door closest to the fire. Anti-C clothing should be provided by radiation protection personnel, if required. The RWFD may call Hastings Fire Department (HFD) for assistance, if necessary. When RWFD personnel arrive at fire scene, the Brigade Chief may release brigade personnel to return to plant operations assignments."

In order to support the emergency activities initiated by PINGP personnel, the City signed a letter of agreement stating that they have reviewed and understand the responsibilities of RWFD in the event of an emergency at the facility. In addition to local law enforcement activities, the memorandum of understanding (MOU) states that, "Fire and rescue services will be provided by and under the control of the Red Wing Fire Department."

Although the City and PINGP have agreed to provide and accept assistance respectively, no formal policies or procedures exist to indicate how those activities will be carried out other than mitigation of radiological contamination of personnel and equipment. No documents were provided that indicated how paid-on-call personnel were to be utilized, or if they were to fill in for career personnel at Station #1 or serve as relief personnel at PINGP. In order to ensure that sufficient personnel are available for back-filling of career personnel, or to relieve career personnel during incidents at PINGP, formal policies should be developed and adhered to in regards to staffing methodologies.

Treasure Island Resort and Casino is owned and operated by the Prairie Island Indian Community and serves as an area of particular concern in regards to emergency medical services. The resort and casino create a variable and dynamic transient population within the area, which has the potential to further stress the emergency services of RWFD. Although not a tax paying community within the municipal limits of Red Wing, the City has the obligation to provide City services to the community.

Although a community health clinic is located on the island, emergency patients are not transported by ambulance to the facility either from the casino or from sites throughout the Prairie Island community. The resort and casino do staff medical personnel on-site and typically employ off-duty firefighter/paramedics and emergency medical technicians (EMTs), as well as personnel from volunteer ambulance providers throughout the area to cover those positions but, based on information ESCI received during our on-site visits, the casino medical staff rarely

leave the casino property to respond elsewhere on Prairie Island or to other areas as requested by Goodhue County Communications. Medical responses from RWFD Station #1 can take upwards of 20 minutes based on travel time models; therefore the community (outside the casino) relies on the first responder capabilities of the tribal police to provide initial aid while awaiting arrival of the ambulance from RWFD.

In addition to these specific high-risk facilities, several marinas and nursing homes are also located within the FSA. A higher amount of nursing homes and assisted living facilities near downtown and the hospital are likely to be part of the reason for the high concentration of calls in that area.

Recommendation:

- Develop formal policies and procedures as to what personnel staffing methodologies will be utilized should an incident occur at the Prairie Island Nuclear Generating Plant.

New Community Development

Development pressures are extending from the suburbs of Minneapolis/St. Paul into Hastings and Dakota County. This may continue into the RWFD service area into the future, depending on economic trends in employment, housing, and fuel prices. While this is a long range vision, short-term projects are in the early stages of planning and construction. According to information received from the City planning department, numerous commercial and residential developments are being developed. These projects are along U.S. Highway 61 west of downtown, as well as south of downtown near State Highway 58.

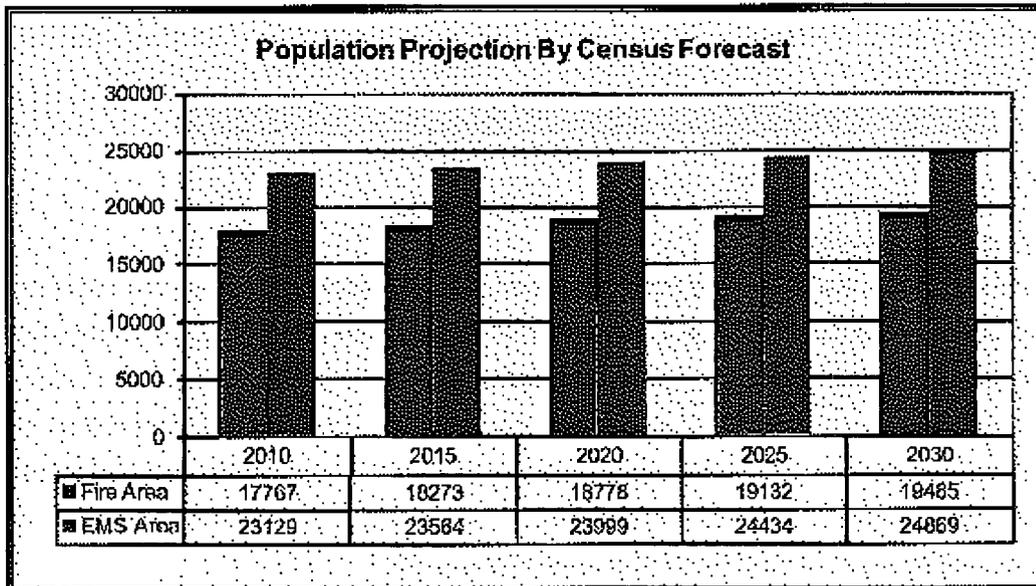
In the west, a gateway development district of industrial and institutional projects will join planned housing of four developments consisting of 168 units. Further east, near the hospital is the Tyler Road Business District zoned for regional commercial and office buildings; 611 units of higher density and elderly housing are planned within this area. In the downtown area, higher density housing is expected in the historic district as redevelopment infill. South of downtown, a planned high school and technical college are located near 234 mostly higher density residential developments. Utilizing the median persons per household in the area of 2.26 persons, the new

residential developments can expect to add over 2,200 people to the total population when completed.

Population Projections

Since we know that the service demand for emergency agencies is based almost entirely on human activity, it is important to have a population-based projection of the future size of the community. In developing a forecast for overall population growth, ESCi typically develops scenarios depending on a variety of factors such as economics, mortality, and fertility to name a few. A mathematical forecast is created through the year 2030 and presented in the following figure.

Figure 71: Projected Growth In Age Group Populations



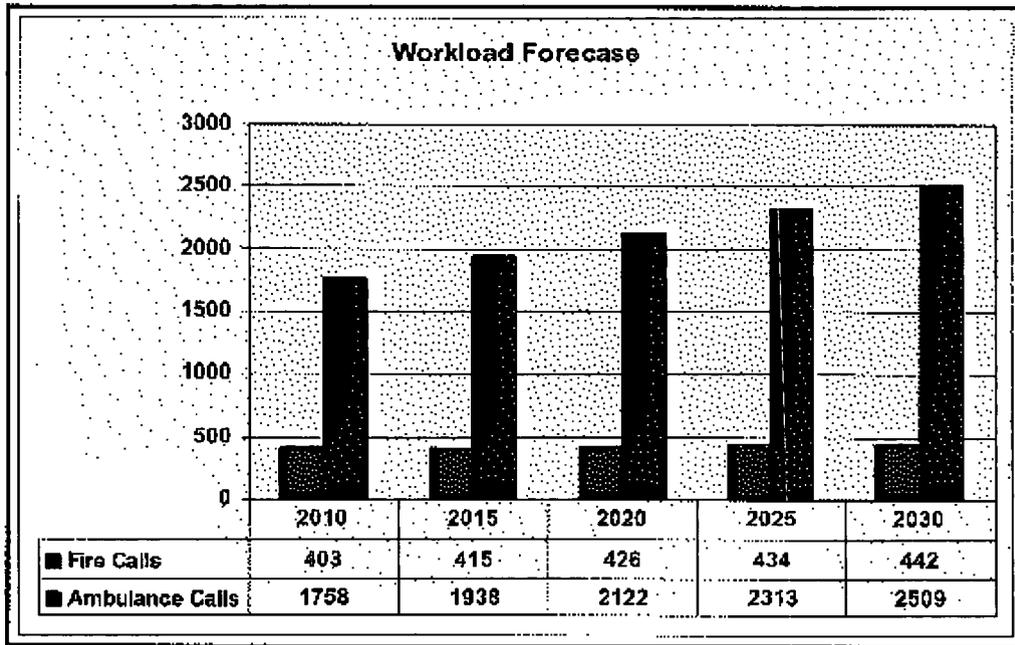
It is not the intent of this study to be a definitive authority for the projection of future population in the service area, but rather to base our recommendations for future fire protection needs on a reasonable association with projected service demand. While there are usually variations in the population projection methodology, one thing that can be certain is that the Red Wing fire and ambulance service areas will continue to grow in population, likely reaching 19,000 to 25,000 persons by 2030. Planning should begin now to maintain the resources needed to meet the continuing demand for services.

In evaluating the deployment of facilities, resources, and staffing, it is imperative that consideration be given to potential changes in workload that could directly affect such deployment. Any changes in service demand can require changes and adjustments in the deployment of staff and resources in order to maintain acceptable levels of performance.

Service Demand Projections

For purposes of this study, ESCI utilized population projections obtained through community development research and multiplied these by a forecasted incident rate derived from incident per capita rates to identify workload potential through the year 2030. The results of the analysis are shown, by year and type of call, in the following chart and table.

Figure 72: Workload Forecast



While fire calls are expected to remain within a narrow range, this is due to advancements in automatic alarm and suppressions systems, building code enforcement, and public education regarding fire prevention. Ambulance calls are expected to rise significantly based on the progression of large segments of the population entering their senior years of life, which often are accompanied by health issues. Additionally, this chart does not take into account the incident rates of Interfacility Transfers, whether to in-town or out-of-town destinations.

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Section III – Future Delivery System Models

A fire protection master plan is intended to provide strategies that are long-term in nature. It is the job of a master plan to identify the most critical issues the agency will face over the long haul, out as much as twenty years in the future. ESCi initiated that process in the previous section of this report where community growth, identified risks, and service demand was reviewed.

In developing a long-term strategy for fire protection services for Red Wing, the integrative use of knowledge acquisition, depth of expertise, and geographic modeling tools were employed. Earlier sections of this report analyzed the current resource and staffing deployments along with the performance levels in geographic coverage and service demand. Once understood, a projected service demand can become a base to model future performance capability. Located 45 miles southeast of Minneapolis/St. Paul, the City is still far enough to be significantly affected by its suburban sprawl. Although the town of Hastings has felt some impact, continued development pressures may progress along Highway 61 toward and into Red Wing. This depends greatly on economic conditions, fuel prices, and if the shift to more urban lifestyle halts the spread of suburban development from the Twin Cities area.

Nonetheless, continued housing and commercial development within Red Wing itself present unique challenges to fire protection strategies. Suburban development continues to spread west and south, extending further into its formerly more rural environment. Future service demand is projected to follow essentially similar patterns as the current demand with the exception of an infill of service demand into areas of future planned development especially between Welch and downtown Red Wing. The service areas served by RWFD in the rest of Goodhue County, MN and within Pierce County, WI are expected to remain primarily rural in nature. The following maps illustrate the projected service demand based upon population, workload, and land use projections.

