SALT LAKE CITY COUNCIL STAFF REPORT

BUDGET ANALYSIS – FISCAL YEAR 2005-06

DATE: May 19, 2005

BUDGET FOR: **FIRE DEPARTMENT**

STAFF REPORT BY: Jennifer Bruno and Gary Mumford

cc: Rocky Fluhart, Sam Guevara, Chuck Querry, John Vuyk, Steve Fawcett, Kay Christensen, DJ Baxter

The proposed fiscal year 2005-06 budget for the Fire Department is $28,576,881. This represents an increase of $1,004,915, or 3.6% over fiscal year 2004-05.

FIRE DEPARTMENT PROPOSED BUDGETS				
	Adopted 2004-05	Proposed 2005-06	Difference	Percent Change
Office of the Chief (including financial management, payroll, purchasing, inventory, research, human resource management, facility maintenance)	$1,804,817	$ 1,861,303	$ 56,486	3.1%
Operations (includng airport operations)	20,694,134	21,321,572	627,438	3.0%
Special Operations (including hazardous material incidents, water rescues, high-rise rescues, trench rescues)	198,592	202,348	3,756	1.9%
Communications (dispatch, equipment maintenance & repair, technical support, records management)	1,531,614	1,596,554	64,940	4.2%
Training (including managing fleet acquisitions, maintenance and supplies activities)	1,638,396	1,683,918	45,522	2.8%
Fire Prevention (business inspections, hazardous materials permits, new construction, special events, community training, public education)	1,035,488	1,160,746	125,258	12.1%
Emergency Medical Services (including medical training, certification, quality assurance)	668,925	750,440	81,515	12.2%
Total	$27,571,966	$ 28,576,881	$ 1,004,915	3.6%

Total staffing for the department is proposed to increase by three positions to 362 FTE positions, from 359 FTE in fiscal year 2004-2005 (note: the Council approved 1 additional FTE in fiscal year 2005 budget amendment #4 – Airport Fire Captain – for a total of 360 FTE).

POTENTIAL MATTERS AT ISSUE

Some of the major changes reflected in the proposed budgets include:

- $ 99,192 – Two new dispatcher positions
- $(32,000) – Overtime eliminated by adding new dispatcher positions
- $ 43,034 –   Fleet maintenance
- $ 41,400 –   One-time funding – equipment for new vehicle
- $ 18,000 –   Workers compensation increased costs
- $ 182,820 –   Employee health insurance rate increase (City share)
- $ TBD   -   Proposed cost-of-living/step increase (negotiations on-going)

Some of the major budget increases include:

- <u>Operations Division</u> – Two FTE will be transferred out of the Operations division (one Captain into Fire Prevention, and one firefighter into EMS). The savings realized by this staffing shift will be offset by the addition of one fire captain assigned to the airport (Budget Amendment #4 FY 2005), anticipated increase in vehicle maintenance costs of $43,034 (8.6%), and an anticipated increase in personnel costs.

- <u>Fire Prevention</u> – The Fire Prevention Division budget is proposed to increase at a greater rate than personal services/step increases, due to staffing shifts. One Captain will be moved from the Operations Division into the Fire Prevention Division.

- <u>EMS Division</u> – The Emergency Medical Services (EMS) Division budgets are proposed to increase at a greater rate than personal services/step increases, due to staffing shifts. One Firefighter will be moved from the Operations Division into the EMS Division. The Council may wish to consider how this staffing shift will impact overtime usage in the Operations division, with one fewer firefighter staffing a vehicle.

- <u>Special Operations</u> – The increase in the Special Operations Division proposed budget is in order to purchase new HazMat/HRT equipment.

AUDIT RECOMMENDATIONS RELATING TO THE BUDGET

The Council initiated an audit of the Salt Lake City Fire Department, which was completed in May, 2005. The final audit report is attached to this report. A briefing will be scheduled to further discuss the report. The following sections detail findings and recommendations from the audit report that relate directly to the budget. Also attached to this report is a memo from Chief Querry to Council staff, with SLCFD responses to particular audit recommendations.

- Additional Dispatch Staff – The audit of the Fire Department included as one of its recommendations, additional Fire Dispatch staff. The proposed budget includes two additional fire dispatchers, at a cost of $99,912, for a savings of $32,000 in associated overtime costs.

A total of 166 recommendations were made in the final report of the Fire Department audit. The following are selected recommendations from the audit that directly relate to the budget, grouped in general categories:

1. Recommendations relating to overtime/retirement management:

   a. #30 The Fire Department uses salary savings from vacant positions to supplement overtime costs, which can result in more overtime. There are times of 20 or more vacancies. Consider some overhire process.

   b. #21 Design an incentive program to provide more notice of retirement.

   c. #10 Explore alternative work schedules that could reduce the reliance on overtime

   d. #11 Identify current trends in leave use and establish a smaller number of people allowed off each day on scheduled leave

   e. #12 Implement incentives to reduce sick leave taken (reduce overtime)

   f. #14 and #115 Assign some basic cause and origin investigation to company officers rather than bring investigator in (overtime) for clear-cut cases

   g. #161 Implement a sick leave reduction program to reduce overtime and provide some health insurance funding after retirement.

2. Recommendations relating to staffing changes:

   a. #49 Staff Station 9 during peak hours only. #48 In the next five years, move Station 9 further southeast to justify full-time operation with sufficient volume of calls.

   b. #46 Add a 2-person Advanced Life Support (ALS) unit in the downtown area from 10 A.M. to 10 P.M.

   c. #37 Continue using four-person staffing on all engines and trucks in the SLCFD.

   d. #144 Fire communications center requires a total of 20 employees, but the center has only 16 employees. (The proposed budget addresses this recommendation)

   e. #47 Upgrade Engine 1 to advanced life support and downgrade Rescue Engine 4 to an engine to better address the distribution of EMS demand.

   f. #55 Institute an officer rotation policy for all captains

   g. #66 Consider adding a provision to its upcoming RFP for ambulance services that would include a single medical director for both the ambulance service provider and the fire department. (See attached memo for SLCFD response)

   h. #81 Convert all employees except four (fire marshal and three sworn fire investigators) in the Fire Prevention Bureau to civilian positions through attrition.

   i. #148 The radio technician position with the Fire Department should be consolidated into IMS Division.

   j. #99 Require fire captains and/or battalion chiefs to become certified as fire inspectors so they can supervise company inspections.

k. #110 The deputy fire marshal (captain) over investigations should be a working captain active in fire investigations.

l. #86 Contract with 1 or 1.5 civilian certified fire plan examiners (or private companies) to provide fire code plan checking services.

m. #88 The hazardous material inspector should become certified as a fire inspector to allow greater flexibility in assignment.

n. #90 The civilian Public Education Specialist should be retained to provide adult and children programs.

o. #91 .5 to 1 FTE clerical position is needed to provide 5-10 hour day coverage for reception and phone duties, at a lower cost than having certified fire inspectors perform these duties.

3. Recommendations relating to general operations:

a. #36 Monitor response times in areas with traffic calming devices.

b. #43 and #44 Call processing, dispatch and turnout times much higher than recommended standards. Implement changes such as to dispatch first fire unit before all call information is entered into the CAD system.

c. #67 The City should maintain the current two-tiered system that involves the SLCFD and a private ambulance provider in the delivery of Advanced Life Support (ALS) and Basic Life Support (BLS) pre-hospital care and ambulance transport. (see attached memo for response)

d. #68 The SLCFD should formalize and strengthen its organizational structure and oversight of EMS service delivery within the Operations Division. (see attached memo for response)

4. Recommendations relating to budget increases/fees:

a. #6 Add technologies to eliminate manual processes for firefighter shift schedules and free up staff resources for other critical projects.

b. #69 The SLCFD should explore a legal mechanism that will allow the ambulance transport provider to pay the City an annual fee for its "paramedic first responder" program. (Fee not allowed under state law. See attached memo for SLCFD response)

c. #16 Allocate revenue from special events back to the EMS Division to offset the cost of the bike patrol.

d. #99 Establish a self-inspection program for the lower risk businesses.

e. The following recommendations all relate to the issue of fees charged (or not charged) for permits and inspections:

i. #104 Institute fees for all permits (only 14 fees out of 47 permits).

ii. #85 Establish fees for fire construction permits that are sufficient to cover the cost of the entire construction code enforcement function including fire plan review and fire construction inspection.

iii. #103 Fire construction permits *with fees* should be issued for the construction and renovation of permanent or temporary structures and for all fire protections systems (alarms, mains, standpipes, sprinklers, hood, etc.)

iv. #105 Fees should be instituted for initial inspections and re-inspections for all operational code enforcement inspections.

v. #107 Fees should be instituted for initial inspections and re-inspections conducted by fire companies.

      vi. #108 Evaluate feasibility of building Services issuing all permits and collecting fees rather than the Fire Department.

    f. #122-128 Workload data on the number of plans reviewed and the amount of time spent on each type of plan should be collected. Establish goals.

    g. #149 Mobile computer devices should be installed in fire apparatus to improve communication capabilities and response times.

PERFORMANCE MEASUREMENTS (Goals and measurable results)

The Fire Department has several goals and objectives to guide the budgeting process and provide a means for management to better evaluate overall Department performance. In order to assist the Council in evaluating progress, Council staff summarized the goals and noted the results or steps taken by the Department through December of 2004.

1. Goal/Objective: Maintain an average time from dispatch to arrival on life-threatening emergencies of less than or equal to 5 minutes. *During 2004 the department maintained an average response time of less than four minutes for each month.*

2. Goal/Objective: Maintain a turnover rate below 10% per year. *The department's "turnover" rate during 2004 was approximately 3.3%.*

3. Goal/Objective: Fire Prevention Bureau inspectors will complete 6,500 fire inspections and preplans annually. *The bureau has exceeded this goal in 2004 with 7,901 building inspections and preplan reviews.*

4. Goal/Objective: Complete 350 community training events with 19,000 participants annually. *The department far exceeded these goals in 2004 with 862 community training events and 33,255 participants.*

5. Goal/Objective: Ensure 90% of employees will perform at or above the "satisfactory" level on their annual performance evaluation. *Currently 99% (up from 95% the previous year) of the employees have received satisfactory or better on the annual performance evaluation.*

LEGISLATIVE INTENT STATEMENTS

The Council did not issue any legislative intent statements in June 2004 that relate to the Fire Department.

During the briefing on the proposed budget, the Council may wish to identify legislative intents relating to the Fire Department.

SIX YEAR BUSINESS PLAN

The following are goals and anticipated needs identified by the Fire Department within their six year business plan:

- Additional budget may be requested to cover the rising costs of utilities and basic required safety equipment, and required replacement of certain training equipment. *Department note: Budget has already been requested, and will continue as utility rates increase and safety equipment ages and is in need of repair.*

- Any other budgetary increases will be defined by the approved adjustments based on the salary compensation plan.

- Currently the City mission is to have every Fire apparatus staffed with four firefighters. Currently a portion of the department's overtime budget is used to accomplish this. However, if it could be accomplished with straight-time firefighters, it would result in a savings to the City. (The Department uses the Fair Labor Standards Act – FLSA – to allow hiring personnel at a straight time rate, saving the City the cost of funding a full time position including benefits).

- The Fire Department will continue to aggressively pursue annual grants from the Utah State Bureau of Emergency Medical Services, which ranges between $50,000 and $100,000 per year. (The Department has been able to secure not only funding from the Utah State Bureau of Emergency Medical Services but other sources enabling the SLCFD to meet some of its equipment and training needs without coming to the City for additional funding.)

CHARLES M. QUERRY
FIRE CHIEF

SALT LAKE CITY CORPORATION
FIRE DEPARTMENT

ROSS C. "ROCKY" ANDERSON
MAYOR

April 13, 2005

Cindy Gust-Jenson
Executive Director
Salt Lake City Council
451 South State Street
Salt Lake City, Utah 84111

Dear Cindy,

Subject: Ambulance RFP Meeting Follow up

Thank you for the opportunity to meet with you and your staff yesterday to discuss the ambulance RFP. I hope that we were able to answer your questions and address your concerns about this process. As was mentioned yesterday, the fire department has worked earnestly to create an RFP that is fair and equal and will select the best ambulance provider for the city and its citizens.

To review some of the specific questions and concerns:

1. The benefits to the city for issuing an RFP for ambulance services are:
   a) Benefits to City
      1. Increased and better service to citizens
      2. Most cost efficient service to the citizens
      3. Better integration between the provider and fire department
      4. Increased accountability of the ambulance provider
      5. Better cost recovery for the city
      6. Improved communications between the city and the provider
2. There is currently no cost for the city with the current ambulance provider and there is no anticipated cost that will be associated with the selected ambulance provider.
3. The RFP as currently constituted addresses all of the issues raised in the Tri-Data audit with one exception. Please see the detailed response listed below.

Impact of the audit on the RFP

Recommendation #65 – *The Department should evaluate the severity of PMA calls to determine the degree ALS intervention that takes place by SLC paramedics during transport.*

SLCFD Response: The fire department and its medical director, Dr. Steven Joyce, agree that ongoing evaluation of advanced life support and the proper use of paramedics is important. Under current state statute and rules, only one provider per geographic area may be licensed to provide paramedic rescue services. The fire department has held that license for over thirty years. As was mentioned in the audit, Salt Lake City pioneered, and is a national leader, as it pertains to determining the severity of calls that come into the 911 center. The fire department also believes that it is state-of-the-art as it pertains to the deployment of the tiered system of basic and advanced life support.

Recommendation #66 – *The City should consider adding a provision to its upcoming RFP for ambulance services that would include medical direction for both the ambulance service and the fire department.*

SLCFD Response: The fire department strongly agrees with this recommendation. Many of the problems associated with our current ambulance provider revolve around having two separate medical directors. Dr. Joyce has expressed an interest in providing dual medical direction for both the fire department and the ambulance provider. As it pertains to the RFP, the law strictly prohibits the City from telling the respondent how to meet a standard such as medical direction and who they must have provide it. Within the RFP, and as part of the City's desire to have as fully integrated a partner as possible, the City has offered the services of its medical director for contract.

Recommendation #67 – *The City should maintain the current two-tiered system that involves the SLCFD and a private ambulance provider in the delivery of ALS and BLS pre-hospital care and ambulance transport.*

SLCFD Response: The fire department strongly agrees with this recommendation and can confirm that the RFP is written to meet this recommendation.

Recommendation #68 – *The SCLFD should formalize and strengthen its organizational structure and oversight of EMS service delivery within the Operations Division.*

SLCFD Response: The fire department agrees with this recommendation and intends to do so with the ambulance RFP.

Recommendation #69 and Recommendation #70 – **(69)** *The SLCFD should consider the re-deployment of its paramedics and establish a staffing policy that places a minimum of one paramedic on every first response unit in the City and (70) The SLCFD should include in the*

proposed RFP for ambulance transport services the requirement that all ambulance units be staffed with a minimum of one paramedic.

<u>SLCFD Response</u>: This recommendation appears to contradict Recommendation #67 *The City should maintain the current two-tiered system that involves the SLCFD and a private ambulance provider in the delivery of ALS and BLS pre-hospital care and ambulance transport.* The fire department believes a tiered system of BLS and ALS is the most effective and efficient system.

The fire department does not agree with this recommendation for the following reasons:
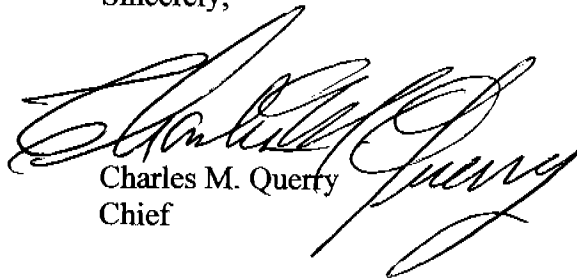
    a)   State law only allows for one paramedic provider in each geographic area and thus this type of structure of having two paramedic providers licensed in the same area is illegal.

    b)   The cost to both the City and the ambulance provider would be prohibitive. This system would require the ambulance company to educate and certify approximately 40 EMTs to the paramedic level, which takes a minimum of six months of education and upwards of $30,000 per employee.

    c)   Salt Lake City has reached its optimal level of ALS coverage with the number of paramedics it has. Adding more paramedics into the system will invoke the law of diminishing returns, in that a large pool of paramedics, the opportunities for paramedics to utilize their skills will severely decline. That degradation of skill levels will have a negative effect on patient outcomes. Dr. Steven Joyce has produced multiple studies on the effectiveness of paramedics, the number of paramedics necessary, and the proper use of paramedics in the pre-hospital setting.

    d)   The costs to the patients will increase substantially. The auditors propose that every unit have at least one paramedic on it and that by doing so, each patient can be charged the higher rate. This practice of charging patients for licensure level rather than service received constitutes fraud under the federal Medicare laws.

    e)   The cost recovery revenues received by the City will drop from approximately $650,000 to about $50,000, leaving an operational deficit of $500,000.

Recommendation #71 – *The SLCFD should include in the proposed RFP for ambulance transport services a provision that will pay the City an annual fee for its "paramedic first responder" program.*

<u>SLCFD Response</u>: The auditors propose that the ambulance provider pay the fire department a "paramedic first responder fee" to make up for the loss of paramedic on board fees. This fee is not allowed under current state law. Paying this fee to the fire department will be illegal unless the law is changed. Additionally, this fee is not typically paid by private insurance companies and is never paid by government payers such as Medicaid and Medicare. This recommendation would be very difficult to implement.

The fire department would be happy to meet with council members for further discussion and explanation if necessary. Because the RFP has been issued and potential offerors are preparing their bids, the fire department recommends that any such meetings be held as confidentially as possible so as not to disrupt the current process. Once again, thank you for the opportunity to meet yesterday. My staff and I are available to you for any necessary follow up.

Sincerely,

Charles M. Querfy
Chief

SF

cc: Rocky Fluhart
      Lyn Creswell
      Bryan Hemsley
      Scott Freitag

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Fire Department Management and Performance Audit

Salt Lake City Corporation, Salt Lake City Council

Final Report

May 2005

System Planning Corporation

TriData Division

FINAL REPORT

FIRE DEPARTMENT MANAGEMENT AND PERFORMANCE AUDIT

SALT LAKE CITY CORPORATION, SALT LAKE CITY COUNCIL

Submitted to:
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MAY 2005

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ACKNOWLEDGMENTS

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EXECUTIVE SUMMARY

The Salt Lake City Council performs a management and performance audit of one major City department each year. The Salt Lake City Fire Department (SLCFD), which was last audited in 1988, was audited in 2004. To perform this evaluation, the City selected TriData, a division of System Planning Corporation, by competitive bid. The primary objectives of the audit were to assess the effectiveness and efficiency of the SLCFD and to compare it to national standards and best practices from other jurisdictions. The highlights of the findings and the 167 recommendations are presented below.

Management and Organization

Overall, the Department is well managed and functions at a high level. The command structure, which is based on a traditional model found in many other departments in the Southwest, appears to serve the Department well. A strong relationship between the Fire Chief, the Mayor, and the City Council exists, though opinions regarding specific issues affecting the Department often differ. Top leadership appears to be receptive to concerns expressed by the labor unions representing Department employees.

Organizational Culture – The organizational culture of the SLCFD is positive and steeped in tradition. Command officers, line officers, and firefighters show pride and a willingness to work to make the SLCFD a better department. Lines of communication and decision making procedures appear to be working well. There does appear to be, at times, difficulty in implementation of directives or changes that originate at the command level and must be enacted at the operational level. TriData recommends changing the role of the Battalion Chiefs to perform more management-related duties, thereby freeing the Deputy Chiefs to concentrate more on system-wide policy issues.

Citizen Expectations – The citizens of Salt Lake City can be assured that they have one of the best fire departments that the TriData team has reviewed. While the SLCFD, union, and City Council may disagree as to the degree and foundation of this citizen support, the project team did not observe any serious issues related to the interface between the Department and the public.

Organizational Structure – The SLCFD follows a traditional organizational model for its command structure. The TriData team recommends retaining the Administrative Assistant position, and considering additional civilian personnel support, reversing cutbacks here.

Budget and Finance – Salt Lake City's financial and budgeting practices follow generally accepted accounting practices. However, the SLCFD should address a number of

policies and procedures affecting the Department's finances. The payroll and employee tracking systems should be updated, and the Department should review and explore alternate work schedules, leave policies, and benefits strategies to reduce the Department's dependence on overtime.

Long-Range Planning – The City has implemented a strategic planning process that ties organizational goals and objectives to performance measures. In support of this process, the SLCFD should develop reasonable and measurable goals and objectives and communicate these to the Department.

Human Resources and Recruiting – The SLCFD employs 351 personnel, 83 percent of which are operational staff members. While the benefits program is generally good, there was some concern about the retirement program. The TriData team suggests that the SLCFD develop pre-retirement counseling, design an incentive program for firefighters to provide more notice of retirement, and require longer notification before retirement.

The Department must increase diversity in its ranks. It needs a better public relations program that includes minority participation, and a better minority recruitment program.

Promotion and Performance – The Department should consider expanding promotional requirements to include formal education, experience in prevention and training, or committee or project work. Performance-based pay incentives also would serve to encourage personnel to pursue additional development activities, which would strengthen the Department.

System Performance Goals

We reviewed standards from the National Fire Protection Association (NFPA), Commission of Fire Accreditation International (CFAI), Insurance Services Office (ISO), and other sources in considering appropriate performance standards for the SLCFD.

Unit Workload – Unit hour utilization (UHU), a measure of how often a piece of apparatus is occupied on emergency calls as a percentage of the total number of hours a unit is staffed and available. The SLCFD should set a maximum desired UHU goal of between 20 and 25 percent.

Response Times – While the speed of response is not directly indicative of outcome or quality, response times do affect the number of lives saved and the value of property losses averted when an emergency occurs.

The TriData team recommends that the SLCFD adopt a 90-second goal for call processing and a 90th percentile turnout time goal of 60 seconds. Changes needed to meet these goals should be implemented. The SLCFD adopt travel and total response time goals based on

call time and priority. The Department should begin to track "vertical" response times. The Department and the City should monitor response times in neighborhoods that employ traffic calming devices, such as speed bumps, to more accurately assess their impact.

Apparatus Staffing – The City should continue to staff fire apparatus with four personnel. The Department should create a standard operating procedure (SOP) that more accurately outlines the number and type of apparatus and personnel to comprise a response to structure fires based on risk level (and taking into account the NFPA guidelines). Continue the current policy of dedicating one engine crew on each fire to be the rapid intervention crew (RIC).

Risk and Demand Analysis

The Salt Lake City area is home to many different types of risks, including a major international airport, high-rise building complexes, diverse street networks, a 1,500 acre state university campus, and commercial facilities containing hazardous materials. Natural risks, such as earthquakes and wildfires, are also of concern. In addition, studies have shown that the elderly create a disproportionate workload for fire departments.

The TriData team projected demand for the SLCFD based on population, demographics, and past trends. While the number of fires decreased since 1991, the per capita demand for EMS has increased. This represents a fundamental change in the types of services required to be provided by the SLCFD and follows a national trend. As discussed in the System Performance Goals chapter, the SLCFD should determine acceptable workload and UHU thresholds and should monitor UHUs on an annual basis.

Station and Apparatus Deployment

The TriData team analyzed response times for apparatus based on current station locations and resource deployment. Although the citizens seem to be satisfied with current response times, there is room for improvement, particularly in call processing and travel times. Despite working to prioritize calls, call processing time in Salt Lake City is much higher than the CFAI and NFPA recommended standards; the 90th percentile is 3:32 vs. a desired 1 minute. The City should review the call processing and dispatch process to determine the root cause(s) of delays. This review should include an assessment of whether the first-due fire unit can be dispatched before all call information is entered into the CAD system, which will reduce overall response times. The City's turnout time, which measures how long it takes from the time a call is received at the station to the time when the apparatus begins driving to the call, exceeds the NFPA guideline by 42 seconds. The 90th percentile for turnout time is 2:35, which is more than twice the recommended time.

When taking into account the "hot-cold" response policy for the City, travel times for fire apparatus nearly meet the NFPA recommended travel time of four minutes for the first arriving unit. For emergency responses (lights and sirens), the 90th percentile travel time for the City was 4:29, which is excellent. However, EMS travel times are significantly shorter than fire travel times, suggesting that rescue engines are not available for fire calls in their first-due areas more than other engines. A unit from farther away must respond, which results in a longer travel time. This disparity between fire and EMS responses should be examined in more detail.

Station Location Analysis – In conjunction with the response time analysis, the project team reviewed the locations of current SLCFD stations and their ability to adequately provide service based on current and projected workloads. At the time of this study, the SLCFD was serving 110 square miles from 14 fire stations. To perform the analysis, the stations were divided into three regions: east, central, and west. Overall, the SLCFD has done a good job of distributing stations and apparatus throughout the City. Response times are currently longer than desired, but that is mainly due to call handling and turnout time that do not meet standard.

There does not appear to be a need for additional resources in the east region (Stations 3, 5, 10, and 13) in the next 20 years. The current number of apparatus is sufficient to handle future demand even under high projections. Stations are of reasonable age and in good condition. Response times in this region can be reduced through reductions in call processing and turnout time, as described above.

Stations in the central analysis region (Stations 1, 2, 4, and 8) also appeared to be in good shape overall. There should be no need to rebuild fire stations in this region for the next 20 years. There is, however, an immediate need for a peak-demand advanced life support (ALS) unit in this region. Further, Engine 1 should be upgraded to a rescue engine and Rescue Engine 4 can be downgraded to an engine to better address the distribution of EMS demand.

The west analysis region comprises Stations 6, 7, 9, 11, 12, and 14. Based on future demand in this region and substantial overlap of coverage areas, there is a need to redeploy some resources here. TriData recommends that the SLCFD relocate Station 9 in the next five years and, in the meantime, consider staffing Station 9 during peak hours only. In the next 10-20 years, Station 7 should be moved slightly north and west as well.

Fire Operations

The SLCFD is very well run operationally. It is a philosophically aggressive fire department in its approach to fighting fire. Internal written and oral communications are good, but could be improved.

Command Level Operations – Battalion Chiefs and first-in company officers handle most incident command responsibilities. While the ICS is employed on large-scale incidents, it should be used for all types of incidents consistently, to keep skills up in using it.

The Battalion 1 Chief should be moved to Station 5 and Battalion 2 be moved to Station 6, to more centrally locate the Battalion Chiefs and improve the rapid response to incidents.

Line Level Operations – The Department should reintroduce the rank of Lieutenant into the organizational structure. In addition, the SLCFD should introduce an officer rotation policy to expose line supervisors (currently, Captains) to different working environments to give them more experience and allow them to develop their knowledge of Department operations.

Mutual Aid – The SLCFD has an excellent mutual aid system and is part of the Unified Fire Authority of Greater Salt Lake. There are 16 jurisdictions and more than 50 stations involved in the mutual aid system. The Department's mutual aid agreements and policies are among the best TriData has reviewed.

Apparatus and Equipment – The age and condition of the front-line apparatus is good. The oldest piece is Engine 13, an 11-year-old 1992 Emergency One pumper. The Department meets NFPA guidelines for apparatus replacement.

Training – The training program provided by the Department is adequate for new recruits and line-level firefighters. However, there is no training provided for freshly promoted line officers (or for any other officers). Developing a more viable professional development program is in the best interest of the Department.

Staffing – The SLCFD meets the standards for apparatus staffing in NFPA 1710. However, adjustments should be made to scheduling practices. For example, restrictions should be placed on the number of consecutive days an individual can work; a protocol for assigning extra individuals to work locations should be developed; and the Department should establish a staffing factor to determine the number of employees required to maintain constant staffing in light of expected leave.

Emergency Management – SLCFD has one individual assigned to Emergency Management, the Emergency Manager. He also serves as the Department's public information officer. Due to the workload involved in this position, an additional position should be assigned to assist the Emergency Manager. These individuals should work to improve the interaction between the SLCFD and the City's Office of Emergency Preparedness in planning for and responding to major emergencies.

Hazardous Materials (Hazmat) – The SLCFD has a well-trained Hazmat team that functions according to a detailed response plan. The Hazmat unit is housed at Station 6 and consists of Engine 6, Hazmat 6, and Support 6. The Hazmat team appears to be well trained, but there is some concern that the Battalion Chiefs who could be called upon to serve as incident commander in a Hazmat situation are not trained to the same level. SLCFD should provide additional training in Hazmat response for Battalion Chiefs.

Emergency Medical Services

Like other departments across the country, the SLCFD is evolving from a traditional fire department with a focus on fire suppression to a more modern fire department that mostly provides EMS first response and also fights some fires. The City appears to have made this transition well and has minimized a problem that is a major concern in many departments by cross-training all personnel as Emergency Medical Technicians (EMTs) and firefighters.

EMS calls account for approximately 75 percent of all SLCFD call activity. The Fire Department operates 9 ALS companies and 9 BLS units. Transport is provided by Gold Cross Services, Inc. The City's "paramedic aboard" (PMA) policy requires that a SLCFD paramedic accompany the transporting unit to the hospital when ALS services are being performed.

As with most urbanized EMS delivery systems, there is a considerable range in the acuity of ALS patients treated. However, the TriData team found that there has been no evaluation of the level of care provided by SLCFD paramedics (as compared to the Gold Cross providers, who operate under the same protocols and medical direction). The Department should work to evaluate the level of severity of the PMA calls to determine the degree of ALS intervention that takes place by SLCFD paramedics during transport. The City should also work to standardize medical direction for both the ambulance provider and the SLCFD in its upcoming RFP for ambulance services.

There has been some question as to whether the SLCFD should assume responsibility for transport services. The TriData team does not believe that this is appropriate at this time and believes that the City should maintain the current two-tiered system.

Operations – The City should formalize the organizational structure and oversight of EMS service delivery in the SLCFD. It should consider redeployment of paramedics within a staffing policy that places a minimum of one paramedic on every first response unit in the City. The City should also write its RFP for ambulance services to require that every transport unit have one paramedic assigned to it. These two recommendations, when implemented together, would ensure that the state requirement for two on-scene paramedics is met. The SLCFD should

also revise its training and quality assurance/improvement standards to ensure that skills assessments are performed and call documentation is reviewed for EMS service providers.

EMS Performance Measures – As discussed earlier, specific measures of service delivery should be established for the Department as a whole. EMS-specific measures are also appropriate. Fractile times should be used in response time standards and the SLCFD should track calls that result in extended response times. In addition, the SLCFD should establish more comprehensive individual performance measures for all employees involved in the delivery of EMS services.

Prevention

The SCLFD has a long tradition of a proactive fire prevention program. While this tradition is evidenced in the mission statement of the Department, there has been a shift from an emphasis on fire prevention to fire suppression. In the Department's efforts to bolster the concept of "4 handed staffing", staffing has suffered in the Fire Prevention Bureau (FPB). The bureau staff has been reduced 30 percent from 2002 to 2005. As a result there has been a decrease in inspections performed, a reassigning of key public personnel, and an intent to eliminate public education programs. Fire prevention is one of the most important components of any fire department. While we support the use of 4 person crews, we do not support the weakening of the FPB to reach that goal.

Despite the changes, the FPB continues to be effective, but decreasing prevention at a time when it should be increased is something the Department should examine closely.

There have been proposed initiatives to address some of the problems in the FPB which include: "One stop shopping "for construction approval and shifting inspection of construction in process from Building Services to the FPB. TriData strongly supports these initiatives. The team also believes that civilianizing the inspector positions is a viable option. It is more costly to have sworn firefighters in the inspector positions. There also should be more clerical help in this division.

The Fire Investigation Unit in the FPB is extremely effective and ahead of many units in the country. However, the TriData team found that the unit lacks a chain of command in the organizational mechanism. There is no direct supervision at the captain's level or above, and the unit needs this structural component to make it more effective. Additionally, there is no career progression for the members of the unit and one should be developed.

Support Services

To support actual fire and rescue operations, fire departments must have training, communications, maintenance, and information technology services.

Information Technology – The SLCFD is hampered by its fragmented, insufficient information technology. Many software programs are outdated while some have never functioned properly. The City's Information Management Service (IMS) department has worked hard to address many of these issues, and the working relationship between IMS and the SLCFD is positive, but improvements are needed. A determination should be made as to whether the SLCFD's current records management software is adequate. Other computer programs such as the computer-aided-dispatch system, geographic information software, and arson investigation programs should be reviewed and updated, if necessary. To promote effective communications, the SLCFD should improve the Department Intranet site. This would facilitate access to up-to-date information by employees from Department computers.

The SLCFD must also work to improve its data collection and analysis capabilities. An analyst should be hired to monitor and analyze Department data, a key element missing in the SLCFD.

The City must continue funding information technology improvements that support fundamental Fire Department programs, particularly those related to data collection, records management, and system performance analysis.

Dispatch and Communications – The SLCFD's communication function comprises secondary 911 call receiving, dispatch communications, and radio technical support (primary call receiving is handled by the Police Department). This police-fire division of labor from a previous consolidated center has led to turf battles. Senior executives and chief officers from departments meet to determine ways to promote better relations between them.

The workload of the fire communications center requires a total of 20 employees, but the center has only 16 employees. Four civilian employees should be hired to meet the staffing needs driven by the workload. In conjunction with additional hiring, performance evaluation and employee replacement programs should be assessed and improved.

The City must also focus time and energy on assessing and updating the technology and technology support for the Dispatch Center. This will require close coordination with the City's IMS group, as well as a monetary and strategic commitment to ensure that technology in the field and in the Dispatch Center are up to date and functional.

Fitness and Wellness

The SLCFD's partnership with Concentra Medical Center, a local medical provider, is serving the Department well and should continue. In 2003, all 365 employees of the SLCFD completed mandatory NFPA 1582-compliant physicals. The SLCFD also makes available a number of programs to promote healthy lifestyles amongst its employees, such as participation in the Healthy Utah state-funded benefits program, negotiation of discounted rates at a local health club, and distribution of the monthly Top Health newsletter. These programs are underutilized, and the SLCFD should work to better promote them.

Trainers – Coordinating with Health Metrics Inc./ARA Human Factors (HMI), a company specializing in validation of job-related fitness standards, the SLCFD invested $6,000 to certify nine Certified Fitness Consultants to provide on-site fitness education and training for SLCFD employees. While the Department made the commitment to initial training for these individuals, it must now provide continuing education to allow them to continue to do their job and provide for a positive return on investment for this program. Additional exercise science training and education should be provided for Fire Department personnel providing this type of instruction. The SLCFD should also allocate funds to purchase exercise equipment, as requested by the Captain in charge of the training center.

Injuries – The Department has no protocol or SOPs for investigating injuries and accidents that occur on the job. Consequently, these procedures should be developed. Sick leave and modified-duty policies should also be reviewed. That being said, the Department's claim rates and incurred costs are significantly lower than those of other comparable departments. Better injury prevention and wellness programs will help to maintain these lower rates and demonstrate the Department's commitment to the health and wellness of its employees.

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Overall, the citizens of Salt Lake City should be proud of their Fire Department. They are getting a high level of service from a dedicated group of men and women. While the changes and recommendations contained in this report may take some time to implement, they build upon a strong foundation.

I. INTRODUCTION

Each year, the Salt Lake City Council hires a consultant to conduct an independent management and performance audit of one City department. In 2004, the focus was on the Salt Lake City Fire Department (SLCFD), which was last audited in 1988. To perform the evaluation, the City selected TriData, a division of System Planning Corporation, by competitive bid.

TriData is a nationally recognized consulting firm and has performed over 100 studies of this type for municipalities throughout the country, including Sacramento, Long Beach, Colorado Springs, Houston, Seattle, Chicago, the District of Columbia, and many other cities and counties of similar size to Salt Lake City. In addition, TriData works closely with the United States Fire Administration to compile annual fire loss statistical data and complete topical studies on current issues affecting fire and emergency medical response in the United States.

The primary objective of this study was to assess the effectiveness of the SLCFD as well as to compare it to national standards and best practices from other jurisdictions.

Scope

The scope of the study was to include the following tasks:

1. ***Compare Salt Lake City to other comparable cities, best practices, and national standards*** – TriData compared Salt Lake City to 10 other jurisdictions in services provided, call volume, number of personnel, budget expenditures, etc. TriData also used consensus standards developed by the National Fire Protection Association (NFPA) and regulations enforced by the Occupational Safety and Health Administration (OSHA) to evaluate the SLCFD.

2. ***Analyze demand, risk, response times, and location of stations*** – we analyzed trends affecting fire and EMS service delivery, including population growth, demographics, risk, incidents over the past decade, and unit workload. These data were used to develop projections of future trends over the next 0–5, 6–10, and 11–20 years. Using advanced geographic information system (GIS) software, the location of fire stations and emergency incidents were analyzed to determine whether additional stations were needed or if stations should be relocated. Response time data were also analyzed and compared to national standards and related to station and apparatus deployment.

3. ***Review and assess organization, staffing, and apparatus*** – The number and type of apparatus and personnel were analyzed to determine compliance with industry standards and national benchmarks. The level of service that can be provided once a unit arrives and the safety of firefighters and civilians were considered. The costs and benefits of four-person staffing were evaluated as was the potential use of alternative staffing scenarios (e.g., peak load staffing).

4. ***Analyze fire operations*** – This analysis included a review of the SLCFD's day-to-day operations and command structure. The training provided to command

officers and the Department's written procedures were addressed as were the Department's after-action review process. Mutual and automatic aid agreements were assessed to identify any areas where regionalization could improve service delivery.

5. ***Identify the pros and cons of ambulance service*** – TriData evaluated the impact of providing Basic Life Support (BLS) transport versus maintaining the current system, which relies on a private Emergency Medical Service (EMS) transport service. Quality assurance, EMS training, and the deployment of EMS units were also reviewed.

6. ***Evaluate hazardous materials capabilities*** – The operations of the hazardous materials (Hazmat) program were reviewed, including training, safety, and the effectiveness of overall response. In addition, the review focused on potential areas for revenue enhancement.

7. ***Assess state of emergency communications and preparedness*** – Each component of the communications process was evaluated, including the dispatchers and the equipment they use. The review also addressed whether the radio system allows the SLCFD to talk to other City agencies and/or neighboring fire departments. Included as part of this task was an analysis of the Emergency Operations Center (EOC) and the plan to move it to an alternate location. We also assessed the ability of the emergency management program to handle a large-scale emergency response, across City agencies.

8. ***Review "non-core" services and support functions*** – This analysis included a variety of critical functions that support the day-to-day operations of the SLCFD. Included were the activities and staffing of the Fire Prevention Bureau, information technology, training, physical fitness, and the safety program.

Background of City

Salt Lake City, Utah was founded on July 24, 1847, by a group of 148 Mormon pioneers, led by Brigham Young.[1] Today, the city encompasses 110 square miles and is home to approximately 180,000 people, with more than one million in the surrounding suburbs. The city boasts an international airport, convention center, multi-million dollar light rail system, and one of the highest concentrations of biomedical, high technology, and software firms in the nation. In 2002, Salt Lake City hosted the XIX Olympic Winter Games, which brought tens of thousands of athletes, officials, members of the media, and visitors to the area; the Olympic venues continue to attract tourists and athletes today.

Population – Population size, growth, and density all impact the risk of fire, fire death, and, subsequently, the demand for fire and EMS services. Population growth is particularly important; it directly impacts future demand.

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[1] Utah.com, *Salt Lake City History*, http://www.utah.com/cities/slc_history.htm, December 5, 2004.

In the 2000 Census, the city's population was 181,743, having grown modestly over the past six decades, as shown in Table 1.

Table 1: Population 1960–2000

Year	Population
1940	149,934
1950	182,121
1960	189,454
1970	175,885
1980	163,034
1990	159,928
2000	181,743

Source: 1990 Census Statistics
Summary, Salt Lake City website

The greater metropolitan area surrounding Salt Lake City, which includes Salt Lake County, Tooele County, and Summit County, is home to nearly 1.3 million people.

Salt Lake City and its surrounding ski resorts are popular tourist attractions; seven million people visit the Salt Lake area each year. The specific impact of these visitors on the SLCFD's call volume is not clear. In addition, the University of Utah and several other educational institutions are located in Salt Lake City. The student population of these institutions also affects call volume; however, it is not clear to what extent.[2]

Demographics – National studies have shown an inverse correlation between income and fire risk. Residents with lower incomes are often at higher risk for becoming victims of fire than persons with higher incomes. Table 2 shows that a slightly higher percentage of families and individuals in Salt Lake City live below the poverty level than do nationally.

Table 2: Percent of Population Below Poverty Level

Subject	Percent Below Poverty Level – Salt Lake City	Percent Below Poverty Level – United States
Families	10.4	9.2
Families with female householder, no husband present	21.7	26.5
Individuals	15.3	12.4

Source: United States Bureau of the Census, Table DP-3. Profile of Selected Economic Characteristics

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[2] Determining the impact of these seasonal visitors to Salt Lake City would require a detailed analysis of visitor trends (how many, when, where they stay, etc.) and response data to compare call volume during the academic year/tourist season to "off-peak" times or recording on each EMS incident whether the victim was from out of town. Since Salt Lake City is a popular tourist destination all year round, it would be very difficult to extract their impact on demand from that of the permanent residents. The demand projections later in this report are completed in such a way that visitor impact is taken into account in that they impacted past demand; the assumption is that visitors will continue to impact demand in the same way as in the past.

Nationally, statistics show that African Americans and Hispanics tend to be at higher risk for fire injury and death than other groups. Asians, however, tend to experience lower risk than the general population. Figure 1 depicts the percent of the population by race for Salt Lake City as of 2000. There is a smaller proportion of these higher risk groups in Salt Lake City than most large cities, but the Hispanic population is 16 percent and growing.

Figure 1: Population by Race
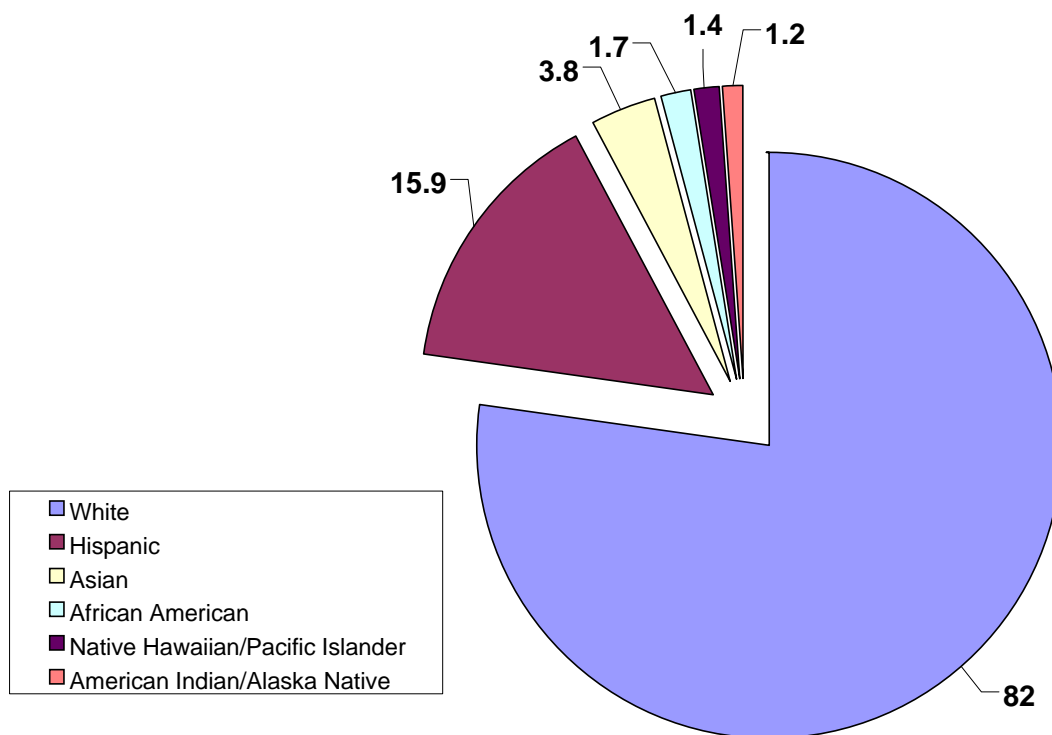
Source: United States Bureau of the Census, Table DP1 - Profile of General Demographic Characteristics
Note: Total is greater than 100 because it is possible for respondents to report more than one race.

Age – Salt Lake is a relatively young city with a median age of 30. Only 11 percent of the population is over the age of 65, and 14.2 percent is younger than 10.[3] The latter two age groups are at significantly higher risk for fire injury and death than the population at large. The elderly (individuals over age 65) also tend to use the EMS system at a higher rate than the general population.

Education – There are 51 grade schools in Salt Lake City: 29 elementary, four intermediate, and three secondary schools in the Salt Lake City School District; 11 private schools; and four alternative schools. Opportunities for higher education include the University of Utah, Westminster College, and Salt Lake Community College.

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[3] Source: Table DP-1, Profile of General Demographic Characteristics, Census 2000.

In Salt Lake City, 41 percent of the population has completed an Associate's Degree or higher, which is significantly above the national average of 29 percent.[4] Another 22 percent of the population has attended at least some college. Education has been related to fire risk; people with low levels of education tend to be at higher risk for fire injury or death. Those with lower educational levels also tend to have lower incomes, another significant risk factor.

Economy – Salt Lake City's economy is diverse, ranging from mining to high-tech industry to the University of Utah and the Church of Jesus Christ of Latter-Day Saints.

In October 2004, the unemployment rate was 4.6 percent, below the national average of 5.5 percent. The median household income in Salt Lake City, according to the 2000 Census, was $36,944 with a per capita income of $20,752. As shown in Table 3, the most common industry in which people in Salt Lake City work is educational, health, and social services, followed by professional services.

Table 3: Salt Lake City Industry, 2000

Occupation	Percent of Employed Population*
Educational, health and social services	22.6%
Professional, scientific, management, administrative, and waste management svcs	12.3%
Arts, entertainment, recreation, accommodation and food services	11.2%
Retail trade	9.8%
Manufacturing	9.5%
Finance, insurance, real estate, and rental and leasing	7.1%
Construction	6.1%
Transportation and warehousing, and utilities	4.9%
Other services (except public administration)	4.6%
Information	4.2%
Public administration	4.2%
Wholesale trade	3.1%
Agriculture, forestry, fishing and hunting, and mining	0.5%

Source: Table DP3, Profile of Selected Economic Characteristics, Census 2000
* Totals to more than 100 percent due to rounding.

Transportation – The City has a strong traffic management program, which includes traffic-calming devices (e.g., speed humps, which slow emergency response, too) as well as neighborhood programs to encourage safe driving. In addition to personal vehicles, there are a variety of public transportation options available through the Utah Transit Authority (UTA). The recently completed multi-million dollar light rail system (TRAX) serves residents from downtown Salt Lake City south to Sandy City and east to the University of Utah. An extensive

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[4] Source: Educational Attainment in Population 25 Years and Over, 1990-2000, Census 2000.

network of buses is also available. Salt Lake City International Airport, located five miles northwest of downtown Salt Lake City, served 18.3 million passengers in 2004.

Tax Base – The City collects revenue through a variety of sources, including property taxes, sales tax, franchise taxes, licenses, permits, fines, and fees for service. For fiscal year 2003-2004, total revenue was projected to be $161,008,587.

Housing[5] – Home ownership, type of residence, and structure age are all factors that contribute to fire risk and the need for emergency services. Older homes tend to be at higher risk for fire, particularly if they are not properly maintained.

Of the city's 77,054 housing units, 92.7 percent are occupied; 7.3 percent are vacant, which is consistent with national statistics. More people in Salt Lake City own their homes than rent them (51.2 percent versus 48.8 percent respectively). Nationally, the percentage of homeowners is significantly higher (66 percent).

The largest percentage of the city's housing units are single-family, detached homes (49.3 percent) followed by multi-family dwellings with 20 or more units (18.6 percent). A significant portion of the city's housing stock was built before 1939 (31.7 percent); nationally, only 14.2 percent of homes were built before 1939. Another 28.6 percent of housing units were built between 1940 and 1959. Again, without proper maintenance, these older homes are at a higher risk for fire than newer ones. Only five percent of housing units were constructed between 1995 and 2000.

The majority of owner-occupied housing units are valued below $200,000 (57.1); 14.2 percent are valued between $200,000 and $299,999. Only 0.5 percent are valued over $1 million.

Climate – The climate in Salt Lake City is generally moderate, with an average annual high of 63.9°F and an average annual low of 40.1°F. On average, the city receives 15.8 inches of rain each year and 62.5 inches of snow.[6]

Geography – Salt Lake City is centrally located near the intersection of Idaho, Nevada, Wyoming, Colorado, and Utah. The city has a variety of target hazards, including several significant industrial areas, the University of Utah, and the Church of Jesus Christ of Latter-Day Saints. The city also sits partially atop the Wasatch Fault, one of the largest active faults in the nation.

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[5] All statistics are from Census 2000.
[6] All statistics are from the Monthly record of Temperature, Precipitation, and Snow, 7/1/1948-4/30/2000, Western Regional Climate Center.

Overview of the Salt Lake City Fire Department

The SLCFD is an all-career fire department with 359 authorized positions (as of July 1, 2004); of those, 326 are sworn personnel. These personnel staff 14 fire stations throughout the city and operate 11 engines, two quints, three ladder trucks, and a handful of specialty units.

In fiscal year 2004, the SLCFD responded to a total of 24,302 calls for service, a slight increase from the 24,005 calls in fiscal year 2003 but a decrease from 326,208 calls in fiscal year 2002.[7] The majority of these calls were for EMS, which is consistent with national trends.

Methodology

The methodology used for this study was based on TriData's 23 years of experience in undertaking similar projects. The study used a mixture of data analysis and personal interviews. This allows the project team to develop a comprehensive picture of the Department.

The study began with a kick-off conference call in August 2004 between TriData staff and representatives from the SLCFD to discuss the study's scope, and discuss a tentative schedule for the first on-site meeting. The kick-off conference ensures that the study plan was appropriate and that staff assignments are in line with the goals of the project.

Members of the TriData team then made their first visit to Salt Lake City to perform an initial "triage" of goals, priorities, and issues. They conducted a series of meetings with SLCFD command staff, rank-and-file firefighters, representatives from International Association of Fire Fighters (IAFF) Local 1645, and city officials. At the conclusion of the visit, a wrap-up meeting was conducted with key members of SLCFD project team to discuss the major issues identified during the visit, review the scope of the study, and determine if any priorities or goals needed to be modified.

During the next phase of the project, specialists from the study team undertook a series of on-site, in-depth reviews of various SLCFD functions. These included management and organization, prevention, fire suppression operations, EMS, special operations, communications, and information technology. A series of data analyses were undertaken to project demand and consider various station location configurations, using GIS software.

The team then developed the initial report draft sections, each of which describes a functional area of the Department, assesses its current efficiency and effectiveness relative to standards and practices across the nation, and makes a series of recommendations for improvements. The drafts were sent to the SLCFD for review to ensure factual accuracy and the

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[7] There was a spike in call volume in the first half of 2002 during the Olympic Winter Games.

suitability of recommendations. Modifications were made, as necessary, and a final report was compiled. The findings were presented in May 2005.

Organization of the Report

Following this introductory chapter are nine chapters. Several chapters address a major area or set of functions of the SLCFD. Others, except chapter III and IV, address goals and risk analysis. A final chapter addresses the fitness and wellness program.

Chapter II, **Management and Organization**, addresses the overall organization of the Department, budget and finance, long-range planning, internal communications, and human resources.

Chapter III, **System Performance Goals**, discusses system performance goal and standards typically used in the fire and EMS industry. The project team compared the Salt Lake City Fire Department (SLCFD) to these standards and makes recommendations on goals to adopt. Interjurisdictional comparisons are included in this chapter.

Chapter IV, **Risk and Demand Analysis**, discusses past demand for emergency services in Salt Lake City and the fire/EMS risks present. Population projections are used in conjunction with past population and past demand to project future demand for services over the next 0–5, 6–10, and 11–20 years. Future demand projections and community risks are factored into the station and apparatus deployment analysis in Chapter V.

Chapter V, **Station and Apparatus Deployment**, analyzes current response times and presents a geographic information system (GIS)-based analysis of station and apparatus deployment. In conjunction with the projections in Chapter IV and the goals established in Chapter III, these models are used to propose a new station location configuration for the city, which will meet current and future demands for service, while maintaining adequate response time coverage.

Chapter VI, **Fire Operations**, discusses the operations component of the Salt Lake City Fire Department. Areas reviewed include incident command, standard operating procedures, staffing, and technical and special operations.

Chapter VII, **Emergency Medical Services**, focuses on the aspects of Emergency Medical Services (EMS) provided by the SLCFD. Consideration is given to alternatives and recommendations made based on the results of interviews, the review of statistical data, field observations, and comparisons with other similar EMS systems.

Chapter VIII, **Prevention**, reviews the services provided by the Fire Prevention Bureau, including plans review, new construction inspections, code enforcement inspections of existing

buildings, annual licensing inspections, fire and arson investigations, hazardous material investigations, preparation of state fire incident reports (NFIRS), and public education programs on fire and personal safety.

Chapter IX, **Support Services**, discusses the many functions required to support the day-to-day operations of the Department. These include information technology, training, communications, fleet management, and safety.

Chapter X, **Fitness and Wellness**, discusses current safety and wellness programs and makes recommendations to improve program effectiveness; firefighter health, wellness, and ultimately job performance; while reducing the number of work-related injury claims and associated costs. Available information on the costs of existing programs and predicted return on investment for the recommendations made is discussed.

II. ORGANIZATION AND MANAGEMENT

Chapter II discusses the overall organization and management of the Salt Lake City Fire Department (SLCFD). Where appropriate, recommendations are offered to improve the efficiency or effectiveness of the Department.

Overview of Management

The Department uses a traditional basic command structure that is found in other career fire departments in the Southwest (e.g., Phoenix, AZ) and is similar in structure to other metropolitan area departments (e.g., Sacramento, CA).

The SLCFD is currently organized into two divisions, Operations and Support Services/Airport, each headed by a Deputy Chief.

Operations oversees a two-battalion, three-platoon system of fire emergency services, and is also responsible for:

- EMS
- Safety and Wellness
- WMRS
- 911 Communications
- Dispatch
- Records

Support Services oversees six administrative sections:

- Airport Operations
- Fire Prevention
- Investigations
- Training, Apparatus and Special Operations
- Finance, Payroll and Inventory
- Buildings and Grounds

The deputy chiefs report directly to the chief of the department. The chief reports to the Mayor and City Council. He is appointed by the Mayor, as are the two deputy chiefs. The Office of the Chief also has two administrative positions, which report to him. The Administrative Assistant position is staffed by a veteran firefighter and the Emergency Manager/Public Information Officer (PIO) is staffed with a civilian.

The command structure of the SLCFD is generally straightforward and traditional. It is organized as a para-military tiered structure, comprised of divisions battalions and companies, and the managerial levels encompassed in the structure reflect those levels of control.

SLC has a strong Mayor form of government. The Mayor heads the executive branch and has direct control over various city departments including the SLCFD. There is also a seven-member city council that represents seven districts throughout the city and serves as the legislative branch. It exerts considerable influence over the running of the fire department, including its budget. The organizational chart of the Salt Lake City Corporation in relation to the SLCFD is displayed in Figure 2.

Figure 2: Salt Lake City Corporation Organizational Chart
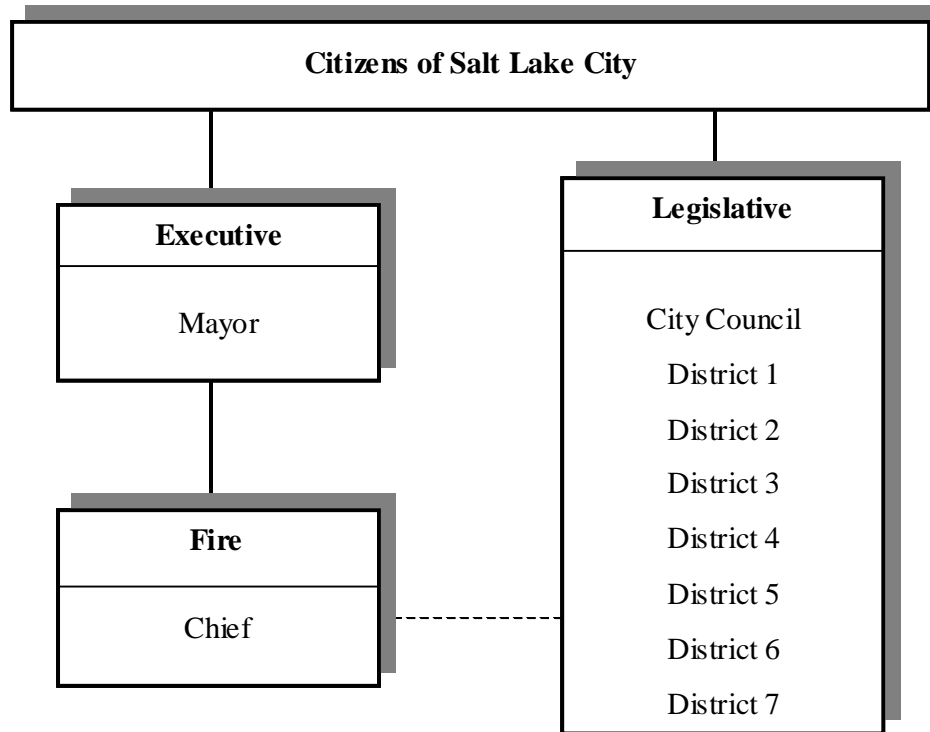
The Fire Department's relationship with the Mayor and IAFF Local 1645 is good. The Chief also has a very good relationship with both the council and the Mayor's office.

From a political and practical standpoint, the Mayor's office has been instrumental in supporting the concept of "four-handed staffing": the practice of running engine and ladder companies with four people. Both the Department and the union are steadfast in their adherence to this concept. They are supported by the Mayor through his issuance of an Executive Order.

This program endorses the use of overtime to meet the "four-handed staffing" goal on a daily basis. While the Executive Order's language is broad, is not codified into a city ordinance or law, nor carries any contractual authority, it does carry a great deal of power in justifying and backing up the union's and Fire Department's insistence on this staffing configuration.

The relationship is not necessarily as politically friendly with the City Council. There is a sense of incredulity on the part of the city council with regard to the overall nature and concept of "four-handed staffing" and the overtime it engenders.

In the process of the city council's budget review of the Fire Department, many questions were asked that reflected curiosity and some lack of understanding about how a fire department is run—all legitimate concerns with regards to city's fiscal health and service to the citizens.

Organizational Culture – The organizational culture of the SLCFD is positive and steeped in tradition. The atmosphere in the department was generally upbeat during the team's site visit and impressed us all. The leadership exhibited by the Chief of the Department was evident and reflected in the way the organization functions. There also seems to be a great deal of respect for him within his staff and the department as a whole.

The lines of communication between the Chief and his uniformed staff, his civilian staff, the city administrator, and other city departments seemed productive and goal oriented. There was a management style of openness and inclusiveness that started with the Chief. The SLCFD Values document/statement embodies what the organization is trying to accomplish. This document provides insight into how the SLCFD is run, and the department follows very closely the attributes cited. The document sets the tone for the atmosphere that exists in the Department.

Decision making in the department appears to be a collaborative process. Based on an aggressive meeting schedule with deputy chiefs, battalion chiefs, and civilian staff, the decision making process is input driven and the Chief seems to listen and be open to that input. There is a problem, however, at times with the implementation of fundamental change. The nexus of the problem lies in the transition of new policy from the executive level to the Battalion Chief level.

The deputy chiefs spend an inordinate amount of time performing functions that are not necessarily appropriate for their level, and could be handled by the battalion chiefs. For instance, the deputy chiefs are concerned about overtime and spend much time managing its implementation. This task that might be better performed by the battalion chiefs that from a more senior management position. Additionally, battalion chiefs are not enough of a part of the management team. They need to be more engaged in planning and other executive processes. One example of management duties in which they could be more involved is progressive discipline.

Recommendation 1: Battalion chiefs should be given more management-related duties and become more engaged in planning and implementing new policies and procedures in the Department. This would free the deputy chiefs to concentrate more on executive decision making, administrative tasks and goal-oriented functions.

Otherwise, the top administrative staff seems to delegate tasks and goal oriented projects well. The demarcation of lines of authority at the administrative level are well drawn. Both uniformed and civilian staff appear to have the latitude to do their jobs and thereby the initiative to complete them with a certain amount of professional pride and freedom to follow them through to completion.

Citizen Expectations – The citizens of Salt Lake City are well served by an effective and efficient fire department. The citizens can be assured of the fact that they have one of the best departments that the TriData team has reviewed. It is important, however, to view the citizens level of expectation and satisfaction with service from different perspectives. The SLCFD and IAFF Local 1645 display a certain hubris regarding how the citizenry views them. In particular, the union cites the public support it generated through its public relations efforts behind "four-handed staffing" and possible station closures. The Fire Department administration also appears to echo this view of citizen support.

However, from a city administration and legislative perspective, there is a more introspective and pragmatic view of citizen support, while still positive. It is their generally held view that the Department is perceived by the citizenry to provide an *appropriate* level of service. The City receives few (if any) glaring complaints from citizens about the Department. There have been occasional rumblings about medical calls taking a long time, but response time data indicates that response times generally are good. EMS response time is often perceived as lacking in many jurisdictions. There are, however, no burning issues surrounding the Department in the public mind.