Figure 73: Projected Fire Call Concentration

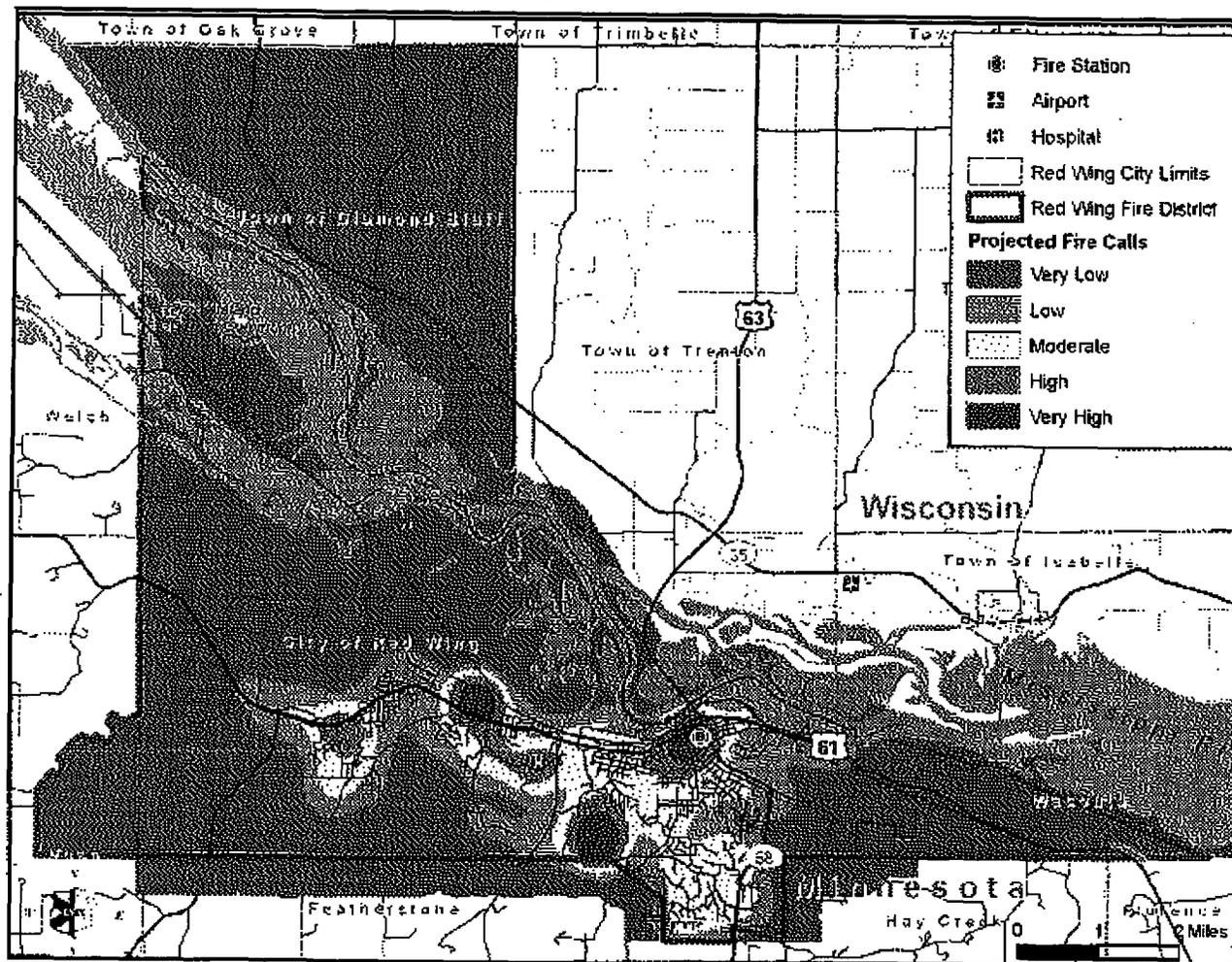
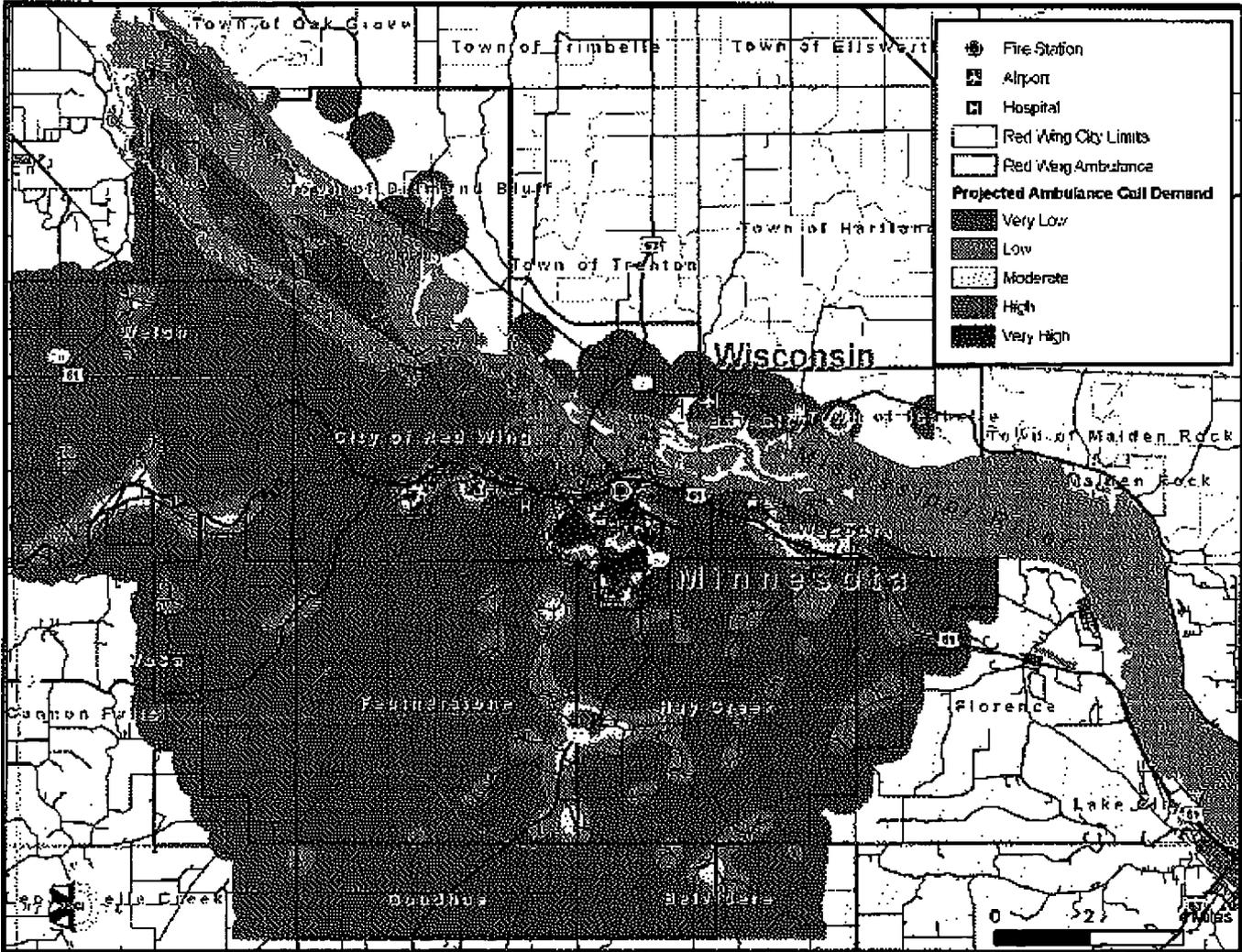


Figure 74: Projected Ambulance Call Demand Concentration



Future service demand is projected to be greater in areas of more dense population, but as the population and infrastructure grow from the downtown area, service demand also increases. Light volume is expected to continue to exist in areas of sparse population and development in much of the service area outside of the municipal limits.

Long-Term Deployment Recommendations

The RWFD service area serves three distinct types of communities consisting of more densely populated areas, a growing suburban area, and a rural extent. These differing types of areas present different relative risks of fire incident impact, as well as different levels of service demand, which therefore suggest alternative fire protection and emergency service. For this study, these areas have been delineated as *service delivery zones* and are suitable for use in considering tiered levels of response performance and system capacity. It is widely recognized that the cost of fire protection and emergency services increases as the levels of facility and resources are increased. Resources are typically increased to achieve reduced response time, faster assembly of an effective firefighting force, increased system capacity, and the ability to protect higher levels of risk. However, in communities where there exists a wide variation in the levels of service demand and risk, it is also recognized that a single level of service delivery performance may not be appropriate or economically feasible.

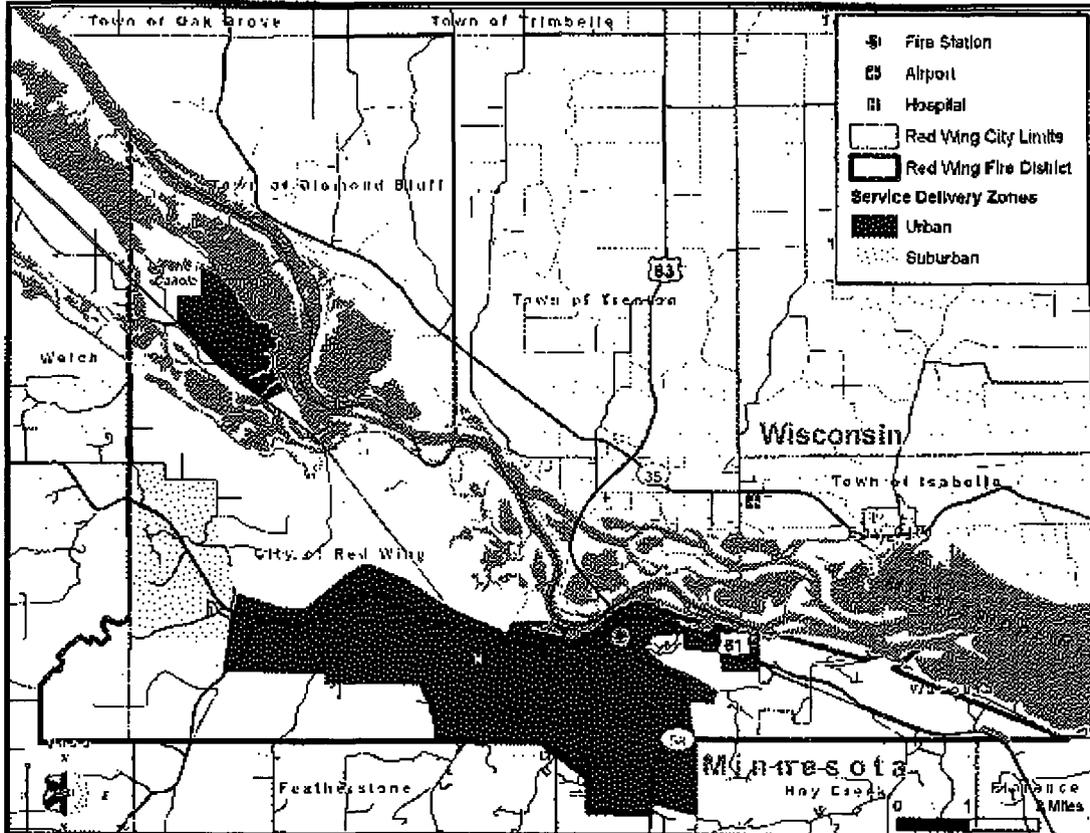
In other words, a municipal government that provides protection for a jurisdiction that is primarily densely urban residential, commercial and industrial development may find a single service delivery performance plan to be perfectly appropriate, but a public service department serving a mix of dense urban area as well as rural farmland will find this much more difficult. Were such a community to attempt to achieve the same levels of response performance and resources for its rural area as it does its urban area, costs would increase greatly due to the smaller number of taxpayers and lower assessed values of the rural regions of the jurisdiction. For these reasons, many of these communities choose to deliver a tiered level of service; levels that more closely match the risk and demand as well as the expectations of the citizens living there.

Service Delivery Planning Zones

Illustrated in the following figure, the entire RWFD service area is divided into three separate service delivery planning zones. The red shaded area depicts where the urban response goal would apply, while the yellow area indicates a suburban enclave. The rest of the fire service area and the ambulance service area would be considered rural for response time performance

measures. The determination of these service delivery zones are based on information from future land use plans, planned levels of population density, types of property uses, and anticipated levels of relative community risk.

Figure 75: Service Delivery Planning Zone Areas



Urban Response Zone

This is an area with high population densities and higher community risk properties corresponding with current higher service demand levels. Projected to remain an area of high service demand, these areas should adhere to response time objectives consistent with urban response times. Response time performance relies on road network and speed limit levels. While the amount of road ways in the urban zones account for a large percentage of total roadway miles within the fire service area, there are some hindrances to fire response capability typical in urban environments. The greater number of turns necessary to arrive at a destination reduces the ability of a multi-ton fire apparatus to maintain speed. This, along with daytime

traffic, signaled intersections, and narrow residential streets impede response performance potential.

While it is understood that the downtown area would be within an urban response profile, this zone extends west as development is planned for and has occurred along Highway 61. Planned housing development past State Highway 19 qualifies this area for suburban response coverage. While the population of Prairie Island does not meet urban population parameters, it is believed by ESCi that the significant community risk structures, such as the Prairie Island Nuclear Generating Plant, the casino, and the amount of daily visitors to the area warrant an urban level service delivery.

Suburban Response Zone

These zones extend from the urban zones usually along major road arteries and are areas of the most recent and future growth potential. Like the urban zones, there are several suburban zones. One main issue that also encumbers emergency vehicle response in these areas is the use of cul-de-sacs, limited access communities, and traffic calming devices such as speed bumps. Although these are also present in Red Wing's urban response zones, they become more pervasive in suburban communities and the norm in future residential developments.

Rural Response Zone

The capability for higher vehicle speed in rural zones tends to be greater due to the lack of turns, sparse development, and because road connectivity becomes less of an issue. Although service demand will increase in this zone as well, it is projected to increase modestly in the same areas as current demand due to the lack of planned development in this zone. Being an area of lower community risk and lower service demand, response times can typically be relaxed in developing a service delivery strategy. A response time of twelve minutes from dispatch is not unusual for very rural areas with limited population and will allow fewer stations to cover a wider area.

New Zoned Performance Objectives

ESCi proposes new service performance standards for each service delivery zone based on currently accepted standards within the fire service and emergency medical communities. These proposed response performance objectives increase in time intervals in relation to the characteristics of each service delivery zone and distance from the fire stations. Any new

performance standards should be reviewed and accepted by the City's elected and appointed officials, and the towns or townships that they serve since they form the foundation for the future deployment of emergency services in the collective jurisdiction and, thus, the resulting levels of service to be anticipated by the taxpaying citizen. The following table illustrates the response performance criteria for the service delivery zones. These response time objectives include a one minute, thirty second turnout time.

Figure 76: Proposed Service Delivery Zones Response Time Objectives

Zone	Coverage (%)	Minutes
Urban	90	06:30
Suburban	80	07:30
Rural	80	11:30

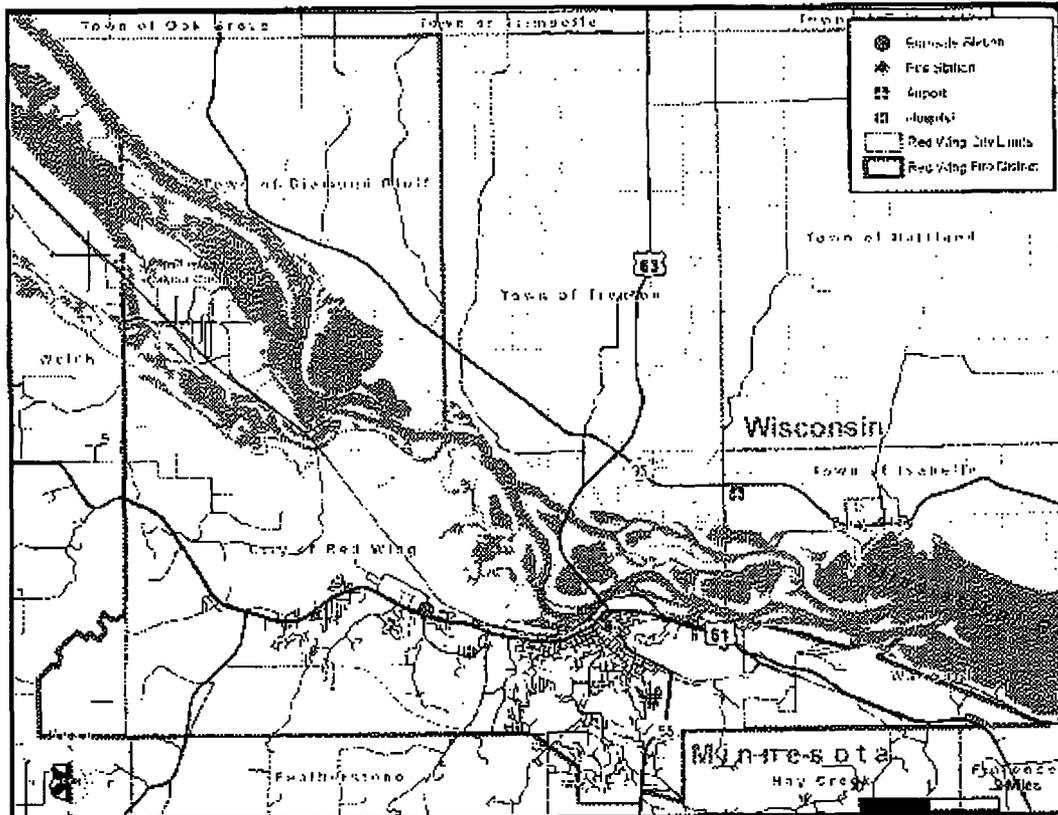
The objectives apply to the first due response unit such as an engine or ambulance.²⁴ It is suggested that the suburban and rural percentile goal is reduced to the 80th percentile based upon the attainability of this standard in consideration of the community risk in these areas.

Facilities

In 1972, the City annexed what was known as Burnside Township on the western side of the Red Wing city limits. At the time, that area was protected by an all-volunteer fire department with a station located in the vicinity of North Service Drive as approximated on the map below.

²⁴ The remaining full alarm assignment of apparatus should arrive subsequently within two to eight minutes from arrival of the first unit, depending on the type of apparatus.

Figure 77: Location of Original Burnside Township Station



This station was staffed 24-hours a day by RWFD personnel until 1977 when the decision was made to close the station and relocate all personnel and equipment to the central location. Based on retrospective analysis of service demand, it appears as though the volume of responses to the west side of Red Wing was not sufficient to support a staffed station in this area, and the personnel and apparatus were routinely being used in the downtown area. Since the personnel and apparatus were being used so extensively downtown, combined with the fact that service demand to western Red Wing was limited, the decision was made to consolidate resources based on economic efficiency.

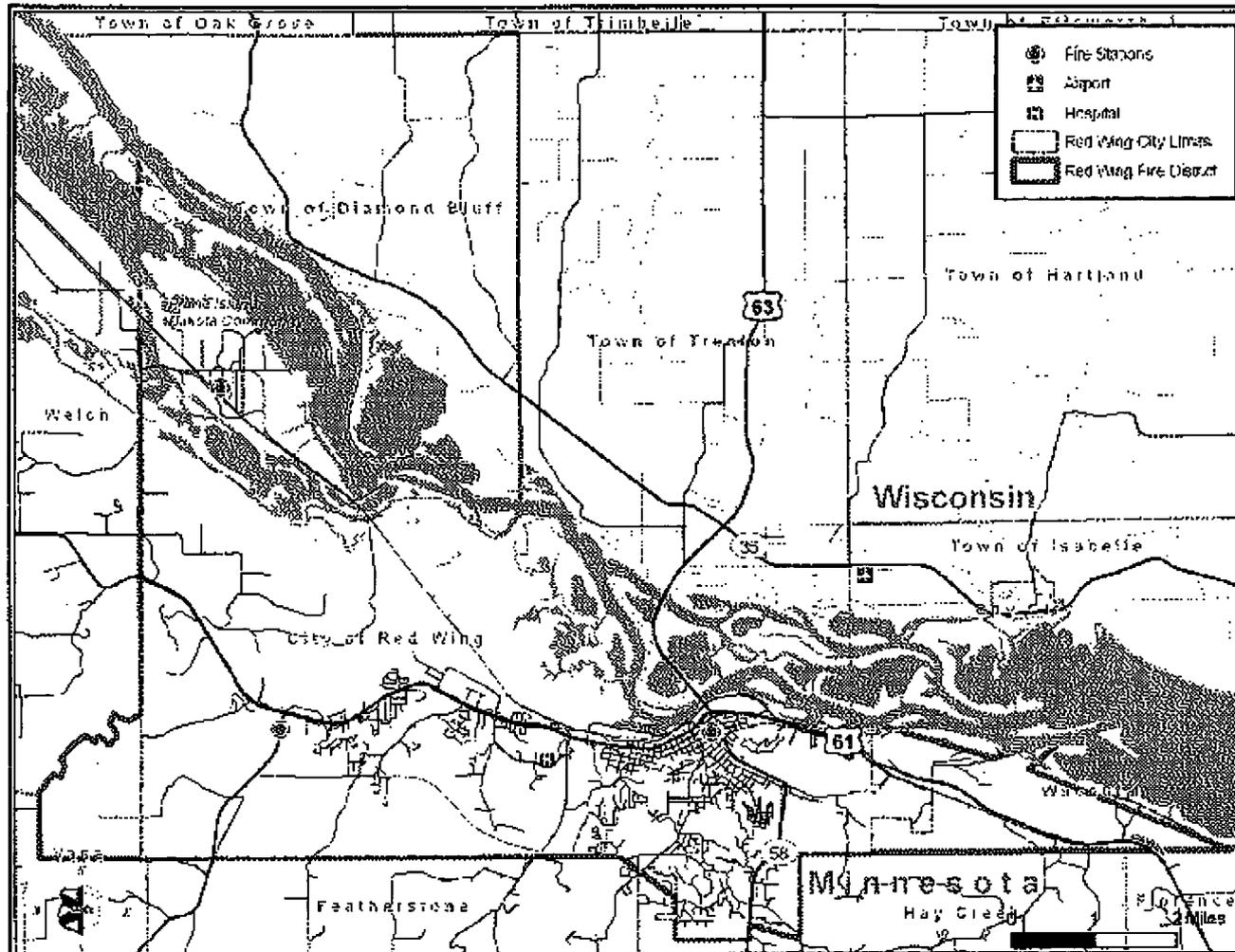
Based on ESCi's analysis of both current and projected service demand, it is our finding that an additional station is currently necessary on the west side of Red Wing, but in a location different than that of the original Burnside Township station.

Because of the continued commercial and residential development along Highway 61 combined with the fact that this area is currently outside of the recommended five mile limit for ISO standards, it is recommended that a station be constructed near the intersection of U.S. Highway 61 and State Highway 19. Hereafter referred to as the *Westside Station*, this will serve the western Red Wing area and provide another departure point for ambulance calls on the west and southwest extents of the RWFD ambulance service area. This station would also allow additional personnel to respond to the Prairie Island community when necessary with a much quicker response time than from the central station.

Because of the community risk considerations of facilities within Prairie Island and the amount of time it would take fire apparatus to respond to this area, it is suggested that a third fire service facility be planned within the Prairie Island Indian community. For this report, the travel model illustrates the apparatus being housed near the community center building. It would be both operationally and economically sound to utilize the Prairie Island facility that once housed heavy apparatus.

The following map illustrates the recommended three-station facility deployment in relation to the fire service area of the RWFD.

Figure 78: Proposed Facility Deployment



Apparatus

The downtown station should maintain as primary response apparatus²⁵ an engine, ladder truck, and an ambulance. In the Prairie Island Station, a quint²⁶ fire apparatus on as short a wheelbase as possible is recommended for fire related calls, as well as first response medical calls. It is recommended that the Westside Station accommodate an engine and ambulance.

Operationally, RWFD should focus efforts on moving water effectively in the areas of the fire response district without hydrants. The department's objective should match its resources to the community risk and demand that it serves. In this area, that clearly involves structures that are not in proximity to a pressurized water source. The presence of multiple fire engines cannot substitute for the abilities of a planned shuttle of well-designed water tankers to move adequate quantities of water.

During a tanker shuttle, the fire department typically establishes at least one *water point*, a location from which water can be pumped into the tankers by means of either a drafting pumper or gravity flow. The flow of water requires tanker trucks to move back and forth between a fire scene and the water point.

Time is consumed at the point where the tankers are loaded with water, known as *load time*. Time is also consumed at the point where they discharge their water at the fire scene, typically into portable dump tanks, known as the *off-load time*. The final element of time in a tanker shuttle is consumed by travel back and forth, which is dependent on the distance between the fire and the water point.

During interviews, it became obvious that the community has limited number of water points available for fire protection supply. This is a critical factor in the ability of the fire department to maintain adequate flow of water at a fire scene, quantified by the measurement of gallons per minute (GPM). An inadequate GPM flow can result in continued fire spread and the inability to control a fire.

²⁵ Does not include reserve apparatus. Reserve apparatus can be located based on convenience.

²⁶ A quint includes the capability of a normal fire pumper, including hose and a water tank, but also is equipped with a full complement of ground ladders and an elevating device such as an aerial ladder. In this case, a short ladder of approximately 75 feet is recommended to maintain the ability of the vehicle to be constructed on a short wheelbase.

The size of the building and the area involved in fire are used to determine the needed fire flow in GPM. The National Fire Academy teaches the following methodology for this calculation.

$$\begin{aligned} &(\text{length X width})/3= \text{GPM per floor} \\ &\text{GPM per floor X \# of floors} \\ &\text{Total GPM X \% of fire involvement} \end{aligned}$$

For example, a two-story residential structure that is 35 feet in length by 28 feet wide that was 60 percent involved in fire would have a needed fire flow of 336 gallons per minute.

It is critical that the fire department know their ability to deliver this quantity of water throughout the area. This can be calculated when certain factors are known. For instance, in the following chart, ESCI provides *example* calculations of the ability of a fictional tanker shuttle to deliver GPM, based on the size of the tankers, the load and off-load times, and the distance to a water point. Distances are shown in miles.

Figure 79: Sample Tanker Shuttle Capability Calculations

Tanker Shuttle Flow Capability Examples			
	Capacity	Load Time	Offload Time
Example Tanker 1	1500	04:45	00:30
Example Tanker 2	1750	05:15	00:40
Example Tanker 3	1800	05:20	01:00
Distance in miles	1.5		
GPM Flow	426		
Distance in miles	2.0		
GPM Flow	365		
Distance in miles	2.5		
GPM Flow	319		
Distance in miles	3.0		
GPM Flow	283		
Distance in miles	3.5		
GPM Flow	254		
Distance in miles	4.0		
GPM Flow	231		
Distance in miles	4.5		
GPM Flow	212		

It becomes obvious that this example of a three-tanker shuttle could not deliver the necessary GPM flow for the example two-story structure if the water point was more than two miles away.

Contrast that, however, with the attempted use of engines in place of tankers to shuttle water. In the following example chart, a three-engine shuttle can flow less than half of the GPM as the tanker shuttle. In any case, the example engine shuttle could not support the needed fire flow of 336 gallons per minute, even if the water point were only a quarter mile away.

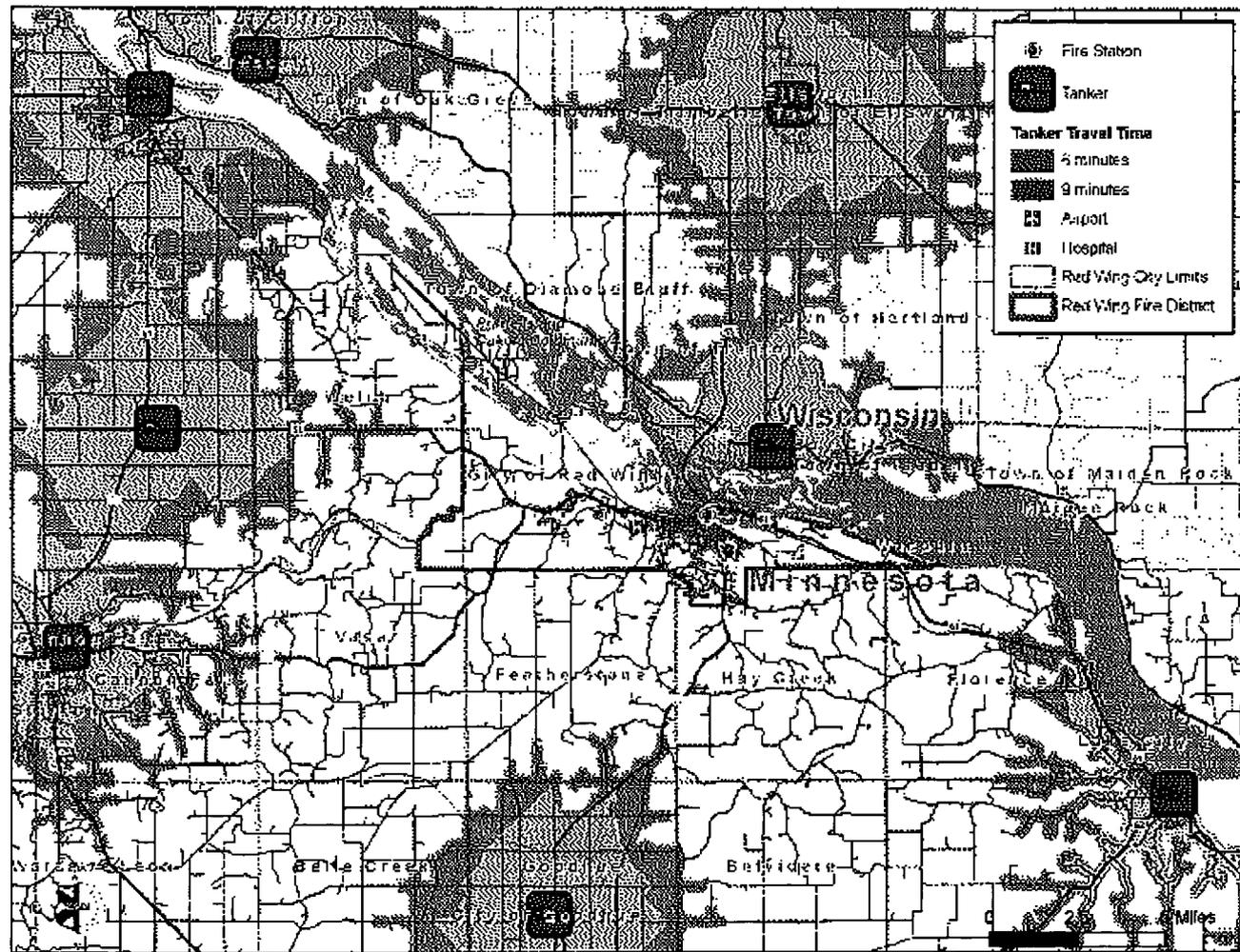
Figure 80: Sample Engine Shuttle Capability Calculations

Engine Shuttle Flow Capability Examples			
	Capacity	Load Time	Offload Time
Example Engine 1	1000	06:00	03:45
Example Engine 2	750	04:50	03:15
Example Engine 3	1000	06:00	03:45
Distance in miles	1.5		
GPM Flow	180		
Distance in miles	2.0		
GPM Flow	158		
Distance in miles	2.5		
GPM Flow	143		
Distance in miles	3.0		
GPM Flow	129		
Distance in miles	3.5		
GPM Flow	118		
Distance in miles	4.0		
GPM Flow	109		
Distance in miles	4.5		
GPM Flow	101		

As the size of the structure involved in fire increases, the situation only worsens. Clearly, the presence of multiple fire engines is not a replacement for the presence of an adequate number of well-designed water tankers in a community with limited water supplies. Likewise, pumper-tankers that are not designed for rapid water shuttle operations cannot adequately substitute for this important asset.