Mission Statement – The SLCFD has a mission statement that it adheres to and prominently displayed in many of the station areas we visited. The mission statement is as follows:

> To protect life, the involvement and property from events and occurrences that could otherwise have a determinate impact upon *our* quality of life.
>
> Our mission is accomplished through…

- Community Education
- Emergency Response
- Preparation and Planning
- Networking with Other Agencies and Jurisdictions.

In TriData's review of the overall organization management principles of the SLCFD, the team found a sound organizational structure. The department is not top heavy, but it is important that middle management at the battalion chief level becomes more engaged, as discussed earlier.

Internal Organizational Structure

Current Structure – The command structure has 17 senior level positions. Three of the positions are civilians and the remaining 14 are uniformed members who have come up through the SLCFD ranks. The current structure is functional and appears to be running smoothly. The civilian staff works well with the uniformed staff and the functionality and cooperation between the two appears seamless. The organizational chart for the executive staff is shown in Figure 3.

Figure 3: Organizational Chart – Executive Staff
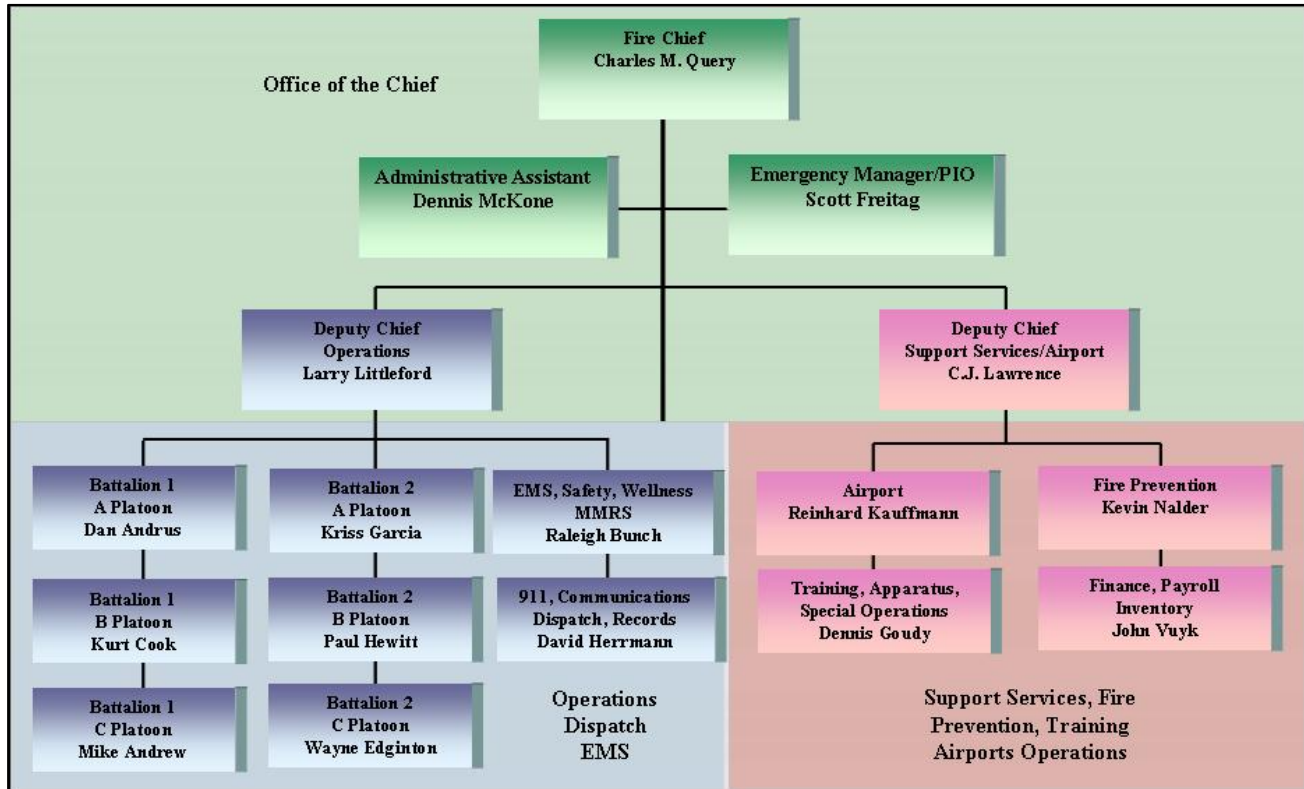
The command staff and span of control for this organization is appropriate. The organization is rightly focused on a proper balance between emergency response and planning. Fiscal accountability is a primary focal point in addition to a genuine concern exhibited by the top people to improve the department. As an organization the SLCFD appears to be aware of its strengths but open to assessment and recommendations with regards to its weaknesses. The layers of administrative control have no glaring problems that need any major changes. There are however some functions that might be better if moved from the Operations division to the Support Services division. These will be discussed later in the chapter.

Executive Experience – One of the characteristics of good leadership is the ability to delegate wisely. The organizational culture fostered by the Chief of the Department is such that

he has a talented people around him that he uses effectively. The combined experience on the executive level staff allows then to negotiate complex issues and undertake effective planning.

The combined experience of the uniform ranks is effectively balanced with a civilian core of managers who head up key components of the executive staff. They are proficient in their areas of expertise and report through the chain of command to the deputy chiefs and the chief. They each manage vital parts of the organization that are removed from the fireground, such as finance, communication, payroll, and records management. The organizational system created by the Department is well constructed to facilitate all of these functions as well as the nuts and bolts of managing the fire service.

Office of the Chief – The Chief's office is two tiered. On one level, there is an Administrative Assistant and Emergency Manager/Public Information Officer. At the next level are the Deputy Chiefs of operations and support services/airport. All of these positions are directly answerable to the Chief and provide him with a viable support mechanism. Under current contract language, none of the positions except the Administrative Assistant are union members. The current chief retired from the Department as a Deputy Chief in 1997 and came back as chief in 2000. He was the consensus choice of the union and the city. The current span of control is four in the immediate office of the Chief. This is quite manageable and the Administrative Assistant position helps even more.

Administrative Assistant – The administrative assistant answers directly to the Chief. The administrative assistant acts in several capacities for the Chief:

- Liaison between City Hall and the SLCFD
- Policy writing and distribution
- Backup duties for the Public Information Officer
- Schedules physicals for firefighters
- Liaison between Concenture and the SCLFD
- Incident command assistant for major fires
- Writes reports on major fires
- Responsible for diversity recruitment
- Facilitates Deputy Chief's needs
- Assists with intake, testing, B-PAT and CPAT, interviews, psychological profiles files, and physical for new recruits
- Administers and assigns light duty policy
- Assists with administration of promotional process
- Works on payroll issues.

He also attends all city council meetings, six times a month. This position is undoubtedly indispensable to the Chief of the Department. It provides the administrative support lacking in so many jurisdictions and contributes to the overall success of the office.

Recommendation 2: Continue to fund and staff the Administrative Assistant position in the Office of the Chief. This position is an excellent administrative organizational tool.

Emergency Manager/Public Information Officer – The Emergency Manager (EM) position is in place to act as an expert and as the liaison with the city's Office of Emergency Management, the Valley-Wide Fire Alliance, Director of the County EOC, and various other agencies in the county and the city.

The EM is also responsible for responding to all media requests and responds to all major incidents for that purpose. Again, this position is a great help to the Chief's office and should be maintained. There is, however, some question regarding the current EM's involvement with the City's Office of Emergency Preparedness and the LEPC.

Deputy Chiefs – The two deputy chiefs under the current organizational structure oversee two divisions – Operations and Support Services/Airport. These are the major divisions reporting to the Chief and the two deputies work closely with him. The working relationship between the Chief and his deputies is positive and productive.

The breakdown of the responsibilities and workload is equitable. However, many of the functions within the divisions of those responsibilities need to be changed and shifted. (See proposed the organizational chart later in this chapter).

Battalion Chiefs – The battalion chiefs play a pivotal role in many aspects of the Department. They run the operations and programs within divisions that are the backbone of the Department. They are essential for the department's success. Six out of the eight primary functions of the SLCFD are overseen by the battalion chiefs, and the deputy chiefs must rely heavily upon them. On the operations side, the battalion chiefs are in control of the two battalions and handle everything from scheduling shifts to incident command.

The battalion chiefs appear to have the proper staff support and span of control required. All of the battalion chiefs who head divisions have one or more captains who administer and manage their respective divisions. (The exception is the Fire Prevention Division, which is discussed in more detail in the Fire Prevention Chapter).

The battalion chiefs are responsible for:

- Strategic planning and organizing
- Leadership and personnel management
- Training and development

- Emergency response and preparedness
- Resource management
- Interagency and community relations

In a broad sense, many of these job description duties are covered in a number of committees that the Department has designated. Many of the committees are labor contract mandated and some are active, while others are not and should be. The list of some committees includes:

- Executive
- Safety
- Apprenticeship
- Technology
- Resource Allocation
- Engineers
- High Rise
- Labor Management
- EMS
- Fitness and Wellness, and
- Compensation

Based on information received during the triage process, operations battalion chiefs are currently not assigned to all specific committees. This is an area where there is a lack of involvement in the management of the Department.

Recommendation 3: Where applicable assign specialty areas within the committee system to all Operations Battalion Chiefs. This move will have the positive effect of getting the Operations Battalion Chiefs more involved in the management of the department.

Proposed Organizational Structure – This department is a well run organization. The structure is sound with the proper mix of management level positions. The span of control is operable and, because of the organizational culture of the department, all involved make the effort to make it work. However, the project team was puzzled by an organizational change that occurred in 2004 in which many of the functions that fell under the purview of Operations were shifted to Support Services and vice-versa.

From an operational standpoint the shifts were not warranted and they seemed to be made based on the experience of the Deputy Chiefs currently heading the divisions. For instance, the Deputy Chief who has recently been promoted to head Support Services was the Battalion Chief who ran the Airport Division prior to the promotion. It seems as though they were switched to provide a certain comfort level that each Deputy Chief had with areas of management with which they were associated. Also, TriData believes that fire prevention is not a support service

and is a primary function of any fire department. Consequently, we propose a title change from D.C. of Support Service to D.C. of Prevention and Support Services.

The following proposed organizational chart reflects a more logical structure. While it may challenge the Deputy Chiefs, it will also round out their professional development skills.

Figure 4: Proposed Organization Chart
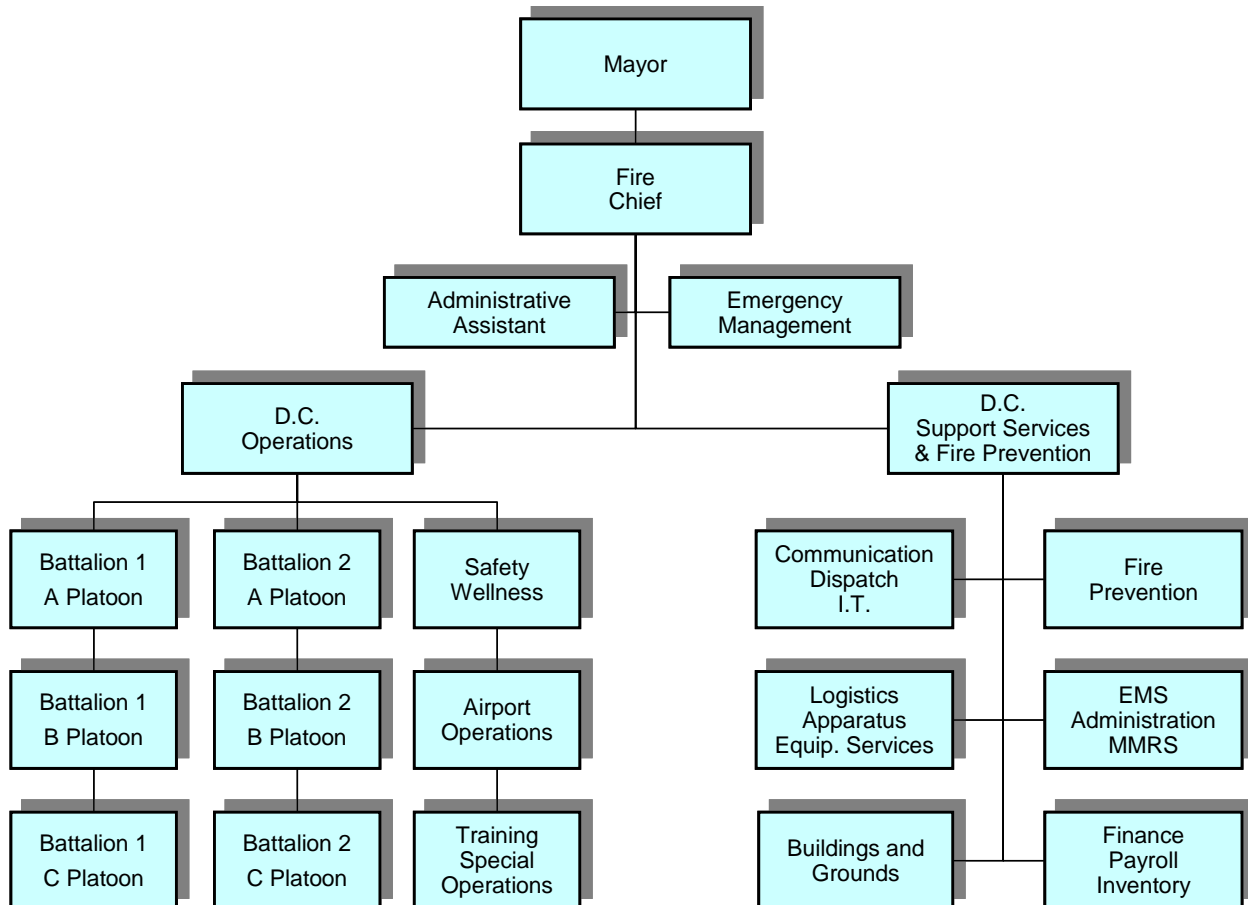
The proposed organizational chart is much like the pre-2004 chart except for some minor modifications in the areas of logistics and Information Technology. One major change is the shifting of Communications and Dispatch to Support Services. TriData believes that changes to an organizational structure can be beneficial to that organization, but in the case of the changes that occurred with the structure in 2004, the changes were more about expediency than efficiency. It will be important for the divisions to continue to work very closely together as they do currently. With the shift of EMS and the Metropolitan Medical Response System (MMRS) back to support services, it is critically important for the coordination of any incident to be the result of training exercises, pre-planning, and cooperation between all city agencies and surrounding mutual aid partners.

Administrative Support – The SLCFD has a total of seven administrative support positions. Four positions are assigned to Administration, handling payroll, personnel, accounts payable and receivable, as well as other general clerical/administrative duties. Two of the seven positions are assigned to the Operations Division and one position is assigned to Fire Prevention. There are five additional administrative positions including a fiscal supervisor, emergency manager director of communications, data administrator, and administrative assistant. Together, these 12 positions make up 3 percent of the Department. This appears lean when considering the amount of paperwork processed by the department (in terms of requisitions, payments, permits, payroll changes, performance reviews, and incident reports). In addition, the details of administering 4 separate compensation packages, the numerous salary adjustments associated with 24-hour shift personnel, and the 27-day cycle for FLSA require more steps in the department payroll process beyond those normally associated with other City departments.

Since the year 2000, four administrative support positions were eliminated. In addition, one position (that of Data Information Administrator) was recently relocated to the City's Information Management Department to assist with the development of a long-range IT improvement plan for the Fire Department. This position is intended to continue working full-time on SLCFD projects, but remains in the IMS Department.

While several employees indicated they had been reclassified a number of times, it was our observation that discrepancies continue to exist. These discrepancies relate not only to the amount of work assigned to each individual, but to the complexity of the tasks and independent judgment required. Several employees indicated that critical projects were routinely accomplished, but there was never enough time to get caught up on filing or planning more efficient ways of organizing processes. In particular, there was a wide variance in the Office Facilitator II positions. The Office Facilitator assigned to Fire Prevention conducts firefighter training, composes test questions, audits incident reports, collects and deposits permit payments, and enters and runs computer reports; the Office Facilitator also works on a number of other independent projects. The use of this position is vastly different from the traditional secretarial functions performed by the Office Facilitator II in the Fire Chief's office. The critical point here is that some members may be expected to perform tasks clearly outside the scope of their job descriptions.

Currently, there is only one administrative support position in Fire Prevention. Several years ago there were two; however, one of these positions was eliminated. The remaining employee not only handles the additional workload, but has taken on numerous other independent projects as well (such as being the department NFIRS Coordinator). To complicate matters, this employee works a flex schedule, coming in at 7:00 A.M. and leaving at 3:30 P.M. or

even 6:30 A.M. to 3 P.M. Because there is no administrative back up, inspectors are required to cover the phones and front desk for two hours each day (10 hours per week), virtually using the equivalent of one-fourth of an inspector for basic receptionist functions. In light of the limited number of inspections that are being accomplished with available fire prevention personnel, the department cannot afford to use inspector time in this way.

Another area that has an extremely heavy workload is payroll. The processing of payroll for a department of 350+ individuals, many of whom are on shift and receive additional pays in each pay cycle, takes 3 to 4 full days of the Payroll Administrator's time. Additional clerical help in this area is sorely needed. Perhaps the SLCFD can hire one 200 series clerical employee who could split time between Fire Prevention and Payroll, providing relief for both positions. If funds are not available, possible use of volunteer personnel should be explored.

Recommendation 4: The SLCFD should consider hiring one additional clerical employee to provide administrative support to Fire Prevention and Payroll. Tasks assigned to this employee would include performing receptionist and phone duty in Fire Prevention, processing inspection permits, and assisting with payroll. The Fire Marshal or Fiscal Supervisor could provide supervision.

Recommendation 5: The City should conduct an administrative support needs assessment to determine the needs of the organization and the best utilization of current staff resources. Job audits should be conducted to determine the appropriate pay and classification for each position.

Redundant processes currently exist in the areas of payroll and staffing. In payroll, information is recorded in three separate places (one of them being a manual log) to track employee leave and pay. This redundancy is due in part to the limitations of the City's payroll software in accommodating the firefighter 27-day cycle. Also, the amount of staff time and resources expended on tracking staffing and overtime is extremely inefficient. Up to four administrative employees contribute to this process. The Battalion Chiefs compile and submit a daily roster; the Administrative Assistant calculates personnel needs, providing for buy-back opportunities and overtime. The Payroll Administrator ensures individuals receive appropriate compensation in their biweekly paychecks. The Fiscal Supervisor and Administrative Assistant compile reports on overtime use in an effort to accurately forecast budget needs. Improved technology would greatly enhance the efficiency of this operation. In fact, one of the high priorities of the newly formed Information Management Committee should be the exploration of software packages that will automate this process and integrate it into existing payroll systems. Streamlining manual or redundant processes will go a long way toward reducing the workload of several administrative positions.

Recommendation 6: The City should prioritize technological improvements needed to eliminate streamline redundant or manual processes, and free up staff resources for other critical projects. Consideration should be given to software programs that address the unique characteristics of the firefighter shift schedule, the 27-day cycle, and its implication on FLSA requirements, as well as any additional payments (buy-backs and step-up pays) identified in their wages and benefits agreement.

One area where the Department is particularly weak is in analyzing its performance. Although performance measures have been established for each section of the Department, very few individuals review or understand them. Without an integrated records management system, the Department has had difficulty obtaining detailed information on emergency incidents, inspections, and other activities performed by its personnel. If quality and efficiency are indeed established goals of the SLCFD, then analyzing service performance is key to reaching those goals. Our interviews confirmed there is very little in-house expertise related to data analysis and performance measurement. It is our understanding the Department previously had a Research Analyst position, but it was eliminated in 2000. This position could greatly enhance the department by compiling detailed information on the emergency workload and activities of the other sections of the Department. At the very least, existing personnel will need to receive training in order to extract information from databases and accurately present these once technological improvements are made.

Recommendation 7: The City should consider reinstating the position of Research Analyst in the SLCFD in order to monitor activities of the Department and analyze service performance. The Research Analyst should be a civilian position with specific background in statistical methods, research methodology, data analysis, report writing, and GIS. In addition, this individual could be utilized in researching and preparing grant applications and compiling monthly, quarterly, and yearly reports. Ongoing review of emergency incident data should include response time performance (divided into small response districts), workload by unit and station, types of calls, as well as effectiveness measures such as "percent of fires kept to the room of origin." This type of analysis should be a major consideration when proposing staffing and deployment changes.

Without exception, administrative support employees indicated they are well informed and included in departmental issues. Personnel are extremely knowledgeable of their job duties and can function with a great deal of independence. While there have been several personality clashes in the past, employees indicated that most of those issues have been resolved and key staff get along fairly well.

There appears to be little opportunity for career advancement unless personnel are willing to transfer outside of the Fire Department. This is typical of paramilitary organizations, but can be addressed if the organization is willing to look at civilianizing other non-operational functions such as fire prevention and communications. In Salt Lake City, there are several civilians in fire

prevention, but there is little chance for advancement. Up to this point, suppression personnel have been promoted into supervisory positions. Creating civilian positions allows the department to hire employees with unique skill sets (often at a lower cost than uniformed personnel); providing a promotional ladder will assist in retaining these skills.

Recommendation 8: The SLCFD should consider creating or reclassifying additional civilian positions in order to provide professional development opportunities for its personnel. Various alternatives can be utilized in administration, communications, and fire prevention. In administration, individuals who become proficient in specific database software might move up to an information specialist position. Fire prevention offers a number of opportunities to stratify the work force, dependent on certification and experience. An entry-level position might be an Inspector I, conducting routine fire safety inspections on existing occupancies. An Inspector II might require specialty classes in public education, arson investigation, or juvenile firesetting. The point is to reward employees for continuing their education throughout their careers.

Budget and Finance

Financial Outlook – The City prepares an annual budget that includes a budget forecast and anticipated revenue projections from all funding sources. While property tax revenue increased steadily from 1992 until 2003, the slowing economy has impacted local construction so that revenue from property tax is not expected to climb in the near future. Likewise, sales tax revenue is expected to decline while franchise fees are expected to grow, due in part to fees charged to the telecommunications industry. The City Council has not increased taxes in 15 years, even during the 1990s when tax revenue was increasing.

Salt Lake City's financial and budgeting practices follow generally accepted accounting practices. Fund balance is maintained, according to Utah State Statute, between 5 percent and 18 percent of total estimated revenue (and typically at about 10-11 percent). Their current fund balance is $21M, but retiree payouts are projected to cost $13M. One-time funding of ongoing programs is avoided and alternative revenue sources are ambitiously sought to minimize the burden on the tax base. The City meets the statutory debt limitation of 4 percent of its taxable value, and has a bond rating of "Aaa/AAA."

General Fund – The General Fund accounts for the normal activities of the City, including such services as police and fire. The fiscal year (FY) 2003–2004 General Fund for Salt Lake City amounted to $165,087,081. Property taxes are the predominant source of revenue, providing 37 percent of the general fund dollars. Together, taxes (ad valorem, sales, and franchise) provide approximately 77 percent of the total General Fund revenue.

The SLCFD approved budget for FY04 was $26.9M. This represents a 1 percent increase over the amount budgeted in FY02 (with FY03 experiencing a budget cut of approximately 1 percent). Only two other City departments experienced an increase during this period, the City

Attorney's Office and the Public Services Department. It would appear that while the City Council is determined to hold the line on taxes and spend taxpayers' dollars prudently, it does recognize and support the Salt Lake City Fire Department.

Capital Budget – The annual Capital Fund includes infrastructure projects that have been approved by the City Council, based on the 6-year Capital Improvement Plan and 20-Year Inventory of Capital Needs. The adopted budget for FY03–04 includes $28.3M in Capital Project costs. It should be noted that capital equipment is not included in this budget, but is part of the fire department's capital. Table 4 shows those items earmarked for the Fire Department in the FY03–04 Capital Budget.

Table 4: Salt Lake City Fire Department FY04 Capital Improvement Program

Name	Description	FY04 Budget
Police/Fire 800 Trunked Radio System	Lease purchase radio equipment for police and fire	$540,794
Police/Fire 800 Tower Repeater System	Lease purchase for the tower repeaters associated with the 800 trunked radio system	$61,717
Impact Fee Projects	Construct various police fire, park and street capital improvement projects identified in the Impact Fee analysis, Capital Facilities Plan	$425,000

The 2005 capital budget request includes a training facility, new fire station (15) in the southwest quadrant of the City, improvements to five existing fire stations and a new air compressor. Station 15 and the training facility are slated to receive funds from the impact fees.

The City has established a CIP Planning Committee, with representation from all City departments, to review and prioritize all the capital needs of the City. These recommendations are then submitted to a citizen board that approves the recommendations prior to being presented to the City Council for adoption. This process is regarded as fair and comprehensive.

Fire Department Budget – The Fire Chief, two Deputy Chiefs, and the Fiscal Supervisor are the primary developers of the annual budget. The Department's FY04 approved budget was $26.9M. The past few years have been very tight and the Department has been asked to submit budget cuts to meet the City's goal not to increase taxes. Funding has remained relatively consistent in spite of the financial challenges. Revenue sources generated by the SLCFD include approximately $600,000 in Paramedic Ride-Along Fees (charged to the private ambulance companies), $3.2M for crash fire rescue services at the Airport, and $174,000 for licenses and permits. The capital account that funds station improvements and repairs as well as capital operating equipment was only budgeted at $131,000 in FY04, which is extremely low.

Table 5 identifies a number of grants that have been awarded to the SLCFD in recent years, providing additional revenue for Department projects.

Table 5: Salt Lake City Fire Department Grants

Grant	Amount
Annual State EMS Grant – for Paramedic training, medical supplies and pharmaceuticals	$50,000
DHS, Weapons of Mass Destruction (3 years) Metro Medical Response System, to fund consultant for valley-wide response plan, training and supplies	$400,000 $200,000 $380,000
Fire Act Grant – TPASS System	$100,000
Fire Act Grant – Fire Prevention (Risk Watch)	$50,000
Total	**$1,180,000**

Department Financial Procedures – The SLCFD has a civilian Fiscal Supervisor to coordinate all budget and financial processes for the department. He has been with the department six years. Three employees work under his direction handling tasks related to purchasing, accounts payable, accounts receivable, and payroll. These employees interact with City counterparts in the Finance and Budget Departments and follow established City procedures. They are well versed in their job duties and utilize the City's IFAS software system for tracking purchases and other transactions.

The payroll process is cumbersome, due to the fact that the City's software does not handle the firefighter schedule and additional payments for step-up or overtime. This incompatibility extends the time it takes to process payroll to three or four days each biweekly pay period. The recent agreement with the City's Information Management Department to assist in the implementation of an IT improvement plan will hopefully remedy this. Any software purchases that address the staffing/roster/overtime/payroll issues also need to integrate with the City's payroll. In developing an action plan, a priority should be placed on those programs that will eliminate redundant, manual payroll records, and provide a greater ability to extract information for internal analysis. The Deputy Chief of Operations along with the Fiscal Supervisor explored the use of outside staffing management contractors such as Telestaff and found them to be too expensive given the budgetary constraints facing the department.

Recommendation 9: The City Council should give priority and funding to an improvement to the payroll system that will also address the need to track staffing of personnel on emergency units and that will integrate with the City's approved payroll system. The software would streamline current staffing/payroll processes, eliminate redundant, manual records, and provide the ability to extract information for internal analysis. This issue has come before the City in the past, but has yet to be funded.

Overtime – Of critical concern to the City council is the increasing costs for overtime. During FY03, the SLCFD spent $1.4M on overtime, and had reached $1.1M this fiscal year (as of October 2004). There are a number of issues that lead to the use of overtime, but the major causes are minimum staffing requirements, the 56-hour workweek, use of sick leave, and a low staffing coverage factor. There are a few alternatives the council might consider that could control the increasing costs for overtime; however, the City should be aware that there always would (and should) be some amount of overtime for the provision of emergency services. (No overtime would mean there were excess of personnel at some times.) While the Operations Division uses the majority of overtime to provide firefighters, EMTs, paramedics and captains on the emergency apparatus, other sections of the department utilize overtime as well. The Dispatch Center utilizes overtime to maintain an adequate staff of dispatchers in the 9-1-1 Center. The Fire Prevention Division pays overtime when an investigator is called out to respond to a fire after hours. The Training Division may use overtime by using off-duty firefighters as instructors, and there can be occasional use of overtime for administrative and other personnel to complete priority projects. Table 6 depicts the amount of overtime budgeted for each division in FY04.

Table 6: SLCFD Budgeted Overtime by Division, FY04

Division	Overtime Budget
Operations	$375,024
Airport	$121,200
Dispatch	$73,200
Investigations	$20,520
Chief's Office	$5,700
Medical Division	$2,280
Training	$1,140
Comm/Technology	$900
Total	**$ 599,964**

Fair Labor Standards Act – One major reason overtime is used is due to the firefighters' 56-hour workweek. First of all, calling it a 56-hour workweek is really a misnomer because, in fact, no firefighter actually works 56 hours in a week. This is an average over a 27-day cycle. Using the three-platoon system, each firefighter is scheduled to work three 24-hour shifts two weeks (72 hours), two 24-hour shifts one week (48 hours); and one 24-hour shift the last week. In a 27-day cycle, each platoon will be scheduled to work nine 24-hour shifts for a total of 216 hours. The Fair Labor Standards Act stipulates that 212 hours is the maximum amount of hours that can be considered as regular work, and anything over that must be paid in overtime. Thus, as a result of the workweek, each firefighter is eligible for overtime at time-and-a-half at least once during the month for four hours (the difference between the 216 hours scheduled and the 212 hour maximum allowed). If the employee takes vacation or sick leave and

does not actually work more than the 212-hour maximum, they are not eligible for FLSA overtime during that period.

It should also be noted that a ruling by the FLSA in August 2004 stipulated that Battalion Chiefs were also covered under the FLSA regulations and should be paid overtime. The department estimates this will cost an additional $160,000 per year. However, the City Attorney's Office has ruled, and the Mayor has stated, that the Battalion Chiefs are exempt employees due to their job descriptions; thus, there are no additional overtime costs.

Adjustments to the work schedule could reduce overall overtime costs. Some fire departments have also reduced the firefighter's work schedule to a 52-hour workweek, virtually eliminating the FLSA overtime altogether. However, the department would need to hire additional personnel (thereby increasing its staffing coverage factor) to maintain minimum staffing levels, and this would probably be a more expensive alternative.

Recommendation 10: The SLCFD should explore alternate work schedules that could reduce the reliance on overtime. But some overtime is more effective than carrying enough personnel to always be able to fill in for absences or to do extra tasks.

Daily Minimum Staffing – Whether to staff three or four people on each engine is a nationally debated question; regardless, overtime will still be required to maintain staffing at whatever minimum level is established. The SLCFD currently has a daily minimum staffing of 79, as listed in Table 7.

Table 7: SLCFD Daily Staffing Requirements

Type of Unit	No. of Units	Minimum Staffing	Total
Engines (BLS or ALS)	13	4 each	52
Ladder Trucks	2	4 each	8
Hazardous Materials Unit	1	4 each	4
Heavy Rescue Unit	1	4 each	4
EMS Units	2	2 each	4
Airport Crash/Rescue	5	1 each	5
Battalion Chief	2	1 each	2
Total			**79**

Whenever someone who is normally scheduled to work takes leave (i.e., sick, vacation, holiday, personal leave, injury leave, long-term disability, bereavement, military leave, jury duty), the department hires back off-duty personnel to ensure these 79 slots are staffed. Because of the FLSA standards, if this extra time falls during the pay period when the overtime employee has already worked the maximum allowed hours, this time is paid at time-and a half. As a result, the Department maintains two lists for calling back personnel. The first list identifies those

employees who have not yet worked the maximum FLSA hours (providing the cheaper straight-time labor); the second identifies those who have worked the maximum (requiring the more expensive overtime rate).

Three remedies might be considered in order to reduce the dependence on overtime for providing daily minimum staffing. One is establishing an adequate staffing coverage factor, thereby hiring enough full-time personnel to cover the amount of leave taken. A discussion of calculating staffing factors appears later in this report. A second remedy might be to establish a smaller number of people allowed off each day on scheduled leave. An analysis of all types of leave would be required to better understand the impact each has on overtime. Essentially, if each shift has 99 people assigned and minimum staffing is 79, only 20 people can be off for any reason before overtime is required.

Recommendation 11: The SLCFD should identify current trends in leave use, including vacation, sick, injury leave, FMLA, and personal time, to determine the amount of full-time equivalent hours being expended on leave. The sum of minimum staffing plus FTE leave hours subtracted from the number of people assigned per shift will determine the maximum number of people that can be allowed off on scheduled leave without incurring overtime.

No. of people assigned per shift (e.g. 99)	−	Minimum staffing (e.g. 79)	=	Maximum allowed off on scheduled leave (e.g. 20)

The other relevant issue is the use of sick time. The use of sick time due to illness and injury can greatly impact overtime costs, although it is recognized that most benefits related to leave and holidays have already been agreed upon in the Memorandum of Understanding with IAFF Local 1645, and would require renegotiation. Because of this, many departments have implemented initiatives and incentives that would reduce the amount of sick leave taken by their current personnel. These initiatives might include safety and wellness programs targeted at injury prevention and healthy lifestyle changes or incentives, usually in the form of financial compensation, for employees who do not use sick leave.

Recommendation 12: The City should consider initiatives and programs that will aid in the reduction of sick leave usage within the SLCFD. Health and wellness programs that address lifestyle changes can have a positive affect on sick leave use. In addition, injury prevention education and implementing other safety practices can reduce the occurrence and severity of on-the-job injuries. Any financial compensation less than what is currently being paid out in overtime costs could be considered a savings. A collaborative solution will be required between management and the union to ultimately affect the bottom line.

Analyzing the workload and service demand may also prove helpful in validating whether the minimum staffing level is appropriately established at 79 per shift. There are a number of different scenarios that could adequately address service needs utilizing fewer personnel without jeopardizing firefighter safety. For example, the personnel at multi-company

stations could be reduced to seven (rather than eight), and either respond as a task force to specific high hazard incidents or, with the purchase of a Quint, provide multiple services from a combined engine/ladder company configuration.

Another compromise could be to implement the minimum staffing requirement in the peak daytime hours only, reducing overtime to twelve-hour shifts. This not only has the benefit of matching the greater demand level with the higher staffing level, but it could also address a potential safety problem of firefighter alertness. Currently, there is no limit to the number of hours an employee can work consecutively without having time off to rest.

Other Contractual Obligations – The Memorandum of Understanding with IAFF Local 1645 include other benefits that can impact overtime costs. These include compensation for temporarily working out of class, being in-charge, or held over at the end of a shift. A review of these costs should be conducted to determine if there are alternative strategies that could reduce or limit the City's exposure. Even changing the compensation to a flat amount (rather than an hourly rate) would assist the City in better identifying and forecasting the cost of these benefits. As compensation and benefits are reviewed and renegotiated, some consideration should also be given to the staff resources required to adequately monitor and administer the benefits package.

Recommendation 13: The City should review all pay and benefits to determine their impact on overtime. Alternatives such as flat rate compensation should be considered that would be easier to administer and allow for better cost/benefit analysis and forecasting.

Vacation Buy-Backs – One tool the SLCFD has been utilizing which has caused some discussion within the City has been the buying back of unused vacation time to cover staffing requirements. This will benefit the City by reducing the cost of future retiree payouts if the vacation time is carried until the employee terminates.

Investigator Call Back – Fire prevention personnel work a regular Monday through Friday, 40-hour workweek; however, they are required to be on stand-by in the event of a fire. If there is a fire after hours or on weekends, a stand-by investigator is called back on overtime to investigate the cause and origin. They receive one-hour pay for each day on stand-by, but time-and-a-half (with a minimum of four hours) if actually called out to an emergency scene.

One way to reduce the need for an investigator is to provide more intensive training to operations personnel on the basis of determining the cause and origin of fires as well as completing all necessary reports. An investigator should still respond on suspicious fires, because it is important to interview witnesses immediately to improve chances of making an arrest. Still, there are a number of fires where the cause is easily determined, such as most accidental cooking fires. In these cases, the officer on scene could handle the immediate tasks,

and an investigator could follow-up later while on regular duty. This would likely provide only a minimal savings to the department.

Recommendation 14: The SLCFD should assign some basic cause and origin investigation to company officers, which is the norm in many fire departments. Training priority should be given to assist firefighters and company officers in conducting preliminary investigations, identifying cause and origin of fires, and maintaining the chain of evidence. Investigators should still be called out for possible arson and suspicious fires, or when there is a fire death. There are a large number of clear-cut cases with minimal damage that can be handled by shift personnel.

National Fire Academy (NFA) courses are available, including arson detection for first responders (two days), courtroom preparation and testimony for first responders (two days), juvenile fire setter I and II (two days), and fire cause determination for company officers (two weeks).

Dispatch Center – The 911 Dispatch Center also functions with a minimum staffing requirement. Dispatchers work 40 hours per week, in 12-hour shifts. While the financial impact is much smaller, the concept of staffing coverage is the same as in Operations. In order to staff the center continuously, the City must either employ enough dispatchers to handle those positions (including coverage for personnel leave) or pay overtime. Leave use in the Dispatch Center should also be analyzed, as this is typically an area that suffers from high burnout. If the analysis identifies high sick leave use or other trends, ideas can be solicited from dispatch personnel that would improve working conditions or job satisfaction. A staffing coverage factor should be developed for the Dispatch Center to ensure adequate dispatchers are hired to fill the minimum staffing requirements as well as provide for coverage.

Recommendation 15: An analysis of the leave usage in the Dispatch Center should be conducted to determine if there are issues related to working conditions or job satisfaction that need to be addressed. A staffing factor should be developed from this analysis that will ensure adequate hiring of employees to meet minimum staffing on a daily basis.

Special Events – The SLCFD typically staffs special events throughout the City with a bike patrol. The bike patrol provides on-site emergency medical service during a street festival or other event where large numbers of citizens are expected. On-site EMS not only provides quicker, easier access to incidents occurring at the event, but also does not have a negative impact on the service delivery system to the rest of the City. The bike patrol is staffed using off-duty personnel on overtime. During FY03, the bike patrol was utilized 5,032 hours for special events. Although an exact figure could not be obtained, the approximate cost of providing this service is estimated at $111,000 annually, and is a contributing factor to the increasing overtime costs. While there is a City ordinance providing for cost recovery of on-site EMS service, it is

not reflected in the SLCFD budget nor is it allocated to the department to defray expenses of the bike patrol.

   Recommendation 16: The City may wish to consider allocating the revenue from special events coverage back to the EMS Division to offset the cost of the bike patrol. This is one way the Department can identify the true cost of providing this service.

Long-Range Planning

   The City has implemented a strategic planning process that ties organizational goals and objectives to performance measures, and ultimately to the mission of the agency. The City has identified eight focus areas for its long-range goals:

- Responsive government;
- Resource management;
- Public safety;
- Quality of life;
- Community building/diversity;
- Revitalization;
- Transportation; and
- Economic development.

   Each of these is to be reviewed from four different perspectives: customer service, financial health, efficiency/effectiveness, and workforce quality. This framework is what the City calls its *2003–2007 Balanced Scorecard.*

   To support these City initiatives, the SLCFD has created a business plan that outlines what efforts it will take to help the City accomplish its goals. Each objective is measured on a quarterly basis, with target performance identified through the year 2010. Some of the Department's objectives contained in this plan are too easily attainable. An example of this is their objective to maintain a turnover rate fewer than 10 percent per year (when actual data indicates a fairly stable 3.9 percent turnover rate). Other objectives, however, will prove challenging to the Department. Most notable of these is the objective to increase the percentage of minority employees hired each year. The current complement has 15 percent minority representation (including all females, in both traditional and non-traditional positions). While this meets the goal for 2004, the goal increases to 17 percent by the year 2006. As discussed under the Human Resources section of this chapter, it is not anticipated the Department will meet this goal in the next two years, given the fact that the entry-level exam has already been given, each list is effective for two years, and there are very few minorities on the eligibility list.

   Recommendation 17: The SLCFD should develop goals and objectives that are reasonable and measurable. Target performance should stretch the organization (i.e., it should exceed current performance and be something the organization can work toward). Action plans

and processes need to be implemented that support the objectives so that performance can improve or efficiencies can be gained.

While the strategic planning process (particularly the Balanced Score Card program) may be new to the SLCFD, it is a bit disturbing that most members interviewed had no idea what the goals and objectives of the organization were. Communicating the goals of the department, and identifying the contribution each employee can make to the successful attainment of those goals, is a key component of the strategic planning process. The Department should be developed based on a broad range of input from employees and union leadership. Once established, the Department should seek additional ways to disseminate this information to its personnel.

Recommendation 18: The SLCFD should regularly communicate with its personnel on issues of relevance to the Department. Established goals, objectives, and actual performance should be developed with a broad range of input from the organization, and be communicated on a regular basis. Newsletters and memoranda can be used, but a portion of regular staff meeting agendas should also include an update on the status of the department's goals.

Performance Metrics

The Department's performance measures are clear and comprehensive. The measures not only relate to workload (what they do), but to effectiveness and efficiency as well (how well they do it). As technological improvements are made and an integrated records management system is implemented, the Department should consider adding measures that address outcomes as well. Examples of outcome measures might include:

- Percentage of fires contained to the room of origin;
- Number of cardiac patients saved;
- Percentage of violations corrected;
- Percentage reduction in firefighter injuries (and injury rate per 100 firefighters).

The monitoring of performance is intended to display how well the Department is providing services in addition to identifying areas needing improvement. Measures should relate to the goals of the organization (and the City), and provide valuable information for the management of the Department. If the information gathered is not utilized to develop more effective internal methods, it becomes a meaningless process. Therefore, action plans should be developed that focus on what it will take to improve the performance or outcome.

Internal Communications

Communication within the department predominantly follows the traditional chain of command. Information is disseminated through a variety of methods, depending on the importance and timeliness of the issue.

The Fire Chief holds monthly staff meetings with the Deputy Chiefs and Battalion Chiefs, and a separate monthly meeting with administrative staff. He holds quarterly meetings with the Captains who also regularly meet with their respective Battalion Chiefs.

Policies, procedures, and important correspondence are posted to the Department Intranet as well as sent out in hard copy to the fire stations twice a week with all other mail delivery. The Administrative Assistant to the Fire Chief normally drafts the policies, and there is a 30-day review period before they become effective. The Battalion Chiefs, Deputy Chiefs, and the union can provide input during that time.

E-mail has become the primary source of communication throughout the Department. This works particularly well for a decentralized organization where there are many work locations and shifts. Each member of the Department has his/her own e-mail account with the City and can access departmental and City information on the Intranet. These sites have some useful information, but could be expanded in the areas of safety, training, and fire prevention. Valuable safety information and alerts can be posted to the Department site for ready access by emergency responders. Fire prevention lesson plans and teaching tips could be posted to the site as well. Because the Department has such a limited training staff, the Intranet can be invaluable in providing additional continuing education online, reducing the need to take units out of service for training classes.

Vertical communication seems to work well, formally through the chain of command and informally through staff meetings, discussions, e-mails, and an open door policy. Unfortunately, horizontal communication between divisions is extremely limited.

Recommendation 19: SLCFD should explore methods for regular interaction between divisions. These programs can include joint training or sharing of inspection and education responsibilities in order to keep abreast of changes in occupancies, population, and infrastructure being protected by the SLCFD.

The morale in the Department appears to be good, although numerous employees expressed frustration about continuous budget cuts. Several different suggestions were made as to where additional funding needed to go. Most felt that training needed more instructors. Some felt apparatus and facilities needed improvement, and still others wanted more operational supplies. The general feeling conveyed was one of disheartenment. The employees want to do a good job, with the best equipment, and provide good customer service, but they feel they have been "stripped to the bone." Without exception, all personnel felt that the four-person staffing was critical for safety reasons and for compliance with NFPA 1710.

The Fire Chief is very well liked and personnel at virtually all levels felt he was open to input and new ideas. There were no concerns expressed during our visits regarding the management of the Department.

Human Resource Management

The SLCFD employs 351 personnel, 83 percent of whom are direct-line operational staff. Combat (shift) personnel work a 56-hour workweek (24 on/24 off; 24 on/24 off; 24 on then 4 days off). Day personnel work a 40-hour workweek that can be worked as either four 10-hour days or five 8-hour days, with starting times fairly flexible. Table 8 lists a breakdown of positions by division:

Table 8: Breakdown of Personnel, by Division

Division	Number of Personnel	Percentage
Operations (Battalion Chief, Captain, Firefighter Paramedic)	293	83.5%
Prevention	14	4.0%
Dispatch	18	5.1%
Training/Special Operations	9	2.6%
Administration (clerical, finance and Chiefs at headquarters)	17	4.8%
Total	**351**	**100.0%**

Wages – The entry-level operational position is a firefighter, who makes $33,192 per year. Specialist assignments such as ARFF, hazardous materials, inspections, investigations, or driver engineer are classified together at a pay rate that is seven percent higher than that of firefighter. A Paramedic classification is 10 percent higher than an entry-level firefighter. There are thirteen steps in each of these classifications, ensuring incremental increases over a 20-year period. This step plan is a bit atypical in the number of steps and the span of time to reach maximum in grade. In our experience, step plans typically range from 5-10 steps, reaching maximum pay grade status by the tenth year of employment.

The 2004-2007 Memorandum of Understanding between Salt Lake City and IAFF Local 1645 indicates a topped out firefighter with twenty years would make $53,580; a specialist would make $57,336 and a Paramedic with twenty years would make $59,472. In comparison to other similar-sized departments, the SLCFD pays $5,000 lower than the average starting salary, but slightly higher than average in the topped-out ranges.[8] According to representatives of the SLCFD, the lower starting salary has impacted their recruiting efforts. The statistics, however, show thus. While they may have lost a few candidates (or even some incumbents) to other

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[8] ICMA Municipal Year Book 2003, Table 3/17, Fire Department Personnel, Salaries and Expenditures, pages 156-157, International City Management Association, Washington, D.C., 2003.

higher-paying departments, the SLCFD still received approximately 900 applications during the last hiring process. In fact, applicants who scored below 83 percent on the written test were advised they would probably not be called for an interview over the 2-year eligibility list, as there were nearly 200 candidates ahead of them.

There are four separate pay plans governing the employees of the SLCFD. The Memorandum of Understanding with IAFF Local 1645 covers benefits for firefighters, specialists, and paramedics (called 400 series employees). A separate plan covers wages and benefits for Captains and Battalion Chiefs (called 900 series employees). Although they are also dues-paying union members, they are not represented by Local 1645 as it relates to wages, benefits or discipline. Civilian employees are covered under a compensation plan for 300 and 600 series employees. The Fiscal Supervisor, Emergency Manager/PIO, and Communications Manager fall in this category (600 series) as well as the Office Facilitators, Dispatch Supervisors, Database Administrator, and Payroll Administrator (300 series). The remaining clerical employees and dispatchers (200 series employees) are covered under a fourth compensation plan, which is outlined in a memorandum of understanding with Local 1004, a local chapter of the American Federation of State, County and Municipal Employees (AFL-CIO).

Benefits – All City employees receive 12 holidays and 15 sick or personal days a year. Vacation is earned at different rates, depending on the length of service, from 5 shifts (or 10 days) for 1 to 3 years of service to a maximum of 12.5 shifts (or 25 days) for over 20 years of service. The City also offers health insurance, life insurance, optional long-term disability and dental insurance, tuition reimbursement, step or longevity increases, and injury leave (worker's compensation). Unused sick leave accruals can be converted, up to 80 hours per year, for vacation, personal leave, or educational leave. Upon termination, an employee may receive compensation for a portion of unused sick leave (Plan A employees hired prior to 1997).

Family health insurance coverage costs employees $80–$90 per pay period, and single coverage is at no cost to the employee. The City contributes $230 biweekly toward the health program on behalf of each employee.

Additional benefits provided to firefighters, Captains and Battalion Chiefs include call-back pay, stand-by pay, temporary assignment pay, and a uniform allowance ($475/year). In addition, in 2002, an agreement was made (through an executive order) to create a vacation/holiday time buy-back program in order to assist the Department in staffing all its operational units with four personnel. These converted hours could be paid at time-and-a-half if the employee's work hours exceeded that of the FLSA standards in any given 27-day cycle. This issue is discussed in more detail later in this section as it relates to overtime costs.

Retirement – During the site visit, concerns were raised related to retirement from a number of levels (both inside and outside the SLCFD). Employees expressed concern about the high cost of health insurance, particularly upon retirement, as the retiree is then responsible for the entire premium. The City voiced some frustration about the late notification employees provided when they retired and the liability the retiree payouts create. Currently, the City has made it a policy to budget 18 percent ($20 million) in contingency (higher than the required 10 percent) because they are not able to adequately project the amount that will be needed each year for retiree payouts of unused sick, vacation and holiday time. Of the Department's 351 employees, 85 (24 percent,) have 25 years of service or more. While all of these employees would not leave the same year, it does represent a substantial financial commitment that must be taken into consideration when projecting future budget needs.

From our interviews, it appears there are two primary causes for late notices of retirement plans. First, many employees struggle with the decision of when to retire and what they are going to do after they retire from the Fire Department (i.e., continue working somewhere else, relocate, etc.). Often, they have not developed a long-term plan themselves, and ultimately make a quick decision and "just do it." Secondly, the high cost of insurance translates into employees staying employed as long as possible, primarily just to have adequate medical coverage. Essentially, no one interviewed felt it was due to a fear of being ostracized once the employee announced his or her retirement. Perhaps one or two individuals who were applying for jobs in other local fire departments may have wanted to withhold the information until they were sure they had secured the new job; however, that has not been the norm.

The City would do well to provide pre-retirement planning sessions and counseling in order to help employees consider the financial and emotional factors of retiring which could assist them in making a decision. One suggestion was to implement a DROP (Deferred Retirement Option Program) similar to that of several other states that effectively "caps" the time the employee can remain employed. The current City policy only requires employees to provide a 14-day notice of separation. This should probably be extended. Incentives could also be implemented that phase in the reimbursement of unused leave balances based on the notification time. For example, a one-year notice might give an employee the option to be paid for 75 percent of his or her sick leave balance; 50 percent for six months' notice, and 25 percent for three months or less. At any rate, 14 days makes it impossible for the City to plan for retirement payouts and causes an undue burden on the Department, ultimately causing overtime while the position is being filled. Of course any change on benefits would need to be negotiated with each employee group in their associated memorandums of understanding.

Recommendation 20: The City should provide pre-retirement planning sessions and counseling to assist employees in making this decision. Planning sessions should include both financial considerations (estimating retirement benefits, financial needs, and insurance costs) as well as emotional factors associated with this drastic lifestyle change.

Recommendation 21: An incentive program should be considered that would provide the City with a longer lead time for planning and budgeting payouts of retirees. This might include a survey of employees to determine what incentives would be most desirable and could include such items as increased sick leave payouts for extended notification, implementation of a DROP plan, or partial contribution of retirees' health insurance premiums.

Recommendation 22: The City should require a longer notification period for individuals desiring to retire. The current short notification negatively impacts the City in a number of ways. First, it does not provide ample time for the City to plan and budget for the unusually large retirement payouts experienced with high-risk personnel. Secondly, the department must promote, hire, or conduct a training academy to replace the retired individual, creating a need to pay overtime during that hiring/training process in order to meet minimum staffing requirements.

Diversity – One of the Mayor's goals is to increase the diversity of the work force. In line with that City goal, the SLCFD established a performance objective to increase its diversity to an amount greater than 16 percent by 2004. Currently, seven percent of the employees are minorities (Hispanics, African Americans, Native Americans, Asian, Pacific Islanders and American Indians). The City's population as a whole is comprised of 25.6 percent minorities. It is unlikely the department will meet this goal as the firefighter register has already been established and very few minorities made the eligibility list. Table 9 specifically shows the breakdown by race in the Operations Division, compared to the county's population as a whole. The Operations Division has been isolated as it represents the area where the greatest number of positions are hired.

Table 9: Employee Diversity

Race/Ethnic Origin	Number of Current Employees	Percentage of Operations Employees	City's Population
Hispanic	*8	3.0%	18.8%
African American	3	1.0%	1.9%
Native American	2	0.5%	1.3%
Asian	1	0.5%	3.6%
Women	*6	2.0%	49.0%
Sub-Total (All Minorities)	***20**	**7.0%**	
Caucasian	270	**93.0%**	79.2%
TOTAL (Operations)	***290**		

*One Hispanic female is counted twice; the actual total number of Operations personnel equals 289

To increase the representation of minorities in the Department, it will take a concerted, sustained effort. SLCFD has already developed a good rapport with the media, regularly appearing in the local newspapers or television. A public relations program could be developed that presents the Department in a positive light as an employer that cares about its workforce. Also, training one or two minority employees as Public Information Officers can demonstrate to the public that minority members already succeed in the Department. Utilizing a female and Hispanic in this role will target the largest percentage of under-represented minorities available in the local labor market.

Recommendation 23: The SLCFD should develop a public relations program that includes minority representation. It should present a consistent, sustained message that presents the firefighter's job in a positive light and the Department as having an atmosphere of inclusion. Use department members in the Public Information Officer role who are representative of the larger target populations (Hispanic and/or female). The media can be very helpful in the attainment of this goal, considering the good working relationship that already exists.

Recruiting – Last year, the SLCFD established a recruitment committee, comprised of 15 representatives of the Department. Its purpose was to increase representation of Hispanics, Asians, African Americans, Pacific Islanders, and females in the upcoming hire. The committee members attended cultural festivals and made presentations to civic groups in targeted communities to promote the SLCFD as a potential employer. While many programs and festivals were attended (Appendix A), the resulting recruitment effort only marginally increased the numbers of minorities who tested for the firefighter position. Consideration should be given to focusing recruiting efforts in special areas (e.g., EMS conferences, college programs that have EMS/Fire science, colleges with a high percentage of minorities).

Recommendation 24: The Department should establish an ongoing minority recruitment program and a consistent message in the community that the SLCFD is a great place to work for minorities. In addition to attending special events and festivals, the Department should participate in recreational and school programs in targeted communities, so minorities can see firefighters firsthand. Whenever possible, Department members who live in those targeted communities should be utilized. Familiarity over the long term will draw minority candidates to the Department, so a sustained effort that brings firefighters directly into the community will better help the Department reach its diversity goals.

Hiring and Testing Processes – The Department typically conducts a hiring and testing process every two years. Candidates for entry-level firefighter positions must be at least 18 years old, have a high school education (or GED), be a U.S. citizen, and be a resident of the State of Utah. The screening of applicants consists of a written, general aptitude test; behavioral role play exercise; physical ability test (CPAT); interview with the Fire Chief; and individual

psychological test. Each candidate must also pass a background check, medical exam, and drug screening.

The processes used to screen applicants are thorough and conform to widely accepted human resource practices. For example, the written test is a validated instrument purchased through Firefighter Selection, Inc. The International Association of Firefighters as well as the International Association of Fire Chiefs has also endorsed the CPAT. Unfortunately, the most recent hiring process did not produce a diverse group of eligible candidates. Of the 900 candidates who took the written test, the top 198 (with a score of 83 percent or better) were invited to continue through the screening process. While a number of minorities were among the top 198, there were no African Americans. The physical ability test screened out female candidates as well. Of the 55 applicants invited to take the CPAT, nine were female; however, none passed.

While it is not unusual for fire service organizations to be predominantly white male, it is incumbent on all government agencies to strive to represent the population it serves. Recruitment and screening processes should be void of bias and be tested for adverse impact. It is our understanding Salt Lake City is monitoring all screening processes, understands its responsibilities in regard to equal employment, and is willing to consider alternatives to improve its performance in acquiring and retaining a culturally diverse work force. In fact, a decision was made recently to allow candidates to take the CPAT a second time and still remain on the eligibility list. This allows candidates an opportunity to become more familiar with what is expected and to train to improve their individual deficiencies.

These types of considerations are to be commended, provided that all recruits ultimately meet the same standard of performance. For example, to assist entry-level candidates needing extra help with the physical component, the Nashville Fire Department recently decided to delay the physical ability test until near the end of the recruit class. At the completion of the recruit academy, all candidates were successful in completing the physical ability test. Considering the fact that fitness is a part of the recruit academy, training instructors can supervise a daily fitness regimen that could ultimately increase the candidates' chance of successfully performing on the ability test. Other departments work with candidates as soon as a potential candidate shows interest, often months before the advertisement of a testing process. This allows for a mentoring process in order to orient the candidates on exactly what the job entails and how to best prepare for the testing processes. Still others have developed viable volunteer components and/or Explorer Posts that can expose potential candidates to the field of firefighting and serve as a vehicle for recruiting. The SLCFD currently has an active Explorer Post in place with three

firefighters who volunteer their time to have oversight of the Post. The Post has been in place for at least seven years.

Recommendation 25: The SLCFD should continue to monitor all screening processes to determine success rates of minority candidates and consider alternatives when those processes ultimately result in minorities being screened from hiring. Alternatives to be considered include a mentoring or tutoring program or delaying the physical ability test until later in the process.

Recommendation 26: The SLCFD should continue using the Explorer Post as a recruiting mechanism and to develop a volunteer contingent. Volunteers and Explorers can be utilized for either operational or non-operational tasks. Operationally, they can supplement career firefighters by providing canteen services or light and air support at extended incidents. They can also be effective in public education and public relations efforts, assist with hydrant maintenance, and installation of smoke detectors or recruiting at community events. Also, a high school vocation technical program for firefighters and EMTs may be considered.

Promotional Processes – Promotions in the SLCFD follow the same personnel rules and regulations as in other Salt Lake City departments. Candidates applying for a Captain's position must have 10 years (nine years with an Associate's degree or higher) with the Fire Department. Civil service rules require promotions to be posted for 20 days and all applicants submit to a written test. A combination of internal and external assessors is utilized to assess the in-basket exercise, role-play, and tactical components. The final screening process is an interview with the Fire Chief and Deputy Chief of Operations, where a "rule of 5" (management's ability to choose from the top five candidates) applies.

The selection process for Battalion Chief is very similar to that of Captain, except candidates must have two years at the rank of Captain and 15 years with the Department (14 with an Associate's degree or 13 with a Bachelor's degree). The assessment center, however, includes two additional components (recently added) that directly relate to the tasks of a chief officer. The first is an oral presentation and the second is a media interview. These additions clearly illustrate the Department's desire to promote employees who possess administrative and managerial skills in addition to those technical (operational) skill sets they have already demonstrated as a Captain. The Department may want to consider other credentials as well, including formal education or broader administrative experience in other areas such as training, community education, and prevention. Any previous project or committee work the employee may have done on behalf of the Department (i.e., Recruitment Committee) could also be considered.

Recommendation 27: The Department should consider expanding the criteria for Captain and Battalion Chief promotions to include formal education, experience in prevention and training, or committee/project work. These additional criteria will support the Department by providing a larger group of employees with administrative/managerial skills, emphasize the importance of other core services, and develop strong leaders for the future.

The Fire Chief is considered an "at will" employee, and may be appointed by the Mayor (and terminated) at his discretion. The Deputy Chiefs are appointed by the Fire Chief but are protected under civil service rules and are not at-will employees. Of the two Deputy Chiefs, one has 27 years with the department and was promoted to the position in 2000. The other Deputy Chief has 29 years with the department and was promoted to the position only 5 months ago. The current Fire Chief was hired in 2000, having been a previous Deputy Chief who had retired from the Department. In 2000, union representatives contacted him to determine his interest in becoming Fire Chief. He applied and was selected by the Mayor with union endorsement.

The promotional processes are routinely administered throughout the SLCFD and are clearly understood by the members of the Department. There were no concerns expressed on the part of management or line personnel related to the Department's promotional practices.

Performance Reviews – For permanent employees, performance is reviewed semi-annually on their calendar hire date. For probationary firefighters, performance is reviewed 4 times during their 12-month probation. All other employees have a six-month probation period, and their performance is reviewed at that time.

The mayor has recently implemented a "pay for performance" component to coincide with his Balanced Score Card goal-setting process. It is the City's intention to link the attainment of goals to all employees' performance reviews (and annual salary increases). Firefighters, however, have a step plan that specifies their salary increases. In this type of atmosphere, it will be extremely challenging to have any impact on this group of employees. In fact, one interviewee admitted that performance reviews were typically disregarded or "pencil-whipped." In addition, many performance reviews within the Department are several months late, apparently given a lower priority in the stations.

Officers and chiefs have already begun establishing goals and performance measures as part of their performance review process at the beginning of the year. They expect to be evaluated on their success in accomplishing those goals. To expand the pay for performance model to firefighters, issues such as sick leave use, vehicle accidents, or fitness could be addressed, thereby including all levels of the organization in the City's "balanced score card" program.

Recommendation 28: The Department may wish to consider pay incentives for firefighters as a component of the "pay for performance" system in order to positively impact departmental issues such as overtime. For example, an employee who used less sick time would warrant a higher percentage increase, whereas high sick time usage might warrant no increase. Other issues such as fitness, vehicle accidents, and quality performance on training assessments could be addressed the same way, but should be based on the goals and objectives prioritized by

the organization. The union and management should meet to jointly identify acceptable criteria for this process, possibly as part of the MOU on wages and benefits.

Discipline and Grievances – The SLCFD utilizes progressive discipline, although no formal plan exists that identifies the specific consequences of different infractions. Discipline typically begins with a verbal or written warning and progresses to suspension, demotion, or termination. Management considers the level of discipline previously given to other members for the same type of offense. Officers are asked to sign a Code of Conduct stating they will ensure Department policies and rules and regulations are carried out. It is rather remarkable that the Department has an unusually low number of disciplinary actions and grievances. During the five-year period from 2000 to 2004, there were a total of 8 disciplinary actions issued in the SLCFD. This could either be attributed to an extremely responsible, motivated work force, or to a low level of accountability where officers are not writing up infractions as they should. It is not surprising that, with the unusually small number of documented disciplinary actions, there were no grievances filed during that same five-year period.

Vacancy Management – One of the concerns mentioned by the City, as well as Department personnel, was the number of vacancies that exist at any one time. In fact, in an attempt to stay within budgeted personal services accounts, the Department has used salary savings from vacant positions to supplement overtime costs. Utilizing salary savings from unfilled positions to fund overtime is a logical remedy, given their cause and effect relationship, if the vacancies relate to existing positions in the Department. As new positions are created, corresponding funding should be established that includes coverage. Relying on overtime on a daily basis to fund new positions is not cost effective. The appropriate number of positions left vacant, however, is really dependent on the frequency of overtime and the cost of benefits.

To complicate matters, fire departments typically do not fill operational positions until they have enough positions for a full recruit class. This means that there could be times when 20 or more vacancies would need to be covered with overtime. (The SLCFD has determined that a recruit class to be cost effective must have at least six to eight vacancies.) During our visits, City representatives indicated they were open to considering some overhire process, assuming the Department could estimate the normal attrition rate from the recruit academy and departmental terminations/retirements. While the SLCFD will probably always be in a catch-up mode, hiring more than the number of actual vacant positions could certainly shorten the time positions are vacant and reduce the need for overtime.

Recommendation 29: The Department should analyze its overtime use and benefits package to determine a break-even point for vacancy management. To gain the most cost efficiencies, the use of overtime above that number should be avoided.

Recommendation 30: The City should consider allowing the SLCFD to hire over the number of positions they have budgeted. In order to minimize the amount of overtime and reduce the length of time positions remain vacant, the Department should determine the typical number of people that fail the recruit academy or terminate from the Department during the length of the academy. This should be the maximum number of slots the Department could be allowed to overhire in a given year.

III. SYSTEM PERFORMANCE GOALS

This chapter discusses system performance goals and standards typically used in the fire and EMS industry. The project team compared the Salt Lake City Fire Department (SLCFD) Operation to these standards and will make recommendations on goals to adopt in this chapter.

There is no "one-size-fits-all" formula for determining appropriate levels of service; rather, determination of adequate emergency service levels are based on choices made by the local jurisdiction. In the end, the community must decide what is appropriate based on risks present, the community's ability to mitigate emergencies, and the costs of mitigation.

Determining System Performance Goals

Various performance, professional, and training standards—as well as regulatory mechanisms—influence the decision-making process when considering the organization of fire/EMS departments. Developing a framework of operational and professional standards allows a department to determine the efficiency and effectiveness of the chosen service delivery system. To this end, the International City/County Management Association (ICMA) suggests that:

> Fire service managers should design the fire control system on the basis of the communities' approved goals and objectives (measured with a sensitivity to probability of attainment) that have been established in the political arena and as expressed in a communities' fire protection master plan.[9]

There are multiple organizations that offer recommendations to fire/EMS departments for determining the efficiency and effectiveness of their system.

National Fire Protection Association (NFPA) – The NFPA is an international, nonprofit organization dedicated to reducing the worldwide burden of fire and other hazards on the quality of life by developing and advocating scientifically based consensus codes and standards, research, training, and education. The NFPA recommendations are standards and guidelines developed by committees of chief officers, volunteer representatives, union officials, and industry representatives. Although the NFPA's standards are not legally binding, they are often codified into law, and it is important to consider NFPA standards whether or not they are adopted locally. NFPA standards have become the *de facto* standard for fire and emergency service organizations.

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[9] ICMA, *Managing Fire Services*, 1978, page 214.

Commission on Fire Accreditation International (CFAI) – Another highly influential group, the CFAI consists of representatives from the International Association of Fire Chiefs (IAFC) and the ICMA. The CFAI and the accreditation process were designed to establish industry-wide performance measures for overall organizational performance and the establishment of the standard for a jurisdiction is purely voluntary. While a small fraction of fire departments across the nation (about 100) have gone through the accreditation process and others are working toward that goal, most departments are focusing on the creation of a "Standards of Response Coverage" document (one of four items required for accreditation). The standards of coverage concept has become proven so useful that the CFAI expanded the original 44-page chapter into a 190+ page how-to manual.

The CFAI does not make many explicit recommendations on standards for fire/EMS departments to adopt. Rather, it encourages a thorough assessment of risks in the community, public expectations, the resources needed to meet expectations given the risks. The creation of written standards should then be based on that assessment. Part of the methodology for setting standards includes looking at what other, similar communities are doing.

Insurance Services Office (ISO) – The ISO is a national insurance engineering service organization that assigns a public protection classification (PPC) to jurisdictions based on fire department services. Insurance companies typically establish insurance rates for individual occupancies or groups of occupancies based on the PPC. PPCs are established using the ISO's *Fire Suppression Rating Schedule* (FSRS). Once widely used by fire departments to evaluate system performance, the FSRS's use is somewhat limited in that it only evaluates fire protection (not EMS, which most modern fire departments now provide as well). It also does not consider efficiency (e.g., how many resources are deployed in comparison to the number of actual calls). Though not as widely used now, ISO ratings are still appropriate to consider as part of a more comprehensive system performance review.

The next section addresses ISO ratings as one system performance standard. NFPA and CFAI standards are discussed in later sections as they relate to response times, staffing, and apparatus complements.

ISO Rating

In 2000, the nation's largest home insurance carrier, State Farm, announced it would cease to use the ISO PPC as the basis for its home insurance rates, and would use its own internal data to determine rates. While the exact effects of this are yet to be seen, for economic reasons it is unlikely that State Farm's rates will be much different than those determined by the ISO method. In addition, most insurance carriers band groups of ratings together for efficiency; thus,

there would be no difference in treatment of a Class 1 versus a Class 4 (for example). Therefore, depending on the rating system used by individual insurance carriers in the Salt Lake City area, there may be little or no fiscal advantage to property owners by being in a certain PPC.

To analyze a community's fire protection, the ISO uses a grading system of 1 to 10. A community protection factor of one is the highest possible grade with insurance rates likely to be lowest for the community. (Ratings increase by 1 for every 10 credits, e.g., Class 1 = 90.00+ credits, Class 2 = 80.00-89.99, Class 3 = 70.00-79.99, etc.) A community with a Class 10 rating means that there essentially is no recognized fire protection system or availability of water for fire suppression. Only a very small number of communities with very effective water distribution systems and mostly career fire departments are able to achieve a rating of one.

According to a report issued by the ICMA in 2002:

> In its practical application, the rating schedule is a tool used for assessing the insurance rate charged in a specific community on a specific property. Generally, the better the rating schedule classification, the lower the insurance premium charged. Although one cannot say with certainty what the effect of an improved rating schedule classification might be in a specific community, improvements in the classification in communities with between 10 and five tend to result in lower insurance premiums for residential properties. Improvements when the community has ratings better than five can result in lower premiums on commercial and industrial properties but will usually have a negligible effect on premiums for residential properties.[10]

ISO ratings are somewhat limited in their application because they are related mostly to the performance of the water system and water pressure to deal with a large-scale fire, rather than the every day house fire (40 percent of the rating is based on water availability for fire suppression). As noted in the *Fire Chief's Handbook*, "The current classification system is not intended to present a complete analysis of the public fire protection needs of a city and should not be used for such an evaluation."[11] A community may have an excellent fire department and communications system, but it may have a higher numerical rating if the water distribution system is not constructed to ISO standards. The three components evaluated by ISO in making a final determination of rates are:

- Fire department: number of engines, training, personnel, procedures, etc. (50 percent). Equipment accounts for 26 percent, personnel for 15 percent, and training for the remaining 9 percent.

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[10] International City/County Management Association, *Managing Fire and Rescue Services*, 777 N. Capitol Street, N.E., Washington, DC, 2002, p. 293.
[11] The Fire Chiefs Handbook, 5th Edition, Penwell Publishing Co., Saddle Brook, NJ, 1995

- Water supply (40 percent).
- Emergency dispatching and communications (10 percent).

A review of the *Fire Suppression Rating Schedule* can be useful to city decision-makers when trying to develop an understanding of the components evaluated by ISO engineers as part of their community survey process. A brief overview of the rating system is given below.

Fire Department – Fifty percent of the overall grading is based on the number of engine companies and the amount of water a community needs to fight a fire. ISO reviews the distribution of fire companies throughout the area and checks that the fire department tests its pumps regularly and inventories each engine company's nozzles, hoses, breathing apparatus, and other equipment. ISO also reviews the fire company records to determine:

- The types and extent of training provided to fire company personnel,
- The number of people who participate in training,
- The number of firefighters responding to emergencies, and
- The maintenance and testing of the fire department's equipment.

Water Supply – Forty percent of the grading is based on the community's water supply. This part of the survey focuses on whether the community has sufficient water for fire suppression beyond daily maximum consumption. ISO surveys all components of the water supply system, including pumps, storage, and filtration. Observations of the tests at representative locations in the community are used to determine the rate of flow the water mains provide. Finally, the distribution of fire hydrants is examined to ensure that no location is more than 1,000 feet from the closest hydrant.

Under the guidelines established by ISO, a community is eligible for Class 8 or better rating if the municipal water supply is capable of delivering at least 250 gallons per minute (GPM) for a period of at least two hours. The 250-gallon per minute flow is in addition to the daily maximum rate of consumption.

Dispatch and Communications – Ten percent of the overall grading is based on how well the fire department receives and dispatches fire alarms. Field representatives evaluate the communications center looking at the number of operators at the center, telephone service (includes the number of telephone lines coming into the center), and the listing of emergency numbers in the telephone book. Field representatives also look at the dispatch circuits and how the center notifies firefighters about the location of the emergency.

Current ISO Rating – The last ISO evaluation was conducted in May 1997 and the City received a Class 2 rating. Table 10 shows the credits received by the SLCFD in their last ISO review.

Table 10: SLC Insurance Rating Credits – 1997

Feature	Assigned Credit	Maximum Credit
Fire Department	37.18	50.00
Water Supply	36.31	40.00
Receiving and Handling Fire Alarms	10.00	10.00
Divergence[12]	-3.29	
Total Credit	**80.20**	**100.00**

Workloads

Unit workload is the amount of time individual stations or units are actively engaged in service to the community. It is a factor of the number and duration of incidents in a community. Workload affects at the availability of individual stations or units hence the response time of the whole fire protection system. One call for service often results in multiple units being dispatched and committed to service for a length of time. More incidents and longer service times produce higher workloads. High workloads negatively impact the performance of the emergency service system by reducing the ability of units to pending respond to calls.

Through Computer Aided Dispatch (CAD) systems, fire departments are able to keep detailed records about service times; these data are useful in determining the availability of a specific unit or station. Again, the concept of workload is not merely a count of how many calls to which a unit was dispatched. One unit can have fewer responses than another but remains on the scene longer on average (e.g. more working incidents), and so has a greater workload. Evaluating workload is important when looking at the overlaps in coverage area that may be required to achieve the response time goals adopted by the city/department and is part of the CFAI self-assessment process. An analysis of workload also can indicate whether a new station should be built or new apparatus purchased—or if current stations should be closed or units moved.

A fire/EMS system must incorporate the necessary redundancies based on whether adjacent stations or units are likely to be available for emergency response. Below are guidelines developed by TriData that outline the redundancy levels needed to meet response time goals according to response levels and are based on our experience with workloads and how they affect availability.

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[12] According the ISO, "Divergence is a reduction in credit to reflect a difference in the relative credits for Fire Department and Water Supply. "

1. *Very Low (<500 responses/yr)* – Simultaneous calls are infrequent and unit availability usually is assured. Stations/units can be spaced at the maximum distance possible to achieve stated travel time objectives established by the community.

2. *Low (500-999 responses/yr)* – Few calls will overlap and unit availability usually is assured. Stations/units can be spaced at the maximum distance possible to achieve stated travel time objectives established by the community.

3. *Moderate (1,000-1,999 responses/yr)* – Some overlap of calls will occur, usually at peak demand periods; however, stations/units are usually available. Stations/units must be located with marginal overlap to achieve stated travel time objectives established by the community.

4. *High (2,000-2,999 responses/yr)* – Additional overlap of calls will likely occur; however, stations/units will probably be available for emergency response. Stations/units must be located with significant overlap to achieve stated travel time objectives established by the community. This footprint usually achieves the best results in terms of cost efficiency and effectiveness of service delivery. (Overlap can be achieved with additional stations or additional units in existing stations.)

5. *Very High (3,000-3,999 responses/yr)* – Overlapping calls occur daily, usually during peak demand periods, and working incidents are frequent. The closest station/unit may not be available, thus requiring the response of adjacent stations/units. Stations/units must be located with the significant overlap to achieve stated travel time objectives established by the community. (Overlap can be achieved with additional stations or additional units in existing stations.)

6. *Extremely High (>4,000 responses/yr)* – Overlapping calls may occur hourly, regardless of the time of day. The closest station/unit is likely to be unavailable thus requiring the response of adjacent stations/units. Frequent transfers or move-ups are required for the delivery system to meet demand. Stations/units must be located with redundancy (back-up units) to achieve stated travel time objectives established by the community. This footprint usually is found in very densely populated urban areas and is especially evident in EMS services located in urban areas with very high demand for service. (Overlap can be achieved with additional stations or additional units in existing stations.)

The 3,000–3,200 response level (*very high* category above) is the point at which units are often considered "busy" and their availability needs to be evaluated. This is a rough rule of thumb, not a fixed standard. At this point, response times often will begin getting longer from frequent call overlap (calls to the same first-due area arriving back-to-back).[13] As units become busier, the chances for overlap, or simultaneous alarms, increase, and second-due units begin to answer more calls. This causes a domino effect where unit B is dispatched to a call in unit A's

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[13] A "first-due" 'area is a certain geographic area of the overall fire department response jurisdiction that is assigned to a particular fire station and the units that are assigned to them. Generally, it is best to dispatch the closest unit or company to any particular type of incident. Companies may be assigned to incidents outside of their first-due area, such as a second-due area, as the need arises because of the normal first-due unit being out-of-service or other circumstances.

area because unit A is already engaged, causing unit B to be unavailable for the next call in its own area. Unit C must then respond to unit B's area, and so forth.

Again, the 3,000-response threshold is just a rule of thumb. How much time a unit is unavailable due to being involved with another incident is better assessment of the impact of workloads on availability and response times. This is the second factor in workload, known as unit hour utilization (UHU).

Unit Hour Utilization – The UHU is a calculation that estimates the amount of time a unit is occupied on emergency calls as a percentage of the total amount of hours a unit is staffed and available for response (a unit staffed full-time is available 8,760 hours per year). In other words, UHU measures the percentage of on-duty time consumed by emergency service field activities. Poor availability will negatively impact response times.

The specific formula used to calculate the UHU for each unit is:

$$UHU= \frac{(number\ of\ calls)\ x\ (average\ call\ duration\ in\ hours)}{8,760\ hours\ per\ year}$$

The UHU measures the percent of a unit's time in service that is spent running calls. There is other time that is *not* accounted for, however, which includes time for training, maintenance, and other preparedness-related functions. Public education efforts also are not included in the UHU calculation.

Although there is consensus within the industry on the importance of utilization rates and how to measure them, the interpretation of how indicative utilization rates are of overall system efficiency is debatable. Most believe that a UHU between 35 and 45 percent is good for economic efficiency. If a UHU is greater than 45 percent, units often are not available and response times suffer. If a UHU is below 35 percent, units may not be as well utilized but response times may be high too often. Many communities choose to aim for a UHU in the 15 to 25 percent range to improve or maintain good response times. If a unit has a UHU of 40 percent, it will not be available for the next call 40 percent of the time. This is, of course, an average over the course of the day.

In order to develop an effective resource deployment plan, units must be available to respond to incidents in their first-due areas most of the time. No amount of resource placement planning will improve system-wide response times if the responding units are not available.

Recommendation 31: Consider setting a maximum desired UHU goal of between 20 and 25 percent. Units should be monitored on an annual basis. A unit approaching this threshold would initiate the consideration of adding another peak-demand or full-time unit. Units should not be added simply because a UHU reaches 25 percent; rather, a unit approaching a 20 or 25

percent UHU should kick-off a study of the impact on response times and workload of other units to determine the need for additional resources, when to add resources, and what resources to add.

Response Times

While demand for services and individual unit workloads dictate how many stations and apparatus are needed in a community, response times dictate where specific resources should be placed. In addition, response time is the way most citizens evaluate the level of service provided. There is, however, no single set of nationally accepted response time standards. Nevertheless, the NFPA and CFAI standards and recommendations are being adopted by more and more departments across the nation.

Measurement Methodology – To determine overall response time, the clock starts when the calling party calls 911 (or alternate emergency number) and stops when the first emergency provider arrives at patient's side or the scene of the incident. This is one of the most common performance measures used by the fire service because it is understood by citizens, easy to compute, and useful in the evaluation of end results. Response time itself really is not a measure of the end result or quality of service, though it does reflect the timeliness of service, which is one attribute desired by citizens.

Several caveats should be kept in mind. First, response times are subject to a variety of measurement errors and only measure one aspect of overall system performance. For example, response times are distorted when units report their arrival on scene either early or late. Second, response times are frequently not comparable across fire-rescue systems because of the differing manners in which they are calculated. Not all departments track vertical response times (that is, the time from arrival on scene to patient contact), so their total response times likely would be lower than the total response times of a department that does track them.

Many fire/EMS departments report average response times while others report *fractile* response times.[14] Average response times have been increasingly less used by the emergency service industry because small numbers of very short or long responses – often recorded in error - can distort the results. Also, the public is interested in how fast a system responds in most cases (fractile) rather than usually (average). More and more departments are adopting the 90th percentile for reporting response times.

A fractile response time of x at the 90th percentile means that units respond in *x* minutes, or less, 90 percent of the time. The remainder beyond the compliance fractile (90th percentile in this case) is the operational tolerance for the system, meaning the system is designed with the

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[14] Fractile measurement reports the percentage of calls responded to in *x* minutes.

understanding that 10 percent of the calls will have response times that exceed the target. Although it is possible to design a system that may ensure rapid response close to 100 percent of the time, it is generally not cost-effective.

Response times here are defined to include four components, which are further illustrated in Figure 5.

- **Call processing/Dispatch** – This time begins when the call taker/dispatcher answers the 911 call and ends when the first unit is dispatched.
- **Turnout** – This is the time elapsed from dispatch to departure from the station (or other location); it comprises activities such as donning protective gear and boarding the apparatus.
- **Travel** – This period begins with departure from the station and ends when the unit advises that they are on the scene. It does not include the time to actually reach the fire or patient after arrival at the street location of the incident.
- **Vertical** – This is the amount of time from arrival at the scene to arrival at the side of the patient or the site of the fire.

Most departments, including the SLCFD, do not record the vertical response time component. However, given the number of high-rises, large facilities (i.e. malls, hospitals, schools), and large open areas (parks, university campuses), in Salt Lake City, this component has the potential to be significant.

Figure 5: Components of Total Response Time

Response Time (lay public conception)			
911 call received →	**Units dispatched** →	**Apparatus en route** →	**First unit on scene** → **Arrival at patient/fire**
Call Processing – Begins when the emergency call is answered and ends when emergency responders are dispatched to the identified address of the call. Additional activities and information gathering may take place after notification of responders, but this is not included in call processing time.	**Turnout** – Begins when emergency responders are notified and ends when appropriate emergency apparatus actually leaves the station en route to the location of the emergency.	**Travel (Drive)** – Begins when the first appropriate emergency apparatus actually leaves the station and ends when the first appropriate apparatus arrives at the scene of the emergency.	**Vertical** – Begins when the first appropriate apparatus arrives at the scene of the emergency and ends when personnel arrive at the patient's side or the fire location.

Recommendation 32: Begin tracking vertical response times. While this time is nearly impossible to reduce, it is important to assess its impact on total response time and determine whether other components should be reduced to compensate for the vertical response component to maintain total response time goals. One method to measure and record vertical dispatch time is to require personnel to radio the dispatch center when arriving on scene and again once at the patient's side. The need to track this time component should be considered in selecting the new CAD system recommended in Chapter IX, Support Services.

Importance of Response Times – While the speed of response is not directly indicative of outcome or quality, response times do affect the number of lives saved and the value of property losses averted when an emergency occurs. This means that while arriving in 3 or 4 minutes every time does not guarantee everyone will live and there will be less damage, more people can be helped or the fire can be put out before the entire building is consumed when emergency personnel arrive in 5 minutes rather than 10 or 20.

Fire spreads quickly after ignition and the faster it is found and extinguished, the better the result; similiarly, the probability of surviving a heart attack increases when treated quickly. Despite these general observations, current statistical models cannot realistically assess nor predict the quality of fire services in terms of lives saved and property losses averted. In place of these "true" measures of fire rescue service outcome, response time is often used as a proxy measure.

Rexford Wilson, a fire protection engineer, describes a nine-step process (Figure 6) from ignition to extinguishment of a fire.

Figure 6: Wilson Nine-Step Schema for Response Time

1	2	3	4	5	6	7	8	9
Free Burn	Permitted Burn	Notification	Alarm Processing	Turnout Time	Travel	Setup	Combat	Overhaul

Source: Wilson R, <u>Nine Steps from Ignitions to Extinguishment</u> (2e), FirePro Institute, Putney, VT (1994), pp. 2-3

A fire department has control over only steps four through nine. A fire that smolders or burns undetected or unreported for a long time (steps one through three) may make such sufficient headway as to negate even the fastest response by a fire department.[15] For example, if the fire burns 20 minutes before it is detected, even with a 5-minute fire department response time, the damage will have been done.

Figure 7 depicts the fire propagation curve, which shows the effect of time and temperature rise of a free-burning fire on the destruction of property. According to multiple studies, extension of the fire beyond the room of origin begins approximately 6 to 8 minutes after ignition, and flashover of the room of origin occurs within 10 minutes of ignition. In some modern rooms with low ceiling and plastics, flashover can occur in two to four minutes, according to studies by the National Institute of Standards and Technology. Clearly, slow turnout and call processing times can have a detrimental effect on property damage.

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[15] Offsetting this headway is the rationale behind using automatic fire detection/reporting and automatic sprinkler systems.

Figure 7: Fire Propagation Curve
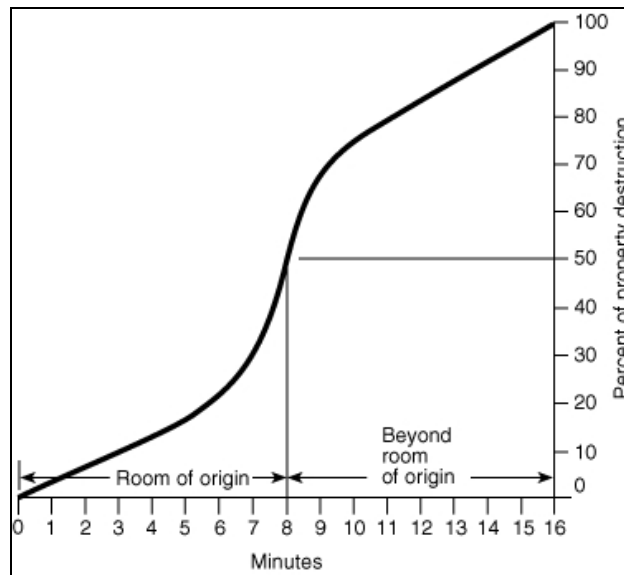
Response Time Standards: Fire/Rescue Service – The most widely recognized standard used in response time analysis is outlined in NFPA 1710, *Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations and Special Operations to the Public by Career Fire Departments*.

NFPA 1710 was established in 2001 and contains two recommendations that caught the attention of fire service managers and city administrators across the nation. The standard recommends 4-person staffing for all engine and truck companies (discussed later), and a 5-minute dispatch-to-arrival time to be met on 90 percent of calls. The time increases to six minutes when one minute is added for call processing/dispatch time, which is recommended in NFPA 1221, *Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems*. The five-minute period includes one minute for turnout time and four minutes for travel. The travel time translates to a driving distance of 2 miles from the first-due fire station to the incident (driving at an average speed of 30 mph). Detailed data regarding response times for the SLCFD is discussed in Chapter V, *Station and Apparatus Deployment*.

Again, like all NFPA standards, NFPA 1710 may be adopted by a local jurisdiction, but is not mandatory. Unlike many NFPA standards, NFPA 1710 is not based on much of a research foundation but rather is the majority vote reflecting experience and opinion of a committee, within which there was much disagreement. There is no published information on the expected reductions in losses or injuries as a function of increased staffing and only a little on the effect of increased response times. Nevertheless, despite having been formulated largely on the basis of expert opinions and task sequencing (what must be done and how many it takes to do it) rather

than research, NFPA 1710 has become the *de facto* benchmark for the emergency response community.

In addition to the NFPA, the CFAI has noted a 50-second average call processing/ dispatch time as a baseline. This is actually a far less stringent goal than 60 seconds 90 percent of the time since an average is closer to the 50th percentile. The CFAI also notes a 50-second average baseline for turnout time. The CFAI baselines were developed by analyzing response records from multiple departments over a decade ago. The new CFAI document, *Creating and Evaluating Standards of Response Coverage for Fire Departments*, now recommends using fractile measurements rather than averages.

Response Time Standards: Emergency Medical Services – One method of measuring and evaluating response times is to count the number of patients who survive to the point of being released from a hospital. Although survival is not solely a function of the timeliness of care, time is crucial to a critically injured or seriously ill patient. Guidelines published by Basic Trauma Life Support International (a widely known training institute) suggest that a trauma patient's odds of survival are directly linked to the amount of time that elapses between the injury and definitive surgical treatment.[16] Similarly, the American Heart Association states:

> [The] passage of time drives all aspects of emergency cardiac care and determines patient outcomes. The probability of survival declines sharply with each passing minute of cardiopulmonary compromise. Some interventions, like basic CPR, slow the rate at which this decline in resuscitation probability occurs. Other interventions, such as opening an obstructed airway or defibrillating [as indicated], can restore a beating heart. The longer it takes to perform these interventions, however, the lower the chances of benefit.[17]

If brain tissues are deprived of oxygen, they will begin to die within four to six minutes. For that reason it is imperative to begin resuscitation measures as soon as possible. A recent study in Ottawa, Ontario, found that defibrillation was most effective if it was provided within six minutes of the patient's initial collapse.[18, 19]

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[16] Campell JE. 1995. *Basic Trauma Life Support 3rd Ed.* Englewood Cliffs, NJ: Prentice-Hall. pp. 24-26.

[17] Cummins RO (Ed.). 1994. *Textbook of Advanced Cardiac Life Support.* Dallas, TX: American Heart Association. pp. 1-3

[18] Defibrillation is a critical intervention that can be provided by paramedics using manual defibrillators, or by laypersons, police officers, or EMTs using automatic external defibrillators.

[19] *USA Today* recently ran a series of investigative reporting articles on EMS services across the country (July 28-30, 2003). The title of one article was "Six Minutes To Live or Die." In this article, new research was cited from the Mayo Clinic that suggested the six-minute mark is when lives are saved or lost.

The study also found the following:

- Effectiveness decreased significantly as the interval between cardiac arrest and defibrillation increased between six and 11 minutes.
- After 11 minutes, the odds of patient survival were extremely poor.
- The odds of patient survival were doubled if ALS (paramedic) care was provided alongside BLS (layperson/police officer/EMT) defibrillation at all points prior to 11 minutes.[20]

Nationally, the closest thing to a response time standard for paramedic (ALS) units in an urban/suburban EMS system with automatic defibrillation-capable first responders is 8 minutes in 90 percent of the critical (i.e., life-threatening) calls. This *de facto* standard is an amalgamation of generally accepted criteria or rules-of-thumb. No standards-making consensus group has ever formally defined a standard for ambulance response times. Generally, various EMS systems interpret the idea of a standard in two ways. Some jurisdictions view the 8-minute standard to mean eight minutes and all of the 59 seconds that follow; other jurisdictions view it as 8 minutes exactly. The latter, more stringent definition is suggested and is more consistent with the medical principles on which it is based.

This form of response time measurement is called a fractile response time because it is stated in terms of the fraction of calls responded to within a specified time. A fractile response time standard specifically acknowledges that there will be some response time outliers in even the best-performing EMS systems. In this case, 10 percent of calls can have response times greater than 8 minutes and the system can still meet the standard. The standard specifically does not use average response time as its measurement because arithmetic averages can be distorted by a small number of outliers.

Current Goals and Recommendations – In SOP 05-02, the SLCFD outlines two time-based response guidelines. When responding from the station, each unit is to confirm that they have received the alarm from dispatch and are responding within 90 seconds. When responding while "on the air" (i.e. already in the unit for whatever reason), units have 30 seconds to respond. If the dispatcher does not get a response after 30 or 90 seconds, he is to dispatch another unit. (The impact of this on response times is discussed in Chapter V.)

In its Five-Year Business Plan, the SLCFD set a five-minute average dispatch to arrival time goal for life-threatening emergencies. While this is better than not having a goal at all, the use of an average time and exclusion of call processing time leaves room for improvement. In addition, "life-threatening emergency" is not defined.

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[20] Nichol G, Stiell IG, Laupacis A, Pham B, De Maio VJ, and Wells GA. 1999. "A Cumulative Meta-Analysis of the Effectiveness of Defibrillator-Capable Emergency Medical Services for Victims of Out-of-Hospital Cardiac Arrest." Annals of Emergency Medicine, 34 (4 pt. 1): 517-25.

Finally, the Department does not have written response time goals for call processing/ dispatch or total response time.

Table 11 summarizes NFPA recommended response time goals by time component and compares them to current SLCFD goals.

Table 11: NFPA Response Time Goals vs. SLCFD Goals

Response Time Component	Salt Lake City Goal		NFPA Standard	
	Time	Compliance	Time	Compliance
Call Processing	N/A	N/A	60 seconds	95%
Turnout	30 seconds (in unit) 90 seconds (in station)	N/A	60 seconds	90%
Travel	5 minutes	Average	4 minutes (fire) 8 minutes (EMS)	90%
Total	N/A	N/A	6 minutes (fire) 10 minutes (EMS)	90%

Recommendation 33: Adopt a 90-second goal for call processing and implement necessary changes to allow dispatchers to meet that goal. Setting a 90-second goal without providing the necessary tools to meet the goal is setting the dispatchers up to fail. A timeline for meeting the new goal should also be created; dispatchers cannot be expected to cut call processing times in half overnight. For example, the first goal could be to get down to three minutes 90 percent of the time, or 90 seconds 30 percent of the time. Each year or six-months the time could be reduced or the compliance increased. A higher goal than NFPA recommends was selected based on what TriData has seen other departments with medical priority dispatch accomplish.

Recommendation 34: Adopt a 90th percentile turnout time goal of 60-seconds and implement any changes necessary to allow personnel to meet this goal. Changes could be as simple as emphasizing the importance of meeting this goal or as complicated as remodeling a station to make it more user friendly. Again, an analysis of the root cause(s) of the extended turnout times should be completed and steps necessary to correct the deficiency developed before officially adopting the new goal.

Recommendation 35: Adopt travel and total response time goals based on call type and priority. Goals should be set for both first-arriving unit and full-complement. The NFPA recommended standards of six minutes for fire calls and eight minutes for EMS calls can likely be met in Salt Lake City with some improvements in call processing and turnout times as well as some changes to apparatus deployment. However, lower goals should be set for non-emergency calls and calls responded to without lights and sirens.

Additional Influencing Factors – There are additional factors influencing emergency apparatus travel time that communities have control over.

TRAFFIC CALMING: On the negative side, many communities across the nation, like SLC are installing traffic-limiting devices (speed bumps and speed humps) to reduce vehicle speeds, mostly in residential neighborhoods. These devices are popular with neighborhood residents,

who often demand them. However, each speed bump adds an estimated 10 to 12 seconds to emergency apparatus response times. The installation of these devices is a value judgment on the part of elected officials, who must weigh the satisfaction and possibly improved traffic safety to neighborhoods with the potential for longer emergency response times and the possible need for additional fire and EMS resources to compensate for the slower travel times. A study on this tradeoff undertaken for the Boulder, CO City Council in 1997 showed that the likely reduction of traffic fatalities from the slowing of traffic was far less than the likely increase in deaths from slowing the response to delayed response to cardiac arrests and other emergencies.[21]

In 1998, the Portland, Oregon Fire Bureau tested the impacts of 14- and 22-foot speed bumps on emergency apparatus response.[22] The tests found that ambulance response times were not impacted but engines and trucks were slowed by up to nine seconds per bump.[23] A compromise to slow traffic but not impact emergency response was to install offset speed bumps with enough room between to allow apparatus to drive around (one in the right lane only followed by one in the left lane only 50 feet ahead).

In the past, the Salt Lake City Fire Department has expressed no objection to the installation of traffic calming devices in Salt Lake City neighborhoods.[24] The reasoning behind this was that slower traffic is safer and reduces the number of traffic accidents to which the Department responds; therefore, the reduction in response time is worth the extra safety. While the number of accidents might be reduced, the trade-off with response time should be reviewed more closely.

Recommendation 36: Monitor response times in neighborhoods that have traffic limiting devices (i.e. speed bumps, humps, and tables). Use before and after time comparisons or even trial runs with apparatus to more accurately assess their impact. Consider the effects of speed bumps in reviewing any unusual delays in response. Seek alternatives that have less impact on emergency vehicle responses, such as educating the public on the need to obey neighborhood speed limits or face emergency delays.

TRAFFIC SIGNAL PREEMPTION: On the positive side, traffic light preemption systems change the traffic lights as emergency vehicles approach, stopping civilian vehicles, and allowing emergency vehicles to enter intersections on a green light, thereby reducing the likelihood of a side-impact or head-on collision with another vehicle when having to go through red lights. These systems can be activated by siren or by infrared technology. When activated, the traffic light changes to a temporary green signal for the approaching emergency vehicle.

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[21] Deaths Expected From Delayed Emergency Response Due to Neighborhood Traffic Mitigation, 3 April 1997; submitted by Ronald Bowman to Boulder, CO City Council.

[22] These speed bumps are also commonly referred to as speed tables and are flat or slightly rounded on top with a maximum height of three inches in the middle.

[23] Source: http://www.trans.ci.portland.or.us/TrafficCalming/reports/split.htm

[24] Salt Lake City Council Staff Report, Subject: *Traffic Management Program Performance Audit*, 8 August 2003, p. 2.

Such a system is an excellent way to improve the safety of citizens and firefighters during emergency responses. In establishing operating procedures for such traffic devices, the Department should restrict emergency vehicle operators from entering intersections on red lights because a delayed green light at an intersection with a preemption device can mean that another emergency vehicle is entering the intersection from the cross-road.

AUTOMATIC VEHICLE LOCATION (AVL) AND MOBILE DATA COMPUTERS (MDCS): Implementation of an AVL system is beneficial because it allows dispatchers to see the actual location of any unit on a computer-generated map of the city. The AVL data could also be integrated into the CAD system to calculate the truly closest unit to any given emergency and make a dispatch recommendation accordingly, rather than making dispatches on the basis of the fixed station locations. In addition to improving dispatching, AVL improves personnel safety because a unit that is in trouble can be quickly located.

Additionally, an AVL system can be integrated with MDCs installed in each emergency response unit. With the appropriate integration of AVL, navigational, and MDC technologies, the AVL can provide the MDC with a visual map showing the current unit location of the unit and the incident location along with the most efficient route of travel.

MDCs can be used to provide CAD data, city maps, building plans, fire-rescue pre-plans, hospital status, patient information, navigational directions to responding units, etc. to units directly in the field. MDCs can also be used to log status and file incident reports. MDCs can be supported by 800 MHz radio system channels or cellular digital packet data (CDPD) technology (the same technology used to access the Internet on cell phones).

Staffing and Apparatus Complements

The number of firefighters needed per engine or truck (ladder) company is a subject of hot debate in the fire world. The NFPA has much influence in this area as well. The fundamental issues in determining unit staffing include:

- The ability to start operations with the first arriving unit;
- The ability to rapidly amass critical staffing for incidents of various sizes and types of hazards;
- Firefighter safety; and
- Productivity of a unit and the system of units.

Like several metro fire departments nationwide, Salt Lake City considers *minimum* staffing for its fire apparatus to be four personnel. This minimum staffing level is at the level specified in NFPA standards. NFPA Standard 1500, *Fire Department Occupational Safety and Health Program* says that "…a minimum acceptable fire company staffing level should be four

members responding or arriving with each engine and each ladder company responding to any type of fire." NFPA 1710 also suggests that fire suppression units be staffed with a minimum of four personnel.

While there is no statistical data on the cost benefits of the four-person staffing standard, it is clear that four-person staffing is more efficient and effective on the fire ground than three-person staffing for non-trivial fires. For example, one four-person unit can do as much work in many situations as two three-person units because it can be split into two two-person teams, whereas a three-person unit should not be divided for safety reasons.

Salt Lake City and the SLCFD have officially adopted a four-person staffing requirement. The SLCFD has been using four or more personnel on fire/EMS units for over a decade, as budgets have allowed. In FY03, the Department was staffing units with four personnel 99 percent of the time.

Recommendation 37: Continue using four-person staffing on all engines and trucks in the SLCFD.

Response Complement – While the staffing of the unit affects its efficiency, a more important criterion is how fast the total team can be assembled for a given incident regardless of the number of vehicles on which they ride. The NFPA *Fire Protection Handbook, 18th Edition,* Table 10-2A, *Typical Initial Attack Response Capability Assuming Interior Attack and Operations Response Capability,* makes staffing recommendations based on the number of firefighters arriving on the scene of a fire depending upon the type of occupancy (low-, medium-, and high-hazard occupancy). The NFPA staffing recommendations by the type of hazard areas follows:

HIGH-HAZARD OCCUPANCIES (schools, hospitals, nursing homes, explosive plants, refineries, high-rise buildings, and other high-risk or large fire potential occupancies):

At least four pumpers, two ladder trucks (or combination apparatus with equivalent capabilities), two chief officers, and other specialized apparatus as may be needed to cope with the combustible involved; not fewer than 24 firefighters and two chief officers.

MEDIUM-HAZARD OCCUPANCIES (apartments, offices, mercantile and industrial occupancies not normally requiring extensive rescue or firefighting forces):

At least three pumpers, one ladder truck (or combination apparatus with equivalent capabilities), one chief officer, and other specialized apparatus as may be needed or available; not fewer than 16 firefighters and one chief officer.

LOW-HAZARD OCCUPANCIES (one-, two-, or three-family dwellings and scattered small businesses and industrial occupancies):

> At least two pumpers, one ladder truck (or combination apparatus with equivalent capabilities), one chief officer, and other specialized apparatus as may be needed or available; not fewer than 12 firefighters and one chief officer.

Table 12 shows the SLCFD's response complement to a structure fire based on risk versus the NFPA guidelines outlined above.

Table 12: SLCFD Structure Fire Response Complement vs. NFPA Guidelines

Type of Occupancy	Salt Lake City Response Complement	NFPA Guidelines
High-Hazard	4 Engines 2 Ladder Trucks Utility 10* Battalion Chief	4 Engines 2 Ladder Trucks
	25 Firefighters 1 Chief Officer	24 Firefighters 2 Chief Officers
Total	**26**	**26**
Medium-Hazard	3 Engines 1 Ladder Truck Utility 10* Battalion Chief	3 Engines 1 Ladder Truck
	17 Firefighters 1 Chief Officer	16 Firefighters 1 Chief Officer
Total	**18**	**17**
Low-Hazard	2 Engines 1 Ladder Truck	2 Engines 1 Ladder Truck
	12 Firefighters	12 Firefighters 1 Chief Officer
Total	**12**	**13**

* Utility 10 is staffed with one firefighter when additional staffing is available.

The recommendations and guidelines outlined in the 18th Edition of the NFPA Handbook should be considered but are not necessarily the latest word. The same staffing level recommendations appeared back in the 15th Edition, which was published in 1981. They do not address compliance with the OSHA-mandated "Two-in/Two-out" rule (discussed below). A Rapid Intervention Team/Crew (RIT/RIC) must also be considered either in addition to or instead of the "Two-in/Two-out" for a working fire. The number of responding firefighters may need to be increased by two or three from the levels outlined in NFPA's guidelines.

Recommendation 38: Create an SOP that outlines the number and type of apparatus and number of personnel to create a full-complement response to structure fires based on risk levels. This should be based on the current complements used in Salt Lake City, with the addition

of one chief officer to the low-risk category. The full-response complement should acknowledge the use of a RIC.

   Two-In/Two-Out – Firefighting is a dangerous and physical labor-intensive occupation. Although technologically the tools and equipment used by firefighters have changed dramatically over the years, the basic goals have remained almost unchanged: to preserve life and protect property by successfully extinguishing fires—and not get hurt in the process. To accomplish this, firefighters must be able to quickly and efficiently gain access to a fire and apply an extinguishing agent (typically water, but increasingly foam and other agents are gaining popularity). This requires emergency responders to operate in dangerous environments where they are at high risk for serious injury or death.

   To protect the heath, safety, and welfare of firefighters, the federal government enacted regulations to ensure that firefighters operate in and around structure fires safely. Enacted by the Department of Labor and the Occupational Safety and Health Administration (OSHA), 29 CFR 1910.134, also known as "Two-in/Two-out," mandates that there must be a minimum of four personnel on the scene of a structural fire before personnel can initiate interior operations. Two firefighters must remain on the exterior of the structure, properly equipped with full turnout gear and self-contained breathing apparatus (SCBA) to act as a RIC in the event the firefighters operating inside the structure become incapacitated or trapped.

   Salt Lake City Fire Department standard operating procedures dictate the addition of one engine to be designated as a RIC on all reported structure fires, above the units shown in Table 3.

   Recommendation 39: Continue the policy of dedicating one engine crew on each confirmed structure fire as the rapid intervention crew.

Interjurisdictional Comparisons

   To gauge a department's performance, it is often helpful to compare it with other departments that are similar in size, offer the same range of services, and are similar in scope and complexity. This section discusses how the SLCFD compares to other fire departments in Utah and around the nation. Though not totally conclusive, when components of the comparisons are far above or below the average, a logical question to ask is why. There might be good reasons for not being close to the average; for example, some departments have greater risk in their service area and thus need more resources, which requires more money. Regardless, comparisons with similar departments provide a good starting point for benchmarking and raising questions related to system performance.

   While interjurisdictional comparisons can be subject to misinterpretations of data that cannot be perfectly compared or defined, they are still of value. Benchmarking is useful as an

input into the planning process but is not directly indicative of the quality of the services provided by the SLCFD. Analytically, benchmarking is simply a point of reference used to improve the understanding of the Department as a whole. It is not the intent of this section to make definitive judgments or implications regarding the quality of service (favorable or otherwise) provided by the SLCFD or departments in the comparison group. The comparisons are, however, quite useful for identifying trends as well as issues to be further explored.

The jurisdictions selected for comparison were chosen because of their general similarity in size, services, and complexity to Salt Lake City. Some jurisdictions and departments were recommended by City and Department management to use for comparison. This is not a scientific sample, the sample size is relatively small, and some of the data may not be perfectly comparable (apple-to-apple comparisons). Sources of comparative data include direct contact with the departments, surveys, U.S. Census 2000, department web pages and contacts, and TriData research.

Fire Station Coverage – Two measures of station coverage are the square miles protected per fire station and the number of citizens protected per station. In an urban setting with high population densities, stations will be closer together than in rural and suburban areas and thus will protect fewer square miles but more people. The average area per station, therefore, is an indirect measure of the level of service, since the number of stations in a given area is related to response times. Less area per station generally results in lower response times.

As Table 13 shows, the SLCFD protects an average 7.9 square miles per station, only a half square mile less than the group average of 8.4 square miles. The area protected varies from as low as 5.1 square miles in Salem, OR, to 13.2 in North Las Vegas, NV.

Table 13: Square Miles Per Station

Jurisdiction	Land Area (Square Miles)	Stations	Square Miles/ Station
North Las Vegas, NV	79	6	13.2
Tucson, AZ	226	18	12.6
Henderson, NV	80	9	8.9
Albuquerque, NM	181	21	8.6
Provo, UT	41	5	8.2
Salt Lake City, UT	**110**	**14**	**7.9**
Mesa, AZ	128	17	7.5
West Valley City, UT	35	5	7.0
Sacramento, CA	144	22	6.5
Ogden, UT	27	5	5.4
Salem, OR	46	9	5.1
Average	**100**	**12**	**8.4**

The population per station is an indication of demand, risks, and need for services. More people per square mile is generally an indicator of higher risks (e.g., more high-rises, building closer together). The population per station is based on the resident population protected; it does not include visitors or non-resident workers.

Table 14 shows that the population served per station varied from a low of 12,979 in Salt Lake City to a high of 27,039 in Tucson, AZ. The average for the comparison group was 20,151, over than 60 percent higher than the SLCFD. This is not to say Salt Lake City has too many stations, especially considering SLC was very close to the group average for square miles protected per station. Rather, it indicates that overall, Salt Lake City is not as densely populated as the communities in the comparison group; thus, they might not have as many high-risk areas as other communities.

Table 14: Population Per Station

Jurisdiction	Resident Population[25]	Stations	Population/ Square Mile	Population/ Station
Tucson, AZ	486,700	18	2,154	27,039
Mesa, AZ	396,400	17	3,097	23,318
West Valley City, UT	109,000	5	3,114	21,800
Albuquerque, NM	448,600	21	2,478	21,362
Provo, UT	105,100	5	2,563	21,020
Henderson, NV	175,400	9	2,193	19,489
North Las Vegas, NV	115,700	6	1,465	19,283
Sacramento, CA	407,000	22	2,826	18,500
Ogden, UT	77,200	5	2,859	15,440
Salem, OR	137,000	9	2,978	15,222
Salt Lake City, UT	**181,700**	**14**	**1,652**	**12,979**
Average	**239,982**	**13.9**	**2,406**	**20,151**

Fire Apparatus – Table 15 shows the number of engines and trucks used across the selected local jurisdictions. Nationally, larger cities tend to need a higher engine-truck ratio of 2:1. More suburban departments have generally operated with a ratio of 4:1 or higher. Rural departments can operate at an even higher ratio. Salt Lake City is close to the suburban ratio at 3.7:1.[26]

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[25] Source: U.S. Census 2000 rounded.

[26] This measure, Fire Apparatus, does not take quints into consideration in determining the Engine to Truck ratio. Quints are used for their versatility. While they may operate mostly as either an engine or a ladder, for the purpose of this formula, it is difficult to assign them to any one column. Therefore, they are not included in the ratio.

Table 15: Fire Apparatus[27]

Jurisdiction	Engines	Trucks	Quints	Engines/ 10,000 pop.	E:T Ratio
Henderson, NV	9	1	1	0.51	9.0
North Las Vegas, NV	7	0	2	0.66	7:0
Ogden, UT	6	0	1	0.78	6:0
Albuquerque, NM	21	5	2	0.47	4.2
Salt Lake City, UT	**11**	**3**	**2**	**0.61**	**3.7**
Mesa, AZ	18	5	0	0.45	3.6
West Valley City, UT	9	3	2	0.83	3.0
Salem, OR	9	3	0	0.66	3.0
Sacramento, CA	22	8	0	0.54	2.8
Tucson, AZ	19	7	0	0.39	2.7
Provo, UT	2	3		0.19	0.7
Average	**12**	**4**	**1**	**0.50**	**3.5**

Ultimately it is the location of the trucks that determines the number needed and hence the ratio. The need for truck companies becomes greater with the increase in population density usually associated with large numbers of multiple family dwellings or high-rise buildings. Although the trucks cannot reach to the top floors, they can reach at least a large portion of the building for water application as well as rescue. Whether the ladder is used, the truck company staffing is needed when combating fires in tightly occupied structures where fire suppression activities, ventilation, and search and rescue operations need to be conducted simultaneously.

Salt Lake City has 0.61 engines per 10,000 population, which is above the 0.50 average for the comparison group. Engines per 10,000 population varied from a low of 0.19 in Provo, UT, to a high of 0.83 in West Valley City, UT.

Staffing – Table 16 shows staffing levels in the comparison group. Salt Lake City has the most suppression personnel per 10,000 residents in this comparison group, 17.7. This is because the SLCFD operates its apparatus with a minimum of four personnel while the other departments do not.

Although not all of the departments provided information on their staffing structure, many use the same three-shift schedule and average 56-hour workweek used by the SLCFD. A higher average workweek is less costly to the department and to the citizens, and results in needing fewer uniformed personnel per shift than departments with fewer average hours per workweek.

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[27] Front-line apparatus only, not reserves.

Table 16: Staffing Levels

Jurisdiction	Total Staffing	Suppression Personnel	Suppression Personnel per 10,000 pop.
Salt Lake City, UT	359	322	17.7
Ogden, UT	110	102	13.2
Tucson, AZ	575	530	10.9
Sacramento, CA	571	434	10.7
North Las Vegas, NV	147	127	11.0
Albuquerque, NM	650	432	9.6
Salem, OR	172	140	10.2
Henderson, NV	183	154	8.8
Mesa, AZ	N/A	333	8.4
Provo, UT	82	75	7.1
West Valley City, UT	83	69	6.3
Average	**293**	**247**	**10.3**

Minimum On-Duty Staffing – Minimum on-duty staffing is the minimum number of personnel required to staff each apparatus on a daily basis. As discussed above, the number of firefighters needed per apparatus is a subject of much debate in the fire service community.

Table 17 shows the minimum on-duty staff per 10,000 population for the comparison group. Salt Lake City has the highest number of on-duty firefighters per 10,000 population at 4.35, which is nearly one and half firefighters above the group average of 2.96. Again, this is due to the use of four-person staffing on all units in Salt Lake City. The low for the comparison group was 1.81 in Provo, UT.

Table 17: Minimum On-Duty Staffing

Jurisdiction	Minimum On-Duty Staffing	Minimum On-Duty Staffing per 10,000 pop.
Salt Lake City, UT	**79**	**4.35**
Ogden, UT	29	3.76
Salem, OR	47	3.43
Albuquerque, NM	144	3.21
Henderson, NV	52	2.96
Sacramento, CA	120	2.95
Tucson, AZ	135	2.77
Mesa, AZ	103	2.60
North Las Vegas, NV	30	2.59
West Valley City, UT	23	2.11
Provo, UT	19	1.81
Average	**71**	**2.96**

Calls Per Capita – Calls per 1,000 population is an important measure of demand. The SLCFD is average for the comparison group at 134 calls per 1,000 population. The number of calls per 1,000 population, as seen in Table 18, varied from the low in Provo, UT, of 78 to the high of 157 in Sacramento, CA.

Table 18: Calls Per 1,000 Population

Jurisdiction	Total Incidents	Fire/Non-EMS Calls	EMS Calls	Fire/Non-EMS Calls/ 1,000 pop.	EMS Calls/ 1,000 pop.	Calls/ 1,000 pop.
Sacramento, CA	63,902	19,840	44,062	49	108	157
Albuquerque, NM	68,000	14,960	53,040	33	118	152
Ogden, UT	11,492	1,604	9,888	21	128	149
North Las Vegas, NV	16,000	2,500	13,500	22	117	138
West Valley City, UT	14,678	6,666	8012	61	74	135
Salt Lake City, UT	**24,302**	**5,704**	**18,598**	**31**	**102**	**134**
Tucson, AZ	65,314	6,114	59,200	13	122	134
Mesa, AZ	49,679	11,191	38,488	28	97	125
Salem, OR	16,234	4,731	11,503	35	84	118
Henderson, NV	18,575	6,377	12,198	36	70	106
Provo, UT	8,200	3,700	4,500	35	43	78
Average	**32,3987**	**7,581**	**24,817**	**32**	**103**	**135**

Mix of Calls – Table 19 shows the breakdown of calls for the comparison group. EMS calls constitute the largest percentage of the calls in all departments, which is common across the nation. The SLCFD experiences about 77 percent of its demand in EMS, which is the average for the group. In Tucson, AZ, over 90 percent of demand is for EMS while the split is closer to 50-50 in West Valley City and Provo, UT.

Table 19: Mix of Calls

Jurisdiction	Total Incidents	Fire/Non-EMS Calls	EMS Calls	Percent Fire/Non-EMS	Percent EMS
Tucson, AZ	65,314	6,114	59,200	9%	91%
Ogden, UT	11,492	1,604	9,888	14%	86%
North Las Vegas, NV	16,000	2,500	13,500	16%	84%
Albuquerque, NM	68,000	14,960	53,040	22%	78%
Mesa, AZ	49,679	11,191	38,488	23%	77%
Salt Lake City, UT	**24,302**	**5,704**	**18,598**	**23%**	**77%**
Salem, OR	16,234	4,731	11,503	29%	71%
Sacramento, CA	63,902	19,840	44,062	31%	69%
Henderson, NV	18,575	6,377	12,198	34%	66%
West Valley City, UT	14678	6,666	8012	45%	55%
Provo, UT	8,200	3,700	4,500	45%	55%
Average	**32,3987**	**7,581**	**24,817**	**23%**	**77%**

Cost Per Capita – For public managers, a measure of the relative cost efficiency of a fire department is the cost per capita of fire protection. This should be considered relative to the level and quality of service, though it is difficult to make meaningful comparisons of quality for fire departments. In considering the cost per capita for emergency services, one should also realize that larger jurisdictions such as Salt Lake City, while requiring more resources, could sometimes achieve better-cost ratios since the cost is spread over more residents. Economy of scale is a consideration in comparing cost per capita data.

The cost per capita of each jurisdiction was based on its operating budget, not including capital budgets. The operating budget includes personnel services, supplies, building maintenance expenditures, etc., which are annual appropriations for recurring costs that do not depreciate. Currently, Salt Lake City Fire Department's per capita cost is $151.35, about $30 more than the group average of $122.50, as seen in Table 20. On the other hand, Salt Lake City's cost per hour of operation is about 10 percent less than the average.

Table 20: Cost Per Capita[28]

Jurisdiction	Operating Budget	Cost per Hour of Operation	Cost Per Capita
Henderson, NV	$29,000,000	$3,310.50	$165.34
North Las Vegas, NV	$17,900,000	$2,043.38	$154.71
Salt Lake City, UT	**$27,500,000**	**$3,139.27**	**$151.35**
Sacramento, CA	$60,200,000	$6,872.15	$147.91
Albuquerque, NM	$59,000,000	$6,735.16	$131.52
Ogden, UT	$9,200,000	$1,050.23	$119.17
Mesa, AZ	$42,000,000	$4,794.52	$105.95
Tucson, AZ	$47,700,000	$5,445.21	$98.01
West Valley City, UT	$7,500,000	$856.16	$68.81
Provo, UT	$6,600,000	$753.42	$62.80
Average	**$30,660,000**	**$3,500.00**	**$122.50**

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[28] Budget data was not available from Salem, Oregon.

IV. RISK AND DEMAND ANALYSIS

This chapter discusses past demand for emergency services in Salt Lake City and the fire/EMS risks at present. These two factors are then used to project future demand for services over the next 0–5, 6–10, and 11–20 years. Future demand projections and community risks are factored into the station and apparatus deployment analysis in Chapter V.

Introduction

It is important for all communities to perform an in-depth analysis of the risks within their community along with a capability assessment for handling the risks identified. The department can use this analysis to develop and improve operations. There are major differences in the fire protection needed for different risk profiles. Without knowing what the problems are and where they are occurring, it is not possible to know what the most effective means are for preventing or responding to the problems. Understanding the risks faced in a community allows elected officials and others to make informed decisions regarding deployment options and response time goals.

The Salt Lake City Fire Department's (SLCFD) long-term needs are dependent on the expected workload in the future. TriData uses a methodology to project workload that was developed over many previous fire department studies. The two main factors that determine a department's workload are population and per capita demand. Population is defined in this study as the resident population in the area protected by the SLCFD. Increase in population is one factor that leads to growth in the number of incidents. Per capita demand is the number of incidents per member of the population. This factor has also been shown to change over time. The product of the forecast of these two factors creates a demand projection for the department.

Risks

A city's risk of fire and other emergencies is affected by a variety of factors, including the built environment, climate, geography, and population. Salt Lake City covers 110 square miles and comprises a diverse geographic range that includes residential foothills, a densely populated downtown with numerous high-rises, and industrial areas.

Airport – The Salt Lake City International Airport (SLC), located five miles northwest of downtown, is run by the Salt Lake City Department of Airports, which is a department of the City of Salt Lake. SLC is a hub to Delta and partner airlines. In 2004, SLC served over 18.3M passengers with 972 flights daily, making it the 26th busiest airport in the nation. The airport has 2 terminals with a total of 79 gates on 5 concourses. There are 3 runways ranging in size from 4,900 feet to 12,000 feet.

In addition to the terminals and runways, airport grounds include parking lots and garages, maintenance hangers, a United States Post Office, cargo company facilities, general aviation facilities, and an 18-hole golf course. Both Delta and Continental airlines operate reservations centers at the airport. All together the airport covers 9.2 square miles.

Currently, the Federal Aviation Administration (FAA) designates SLC as an Index D facility. This means the airport is able to accommodate aircraft up to 200 feet in length. For an Index D airport, the FAA requires a minimum of three aircraft rescue firefighting (ARFF) units. The SLCFD currently operates six ARFF units: two at Station 11 and four at Station 12.

High-rises – High-rises in Salt Lake City are defined as "any building used for human occupancy at a level 75 feet or more above the lowest level of Fire Department vehicle access." Data on the exact number of high-rise buildings in Salt Lake City were not available, but there are at least 59, most of which (63 percent) are fully sprinklered. High-rises are concentrated in the downtown area, with a few in the southeast as shown in Map 1.

High-rise buildings require additional apparatus, personnel, and skills to protect. They also present special problems in rescue and firefighting, as was evidenced in the extreme by the World Trade Center attack. High-rise firefighting is highly labor intensive unless a fire is contained by a sprinkler system. A formidable challenge to suppression personnel, high-rise fires usually require at least a second alarm assignment, even for a minor fire. The logistics of high-rise firefighting include the need for personnel to use stairways to transport equipment and access upper floors, making more personnel even more important.

While the majority of high-rise buildings in Salt Lake City are sprinklered and compliant with current code regulations, there are a handful that are non-compliant. The non-compliant buildings are older structures that are not subject to current codes due to grandfather clauses in the codes. These structures present some of the highest risk for the SLCFD, if they actually catch fire.

The majority of fire injuries and deaths occur in residential structures. However, in light of recent high-profile fires in Chicago and elsewhere, an area of particular concern in Salt Lake City is the downtown area. Specifically, the study team was asked to address the number of sprinklered properties in this area. Sprinklers have been shown to be highly reliable and effective in preventing loss of life and limiting damage. Of 60 high-rise buildings in the downtown area, 37 are fully sprinklered. Another 9 are partially sprinklered, and 5 are not sprinklered at all. Information on the remaining 9 buildings was not available, nor was information on the prevalence of sprinklered buildings elsewhere in the City.

Map 1: High-rise Buildings
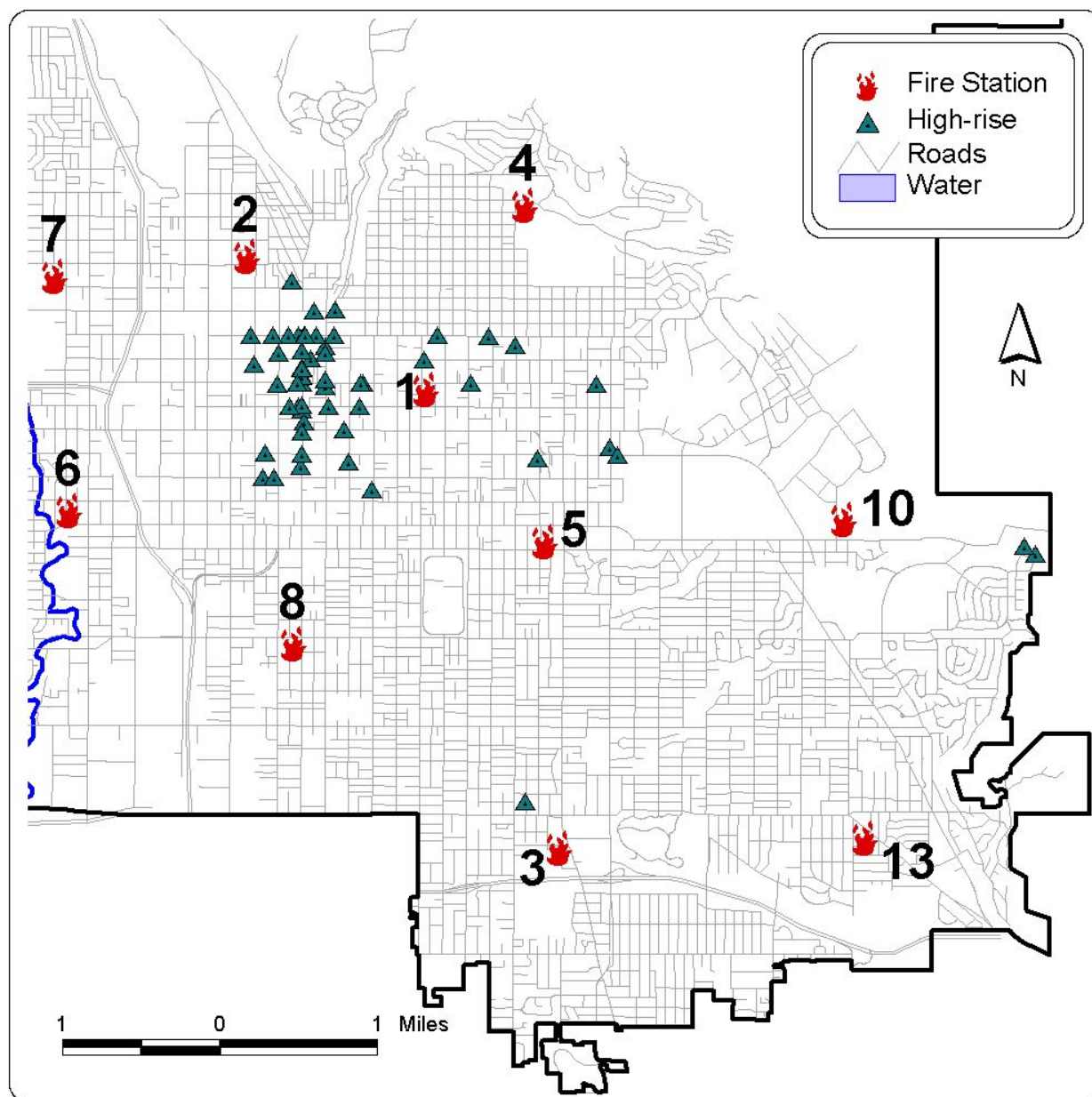
Street Network – The street network in Salt Lake City ranges from straight, grid patterned city roads to limited access high-speed interstates. This presents the Department with a wide range of vehicular risks to deal with as well as a wide array of travel speeds for responding to incidents.