Currently, the department does not operate any tankers and, instead, relies on the arrival of mutual aid tankers from surrounding volunteer fire departments. The following map illustrates the travel time of those mutual aid tankers and their ability to reach areas of the Red Wing fire service district.

Figure 81: Travel Time Capability of Current Mutual Aid Tankers



The map shows that none of Red Wing or Diamond Bluff can be reached by any tanker in less than nine minutes. This is assuming volunteer staff were at the station and available for immediate response. Additional turnout time for volunteers would extend these response times. From the information and sample water shuttle charts provided earlier, it becomes obvious that Red Wing could not likely support an adequate water flow for any sizable structure fire until the arrival of the tankers.

For this reason, ESCi is recommending at least one tanker be located at the new Westside fire station. ESCi further recommends that additional research and analysis be conducted to determine possible tanker needs based on gallons per minute flows required in non-hydrant areas.

It is important that the fire department determine the true and accurate calculations of their normal tanker shuttle capability, using tested load and off-load times and true capacity (based on weight testing). Maps can be generated using known, established water points that would demonstrate GPM flow capability on all town street segments. The map street segments could be color-coded to show GPM capability.

More importantly, once this calculation effort was completed, it would become relatively obvious where additional water points would most benefit Red Wing and Diamond Bluff. To that end, additional effort could be made to obtain rights to any existing static supplies. It is also possible that new water points, such as cisterns or gravity tanks, could be installed.

Staffing

It is recommended that within Station 1, three career firefighters staff the engine, while two firefighters staff the ambulance. Additionally, two career personnel would be assigned to the truck company. The paid-on-call personnel would respond as necessary to bring additional apparatus as ordered by incident command.

It is suggested that within the Westside Station, two career firefighters cross-staff the engine and ambulance, while a third career personnel be available to either serve as a third firefighter on the engine or to serve as a driver of the engine or tanker when the ambulance is already on a call. The paid-on-call personnel would respond to serve as additional personnel or retrieve second-out apparatus when necessary and as deemed appropriate by incident command.

Within the Prairie Island Station, two career personnel would staff the quint apparatus, with potential assistance of the casino medic who could be cross-trained as a firefighter.

As indicated earlier in this report, Prairie Island Indian Community employs off-duty EMT personnel to staff the medical team within the Treasure Island Casino. One potential staffing methodology would be for the City and the Prairie Island Indian Community to enter into an agreement that would place those personnel under the auspices of RWFD as employees. Under this scenario, the current medical personnel working with the casino would become career personnel with RWFD, and casino duty would be rotated or assigned as determined by agreement between RWFD, casino management, and security personnel through a contractual agreement. This arrangement, however, would require significant contractual negotiations between the City and the Prairie Island Indian Community in regards to personnel and human resources policies, scheduling, and utilization. Policies for infilling of casino personnel would be necessary when that individual is utilized outside the casino campus, and guidelines would be necessary that dictated when and under what circumstances that individual could leave the campus. In lieu of such a significant modification of personnel policy, ESCi would recommend three personnel be assigned to the Prairie Island station as indicated in the figure below.

In the preceding paragraphs, we have recommended additional staffing for the current location, as well as in new stations on the west side of Red Wing and on Prairie Island. The tables below summarize those recommended positions.

Figure 82: Proposed Staffing per Station and Apparatus

Position	Station # 1			Westside Station			Prairie Island Station
	Engine 1	Truck 1	Medic 1	Medic 2	Engine 2	Tanker 1	Truck 2
Firefighter/Paramedic	3	2	2	2	2		3
Lieutenant		1			1		
Captain	1						
Administrative and Support							
Deputy Chief		2					
Administrative Assistant		1					
Fire Marshal		1					
Inspector		2					

Future Deployment Performance

Retrospectively, a performance analysis of the current one-station deployment utilizing the service delivery zones and the proposed response time objectives was conducted. The first table measures the current performance within each zone based on current service demand.

Figure 83: Current Performance of Service Demand – Current Facility Deployment

	Current Service Demand		
	Current Facility Deployment		
	Coverage (%)	Fire Calls	Ambulance Calls
Urban	90	09:20	12:27
Suburban	80	08:24	12:34
Rural	80	11:56	17:31

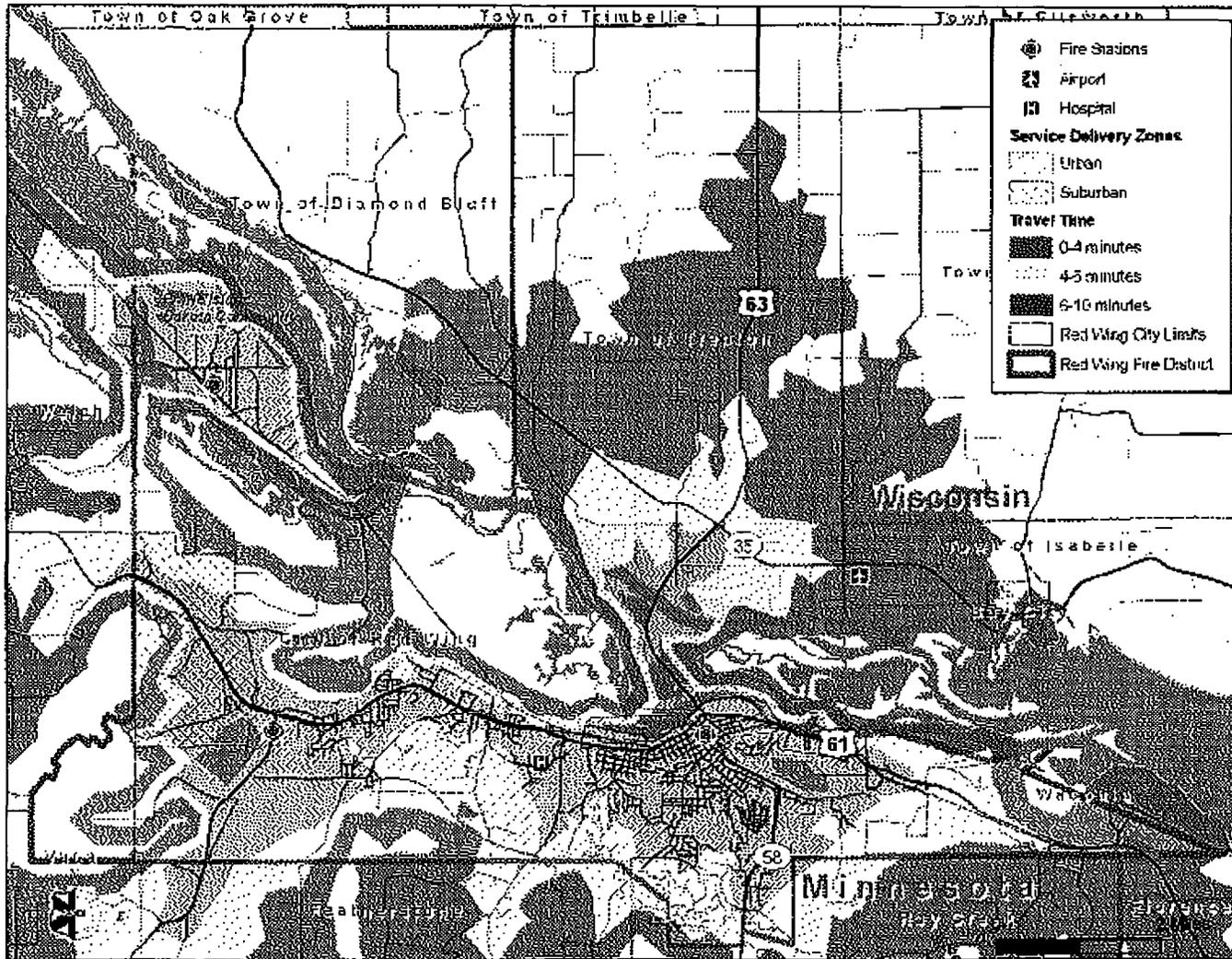
The urban service area has a longer time performance than the suburban performance due to the inclusion of calls within Prairie Island. Excluding these calls, the response time performance within the downtown urban area is within six minutes. The higher ambulance call performance reflects the higher concurrent events within the dataset. The next table examines the percentage of projected service demand coverage within each zone based on the proposed response time objectives in Figure 84 utilizing the current sole fire station.

Figure 84: Projected Coverage of Service Demand – Current Facility Deployment

	Projected Service Demand				
	Coverage (%)	Current Facility Deployment			
		Fire Calls	Minutes	Ambulance Calls	Minutes
Urban	90	75%	06:30	84%	06:30
Suburban	80	0%	07:30	0%	07:30
Rural	80	50%	11:30	47%	11:30

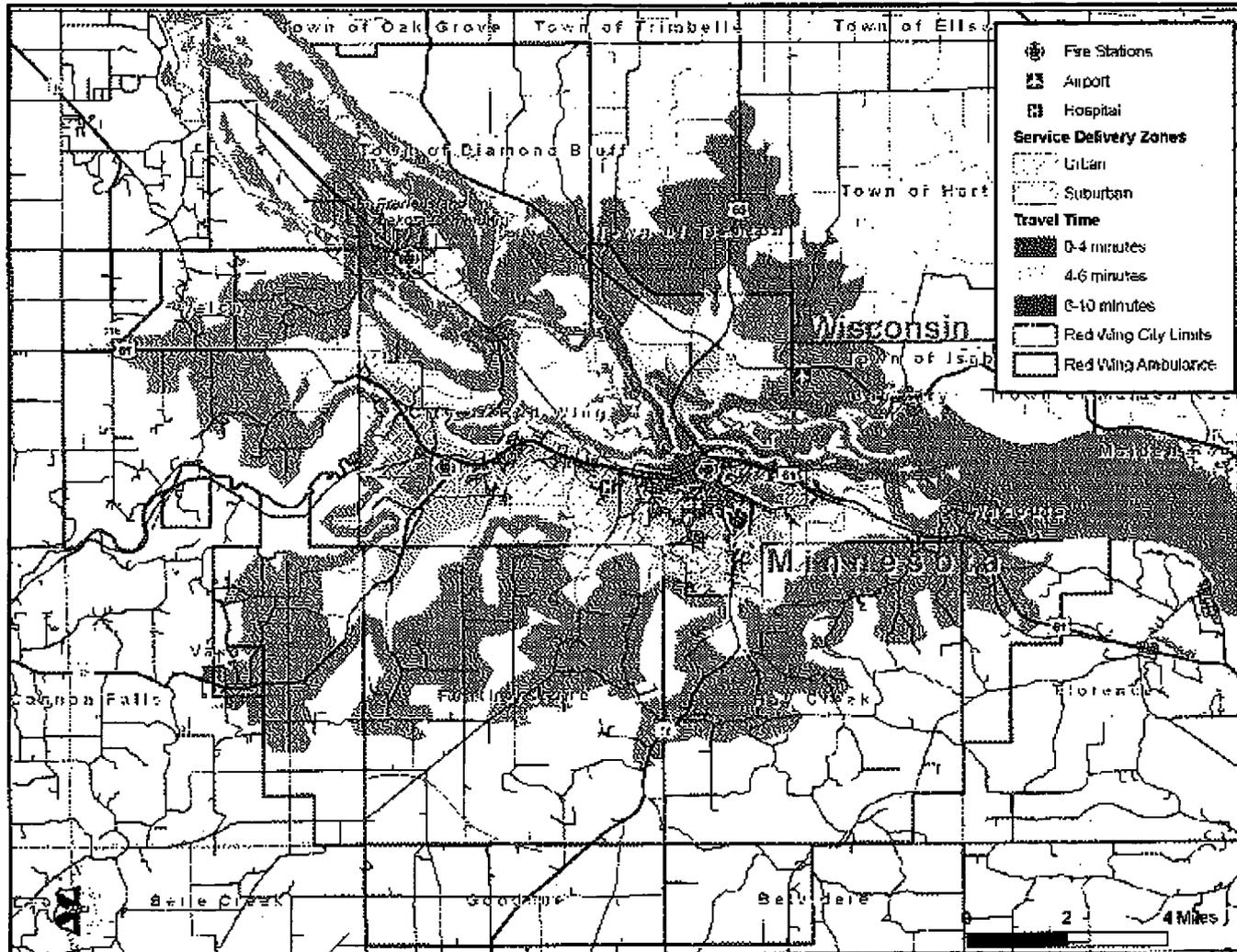
It is clear that the current one-station deployment would fare poorly when measured against the proposed response time objectives within the service delivery zones. Next, ESCi examined the performance of the proposed facility deployment. The following map illustrates the extent of travel time from these facilities compared to the fire service area.

Figure 85: Proposed Facility Fire Service Area Travel Capability



With the addition of the two stations it can be seen that much of the area within City limits enjoys a modeled response of an apparatus from a station within four minutes.

Figure 86: Proposed Facility Ambulance Service Area Travel Capability



The additional ambulance within the Westside Station improves response for medical calls not only within Red Wing, but also for Welch, Vasa, and Featherstone Townships. The quint-type fire apparatus is recommended to provide first responder medical service within City limits, on Prairie Island, and along the county road from Prairie Island to Highway 61. The following table details the performance of the proposed facility deployment in handling projected service demand in the proposed service delivery zones.

Figure 87: Proposed Facility Deployment Projected Service Demand Performance

	Projected Service Demand				
	Coverage (%)	Proposed Facility Deployment			
		Fire Calls	Minutes	Ambulance Calls	Minutes
Urban	90	95%	06:30	91%	06:30
Suburban	80	80%	07:30	98%	07:30
Rural	80	80%	11:30	88%	11:30

It should be noted due to the location of the Westside Station, 90 percent of the projected suburban ambulance calls would actually be reached within an urban level of response time, exceeding the performance objectives. The projected level of ambulance calls, as opposed to fire-related calls, create a higher frequency of projected events allowing more instances to be reached within the travel time model.

Fiscal Analysis of Long-Term Recommendations

The following figure identifies the total number of full-time positions necessary to accommodate the full long-term staffing recommendation provided earlier. It takes into account the likelihood of personnel occasionally being absent for either scheduled or unscheduled leave and, therefore, presents the positions in full-time equivalents (FTEs).

Figure 88: Staffing Represented in FTEs

Career Staffing Levels in FTEs		
Position	Current Level	Proposed Level
Firefighter/Paramedic	15	42
Lieutenant	0	6
Captain	3	3
Deputy Chief	0	2
Administrative Assistant	0.5	1
Total	18.5	54

Based on the full implementation of personnel as indicated, the figure below represents an estimate of the total costs associated with those additional personnel.

Figure 89: Estimated New Personnel Costs

Positions	Total New Positions	Total Additional Cost
Firefighter/Paramedic	27	\$1,874,030.56
Lieutenant	6	\$446,788.74
Deputy Chief	2	\$177,573.76
Administrative Assistant	1	\$49,795.20
Total		\$2,498,393.06

The following figure compiles the information from the previous paragraphs and figures into a summation of total costs for facilities, apparatus, and personnel assuming total implementation of this recommendation.

Figure 90: Estimated Total Cost of Recommendations^{27, 28}

Facilities	
Westside Station	\$1,591,777.00
Prairie Island Station	\$0.00
Subtotal	\$1,591,777.00
Apparatus	
Quint	\$600,000.00
Engine	\$340,000.00
Tanker	\$210,000.00
Subtotal	\$1,150,000.00
Personnel	
Central Station	\$594,553.09
Westside Station	\$1,056,296.84
Prairie Island Station	\$624,676.85
Subtotal	\$2,275,526.78
Total	\$5,017,303.78

²⁷ Prairie Island station cost of zero assumes that the City and the Prairie Island Indian Community enter into a mutually beneficial agreement for use of the current facility in exchange for increased protection and service delivery.

²⁸ Facilities estimate generated from the D4Cost projection software and adjusted to more closely match construction costs in southeastern Minnesota. A detail of these costs can be found in Appendix D.

Recommendations:

Facilities

- Construct a station on the west side of Red Wing near the intersection of US 81 and State Hwy 19
- Enter into an agreement with the Prairie Island Indian Community to make use of the existing facility to house fire suppression apparatus and personnel as listed. In the alternative, an additional station is recommended for construction on Prairie Island

Apparatus

- **Station One**
 - Engine 1
 - Truck 1
 - Medic 1
- **Westside Station**
 - Engine 2
 - Medic 2
- **Prairie Island Station**
 - Truck 2 (quint' apparatus)

Staffing

- Station 1, three career personnel staff the engine, three personnel staff the truck, and two personnel staff the ambulance
- Westside Station, three career personnel staff an engine and two personnel staff the ambulance
- Prairie Island Station, three career personnel staff the truck

Integration and Use of Paid-On-Call Staffing

In previous sections, it has been demonstrated that RWFD has insufficient on-duty staffing to consistently deliver an adequate number of trained firefighters to accommodate the critical tasks required in the initial stages of moderate and high-risk incidents. This is particularly true when one or more ambulances are involved in transportation of medical patients, thereby reducing the number of personnel at the station and available for the next call. The City has traditionally used paid-on-call firefighters in an attempt to mitigate this on-duty staffing shortage.

All fire departments fall into one of three general categories where staffing methodology is considered:

Volunteer Departments - These are departments that use strictly volunteer responders that initiate a response upon notification of an emergency call (typically by radio pager). This category is also used to describe department where responders are given some sort of stipend or paid on a per call basis. In some cases, volunteers or paid per call members may perform some volunteer station duty to shorten turnout times.

Career Departments - These are departments that use strictly paid firefighters that are employed in a traditional manner with specified salaries and benefits and perform on-duty staffing of the fire stations. This category may also describe departments that use some full-time career paid personnel as well as some part-time paid personnel, but the common factor is that staff is paid to be on duty at the station and initiate primary response from there.

Combination Departments - These are departments that use at least some level of paid, regularly-scheduled employees performing on-duty staffing of the fire station, but continue to rely on volunteer or paid-on-call responders who answer pager notifications. The blend between paid, scheduled employees and on-call responders can vary widely, depending on the needs of any individual community. Some communities operate virtually an all-paid department during weekdays and transition back to a nearly all-volunteer department nights and weekends. Others employ a handful of paid drivers that primarily operate the apparatus and rely on on-call responders to meet them at the incident to provide firefighting manpower. Still others will use one or more crews of paid employees to handle the majority of low-risk, single unit responses

such as alarms, vehicle fires, and investigations while continuing to depend on on-call responders for the manpower necessary to accommodate larger incidents. This is arguably the fastest-growing category of fire department staffing as many previously all-volunteer departments are transitioning to at least some use of paid personnel.

RWFD clearly falls into this third category of combination department. However, there is a clear sense that the organizational culture favors its identity as a career department. In other words, the department does not appear to fully embrace the fact that it is a combination department and does not adequately provide for an organizational culture that will enhance and promote the efficiency of the combination staffing system.

The challenge for any growing City is to not move too quickly in the transition from a combination department to a fully career department. It is relatively easy to allow this transition to get ahead of the community's ability to pay for it. In simplest terms, if the fire department attempts to make the transition to a fully career department before the community can afford to adequately and properly staff its fire stations for the workload and risk, inadequate incident staffing will almost certainly result.

This problem can occur either at the operational level, the organizational culture level, or both. A department that attempts the transition to relying solely on on-duty career staffing before an adequate number of career firefighters can be consistently provided will bear the consequences by being unable to accomplish critical tasks at an incident due to a lack of manpower. Likewise, a department that allows its organizational culture to transition to that of a career department before being fully prepared for that transition at the operational level will suffer many of the similar results. On-call responders will feel devalued, under-utilized, frustrated, or even bored, and the ability to rely on these responders will begin to degrade.

ESCI's analysis of RWFD's operating procedures, individual and group interviews of members, and the results of the member confidential survey instruments leads to the conclusion that RWFD is, to at least some extent, suffering this problem at both the operations and organizational culture levels. Further, it is the study team's opinion that the City is not at a point where it can afford to fully and adequately staff the department 24-hours a day for its moderate and high-risk incident potential, while accommodating the demanding workload of the ambulance transport services it provides. While this study will provide several recommendations

related to expanding various fire protection resources, including paid on-duty staff, we are led to the conclusion that the use of on-call responders can and should continue to be a substantive element of the City's fire protection system.

As a result of this conclusion, ESCi is providing several recommendations for continuing, as well as enhancing, the capability, integration, and operation of the on-call firefighter program. These will be presented in two categories - operational considerations and organizational culture considerations.

Paid-On-Call Operational Considerations

Paid-On-Call Training

The training program for the paid-on-call firefighters should be expanded. Currently, the POC members are divided into three shifts, with each shift's training focused primarily on the functions and operations of a single apparatus to which their shift is assigned.

The operational issues related to this methodology will be discussed later, but the lack of a broader training program limits the capability and flexibility of the POC staffing force. The reasons provided to the ESCi team, for limiting the number of apparatus that POC members were trained and qualified to operate, seemed unfounded and based on hypothetical arguments or anecdotal references.

In contrast to the RWFD concept that POC personnel perform best when their training is more focused on a single apparatus, most volunteer fire departments must, by their very nature, have a workforce that is cross-trained to operate multiple apparatus, from aerials to engines to tankers. This is often due to the fact that the workforce size is limited, while the community's risks require a broad range of resource types. In many volunteer fire departments, one can find members trained, qualified, and experienced in operating as many as four or five different pieces of equipment.

The key to getting the best advantage from the POC workforce is learning to adapt that workforce to maximum flexibility. After all, these are the firefighters the City will rely on when the worst of situations is occurring, such as multiple concurrent calls, high-risk structure fires, or technical rescue incidents. When seconds count, it is particularly self-defeating if this back-up workforce is only trained on a single apparatus that is not appropriately matched to the critical

need of the moment. Cross-training them for a variety of apparatus, a variety of operational skills, and even certain technically advanced skills, will accommodate the department's need to make the best use of additional manpower during moderate and high risk incidents.

The optimum goal should be to have the POC workforce trained to perform as many functions at as high a level as the full-time career workforce. The exception may be certain advanced functions, such as paramedic-level advanced life support tasks, that require certification and in-service training hours above that of a firefighter. Most part-time or volunteer personnel are unable to commit adequate time to maintain such certifications if they hold other full-time employment as well.

Paid-On-Call Response Methodology

Under the current system of deployment, the POC personnel are divided into three companies. Each company is assigned to be on call in conjunction with a particular 24-hour shift, either A, B, or C shift. The POC personnel are, for all practical purposes, only paged out for reported structure fires. Once paged, they are to respond to the station to pick up and staff their assigned apparatus. Two of the companies are assigned to an engine and one is assigned to the aerial truck.

It should be understood that this describes the routine methodology for deployment of POC personnel and there are, of course, exceptions to this procedure. From our experience with volunteer and paid-on-call systems, ESCi believes there are several drawbacks to the current methodology.

First, the system limits the number of POC personnel available at any given time. In most POC or volunteer systems, it is understood that at any given time there will naturally be an unknown ratio between the number POC personnel on the roster and the number of POC personnel actually available for response when an incident is dispatched. This is simply due to the nature of volunteer response. At any given moment, some POC members may be at work, in an important meeting, in a dentist's chair, out of the response area, or otherwise committed to an obligation that does not permit them to respond to a particular incident.

POC and volunteer systems depend on the concept that an adequate ratio of members will be available at all times to properly staff the response. The key, as most volunteer systems have

learned, is monitoring that ratio and maintaining an adequate roster of members such that the number of available responders remains adequate. For instance, if a department analyzes its POC response and finds that, on average, 30 percent of its available roster is actually responding to each call, it can use that information to adjust its roster accordingly. If it needs 12 members to be available for each structure fire call and, on average, 30 percent of the roster is responding, then it follows that it must maintain a roster of at least 40 members and it can adjust its recruitment efforts accordingly. There are many progressive volunteer and POC agencies around the country employing this, or similar, methodology to attempt to maintain adequate POC response.

In RWFD's case, no such analysis or monitoring is being done. In fact, the deployment methodology seems to artificially lower the number of members who are on call, thus reducing (by ratio) the number of responders that are likely to be available for immediate response to any given incident. The methodology may be counter-productive. Even if additional companies are subsequently paged out when a manpower shortage is recognized, precious time is lost in assembling an adequately sized crew.

An addition, the methodology calls for the initial POC company to respond with the apparatus they are assigned to and trained on. This means that the apparatus response may or may not match the need of the incident. For example, a single-family dwelling fire may benefit most from the response of an additional engine company. If, however, the on-call POC company is assigned to the aerial truck, that is the unit that is likely to respond to the call. Perhaps the narrow streets in the neighborhood even make movement of the aerial truck unwieldy. Still, the mismatched apparatus is responding.

Our benchmark data indicates that the City is only maintaining about 80 percent of the ratio of on-call firefighters to 1,000 population in comparison with other communities of similar population in the North Central region, and about 74 percent of the national ratio. If RWFD wishes to enhance the viability of its POC system, it needs to consider adopting revised methodology in the use of the personnel. These recommendations are listed in the next table.

Recommendations

- Consider eliminating the three-company system for on-call duty with the possible exception of low-risk responses. All POC personnel should be paged out for structure fire responses and other moderate and high-risk incidents to ensure a rapid response of an adequate crew.
- Consider using POC response for additional calls beyond just structure fires, such as concurrent low-risk responses, motor vehicle accidents, or rescue incidents to bring more firefighters into the station for concurrent call coverage or to the scene when multiple apparatus are involved.
- Consider using the POC response to bring the most appropriate apparatus to the incident that matches the call-type or risk involved.