The three major highways that run through Salt Lake City are: I-80, I-15, and I-215, as shown on Map 2. I-15 is a major north-south highway that provides a pipeline from Arizona to Idaho. I-80 is a major east-west conduit that runs from Colorado to Nevada.

Map 2: Major Roads in Salt Lake City
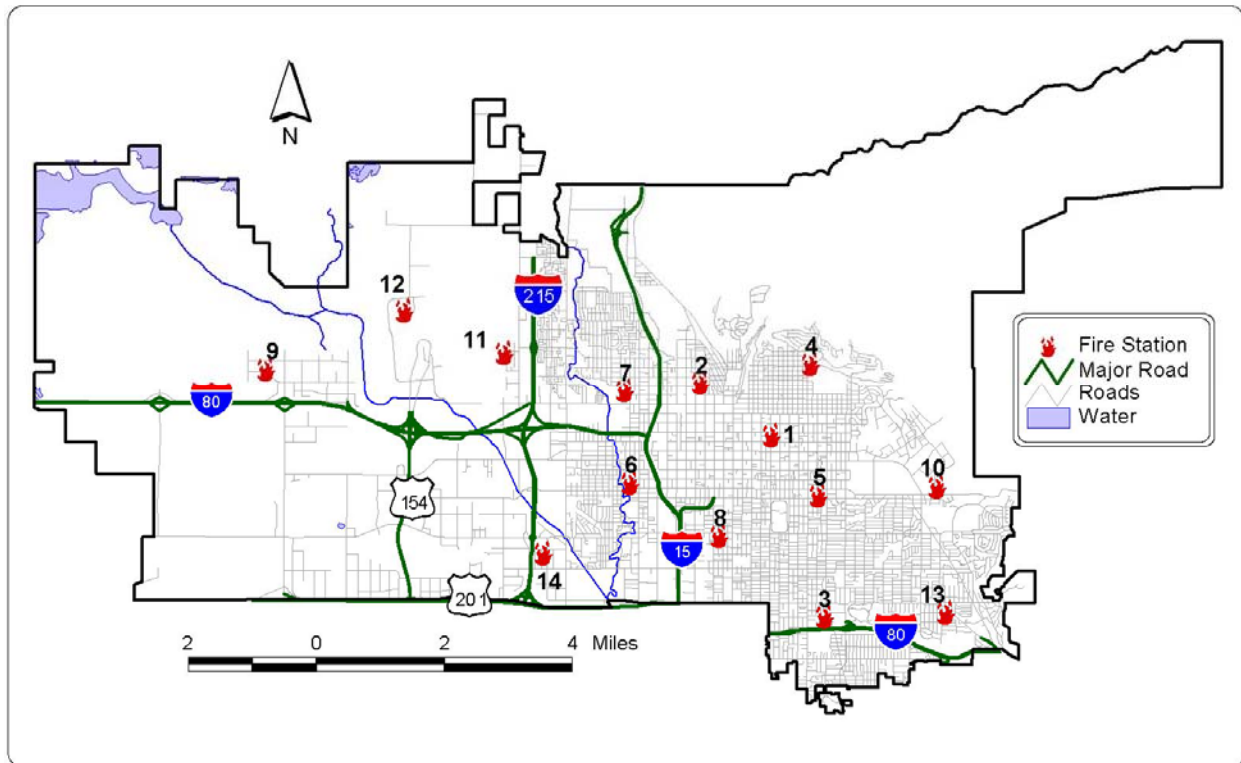
There is a high incidence of vehicle accidents, which include entrapment, car fires, and multi-vehicle accidents for emergency personnel to deal with. The interstate corridor through the heart of Salt Lake City also is a major truck route, with the potential for hazardous payloads creating major emergency incidents.

Highways also present a two-fold risk operationally: a higher chance for accidents while driving at higher speeds in more traffic and a higher risk of being hit by other drivers while at the scene of an incident. SLCFD SOP 08-03 outlines safety procedures for firefighters when working on streets or highways, including using Police Department assistance for traffic control, when necessary. This is an excellent procedure but it could be expanded.

Recommendation 40: Consider implementing extra safety procedures for high-volume and high-speed roads. The new procedure could include dispatching additional apparatus to the scene to provide additional protection. In addition, dispatching units from both directions when responding to incidents on the interstates may provide a faster response (e.g. when the direction with the accident has backed traffic up over a long distance).

Emergency vehicle response times are affected by traffic congestion, the type of roads being driven, and a number of measures taken by communities to control and reduce traffic in residential neighborhoods. Narrow streets, one-way streets, and traffic calming measures all

impact emergency vehicle response times, mostly be increasing them. The impact of traffic calming was discussed in the pervious chapter.

Earthquakes – The Wasatch Fault runs 240 miles from southern Idaho to central Utah and under the eastern side of Salt Lake City. This fault presents the greatest earthquake risk in the interior western United States. The risk is calculated both on the probability of an earthquake, possible magnitude of earthquakes, and the concentration of people. With 75–80 percent (1.6M+) of Utah's population living along the Wasatch Front (the area around the Wasatch fault), even a small quake could produce millions of dollars in damage.

The last major earthquake along the Wasatch fault was somewhere between 400 and 600 years ago. Experts are not currently capable of predicting when the next large earthquake will occur; however, estimates put the chance of a significant earthquake (5.0 magnitude or higher) on the Wasatch fault between 13 and 25 percent in the next 50 years. Experts speculate that the Brigham City and Salt Lake City segments may be the next location of a major earthquake along the fault.[29]

Wildfires – Wildfire risks are generally defined in terms of wildland-urban interface areas, which come in multiple forms. Occluded interface areas are completely surrounded by urban development such as city parks. Mixed interface areas are covered predominantly by vegetation but have some homes and other structures. According to the Utah Division of Emergency Services and Homeland Security, Salt Lake City has about 3,000 acres of mixed interface areas. Finally, there are the classic interface areas where homes abut wildland vegetation along a broad front. Salt Lake City has about 950 acres of classic wildfire threat.[30]

Weather patterns in the area increase the risk of wildland fires in the summer with high temperatures and low precipitation. Drought has been a problem in the area for the last five years. The longer a drought lasts, the higher wildland fire risk grows.

Hazardous Materials (Hazmat) – Hazardous materials risks arise in manufacturing facilities, transportation networks, and many other places. In Salt Lake City, there is a hazmat risk on the interstates and extensive railroad system and in various industrial areas, primarily located in the southwestern area. Union Pacific is the nation's largest hazmat carrier and operates trains through Salt Lake City.

There are hundreds of chemical plants in and around Salt Lake City. Some contain highly toxic substances and processes with the potential to cause a major incident. There are also

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[29] Source: Utah Geological Survey Public Information Series 40, *The Wasatch Fault*, 1996.
[30] Source: http://emergencymanagement.utah.gov/hazards/wildfire.htm.

numerous tank farms and oil refineries on the airport grounds and within the city limits that pose potential risks.

The SLCFD keeps track of all facilities in the city with hazmat permits. Those that pose the highest risk are shown in Map 3. They include three refineries, Union Pacific Rail Yards, propane companies, pharmaceutical labs, recycling centers, and others. The map shows that the risks are spread through much of the city.

In response to the hazmat risks, the SLCFD has a hazmat team and detailed hazardous material response plan. A specialty hazmat unit (Hazmat 6) operates from Station 6. (Hazmat response and operations are discussed in detail in Chapter VI, *Fire Operations*.)

University Of Utah – The University of Utah (U of U) has a 1,500 acre campus in eastern Salt Lake City. Fall 2004 enrollment at U of U was 28,933 with about 3,500 students and faculty living on campus.[31] The University is one of the top research universities in the nation and has a nuclear research/testing facility that is of particular concern to the SLCFD. There are also the normal risks associated with any large campus in excess of 28,000 students with regards to fire service operations. Some of the laboratories at the university use radioactive materials in their research; these labs are required to adhere to strict university policies and procedures to prevent the accidental release of or exposure to such materials. The SLCFD does not have a specific response protocol for radiological incidents at the university; rather, the Department's hazmat unit uses an all-hazards hazardous materials response plan, which addresses the response to and command of hazmat incidents. (This is addressed in more detail in Chapter VI.)

Weapons of Mass Destruction/Terrorism – Weapons of mass destruction (WMD) are generally defined as chemical, biological, or radiological devices or attacks designed to inflict mass casualties and environmental contamination. Credible threat assessments indicate that terrorist groups have the capability of deploying such devices of agents with the United States. In addition, the Oklahoma City bombing and the World Trade Center disaster prove that terrorist attacks can occur anywhere.

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[31] Source: http://www.utah.edu/unews/facts/index.html.

Map 3: SLCFD High-Risk Hazmat Permit Locations
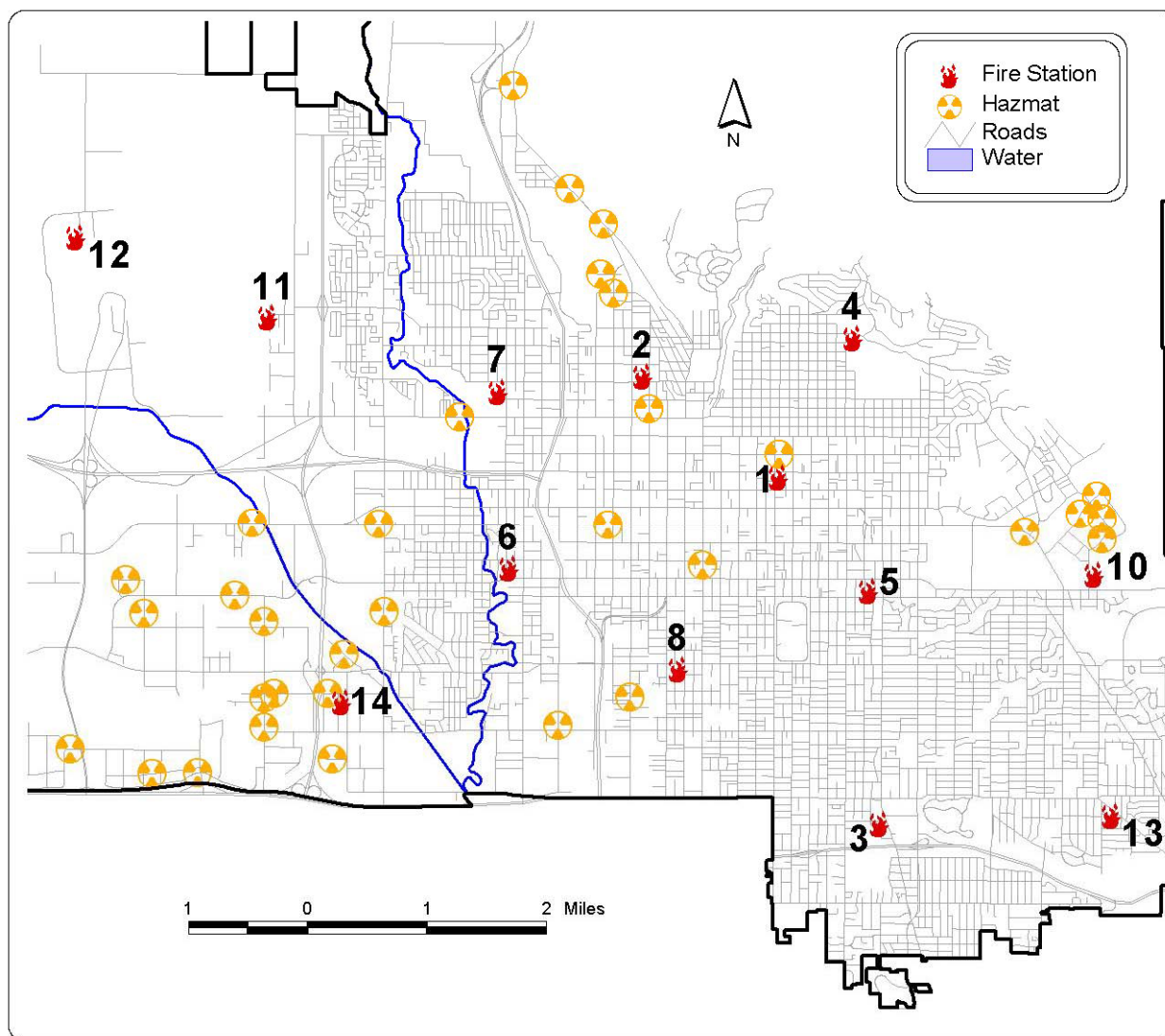
The use of WMD has taken on a new meaning in the 21st century. While the likelihood of having to deal with a WMD incident in the area is small, the Department and the City are wise to ensure sufficient planning for these events. The SLCFD is ahead of many metro departments in planning and training for such events in response to its preparations for the 2002 Winter Olympics. Planning and training should continue to keep the Department up-to-date with current threats.

Population

Salt Lake City covers approximately 110 square miles in north central Utah and, according to the U.S. Census, was home to 181,743 people in 2000. With commuters and visitors, the daytime population in the city can swell to 500,000.

The 1990 Census put the City's population at 159,928. This is an annualized growth of 2.7 percent. While this rate is best described as moderate growth, increases in population at this rate over 10 years can have significant impacts on emergency service delivery. Salt Lake City's population has fluctuated significantly over the past four decades as shown in Figure 8.

Figure 8: Salt Lake City Population, 1960–2000[32]
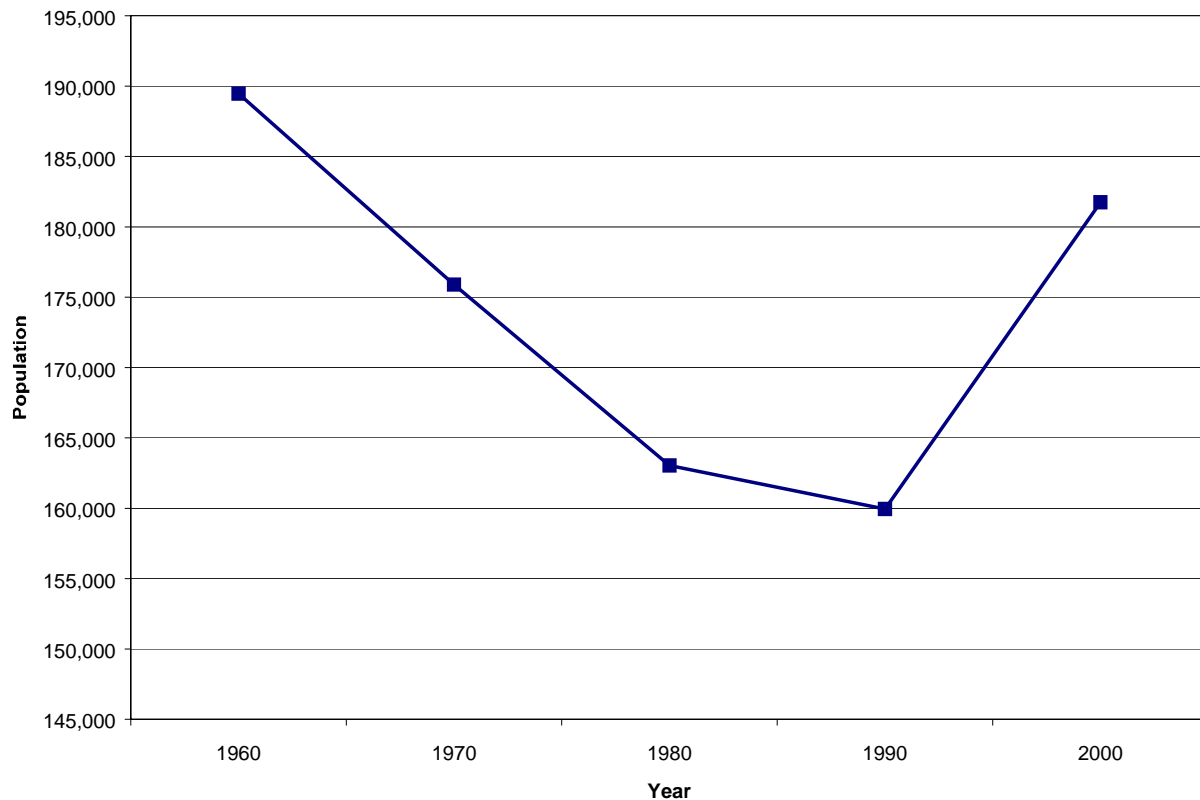
While the U.S. Census is an excellent source for population and other demographic information, local planning groups in metro areas typically have more up-to-date and detailed statistics. The Salt Lake City Planning Department suggested the use of population projections from the Wasatch Front Regional Council (WFRC) for this study.[33]

The WFRC projected population at the city level as well as by traffic analysis zone (TAZ).[34] (TAZ projections are used later in this chapter when looking at population and demand by area of the city.) City level projections use a growth rate method, which took the median

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[32] Source: U.S. Census.

[33] The Wasatch Front Regional Council is a metropolitan planning organization designated by the Governor of Utah to oversee transportation planning in the Salt Lake and Ogden areas.

[34] A traffic analysis zone (TAZ) is a common unit of analysis employed by planning offices throughout the United States. Although TAZs do not have intuitive meaning, they provide a good analytical platform because they are relatively stable over time; they are mutually exclusive; and they are exhaustive (meaning they are designed to completely cover a given geographic region).

growth rate for each city from 1990–1998 according to U.S. Census estimates. The rate was then applied to the 1998 estimates and assumed to continue until a city reached 90 percent of calculated buildout. At the 90 percent buildout mark and each year after, the growth rate was halved. Finally, city and unincorporated area population projections were controlled using a factor applied across all cities. The control factor was to keep the total projections in line with county projection totals.

According to WFRC projections, the population of Salt Lake City is expected to grow at an annual rate of under one percent per year. The population is expected to exceed 190,000 in the next decade and reach nearly 200,000 by 2025. These expectations are illustrated in Table 21.[35]

Table 21: Population of Salt Lake City, 2003–2025

Year	Population
2003	184,507
2005	185,336
2010	187,259
2015	191,317
2020	193,130
2025	195,062

In order to determine past demand, estimates for each year are necessary. The difference between population projected by the WFRC and the past estimates (both WFRC and U.S. Census) would have caused a discontinuity and skewed the trend data. Therefore, a reverse interpolation method was used. The reverse interpolation method is a simple linear calculation of the population each year between the years already known (1991 to 2002) using the rate of growth predicted by the WFRC.[36] The past and future population used for the analysis is shown in Figure 9.[37]

Overall, by 2025 Salt Lake City's population is projected to increase only 5.7 percent over 2003 levels.

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[35] Wasatch Front Regional Council, *Wasatch Front Region Small Area Socioeconomic Projections: 2002-2030 Technical Report #42*, p. 16, October 2003. Available online at http://www.wfrc.org/resources/sedata/tr42.pdf.

[36] All data are estimates and no implication of accuracy or a lack there of is expressed by this report.

[37] Population was adjusted to correlate to the beginning of the year for corresponding demand data. Demand data was provided for calendar years 1991–1999 and fiscal years 2001–2004. Thus, the population in calendar year 1991 correlates to January 1, 1999, and the population for fiscal year 2001 correlates to July 1, 2000.

Figure 9: Salt Lake City Past and Future Population, 1990–2025
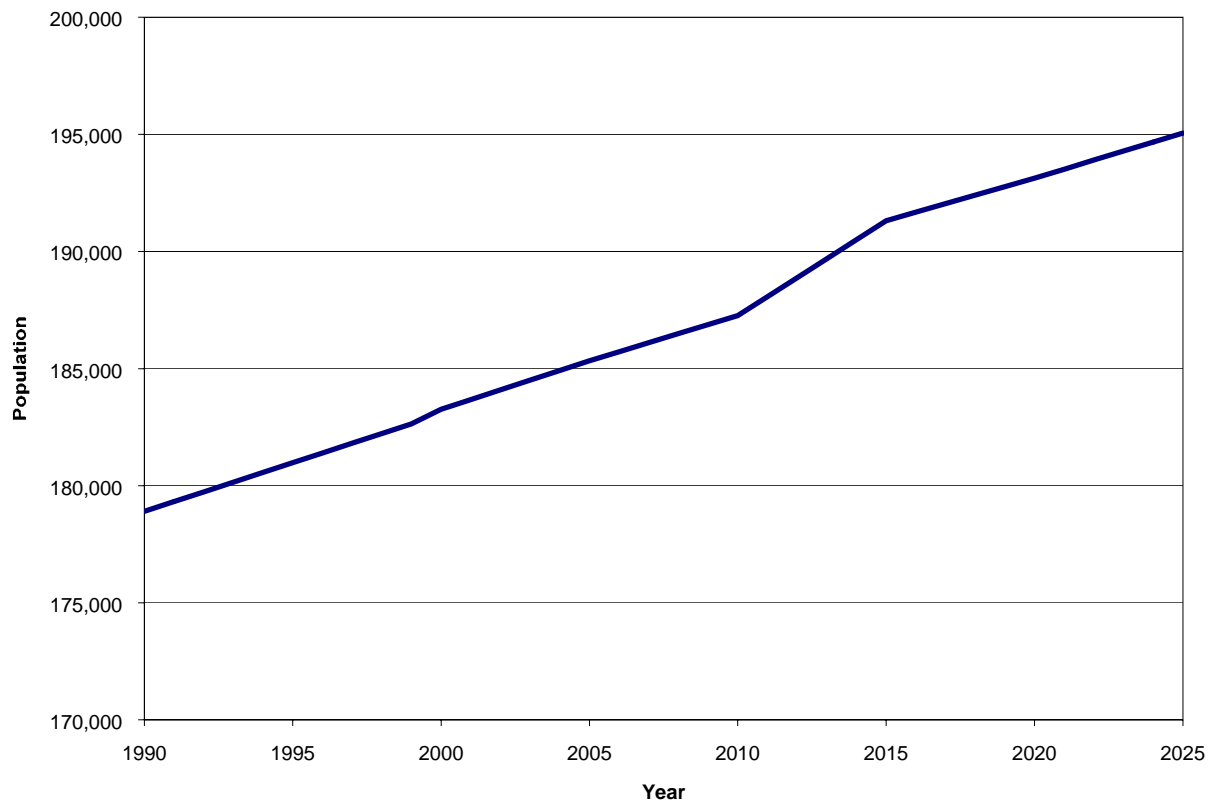
Aging Demographics

Studies have shown that the elderly create a disproportionate amount of workload for fire departments; a high percentage of most departments' medical workload comes from the population age 65 and over. Data from the 1990 and 2000 censuses and the next change in percent of the population by age range is shown in Table 22. All values shown are percentages of the total population of Salt Lake City with the exception of the median age, which is expressed in years.

Table 22: Aging Demographics of Salt Lake City's Population

Year	55 and over	65 and over	55 to 84	55 to 64	45 to 54	Median age
1990	21.3%	14.5%	19.6%	6.8%	7.4%	31.0[38]
2000	16.9%	11.0%	15.2%	5.9%	10.8%	30.0
National 2000	*21.1%*	*12.4%*	*19.6%*	*8.6%*	*13.4%*	*35.3*
Net change	**-4.4%**	**-3.5%**	**-4.4%**	**-0.9%**	**3.4%**	

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[38] This is an approximate value that is accurate within one year of age. Median age was not included in the 1990 Census.

The percentage of the population age 65 and over is an intermediate measure. This is the age group commonly defined as senior citizens. A net change of -3.5 percent between 1990 and 2000 likely affected per capita demand for emergency medical care in a negative fashion (that is, less demand, which is good). The future percentage of senior citizens is the product of two factors. First of all, the population between age 55 and 64 is added to the population age 65 and over within ten years. The other factor, net migration by senior citizens, is considered minimal. The percentage aged 55 and over and the percentage between ages 55 and 84 has decreased. This implies that the overall contribution to population totals by those 65 and over will decrease over the next ten years. The final column, median age, is an overall indicator of the aging of the population. Both in 1990 and 2000, the average citizen of the City is approximately 31 years old. Overall, due to the expected small decrease in the percentage of the population age 65 and over, aging of the population is not expected to be a major factor in increased medical workload.

Demand

As noted before, the SLCFD's long-term needs depend partially on the expected future demand for services and workloads of individual units. Demand is the number (and types) of calls for service—services provided by the entire fire department. Analysis of demand indicates which times of day certain services are used the most, and allows decision-makers to consider alternative deployment and staffing methodologies (e.g. staffing extra units during peak demand times).

Demand for service varies greatly between communities for a number of reasons. For example, the degree of urbanization, community income level, and overall age and health of the population impact demand. Demand also is affected by the degree to which fire and EMS services are publicized and to which the public is encouraged to call for service. Citizens will typically call for 911 services proportionately more in a city than in rural areas with suburban communities somewhere in between.

On average, the SLCFD responds to about 24,000 incidents a year, of which 70–75 percent are EMS calls. The number of incidents is not to be confused with the number of unit responses, which will be discussed shortly. An emergency call may require the response of more than one unit, but only one incident number is generated. For example, the SLCFD dispatches two engines and a truck to a garage fire; this is one incident with three unit responses.

Current Demand – Demand is distributed across the system (among stations and units) and varies by hour (Figure 10), day (Figure 11), and month (Figure 12). Differences in activity result from the characteristics of the community, such as where people live, more people being awake during the day than at night, more people driving on the roads on the weekends, and more

people grilling food outside during the summer. Severe storms, high heat, droughts, average age of the population, and education are also factors that affect demand.

In FY04, Salt Lake City experienced 73 percent of overall demand for service between the hours of 8 A.M. and 10 P.M. Demand is lowest in the early morning between 4 A.M. and 6 A.M. However, demand is relatively steady throughout the week, peaking on Fridays and lowest on Sundays. Demand also peaks in July and December due to an increase in the number of fire calls. In 2003, fire demand reached about 650 calls in July and 675 in December, a 70 to 80 percent increase from January and February's lows around 395. EMS calls also peaked at just under 1,700 in July and December of 2003, which is a 23 percent increase over the low in February. These trends were the same for CY03, FY04, and the first nine months of CY04 which, in the absence of multiple years of data, indicates a regular trend.

Figure 10: SLCFD Demand by Time of Day, FY04
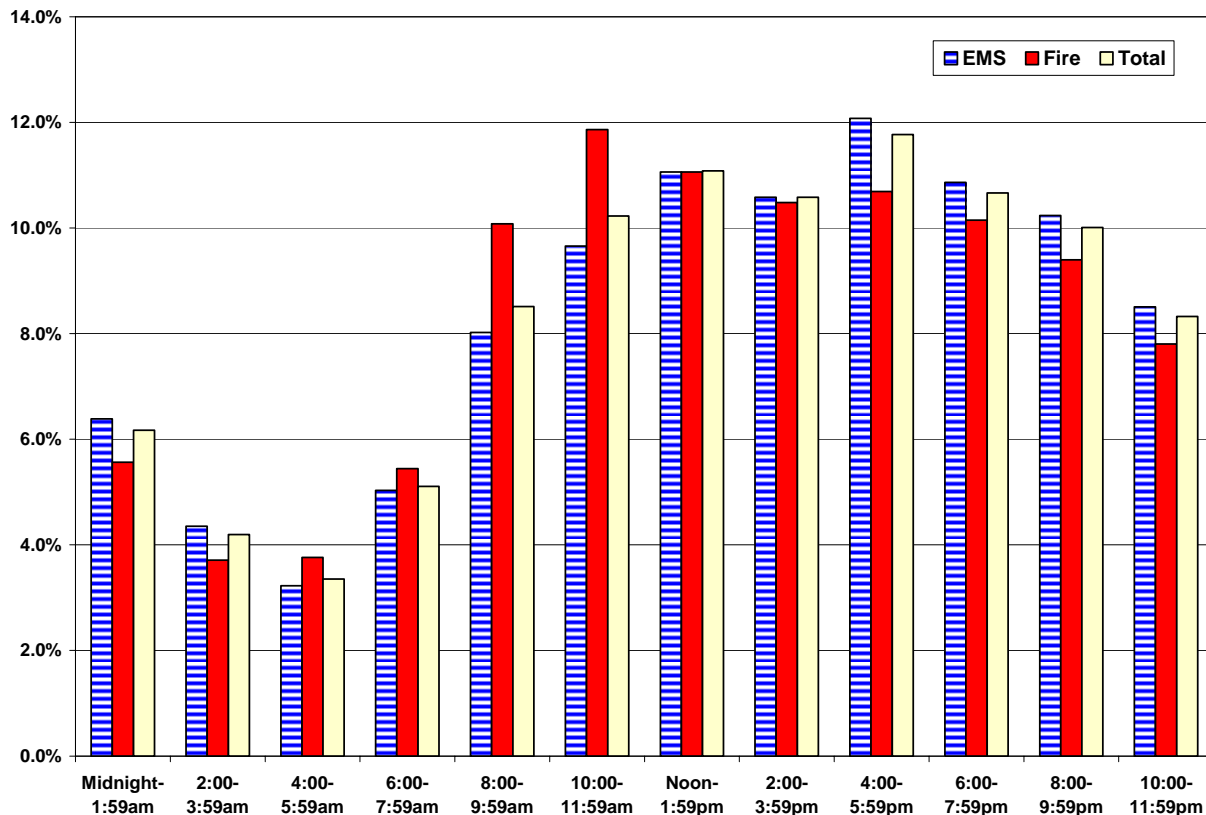
Figure 11: SLCFD Demand by Day of Week, FY04
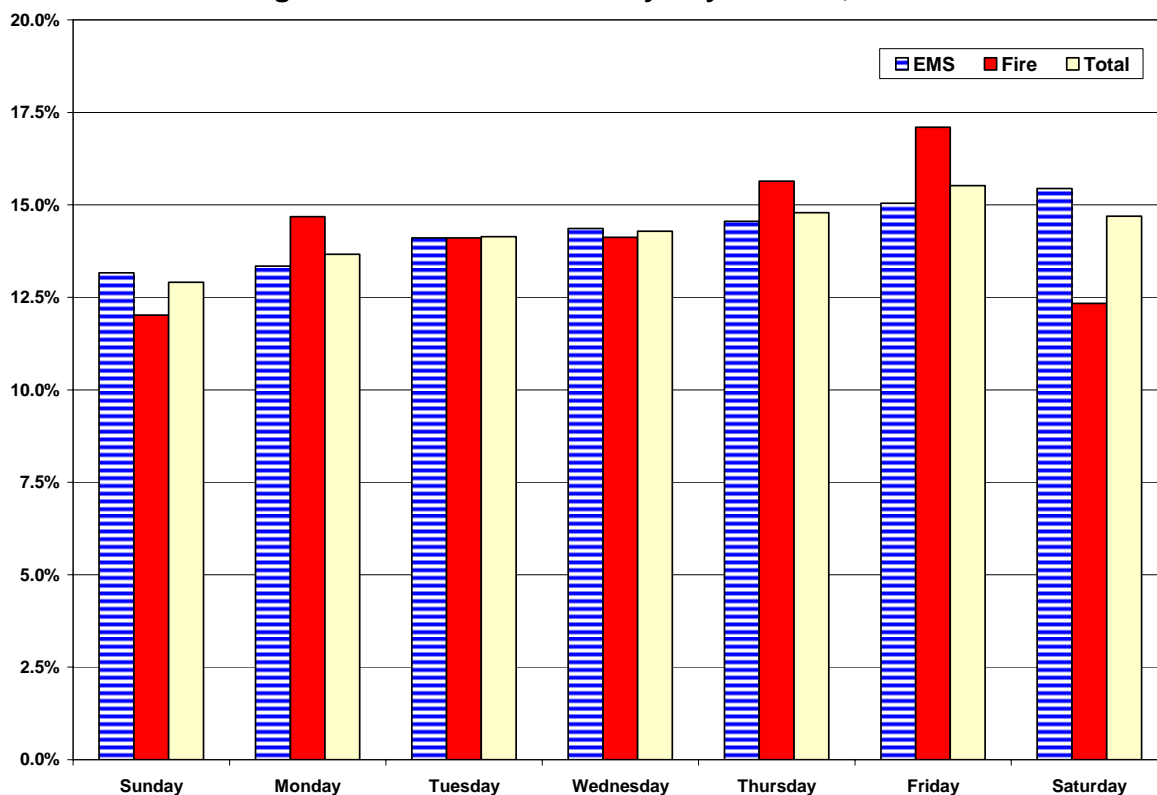
Figure 12: SLCFD Demand by Month, FY04
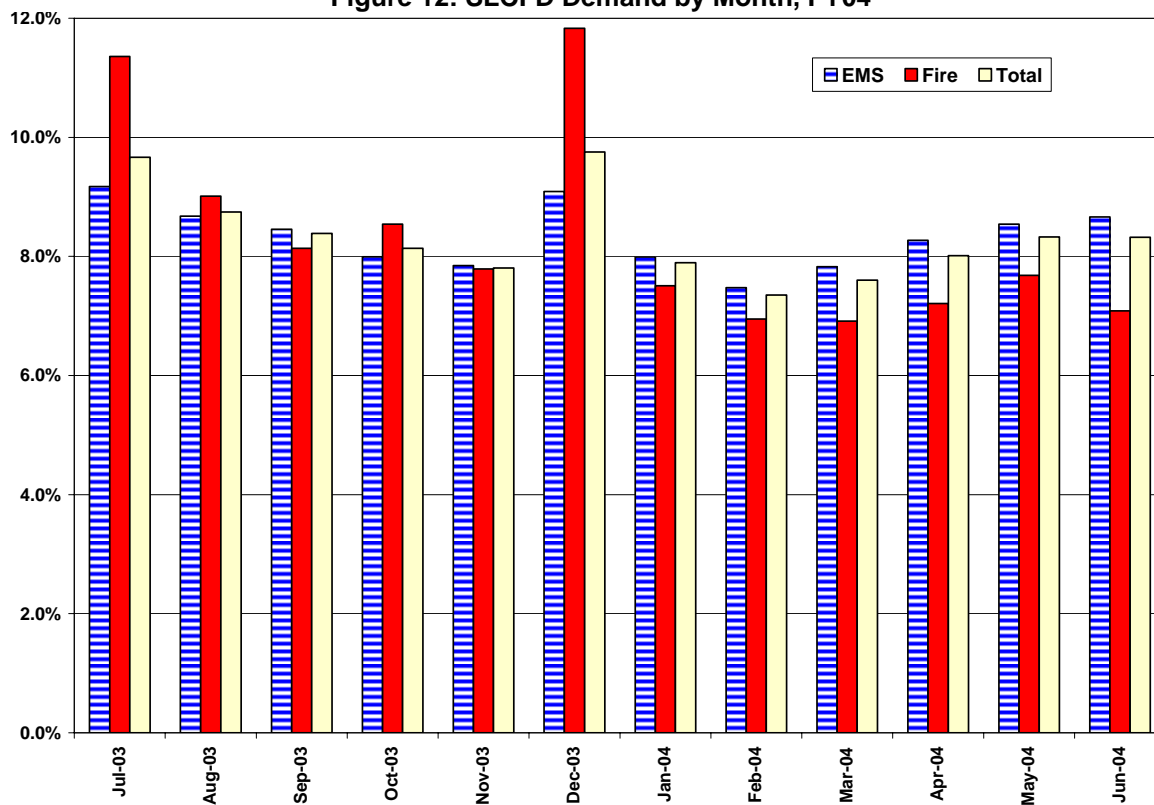
Past Demand – Table 23 shows demand for services divided into two categories: EMS and fire/non-EMS. Until 1999, the SLCFD reported incident totals by calendar year. In 2000, the Department switched to reporting by fiscal year (FY). Because of the switch, incidents between January 1, 2000, and June 30, 2000, were not available; however, due to the large time period of data collection (13 years) and relative consistency in demand, this did not pose a statistical problem.

Table 23: Salt Lake City Fire Department Incidents, 1991–2004

Year	EMS	Fire	Total
1991	14,942	4,727	19,669
1992	16,463	5,145	21,608
1993	17,652	5,117	22,769
1994	18,428	5,447	23,875
1995	18,885	5,283	24,168
1996	18,881	5,640	24,521
1997	20,659	5,529	26,188
1998	19,522	6,020	25,542
1999	19,664	6,085	25,749
FY01	18,867	6,354	25,221
FY02	19,782	6,426	26,208
FY03	18,497	5,508	24,005
FY04	18,598	5,704	24,302

Demand leveled out between 1997 and FY02 before dropping over the last two years. Overall since 1991, demand has been increasing (Figure 13). The dashed line on the graph shows the linear trend in demand between 1991 and FY04.

Per Capita Demand – The size and relative age of the population and past demand work together to project a department's demand. An important factor involving both population and demand is demand per capita—the number of incidents requiring response divided by the size of the population, yielding the number of incidents per person.

Demand for Fire Department service since 1991 was analyzed in order to predict future demand. Here demand refers to incident totals divided by the population of the city. Population is defined here as the population of the city at the beginning of the time period; for example, July 1, 2001 population will correspond to incident totals for the year 2002. Some adjustment of population estimates for the years 1991–1999 was required and this adjustment is reflected in the trend analysis.

Figure 13: Trend in Total Incidents, 1991–2004
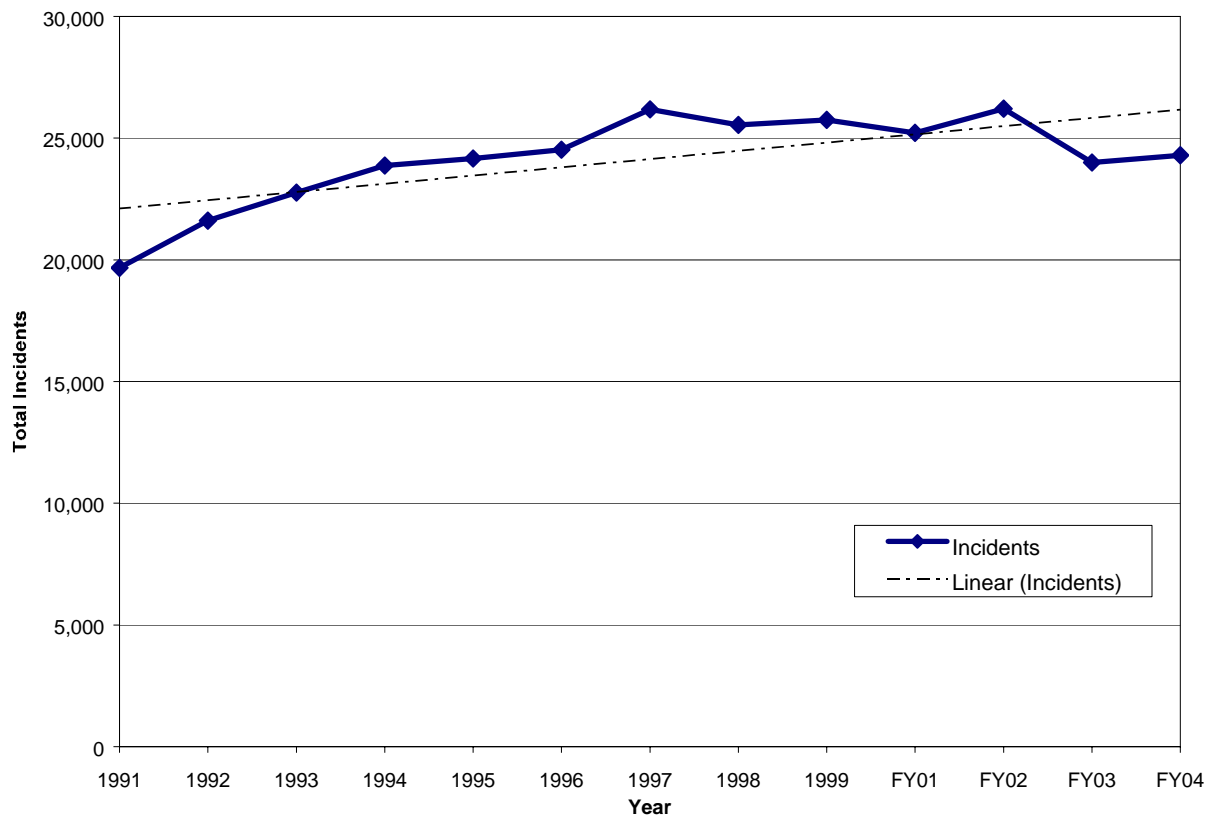
Using the historic population discussed above, Table 24 and Figure 14 show the number of incidents per 1,000 population from 1991 through FY04. EMS incidents represent the majority of demand for the SLCFD, with an average 101.8 incidents per 1,000 people.

Table 24: Salt Lake City Fire Department Demand per 1,000 Population, 1991–FY04

Year	EMS	Fire	Total
1991	83.3	26.4	109.7
1992	91.6	28.6	120.2
1993	98.0	28.4	126.4
1994	102.1	30.2	132.2
1995	104.3	29.2	133.5
1996	104.1	31.1	135.2
1997	113.6	30.4	144.0
1998	107.1	33.0	140.2
1999	107.7	33.3	141.0
FY01	103.0	34.7	137.6
FY02	107.7	35.0	142.7
FY03	100.5	29.9	130.4
FY04	100.8	30.9	131.7
Average	**101.8**	**30.9**	**132.7**
Percentage	76.7%	23.3%	100.0%

Figure 14: Fire Department Incidents per 1,000 Population, 1991–FY04
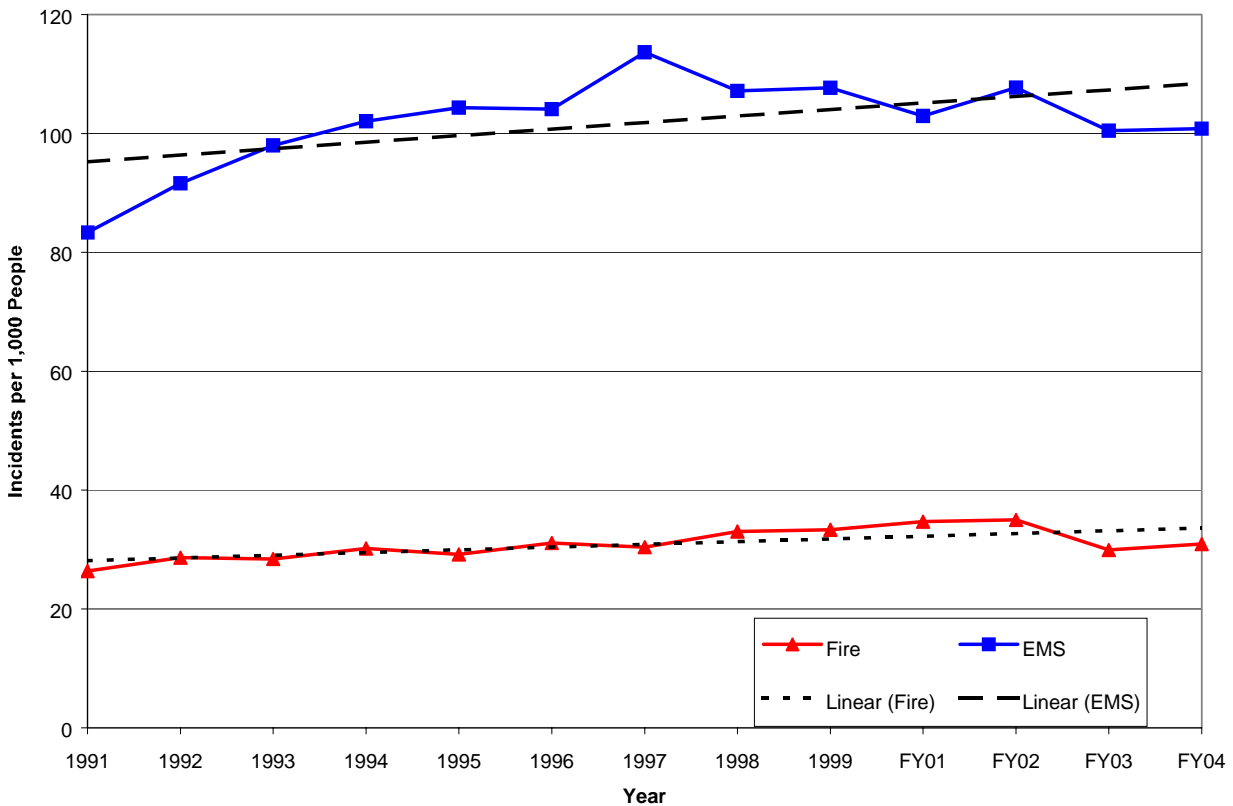
Per capita demand for EMS peaked in 1997 and then showed an overall decline; however, the overall trend in EMS demand is slightly upward, which is the trend nationally. Per capita demand for fire and other non-EMS is also trending slightly upward in Salt Lake City, with a slight decline in FY03 and FY04. Nationally, fires are occurring less and less; therefore, the increase in demand in this category is likely due to increase demand for other non-EMS services.

Recommendation 41: Begin tracking incident totals with more detailed categories. The current CAD system tracks incident types with nearly 1,000 different codes. The codes are part of the priority dispatch system used and determine what type and how many apparatus to send to an incident. These codes can also be used to track demand by more detailed categories, including multiple levels of EMS (e.g. ALS vs. BLS), types of fires (structure, vehicle, and grass), hazmat, good intent, false alarms, non-emergency, etc. A more accurate breakdown of incident types over multiple years will allow the SLCFD to more accurately project demand and tailor the deployment of resources.

Several mathematical measures were analyzed for each category including mean increase, geometric mean increase, and linear regression. Mean increases of both incident categories were determined to best fit the data. The per capita demand growth rates for EMS and fire and non-EMS incidents were calculated as 2.3 and 1.3 percent respectively.

Demand Projections

The incident projection model used for this study was developed over 20 years of conducting fire department studies. This model allows for demand increases due to both population increase and changes in per capita demand. The two methods discussed below produce high and low boundaries into which a future year's incident totals can be expected to fall.

The first method for estimating the number of incidents in a future year is to assume the current per capita demand for service will remain constant. In this case, demand grows in proportion to population growth. Since population growth is predicted to be fairly minimal, this method produces the best-case scenario for SLC. However, in most cases, per capita demand has been shown to increase over time; thus, the demand predicted with this method will often fall short of the true value.

The second projection method assumes that per capita demand will grow similarly to the historic trend. The number of incidents projected in this fashion tends to be above the true value since demand fluctuates and per capita demand levels off eventually.

The number of incidents in a given year can be predicted to fall between the two projections with a high degree of certainty.

Using the WFRC population projections and the per capita demand rates discussed above, high and low projections through the year 2025 were created. Keeping in line with the Department's current reporting procedures, future demand projections correspond to fiscal years.

Table 25 shows the projections for EMS. The low demand projection grows only as a result of projected population increases but has been supplemented by a one-time increase, which reflects the unlikelihood of zero growth in per capita demand. The high incident totals are a product of both population growth as well as the observed growth in demand of 2.3 percent annually. This growth rate is applied for 10 years before being slowed by one-half. Totals are expected to exceed 19,000 in 2005 and could exceed 24,000 by 2015.

Table 25: Projected EMS Incidents, FY05–FY25

Year	Low	High
FY05	19,067	19,952
FY10	20,162	21,582
FY15	20,554	24,366
FY20	20,798	26,101
FY25	21,004	27,906

Fire and other non-EMS incidents were projected in a similar fashion. Table 26 shows the high and low demand projections through 2025. Again the observed growth rate of 1.3 percent was applied to population growth to produce the high incident projections. This growth was also slowed after 10 years by a factor of one-half. Totals are expected to reach 5,800 in 2005 and could surpass 6,700 by the year 2015.

Table 26: Projected Fire and Other Non-EMS Incidents, FY05–FY25

Year	Low	High
FY05	5,791	5,867
FY10	5,929	6,244
FY15	6,044	6,748
FY20	6,116	7,054
FY25	6,176	7,359

The two incident categories are combined to create a total projection envelope, shown in Table 27 and Figure 15. Again, a future year's total can be expected to fall between the low and high projections. Since over 10 years of data were available, these projections are considered very accurate for the next 5 years and fairly accurate for the next 10 years. After 10 years, the reliability of the projections begins to degrade significantly. The demand projections should be updated every year as new data becomes available.

Table 27: Salt Lake City Total Demand Projections, FY05–FY25

Year	Low	High
FY05	24,859	25,819
FY10	26,091	27,826
FY15	26,598	31,113
FY20	26,914	33,155
FY25	27,181	35,264

Figure 15: Salt Lake City Total Demand Projection Envelope
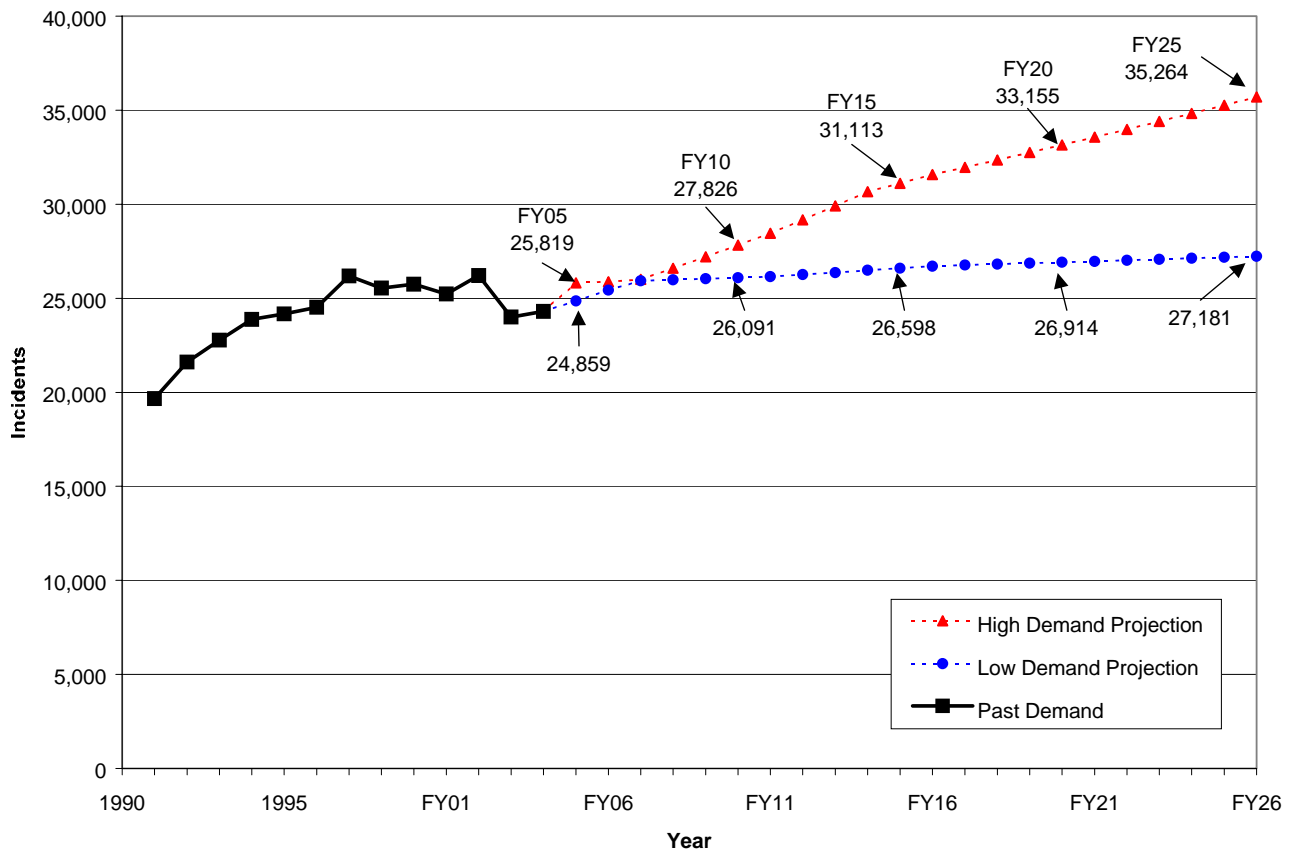
Workload

Workload is a product of two factors: individual unit responses and incident durations. Table 28 summarizes the number of responses by each unit in FY04. As can be seen, there are major differences in workloads across units: only 1(Engine 1) had a very high workload with over 3,000 responses annually, 6 had high workloads, 7 were moderate, and only 2 were low, with under 1,000 responses. (Workload levels and their impact on system performance goals were discussed in the previous chapter.)

It is difficult to evenly distribute the workload among units because it is largely geographically driven. For example, Engine 9 (the least busy) is located in a sparsely developed industrial area while Engine 1 (the busiest) is located downtown, surrounded by the highest population density. Units are, however, needed in the areas with lower demand if response times are to be kept at acceptable levels throughout the city. Having good response times everywhere in the city benefits all citizens because one never knows where one will be involved in an auto accident or be visiting a friend or store where a fire or medical emergency occurs.

Table 28: SLCFD Responses by Unit, FY04

Unit	Responses
Engine 01	3,110
Rescue Engine 02	2,867
Rescue Engine 03	1,972
Rescue Engine 04	1,499
Rescue Engine 05	2,315
Engine 06	1,906
Rescue Engine 07	2,264
Rescue Engine 08	2,374
Engine 09	561
Engine 10	1,186
Rescue Engine 11	1,332
Rescue 12	1,186
Engine 13	903
Rescue Engine 14	1,376
Truck 02	2,616
Truck 05	1,824
Truck 08	1,938
Total	**34,407**

The second portion of workload, the average time spent on a call (duration), was calculated for each unit in FY04. Table 29 shows UHUs (based on responses given in Table 28).

Table 29: SLCFD UHUs, FY04

Unit	UHU %
Engine 01	9.9
Rescue Engine 02	13.2
Rescue Engine 03	10.3
Rescue Engine 04	6.2
Rescue Engine 05	11.2
Engine 06	6.9
Rescue Engine 07	12.1
Rescue Engine 08	12.1
Engine 09	2.4
Engine 10	4.2
Rescue Engine 11	6.1
Rescue 12	6.8
Engine 13	3.5
Rescue Engine 14	7.1
Truck 02	7.7
Truck 05	5.4
Truck 08	6.0
System-wide	**7.3**

While Engine 1 had the most responses in FY04, its UHU is neither the highest, nor near the 20 percent threshold discussed in Chapter III. Rescue Engine 2 had the highest UHU at 13.2 percent, which is reasonable. This analysis indicates that SLCFD units are not excessively busy and are usually available for the next call. This also indicates that as long as response durations do not increase significantly, all units are capable of handling a lot more calls as demand increases. In fact, based on the current average duration for an engine response, an engine would have to make 5,657 responses in a year to reach a UHU of 20 percent. Rescue engines would need to make 4,144 responses a year to reach the 20 percent UHU level.

UHU does vary by time of day based on the variation in demand discussed above. A sampling of UHUs by time of day for the busiest units shows much higher workloads during the afternoon (Table 30). UHUs for Rescue Engine 02 approach 20 percent from 6 P.M. to 10 P.M. This spike in workload indicates the possible need an additional unit in this area during the afternoons, or the redistribution of rescue engines. Extended response times during the peak period would be a second indicator and is considered in the next chapter. The timing and placement of a peak demand unit in the central region is discussed in detail in Chapter V.

Table 30: SLCFD UHUs by Time of Day, FY04

	E01	RE02	RE03	RE05	RE07	RE08
Midnight–1:59 A.M.	9.4%	11.6%	5.9%	9.0%	8.3%	10.5%
2:00–3:59 A.M.	5.4%	6.4%	4.8%	6.5%	8.3%	7.5%
4:00–5:59 A.M.	5.0%	5.6%	4.6%	6.2%	5.7%	3.8%
6:00–7:59 A.M.	4.8%	6.9%	6.1%	7.0%	5.8%	8.4%
8:00–9:59 A.M.	9.1%	14.0%	11.8%	13.4%	8.8%	13.9%
10:00–11:59 A.M.	9.5%	15.8%	13.1%	15.5%	14.1%	15.2%
Noon–1:59 P.M.	12.5%	16.3%	14.7%	15.7%	16.0%	15.8%
2:00–3:59 P.M.	13.3%	14.9%	14.8%	13.1%	16.3%	15.5%
4:00–5:59 P.M.	12.6%	16.8%	14.9%	13.2%	16.0%	16.0%
6:00–7:59 P.M.	13.6%	19.0%	13.6%	15.7%	15.5%	14.7%
8:00–9:59 P.M.	12.4%	19.0%	12.1%	12.3%	17.8%	14.2%
10:00–11:59 P.M.	11.4%	13.1%	9.4%	11.3%	11.9%	12.7%
Overall	**9.9%**	**13.2%**	**10.3%**	**11.2%**	**12.1%**	**12.1%**

Recommendation 42: The SLCFD should determine acceptable workload and UHU thresholds and monitor unit UHUs on an annual basis. Regular monitoring of the response profile will allow the Department to add resources as necessary rather than having to compensate after a unit has already become excessively busy.

Analysis using the high demand projections from the previous section, the same unit response to incident ratio (which assumes that growth will occur uniformly throughout the city), and the same demand distribution throughout the day shows that Rescue Engines 02 and 08

could have UHUs near or above 20 percent between 4:00 PM and 10:00 PM by FY10. By FY15,
Rescue Engines 02, 07, and 08 would have UHUs over 20 percent between noon and 10:00 PM
Additional units would surpass the 20 percent mark during various hours by FY20, with all but
Engine 01 reaching that level by FY25. Table 31 shows estimated UHUs by unit by time of day
through FY25.[39] UHUs over 20 percent have been highlighted in gray.

Table 31: SLCFD UHUs by Time of Day, FY05–FY25

FY05	E01	RE02	RE03	RE05	RE07	RE08
Midnight–1:59 A.M.	8.8%	12.3%	6.4%	8.9%	9.0%	10.4%
2:00–3:59 A.M.	5.4%	6.9%	5.1%	6.5%	8.3%	6.7%
4:00–5:59 A.M.	4.4%	5.8%	4.0%	6.1%	5.9%	4.1%
6:00–7:59 A.M.	5.9%	8.2%	6.2%	7.9%	7.2%	8.2%
8:00–9:59 A.M.	10.7%	14.8%	12.1%	14.9%	10.9%	12.4%
10:00–11:59 A.M.	11.8%	16.1%	12.5%	15.7%	13.9%	18.2%
Noon–1:59 P.M.	14.2%	17.8%	15.0%	15.2%	17.8%	15.8%
2:00–3:59 P.M.	14.4%	16.5%	15.9%	13.6%	16.8%	16.9%
4:00–5:59 P.M.	13.8%	19.6%	16.0%	13.6%	17.3%	18.9%
6:00–7:59 P.M.	14.6%	18.3%	14.8%	15.8%	16.6%	15.8%
8:00–9:59 P.M.	11.8%	18.8%	12.8%	12.7%	17.5%	14.0%
10:00–11:59 P.M.	10.9%	13.1%	10.2%	11.4%	12.7%	13.0%
FY10	**E01**	**RE02**	**RE03**	**RE05**	**RE07**	**RE08**
Midnight–1:59 A.M.	9.5%	13.3%	6.9%	9.6%	9.7%	11.2%
2:00–3:59 A.M.	5.8%	7.4%	5.5%	7.0%	8.9%	7.2%
4:00–5:59 A.M.	4.7%	6.2%	4.3%	6.6%	6.3%	4.5%
6:00–7:59 A.M.	6.3%	8.9%	6.7%	8.5%	7.8%	8.9%
8:00–9:59 A.M.	11.5%	15.9%	13.0%	16.0%	11.8%	13.4%
10:00–11:59 A.M.	12.8%	17.3%	13.5%	17.0%	15.0%	19.6%
Noon–1:59 P.M.	15.3%	19.1%	16.2%	16.4%	19.2%	17.0%
2:00–3:59 P.M.	15.5%	17.8%	17.2%	14.6%	18.1%	18.2%
4:00–5:59 P.M.	14.9%	21.1%	17.3%	14.7%	18.6%	20.4%
6:00–7:59 P.M.	15.7%	19.7%	15.9%	17.0%	17.9%	17.1%
8:00–9:59 P.M.	12.8%	20.3%	13.7%	13.7%	18.9%	15.1%
10:00–11:59 P.M.	11.7%	14.1%	10.9%	12.2%	13.7%	14.0%

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[39] These estimates assume that demand grows evenly throughout the city, that response levels do not change, that first-due areas remain the same as in FY04, and that all units remain in service at their current level (i.e. Engine 01 does not become a rescue engine, and Rescue Engine 04 does not drop down to engine).