Paid-On-Call Station Duty

Keeping the experience level of the volunteer or POC responders at an adequate level, is a legitimate concern in combination fire departments. This is particularly true as the number of low-risk, single engine responses handled solely by the paid on-duty crew increases. When POC personnel are used only for moderate or high-risk incidents, their routine firefighting skills can begin to deteriorate. For this reason, many combination departments highly encourage, or even require, their on-call staff to perform some reasonable amount of on-station duty time each month or each quarter.

When members at RWFD were asked about POC personnel working station duty, they seemed almost surprised at the question and indicated this rarely, if ever, occurs. The only routine interaction between full-time career personnel and POC staff is at monthly training sessions or occasional emergency calls. This is unfortunate on several counts.

Performing occasional station duty shifts allows the POC personnel to be involved in routine station duties, maintenance, and upkeep. This process keeps them *in touch* with the apparatus and equipment. It also allows them to build camaraderie with the full-time paid staff and to interact with them in the non-emergency setting, such as meals, shift training, and so forth.

Even more important is the opportunity for the POC personnel to keep routine firefighting, pump operation, and driving skills honed by participating in responses to low-risk, single engine calls, or to be part of the first-arriving crew at moderate and high-risk incidents.

Last, but not least, is the enhancement of having a larger on-duty crew at the station to accommodate the workload and increase the size of the initial response crew during any periods where one or more POC personnel are performing station duty.

It should be acknowledged that POC station duty is likely to involve some cost. A system to provide at least some incentive for POC station duty will probably be necessary. Requiring or asking POC personnel to commit to station duty with only the possibility of receiving a call stipend IF the crew received an emergency call during that time is not likely to be sufficient. A *pay per shift* or hourly rate would most likely be needed to support this program, but the benefits could be significant if it improves the skill levels of the POC staff and increases the number of on-duty members at the fire station.

Recommendation:

- RWFD should initiate a program to require or encourage occasional station duty by its paid-on-call members, working side by side with career staff in routine station operation and response duties.

Paid-On-Call Organizational Culture Considerations

Paid-On-Call Recruitment

Appointment of new POC staff at Red Wing has fallen off in recent years. The department has chosen not to pursue significant advertisement or recruitment efforts in response to attrition or to enhance its POC complement. This decision is not supported by staffing performance at incidents. In simplest terms, the historical response data demonstrates an inadequate number of firefighters responding to structure fires and other moderate and high-risk incidents, as well as an increasing number of EMS calls that leave the station with limited manpower for subsequent responses.

Unless the City intends to fully fund a fully-paid, career fire department that is adequately staffed for these moderate and high-risk incidents and able to fully accommodate the concurrent calls, the trend away from POC firefighters should be reversed. It is ESCi's recommendation that the City and the fire department accept and enhance its identity as a combination fire department and pursue enhancement of its POC recruitment efforts. The target number of POC staff should be identified by monitoring the ratio of members responding²⁹ to the total POC roster, then applying that ratio in reverse to the number of POC responders actually needed for moderate and high-risk incidents.

Recommendation:

- The City and the fire department should pursue enhancement of the POC recruitment efforts.

Paid-On-Call Leadership Opportunities

The most successful and progressive combination departments in the U.S. today strive to develop a sense of unity, camaraderie, and mutual respect between full-time, career staff and volunteer or POC members. If a particular department fully embraces the combination staffing concept, it will seek to provide equal opportunities, where practical, throughout its organization for both career and POC personnel. In addition, a department that takes pride in both the capability and criticality of its POC crew will often demonstrate its commitment to the program by providing leadership opportunities for its POC staff.

Having a hierarchy of POC officer positions can enhance the sense of pride, ownership, and general *buy in* that the POC staff have for the organization, and provides a means by which the POC members can move up the ladder of responsibility throughout their *career* with the RWFD. This also provides a way by which the concerns, issues, and stakeholder input of the POC staff can be fully integrated into the department's decision and planning processes.

RWFD should consider establishing a level of POC officer(s) above the existing captain rank. There could be significant value in having the POC staff represented by an officer among the

²⁹ It is suggested that this performance monitoring be performed at somewhere between the 80th and 90th percentile.

primary leadership of the department, when such a group is established. The need for some form of leadership team to expand decision-making and input process beyond just the chief is addressed in the *Organization and Community Overview* section and will not be repeated here. However, ESCi does encourage the involvement of a POC officer in that leadership team when it is established.

Recommendation:

- RWFD should consider establishing a level of POC officer(s), above the existing captain rank, with POC staff represented by that officer on the department's leadership team when it is established.

Summary of Short and Mid-Term Recommendations

The following list summarizes all of the recommendations provided throughout this report that are achievable in the short or mid-term, typically within a maximum of five years. These recommendations have been compiled into a prioritized list for easy reference. The prioritization system is as follows:

1. **Immediate Internal Life Safety**

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

2. **Legal or Financial Exposure**

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

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

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

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

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

5. **A Good Thing To Do**

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

Each recommendation is also accompanied by a page reference to identify where the recommendation first appears in the report so that the reader can quickly locate the explanatory narrative.

PRIORITY ONE - Immediate Internal Life Safety	
• Severe rust damage involving frame or suspension areas of apparatus should be inspected and, where appropriate, repaired immediately.....	68
PRIORITY TWO - Legal or Financial Exposure	
• The incident operating guidelines manual should be revised and updated, and should consistently be maintained in such a manner as to reflect industry best practice and current departmental procedures and processes.....	19
• A formal system should be put in place for distribution of written information. When critical memos or policies are released, a system should be in place for verification of the distribution to all personnel.....	37
• The department should initiate an automatic log-off feature on computers to activate password protection when the computer is not used for several minutes, such as when an officer leaves suddenly on a fire call.....	39
• The fire department should establish an up-to-date inventory of capital assets. A process should be put in place to maintain this inventory, with new assets being logged and recorded at time of purchase.....	39
• Immediately initiate a program requiring all fire department operational employees to successfully complete on-going NFPA 1582 medical examinations.....	44
• Breathing air compressor is required to have regular air samples certified for compliance with OSHA requirements. Current certificate must be posted at the compressor. This should be corrected immediately.....	62
• Develop a formal EMS quality assurance and control program.....	124
PRIORITY THREE - Corrects a Service Delivery or Management Issue	
• Construct a station on the west side of Red Wing near the intersection of US 61 and State Hwy 19.....	4
• Enter into an agreement with the Prairie Island Indian Community to make use of the existing facility to house fire suppression apparatus and personnel as listed. In the alternative, an additional station is recommended for construction on Prairie Island.....	4
• The fire department should publish a formal annual report of activities including a summary of events and activities during the report year, a description of major incidents handled by the department, descriptions of new or improved services and programs, awards received by the department or individuals, and statistical analysis of key community service level indicators.....	24
• On average, RWFD is not providing adequate staffing to moderate and high-risk incidents, particularly structure fires. The result of inadequate incident staffing is typically the failure to complete all critical tasks in a timely manner. The predictable outcome is undesirable fire spread and increased dollar loss. Additional incident staffing should be a critical goal of the department through better use of paid-on-call personnel and/or additional career personnel on duty.....	54

• Specific apparatus issues or concerns should be addressed as soon as practical	68
• Several of the RWFD's apparatus have significantly exceeded their life expectancy and are, as might be expected, in poor condition. Replacement of these vehicles should be a department and City priority	68
• A systematic replacement schedule should be established using a reasonable life expectancy for apparatus, by type and use, and a sustainable and reliable funding source should be established	75
• All operating thermal imaging units should be assigned to response apparatus at all times. The devices are critical for firefighter safety and rescue	79
• Conduct a complete annual inspection of all turnout gear ensembles used by RWFD personnel. Complete any repairs and check proper fit. Outdated or worn out gear should be replaced	79
• Turnout gear should only be reassigned following a complete, professional fit assessment and any necessary tailoring to ensure safety	79
• Standardized alarm assignments should be established as department policy to provide the quantity and type of apparatus needed for the given risk presented by a particular incident type, as well as the correct number of staff to accomplish the critical tasks necessary to mitigate the emergency	123
• Incident command should be declared and ICS used on all incidents	123
• Require that all POC and career personnel complete all in-service training so members may participate in both engine and truck company responses	134
• Determine the number of fire code inspectable properties in the City and develop an inspection schedule based on property risk	144
• Establish and implement standard procedures for fire marshal notification, fire scene control, and evidence processing during fire investigations	144
• Develop formal policies and procedures as to what personnel staffing methodologies will be utilized should an incident occur at the Prairie Island Nuclear Generating Plant	149
• Construct a station on the west side of Red Wing near the intersection of US 61 and State Hwy 19	175
• Enter into an agreement with the Prairie Island Indian Community to make use of the existing facility to house fire suppression apparatus and personnel as listed. In the alternative, an additional station is recommended for construction on Prairie Island	175
• Consider eliminating the three-company system for on-call duty with the possible exception of low-risk responses. All POC personnel should be paged out for structure fire responses and other moderate and high-risk incidents to ensure a rapid response of an adequate crew	181
• Consider using POC response for additional calls beyond just structure fires, such as concurrent low-risk responses, motor vehicle accidents, or rescue incidents to bring more firefighters into the station for concurrent call coverage or to the scene when multiple apparatus are involved	181
• Consider using the POC response to bring the most appropriate apparatus to the incident that matches the call-type or risk involved	181
 PRIORITY FOUR - Enhances the Delivery of Service or Department Management	
• Additional topics should be considered for inclusion in the incident operating guidelines, with incident-specific procedures that meet industry best practices	19
• Consider alterations to the organizational structure to broaden the number of officers involved in decision-making and policy level issues	23

- Develop a more representative *leadership team* to increase internal communication and improve the empowerment of the members, thus increasing *buy-in* and a sense of ownership in performance issues and outcomes. 23
- Consider conducting a customer-centered strategic planning process involving the internal stakeholders of the department, as well as opportunity for involvement by the general public or other customer representation. 34
- Conduct annual physical competency evaluations of all fire department operational employees. 44
- Conduct an annual performance evaluation of all operational members and employees. 44
- RWFD should consistently monitor its incident staffing performance to compare actual incident staffing to the critical task analysis. Where deficiencies are found, operational changes should be considered to correct the problem. Ongoing performance monitoring is a key to recognizing trends in incident staffing. 54
- Fire station sprinkler system inspections should be conducted annually and inspection tags properly posted. 62
- Red Wing Fire Department should address the organization and cleanliness of vehicle compartments, with a specific focus on rapid deployment of equipment. 68
- Consideration should be given to universal reorganization of rescue and technical services equipment to ensure that multiple apparatus need not be dispatched simply to collect the necessary equipment to perform a rescue evolution. 68
- A future pumper replacement should consider the possibility of a rescue compartmentation design to facilitate its performance as both a pumper and light to medium-duty rescue truck. 68
- Maximize the space on all apparatus and, to the extent possible, equip for maximum PPC scoring from the ISO. 79
- ESCI recommends that all primary fire apparatus be equipped with an automatic defibrillator. 79
- Develop and fund a small equipment replacement program that anticipates replacement schedules and builds necessary funding in order to spread cost over multiple years. 79
- Information available on the maps should be expanded to include location and layout of static water points or drafting locations. 123
- Consider dedicated and assigned staffing for at least the first-out EMS unit rather than cross-staffing with fire apparatus. 124
- Consider appointing a dedicated full-time department training officer. 134
- Develop and implement a comprehensive departmental training plan. 134
- Encourage POC members to achieve ALS certification and training so they may participate in ALS service delivery. 134
- Provide pre-promotion training for all potential promotional candidates. 134
- Provide ongoing skills maintenance and supervisory training for all officers. 134
- Consider enhancing the minimum training requirements for firefighters, paramedics, and officers. 134
- Consider developing and implementing a competency-based training program. 134
- Design and implement a scheduled training program with neighboring, mutual aid fire and emergency services companies. 134
- The fire marshal, in concert with the fire chief and operations personnel, should make use of emergency incident records to evaluate program effectiveness and develop programs and strategies targeted at frequently occurring emergencies. 144

• Consider including the RWFD (fire marshal) in the City's development authorization review process such that building permits must have an approval signature from the fire department prior to issuance	144
• Consider making fees collected for fire code compliance inspections, reviews, and tests available to the fire department to fund the associated expenses	144
• Provide dedicated fire code inspectors	144
• Consider using fire station personnel to complete fire inspections	144
• Establish and implement standard procedures for juvenile fire setter intervention	144
• Expand the scope and audience for the delivery of public safety education	144
• RWFD should initiate a program to require or encourage occasional station duty by its paid-on-call members, working side by side with career staff in routine station operation and response duties	182
• The City and the fire department should pursue enhancement of the POC recruitment efforts	183
PRIORITY FIVE - Represents Industry Best Practice (A Good Thing To Do)	
• An occasional open personnel meeting or forum, such as a quarterly <i>Chief's Breakfast</i> that is open to all members, should be considered to enhance the feeling of teamwork, open lines of communications, and encourage a feeling of ownership among the members	37
• Consideration should be given to establishing a citizen's advisory group that can meet occasionally with department management to provide the customer perspective to issues within the department and assist in planning efforts	37
• Establish a record system for maintenance, uses, and repairs of small equipment	79
• Consider appointing and implementing a training committee comprised of department representatives of all ranks and disciplines to advise the training specialists of all aspects of an departmental training plan	134
• Utilize fire station personnel and community volunteers to deliver public safety education programs	144
• Consider pursuing legislation to require the installation of approved fire sprinkler systems in all new structures including residential properties	144
• RWFD should consider establishing a level of POC officer(s), above the existing captain rank, with POC staff represented by that officer on the department's leadership team when it is established	184

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Appendix

A: First-Responder EMS Teams in Outlying Areas

In reviewing travel time models for the RWFD ambulance service area, many rural areas are between twenty to thirty minutes from the Red Wing station. These areas include all or portions of Diamond Bluff and Isabelle in Wisconsin, and Welch, Vasa, Featherstone, Goodhue, Belvedere, Hay Creek, and Florence Townships in Minnesota. The volunteer fire departments serving each of these areas do provide some EMS response at the first responder level and are typically dispatched automatically on EMS calls with the RWFD.