FY15	E01	RE02	RE03	RE05	RE07	RE08
Midnight–1:59 A.M.	10.6%	14.9%	7.8%	10.8%	10.9%	12.5%
2:00–3:59 A.M.	6.5%	8.3%	6.1%	7.8%	10.0%	8.1%
4:00–5:59 A.M.	5.2%	6.9%	4.8%	7.3%	7.1%	5.0%
6:00–7:59 A.M.	7.1%	9.9%	7.5%	9.5%	8.7%	9.9%
8:00–9:59 A.M.	12.9%	17.8%	14.6%	17.9%	13.2%	15.0%
10:00–11:59 A.M.	14.3%	19.4%	15.1%	19.0%	16.8%	21.9%
Noon–1:59 P.M.	17.1%	21.4%	18.1%	18.3%	21.5%	19.0%
2:00–3:59 P.M.	17.3%	19.9%	19.2%	16.3%	20.3%	20.4%
4:00–5:59 P.M.	16.6%	23.6%	19.3%	16.4%	20.8%	22.8%
6:00–7:59 P.M.	17.6%	22.0%	17.8%	19.0%	20.0%	19.1%
8:00–9:59 P.M.	14.3%	22.7%	15.4%	15.3%	21.1%	16.9%
10:00–11:59 P.M.	13.1%	15.8%	12.2%	13.7%	15.3%	15.7%
FY20	**E01**	**RE02**	**RE03**	**RE05**	**RE07**	**RE08**
Midnight–1:59 A.M.	11.3%	15.9%	8.3%	11.5%	11.6%	13.4%
2:00–3:59 A.M.	6.9%	8.8%	6.5%	8.4%	10.6%	8.6%
4:00–5:59 A.M.	5.6%	7.4%	5.1%	7.8%	7.6%	5.3%
6:00–7:59 A.M.	7.5%	10.5%	8.0%	10.1%	9.3%	10.6%
8:00–9:59 A.M.	13.7%	19.0%	15.5%	19.1%	14.0%	16.0%
10:00–11:59 A.M.	15.2%	20.6%	16.0%	20.2%	17.9%	23.4%
Noon–1:59 P.M.	18.2%	22.8%	19.3%	19.5%	22.9%	20.2%
2:00–3:59 P.M.	18.4%	21.2%	20.5%	17.4%	21.6%	21.7%
4:00–5:59 P.M.	17.7%	25.1%	20.6%	17.5%	22.2%	24.3%
6:00–7:59 P.M.	18.8%	23.5%	19.0%	20.3%	21.3%	20.3%
8:00–9:59 P.M.	15.2%	24.2%	16.4%	16.3%	22.5%	18.0%
10:00–11:59 P.M.	13.9%	16.8%	13.0%	14.6%	16.3%	16.7%
FY25	**E01**	**RE02**	**RE03**	**RE05**	**RE07**	**RE08**
Midnight–1:59 A.M.	12.1%	16.9%	8.8%	12.2%	12.3%	14.2%
2:00–3:59 A.M.	7.4%	9.4%	6.9%	8.9%	11.3%	9.2%
4:00–5:59 A.M.	5.9%	7.9%	5.4%	8.3%	8.0%	5.7%
6:00–7:59 A.M.	8.0%	11.2%	8.5%	10.7%	9.9%	11.2%
8:00–9:59 A.M.	14.6%	20.2%	16.5%	20.3%	14.9%	17.0%
10:00–11:59 A.M.	16.2%	22.0%	17.1%	21.5%	19.1%	24.8%
Noon–1:59 P.M.	19.3%	24.3%	20.5%	20.8%	24.4%	21.5%
2:00–3:59 P.M.	19.6%	22.6%	21.8%	18.5%	23.0%	23.1%
4:00–5:59 P.M.	18.8%	26.7%	21.9%	18.6%	23.6%	25.8%
6:00–7:59 P.M.	19.9%	25.0%	20.2%	21.6%	22.7%	21.6%
8:00–9:59 P.M.	16.2%	25.7%	17.4%	17.4%	23.9%	19.2%
10:00–11:59 P.M.	14.8%	17.9%	13.9%	15.5%	17.4%	17.8%

V. STATION AND APPARATUS DEPLOYMENT

This chapter discusses the deployment of fire stations and emergency response apparatus in Salt Lake City. There are many factors that should be taken into account when determining the appropriate number of stations, including demand for services, population, density of demand and population, size of the jurisdiction, and desired response times. These factors are the primary determinants of the appropriate number of stations, apparatus, and personnel to provide fire and EMS services to an area as well as where to place those resources. Many of these factors were discussed in the previous two chapters. This chapter applies these factors to the current and future situation of the Salt Lake City Fire Department (SLCFD). Focus is placed on:

- Analyzing the Department's response time performance in fire and EMS;
- Providing recommendations for any changes in current station locations and apparatus placement;
- Providing recommendations on how future plans and zoning for the City might affect performance and the current locations of its stations;
- Evaluating whether the City's current development patterns allow for appropriate, necessary, and timely emergency access; and
- Determining whether there are ordinance or policy changes that the City should consider to ensure that the City considers access for emergency equipment as part of all requests for development, including development and access in the foothills.

Methodology

Before any analysis took place, project team members gathered and reviewed information related to properly locating fire stations, including but not limited to:

- Current station locations and building ages
- Current apparatus deployment
- Current zoning and land use and related policies
- National response time standards (see Chapter III)
- Current and projected population (see Chapter IV)
- Current and projected demand and workload (see Chapter IV)

Actual incident data for 2003 and the first nine months of 2004 were gathered from the computer aided dispatch system (CAD). Data included addresses for geocoding, type of incident, units responding, and overall response times.[40] Geographic information system (GIS) files used for the analysis were provided by the City. U.S. Census TIGER/Line files were also used.[41]

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40 Geocoding is a process by which the street address of an emergency incident is translated into latitude and longitude so that it can be placed onto a map.

[41] The Census 2000 TIGER/Line shapefiles are created from the Topologically Integrated Geographic Encoding and Referencing (TIGER) database of the United States Census Bureau and contain data about roads, railroads, water, census tracts, counties, etc.

Due to the size of the city and differences in the areas covered, it would be difficult to complete a thorough analysis while looking at the city as a whole. Therefore, the city was divided into three regions based on current engine first-due districts. Map 4 outlines the three regions.

Map 4: SLCFD Analysis Regions
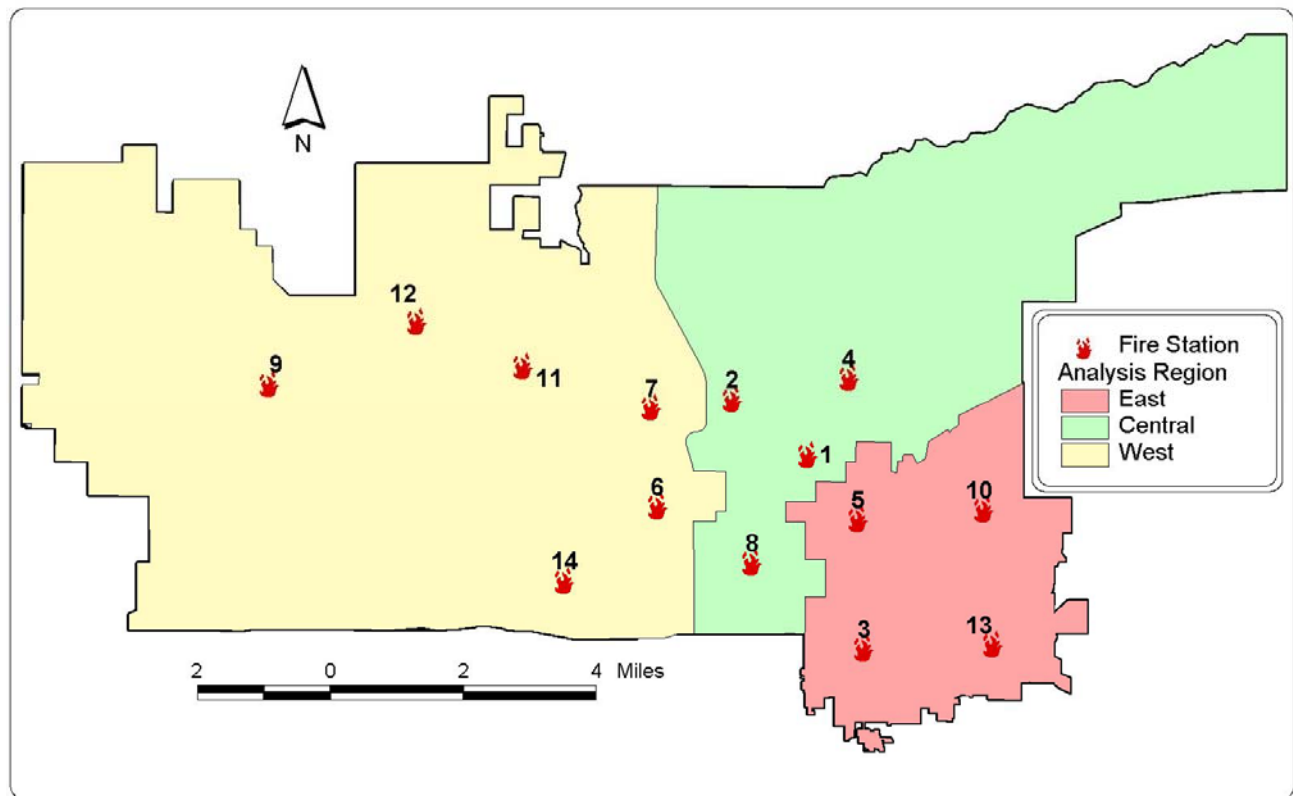
For moderating purpose, reasonable emergency vehicle travel speeds were set for all roads in the city. The City-provided road network file included one-way streets and speed limits. These were both taken into account when setting reasonable travel speeds for emergency apparatus. First, apparatus must obey the one-way street directions. Second, to account for traffic congestion, traffic calming devices, stops, and turns, speed limits were reduced. All speed limits 25 mph and under were maintained; 35 mph and over were reduced by 10 to 25 mph; and 30 mph were reduced by 5 to 25 mph.

Station and apparatus deployment analysis was based on the goals outlined in Chapter III, *System Performance Goals*.

Finally, the study focused on three time periods: 0–5 years, 6–10 years, and 11–20 years in the future.

Current Response Times

The first step in the deployment analysis is a review of Department-wide response times. The analysis of response times included emergency incidents only. Call processing included the first-dispatched unit from each incident. Turnout, travel, and total response times included only engines, trucks, and Rescue 12. These criteria were applied to keep the analysis in line with the standards against which times are being compared.

Call Processing – Call processing time includes both call processing (taking down necessary information) and dispatch (notifying the appropriate units). Some CAD systems track each time segment separately; most do not. Throughout this section call processing time includes dispatch time.

In Salt Lake City, when an individual calls 911, the call is initially answered at the primary public safety answering point (PSAP) operated by the police department. Once the call taker determines that the emergency is fire or medical related, the call is transferred to the fire dispatch center (Dispatch). Fire dispatch personnel then gather necessary information from the caller and dispatch units. All of this time is included in the call processing times discussed below.

Call processing times in Salt Lake City were analyzed for 2003 and the first nine months of 2004. Only first-dispatched units were included for calculating call processing times because additional units may have been dispatched well into the call (e.g. after the first engine arrives and calls for additional resources). In addition, only emergency calls were included.

In 2003, call processing times for the SLCFD averaged 2:42 with a 90th percentile time of 3:32. These times are well above the CFAI and NFPA recommendations of 60 seconds (see Chapter III).

Additional analysis was completed to determine the causes of the extended call processing times. To begin with, applying a 5-minute upper limit to call processing times reduces the average call-processing time to 2:02 and the 90th percentile to 3:18, only a slight improvement. The 5-minute upper limit eliminates extraordinarily high times (due to data-recording mistakes or unusual circumstances) that may skew the data. Out of 24,273 incidents included in the analysis, only 3 percent (approximately 703 calls) had call processing times over 5 minutes.

Some variation can be expected by time of day to correspond with heavier or lighter call volumes. Figure 16 depicts the variation in 90th percentile call processing time by time of day. Despite the variation in call levels, call processing time is relatively steady throughout the day.

Figure 16: 90th Percentile Call Processing Time by Time of Day, 2003
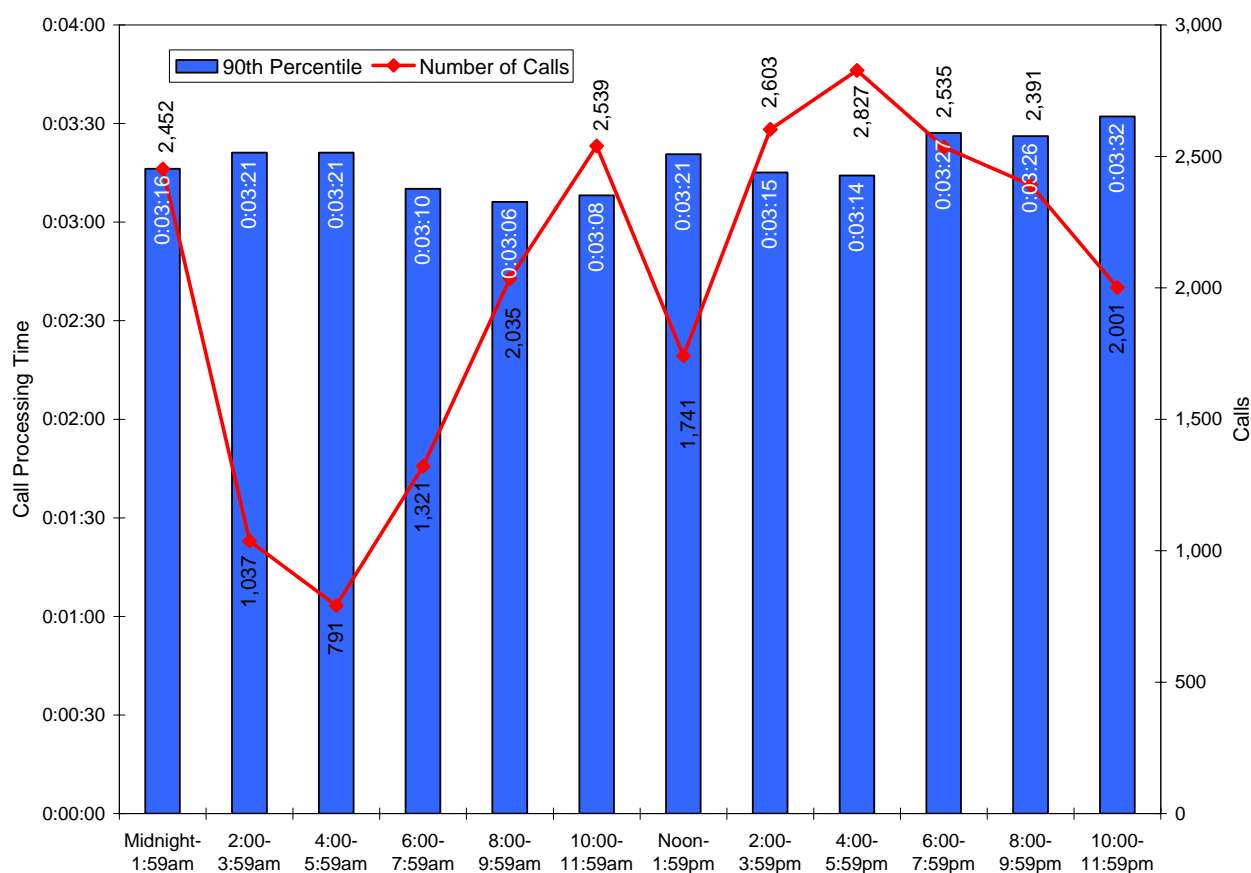
Table 32 shows the 90th percentile call processing time for 2003 by type of call. EMS calls are processed slightly faster than fire calls, but the difference is not statistically significant. Table 33 gives the 90th percentile call processing times by call response level. *Echo* calls, the highest priority, have the lowest call processing time, which indicates the medical priority dispatch (MPD) used by SLCFD dispatchers is serving at least one of the purposes—to process and dispatch the most urgent calls fastest.

Table 32: 90th Percentile Call Processing by Call Type

Type	90th Percentile
EMS	3:15
Fire	3:21

Table 33: 90th Percentile Call Processing by Response Level

Level	90th Percentile
Echo (highest priority)	2:52
Delta	3:13
Charlie	3:10
Bravo	3:18
Alpha	3:24
Omega (lowest priority)	3:17

Despite MPD working to prioritize calls, call processing time in Salt Lake City, even for the most serious calls, is much higher than CFAI and NFPA recommended standards. Call processing times are higher even than in other cities also using MPD reviewed by TriData as shown in Table 34.

Table 34: 90th Percentile Call Processing Time Comparison[42]

Jurisdiction	90th Percentile
Salt Lake City, UT	**3:32**
Irving, TX	1:44
Lynnwood, WA	1:40

Call processing times in the first 9 months of 2004 were consistent with 2003.

Recommendation 43: Review the call processing and dispatch process to determine the root cause(s) of the high call processing times. Areas to consider include the lack of appropriate staffing in the dispatch center (see Chapter IX, *Support Services*), the amount of information gathered before dispatching the first unit, and turnover rates in Dispatch staff and resulting lack of experience.

Recommendation 44: Review call processing and dispatch procedures to determine whether the first unit can be dispatched sooner (before all information is taken). Dispatchers could then follow up with additional units as required after all information has been collected.

Turnout – Turnout time is measured from when the alarm is received by station personnel to when the apparatus begins driving to the incident scene. According to CFAI and NFPA, turnout time should not exceed more than 60 seconds. The average turnout time in Salt Lake City in 2003 was 1:42 with a 90th percentile time of 2:35, over twice the recommended time.

Like call processing time, applying a 5-minute upper limit (which removes only 2.7 percent of responses), 90th percentile turnout times drop to 2:25. The change is statistically insignificant.

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[42] No upper limit applied.

Turnout time is also subject to variability based on time of day as well as station design and personnel duties (e.g. inspections). Figure 17 shows turnout times by time of day. There is significant (nearly one-minute) variation in turnout time by time of day, which can be expected since personnel are generally asleep between midnight and 6 A.M. (when turnout times are highest). But even during periods when firefighters are awake, turnout times exceed two minutes. This is too long by any reasonable standard, but is in line with times seen in other large cities reviewed by TriData.

Figure 17: Turnout Times by Time of Day, 2003
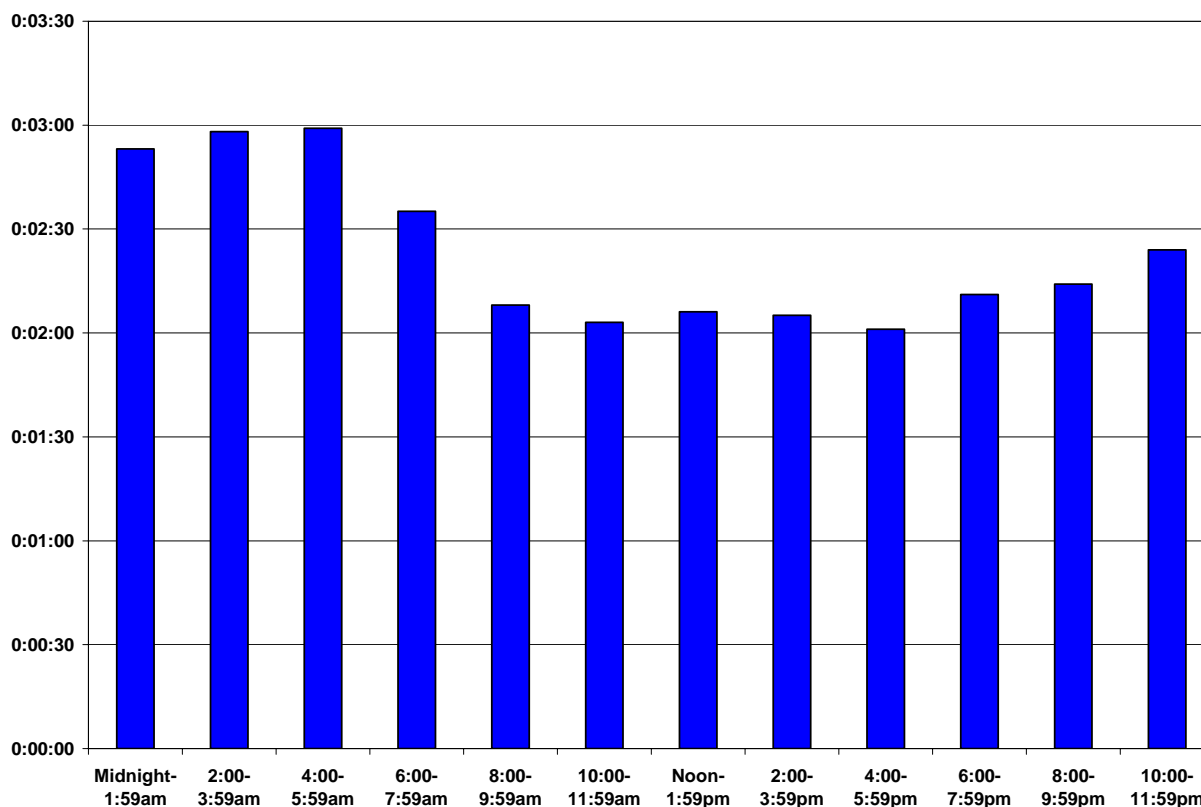
Turnout times are about the same for fire and EMS calls (90th percentiles of 2:26 and 2:19 respectively) even though turnout for fire calls involves donning protective gear that is not required for EMS calls. Turnout times in the first nine months of 2004 were consistent with turnout times in 2003.The SLCFD needs to improve turnout times.

Some units turnout faster than others. Rescue Engine 2, for example, had a 90th percentile turnout time of 2:06 in 2003, the lowest of all engines. Rescue Engine 11, on the other hand, had a 90th percentile turnout time of 2:31, nearly half a minute longer. The reason for this is unclear; however, units in Salt Lake City are not always in the station. Crews perform inspections and public education throughout their first-due areas. It takes longer to turnout for a call when

personnel are busy doing something other than sitting around the station waiting. The extra time to turnout may be worth the benefits and cost-savings of using crew personnel "downtime" for prevention activities such as inspections and public education.

Of the different segments of response time (call processing, turnout, and travel) it is easier and less costly to improve call processing and turnout times. Travel time is typically much more difficult and the most expensive to improve (e.g., new/more stations, new roads, or traffic signal interruption devices). Reducing the first two times will reduce total response times. Reduction in call processing and turnout time also permits longer travel times without increasing total response times; thus, stations can typically serve larger areas and still meet response time goals. The critical time is to dispatch the first unit; further call processing can occur simultaneously (i.e., talking more to the caller to obtain details).

To illustrate the impact reductions in call processing and turnout times can have on total response time, 1 minute was taken off all call processing and 30 seconds off turnout times that were 2 minutes or more in 2003. Reducing both call processing and turnout time resulted in a 58 second reduction in 90th percentile total response time for the first arriving unit to emergency calls. Total response time is discussed in more detail later in this section.

Travel – Travel (drive) time is the time it takes to travel from the station, or wherever the unit is, to the emergency incident. Station and apparatus placement has the biggest impact on travel time. (Apparatus are not always in the station when dispatched to an incident.) Additional factors influencing travel time include traffic, weather, traffic limiting devices (stop lights, speed bumps, etc.), and driver familiarity with the area. Traffic congestion and weather are beyond the Department and City's control; however, traffic limiting devices and driver knowledge are not.

NFPA 1710 recommends a 90th percentile travel time of 4 minutes. Travel times in Salt Lake City are higher than NFPA recommendations. In 2003, SLCFD experienced an average travel time of 5:04 and a 90th percentile time of 8:53. Initially, SLCFD travel times appear somewhat high and suggest that units are not able to travel very fast; however, SLCFD does not respond "hot" to all calls. That is, apparatus respond "cold"—without lights and sirens—to non-life threatening calls (Alpha and Bravo response level), which results in lower travel times. In addition, the four-minute travel time in NFPA 1710 is recommended for the first arriving unit only. (The idea is that a four-minute travel time coupled with the recommended call processing and turnout times will result in an overall six-minute total response time for the first unit to each call.)

Excluding all responses over 30 minutes in 2003, the 90th percentile travel time for the first arriving unit on all response levels was 6:30, much better but still higher than NFPA

recommends. For hot responses (levels Charlie, Delta, and Echo), the 90th percentile travel time for first arriving unit was 4:29. This is excellent, and nearly meets the four-minute NFPA recommended time. Table 35 shows the 90th percentile travel times by response level for 2003.

Table 35: 90th Percentile Travel Time by Response Level, 2003

Response Level	90th Percentile (All Units)	90th Percentile (First Arriving Unit)
Echo	5:33	4:31
Delta	7:13	4:50
Charlie	5:59	5:41
Bravo	8:17	7:31
Alpha	8:23	7:25
Omega	7:29	7:36

Travel times also vary by call type with the 90th percentile for first arriving unit to EMS calls at 6:07, a full minute lower than for fire call at 7:10. This difference can usually be attributed to more EMS calls being of higher priority, and thus receiving a hot response; however, analysis of travel times for the three highest call priority levels split by fire and EMS should show similar travel times. The 90th percentile travel time for high-priority fire calls in 2003 was 6:30 and only 4:48 for EMS calls. This is a larger difference than EMS versus fire response overall, which significantly impacts total response times (next section).

In many cities, EMS calls have a lower travel time because ambulances tend to travel faster than the larger engines and trucks. In Salt Lake City, the Fire Department does not operate ambulances. The rescue engines are the same size as the other engines, but travel faster. In addition, there are more units available to respond to fire incidents (engines and rescue engines) than there are for EMS calls (only rescue engines).

The nearly two-minute difference in travel times for EMS versus fire calls seems to indicate that rescue engines are not available for fire calls in their first-due areas more than other engines; thus, a unit from further away must respond, resulting in a longer travel time.

Recommendation 45: Investigate the reason behind the difference in travel times for fire calls versus EMS calls. This is one of the most important factors in deciding whether to add units or stations and where to place them.

In addition to varying by response level and call type, travel times vary by time of day due to traffic and visibility. Relatively steady travel times throughout the day in Salt Lake City, as shown in Figure 18, indicate that congestion due to rush-hour traffic is not a major problem for the SLCFD. Again, travel times in the first nine months of 2004 were generally consistent with times from 2003; however, Echo responses had a 90th percentile travel time of 3:46, a significant improvement for the highest priority incidents.

Figure 18: 90th Percentile Travel Time by Time of Day, 2003
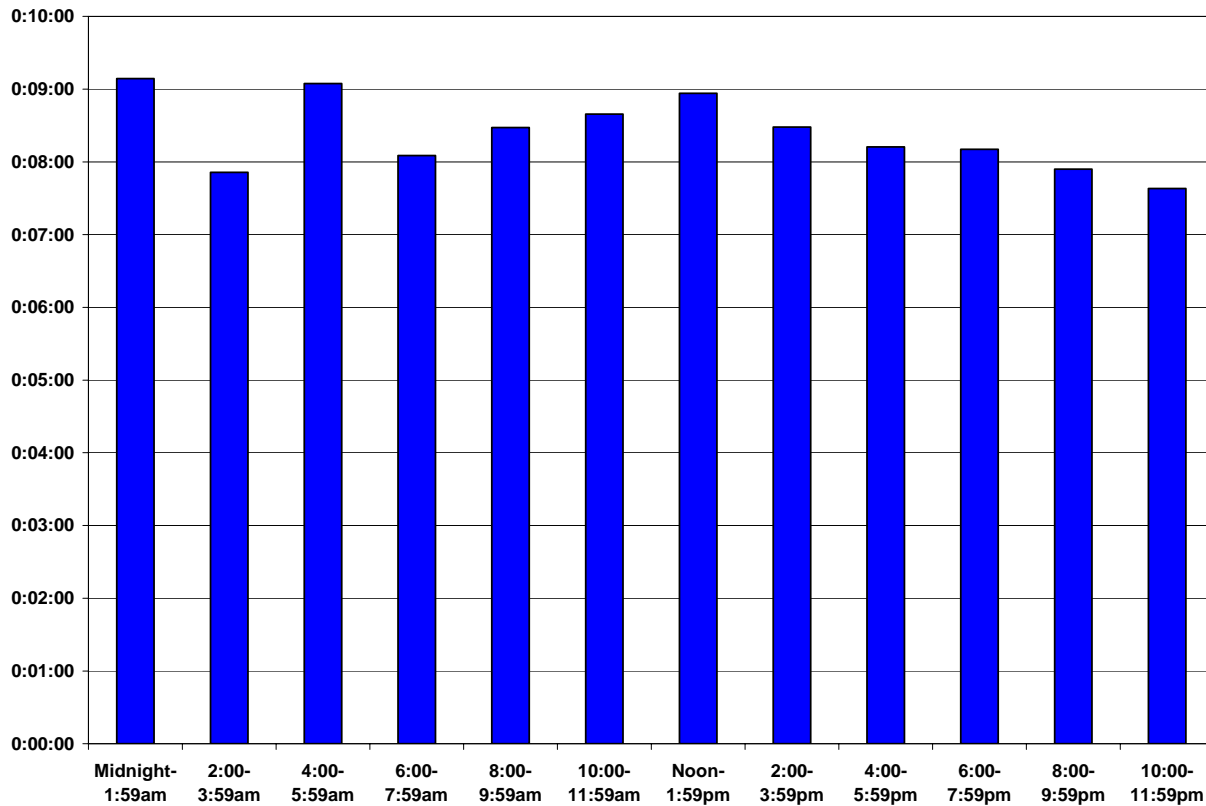
Vertical – Vertical response time is the time to get from the street to the patient's side or fire location and includes time to dismount from vehicle, assemble equipment, and locate the patient or fire floor. The time can be significant in areas with high-rise buildings or large properties (e.g., malls or golf courses). Vertical response time often is not tracked by first responders, including the Salt Lake City Fire Department, but makes a difference in patient outcomes, customer satisfaction, and public perception of fire department service. On EMS calls, services cannot be provided until personnel arrive at the side of the patient. Nationally, for EMS units, vertical response times range from four to six minutes. Fire units experience similar, or even longer, vertical response times. For fire units, there are added concerns, including the level of fire origin and the operability of elevators; in a fire or emergency in which power is out or intentionally disconnected, firefighters may have to use the stairs to reach the location of the fire.

While it is possible to reduce the other components of response time through technology and fire station location, it is difficult to substantially and safely reduce vertical response times. As a result, the importance of built-in fire suppression systems cannot be overstated. These systems buy time for the firefighters to get to where they have to be within the structure to completely extinguish fire.

Total Response Time – It is important to note that, for mathematical reasons, one cannot simply add the average or 90th percentile time components of response time to reach the total response time. In 2003, total response times for the SLCFD averaged 12:06 for all calls, a very high time. The 90th percentile total response time was 17:56, again very high. Applying a 30-minute limit to the data set results in an average total response time of 8:27 and 90th percentile of 13:36, still high but much better.

The 90th percentile total response time for first arriving units to all response levels was 11:22, which is still high but improving. Table 36 shows the 90th percentile total response time in 2003 by response level.

Table 36: 90th Percentile Total Response Time by Response Level, 2003

Response Level	90th Percentile (All Units)	90th Percentile (First Arriving Unit)
Echo	8:54	8:25
Delta	16:02	9:11
Charlie	10:46	10:06
Bravo	16:12	12:10
Alpha	25:14	16:54
Omega	12:06	12:15

The variation in total response time by time of day tends to follow the same pattern as travel time since that is the largest component, shown in Figure 19.

Actual response times in Salt Lake City are compared to NFPA standards and the study team's recommended goals in Table 37.

Table 37: Salt Lake City 90th Percentile Response Times, 2003 vs. Standards and Goals[43]

Response Time Component		Salt Lake City Actual	NFPA		TriData Recommended	
			Standard	Reduction	Goal	Reduction
Call Processing*		03:12	01:00	02:12	01:30	01:42
Turnout*		02:24	01:00	01:24	01:30	00:54
Travel	Fire	06:30	04:00	02:30	04:00	02:30
	EMS	04:48	08:00	N/A	06:00	N/A
Total	Fire	11:03	06:00	4:03	06:00	4:03
	EMS	09:32	10:00	N/A	08:00	01:32

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[43] SLCFD response times are based on the first dispatched or first arriving unit to emergency calls with a hot response (response levels Charlie, Delta, and Echo) because these responses are most in line with the type of response NFPA recommendations were designed for.

Figure 19: 90th Percentile Total Response Time by Time of Day, 2003
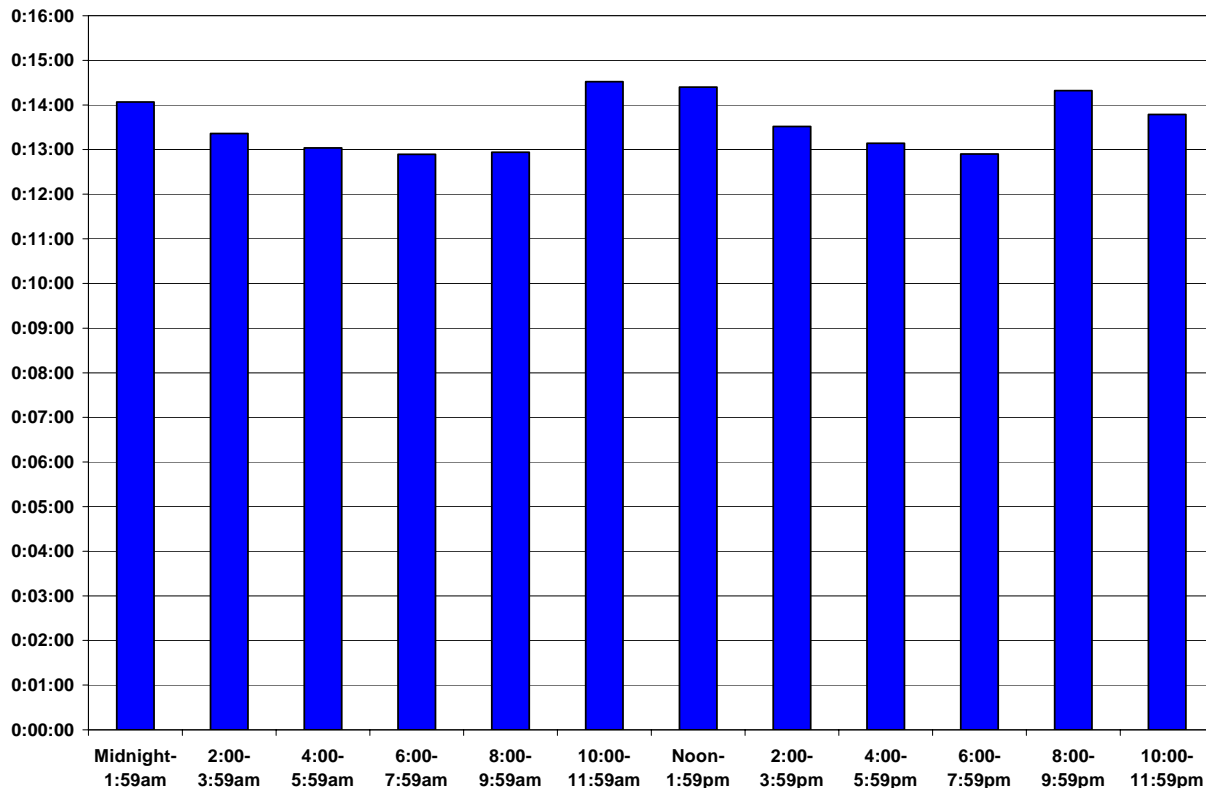
Despite the high call processing and turnout times, total response times for the SLCFD are only about a minute and a half higher than the eight-minute goal being adopted in many jurisdictions across the nation for EMS. Total response times for fire calls are five minutes higher than the recommended six-minute goal, nearly twice as long.

Although the citizens in Salt Lake City seem to be satisfied with the current response times, there is room for improvement, particularly in call processing and fire travel times. Again, the reason for the extended travel times for fire calls must be investigated. Since units are able to travel faster for EMS calls, it does not currently seem reasonable to look at adding stations or apparatus to reduce the fire call travel times.

Current Station and Apparatus Locations

At the time of this study, the SLCFD was serving 110 square miles from 14 fire stations. All stations were equipped with at least one engine staffed continuously by four firefighters, except Station 12 at the airport, which was equipped with a paramedic rescue unit and specialty aircraft firefighting (ARFF) units.

Map 5 shows the current station locations, road network, and major geographical features of the city.

Map 5: Current Station Locations
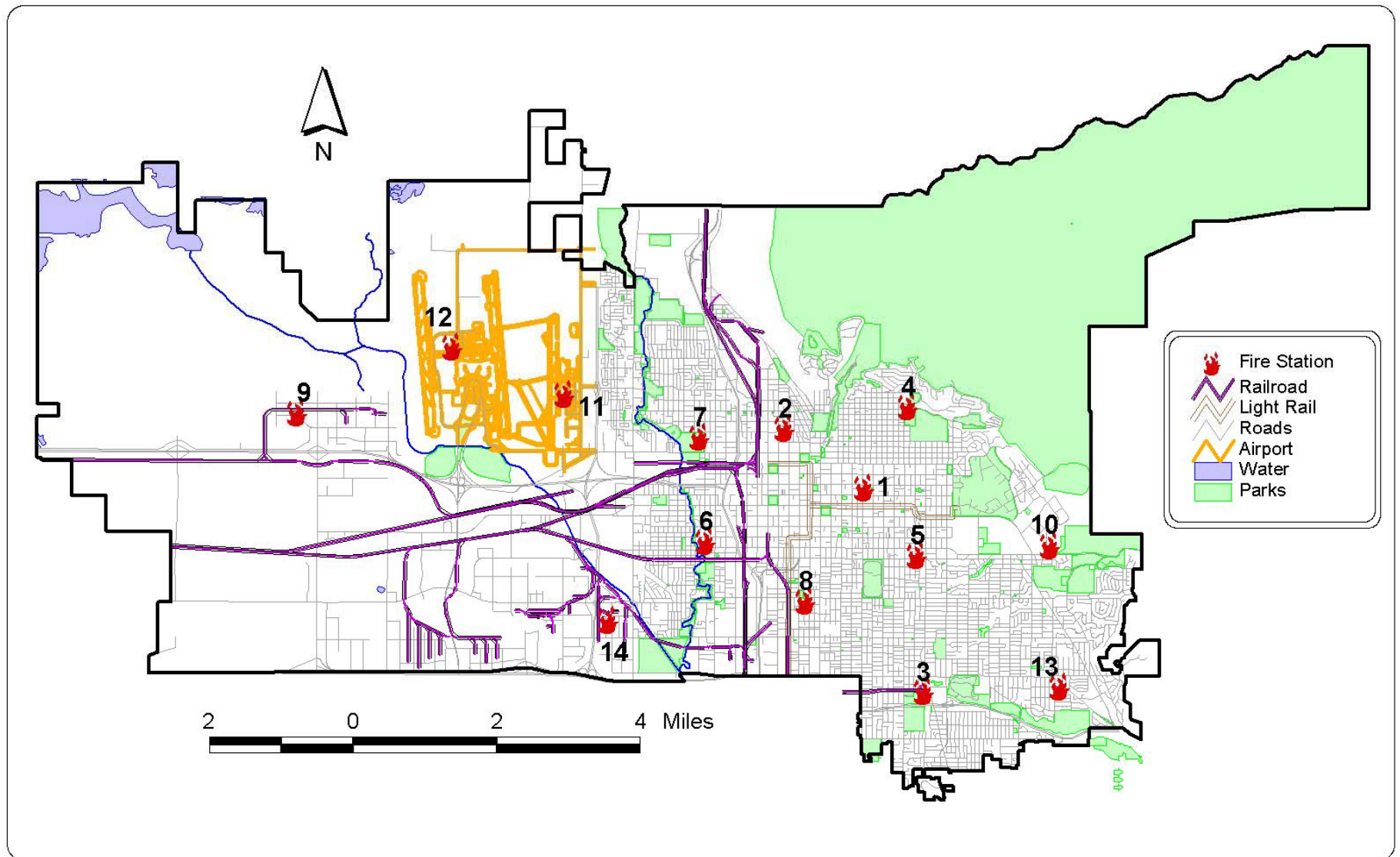
At first glance, the distribution of stations and apparatus throughout the city seems reasonable; however, a more detailed look shows some room for improvement. These areas and possible changes are discussed later in this chapter.

Analysis of Station and Apparatus Locations

This section provides an in-depth look at station and apparatus placement. The goal is to determine what areas, if any, are in need of additional or fewer resources. As discussed earlier, to complete the analysis the city was divided into three regions. Engine coverage is discussed by region while truck (ladder) and specialty unit coverage is discussed citywide since there are so few.

Two sets of data are taken into account in this section in addition to the response times, demand, and workload discussed up to this point. The first set is Wasatch Front Regional Council (WFRC) population projections by traffic analysis zone (TAZ). Population projections by TAZ were completed using a different methodology than the citywide projections.

TAZ projections follow the theory that "as distance from the central city increases, density decreases, and growth rates increase."[44] Growth rates were derived from trends between 1980 and 2000. A base density was calculated for each TAZ; then growth rates based on density were applied. Each year the population density was recalculated and growth rates adjusted.

The second set of additional data used in this section is geocoded incidents. Starting with a base set of 23,184 emergency incidents from FY04 with complete addresses, 96.8 percent (22,431) were geocoded. The remaining 3.2 percent could not be matched to known addresses.

East Region – The East Region comprises 15.2 square miles and is bordered on the east by Salt Lake County, on the south by Canyon Rim and Millcreek, on the west by South Salt Lake, and by the central analysis region on the west and north. The east analysis region is primarily residential as shown in Map 6.

STATIONS: Fire stations 3, 5, 10, and 13 are currently located in the east analysis region. Table 38 shows pertinent information about each station. Station 3 is the oldest, but at 30 years is not unreasonably old.

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[44] Wasatch Front Regional Council, *Wasatch Front Region Small Area Socioeconomic Projections: 2002-2030 Technical Report #42*, p. 7, October 2003. Available online at http://www.wfrc.org/resources/sedata/tr42.pdf.

Map 6: East Region Zoning
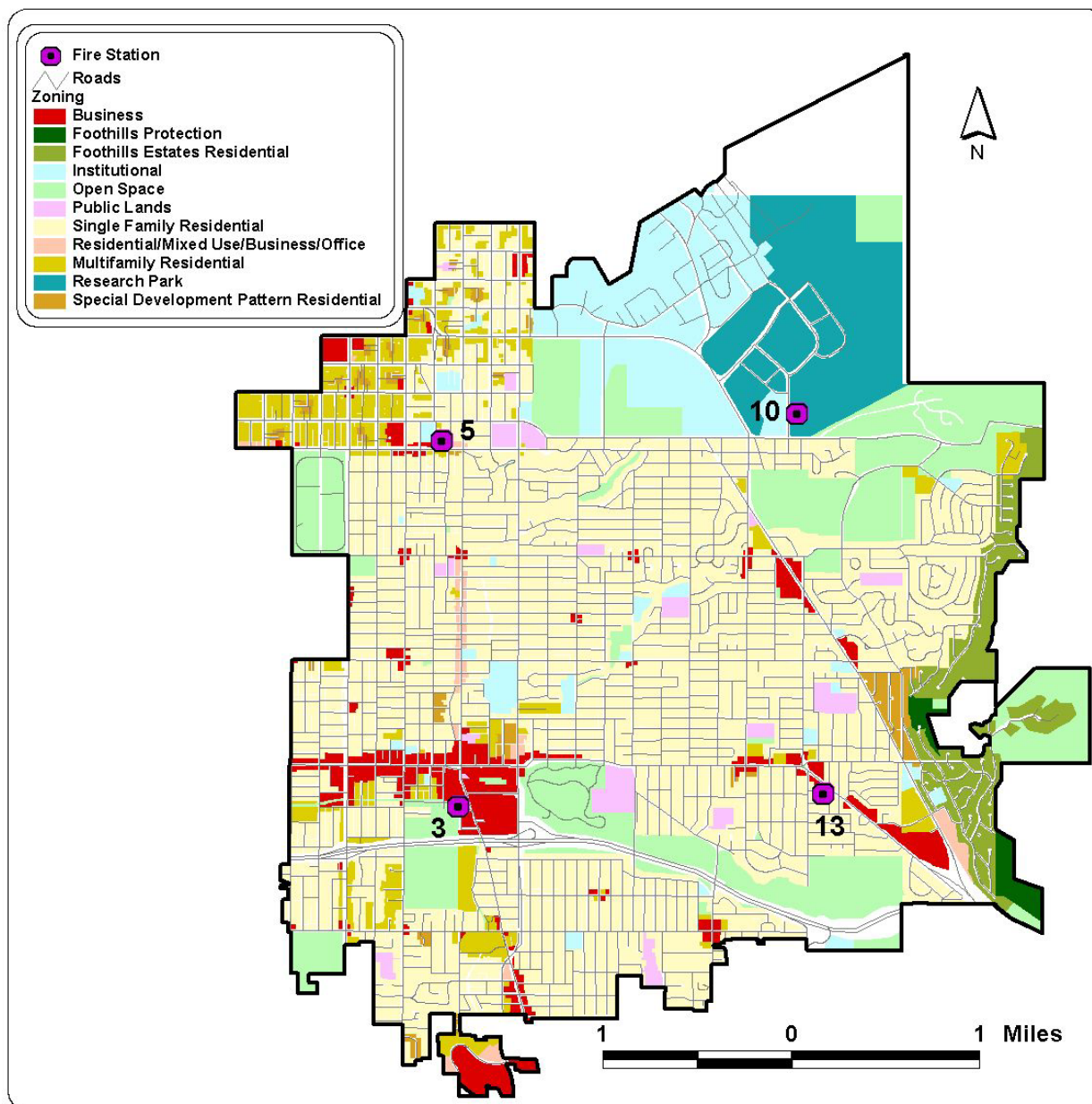
Table 38: SLCFD Station and Apparatus Complement, East Analysis Region

Station	Address	Built	Bays	Apparatus
3	1058 Simpson Ave	1975	2.5	Rescue Engine
5	1023 East 900 South	1979	3	Rescue Engine, Heavy Rescue, Truck
10	785 Arapeen Drive	1994	3	Engine, Utility, Squad
13	2360 East Parleys Way	1995	2	Engine, Squad

While a full facility assessment was beyond the scope of this study, stations in the east analysis region appeared to be in good shape overall. There should be no need to rebuild fire stations in this region in the next 20 years based on age, provided the buildings are taken care of as well as they have been in the past.

RISKS: Map 7 shows the locations of risks in the east analysis region in relation to the four fire stations protecting the area. Major risks in the region include 21 grade schools, 2 college campuses, 7 high-rise buildings (only three of which are fully sprinklered), and 5 locations with hazmat permits (all on the University of Utah's campus). These are all high-risk structures or facilities with special public safety needs. Additional hazards in the area include: the University of Utah protected primarily by Station 10 and secondarily by Station 5; a commercial area protected by Station 3; a portion of I-80 (a high-volume road); and numerous parks, open spaces, and public lands (risk for wildfires during the summer).

Map 7: East Analysis Region Risks
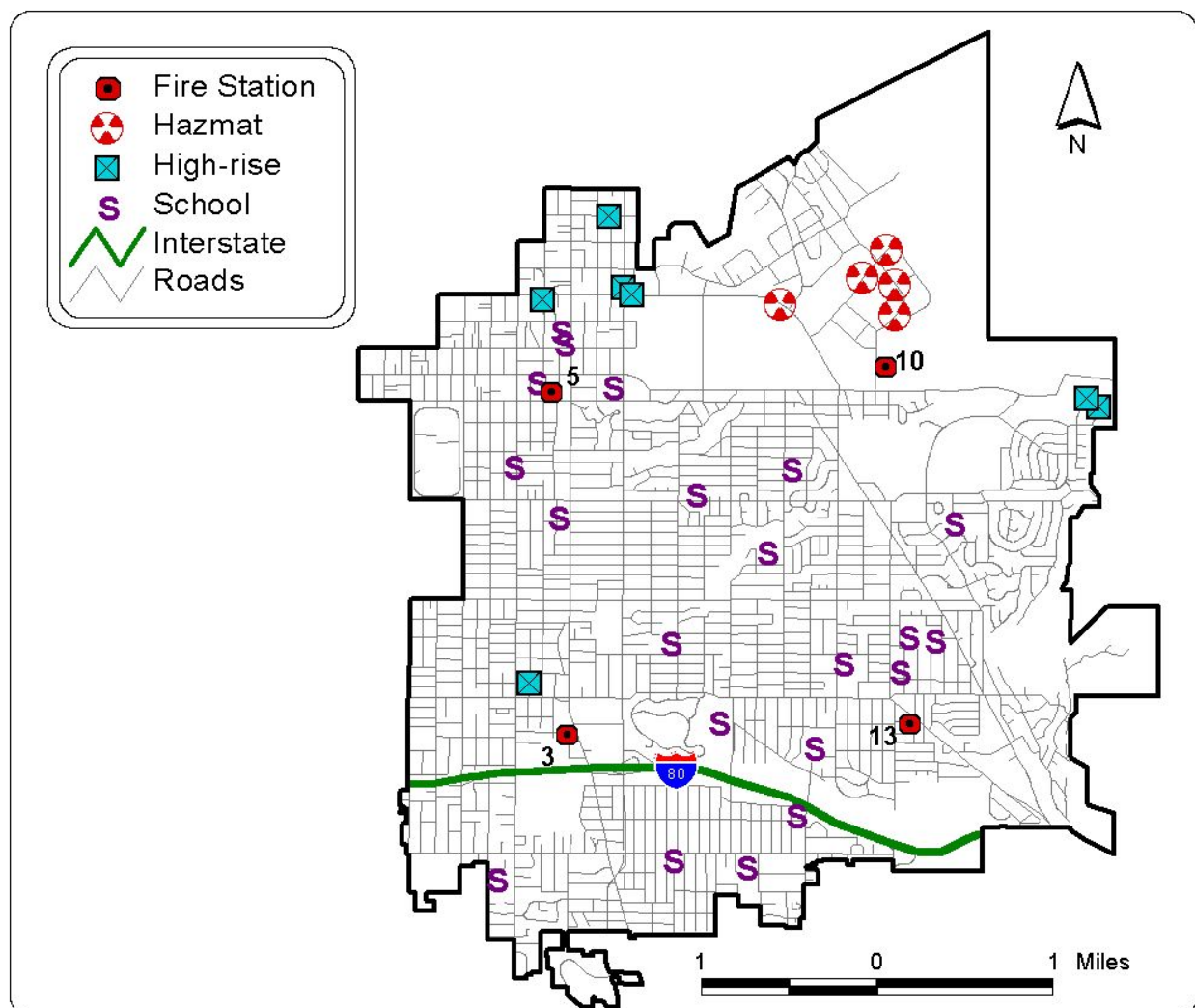
POPULATION: In FY04, the east analysis region had a population of approximately 75,514, the highest of all regions.[45] Map 8 shows the population by TAZ. Overall, there are 4,968 people per square mile in the east analysis region. Mostly residential zoning, proximity to downtown, and the University of Utah contribute to the population levels in this region.

Map 8: East Analysis Region Population, FY04

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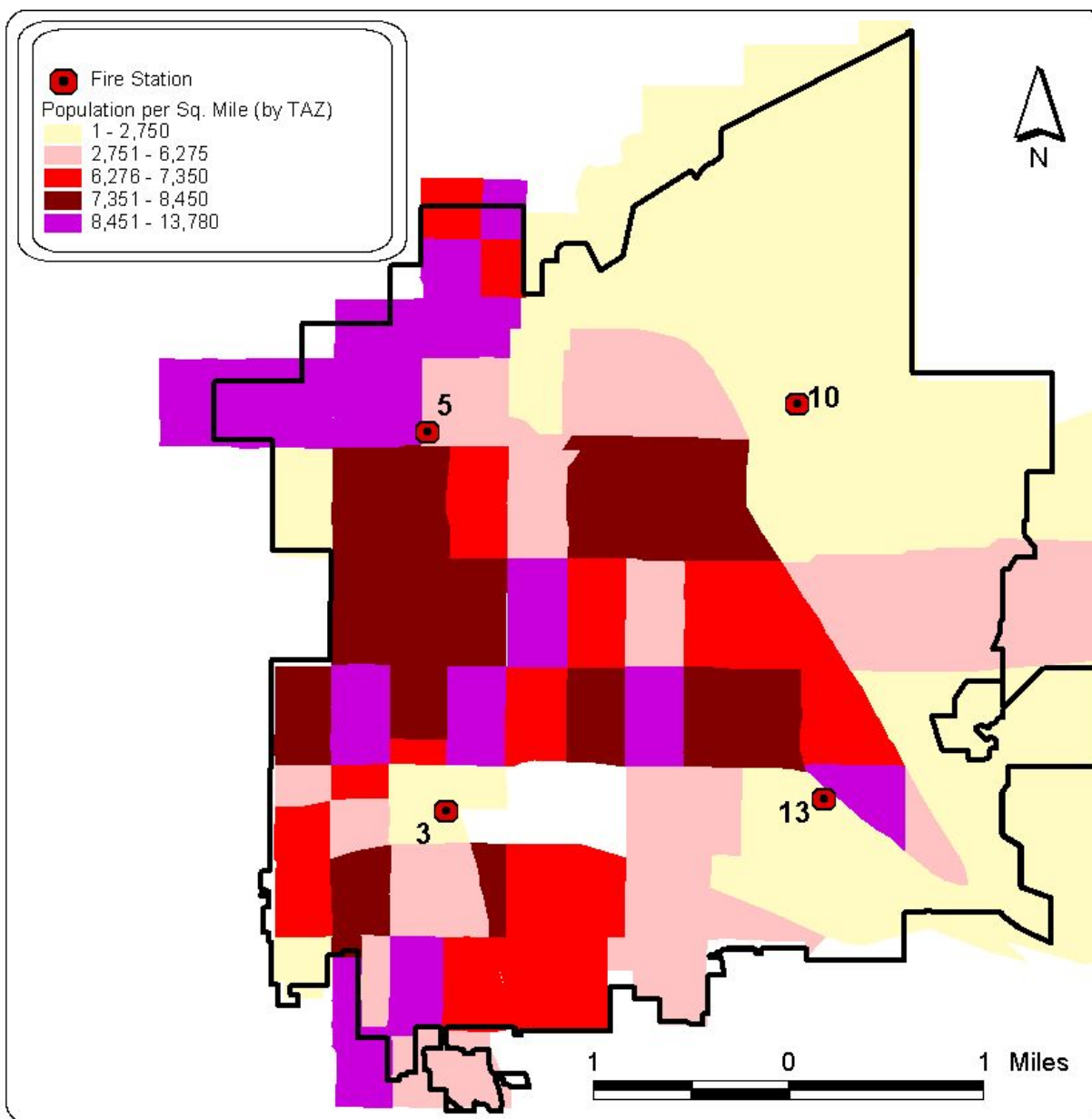
[45] Not all TAZs fall completely within one region, and population is not distributed evenly throughout a TAZ. Therefore, population was included in the containing the center of the TAZ.

Station 5's first-due area has the highest population (24,733) while Station 10's has the lowest (15,053). Table 39 shows population for the east analysis region by station first-due area from FY05 through FY25. Growth in this region is expected to be about 5 percent over 20 years, which is considered very slow growth.

Table 39: East Analysis Region Population, FY04–FY25

Station	Square Miles	FY04	FY05	FY10	FY15	FY20	FY25
3	5.0	20,287	20,309	20,310	20,570	20,705	20,832
5	3.1	24,733	24,731	25,067	25,130	25,255	24,733
10	3.6	15,053	15,369	15,766	16,077	16,410	15,053
13	3.5	15,441	15,865	16,377	16,703	16,949	15,441
Total	**15.2**	**75,514**	**75,536**	**76,275**	**77,780**	**78,615**	**79,446**

DEMAND: In FY04, there were 5,104 geocoded calls in the east analysis region. This is about 335 calls per square mile, 1,276 calls per station, and 67.6 calls per 1,000 people. Since incidents are not distributed evenly across the area, Table 40 shows the number of geocoded calls by station first-due area as well as the number of responses made by the engines/rescue engines. Map 9 illustrates FY04 call density for the east analysis region.

Table 40: Calls by Station First-Due Area, East Analysis Region, FY04

Station	Incidents	Engine Responses
3	1,678	1,972
5	1,903	2,315
10	881	1,186
13	642	903
Total	**5,104**	**6,376**

Based on the population growth expected in the east analysis region and projected system-wide demand, demand in the area could increase to nearly 6,000 calls by 2010 and over 7,000 by 2025. Demand could also remain closer to the 5,000–5,500 range, as shown in Table 41. Unit responses could increase as shown in Table 42. Based on the projected demand and unit responses, there does not appear to be a need for additional resources in the east analysis region.

Table 41: East Analysis Region Demand, FY05–FY25

Fiscal Year	Low	High
2005	5,208	5,208
2010	5,259	5,809
2015	5,363	6,415
2020	5,420	6,816
2025	5,478	7,241

Map 9: FY04 Call Density, East Analysis Region
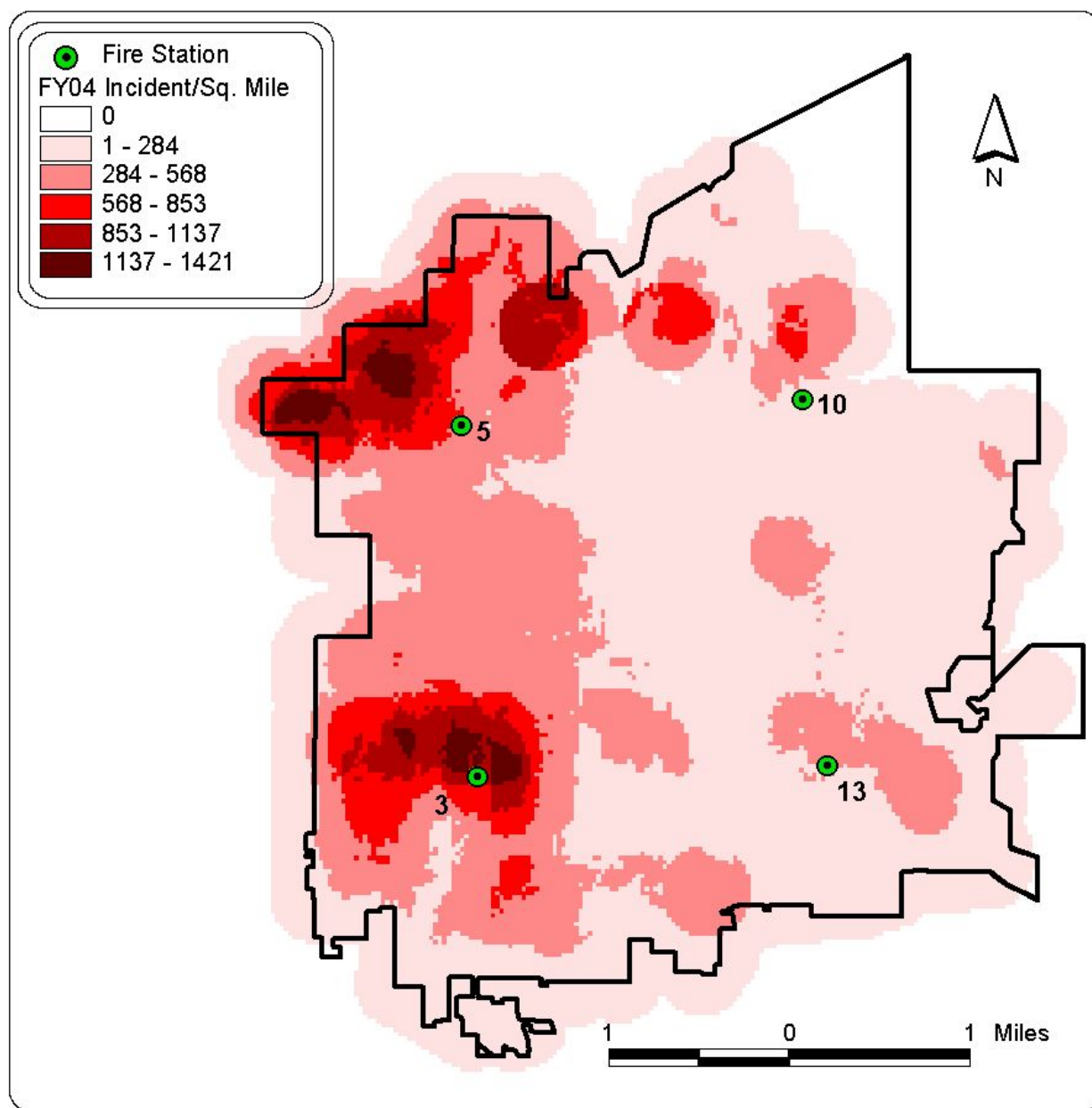
Table 42: East Analysis Region Unit Responses, FY05–FY25

Unit	FY05		FY10		FY15		FY20		FY25	
	Low	High	Low	High	Low	High	Low	High	Low	High
Rescue Engine 3	2,017	2,095	2,117	2,258	2,158	2,525	2,184	2,690	2,206	2,862
Rescue Engine 5	2,368	2,459	2,485	2,651	2,534	2,964	2,564	3,158	2,589	3,359
Engine 10	1,213	1,260	1,273	1,358	1,298	1,518	1,313	1,618	1,326	1,721
Engine 13	924	959	969	1,034	988	1,156	1,000	1,232	1,010	1,310
Total	**6,522**	**6,774**	**6,845**	**7,301**	**6,978**	**8,163**	**7,061**	**8,699**	**7,131**	**9,252**

RESPONSE TIMES AND COVERAGE: To determine whether there are any areas in the east analysis region that are not well covered, and to evaluate the overlap among stations, the ability of apparatus to cover the area and risks present in the recommended time must be evaluated. As discussed above, overall total response times are higher than recommended; however, station and apparatus placement depends largely on travel times. In the east analysis region, 90th percentile travel times for the first arriving unit in FY04 was 6:24, about 2.5 minutes higher than the 4 minutes recommended by NFPA 1710. For the three highest priority levels, 90th percentile travel time was 5:22, closer to the recommended time.