However, with the exception of Goodhue Township, none of these communities has a local fire station situated within their borders and, instead, rely on contractual service from an outside fire department. Despite the fact that their serving fire department provides first responder service, Diamond Bluff, Isabelle, Welch, Vasa, Featherstone, Hay Creek, and Florence will still experience significantly long response times for a trained EMS responder.

Service demand in these areas is quite low and would not justify the stationing of a full-time ambulance crew in closer proximity. One possible method of mitigating the long delays for medical response in these areas would be through the establishment of *Rural First Responder EMS Teams*. These teams have been used extensively in other rural areas around the country to decrease the arrival time of a trained medical responder that can initiate at least basic care until the arrival of a more advanced crew from the fire department or ambulance service.

The concept is not unlike the similar use of police officers in initial medical response. Police officers are trained to at least the first responder level in their initial academy classes and many police departments continue to maintain and enhance this training once the officers are assigned to field patrol. In these communities, the police department is typically notified when an EMS response is dispatched and, if available and nearby, they respond to render medical aid until the arrival of the ambulance crew.

In similar fashion, these Rural First Responder EMS Teams could be established by the local community governments (town or township), or even as independent volunteer groups under non-profit corporation status. A cadre of volunteer responders trained to the first responder EMS

level and equipped with basic life support *jump kits*, two-way radios, and pagers would be available to accept assigned duty shifts.

During a duty shift, the member would be responsible for monitoring the pager and being available for immediate response in his/her local community. Once dispatched, the member grabs the jump kit, acknowledges the call by radio, and responds directly to the scene to provide size-up information on the incident and render medical care to the extent possible prior to the arrival of more advanced crews, such as the fire department or Red Wing's ambulance and paramedics.

Monthly meetings would be held to maintain management, internal communications, scheduling and coordination, and provide ongoing medical training and certification. Such meetings and trainings could be held in a local community room, school, or church. Because no special apparatus or vehicles would be involved, a dedicated station or facility would not be necessary. The cost of such a team is typically quite low, when compared to a fire department, and is limited to the expense for liability insurance, EMS supplies, training instructors, and any incentive or paid-on-call benefits provided to members.

To provide an example of one such program, ESCI offers the following case study from Portage County, Wisconsin. The following paragraphs describe the Stockton EMS organization and its services to a very rural portion of that county, where it is actively used to reduce response times from the Steven's Point Fire Department paramedics that are between 20 and 25 minutes away.

Stockton EMS Case Study

Stockton EMS is an independent organization in Portage County, Wisconsin that provides first responder service through paid on-call personnel. Twelve members are on the roster for Stockton EMS, certified either to the first responder or EMT level. Most times the members respond to incidents from their homes and elsewhere in their own vehicles. Stockton EMS serves primarily the Town of Stockton, within an area of 11 square miles and 118.22 miles of roadway. The 2000 Census information included 2,896 persons within 1,024 housing units.

Stockton EMS budgeted \$9,000 in expenses for 2005, including \$2,780 for on-call wages based on an expectation of 80 calls. Reimbursement for these expenses was not specified.

According to Portage County's first responder database, Stockton EMS reported 142 responses answered within the Town of Stockton for 2004-2005. This compares to 157 EMS calls dispatched in their primary area, which indicates a 90.4 percent response reliability performance.

The average turnout time for Stockton EMS was **two minutes and 50 seconds**, while the average response time from dispatch was **seven minutes and 52 seconds**. They responded to 90 percent of EMS calls within 11 minutes.

The case study illustrates how the Stockton EMS organization was able to reduce overall arrival times for a trained medical responder by as much as ten to fifteen minutes with little cost involved.

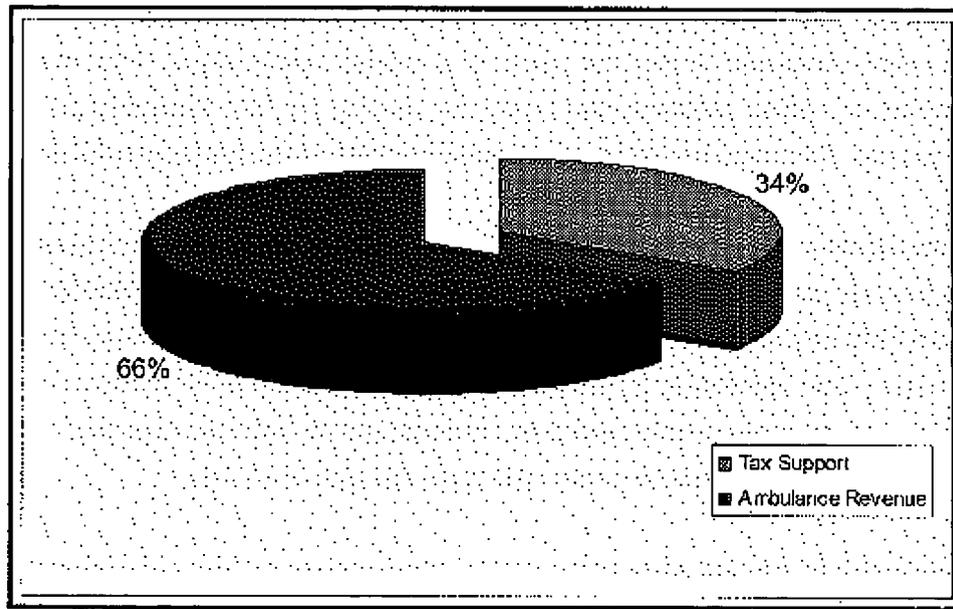
Red Wing Fire Department may wish to consider meeting with the community leaders in each of these outlying rural communities, along with their contract fire department, to discuss the potential establishment of a Rural First Responder EMS Team where sufficient local interest could be generated. Any such program, if established, should be supported by RWFD and the Goodhue County Emergency Communications Center in whatever manner possible and integrated into the overall emergency response system.

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B: Emergency Medical Services Alternatives

As noted throughout this report, a majority of Red Wing Fire Department's (RWFD) responses are comprised by emergency medical services (EMS) calls. This is typical in today's fire departments that participate in either transport or non-transport EMS. The positive aspect of participating in transport EMS as RWFD does is the impact of the revenue generated through billing for those services. In the case of RWFD, ambulance transports generated \$2,359,331.00 during 2006, which equates to 66 percent of the total department revenue compared to expenditures. The figure below illustrates ambulance revenue compared to tax support.

Figure 91: Ambulance Revenue Compared to Tax Support



Given the information above, it is easy to see that simply eliminating EMS from RWFD and contracting that service with a private provider would be financially impractical. In most cases, however, EMS is segregated into two categories - emergency and non-emergency. Emergency calls are those received through the typical 9-1-1 call processing system and require an emergent response. Non-emergency calls are those that are typically directed to a non-emergency number within the central communication center and usually receive a non-emergency response and transport such as those calls originating at hospitals.

The department provides both emergency and non-emergency responses throughout the City of Red Wing (City) as well as a large portion of Goodhue County surrounding Red Wing. As already discussed, using a cross-staffing methodology places a strain on both EMS and fire suppression response personnel. One matter of particular concern is out-of-town transports, which consume large amounts of time, some as long as four hours.

Based on EMS billing data provided by the City, there were 446 out-of-town transports between November 1, 2005 and October 31, 2006 that generated approximately \$569,114.00 not including mileage charges, which could account for another \$83,286.00 in revenue. These amounts combined equate to approximately 30 percent of total ambulance revenue. It should be noted, however, that internal fire department documentation indicates that 464 out-of-town transports were completed during the same time period noted above. This may indicate documentation or coding problems that could be costing the city thousands of dollars in potential revenue. This issue should be investigated internally to maximize potential revenue.

Although the aforementioned amounts are significant, one must ask what level of service RWFD wishes to provide, and at what cost. It has already been determined that RWFD personnel staffing both EMS and fire units reduce the system capacity to handle both types of responses simultaneously. One alternative to alleviate this system stress is to contract out-of-town transports to one or more private providers. Several private providers operate in the area surrounding Red Wing and could be viable options for this type of service.

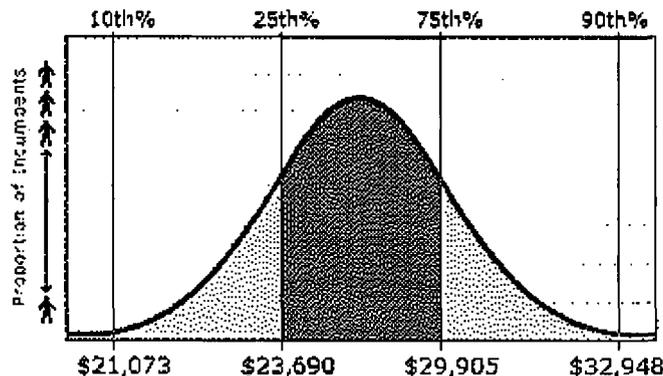
Another alternative to alleviate some of the system stress caused by both out-of-town transports and in-town non-emergency transports is to staff a dedicated unit to handle the non-emergency workload. Based on an assumption of staffing one dedicated unit Monday through Friday during daytime hours with one emergency medical technician (EMT) and one EMT-Paramedic, and creating a new cost center to fund this unit, the potential exists for this unit to pay for itself as a separate entity within RWFD. Minnesota Statutes 144E101 *Ambulance Service Requirements*, allows advanced life support services to staff units with one EMT as long as there is also one EMT-Paramedic. Since RWFD also has service area in Wisconsin, the service must comply with the statutes governing EMS in that state as well.

The State of Wisconsin Department of Health and Family Services (DHFS) Chapter HFS 112 *Licensing of Emergency Medical Technicians-Paramedic and Approval of Emergency Medical*

Technician-Paramedic Operational Plans, mandates that any service providing paramedic level care in the pre-hospital or interfacility transport setting submit an **EMT-Paramedic Operational Plan** to the State Bureau of Local Health Support and EMS, EMS Section for review. The statute allows for services to staff their ambulances with one EMT-Paramedic and one EMT-Basic, if the system medical director has specifically outlined and approved such staffing within the submitted operational plan. As of the writing of this report, ESCi was unable to obtain a copy of this plan for verification of staffing methodology.

The figure below illustrates a sample salary range of a single-certified (someone not cross-trained as a firefighter in addition to emergency medical skills) EMT.

Figure 92: Estimated Salary Range for Single-Certified EMT



Source: Salary.com

The figure shows the estimated salary and benefits for a single-certified EMT. As is evident by this estimation, the cost savings between an EMT and firefighter/paramedic are significant.

Figure 93: Estimated EMT - Basic Salary and Benefits

Position	Hourly Rate	Annualized	Benefits	Total
EMT-Basic	\$12.88	\$26,798.00	\$10,719.20	\$37,517.20

When the information above is combined with the salary data for a starting firefighter/paramedic (\$69,409.00) the total personnel costs associated with this methodology would equate to \$106,927.00 annually plus general operating costs. The figure below illustrates the difference between the two positions in table format.

Figure 94: Comparison of Paramedic and EMT - Basic Costs

Position	Cost
Firefighter/Paramedic	\$69,408.54
EMT-Basic	\$37,517.20
Total	\$106,925.74

C: Apparatus Condition Evaluation Ratings

Excellent	Like new condition. No body or paint defects. Clean compartmentation. Interior cab complete, in full working order with no modifications. No significant defect history. Age is less than 25 percent of life expectancy.
Good	Body and cab have good appearance with no rust and only minor cosmetic defects or dents. Clean compartmentation with no visible rust or corrosion. Interior cab is in full working order and good appearance. Normal maintenance history with no significant defects or high downtime. Age is less than 75 percent of life expectancy.
Fair	Body and cab have weathered appearance with minor surface rust and some cosmetic defects or dents. Unimpeded compartmentation with only surface rust or corrosion. Interior cab is in reasonable working order and appearance. Only repairable tank or plumbing leakage. Showing increasing age-related maintenance, but with no major defects or unreasonable downtime. Age is less than 100 percent of life expectancy.
Serviceable	Body and cab have weathered appearance with surface corrosion, cosmetic defects or dents, and minor rust-through of non-structural metals (body panels). Unimpeded compartmentation with significant surface rust or corrosion and/or minor rust-through (not affecting use). Interior cab is in rough, but working order, often with local repairs or modifications to compensate for problems. Occasional or intermittent tank or plumbing leakage. Showing increasing age-related maintenance, but with no major defects or unreasonable downtime. Most service parts still available. Age is greater than 100 percent of life expectancy.
Poor	Body and cab have weathered appearance with surface corrosion, cosmetic defects or dents, and visible rust-through of non-structural metals (body panels). Significant rust or corrosion is present in structural or support members. Use of compartmentation is impeded with significant corrosion and rust-through. Interior cab is in rough condition with defects impeding safe and proper use. Unrepairable tank or plumbing leakage. Problematic age-related maintenance, major defects, or unreasonable downtime are evident. Service parts difficult or impossible to obtain. Age is greater than 100 percent of life expectancy. Vehicle exceeds its GVWR.