Table 43 summarizes 90th percentile travel times to incidents in the east analysis region during FY04. The extended travel time is due primarily to traffic congestion and traffic calming (speed humps) in neighborhoods rather than distance between stations or unavailability of units.

Table 43: East Analysis Region Apparatus Response Times in FY04

Unit	90th Percentile Travel*
Rescue Engine 3	06:42
Rescue Engine 5	05:47
Engine 10	05:50
Engine 13	06:12
EMS	06:14
Fire	06:42
Alpha	07:57
Bravo	07:32
Charlie	05:43
Delta	04:36
Echo	04:13

* All times calculated for first-arriving unit to incidents in the east analysis region.

Based on the road network and travel speeds discussed above, the four-minute response reach of stations in the east analysis region is shown in Map 10. Based on the calculated response reach, 94.9 percent of FY04 calls were within a 4-minute travel time from the current east region stations.

Map 10: East Analysis Region, Current Response Reach
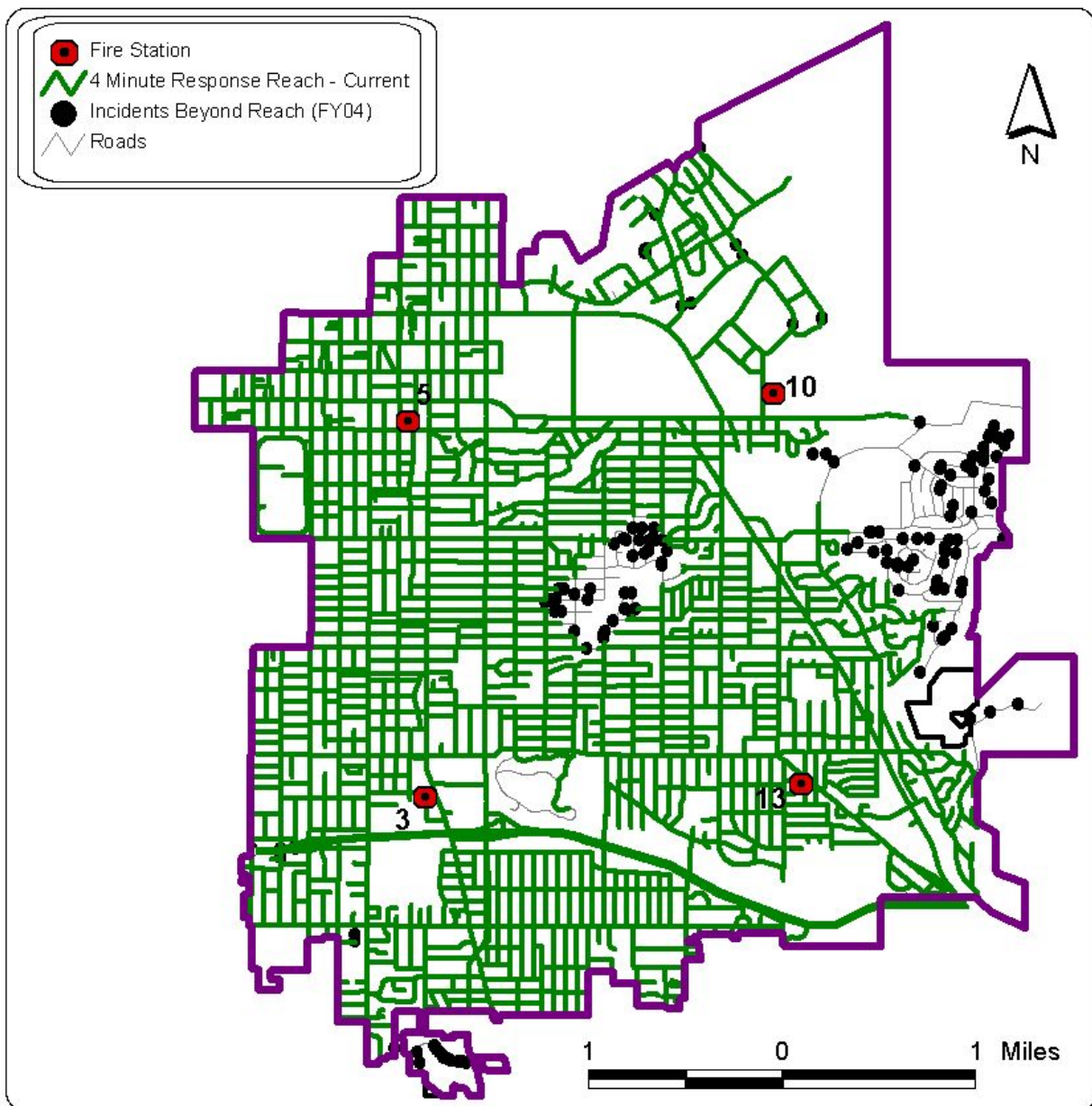
There are two main areas beyond the current four-minute travel time reach: one centrally located in the east analysis region, between the current four stations, and another on the far east border. This is a small percentage of the total calls in the area (three percent). Given the total demand in the region and the relative workloads of units serving the area, there is no need for an additional station in the east analysis region at present.

Of the high-risk facilities identified above, all schools and hazmat locations are within the current four-minute travel time reach. Only two high-rises are beyond reach, one of which is sprinklered.

FUTURE NEEDS: Despite the current travel times in the east analysis region, there does not appear to be a need for additional resources in this area in the next 20 years. The current number of apparatus is sufficient to handle future demand under both the low and high projections. The primary land use types do not present high risks to the SLCFD. Finally, stations are of a reasonable age, and in good condition. Response times in the east analysis region can be reduced through reductions in call processing and turnout time, as recommended in Chapter IV.

Central Analysis Region – The Central Region comprises 17.1 square miles, with an additional 19 square miles of undeveloped forestland bordering on the northeast. Map 11 shows that the central analysis region is a mix of commercial, industrial, and residential development. Residential development occurs primarily on the eastern and northern sides of the region.

STATIONS: Table 44 shows pertinent information about each station currently located in the central analysis region: Stations 1, 2, 4, and 8. Station 2 is the oldest station in the region and second oldest in the city.

Table 44: SLCFD Station and Apparatus Complement, Central Analysis Region

Station	Address	Built	Bays	Apparatus
1	211 South 500 East	1996	4	Engine, Battalion Chief
2	270 West 300 North	1971	3	Rescue Engine, Truck
4	830 East 11th Ave	1989	2	Rescue Engine, Squad
8	15 West 1300 South	1996	2	Rescue Engine, Truck

As with station in the east analysis region, stations in the central analysis region appeared to be in good shape overall, and there should be no need to rebuild fire station in this region in the next 20 years based on age.

RISKS: Since the central analysis region includes downtown Salt Lake City, there are many risks, which are shown in Map 12 in relation to the four fire stations protecting the area.

Major risks in the region include 15 schools, 51 high-rise buildings (three-quarters of which are fully sprinklered), 10 locations with hazmat permits, and 32 places of large public assembly (convention center, theater, club, etc.). These are all high-risk structures or facilities with special public safety needs. Additional hazards in the area include: portions of I-15 (a high-volume road); a manufacturing and mining area north of Station 2; and the wildland interface along the residential area protected by Station 4.

Map 11: Central Region Zoning
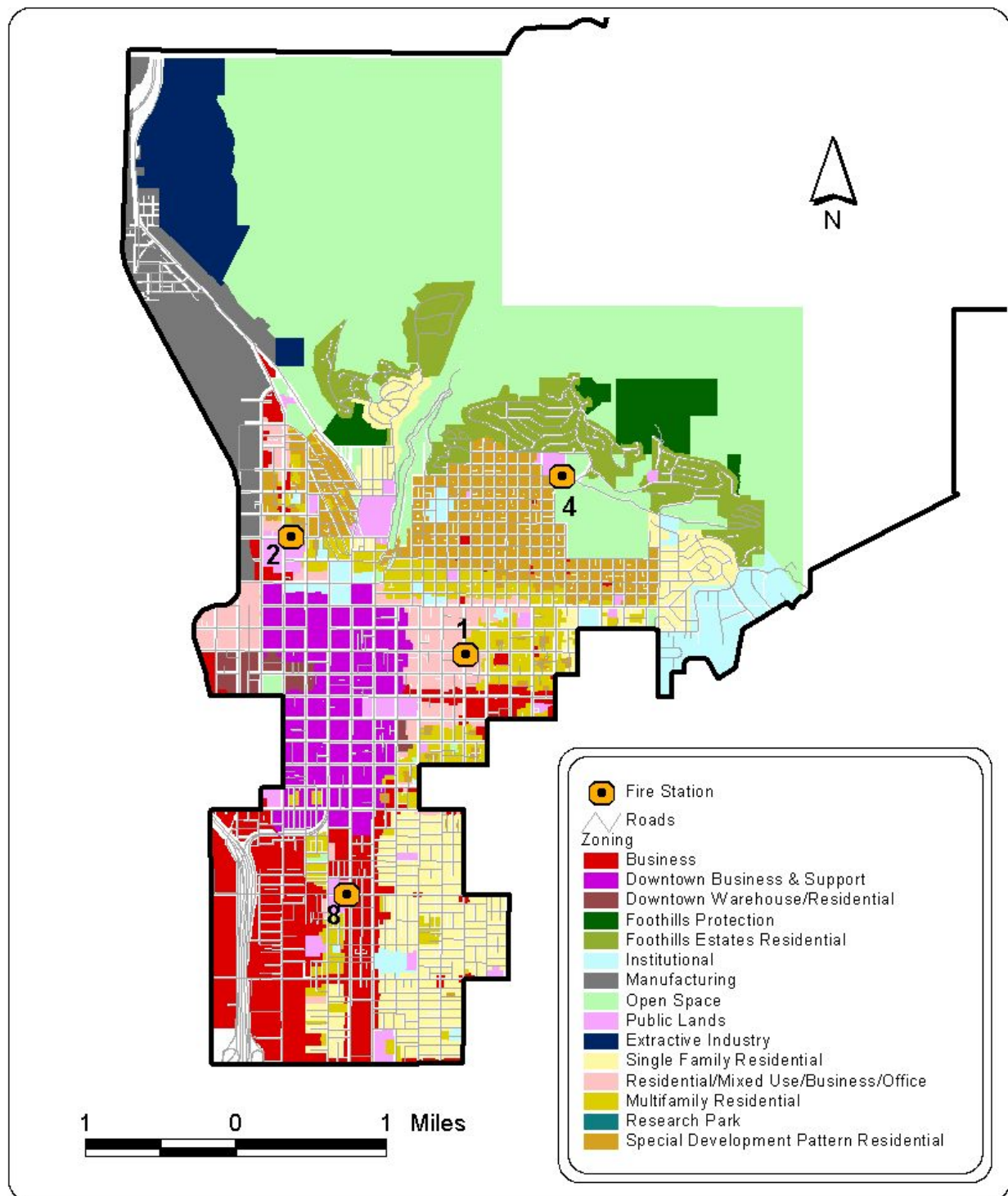
Map 12: Central Analysis Region Risks
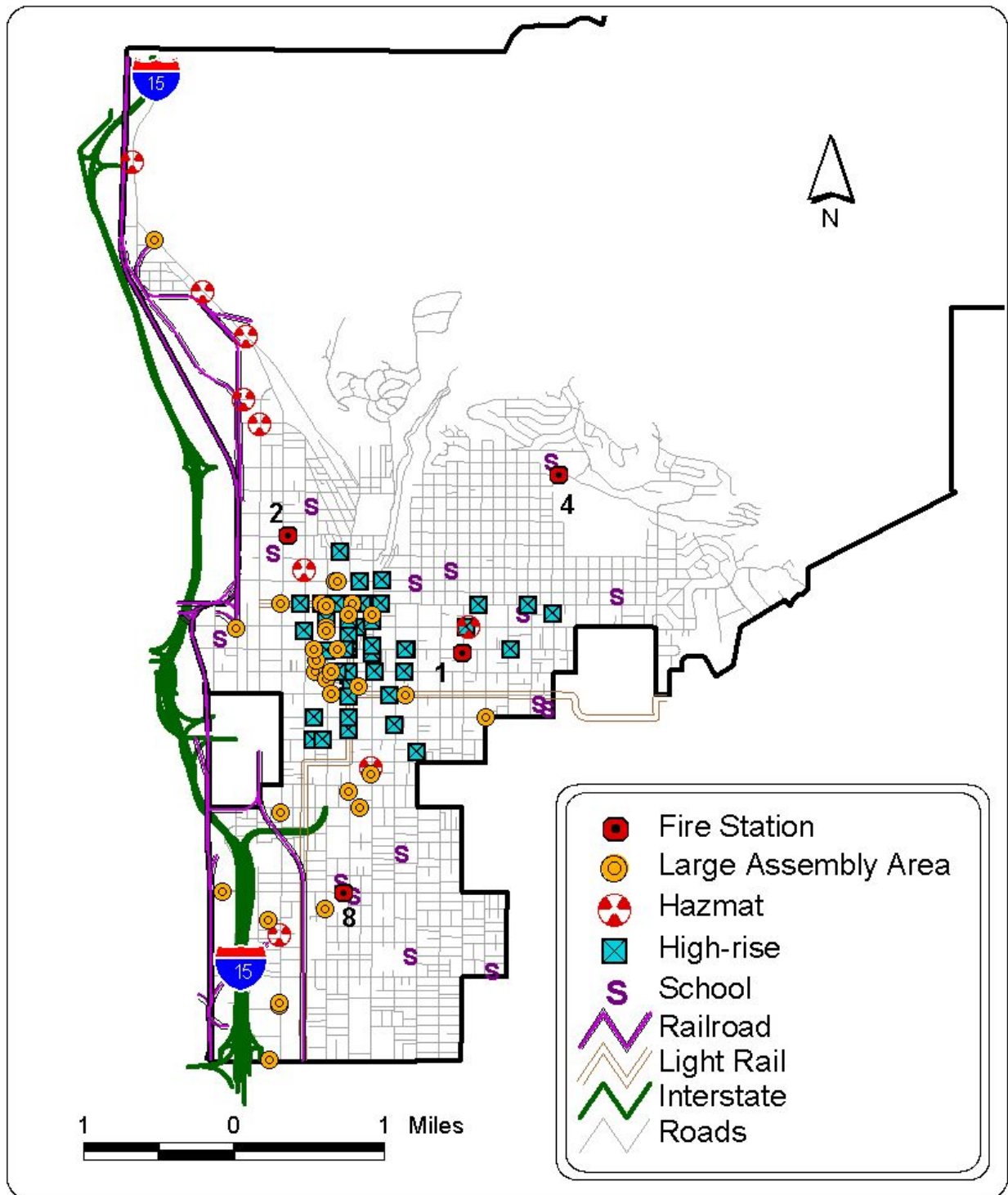
POPULATION: Map 13 shows the population by TAZ in FY04 for the central analysis region. Total population for the region was approximately 54,081.[46] Overall, there are 3,163 people per square mile in the central analysis region. The lower population density than in the east analysis region is due to the concentration of businesses in the downtown area, and thus less residential development.

Station 8's first-due area has the highest population (17,837) while Station 2's has the lowest (11,240). Table 45 shows population for the central analysis region by station first-due area from FY04 through FY25. Growth in this region is expected to be 9.5 percent over 20 years, which is twice as high as in the east analysis region, but still slow growth. Station 2's area is expected to experience significant growth, 27 percent (1.3 percent per year).

Table 45: Central Analysis Region Population, FY04–FY25

Station	Square Miles	FY04	FY05	FY10	FY15	FY20	FY25
1	1.7	13,039	13,041	13,049	13,238	13,348	13,484
2	8.1	11,240	11,773	12,875	13,792	14,018	14,283
4	3.5	11,965	12,049	12,213	12,476	12,676	12,905
8	3.7	17,837	17,848	17,878	18,164	18,341	18,536
Total	**17.1**	**54,081**	**54,711**	**56,015**	**57,670**	**58,383**	**59,208**

DEMAND: In FY04, there were 10,496 geocoded calls in the central analysis region. This is 194 calls per 1,000 people, twice that of the east analysis region. Although not many people live in the central analysis region compared to elsewhere in the city, the large numbers of workers and visitors in the area increase call volume significantly.

Table 46 shows the number of geocoded calls by station first-due area as well as the number of responses made by the engines/rescue engines. Map 14 illustrates FY04 call density for the central analysis region.

Table 46: Calls by Station First-Due Area, Central Analysis Region, FY04

Station	Incidents	Engine Responses
1	3,128	3,110
2	3,420	2,867
4	829	1,499
8	3,119	2,374
Total	**10,496**	**9,850**

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[46] Not all TAZs fall completely within one region, and population is not distributed evenly throughout a TAZ. Therefore, population was included in the containing the center of the TAZ.

Map 13: Central Analysis Region Population, FY04
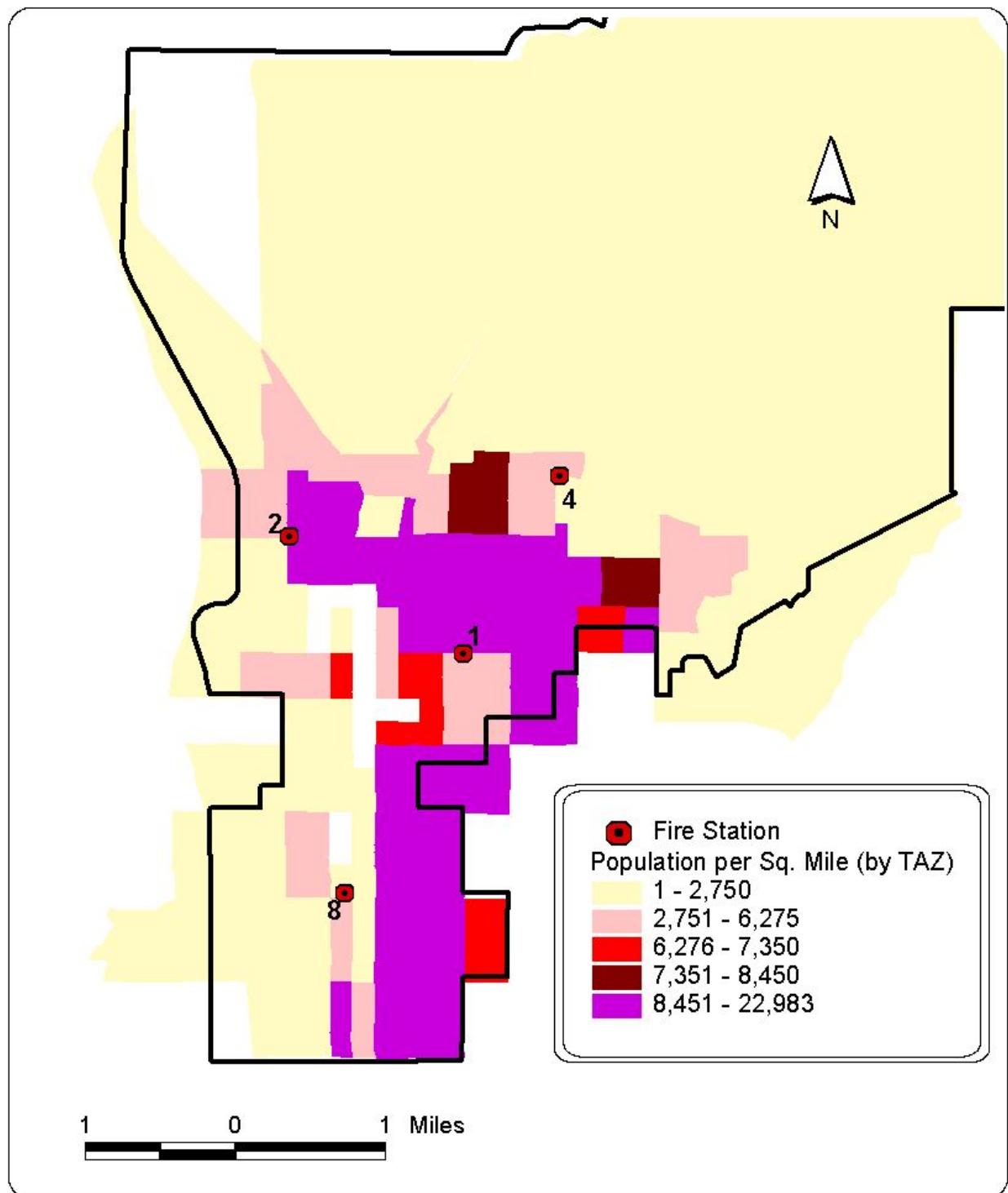
Map 14: FY04 Call Density, Central Analysis Region
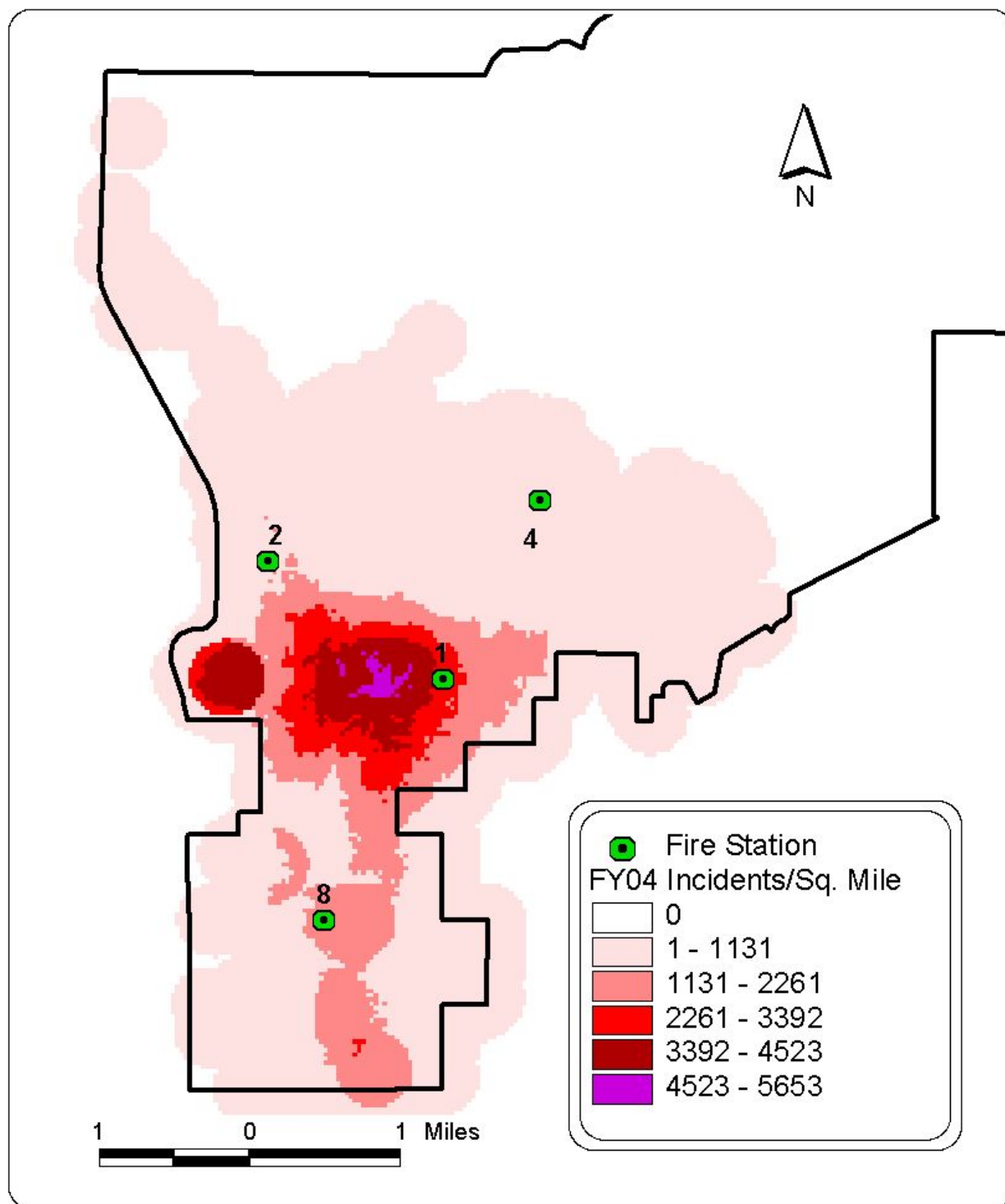
With the exception of Rescue Engine 4, units in the central analysis region are making

fewer responses than there are incidents in their area. This indicates that units are either not

available for calls in their first-due areas, or the unit needed is not available (i.e. when a Rescue

Engine is needed in Station 1's first-due area). The UHUs discussed in Chapter IV indicated that units in the central analysis region are most likely to miss a call in the afternoons. The impact on response times and future needs is discussed below.

Based on the population growth expected in the central analysis region and projected system-wide demand, demand in the central analysis region is not expected to increase much, as shown in Table 47. While demand could surpass 15,000 calls by FY25, it could increase by only 1,000 calls. Unit responses could increase as shown in Table 48. Based on the current workloads and projected demand and unit responses, there appears to be a need for additional resources in the central analysis region.

Table 47: Central Analysis Region Demand, FY05–FY25

Fiscal Year	Low	High
2005	10,832	10,832
2010	11,090	12,249
2015	11,417	13,657
2020	11,559	14,534
2025	11,722	15,495

Table 48: Central Analysis Region Unit Responses, FY05–FY25

Unit	FY05		FY10		FY15		FY20		FY25	
	Low	High	Low	High	Low	High	Low	High	Low	High
Engine 1	3,181	3,304	3,339	3,561	3,404	3,982	3,444	4,243	3,478	4,513
Rescue Engine 2	2,933	3,046	3,078	3,283	3,138	3,671	3,175	3,911	3,207	4,160
Rescue Engine 4	1,533	1,593	1,609	1,716	1,641	1,919	1,660	2,045	1,677	2,175
Rescue Engine 8	2,428	2,522	2,549	2,718	2,598	3,039	2,629	3,239	2,655	3,445
Total	10,076	10,465	10,575	11,278	10,781	12,611	10,909	13,438	11,017	14,293

RESPONSE TIMES AND COVERAGE: Again, to determine whether there are any areas in the central analysis region that are not well covered, and to evaluate the overlap among stations, the ability of apparatus to cover the area and risks present in the recommended time must be evaluated. In the central analysis region, the 90th percentile travel time for the first arriving unit in FY04 was 5:47, better than the east analysis region, but still 1.75 minutes higher than the 4 minutes recommended by NFPA 1710. For the three highest priority levels, 90th percentile travel time was 5:54, slightly longer but statistically insignificant.

Table 49 summarizes 90th percentile travel times to incidents in the central analysis region during FY04. The extended travel times in this region are due in part to traffic congestion and the availability of units of the proper type. Rescue Engines 2 and 4 have very high travel times. Analysis of the locations of incidents to which these units responded shows a high rate of

crossover among first-due areas, primarily with Stations 1 and 4. In other words, Rescue Engine 4 is responding into Station 1's first-due area on a regular basis due to the concentration of EMS calls in the downtown area.

Table 49: Central Analysis Region Apparatus Response Times in FY04

Unit	90th Percentile Travel*
Engine 1	06:01
Rescue Engine 2	07:43
Rescue Engine 4	07:53
Rescue Engine 8	06:42
EMS	06:11
Fire	06:07
Alpha	06:48
Bravo	06:54
Charlie	04:40
Delta	03:49
Echo	03:29

* All times calculated for first-arriving unit to incidents in the central analysis region.

Travel times for the highest priority calls in the central analysis region are excellent, under four minutes. Because high priority calls have good travel times and units in the region are responding to fewer calls than occur in their first-due areas, it would appear that units from stations in the east and west analysis regions are responding to incidents in the central region, and responding quickly.

Travel times in the central analysis region also indicate the need for additional resources in the area.

Based on the road network and travel speeds discussed above, the four-minute response reach of stations in the central analysis region is shown in Map 15. Based on the calculated response reach, 96.6 percent of FY04 calls were within a 4-minute travel time from the current central region stations. Of the high-risk facilities identified above, all are covered except one hazmat location in the far north near I-15.

Map 15: Central Analysis Region, Current Response Reach
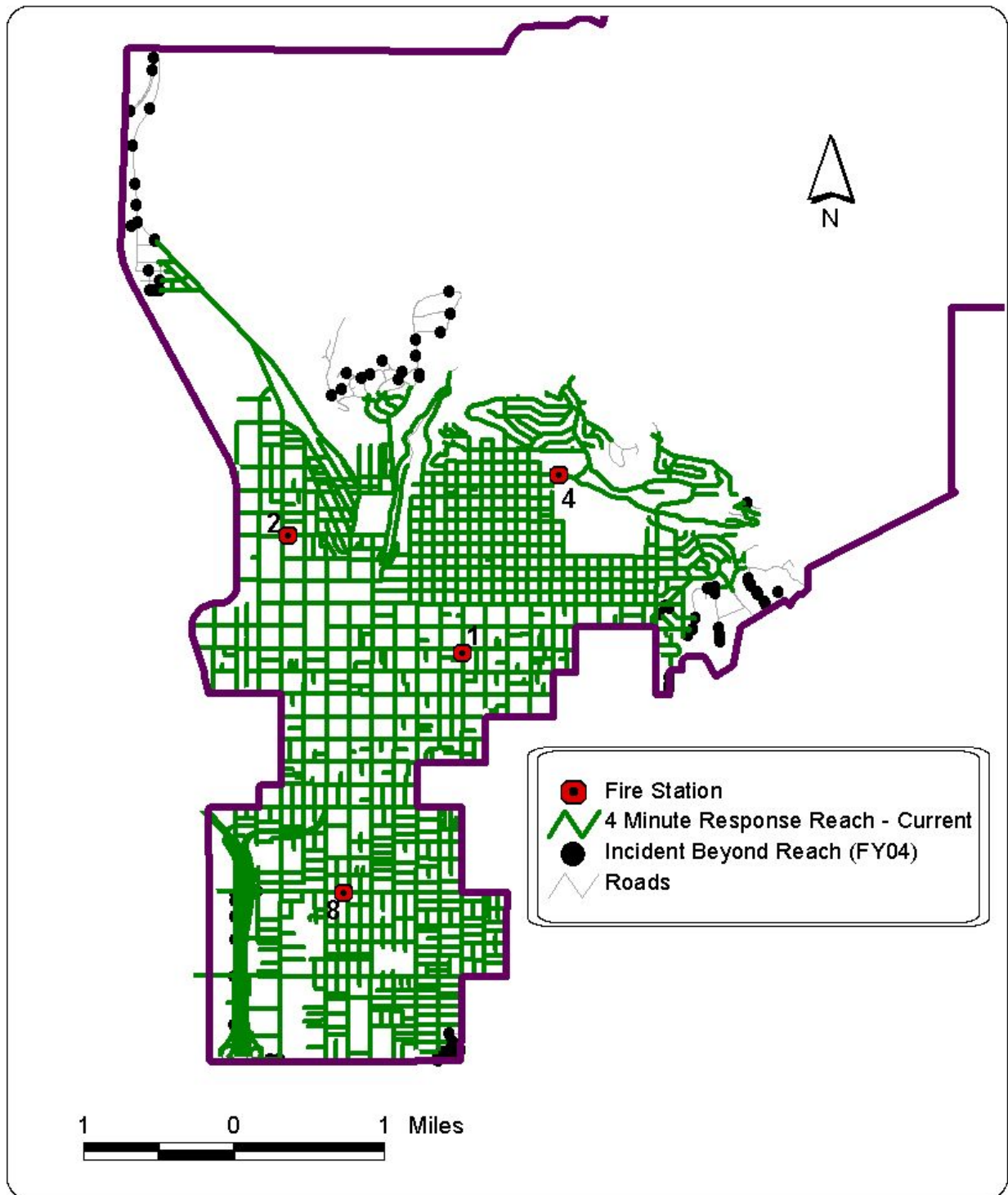
Although current travel times indicate that units are not able to cover the area shown, additional factors suggest that travel speed is not the reason for the extended travel times. Rather, units seem to be responding to calls outside of their first-due area frequently, which means further distances to travel and thus longer travel times.

FY04 incidents beyond reach in the central analysis region are primarily north of Station 2 in the manufacturing area and east of Station 4 in a residential area. These are a small percentage of the total calls in the area and do not warrant relocating station to provide faster response.

FUTURE NEEDS: Given the current workloads of units serving the area, anticipated future demand, and current travel times, there is an immediate need for a peak-demand ALS unit in the central analysis region.

Recommendation 46: Add a peak-demand ALS unit in the downtown area. This can be a two-person unit like Rescue 12 and should be operated from 10 A.M. to 10 P.M. The unit can be housed at Station 2 over night, but should move around the area using system status management (the same way Gold Cross determines appropriate deployment of its ambulances).

Analysis shows a very high concentration of EMS calls around Station 1 and the general downtown area. The concentration of EMS calls in FY04 is shown in Map 16. Based on the distribution of EMS incidents, it would make more sense to upgrade Engine 1 to a Rescue Engine and downgrade Rescue Engine 4 to a regular Engine.

Recommendation 47: Upgrade Engine 1 to a Rescue Engine and downgrade Rescue Engine 4 to an Engine. This is more in line with the distribution of EMS demand.

West Analysis Region – The West Region covers 66.3 square miles and is the largest analysis region. Map 17 shows that a large portion of the west analysis region is vacant; the airport and industrial areas cover much of the rest of the area. There is a small residential development south of Station 9, which is important to protect, but difficult to cover with the current resources.

STATIONS: Five fire stations cover the west analysis region: 6, 7, 9, 11, and 14. An additional station, Station 12, covers the airport only. Table 50 shows pertinent information about each station. Station 14 is the oldest station in the city, but is not excessively old.

Map 16: Central Analysis Region EMS Incident Density, FY04
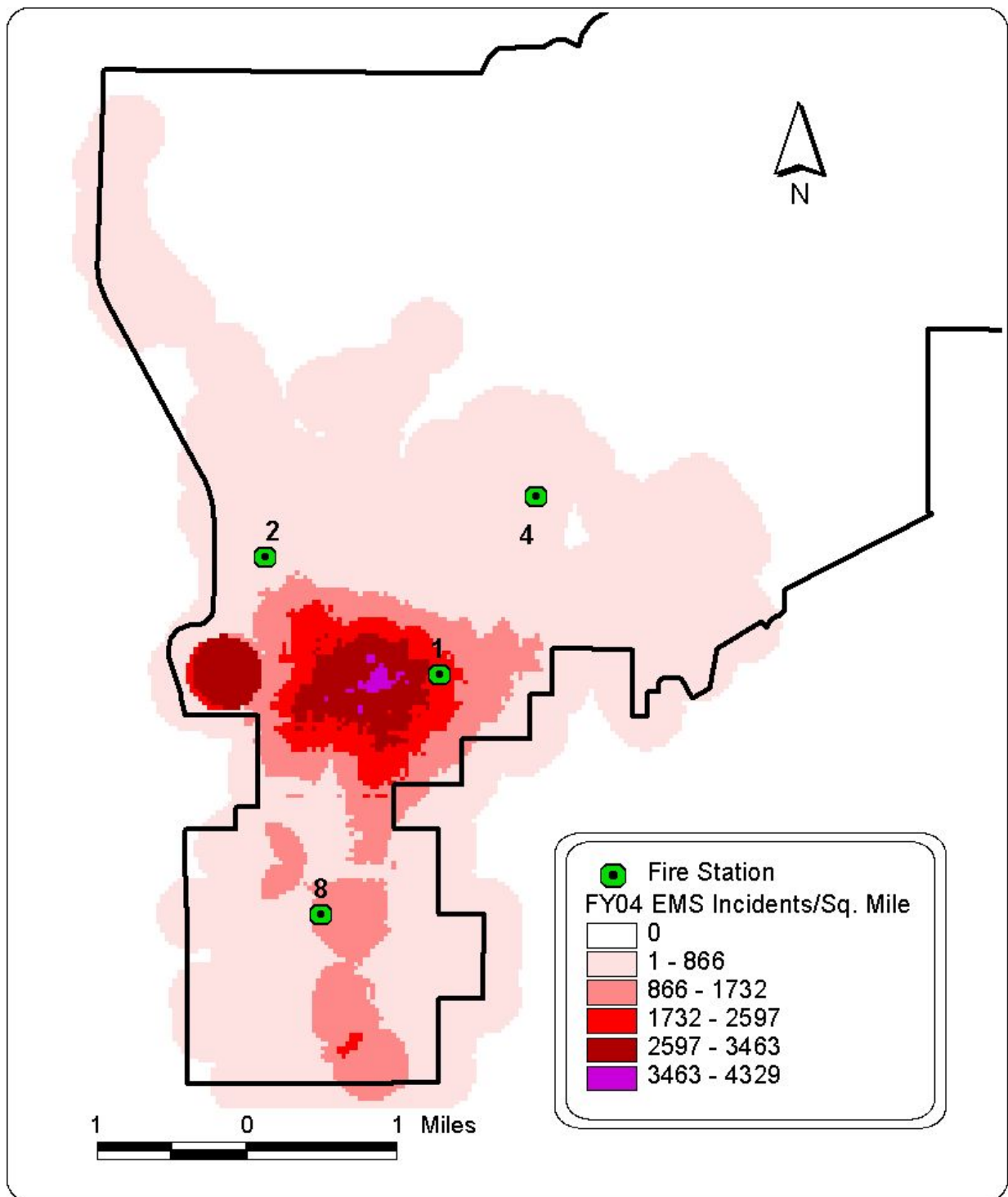
Map 17: West Region Zoning
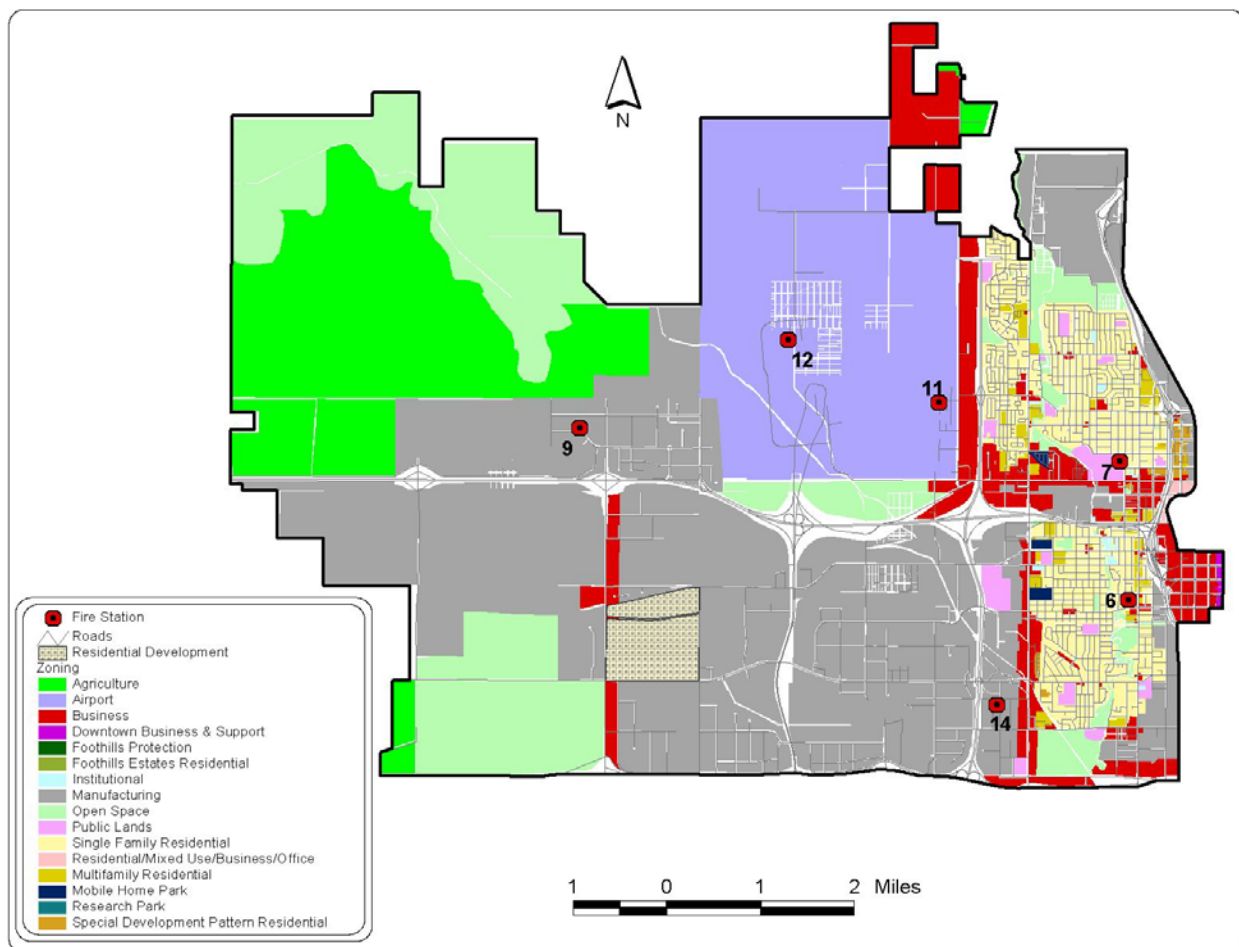
Table 50: SLCFD Station and Apparatus Complement, West Analysis Region

Station	Address	Built	Bays	Apparatus
6	948 West 800 South	1978	3	Rescue Engine, Hazmat
7	273 North 1000 West	1991	2	Rescue Engine, Swift Water Rescue
9	5822 West Amelia Earhart Drive	1987	3	Engine, Squad
11	Airport	1999	4	Rescue Engine, 2 RED, Battalion Chief
12	Airport	1995	6	Rescue 12, 4 RED
14	1560 South Industrial Road	1968	2.5	Rescue Engine, Squad

RISKS: Map 18 shows the locations of risks in the west analysis region in relation to the fire stations protecting the area. Major risks in the region include 15 schools, 19 with hazmat permits, and 3 large assembly places. Additional hazards in the area include: the Salt Lake International Airport (protected by Stations 11 and 12); a very large industrial area (protected by Stations 9 and 14); a large network of railroad and rail yards; and large stretches of Interstates 15, 80, and 215 (high-volume roads).

Map 18: West Analysis Region Risks
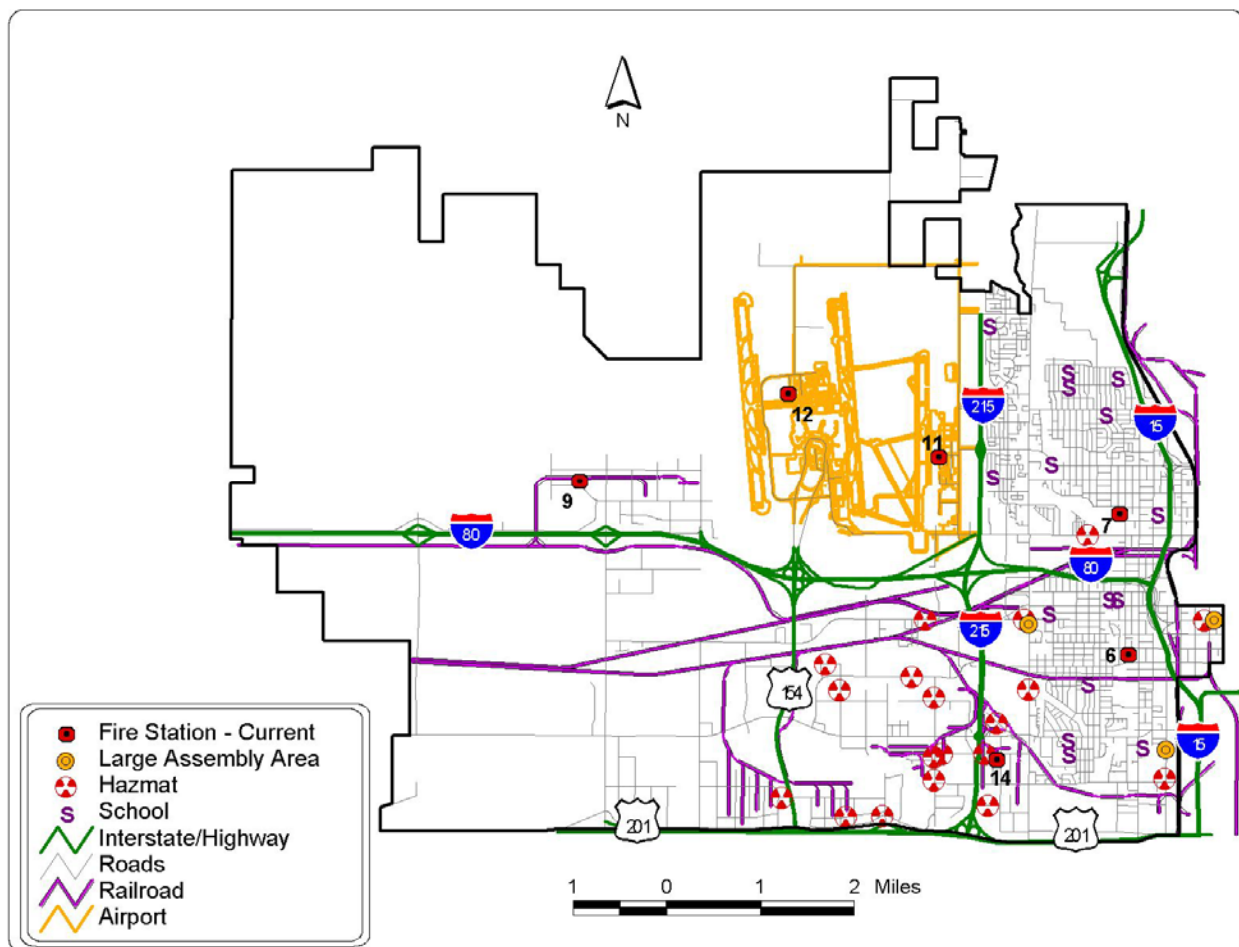
POPULATION: In FY04, the west analysis region had a population of approximately 54,218.[47] Map 19 shows the population by TAZ. Overall, there are 818 people per square mile in the west analysis region, which is very low. The majority of the population in the west analysis region (99 percent) lives in a 13 square mile area east of Station 11, producing a density of 4,150 people per square mile.

Station 9's first-due area has only 25 people while Station 6's has 19,610. Table 51 shows population for the west analysis region by station first-due area from FY04 through FY25. Growth in this region is expected to be very low, about 4 percent over 20 years.

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[47] Not all TAZs fall completely within one region, and population is not distributed evenly throughout a TAZ. Therefore, population was included in the containing the center of the TAZ.

Map 19: West Analysis Region Population, FY04
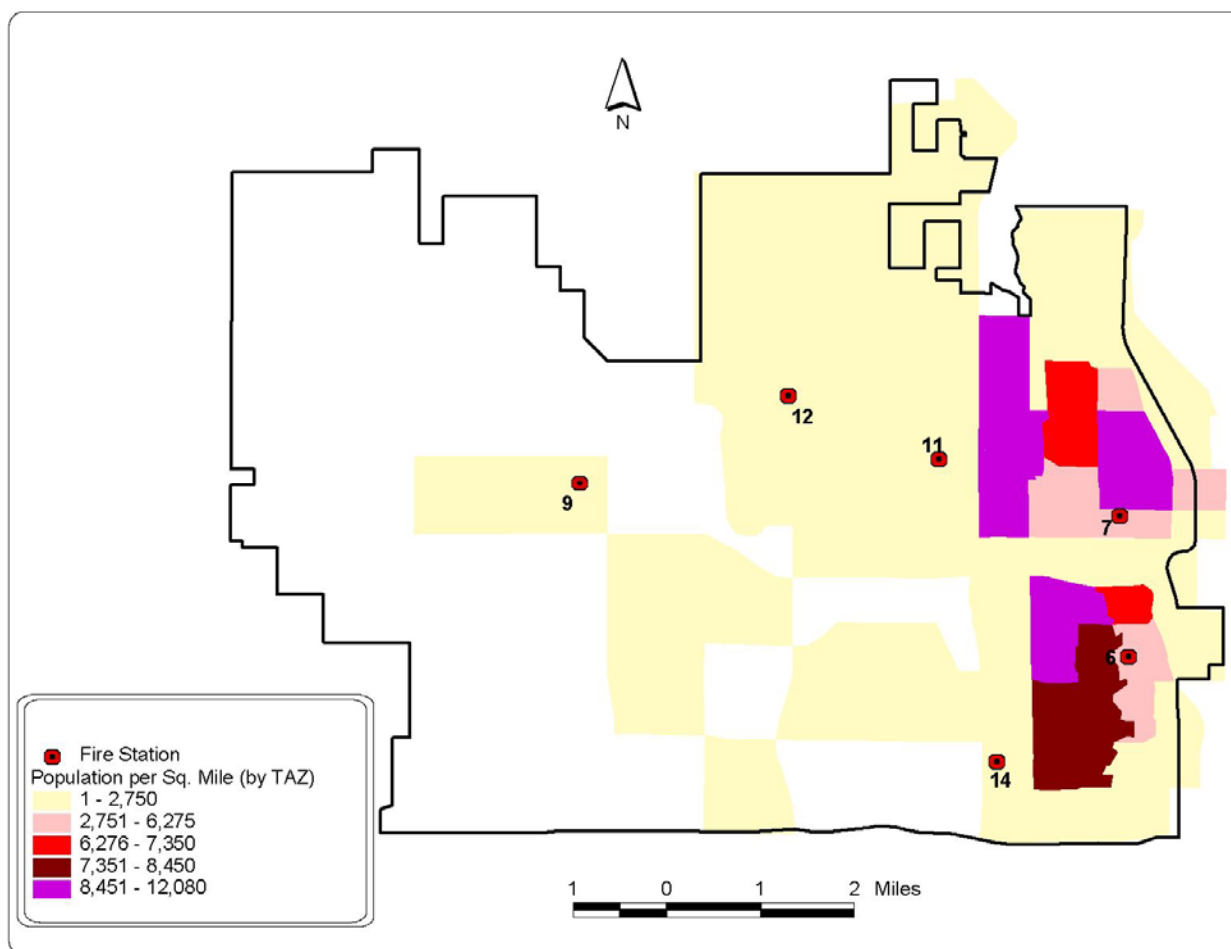
Table 51: West Analysis Region Population, FY04–FY25[48]

Station	Square Miles	FY04	FY05	FY10	FY15	FY20	FY25
6	5.3	19,610	19,669	19,740	20,061	20,255	20,412
7	5.6	18,881	18,895	18,903	19,149	19,265	19,340
9	30.6	25	25	26	27	29	29
11	15.0	12,182	12,203	12,322	12,774	12,849	12,955
14	9.9	3,520	3,515	3,506	3,547	3,566	3,595
Total	**66.3**	**54,218**	**54,307**	**54,497**	**55,558**	**55,964**	**56,331**

DEMAND: In FY04, there were 7,058 geocoded calls in the west analysis region. This is about 1,412 calls per station and 130 calls per 1,000 people. Like the population, incidents are concentrated on the east, near downtown as shown in Map 20.

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[48] Since Station 12 is dedicated to the airport, it does not have a first-due area; thus, it was not included here.

Map 20: FY04 Call Density, West Analysis Region
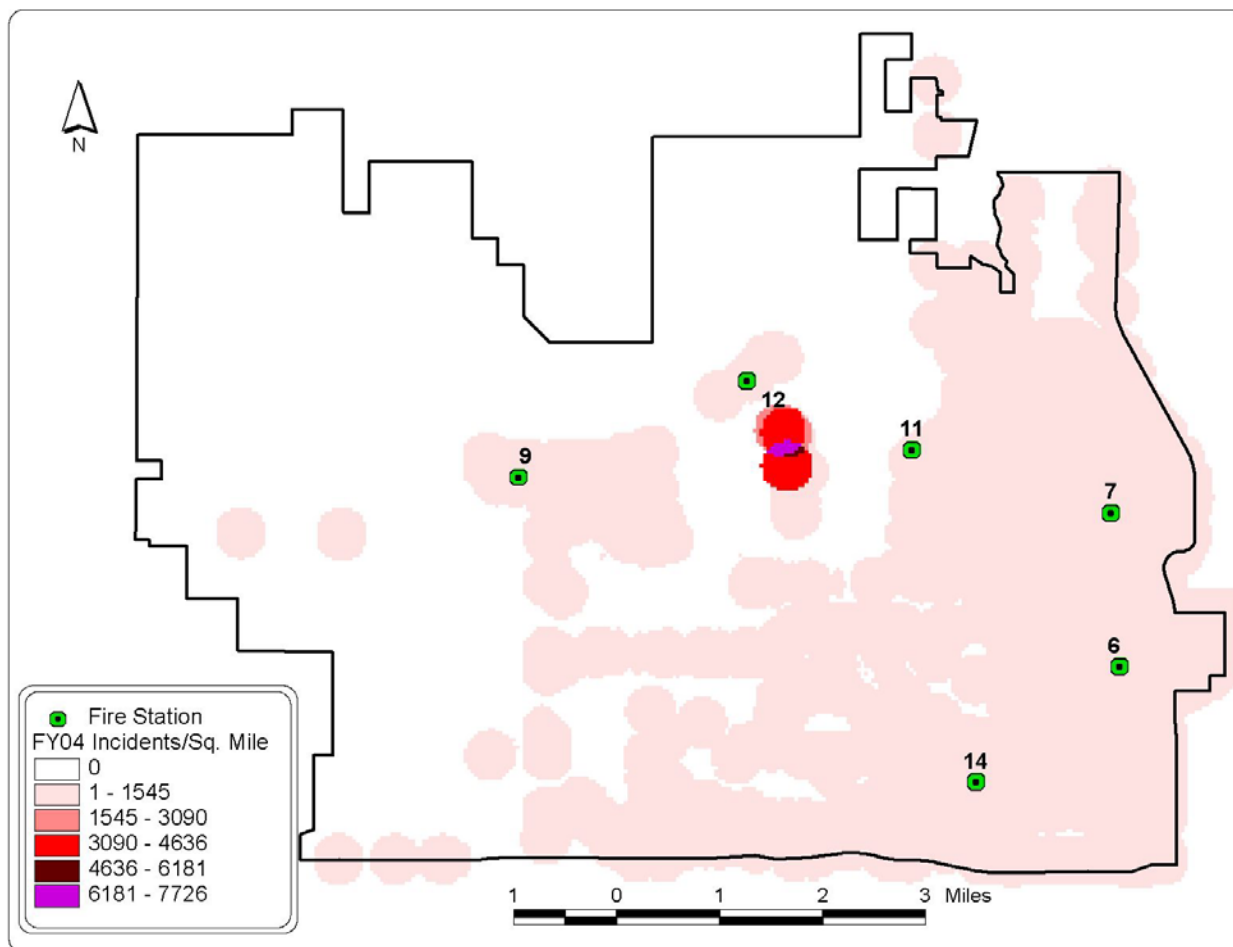
Table 52 gives a more detailed look at the distribution of calls by summarizing the number of geocoded calls by station first-due area as well as the number of responses made by the engines/rescue engines.

Table 52: Calls by Station First-Due Area, West Analysis Region, FY04

Station	Incidents	Engine Responses
6	1,880	1,906
7	1,516	2,264
9	313	561
11	2,214*	1,332
12**	–	1,186
14	1,135	1,376
Total	**7,058**	**8,625**

* Includes calls to which Rescue 12 would have responded.
** Does not have a first-due area. Responses included are for Rescue 12 only.

Based on the population growth expected in the west analysis region and projected system-wide demand, demand in the area could increase to nearly 8,000 calls by 2010 and nearly 10,000 by 2025. Demand could also remain closer to the 7,000–7,500 range, as shown in Table 53. Unit responses could increase as shown in Table 54. Based solely on the projected demand and unit responses, there does not appear to be a need for additional resources in the west analysis region at present. Rescue Engine 7 and Engine 6, however, could be in need of assistance in the next 10 years.

Table 53: West Analysis Region Demand, FY05–FY25

Fiscal Year	Low	High
2005	7,212	7,212
2010	7,237	7,994
2015	7,378	8,825
2020	7,432	9,345
2025	7,480	9,888

Table 54: West Analysis Region Unit Responses, FY05–FY25

	FY05		FY10		FY15		FY20		FY25	
Unit	Low	High	Low	High	Low	High	Low	High	Low	High
Engine 6	1,950	2,025	2,046	2,182	2,086	2,440	2,111	2,600	2,132	2,766
Rescue Engine 7	2,316	2,405	2,431	2,592	2,478	2,899	2,507	3,089	2,532	3,285
Engine 9	574	596	602	642	614	718	621	765	627	814
Rescue Engine 11	1,363	1,415	1,430	1,525	1,458	1,705	1,475	1,817	1,490	1,933
Rescue 12	1,213	1,260	1,273	1,358	1,298	1,518	1,313	1,618	1,326	1,721
Rescue Engine 14	1,408	1,462	1,477	1,576	1,506	1,762	1,524	1,877	1,539	1,997
Total	8,823	9,163	9,260	9,876	9,440	11,042	9,552	11,767	9,647	12,516

RESPONSE TIMES AND COVERAGE: In the west analysis region, the 90th percentile travel time for the first arriving unit in FY04 was 6:55, the highest of all regions. For the three highest priority levels, the 90th percentile travel time was only slightly better at 6:25.

Table 55 summarizes 90th percentile travel times to incidents in the west analysis region during FY04. The extended travel times in this region can be attributed partly to the large areas covered by Stations 9, 11, and 14. The extensive railroad network with regular traffic also contributes to longer travel times from Stations 6, 9, and 14.

Travel times for fire incidents are very high in the west analysis region, nearly eight minutes, which is unusual since there are more units available to respond to fire incidents than to EMS incidents.

Table 55: West Analysis Region Apparatus Response Times in FY04

Unit	90th Percentile Travel*
Engine 6	6:09
Rescue Engine 7	6:32
Engine 9	8:46
Rescue Engine 11	8:55
Rescue 12	4:59
Rescue Engine 14	8:03
EMS	6:17
Fire	7:55
Alpha	7:10
Bravo	7:54
Charlie	6:49
Delta	5:39
Echo	5:10

* All times calculated for first-arriving unit to incidents in the West analysis region.

Based on the road network and travel speeds discussed above, the four-minute response reach of stations in the West analysis region is shown in Map 21. Based on the calculated response reach, only 65.2 percent of FY04 calls were within a 4-minute travel time from the current west region stations. Of the high-risk facilities identified above, 2 schools and 3 hazmat locations are beyond the current four-minute reach.

There are two concentrations of calls beyond reach. The first is north of Station 7 and northeast of Station 11. This is a residential area with over 7,500 residents currently and about 250 calls in FY04.

The second area is the industrial area west of Station 14 and south of Station 9. This area is difficult to reach because of the railroads. In FY04, there were about 300 calls in this area. Based on the number of incidents alone, there is no reason to relocate stations. However, since response times are also very high compared to elsewhere in the city, primarily due to the long response times to the uncovered areas, it is wise to look at some redeployment in the west analysis region.