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D: Red Wing New Fire Station Cost Estimate

Project Information			
Projected Size	6500	Projected Location	MN - Other
Building Height	30.6	Projected Date	Jan 2009
Building Use	Civic/Gov.	Foundation	CON
Number of Buildings	2	Exterior Wall	CMU
Site Size	39360	Interior Wall	WOD
1st Floor Size		Roof Type	MET
1st Floor Height		Floor Type	TIL
Number of Floors	1	Project Type	NEW

Building Costs				
Division #	Label	Projected %	Projected Sq. Cost	Projected
00	Bidding Requirements	9.76 %	\$22.39	\$145,547.15
	Bidding Requirements	9.76 %	\$22.39	\$145,547.15
01	General Requirements	4.89 %	\$11.22	\$72,938.71
	Specifications	4.89 %	\$11.22	\$72,938.71
03	Concrete	11.69 %	\$26.81	\$174,270.62
	Concrete	11.69 %	\$26.81	\$174,270.62
04	Masonry	13.54 %	\$31.06	\$201,883.08
	Masonry	13.54 %	\$31.06	\$201,883.08
05	Metals	2.75 %	\$6.31	\$41,000.91
	Metals	2.75 %	\$6.31	\$41,000.91
06	Wood & Plastics	7.69 %	\$17.65	\$114,692.98
	Woods & Plastics	7.69 %	\$17.65	\$114,692.98
07	Thermal & Moisture Protection	5.01 %	\$11.50	\$74,720.89

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	Thermal & Moisture Protection	5.01 %	\$11.50	\$74,720.89
08	Doors & Windows	6.19 %	\$14.20	\$92,294.67
	Doors & Windows	6.19 %	\$14.20	\$92,294.67
09	Finishes	5.74 %	\$13.17	\$85,613.38
	Finishes	5.74 %	\$13.17	\$85,613.38
10	Specialties	1.33 %	\$3.05	\$19,838.42
	Specialties	1.33 %	\$3.05	\$19,838.42
11	Equipment	1.66 %	\$3.80	\$24,696.43
	Equipment	1.66 %	\$3.80	\$24,696.43
12	Furnishings	2.74 %	\$6.29	\$40,901.99
	Furnishing	2.74 %	\$6.29	\$40,901.99
13	Special Construction	2.80 %	\$6.42	\$41,701.00
	Special Constructions	2.80 %	\$6.42	\$41,701.00
15	Mechanical	14.01 %	\$32.14	\$208,935.72
	Mechanical	14.01 %	\$32.14	\$208,935.72
16	Electrical	10.20 %	\$23.39	\$152,036.68
	Electrical	10.20 %	\$23.39	\$152,036.68
	Total Building Costs	100 %	\$229.40	\$1,491,072.63

Site Costs				
Division #	Label	Projected %	Projected Sq. Cost	Projected
02	Site Work	100.00 %	\$2.56	\$100,705.23
	Site Work	100.00 %	\$2.56	\$100,705.23
	Total Site Costs	100 %	\$2.56	\$100,705.23
Total Project Costs				

		Projected %	Projected Sq. Cost	Projected
	Total Project Costs	--	--	\$1,591,777.86

Project Notes

This fire station is a new 6,000-square-foot fire station/site development project completed in the summer of 1998 in the City of Palmdale, California, and used here as an example for costs and possible design. Fire Station 131 is located on a main street corner between an established residential neighborhood and a newly developed commercial center. In response to the location, the building is located as far away from the residential street as possible. Major station activity occurs at either the front, where fire trucks exit onto a major thoroughfare, or the rear, where vehicle parking, maintenance, fueling, hose drying, or personnel training occurs. The rear yard is surrounded by a concrete masonry wall to screen this activity from view.

The design of Fire Station 131 responds to the residential context by incorporating a sloping roof, clad in standing seam metal panels, which borrow from the residential roof forms and reduce the visual bulk of the building. Exterior walls are constructed of reinforced solid grouted concrete masonry units with insulation and gypsum wallboard on the inside living areas. An aluminum storefront glazing system with energy efficient double glazed gray tinted glass helps mitigate heat gain and control view.

Efficiently designed to eliminate connecting hallways, this fire station employs a *split floor plan* design concept which uses the apparatus room to separate active group areas from more passive areas. The *active* side contains the entry, station office, public restroom, kitchen, and dining and recreation room. The *passive* side contains the dormitory, locker cubicles, bathrooms, and exercise room. Both sides connect to the two-bay apparatus room where vehicles are parked. Special features include a glass-walled entry to greet visitors at the main street entrance, an open plan kitchen/dining/recreation room with patio access, and semi-private sleeping cubicles which contain a bed, study desk, and lockers.

All building areas receive generous amounts of daylight through numerous windows, sized according to their location and use. Window openings are small where privacy is a concern and large where exterior view and sunlight are desired. Steel trusses supporting the roof over this

area also support an evaporative cooler and galvanized metal duct. Exposed florescent light fixtures are suspended from the ceiling above and run between the steel truss members. Over other areas, attic space is designed for storage and HVAC equipment.

Fire department vehicles enter the fire station from the rear yard, where fuel is dispensed from an environmentally safe, easily monitored above ground tank. Twenty-five off-street parking spaces fill the perimeter of the large paved rear yard, where training drills are also conducted.

E: Volunteer Recruitment and Retention

What Makes Members Want to Volunteer?

- Response to emergencies – 83.6 percent
- Family traditions – 61.9 percent
- Part of a team – 55.4 percent
- Social Opportunities – 48.9 percent
- Need for affiliation – 29.3 percent
- Helping neighbors – 81.5 percent
- Feel needed – 41.3 percent
- Career development – 42.3 percent
- Personal skill and knowledge development – 39.1 percent

What Keeps Volunteers Serving?

- State and local tax credits – 77.1 percent
- Length of service award from fire company/municipality – 63.0 percent
- Tuition reduction – 59.7 percent
- Access to group health insurance programs – 45.6 percent
- Group rates for auto and home insurance – 39.1 percent
- Access to group dental insurance programs – 32.6 percent
- Regular purchases of apparatus – 53.2 percent
- Friends/families also members (fraternizing) – 52.1 percent
- Frequent social activities – 41.3 percent
- Praise 44.5 percent
- Cash per call responded to – 41.3 percent

What Makes Your Members Leave Your Organization?

- No time to volunteer – 92.3 percent
- Conflicts in the organization – 47.8 percent
- Organizational leadership creates adversity – 46.7 percent
- Too much training – 45.6 percent



- Attitude of existing personnel to newcomers – 39.1 percent
- Criticism received from officers and older members – 38.0 percent

People are willing to volunteer in the fire and rescue service provided the following are true:

- The experience is rewarding and worth their time.
- The training requirements are not excessive.
- The time demands are not excessive.
- They feel valued.
- Conflict is minimized.

The roots of retention and recruitment challenges are briefly identified in the following chart:

Figure 95: Roots of Recruitment and Retention Challenges

Sources of Challenges	Contributing Factors
Time Demands	<ul style="list-style-type: none"> • The two income family working multiple jobs • Increased training time demands • Higher emergency call volume • Additional time demands within the dept.
Training Requirements	<ul style="list-style-type: none"> • Higher training standards and federal requirements • Greater public expectation of FD's response capabilities • Additional training demands to provide broader range of services • Recertification demands
Increasing call volume	<ul style="list-style-type: none"> • FD's assuming wider roles • Increasing medical call volume • Increasing automatic fire alarms • Greater reliance by public on FD services
Changes in the "nature of the business"	<ul style="list-style-type: none"> • Abuse of emergency services by the public • Less of an emphasis on social aspects of volunteering
Changes in sociological conditions	<ul style="list-style-type: none"> • Transience • Loss of community feeling • Less community pride • Less of an interest or time for volunteering • Two-income family and time demands • "Me" generation
Leadership problems	<ul style="list-style-type: none"> • Poor leadership and lack of coordination • Authoritative management style • Failure to manage change
Federal Legislation and regulation	<ul style="list-style-type: none"> • FLSA interpretations • "2-in, 2-out" rulings requiring four firefighters on scene before entering hazardous environments
Increasing use of combination departments	<ul style="list-style-type: none"> • Disagreements among chiefs or other department leaders • Friction between volunteer and career members
Higher cost of housing	<ul style="list-style-type: none"> • Volunteers cannot afford to live in the community they serve
Aging communities	<ul style="list-style-type: none"> • Greater number of older people today • Lack of economic growth and jobs in some towns

Retention and Recruitment for the Volunteer Emergency Services: Challenges and Solutions provides a comprehensive analysis of volunteer retention and recruitment challenges and solutions. The following topical list of retention and recruitment challenges and solutions represents an outline of this analysis as an indication of the value of this reference to Red Wing Fire Department.

Generally, the primary headings (Letters) represent the challenge topics and the sub-headings (numbers) represent the solution topics.

1. Retention

A. Leadership

1. Management style
2. Mission statement
3. Long range planning, goals and objectives
4. Selection and tenure of the chief
5. Selection and tenure of the officers
6. Training of the chief and officers
7. Internal communications
8. Volunteer coordinator
9. Adopting department standards

B. Department Image

1. Pride in the uniform
2. Pride in the department and community
3. Training in public
4. Delivering public fire safety and prevention programs
5. Well-maintained gear and apparatus
6. Demonstrating financial benefit to the community
7. Community newsletter
8. Use of the media
9. Customer service
10. Working with local politicians

C. Risks

1. Health risks
2. Medical examinations

3. Concerns of the family
 4. Death and disability coverage
 5. On duty Injury and hospitalization insurance
 6. Line of duty death and disability benefits
 7. Liability coverage
- D. Relocation
1. Transferring to other departments
 2. Reciprocity of training credentials
- E. Diversity of people and interests
1. Fire and EMS members
 2. Females
 3. Minority groups
 4. Retired firefighters
 5. Non firefighting personnel
 6. "Burned out" or disabled members
 7. Learning disabled/mentally challenged
- F. Consolidation
- G. Attitude and motivational research
1. Attitude research
 2. Motivational research
 3. Member surveys
 4. Exit interviews
 5. Evaluations
- H. Cohesiveness
1. Cliques
 2. Females and minorities
 3. EMS and firefighters
 4. Handling grievances and problem volunteers
 5. Combination departments
 6. Encouraging teamwork
- I. Emotional Support
1. Nurturing new members
 2. Nurturing all members
 3. Handling specific personal problems

4. Employee assistance programs/member assistance programs
5. The department as a family
6. Stress debriefings

J. Training requirements

1. The dilemma of reducing training requirements
2. Provide training schedules
3. Training in modules
4. Training in context
5. Instructor competency
6. Provision of remedial help
7. Diversifying instruction
8. Out-of town training weekends
9. Training competitions

K. Time Demands

1. Evaluating requirements and improving efficiency
2. Narrowing assignments
3. Duty shifts
4. Leaves of absence
5. Screening calls and alarm malfunctions
6. Involving the family in the department
7. A new take on fire department auxiliaries
8. Involving the family in social functions
9. Selective paging
10. Handling the most demanding hours: weekday hours
11. Supplementary full-time personnel

L. Recognition

1. Newsletters
2. Thank you notes and greeting cards
3. Pictures
4. Press releases
5. National volunteer awards
6. State recognition
7. Local community recognition and heroism awards
8. Award banquets

9. Graduation ceremonies

10. Pats on the back

M. Incentives

1. Setting up an incentive system

2. Direct financial incentives

a) Retirement plans

b) Pension plans

c) Length of service award programs

3. IRAs

4. Pay per call or per hour

5. "Monthly Pot"

6. Annual reimbursement

7. Tax exemptions and deductions

8. Health insurance

9. Tuition assistance

10. Housing assistance

11. Special low interest housing loans

12. In-season bonus

N. Indirect monetary incentives

1. Local business accounts

2. Chamber of Commerce dollars and gift certificates

3. Health club memberships

4. Other indirect monetary incentives

O. Uniform and department paraphernalia

P. Other incentives

Q. Equality in incentive system

R. Qualifying for benefits and Incentives

S. The fun factor

1. Social committee/social director

2. Parties

3. Prevention activities

4. Making training enjoyable

5. Other ways to have fun

6. Increased range of services

7. What to avoid

- a) Alcohol
- b) Drugs

2. Recruitment

- A. Citizens corps
- B. Needs assessment
- C. Qualities and skills to look for in volunteers
 - 1. Character qualities
 - 2. Education
- D. Daytime availability
- E. Geographically well-located
- F. Young firefighters
- G. Cadet training information
- H. Previous public safety experience
- I. Special skills
- J. Who should do the recruiting
 - 1. Members
 - 2. Recruitment coordinator
 - 3. Recruitment committee
 - 4. County, Borough, District, or City-level recruiting
- K. Where to look
 - 1. Personal contacts
 - 2. Door-to-door
 - 3. Dedicated recruitment telephone number
 - 4. Newcomer to town
 - 5. Schools
 - 6. Retirement homes
 - 7. Civic Associations and churches
 - 8. Fire departments
 - 9. County fairs
 - 10. Resorts
 - 11. Local businesses
 - 12. Events
 - 13. Utility companies and county and local government employees

14. Military bases and personnel
 15. Other emergency personnel
 16. Local stores, government offices, restaurants and gyms
 17. Training the public
- L. Recruiting messages
- M. Message examples
- N. Volunteering as career advancement
- O. The true nature of the job
- P. Firefighter checklist
- Q. Use of various media
1. Television, radio and print media
 2. Videotapes and multimedia shows
 3. Brochures
 4. Direct mail
 5. Posters
 6. Signs at stations
 7. Advertisements on apparatus
 8. Informal station open house
 9. Movie theater
 10. World Wide Web
 11. Other places to advertise
- R. Informational Sessions
1. Volunteer firefighter job description
- S. Screening recruits
1. Who to accept
 2. Motivations
 3. Tests and background checks
 4. Interviews
 5. Driving and criminal records
 6. Immigration status
 7. Commitment agreements
- T. Follow-through
1. Follow up on initial contacts
 2. Follow up after acceptance

3. Opportunities to leave

U. Barriers to recruiting

1. Exclusivity image
2. Training burden
3. Residency requirements
4. Tenure requirements

V. Recruiting special groups

1. Females
2. Hispanics
3. African Americans
4. Native Americans
5. Other minorities
6. White-collar workers/college students
7. Retirees

W. The annual recruitment plan

X. The national 1-800-FIRE-LINE recruitment campaign

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