Map 21: West Analysis Region, Current Response Reach
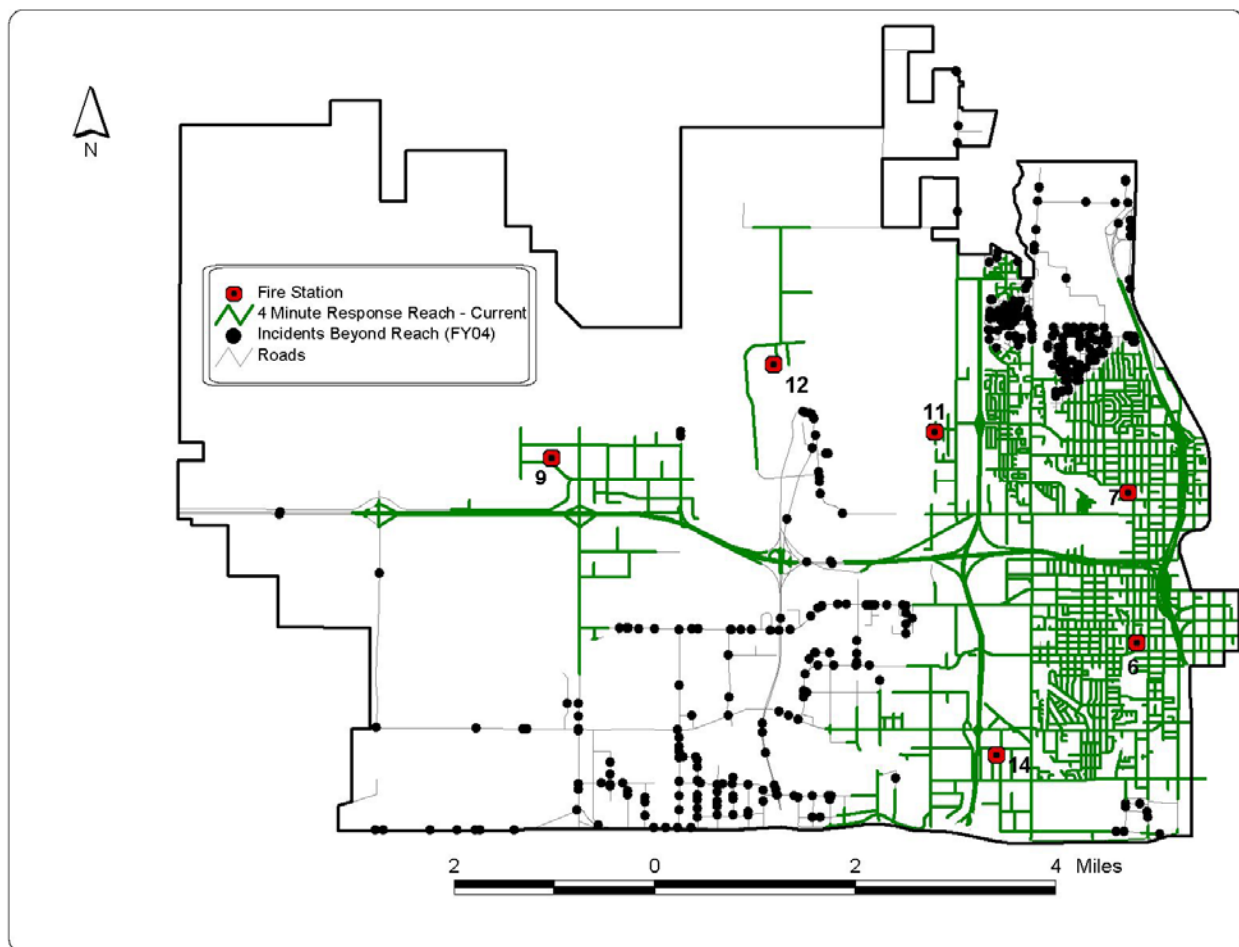
FUTURE NEEDS: Based on the future demand in the west analysis region and current travel times to the area, there is a need to redeploy some resources in the west analysis region.

Station 14 is the oldest station in the city and sits in a poor location with respect to the road network. The station is virtually surrounded by railroad tracks, which slow travel significantly, both in terms of slow travel over tracks and in terms of being stopped by trains. Finally, there is significant overlap between Station 14 and Station 6 in terms of a four-minute response reach, as shown in Map 22.

Map 22: Station 14 Current Reach and Overlap
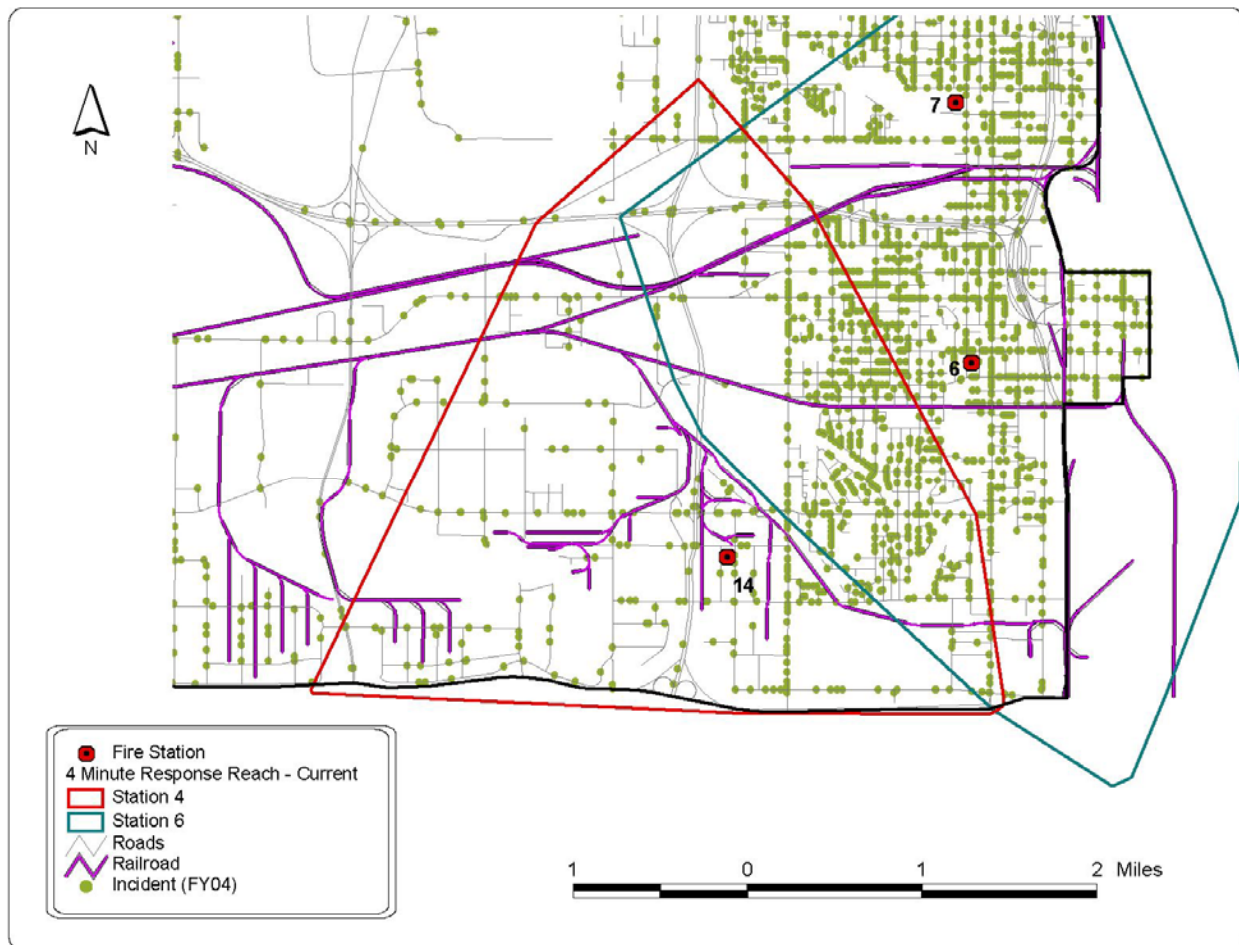
Station 9's response reach is also hindered by the railroads as well as its distance from most development. The area currently protected by Station 9 is sparsely developed, and primarily industrial.

Both Station 9 and 14 protect the large area currently left uncovered by the four-minute response reach. Analysis was done to determine whether relocating either station would improve coverage of the southwest industrial area.

Relocating Station 14 west would improve coverage to the west, but would cause a gap in coverage near its current location. Map 23 shows the change in coverage by relocating Station 14 to the vicinity of W California Avenue at S 3600 West Street. Under this option, FY04 incident coverage remains the same, 62.5 percent, but shifts west.

Map 23: Relocated Station 14 Four-Minute Reach
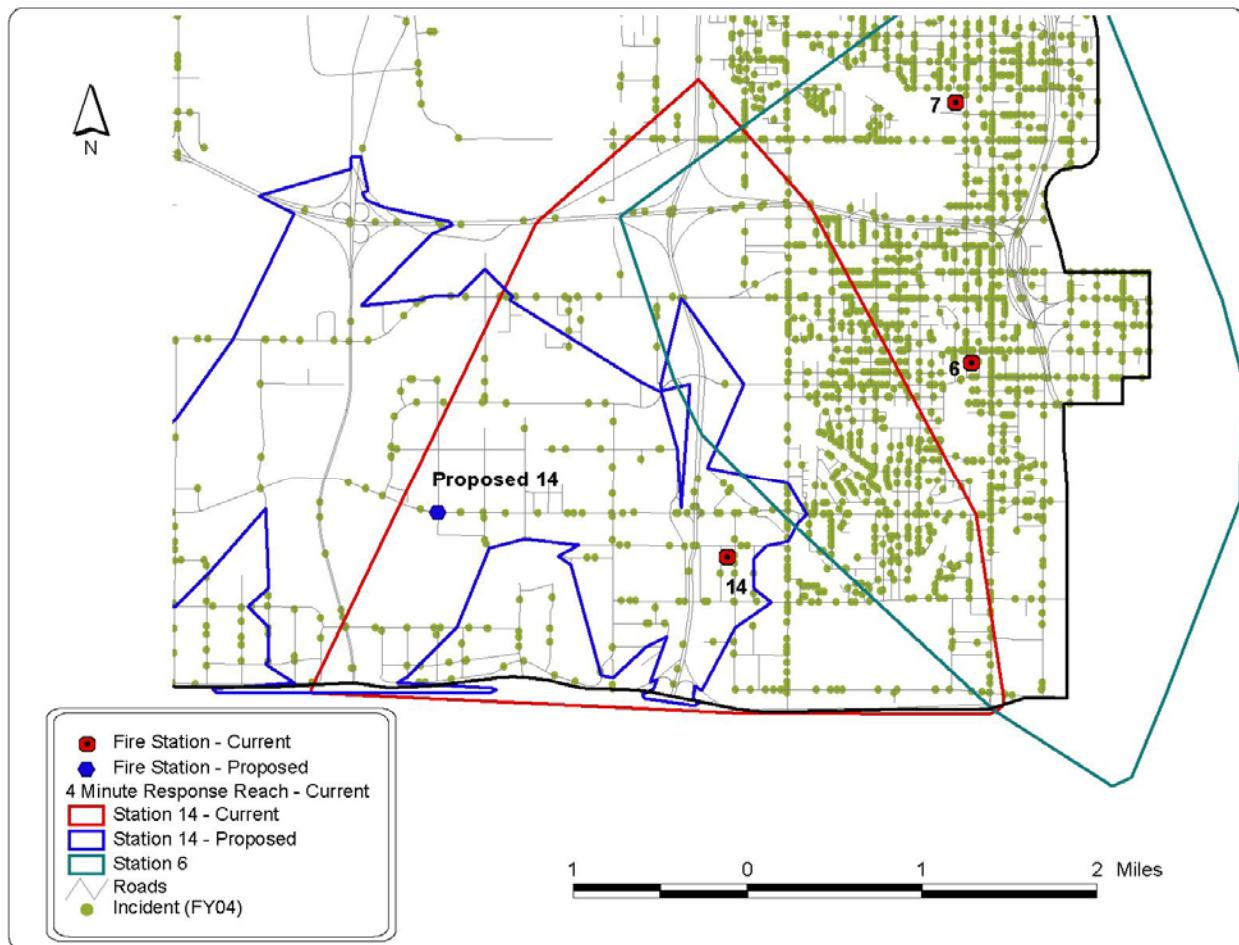
Although Station 9 is only 18 years old, and was not used as a fire station until FY00, relocating this station may make more sense. Map 24 shows response coverage achieved by relocating Station 9 to the vicinity of W 700 South Street at S 4050 West Street. Under this option, 75 percent of FY04 incidents would be within a 4-minute travel time, an increase of nearly 700 calls over the current coverage.

Map 24: Relocated Station 9 Four-Minute Reach
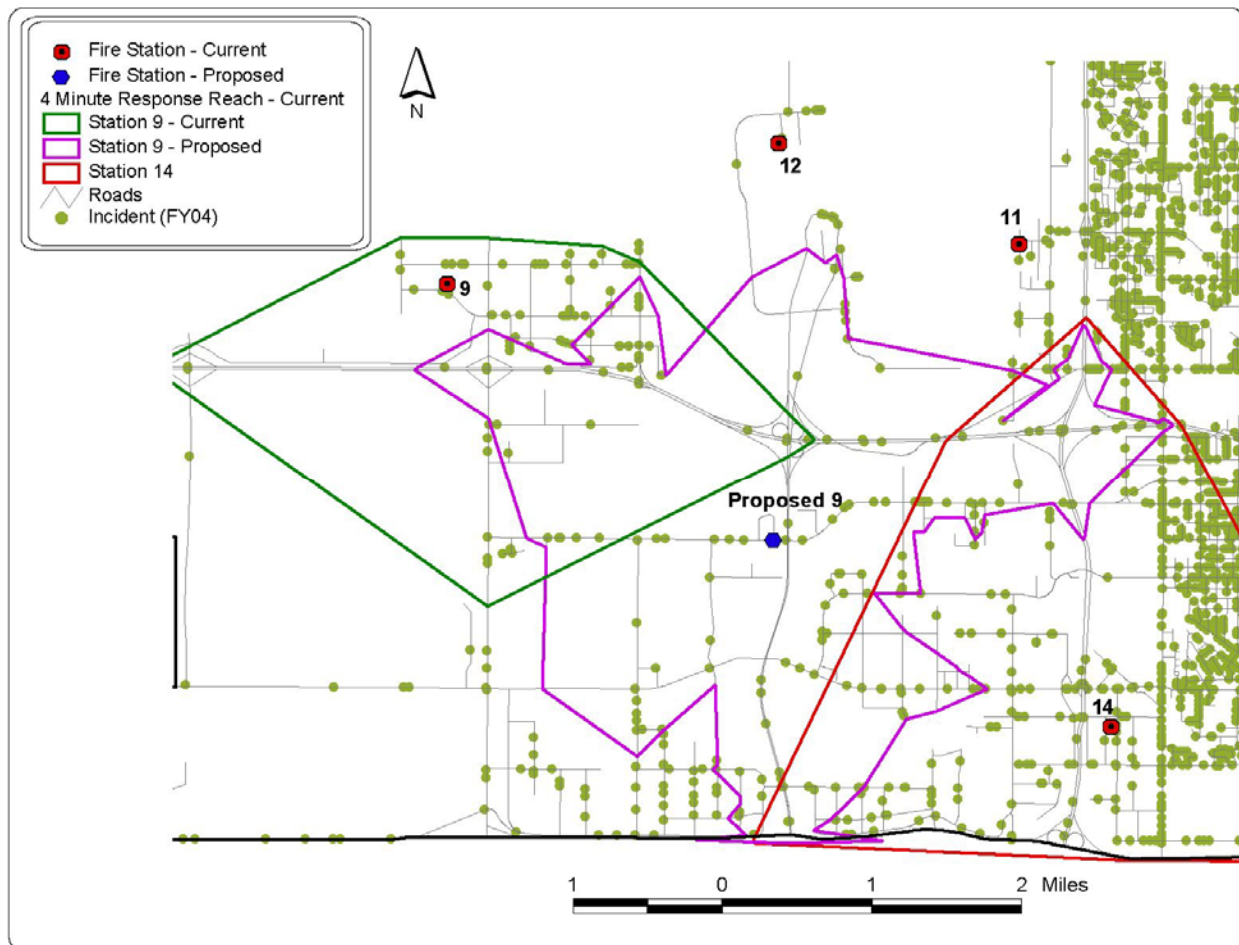
Recommendation 48: Relocate Station 9 southeast to a location near the intersection of W 700 South Street and S 4050 West Street in the next five years. This relocation would shift engine first-due areas and should create enough call volume to justify continuing to operate Station 9 full-time. This new location would better serve the residential development that sits between W California Avenue, S 5600 West Street, and S 4800 West Street.

Recommendation 49: Until Station 9 is relocated, consider staffing Station 9 during peak hours only. In the interim of the relocation, the SLCFD should consider the option of closing Station 9 during off peak hours (6 P.M. to 6 A.M.), and run a daytime crew only during peak hours (6 A.M. to 6 P.M.). Personnel from that station could then be deployed during the remainder of their tour to other stations to fill vacancies due to sick leave, vacations, paid time off, etc. This would save money on overtime, and help to fill gaps in four-person staffing. The one caveat to this recommendation is the remoteness of the station. Station 11 and Station 14 would handle any calls in this area; consequently response times at night would be affected; however, considering the low number of calls during off-peak hours, this should not be a major problem.

The second area with a concentration of calls beyond reach is north of Station 7, with about 250 calls. Relocating Station 7 north in the next 10–20 years would provide better

coverage to this area. A move is not warranted at this time due to the low number of incidents and the relative age of Station 7. A new analysis of call density and response times should be completed in the future to determine the best location for moving Station 7.

Recommendation 50: Consider relocating Station 7 slightly north (about half a mile) and slightly west (about half a mile) in 10–20 years.

Truck Deployment – The Salt Lake City Fire Department operates three trucks and two quints (units that can serve as either an engine or a truck). These units are located at Stations 2, 5, 6, 8, and 9. Truck companies need to be placed strategically throughout the city in order to fully cover areas with high-rise buildings and structure fires. Map 25 shows the locations of current trucks in Salt Lake City in relation to high-rise buildings. High-rises are concentrated in the downtown area.

Map 25: SLCFD Truck Placement vs. High-rise Buildings
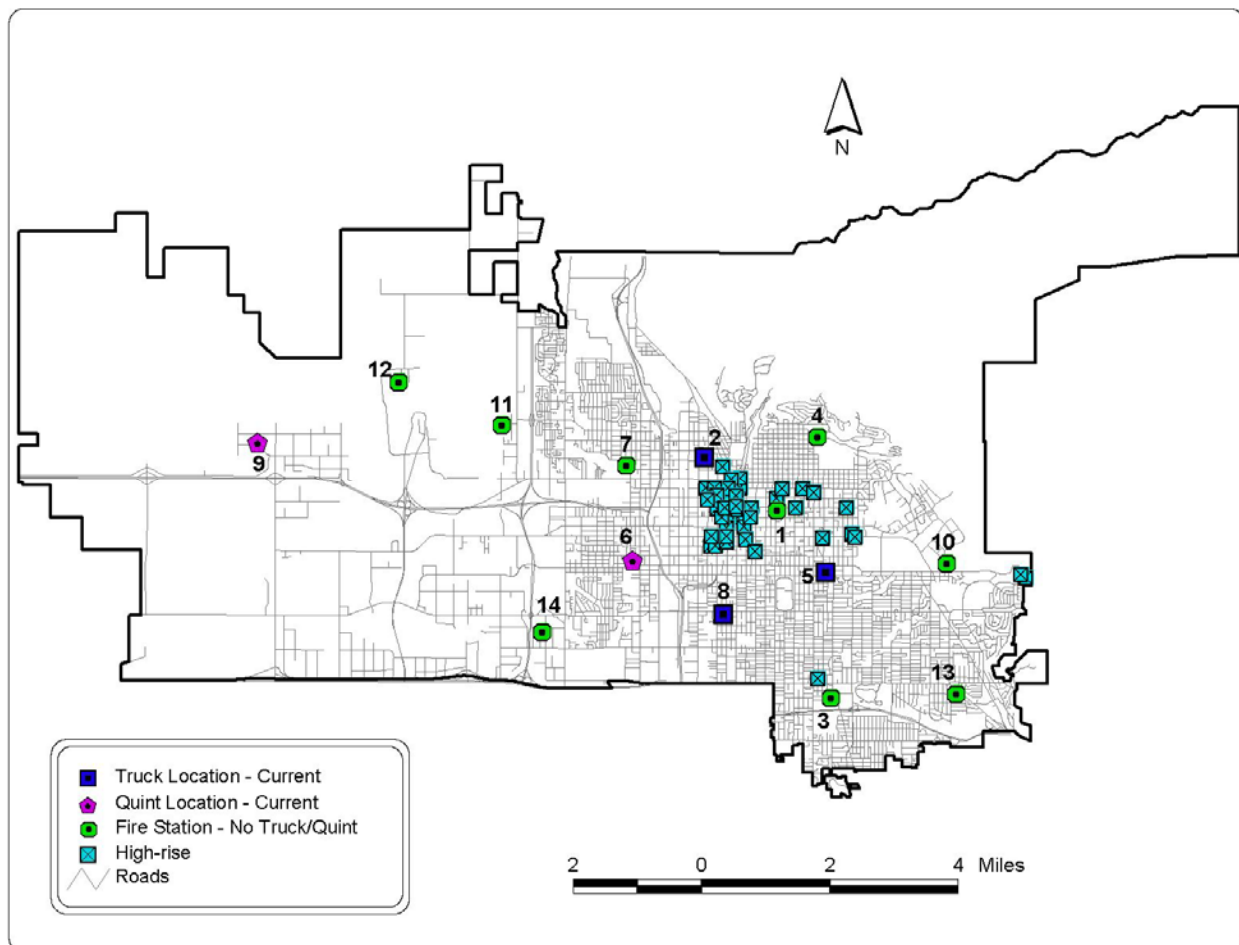
DEMAND: In FY04, there were 5,594 geocoded calls that required a truck response in Salt Lake City, which is about 15 per day. Table 56 shows the number of responses made by each truck; responses are spread across the entire city. Map 26 illustrates FY04 truck response density.

Table 56: Truck Responses, FY04

Station	Truck Responses
2	2,616
5	1,824*
8	1,938
Total	**6,378**

* Includes responses made as Heavy
Rescue 5.

Map 26: FY04 Density of Truck Responses
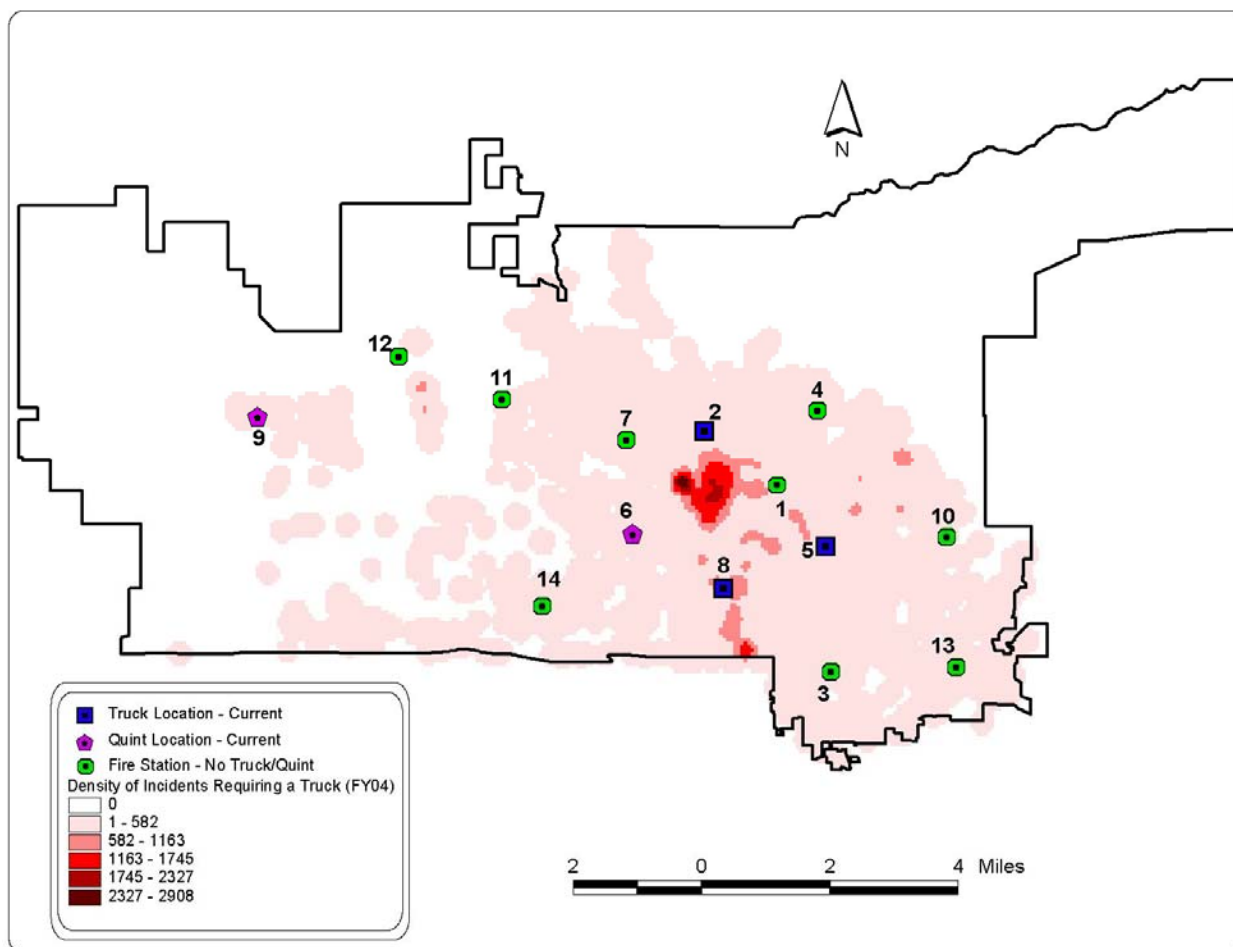
Based on the population growth expected and projected system-wide (fire) demand,
demand for trucks is not expected to increase much, as shown in Table 57. Unit responses could
increase as shown in Table 58.

Table 57: Truck Demand, FY05–FY25

Fiscal Year	Low	High
2005	5,754	5,680
2010	5,815	6,124
2015	5,927	6,618
2020	5,998	6,917
2025	6,057	7,217

Table 58: Truck Responses, FY05–FY25

Unit	FY05 Low	FY05 High	FY10 Low	FY10 High	FY15 Low	FY15 High	FY20 Low	FY20 High	FY25 Low	FY25 High
Truck 2	2,676	2,779	2,809	2,995	2,863	3,349	2,897	3,569	2,926	3,796
Truck 5	1,866	1,938	1,958	2,088	1,996	2,335	2,020	2,488	2,040	2,647
Truck 8	1,982	2,059	2,081	2,219	2,121	2,481	2,146	2,644	2,168	2,812
Total	6,524	6,776	6,848	7,303	6,981	8,166	7,064	8,701	7,133	9,255

Despite the increasing responses by SLCFD trucks, analysis of UHUs using the high demand projections from the previous section, the same unit response to incident ratio (assumes that growth will occur uniformly throughout the city), and the same demand distribution throughout the day shows that Truck 2, with the highest number of responses will reach a UHU of only 10.1 percent overall. Table 59 shows estimated UHUs by truck by time of day through FY25.[49]

Table 59: Truck UHUs by Time of Day, FY05–FY25

FY05	T02	T05	T08
Midnight–1:59 am	6.5%	4.8%	5.2%
2:00–3:59 am	3.7%	2.7%	3.6%
4:00–5:59 am	2.4%	3.1%	3.3%
6:00–7:59 am	4.2%	5.3%	4.5%
8:00–9:59 am	6.7%	8.7%	7.8%
10:00–11:59 am	8.6%	10.3%	9.2%
Noon–1:59 pm	9.4%	11.2%	11.1%
2:00–3:59 pm	8.8%	9.3%	11.8%
4:00–5:59 pm	11.7%	10.9%	12.1%
6:00–7:59 pm	9.4%	10.3%	9.6%
8:00–9:59 pm	9.3%	7.1%	8.3%
10:00–11:59 pm	7.8%	6.0%	6.5%

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[49] These estimates assume that demand grows evenly throughout the city, that response levels do not change, that first-due areas remain the same as in FY04, and that all units remain in service at their current level (i.e. Engine 1 does not become a rescue engine, and Rescue Engine 4 does not drop down to engine).

FY10	T02	T05	T08
Midnight–1:59 am	7.0%	5.1%	5.6%
2:00–3:59 am	4.0%	2.9%	3.9%
4:00–5:59 am	2.6%	3.4%	3.6%
6:00–7:59 am	4.6%	5.7%	4.9%
8:00–9:59 am	7.3%	9.4%	8.4%
10:00–11:59 am	9.3%	11.1%	9.9%
Noon–1:59 pm	10.1%	12.1%	12.0%
2:00–3:59 pm	9.5%	10.1%	12.7%
4:00–5:59 pm	12.6%	11.8%	13.0%
6:00–7:59 pm	10.1%	11.1%	10.4%
8:00–9:59 pm	10.0%	7.6%	9.0%
10:00–11:59 pm	8.4%	6.5%	7.0%
FY15	T02	T05	T08
Midnight–1:59 am	7.9%	5.7%	6.3%
2:00–3:59 am	4.4%	3.3%	4.4%
4:00–5:59 am	2.9%	3.8%	4.0%
6:00–7:59 am	5.1%	6.4%	5.5%
8:00–9:59 am	8.1%	10.5%	9.4%
10:00–11:59 am	10.4%	12.4%	11.1%
Noon–1:59 pm	11.3%	13.5%	13.4%
2:00–3:59 pm	10.6%	11.2%	14.2%
4:00–5:59 pm	14.1%	13.2%	14.6%
6:00–7:59 pm	11.3%	12.4%	11.6%
8:00–9:59 pm	11.2%	8.5%	10.0%
10:00–11:59 pm	9.4%	7.3%	7.9%
FY20	T02	T05	T08
Midnight–1:59 am	8.4%	6.1%	6.7%
2:00–3:59 am	4.7%	3.5%	4.6%
4:00–5:59 am	3.1%	4.0%	4.3%
6:00–7:59 am	5.4%	6.8%	5.8%
8:00–9:59 am	8.7%	11.2%	10.0%
10:00–11:59 am	11.1%	13.2%	11.8%
Noon–1:59 pm	12.0%	14.4%	14.3%
2:00–3:59 pm	11.3%	12.0%	15.2%
4:00–5:59 pm	15.0%	14.1%	15.5%
6:00–7:59 pm	12.1%	13.2%	12.4%
8:00–9:59 pm	12.0%	9.1%	10.7%
10:00–11:59 pm	10.0%	7.8%	8.4%

FY25	T02	T05	T08
Midnight–1:59 am	8.9%	6.5%	7.2%
2:00–3:59 am	5.0%	3.7%	4.9%
4:00–5:59 am	3.3%	4.3%	4.6%
6:00–7:59 am	5.8%	7.2%	6.2%
8:00–9:59 am	9.2%	11.9%	10.6%
10:00–11:59 am	11.8%	14.1%	12.6%
Noon–1:59 pm	12.8%	15.3%	15.2%
2:00–3:59 pm	12.0%	12.7%	16.1%
4:00–5:59 pm	16.0%	15.0%	16.5%
6:00–7:59 pm	12.8%	14.1%	13.1%
8:00–9:59 pm	12.7%	9.7%	11.4%
10:00–11:59 pm	10.6%	8.2%	8.9%

RESPONSE TIMES AND COVERAGE: To determine whether there were any areas in the city that were in need of truck coverage, the ability of apparatus to cover the area and risks present in the recommended time was evaluated. In FY04, trucks had 90th percentile travel times around 7 minutes, which is very good considering the large area that truck units have to cover. Table 60 summarizes 90th percentile truck travel times during FY04.

Table 60: Truck Travel Times in FY04

Unit	90th Percentile Travel
Truck 2	7:03
Truck 5	7:11
Truck 8	7:17

Based on the road network and travel speeds discussed above, the six-minute response reach of trucks is shown in Map 27. Based on the calculated response reach, 83.9 percent of FY04 calls requiring a truck response were within a 6-minute travel time from the current stations with a truck. Only 2 out of 59 (3.4 percent) of the high-rises were beyond a 6-minute travel time of a truck.

Map 27 also shows the response reach of the quints. When included with the trucks, 86 percent of FY04 incidents requiring a truck response were within reach. With the relocation of Station 9 as recommended above, 90.1 percent of FY04 incidents requiring a truck response would be within a 6-minute travel time of a truck or quint. Map 28 shows the change in truck coverage with the relocation of Station 9.

Map 27: Current Truck and Quint Coverage
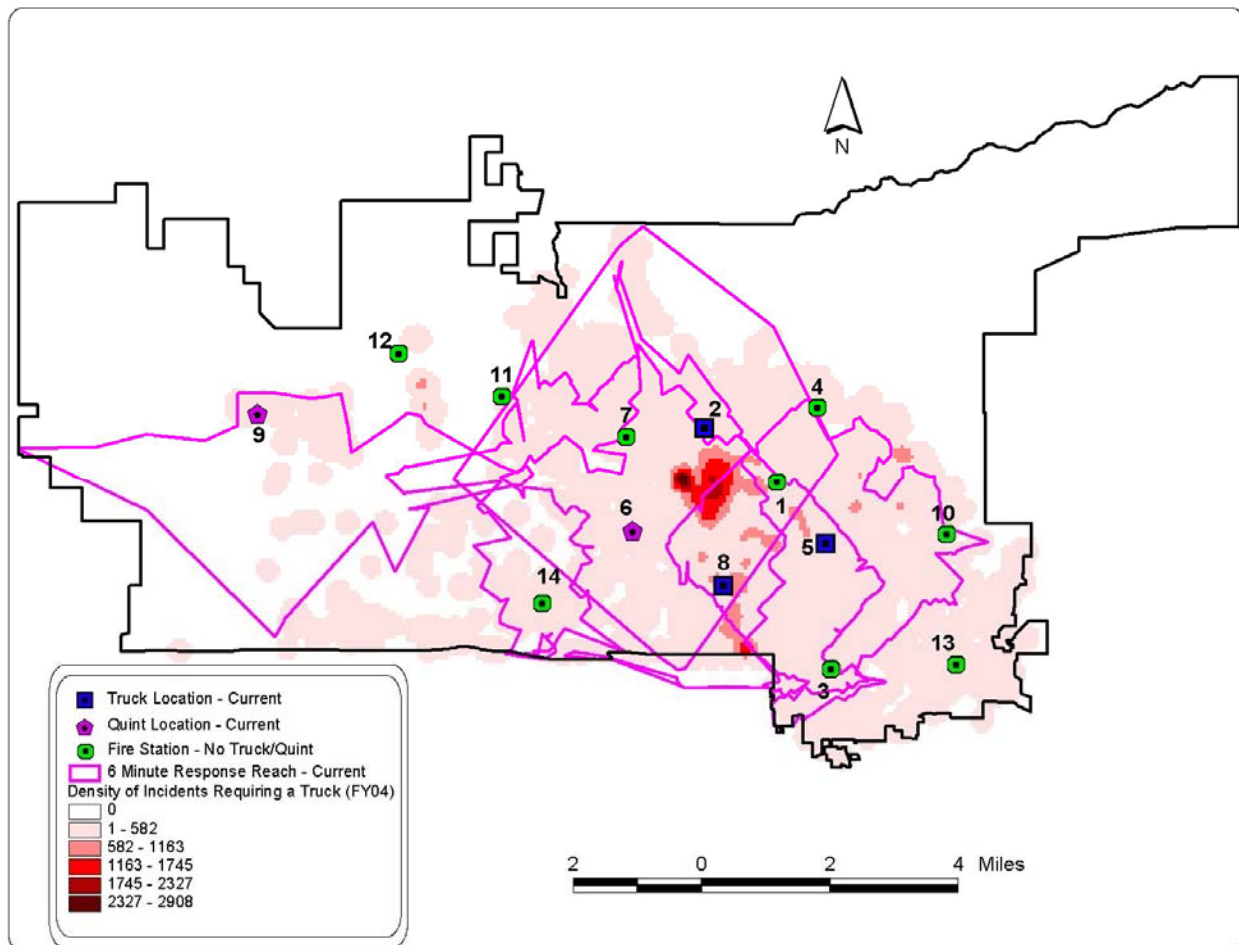
Battalion Chief Deployment – The SLCFD is divided into two battalions, each headed by a Battalion Chief (BC). The BCs are currently deployed at Stations 1 and 11, and among other duties they respond to all major incidents in their region. In FY04, the BCs had a 90th percentile travel time of 10:55. Battalion Chief 1, with a smaller area to cover, had a 90th percentile travel time of 8:57. Battalion Chief 2's 90th percentile travel time was 13:58. Map 29 shows the current eight-minute travel reach of the Battalion Chiefs.

By relocating the Battalion Chiefs to Station 5 and 7, as discussed in the next chapter, the response reach would change as shown in Map 30. The difference would be an increase of 3 percent of calls within reach (from 83.9 percent to 87 percent).

Map 28: Proposed Truck and Quint Coverage
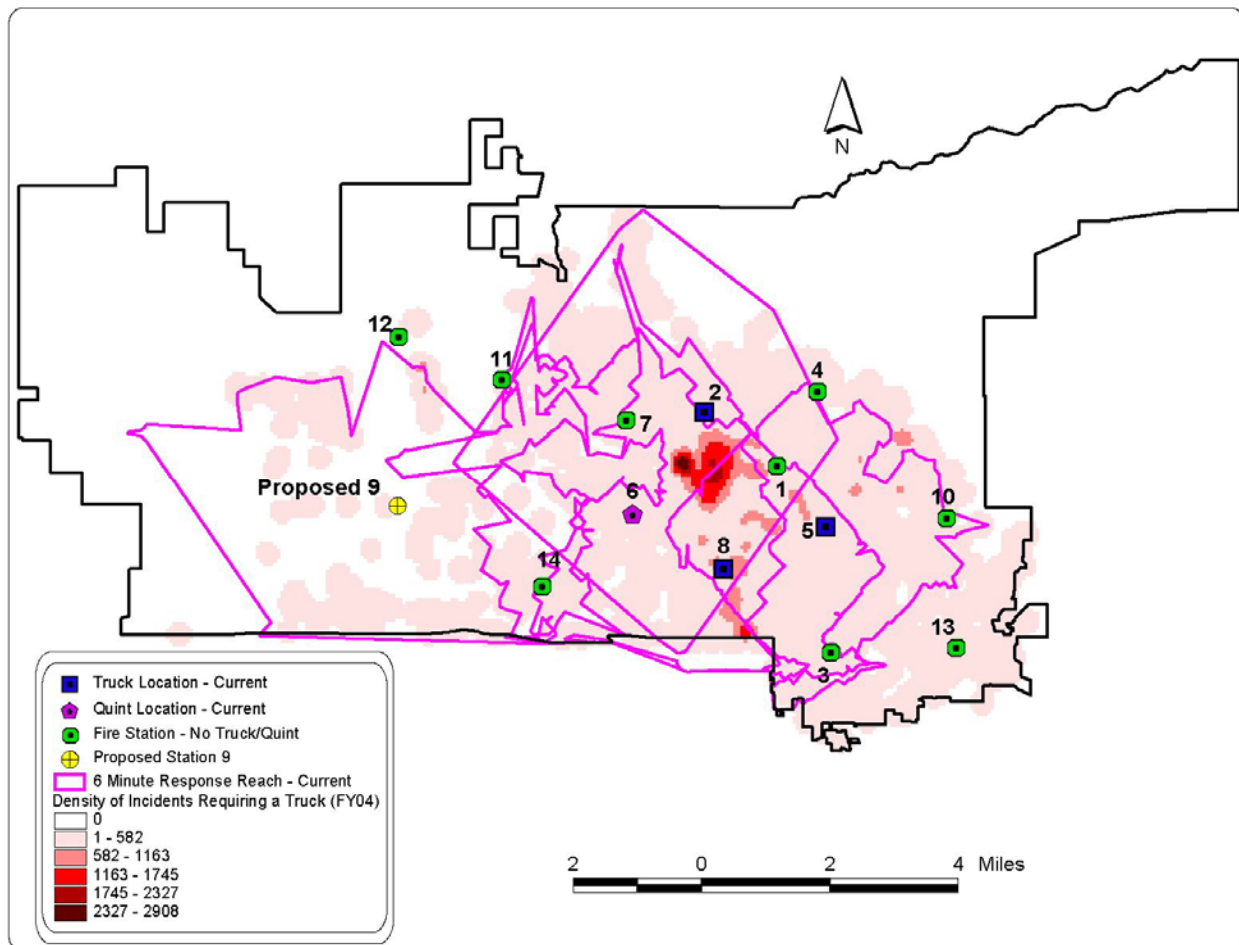
Map 29: Current Battalion Chief Response Reach
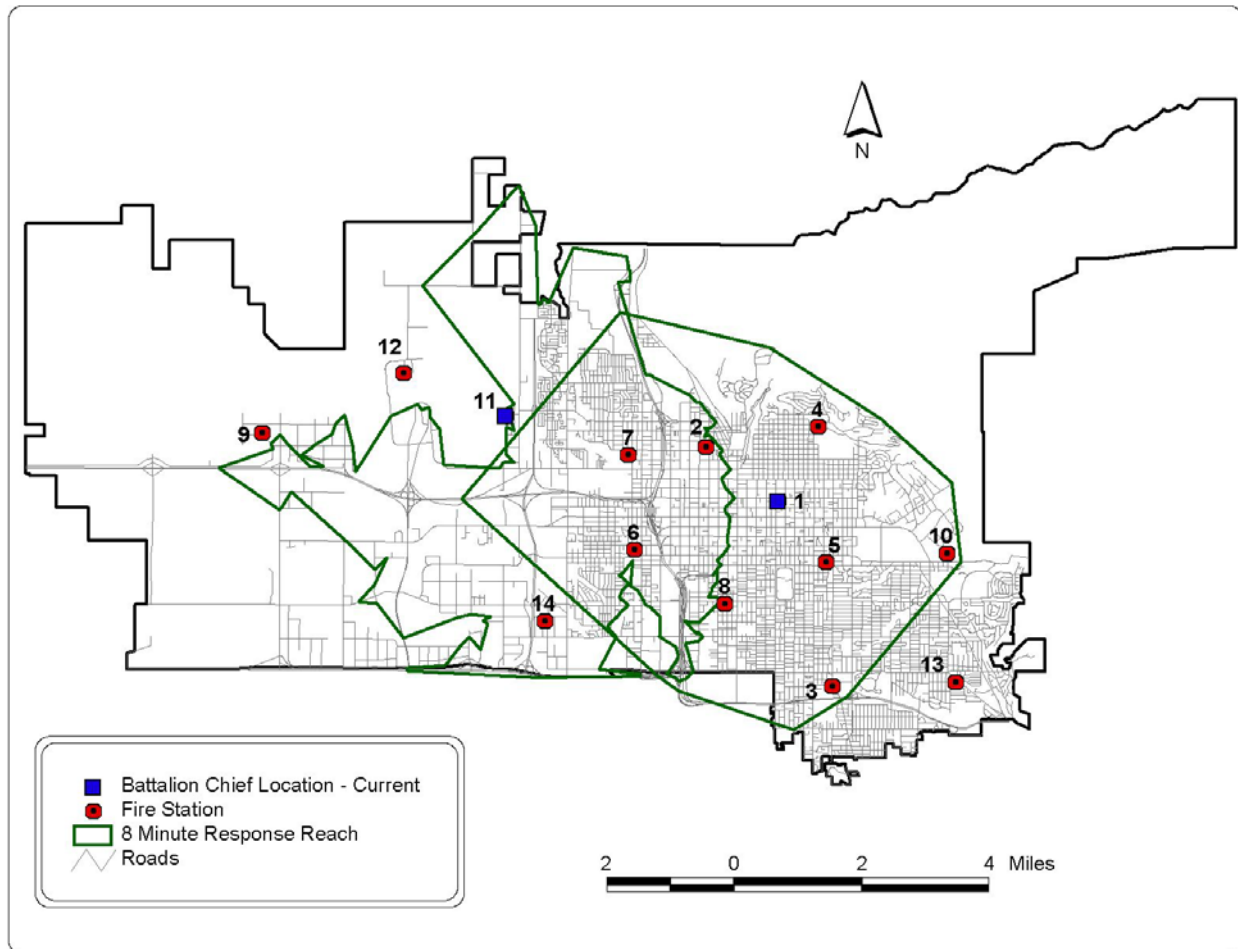
Map 30: Proposed Battalion Chief Response Reach
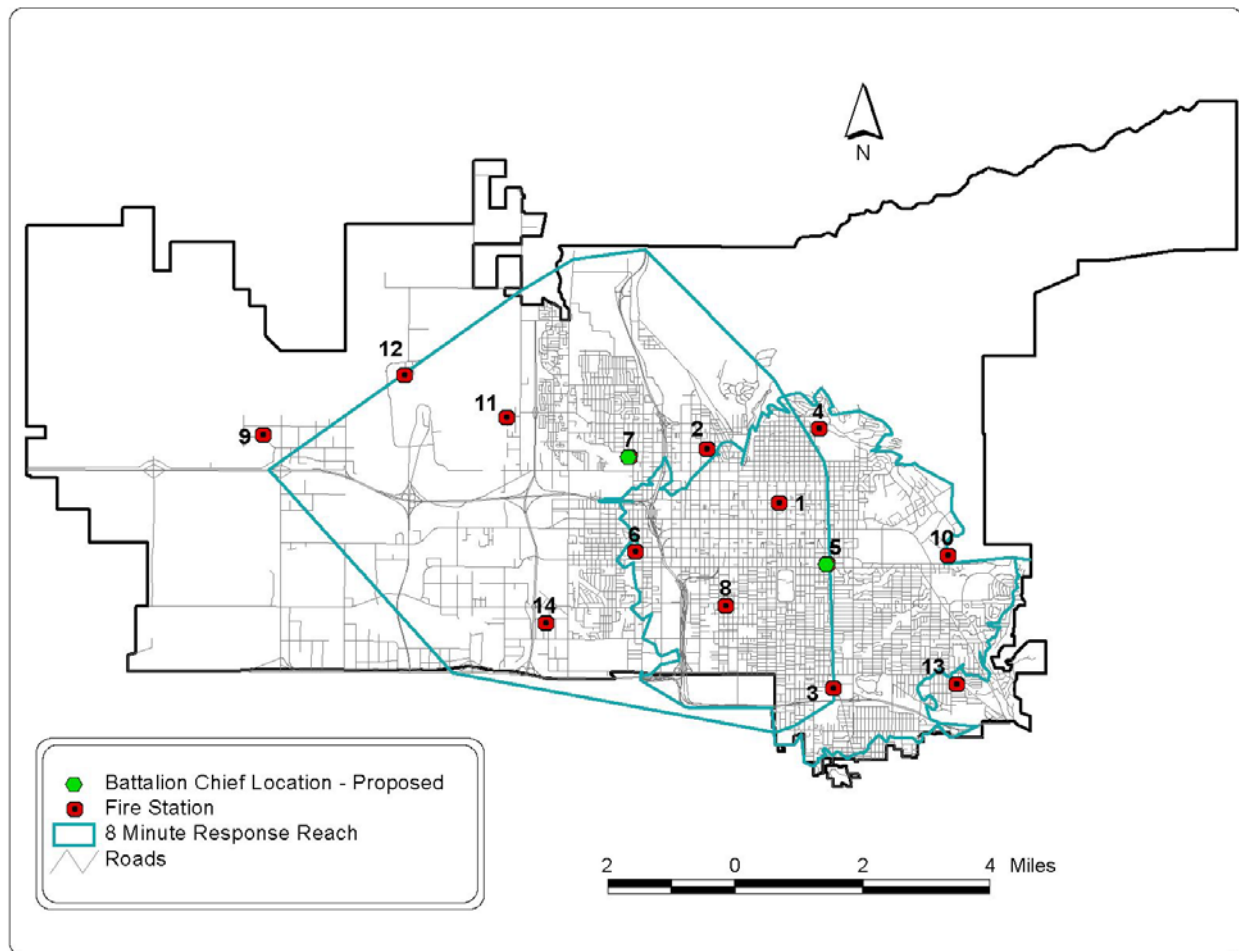
Summary

Overall, the Salt Lake City Fire Department has done a good job of distributing stations and apparatus throughout the city to provide appropriate response coverage. Response times overall are currently longer than recommended. Call processing time is a major factor in the extended total response times. While travel time does play some role in the extended total response times in Salt Lake City, relocating stations does not appear to be the best solution at this time. Response time efforts should initially be focused on reducing call processing and turnout times.

VI. FIRE OPERATIONS

This chapter discusses the operations component of the Salt Lake City Fire Department (SLCFD). Areas reviewed include incident command practices and procedures, standard operating procedures, staffing levels, deployment for operations, and day-to-day emergency response operation under the command structure. Special operations, including technical rescue and hazardous materials capabilities, are also reviewed.

Previous TriData studies have found that many jurisdictions have weak or non-existent intergovernmental agreements with surrounding jurisdictions. This chapter includes a review of existing mutual aid agreements and determines what changes, if any, should be made.

In order to provide effective service, fire departments should have an operational profile that permits them to provide a level of service consistent with the demands of the community. Sometimes the decision about the type of operating profile to use is consistent with the demand and sometimes it is not. In many cases, the decision about what type of operating profile is best for the community is not made by a rational decision-making process; rather, it is often the result of incremental policymaking or is based on tradition.

Overall Approach to Operations

The Salt Lake City Fire Department operationally is very well run. It is a philosophically aggressive Department in its approach to fighting fire and is impressive in its ability to administratively implement operations. The Department is also nationally recognized for its EMS and dispatch models.

Overall, the SLCFD is modeled after most southwestern cites in its development of deployment strategies for Department resources. While fires today have decreased significantly, EMS demands have sharply increased. The SLCFD has met this challenge and is looking for ways to increase efficiency and improve services in both EMS and fire suppression. Every firefighter in the Department knows, understands, and practices the "Five Benchmarks:"

- Primary search – "all clear"
- Secondary search – "all clear" (performed by second unit)
- Under control
- Loss stopped
- Safe termination

One of the bedrock principles the Department lives by is four-person staffing. Reinforcing the position is a Mayoral Executive Order, which states in part: "…the Fire Department (is) to provide staffing of four firefighters per engine or truck to the extent possible."

While the language is broad, the intent is specifically designed to keep four-person staffing sacrosanct in the SLCFD. The four-person staffing concept is essential to SLCFD's approach to operations, and ultimately may affect other aspects of department operations.

Overview of the Department

The SLCFD's operations personnel work a 56-hour week with 216 hours in a 27-day cycle. Their shifts are 24 hours on, 24 hours off; 24 hours on, 24 hours off; 24 hours on and 96 hours (4 days) off. The Department uses a three-platoon system and currently employs 359 personnel: 326 uniformed personnel, 15 civilian personnel, and 18 communications personnel. With the exception of the individuals assigned to Rescue Engine 11 (RE11) and Rescue 12 (R12), all members of the SLCFD are paid by the City. Those on RE11 and R12 are paid through an airport enterprise fund. This fund provides the salaries mentioned, station upkeep, equipment and apparatus, and training for ARFF certification. The SLCFD identifies and supplies the personnel for the staffing of the units. In FY03, the enterprise fund paid the City $3.6 million.

The Department's rank structure is indicated in Table 61.

Table 61: Department Rank Structure

Rank	How Attained
Fire Chief	Appointed
Deputy Chief	Appointed
Battalion Chief	Competitive Examination
Captain	Competitive Examination
Engineer, Paramedic, ARFF, HM	Examination
Firefighter	Intake Process

There is presently no rank of lieutenant in the Department. The lieutenant's position was eliminated in 1985 in what one high-ranking official dubbed "the great captain giveaway." The elimination revolved around a contractual issue with the Union and the City, which was never fully explained. Whatever the reason, the TriData team believes it was a misguided one. The need for a greater breakdown of ranks and command structure is essential for this organization. It defines the span of control, eliminates the blurring of command responsibilities, and creates a natural progression in the lines of promotion and experience. This is especially germane in a promotional system where there is no training provided for any newly promoted individual to Captain or any other rank.

Recommendation 51: Reinstate the rank of lieutenant. The SLCFD should reconsider its past decision to eliminate the lieutenant's position from the rank structure. The reinstatement of this position will create a better defined chain of command, and reestablish a level of gained experience within the officer ranks.

Internal Communication

From an operational perspective, internal communications are quite good in the SLCFD. All uniformed personnel have an E-mail account which serves as the primary vehicle for communicating information throughout the Department, including the daily staffing rosters. The Fire Chief also conducts quarterly meetings with all officers down to the rank of Captain, including training representatives and the Fire Marshal. He holds monthly staff meetings that include his two deputies, a communications representative, and his Battalion Chiefs. Following this meeting, the Battalion Chiefs hold meetings with their company officers where they relay pertinent information and discuss platoon issues. The Fire Chief also conducts a monthly administrative meeting that includes the upper echelon of his staff (including the civilian sector). Written internal communications—which include policies, procedures, rules and regulations, and many of the changes that might occur in these policies—are also transmitted to personnel via Department E-mail.

The Fire Chief has an open door policy. Open communication is positive and shows a degree of leadership that is sometimes lacking in other organizations. However, an open door policy sometimes circumvents the chain of command that is essential for any fire department to run smoothly. Any chief who employs this type of policy must also be constantly aware of the pitfalls associated with it, and guard against the excess of such a policy and the possible deterioration of command. A careful balance must be adhered to and must contain checks that can be wielded by subordinates to the chief.

Incident Command

Battalion chiefs (BC) and initial on-scene unit officers handle most incident command (IC) responsibilities (until the BC arrives and command is transferred) in the Salt Lake City Fire Department. While the Deputy Chief of Operations would potentially have an IC function in a larger scale incident or event, he relies heavily on his BCs to manage the bulk of on-scene IC duties. The Incident Command System (ICS) for the SLCFD has a formal manual entitled *Incident Command System for the Salt Lake City Fire Department.* It is produced by the Training Division and spells out in detail how the system is to work. This 66-page document with an extensive appendix is based on the National Fire Service Incident Management System (NFSIMS), the California FIRESCOPE Incident Command System, and the Phoenix Fireground Command System. Basically the SLCFD's Incident Command System is an adoption of the NFSIMS with "some minor modifications." The five basic chapters include an overview; basic procedures, including the assuming of command; units and sectors and their use in the system; sections used in larger incidents; and branches used in very large incidents to reduce the span of

control. It was learned, however, during discussions the study team conducted with Battalion Chiefs that perhaps the ICS was not used to any great extent. The impression conveyed was that the department does not experience many incidents where a full-blown ICS is really needed. There were further concerns about the lack of training in the Incident Management System (IMS), and of coordination and training in conjunction with the dispatchers. As it was stated to the study team, "IMS starts and stops upon arrival on the scene, and we simply need more training in how that system works at that level."

Recommendation 52: The Incident Command System should be reinforced on all levels in the SLCFD. The lack of use of the ICS to any great extent by command officers at all levels needs to be changed and reviewed. This practice and training in day-to-day procedural responses and exercises constantly reinforces the discipline needed in anticipation of potential larger scale events. It will help in establishing the environment and atmosphere conducive to the ICS functionality and success. Additionally, more training in the use and implementation of the ICS should be provided and available to the command personnel of the Department. [Note: The Department's incident command manual is currently under review to ensure compliance with current Nation Incident Management System (NIMS) standards.]

Recommendation 53: The Department's Incident Command System should be implemented on all incidents.

Deputy Chief

The Deputy Chief (DC) of Operations for the SLCFD is primarily an administrative position. The DC works a 40-hour week during normal business hours. He oversees a two-battalion system broken down into three platoons. The DC also has the responsibility of overseeing EMS, safety and wellness, communications, dispatch and records. Administratively, the DC of Operations sees his priority as staffing and safety. He considers four-person staffing part and parcel of those goals and certainly not mutually exclusive of each other. Much of this position's responsibility revolves around staffing, fairness in the distribution of overtime, and keeping within the allocated budget. The battalions are geographically split east (Battalion 1) and west (Battalion 2). The battalion structure is shown in Figure 20.

Figure 20: SLCFD Battalion Structure

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                        ┌──────────────┐
                        │  Fire Chief  │
                        └──────┬───────┘
                        ┌──────┴───────┐
                        │ Deputy Chief │
                        │  Operations  │
                        └──────┬───────┘
       ┌──────────────┬────────┴────────┬──────────────────────┐
┌──────┴───────┐ ┌────┴─────────┐ ┌─────┴──────────┐ ┌─────────┴──────────┐
│ Battalion    │ │ Battalion    │ │ EMS, Safety,   │ │ 911 Communications,│
│ Chief 1      │ │ Chief 2      │ │ Wellness       │ │ Dispatch & Records │
└──────┬───────┘ └────┬─────────┘ └────────────────┘ │ (Civilian Supervisor)│
       │              │                               └────────────────────┘
  ┌────┴────┐    ┌────┴────┐
  │ Shift A │    │ Shift A │
  └─────────┘    └─────────┘
  ┌─────────┐    ┌─────────┐
  │ Shift B │    │ Shift B │
  └─────────┘    └─────────┘
  ┌─────────┐    ┌─────────┐
  │ Shift C │    │ Shift C │
  └─────────┘    └─────────┘
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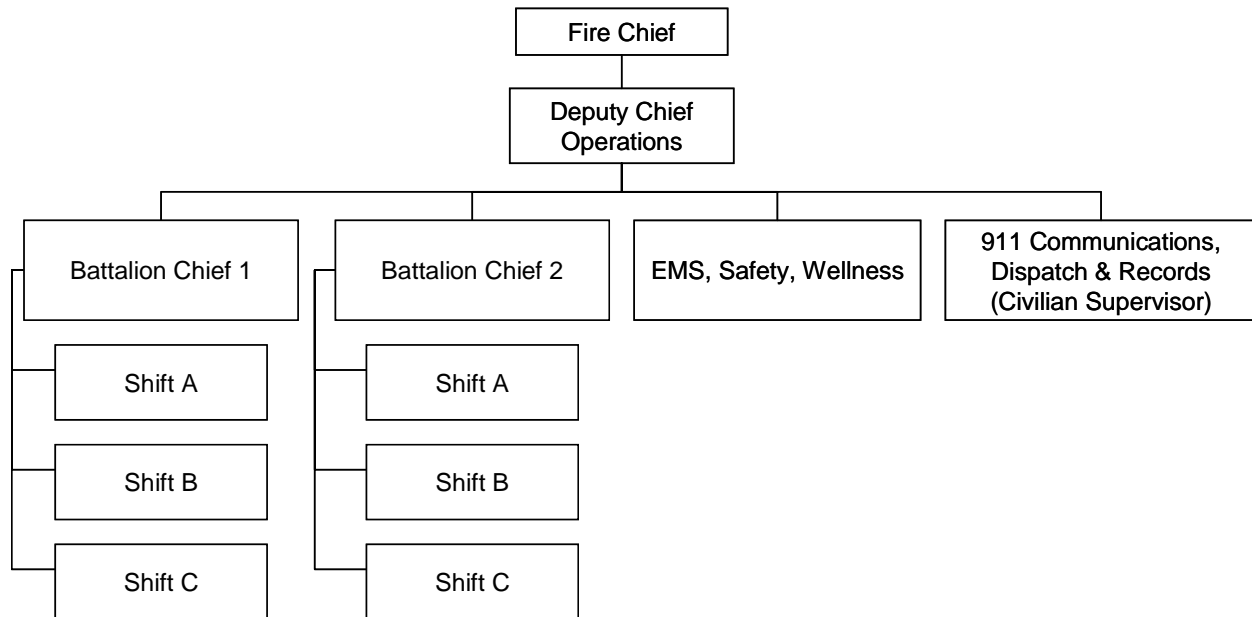
Battalion Chiefs

The Battalion Chiefs (BCs) are in direct command of the battalions and platoons. There are six Battalion Chiefs who work the same shift as the firefighters. They generally respond to all calls, but have the discretion to leave some of the smaller calls to the on-duty captains. There are four more Battalion Chiefs in managerial positions for EMS, fire prevention, airport operations, and training. These four Battalion Chiefs primarily perform administrative duties relating to their respective areas. All ten of the SLCFD Battalion Chiefs have take-home vehicles and carry pagers 24/7; they are on call for when the need arises.

Each of the two on-duty Battalion Chiefs is responsible for seven fire stations—Battalion 1 encompasses Stations 1, 3, 4, 5, 8, 10 and 13, and Battalion 2 oversees Stations 2, 6, 7, 9, 11, 12 and 14. On several occasions, the project team heard concerns about the east to west and north to south travel time for Battalion Chiefs. Personnel reported that it can take up to 12 minutes for a BC to transverse the city. Additionally, the location of the Battalion Chief is questionable in relation to response times given the large response areas.

Recommendation 54: The SLCFD should consider moving Battalion 1 from Station 1 to Station 5 and Battalion 2 from Station 11 to Station 7. A more balanced relationship will exist in terms of the ability to respond to emergency situations in a timelier manner. It will also centrally locate the BC offices and address the problem of accessibility for both department companies and the Battalion Chiefs themselves.

It should also be noted that in some fire departments responsibility for this number of stations could be considered to be excessive. During the course of the on-site interviews,

however, this did not seem to pose a problem in practical terms for SLCFD Battalion Chiefs. The Department should monitor this situation and make modifications or adjustments if future need arises.

The Battalion Chief in charge of the airport holds the responsibility for two other airports: Salt Lake City Municipal #2 and Tooele Regional Airport, both outside the City limits. There are no SLCFD resources in place at these facilities. There is a verbal agreement between the SLCFD and the Utah National Guard whereby the Fire Department agrees to provide air crash rescue capability for the airport.

ARFF unit stationed at Station 12

Operations

As discussed previously, the SLCFD operates in two battalions as depicted in Table 62.

Table 62: Battalion Divisions

Battalion 1	Battalion 2
Station 1 – South 500 East	Station 2 – 270 West 300 North
Station 3 – 1058 Simpson Ave.	Station 6 – 948 West 800 South
Station 4 – 830 East 11th Ave.	Station 7 – 273 North 1000 West
Station 5 – 1023 East 900 South	Station 9 – 5822 W. Amelia Earhart Dr.
Station 8 - 15 West 1300 South	Station 11 – SLC International Airport
Station 10 – 785 Arapeen Dr. (2250 E)	Station 12 – SLC International Airport
Station 13 – 2360 East Parleys Way	Station 14 – 1560 S. Industrial Road

Captains are the first line supervisors in the command structure of the Department, and act as the officers on the engine and ladder companies. They are also the lead officers in many special project areas and divisions within the Department. As previously stated, this creates a blurring of the lines of demarcation in the command structure. Also the Department has no officer rotation policy. Once a Captain bids for a station assignment it is his or hers until they bid for a different assignment. This policy limits the extent of professional development and growth by limiting the scope of experience within the entire spectrum of the Department.

Recommendation 55: Institute an officer rotation policy for all captains. To gain an increased knowledge and experience as to how the Department runs, officers should be periodically rotated to different stations.

The SLCFD has a comprehensive complement of fire stations that are placed throughout the City. There are 13 engine companies (including two quints), eight of which carry paramedics and serve as rescue engines. There are three truck companies, including Heavy Rescue 5, which can run as either a heavy rescue or a truck company. Since Engine 6 and Engine 9 are quints, the Department effectively has five truck companies.

The question of using quints creates much debate, and the decision to use them as part of a department fleet has been a difficult one to answer for many jurisdictions. The discussion usually comes down to two general principles: apparatus versatility and fiscal viability. The main reason for using quints is their versatility. A quint is a combination fire apparatus that facilitates the performance of both engine and truck company fireground functions using one all-purpose apparatus. Quints consist of an aerial ladder, water source, hose, ground ladders and pump, and provide multi-functionality that traditional pumper and ladder responses do not. The SLCFD uses their quints primarily as engines, and they are listed as such. However, the Department has demonstrated its willingness to be innovative by the addition of quints to the apparatus fleet and should be commended. They should however consider their expanded use as a viable ladder company in their tactical response.

A fully staffed hazmat unit and a special operations vehicle respond out of Station 6. Station 10 houses Utility 10 which is an SCBA air supply unit and lighting vehicle. Stations 11 and 12 are International Airport companies. Station 11 houses Rescue Engine 11 (RE11). Both Stations 11 and 12 house ARFF units; Rescue 12, a two-paramedic vehicle, also is housed in Station 12. RE11 responds on and off of airport grounds and has its own local district. Units from Station 12 do not respond off airport grounds.

Standard response to a reported structure fire is three engines, one truck, one Battalion Chief, and Utility 10 (a utility truck with air supply and lighting capability). One of the engine companies is designated as the Rapid Intervention Crew (RIC). A second alarm response

dispatches two engines, one truck, and one Battalion Chief. Off duty BCs are called back to set up Battalions 3 and 4 to fill in for Battalion 1 and 2's engagement in the fire scene. A third alarm dispatches an additional two engines and one truck. This same assignment is dispatched for fourth, fifth, and sixth alarms. On average, the SLCFD experiences about one structure fire per day.

Water supply and pressure for suppression operations throughout the city was generally described as good to great. There were some water problems reported in the University of Utah section of the city, but the problems do not appear to be pervasive. All engine companies carry a five-inch diameter supply hose, and there is a 3,000-gallon tanker at Station 14.

Mutual Aid

The SLCFD has an excellent mutual and automatic aid system and is part of the Unified Fire Authority of Greater Salt Lake. It involves various levels of cooperation and formalized agreements throughout the county. It is a system that works, is reliable, and (as one fire department official described) "has never failed." There are 16 jurisdictions with more than 50 stations that are part of the various formalized agreements and involvement in the mutual aid system. There seven agreements, resolutions, protocols, and articles that comprehensively and reciprocally cover all aspects of the mutual aid fire service needs of Salt Lake City and its surrounding neighbors. The following list represents the comprehensiveness of the mutual aid system:

- Interlocal Cooperation Agreement Between Salt Lake County and Salt Lake City for the Exchange of Fire Protection Services
- Combined Brushfire Strike Team Response Protocol
- Interlocal Cooperation Agreement for Exchange of Firefighters and Hazardous Material Response Services
- Combined Tiered Engine Response Protocol
- Agreement for the Supplying of Firefighter Services on a Reciprocal Basis
- Urban Search and Rescue Interlocal Agreement
- Multi-Jurisdictional Mutual Aid Fire and Emergency Medical Protection Agreement

When compared to best practices in other jurisdictions across the nation, the adequacy of the department's mutual aid agreements and policies is one of the best TriData has reviewed. The TriData project team sees no reason to change the present configuration of agreements or protocols in this area.

Apparatus and Equipment

Another on-going problem faced throughout the American fire service is the age, appropriateness, and operability of its apparatus. Table 63 provides an insight into the status of the SLCFD as it relates to these three categories.

Table 63: SLCFD First-Line Engine/Pumper and Truck Inventory

Unit	Make	Year	Age
Engine 1	Seagrave	2000	4 Years
Rescue Engine 2	E-One	1996	8 Years
Rescue Engine 3	E-One	1997	7 Years
Rescue Engine 4	Becker	1994	9 Years
Rescue Engine 5	Seagrave	2000	4 Years
Engine 6	Seagrave (Quint)	2001	3 Years
Rescue Engine 7	Pierce	2001	3 Years
Rescue Engine 8	Seagrave	2000	4 Years
Engine 9	ALF (Quint)	2001	3 Years
Engine 10	E-One	1997	7 Years
Rescue Engine 11	Pierce	2001	3 Years
Engine 13	E-One	1992	11 Years
Rescue Engine 14	Pierce	2001	3 Years
Truck 2	Simon/LTI	1996	8 Years
Truck 8	Seagrave	2000	4 Years
Heavy Rescue 5	Freightliner	1998	6 Years

The Department is in very good shape in terms of the age and operability of its first-line apparatus. The oldest piece is Engine 13, an eleven year old Emergency One pumper.

The NFPA set out recommendations regarding the age of first-line as well as reserve apparatus in the *Fire Protection Handbook (19th Edition)*. For first-line apparatus the NFPA states, "In general, a 10- to 15-year life expectancy is considered normal for first-line pumping engines. First-line ladder trucks should have a normal life expectancy of at least 15 years." All of the first-line pumper/engines and trucks fall well within these limits. This is due, in no small part, to the apparatus replacement program currently in place.

To further enhance its fire emergency fleet, the SLCFD is expecting delivery of a new Hazmat vehicle in March 2005 and two pumper/engines later in the year. The Hazmat unit will replace Hazmat 6 and the two pumper/engines are slated to replace Rescue Engines 2 and 4.

Regarding appropriateness, the Department has built in flexibility by assigning quint apparatus to Stations 6 and 9 and making Heavy Rescue 5 a dual-purpose vehicle. This actually raises its truck availability from two to five, thereby greatly improving the truck to engine ratio.

In addition to flexibility, the two quints are positioned in geographic areas where truck responses into their local districts could be somewhat greater than desirable.

Reserve Apparatus – Vital to any fire department is the status of its reserve apparatus fleet. There must be replacement vehicles readily available when and if they are needed and in sufficient quantity to maintain the operability of the department's mission. Table 64 summarizes SLCFD's reserve apparatus inventory.

Table 64: SLCFD Reserve Engine/Pumper and Truck Inventory

Location	Make	Year	Age	Remarks
Apparatus Division	Mack	1978	26 Years	
Apparatus Division	ALF	1980	24 Years	Training
Apparatus Division	American Eagle	1982	22 Years	Training
Apparatus Division	American Eagle	1986	18 Years	Training
Station 2	E-One Stratosphere	1986	18 Years	
Station 9	E-One	1989	15 Years	
Apparatus Division	American Eagle	1989	15 Years	Training
Apparatus Division	American Eagle	1989	15 Years	Training
Station 5	E-One	1992	11 Years	
Station 11	E-One	1992	11 Years	
Apparatus Division	Becker	1994	9 Years	

With regard to reserve apparatus, the NFPA standards generally state that as long as the piece is in good operating condition, age is not a factor. The one caveat is that no engine or ladder should be more than 25 years old. This is simply because of extended general wear and tear, the technological advancements in terms of safety enhancements, and other improvements made in fire apparatus over the last 25 years. The SLCFD has one piece that is 24 years old and another is 26 years old. Action should be taken to dispose of both of these apparatus in the immediate future. The NFPA also offers a suggested ratio of eight to one in terms of front-line to reserve engine and ladder apparatus. The SLCFD is well within the recommended requirements.

The City's apparatus maintenance program is sound. Further, the preventive maintenance program under the auspices of the City's Public Works Division is good and provides top-notch customer service.

Recommendation 56: Dispose of apparatus near or at the 25 year mark.

Engine 10 being worked on at Station 10

Training

The SCLFD has a viable training section in the Support Services Division. The Department boasts of having one of the best state-of-the-art training towers in the world. The Aircraft Rescue Fire Fighter Training Academy is also very impressive and used extensively by fire departments from other jurisdictions on a regular basis. Both are revenue-generating operations that bring in about $80,000 per year. There is, however, only one Captain actually doing training, which forces the Battalion Chief heading the division to get involved in the actual training exercises.

Currently, at the training center the Department is utilizing makeshift modular classrooms because of the deterioration of the existing training facility classrooms and offices.

The training program provided by the department is adequate. It makes sure certifications are up to date, and that the minimum requirements for training are met. The program is lacking, however, in the area of professional development and training of command level officers.

There is, at present, no training provided of newly promoted individuals to Captain or any other rank for that matter. In defense of the fire department, the major problem with the lack of a more comprehensive training program is funding and lack of staff. The emphasis on "four handed staff," the 27 percent cut in the travel budget by the Mayor, and constraints of overtime

for filling of slots for those out on outside training are all contributing factors. However, a more viable professional development program is in the long-term interest of the Department.

ARFF training exercise at the SLCFD Aircraft Rescue Fire Fighting Academy

Recommendation 57: The SLCFD should create an Officer Development Program. This is needed especially for new captains (and lieutenants if that rank is reinstalled). It should also include a similar professional program for battalion chiefs, especially in the area of incident command and the incident management system.

Staffing

The SLCFD Fire Chief considers staffing to be a priority item. There is a firm policy that all Department companies are to be staffed with four firefighters, which creates a daily minimum staffing level of 79 firefighters. The Chief is backed in this policy by a Salt Lake City a Mayoral Executive Order (Fire Department Combat Crews) signed in 2002. While the language is broad, it directly addresses the issue of four-person staffing and has created an ad hoc staffing policy.

In addressing the daily inventory of emergency events related to its stated mission, the Salt Lake City Fire Department brings a full inventory of personnel and equipment to provide fire protection, emergency medical services, and other specialty emergency services for the community. Table 65 displays the daily array of personnel and equipment along with their locations and staffing patterns.

Table 65: SLCFD Stations, Staffing, and Units Assigned

Station	Staffing and Units Assigned	Station Totals
1	4 – Engine 1 1 – Battalion Chief 1	5
2	4 – Rescue Engine 2 4 – Truck 2	8
3	4 – Rescue Engine 3	4
4	4 – Rescue Engine 4	4
5	4 – Rescue Engine 5 4 – Heavy Rescue 5	8
6	4 – Engine 6 4 – Hazmat 6 Special Operations	8
7	4 – Rescue Engine 7	4
8	4 – Rescue Engine 8 4 – Truck 8	8
9	4 – Engine 9	4
10	4 – Engine 10 Utility 10	4
11	4 – Rescue Engine 11 1 – ARFF 2 1 – ARFF 3 1 – Battalion Chief 2	7
12	1 – ARFF 1 1 – ARFF 4 1 – ARFF 5 2 – ARFF 6 2 – Medic 12	7
13	4 – Engine 13	4
14	4 – Rescue Engine 14	4
Total Minimum Daily Staffing		**79**

At present, the Department is aptly meeting the staffing levels for engine and ladder companies set out in the standard NFPA 1710, *Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*. NFPA 1710 specifically states:

- "**5.2.2.1** Fire companies whose primary functions are to pump and deliver water and perform basic fire fighting at fires, including search and rescue…"
- "**5.2.2.1.1** These companies shall be staffed with a minimum of four on-duty personnel."

- "**5.2.2.2** Fire companies whose primary functions are to perform a variety of services associated with truck work, such as forcible entry, ventilation search and rescue, aerial operations for water delivery and rescue, utility control, illumination, overhaul, and salvage work…"
- "**5.2.2.2.1** These companies shall be staffed with a minimum of four on-duty personnel."

Credit is due the SLCFD for sustaining this level of service by way of operational philosophy and to the City administration for ensuring that the funds are available to support it. On an individual unit basis, the TriData team recommends continuing to staff units at this level.

In the interest of objectivity, it must be reiterated that the Fire Chief considers staffing a priority and relies on an Executive Order from the Mayor dated June 17, 2002 as his authority to maintain the staffing levels they do. In that order Section 1.1 states, "*The City has created a Vacation/Holiday Buy Back program within the Fire Department <u>to provide staffing of four firefighters per engine or truck to the extent possible</u>.*"[50] The rest of the Executive Order goes on to spell out the method for administering this program. Local 1645, International Association of Fire Fighters, representing the Department's rank and file, also accepts this Executive Order as a mandate to staff engines and trucks at four. The wording of this document, if looked at objectively, is loose and certainly open to interpretation. There is no real contractual constraint, however, to altering this arrangement.

Recommendation 58: No changes should be made at this time in the current staffing pattern for the SLCFD. The practice of using four-person staffing for engine and truck companies is sound. The requirement of four-person crews creates some overtime but is not adversely affecting the overall department budget. The SLCFD has not exceeded its operating budget in the past six years and has even turned back as much as $100,000 to the City's Fund Balance; last year they turned back $5,000. This is largely unprecedented in TriData's reviews of fire department budgets, and the SLCFD is to be commended for its fiscal management.

The daily minimum operational staffing level is 79 firefighters as required by the staffing assignment shown in Table 65 above. The Department starts each shift with this number and when it falls below 79, members are called back. There are two lists that callbacks are drawn from: straight time and overtime lists. The straight-time individuals are those who have not completed their required FLSA time and want to make it up by way of call back. Meeting the FLSA requirement assures them receipt of their designated overtime payment in their given cycle. All others called back are from an established overtime list. Obviously, it is desirable for the Department to draw from the straight-time list. There is no restriction on how many consecutive days a member may work; and the SLCFD might consider taking another look at

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[50] The operative line in this section has been underlined for reference purposes.

this policy. There comes a point where an individual might not be as fit for duty as he or she should be.

The shift rarely exceeds the 79 personnel, and when it does, it is usually by 1. On the shifts where the level reaches 80, Utility 10 is manned and responds to all structure fire calls.

Recommendation 59: Restriction should be placed on the number of consecutive hours an individual can actually work. In many departments the limit is 72 hours, but local considerations may dictate some another number.

As previously outlined, the Department starts each day with 79 individuals in the combat force. If an on-duty member goes off for any reason during the tour they will only replace him or her if there are more than 12 hours left on the shift. This means that units are occasionally staffed with three personnel.

At present, there is no hard and fast rule or protocol as to where those individuals who raise the daily number to above 79 are assigned. There is much latitude in personnel distribution; it is left to the individual Battalion Chiefs to decide. An excellent homegrown form is used as the working document for the coordination of daily staffing. It contains a great deal of information all in one place and is extremely functional. The Department should establish a firm list outlining where those individuals who raise the daily number over 79 should be assigned based on historical experience.

Recommendation 60: A protocol for assigning individuals when the daily number exceeds 79 should be established and followed by all shifts.

While the Department does not experience too many grievances per year, most of those they do face relate to the scheduling or distribution of overtime assignments.

Staffing Coverage Factor – Another point for consideration is to identify the actual number of people it takes to staff the emergency vehicles 24 hours a day, seven days a week. This is typically called a staffing factor or coverage factor and acknowledges that each individual will be off for vacation, sick, FMLA, worker's compensation, etc. for some portion of their regular duty hours. The SLCFD currently has 99 personnel per shift to meet a daily staffing requirement of 79. Time off is essentially exceeding the difference between these two, necessitating overtime. To constantly staff an engine with four people typically requires 16 to 18 people.

An example of how to compute the staffing factor is illustrated in Table 66. This analysis was prepared for Arlington County, Virginia, which also has a 56-hour workweek; the computations should be similar for Salt Lake City. However, the items marked in bold italics will need to be calculated based on historical leave usage in the SLCFD.

Table 66: Illustration of Staffing Factor Calculation (Arlington County, VA)

A	Number of Days in a Year	365
B	Number of Hours in a Day	24
C	Number of Hours in a Year (A X B)	8,760
D	Number of Shifts	3
E	Number of Hours of Scheduled Work per Employee per Year (C / D)	2,920
F	Less: Average Number of Hours of Leave Consumed Per Year	*-597*
G	Number of Productive Hours per Employee per Year (E – F)	2,323
H	Staffing Factor (E / G)	1.26
I	Number of Employees Needed per Position for 24/7 Staffing (H X D)	3.78

Applying Arlington's staffing factor to the SLCFD minimum staffing requirement of 79 indicates that 298 personnel are needed to cover the 79 positions through vacations, sick leave, etc. (3.78 *x* 79 = 298). Since the number of operational personnel currently on staff in the SLCFD is 289, this would indicate a shortage of nine employees. When additional units are placed in service, the funds to support the constant staffing of that unit should be included. Using the above numbers as a gauge, that would mean adding an additional 4-handed truck company in the south end of the City. This would require hiring 16 people (actually 15.12, but for staffing purposes, should be rounded up to the next whole number). This type of analysis should be done on a regular basis, and particularly when staffing levels or leave and benefits change.

Recommendation 61: The Department should establish a staffing factor to determine the number of employees required to maintain constant staffing. This staffing factor should be utilized in funding and hiring processes. This analysis should include the leave experience of the SLCFD to determine the average number of hours operational personnel are not available to staff emergency apparatus.

Emergency Management

The SLCFD has an Emergency Manager (EM) position that in addition to coordinating emergency management has other duties which include: media relations, ambulance contract management, and statistical research and analysis. The position and emergency management office is an integral part of the Department. It is a part of the Fire Chief's executive staff. As such there is ample coordination and interaction between that office, the Fire Chief, Incident Commanders, and the Department as a whole. The emergency manager position, while effective in the Department, appears to be another one of the administrative positions that handles a large and complex workload.

The SLCFD plays a major role in emergency preparedness and mitigation for the city. The Winter Olympics recently held in the greater Salt Lake area brought the entire region together for a common cause. The department had already established good relations with public safety organizations however they established even stronger working relationships as they

prepared for and successfully executed the Olympic games. Those relationships remain strong and are continuing to prove beneficial to the larger Salt Lake region today. Joint training, drills, mass causality incidents, and emergency planning are well coordinated within the region, and the Salt Lake City Fire Department is a leader as well as a participant in these activities.

Emergency Management has four primary functions:

- *Mitigation:* Is prevention-oriented to eliminate or reduce the degree of long-term risk to human life and property from natural and man-made hazards. Public education, building/safety codes, litigation, and disaster insurance are important components for the city.
- *Preparedness:* Being prepared ahead of time for disasters. Development and exercise of emergency response plans/systems, creations of mutual aid agreements, and training of personnel are all part of the fire departments activities.
- *Response:* Actions taken immediately before, during and after an emergency occurs to save lives, minimize damage to property, and enhance the effectiveness of recovery. Depending on the scale of emergency the Emergency Operations Center may open, search and rescue missions begin, evacuation and shelter of victims, and emergency medical operations are at the core of the fire departments mission.
- *Recovery:* Activities to return life to normal or improved levels after a disaster. There is a need to assess damage, provide crisis counseling, have available temporary housing, and develop plans for reconstruction.

The Salt Lake City Fire Department serves an important leadership role in all four of these primary functions and does an outstanding job. In fact, it is the project team's opinion the other jurisdictions could model their own programs after the SLCFD.

In the event of a disaster, public safety becomes the role of the entire city with police and fire leading that effort. The SLCFD is well prepared to serve the community in the event of a disaster. Additionally the Department has formed partnerships with organizations like the American Red Cross for added value to the community in the event of a disaster.

Staffing – Currently, the Fire Department has one manager dedicated to Emergency Management. However, this manager also serves as the Public Information Officer for the Department among other duties. Most metropolitan cities, of similar size, have dedicated staff within the fire department to coordinate emergency management. Consequently there is some concern that the SLCFD is not sufficiently staffed to deal with a major event, such as a major earthquake. If such an event occurs, it is quite possible that the City would be unable to rely on mutual and automatic aid as heavily, because those jurisdictions will be dealing with their own problems.

Also, it was pointed out during interviews that because of the EM's concomitant duties, the position sometimes suffers a lack of continuity in communication and coordination with the Salt Lake City Office of Emergency Preparedness. This communication needs to be improved.

Recommendation62: One full time position should be assigned to report to the program manager serving as the Emergency Management Coordinator for the Department. More emphasis can be placed in a proactive way for the community towards mitigation and preparedness with the addition of one full time coordinator.

Recommendation 63: The SLCFD should make efforts to improve the interaction between the Emergency Manager (EM) and the City's Office of Emergency Preparedness. It was learned by the TriData team that these two offices do not interact enough. It was also learned that the EM does not attend Local Emergency Planning Committee meetings. The interaction between these two entities is essential to effective emergency planning and should be enhanced, and expanded beyond its current parameters.

Salt Lake City Emergency Plan – The SLCFD has a well laid out emergency plan. The coordination between Salt Lake City's Office of Emergency Preparedness and SLCFD's emergency management program works well and certain representatives from the Fire Department have a major presence in the planning process. There is a very active Local Emergency Planning Committee (LEPC). Monthly meetings of this group are well attended by various representatives of the community, including:

- The Salt Lake City Fire Department
- The Salt Lake City Police Department
- Public Works
- School officials
- Business community representatives
- Citizens

There is a need for continual modifications to all emergency plans. As such, it is imperative the City continually update the existing citywide plan.

While there is an executive branch of the Mayor's office coordinating Salt Lake City's efforts to ensure overall city coordination, the operational matters of public safety are really the responsibility of the city's public safety officials. In the event of a disaster, the Fire Department's role is critical and must have an emergency plan that is current. With the addition of the Fire Department Emergency Management Coordinator (Recommendation62), there will be dedicated staff to ensure an up to date fire emergency operational plan is always maintained, ensuring citywide emergency preparedness.

Emergency Operations Center – The Emergency Operations Center (EOC) is space that is located at the Information Management Services facility and is really a conference room that can be set up to operate as an EOC. The space has hot jacks and dedicated phones; however,

computers have to be deployed from offices. There is no 911 connection or radio capabilities today in the EOC.

The optimum is that Salt Lake City have a dedicated facility designed specifically as an EOC that is equipped and ready for immediate activation in the event of a disaster. It is recommended the City consider this need as space and facility planning begins in the future. September 11th demonstrated to America acts of terrorism are real threats faced in every community today, and we must be ready everyday.

Consequently, there is an ongoing issue with getting a viable EOC up and fully running in Salt Lake City. The current EOC is located at Plaza 349, with a backup EOC at Station 1. It was repeatedly stated and became increasingly apparent during our visit and subsequent follow up, that the current EOC is inadequate and needs major revisions, updating, and overhaul. Basically, the lack of the overhaul seems to boil down to funding issues. There are few funds within the City budget to build or properly refurbish the existing EOC, or the backup.

On the county level, there already exists an excellent state-of-the-art EOC, and as with mutual and automatic aid the SLCFD has an excellent relationship and coordination with the County and the Director of the Salt Lake County EOC.

Some mention was made to perhaps consolidate Salt Lake City's EOC into the County's EOC, but this is probably not a good idea for the following reasons. The County EOC is responsible for all county operations, which includes coordinating all of the cities in the county. In the event of a major event, this would be an overwhelming task. Additionally, the County EOC is 10 miles outside the City and therefore not viable logistically for City officials to conduct emergency operations in the case of a major event.

Hazardous Material Response

The SLCFD has a comprehensive hazmat team configuration coupled with a detailed hazardous material response plan. Both are governed by SLCFD Standard Operating Procedures 05-11 and 05-12. The response plan is also part of the local Emergency Management Agency planning and protocols. The document is an integral part of the Department's SOPs, and it is the longest and most detailed. SLCFD SOP 05-12 states:

> *"The mayor and the city council through administrative action, have empowered the SLCFD with the authority and responsibility for the mitigation of Hazardous Material incidents…"*

It further states, "The Fire Department has the responsibility in *any* HAZMAT incident, of rescue, evacuation (initial, and with SLCPD assistance), containments, and finally *only if necessary*, *clean up*."

The Hazmat unit is a dedicated unit that is staffed 24/7. It is housed at Station 6 and consists of Engine 6, Hazmat 6, and Support 6.

Station 6 which houses the Hazmat 6 units

Support 6 is a support vehicle that is not staffed and only carries equipment and tools. It is only dispatched on special calls. Engine 6 and Hazmat 6 are dispatched on all fire calls and automatic alarms. They respond together as a unit to all fire calls and the personnel on Hazmat 6 act as firefighting personnel on structural fires. The unit also responds to BLS calls. There are no paramedics at Station 6. Firefighters in the unit function as either frontline suppression personnel or perform search and rescue on fire calls, depending upon the situation faced on the fireground.

One Captain runs and supervises the entire hazmat unit. The Captain rides on Engine 6 with two Hazmat specialist firefighters and an engineer. Hazmat 6 rides with four Hazmat specialist firefighters, and has a lead firefighter in charge of the unit on all calls.

All firefighters assigned to Station 6 have specialty training. They receive 240 hours of initial training, which is delivered by the SLCFD Training Division. They receive an additional 80 hours of training in Chemistry I and Chemistry II from the Utah Department of Emergency Services (UDES). Firefighters in the unit receive state certification from UDES and a certificate of completion from the SLCFD Training Division. Every member in this unit is required to have these minimum certifications in order to be in the unit. The personnel in the unit also receive

annual training within CFR 1910-126, NFPA 471, and 472 to ensure competencies and maintenance of skills.

As previously stated SOP 05-12 is a comprehensive document that is well thought out and outlines specific procedural steps for hazmat response. However, as a response guide without regular training simulations, it could be unwieldy. Although it is an operational guideline, it is also followed as a checklist for training.

The major component procedurally for 05-12 is encompassed in the concept known in the document as "A-SMACT." This acronym represents the steps incorporated in the procedure as follows:

- **A**pproaches the Scene
- **S**cene **M**anagement
- **A**ssessment of the Hazard
- **C**ontrol of the Incident (Material)
- **T**ermination Activities.

The unit members are the real experts in the Department. The Battalion Chiefs appear to be less familiar with the procedures and processes in 05-12 than the Captains in the unit. Captains are often tapped by Battalion Chiefs at Hazmat incidents because of their expertise as incident commanders at established command posts, leaving lead firefighters or officers with less hazmat training or certification to be supervisors on the scene.

Recommendation 64: Battalion Chiefs should receive more in depth training in hazmat SOP 05-12 so as to better command a hazmat incident. Battalion Chiefs should be able to handle a hazmat incident from the command post without having to rely as much on Captains in the Hazmat unit, who need to be on the scene to supervise and oversee the unit.

The safety factor within the unit is good. This is based largely on the well-trained and dedicated personnel in the unit. It is an effective response team. Station 6 is well placed in the city and response time is good.

Concern was voiced about the lack of outside hazmat training funding and the lack of ability to receive paid time off to pursue training. There is no overtime budget for outside training. Management will, however, send personnel to training in outside classes while on duty.

VII. EMERGENCY MEDICAL SERVICES

This chapter focuses on the aspects of Emergency Medical Services (EMS) provided by the Salt Lake City Fire Department (SLCFD). Consideration is given to alternatives and recommendations made based on the results of interviews, the review of statistical data, field observations, and comparisons with other similar EMS systems. Overall, the SLCFD is delivering excellent EMS to its citizens and visitors to the community.

The SLCFD provides Advanced Life Support (ALS) level EMS, as well as Basic Life Support (BLS). The goal of the City to provide the highest quality of care to patients is evident in the desire of the Department to provide ALS services through the staffing of strategically located neighborhood fire stations with engine companies that are staffed with a minimum of two paramedics. The remainder of its units are staffed with EMTs and equipped at the BLS level. All BLS units are equipped with automatic external defibrillators (AEDs), a commendable practice that clearly impacts patient care. This function also is an excellent way to increase the productivity of the workforce through the utilization of dual-role, cross-trained firefighters.

The SLCFD has minimized a problem that is a major concern in many departments by cross-training all personnel as Emergency Medical Technicians (EMTs) and firefighters.[51] This has helped to instill the importance of EMS delivery throughout the organization and allows for cohesiveness between paramedics and firefighters. It is a very "EMS-oriented" department and there is little evidence of any disparity between paramedics and firefighters. Firefighters understand that EMS is an integral part of the SLCFD mission.

EMS Overview

The SLCFD provides EMS services in a large urban setting that covers approximately 110 square miles. This service responsibility includes response to multiple high-rise buildings, oil refineries, an international airport, government buildings, (including the State Capitol and the University of Utah), heavy and light rail, multiple interstate highways, and a wide mix of residential structures. The demand for EMS varies greatly throughout the city because of population concentrations, traffic patterns, and the movement of people into and throughout the various commercial, tourist, and industrial centers. EMS services are provided daily to not only the approximately 181,000 Salt Lake City residents, but also to a consistent tourist population that averages over 100,000 people each day. These challenges are compounded with a large number of aging residential structures, a significant indigent population, and increasing vehicle congestion.

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[51] U.S. Fire Administration, *Implementation of EMS in the Fire Service,* Emmitsburg, Maryland: U.S. Fire Administration, 1997; report no. FA-167

The SCLFD operates from 14 fire stations with nine strategically placed ALS companies: Rescue Engines 2, 3, 4, 5, 7, 8, 11, 14, and Rescue 12, which operates at the airport terminal. There are also nine BLS units that fill out the compliment of emergency response units: Engines 1, 6, 9, 10, and 13, Trucks 2, 5, and 8, and Hazmat 6. Table 67 outlines the type of EMS resource at each station.

Table 67: Location of EMS Units

Station	Address	ALS	BLS
1	211 South 500 East		E 1
2	270 West 300 North	RE 2	T 2
3	1085 Simpson Ave.	RE 3	
4	830 11th Ave.	RE 4	
5	1023 East 900 South	E 5	T 5
6	948 West 800 Street		E 6, HM 6
7	273 North 1000 West	RE 7	
8	15 West 130 South	RE 8	T 8
9	5822 W. Amelia Earhart Dr.		E 9
10	785 Arapeen Dr.		E 10
11	SLC International Airport	RE 11	
12	SLC International Airport	R 12	
13	2360 E. Parleys Way		E 13
14	1560 S. Industrial Road	RE 14	

Each ALS engine is staffed with two firefighter/paramedics and two firefighter/EMTs, ALS equipment, and drugs as specified by the Utah Administrative Code R426-14 for Paramedic Rescue Licensure. The City has established mutual aid and automatic response agreements with Salt Lake and Davis Counties, South Salt Lake, Murray, Midvale, and West Valley.

The Department's response activity to EMS incidents has remained surprisingly constant throughout the last four years. The four-year average for EMS incidents is 18,936, and includes the 2002 Winter Olympics (which seems to have created a spike in run activity). Table 68 shows the trend in call volume over the last four years compared to other calls.

Table 68: Calls by Type, FY01–FY04

Type	FY01	FY02	FY03	FY04
EMS	18,867	19,782	18,497	18,598
Fire	6,354	6,426	5,508	5,704
Total	**25,221**	**26,208**	**24,005**	**24,302**

EMS calls accounts for approximately 75 percent of the overall call activity. The total number of unit responses per calls is represented in a ratio of 1:1.4 per incident. This means that for every call on average, 1.4 units respond. This ratio of unit responses to total calls is consistent

with data in communities that operate at four-person staffing and who do not operate ALS units from all fire station locations. Four-person staffing reduces this ratio because fewer units are needed to reach the recommended staffing complement; however, not having ALS units at each station causes an increase in this ratio. (This is discussed in more detail later in this chapter.)

The Department utilizes Gold Cross Services Inc. for EMS transport. The City and Gold Cross have enjoyed a two-tiered working relationship for nearly 30 years. Gold Cross is dispatched to emergency incidents through the City's 911 Dispatch Center. It is a privately owned company that is licensed to provide Intermediate BLS services and Paramedic Interfacility Transport within Salt Lake City under Utah State licensing guidelines. It receives no governmental supplement or assistance to provide services in the area. In addition, Gold Cross provides these services (emergency/911 and interfacility transport) throughout Salt Lake County, and in adjacent counties and municipalities.

EMS Regulations – EMS in the State of Utah is regulated through the Utah Department of Health. This oversight is provided through the Department of Health's Bureau of Emergency Medical Services (BEMS). Regulatory guidelines are developed through the Utah Code—Title 26–Chapter 08a—Utah Emergency Medical Services System Act. BEMS also develops a series of administrative rules that regulates EMS services and licensure within the state. Rule R-426-14 provides oversight for Ambulance and Paramedic Services Licensure. Though the State provides specific guidelines for many aspects of EMS service delivery (i.e., training and recertification of personnel, utilization of medical control, vehicle licensure and transport fees), there is significant latitude granted to local government because of the broad range of services and capabilities that exist statewide. One unique aspect of the regulatory process is the number of licensing categories that exist. For ground ambulance and interfacility transport licenses, five levels are identified, and for non-transport services, there are four licensing categories (Table 69).

Table 69: Level of Transport and Non-Transport

Transport	Non-Transport
Basic	Quick Response-Basic
Basic-IV	Quick Response-Intermediate
Intermediate	Paramedic Rescue
Intermediate Advanced	Paramedic Technical Rescue
Paramedic	

The State also provides licensing guidelines for Air Ambulance activities. As with many EMS delivery systems nationwide, there is on-going expansion and upgrading in the level of training and service delivery that is provided within the licensure categories. EMT training

curriculums have expanded; as a result, personnel trained at these levels have been authorized to carry out many of the procedures that not very long ago were restricted to paramedics. Today, in many jurisdictions, advanced EMT certifications allow defibrillation. In some instances intubation and intravenous (IV) therapy are part of these expanded EMT protocols. Licensing agencies respond to this expanding scope of service by creating new categories of licensing; Advanced EMT or Intermediate EMT (EMT-I) are common designations. The caliber of service delivery in the pre-hospital setting has improved dramatically with this combination of expanded training, greater latitude in medical control, and the new technology for diagnostic and patient treatment. In addition, there is an overall expectation on the part of the public to receive the highest level of pre-hospital care whenever the 911 system is activated. The SLCFD has kept pace with these improvements and approaches this expanding scope of service philosophy in a calculated, proactive way.

EMS Transports – The dispatching system in Salt Lake City has long been a model for emergency medical dispatching in the nation. Salt Lake City has successfully pioneered this process and is universally recognized as a leader in its dispatching practices and the utilization of pre-arrival instructions.

Transport activities and the interaction between the SLCFD and Gold Cross presented an interesting dichotomy in terms of patient care and the division of duties. At the dispatch level, there is a very aggressive and successful interpretive component of the EMS delivery system in the utilization of the Advanced Medical Priority Dispatching System (AMPDS). This system uses highly trained individuals who use clear and comprehensive guidelines to determine the severity of the incident so that the appropriate level of care is dispatched (i.e., ALS vs. BLS). On the least severe incidents, as determined through the dispatcher interview process, only a Gold Cross Ambulance is dispatched to the scene (Alpha calls). On calls determined to be more severe (Bravo calls) but not meeting the criteria for a life-threatening incident, an SLCFD BLS unit is dispatched in a non-emergency mode (no lights or sirens) along with a Gold Cross Ambulance. On these low priority calls (Alpha and Bravo), patients that require transport are transported with only Gold Cross personnel on board. On Bravo calls to which SLCFD units respond, they release from the scene after assessment and treatments are completed. Table 70 summarizes transport data for calendar years 2000–2003.

Table 70: Transport Data, 2000-2003

Year	EMS Runs	BLS Transports	ALS Transports	Percent Transported
2000	18,540	4,713 (25%)	4,166 (22%)	47%
2001	19,421	5,148 (27%)	4,169 (21%)	48%
2002	19,401	5,135 (26%)	3,846 (20%)	46%
2003	18,563	4,691 (25%)	3,821 (21%)	46%

During the more critical patient situations (Charlie, Delta and Echo calls), there is a much different approach. The two-tiered system for on-scene patient care and transport was observed to be very guarded and there was clear division with regard to patient control and the level of care required in attending the patient in transport. The line of distinction between advanced life support, administered by Fire Department paramedics and patient attendants in transport by Gold Cross at the EMT-I level, was very rigid. The Fire Department's policy regarding paramedic accompaniment is very restrictive and requires that an SLCFD paramedic accompany any patient on which ALS procedures are initiated. The corresponding "Paramedic Aboard" (PMA) policy, results in a fee for service arrangement that in 2003 generated just under $700,000 in revenues for the Department. This fee is generated by adding $197.17 to the transport charge for the nearly 3,800 ALS transports in which a PMA occurred.

In Salt Lake City, as with most urbanized EMS delivery systems, there is a considerable range in the acuity of those ALS patients treated. In many instances ALS procedures are done in preparation for, or in anticipation of, a decline in the patient's condition. Establishing an IV line for precautionary measures is an action that would fall into this category. Though the establishment of an IV is typically classified as an advanced life support procedure, it is done in many instances solely for the purpose of having an available entry point for drug therapy should the patient's condition deteriorate. This review indicated that, on an on-going basis, neither the SLCFD nor its Medical Director currently review patient treatment information to determine the severity of the patient's condition in which paramedic accompaniment occurs. An evaluation of "in-transport" paramedic actions may be helpful in determining the severity of call activity currently classified on-scene as ALS.

Recommendation 65: The Department should evaluate the severity of PMA calls to determine the degree of ALS intervention that takes place by SLC paramedics during transport. There are a number of simple methods that can provide a comprehensive overview of actions taken in transport. A review of activities obtained from the run report information can clearly show actions taken in transport. In addition, some type of qualitative assessment by the paramedic aboard to determine if any expanded ALS procedures were provided or required in transport could be performed.

The issues of accompaniment by the attending SLCFD paramedics and the quality of care discussions that revolve around continuity of care during transport have generated considerable debate over the last 10 to 15 years. The reality is that both Fire Department and Gold Cross personnel operate under the same statewide regulations. The SLCFD and Gold Cross paramedics must adhere to the same initial training requirements. EMTs in both settings must comply with the same standards. Continuing education and recertification requirements are the same. The only difference is typically with medical control, in service training, assignment requirements, and quality control practices. Public and private agencies alike have demonstrated both exceptional and dismal track records in each of these areas. It is apparent that those exceptional service delivery systems have orchestrated system oversight that requires that same standards for both private and public providers in their system. In Orange County, Florida, all licensed EMS providers, both private and governmental, operate under common medical direction and utilize the same ALS and BLS protocols. There is consistency in quality assurance requirements, standards of care, and continuing education requirements. In San Diego, California, there is common medical direction for both the fire department and its private ambulance provider. Salt Lake City should consider the concept of a common medical director for both the SLCFD and Gold Cross.

Recommendation 66: The City should consider adding a provision to its upcoming RFP for ambulance services that would include medical direction for both the ambulance service provider and the fire department. Medical direction is perhaps the most important component in determining the quality and effectiveness of EMS services in a community. Quality EMS delivery systems require a three-way partnership between the governmental organization that manages the system, its medical direction, and the field personnel (fire department and private ambulance). The orchestration of this type of partnership is fostered by comprehensive agreements with both the ambulance company the medical director and through a series of monitored policies that spell out the explicit requirements and performance measurements for all personnel who operate within the system. By combining the oversight for medical direction to include both SLCFD and Gold Cross personnel, we believe that the continuity of care will be enhanced and there will be a corresponding reduction in the perceptions regarding the training and capability of ambulance personnel.

SLCFD Involvement in EMS Transports –The primary consideration surrounding the issue of PMA is the cost offset that can be obtained if the SLCFD assumes transport duties and the enhancement to patient care. Based on a review of the analysis done by the Emergency Care Information Center (ECIC) in 1996 and a more recent analysis compiled by the Fire Department, it is TriData's belief that the assumption of EMS transport by the SLCFD will not provide positive outcomes in either of these key areas.
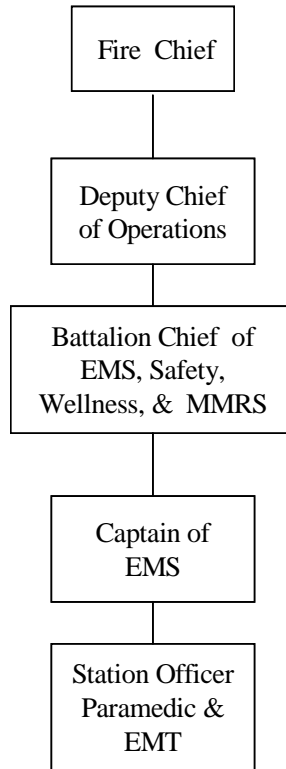
This judgment is based on the following:

- The projected revenues and anticipated collection rates combined with the loss of PMA receipts will not off set the required start-up and on-going operating costs necessary to properly serve the community.
- The current two-tiered system is providing a high level of patient care at a reasonable cost.
- The SLCFD's involvement in ALS and BLS transports may jeopardize the financial viability of the private ambulance provider and the inter-facility services it offers to the community.
- If the SLCFD chooses to assume only the ALS transports, leaving BLS transports and inter-facility work to a private provider, this may similarly jeopardize the viability of the private provider and reduce the revenue potential for the City without a corresponding reduction in costs.
- During large-scale disasters or major mass-casualty incidents, the absence of the private ambulance provider will severely reduce the capability of the SLCFD to manage this level of incident with internal and mutual aid resources.
- The involvement of the SLCFD in the transport of EMS patients will increase the City's liability exposure resulting from vehicle accidents involving patients that are being transported in City vehicles.
- Any reduction in the SLCFD's staffing levels on engines or ladder trucks for the purpose of freeing up personnel to staff EMS transport vehicles will be resisted by the firefighter's union and will elevate political questions regarding employee safety and levels of service.

Recommendation 67: The City should maintain the current two-tiered system that involves the SLCFD and a private ambulance provider in the delivery of ALS and BLS pre-hospital care and ambulance transport.

Operations

Figure 21 shows the current organizational structure for EMS within the Salt Lake City Fire Department. EMS operations are under the authority of the Deputy Chief of Operations. The EMS Battalion Chief reports to the Deputy Chief of Operations and has administrative oversight for EMS throughout the Department. The Department utilizes an EMS Captain who is assigned to the EMS Battalion Chief on a 40-hour basis. The EMS Captain provides the administrative and technical support for EMS field operations and has primary interaction with the Medical Director. Station officers supervise both paramedics and EMTs with regard to stations matters, scene management, and crew deployment.

Figure 21: Current EMS Organizational Chart

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            ┌──────────────┐
            │  Fire  Chief  │
            └──────┬───────┘
                   │
            ┌──────┴───────┐
            │ Deputy Chief  │
            │ of Operations │
            └──────┬───────┘
                   │
            ┌──────┴───────┐
            │ Battalion Chief of │
            │   EMS, Safety,  │
            │ Wellness, & MMRS │
            └──────┬───────┘
                   │
            ┌──────┴───────┐
            │  Captain of   │
            │     EMS       │
            └──────┬───────┘
                   │
            ┌──────┴───────┐
            │Station Officer│
            │  Paramedic &  │
            │     EMT       │
            └──────────────┘
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There is limited field supervision specifically devoted to EMS activities. Generally, the individual station officer is responsible for this oversight in conjunction with paramedics and EMTs. The SLCFD does not have field supervision specifically identified for EMS. Though the EMS Captain plays a key administrative role in day-to-day coordination of the system, this position has limited field responsibilities and is not specifically identified in the Department's organizational structure. The assumption is that supervision will be provided first by the company officer and during major incidents by the appropriate Battalion Chief. SLCFD Policy 06-03 identifies the position of EMT District Coordinator, yet this position was unfamiliar to the field personnel we met. The Department uses three EMS liaison officers (one per shift). These personnel are Captains with paramedic certifications and field experience. They serve as part of the EMS Medical Staff and assist in identifying EMS training needs. They also interact with hospital staff when problems arise. EMS liaison officers serve in a voluntary capacity and receive no additional compensation for these services. The Department does not have a person on staff, besides the medical director, with the responsibility to conduct on-going quality assurance reviews regarding EMS service delivery.

Recommendation 68: The SLCFD should formalize and strengthen its organizational structure and oversight of EMS service delivery within the Department. EMS typically constitutes the largest workload within fire service organizations. Standards for service delivery

are clearly designated within medical protocols and these are guided through state rulemaking. The replenishment of supplies, equipment maintenance, and the monitoring of controlled substances all require on-going oversight and management. Training requirements are specific and necessitate detailed documentation for recertification purposes. EMS incident reports undergo significant scrutiny for both pending litigation and during the review by insurance companies to qualify reimbursements. Quality assurance practices are crucial to performance measurement and skills remediation. During major EMS incidents involving multiple patients, or EMS activities in hazardous environments, there is a need for dedicated EMS field supervision responsible for the coordination of triage, treatment, and transport activities. Each of these reasons provides ample justification for strengthening the amount of oversight for EMS service delivery both administratively and in the field. These combined actions will improve the Department's ability to maintain the high level of service and patient care that was observed in SLC. This reconfiguration will work equally as well under the proposed organizational chart cited in Chapter II.

Staffing and Workload – In FY04, the SLCFD employed 359 full time personnel, 331 of whom were firefighters, company officers, and chief officers who are cross-trained as either EMTs or paramedics. There are 67 firefighter/paramedics in the Department. The remaining 28 personnel assume non-emergency response roles or are employed in the various clerical, administrative, and dispatcher positions.

The Utah Bureau of Emergency Medical Services guidelines provide some flexibility with regard to staffing levels on Paramedic Ground Ambulances or Rescue Services. Rule 426-15-200 Staffing, Section 3(a) specifies that staffing *at the scene* shall consist of no less than two paramedics. This provision does not set specific staffing requirements for each response vehicle, but instead specifies the number of personnel who must assemble at the scene in order to provide the service. When we further evaluated this provision of the rule, clarification was obtained to confirm that it is permitted to have multiple agencies contribute personnel in meeting this criterion. It was also discovered that individuals arriving at the scene in separate units (i.e., two paramedics) could initiate treatment prior to the arrival of the other unit. The SLCFD has established a staffing requirement in which two paramedics are maintained on each of its nine ALS engines that operate within the City. On the remaining nine BLS units, there are no internal requirements for paramedic assignments; however, paramedics are frequently assigned to these BLS units. It was estimated that on any given day 20 to 22 paramedics are on-duty within the SLCFD. The Department maintains a minimum daily staffing requirement of 18 paramedics.

State guidelines also defer to on-line medical control (which also includes pre-established medical protocols), the ability to adjust staffing during the transport of a patient based on the severity of the incident.

Section 2 (d) of Rule 426-15-200 states:

> *"If on-line medical control determines the condition of the patient to be 'serious or potentially critical,' at least one paramedic shall accompany the patient on board the ambulance to the hospital, if a Paramedic rescue is on scene."*

Section 2 (e) provides further clarification, in stating;

> *"If on-line medical control determines the condition of the patient to be 'critical,' the ambulance driver and two Paramedics shall accompany the patient on board the ambulance to the hospital, if Paramedics are on scene."*

The combined requirements regarding paramedic staffing at the scene and the latitude offered regarding transport offer SLC the opportunity to review its staffing and deployment practices. The current practice of deploying nine ALS units and nine BLS units results in a three-unit response whenever a Charlie, Delta, or Echo call is received from a station response district that is staffed with only BLS units.[52] A review of response activities for FY04 indicates that the SLCFD responded to 7,774 of these highest-priority incidents. A further review of the distribution of these calls indicates that 2,647 (34 percent) of these calls originated in station districts that operate BLS units. This data suggests the following:

- In response districts that house only BLS units, the response times for ALS units are longer.
- The distribution of ALS units at select fire stations results in a three-unit emergency response assignment (ALS, BLS, and Ambulance) on just over one-third of all ALS responses.
- Increased emergency response traffic (with lights and sirens) elevates the risk of vehicle accidents involving SLCFD units.
- The operation of nine ALS units to serve 14 response districts results in an extended call utilization time for those ALS units and reduces the overall availability of ALS capacity throughout the system. This situation is compounded by the PMA policy that extends the out of service time of ALS units during transport time and SLCFD personnel retrieval from the hospital.

In the future as a possible option for improvement of their system, the SLCFD may want to consider the redeployment of its paramedics and establish a staffing policy that places a minimum of one paramedic on every first response unit. The SLCFD has taken the approach that it is the sole provider of ALS services in the city. The proposed RFP for ambulance service presents an opportunity to rethink the staffing requirements on all Gold Cross ambulances to include a minimum of one paramedic. If each ambulance was staffed with a paramedic and this was combined with a paramedic responding on each SLCFD unit, compliance with regard to

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[52] One ALS engine, one BLS engine, and one ambulance.

having two paramedics at the scene will be met. In addition, the City will benefit from a spreading out the number of paramedics who provide services on a daily basis.

TriData is aware that state law prohibits the licensure of only one paramedic provider per geographic area, but the same law has a proviso for a waiver of the rules if they enhance the public good. The enhancement of the public good can also be pursued by changing or amending unfavorable laws.

TriData also believes that the SLCFD should consider including a requirement that all ambulance units be staffed with a minimum of one paramedic into the current, or any future, RFP for ambulance transport services. Staffing is the most important and most costly component in the delivery of emergency services. In a more proficient two-tiered response system, both the fire department and the private ambulance provider are partners in the process. The SLCFD should take the next step and build the concept of partnership and coordination into its future working relationship with the ambulance provider.

The combination of staffing ambulance units with a paramedic and having a common medical director for both the Fire Department and the ambulance service produces a range of results that can enhance service delivery and improve efficiency, including:

1. From a deployment perspective, there will be an immediate reduction in the number of units responding in an emergency mode to many ALS incidents.
2. On most ALS transports that currently involve a PMA, the ambulance service can transport with its own paramedic on board and this will allow the SLCFD unit to remain in its district and return to service sooner.
3. The City will realize on a daily basis a net increase in the number of paramedics available for emergency response.
4. A common medical director may establish unified training requirements and compliance with the same service qualifications for both fire department and ambulance personnel. This can result in a greater sense of equity and co-dependence between the service providers.
5. Joint-training activities between SLCFD units and the ambulance provider can be increased and required through the common medical direction.
6. The utilization of similar equipment and supplies can improve compatibility of field operations and provide greater opportunity for the restocking of expended supplies. Opportunities for joint purchasing arrangements and the distribution of equipment and supplies are similarly enhanced.

As noted in an earlier section of this chapter, the SLCFD generated nearly $700,000 last year through PMA fees. With the proposed recommendation in the RFP to require a paramedic as part of the ambulance staffing, there can be a corresponding reduction in the number of PMAs by SLCFD paramedics. The SLCFD, in conjunction with its medical director, would then have

the ability to revise its policy regarding PMAs to reflect the ability to transport the less critical ALS patients with only one ambulance paramedic in attendance. The ambulance provider will have the opportunity to upgrade its transport level from the BLS-Intermediate to an ALS-Paramedic level. This will increase the base rate that the ambulance provider can charge and will allow the City and ambulance provider to establish a paramedic first responder response fee that will offset any PMA revenue loss.

Recommendation 69: The SLCFD should explore a legal mechanism that will allow the ambulance transport provider to pay the City an annual fee for its "paramedic first responder" program. In the cooperative two-tiered system proposed, the ability of the system to operate requires that both agencies utilize personnel for patient care both at the scene and in transport. The combination of a paramedic first responder fee, cost savings from a common medical director, and savings through supply exchange and joint training activities can offset the current revenues from the PMA fee process. Law currently prohibits the adoption of this proposal, but legal remedies should be explored to change the barriers that block its implementation.

EMS Training

EMS training and recertification at the Paramedic and EMT levels is done in accordance with guidelines established by the Utah Department of Health, Bureau of Emergency Medical Services. These guidelines are specified and published in *Recertification Protocol for Emergency Medical Services Personnel.* The SLCFD is able to conduct its own recertification training with the approval of the State and under the supervision of its medical director. This is a common way for continuing education credits and skills review to meet the requirements for recertification.

The Continuing Medical Education (CME) requirements for both paramedics and EMTs involve 100 contact hours of training within each four-year certification period. These requirements are spelled out for the different certifications and are broken down into individual subject areas with hourly allocations suggested for each. The SLCFD delivers the training for its paramedics and EMTs in an on-duty status. Training typically takes place in a classroom/group setting and crews are cycled into a common location once each month for a two-hour block of instruction. An internal committee composed of the medical director, the EMS training instructor, the EMS Battalion Chief, the captain of EMS, and the EMS liaison officers develop the training topics. This EMS Medical Staff (as they are called) meet quarterly to determine topics and delivery methods for in-service training. The EMS training instructor assumes much of the responsibility in coordinating EMS training activities once the EMS Medical Staff line out the curriculum.

In conjunction with the EMS liaison officers and the Battalion Chiefs, crews are rotated in and out of training classes on designated days each month. The EMS instructor will arrange

for instructional staff and develop the lesson plans and instructional props that may be utilized during the sessions. Student rosters are filled out for each class and the EMS training instructor enters this information into the training records management program for the official documentation of CME hours. There are limited skills assessments done during individual training sessions and typically individuals are not required to demonstrate proficiency through a formal testing process for the instruction they receive. Most instruction is done in a lecture format. In certain instances demonstrations on new equipment or techniques allow individual students to demonstrate their understanding through hands-on activities. The training effort rarely utilizes videos in the presentation of materials nor is "web-based" training utilized. Gold Cross participates in training activities on an infrequent basis; however, it was estimated that joint training activities between Gold Cross and SLCFD personnel occurs once or twice each year.

The State guidelines regarding CME instructional delivery methods provide a range of flexibility on how EMS personnel may obtain the required hours. The State has taken the approach of identifying the various training delivery methods and then establishes limitations regarding the number of qualifying hours that can be obtained through each method. As noted above, the SLCFD has chosen to deliver all required EMS training in a classroom/group format. This process requires considerable movement of personnel and equipment. On a monthly basis, units are required to move out of their primary response districts in order to attend this training. This often results in delays in response as units are required to travel extended distances to handle calls while they are out of district or covering neighboring districts. This training delivery method is compounded by the limited number of ALS units that operate on a daily basis throughout the City. Table 71 lists the different instructional methods that are authorized under State guidelines and maximum number of CME hours that can qualify under each method.

Table 71: Instructional Methods and Corresponding CME Hours Required

Type of Training	Maximum hours
Group Training	No limitation
Teaching classes	15
Audio visual	10
Computer-Web based	25
Journals/literature in field	5

Recommendation 70: The SLCFD should alter its CME training delivery methods and include instruction that minimizes the monthly movement of personnel and equipment out of their primary response districts. There are a number of subscription training services that provide CME approved instruction in both video and DVD formats. This methodology has proven to be effective in larger metropolitan fire departments and allows in-service CME training to take place without moving units from their primary response districts. Web-based

training that is available through a host of commercially offered Internet sites has been created specifically for EMS continuing education. It is estimated that upwards of 50 percent of the current 100 hour CME requirements can be met through a combination of these alternative delivery methods.

The absence of a formal skills assessment process for EMS training should be re-evaluated. In many municipal environments skills deterioration is prompted by a number of factors. In the busiest stations, there is a tendency towards non-compliance because of the high call volumes and the attempt to rush through treatment protocols. In those areas that typically have low call volume, just the opposite occurs. Mistakes are made because skills get rusty or field personnel simply miss a diagnostic or treatment protocol. These factors are likely to go un-noticed when there is limited quality assurance occurring or on-scene EMS supervision is absent.

Recommendation 71: The SLCFD should institute quarterly skills assessments for both EMTs and paramedics. Skills assessment should be an integral part of the training process. All CME training should include some type of assessment or a requirement to demonstrate the competencies learned. On a more formal basis, testing and the recording of these results should be included as part of the training process. The assessment process should be a regular and an expected part of the training. On a quarterly basis, we would recommend that training time be devoted towards the assessment of the skills taught during that quarter. This formal assessment process must also be included as a part of the annual employee performance appraisal process.

Quality Improvement/Quality Assurance (QI/QA) – The IAFF Guidebook defines QI as:

> *"The sum of all activities undertaken to continuously examine and improve the product and services. QI activities are described as being prospective, concurrent, or retrospective, depending on when they are conducted relative to an event."*

The SLCFD Quality Improvement Program is not given a high priority according to many in the Department. There is a clear understanding among both the leadership and line personnel within the organization regarding the importance and benefit of this effort. However, the recent financial constraints that have been placed on the fire department have necessitated the elimination of this program. The primary goal for a QA program is to maximize positive patient outcomes by providing an efficient and effective review of patient contacts. This process should include regular reviews of EMS incident reports on all codes (cardiac arrests), traumas, intubations, and calls that require the administration of two or more medications.

Recommendation 72: The SLCFD should re-establish a QA position with the responsibility to review field reports on selected and random incidents. This information helps to demonstrate the performance of personnel in using certain medical skills as well as maintaining a minimum level of competency. *The program is not designed to be punitive in nature and focuses instead on improving paramedic performance through specific training and counseling.* The QA process must also maintain confidentiality regarding reports and medical

information. For this reason it is important that this information be done under the supervision of the medical director. Initially a paramedic or the paramedic supervisor who has the responsibility for this first level of screening should review reports at the station level. If there are questions concerning the treatment provided by a paramedic, consultation should take place with the medical director. Counseling sessions, depending on the type and seriousness of the issue would follow. Questionable treatment of a patient, or substandard administration of protocols or skills, should result in the development of an action plan, most likely including additional training for the paramedic. The National Highway Transportation Safety Administration document *Leadership Guide to QI for Medical Services* (July 1997) provides useful information in this regard. It is extremely important that the City re-evaluate this issue and provide a viable method to conduct QI/QA activities within its EMS structure.

Currently the SLCFD does not employ an in-depth or formal analysis of its incident reports in determining its EMS training needs. State recertification guidelines provide ample opportunity to include non-specified or *elective* training topics in the CME requirements. These elective categories are intended to give the employer and its medical director the opportunity to craft its CMEs towards specific departmental needs. The paramedic recertification guidelines provide up to 20 hours per cycle for elective training categories. EMT guidelines allow 25 hours in elective training. Typically there should be a link between in-service training topics and deficiencies identified through the QA process. Because of the elimination of the QA position within the SLCFD this link has been greatly diminished.

Recommendation 73: The SLCFD and its medical director should make a concerted effort to align the QA process with the development of in-service CME training for its EMTs and paramedics. QA is a logical and proven method to determine both individual and system shortcomings in the delivery of EMS. Nationally, most EMS systems require QA as part of its medical control and licensing guidelines. The State of Utah does not require specific actions regarding QA activities. Instead the State defers these decisions to the employer and its medical director. The SLCFD has a strong tradition of reviewing its operations both for EMS and EMD against recognized standards and adjusting when individual or systemic shortfalls are detected. It is recommended that the QA process be re-instituted to at least the level it was previously operating.

As stated above, the responsibility for coordinating CME activities and recording training hours for each individual employee rests with the EMS training instructor. It is our belief that this responsibility should be shared with a field supervisor who has responsibility over the individual paramedic and EMT. This point is more important when skills assessments are required. The SLCFD appears reluctant to break out EMS responsibilities from the general supervision provided through the fire command structure. We believe that the overall organization and administrative oversight for CME and skills assessments will be enhanced if a designated officer within each battalion is responsible for these functions.

Recommendation 74: The SLCFD, in conjunction with its medical director, should establish a group of paramedic supervisors (six total, one per battalion on each shift), who have the primary responsibility to insure the delivery of CME training and conduct quarterly assessments of the paramedics under their supervision. Skills maintenance and the assessment of paramedic capabilities is a supervisory function. This level of supervision requires an in-depth understanding of paramedic responsibilities and field experience in the delivery of ALS care. It is important that SLCFD paramedics have supervision and training oversight from a supervisor who is trained as a paramedic. The logistical difficulty in having every paramedic supervised daily by an officer who is also a paramedic is impossible. However, we believe that the SLCFD should designate at least one paramedic supervisor in each of the two battalions on each shift who periodically interacts with the paramedics assigned to them. This position will replace the exiting EMS liaison officers and also expand their current responsibilities. We believe that this responsibility can be in addition to the normal duties these personnel hold as company officers. In addition, they should be responsible for the logging of CME training and conducting quarterly skills assessments. In the event that any remedial training is required, the paramedic supervisors would interact with the company officer having direct supervision over that person and work jointly in carrying out the necessary remedial activities. The department should also consider some form of additional compensation for these paramedic supervisors.

EMS Performance Measures

The use of performance measures in conjunction with an aggressive training program, appropriate field supervision, on-going quality assurance practices and comprehensive management and medical control systems will ultimately yield the highest level of pre-hospital EMS. The SLCFD has developed its service mission with emphasis on quality patient care and professional customer service. The absence of a comprehensive series of relevant and measurable indicators has not detracted from the exceptional level of care and performance observed. However, the establishment of reliable indicators will ultimately minimize the chances that sub-standard performance will go undetected or have on-going negative impacts on patient care.

Department-wide Measures – The Salt Lake City Annual Budget for FY04 identifies only one performance measure for the Fire Department that is directed towards a measurable service delivery standard. Measure 2 under the Goal to "Excel in Municipal Services and Continuously Improve Service Delivery" is stated as follows:

Respond to life threatening emergencies in an average time of five minutes or less.

As discussed in Chapter III, the measurement of response times that is based solely on an average is not recommended. NFPA 1710, which establishes response time standards for fire and EMS services, uses what is termed *fractile* measurements. A fractile measurement establishes limits on the number of responses that may exceed the recommended standard. For example, if the recommended response time is five minutes, a fractile standard would say that not more than

10 percent of the total responses can exceed this five-minute goal. This fractile number is much more restrictive than an average, and provides a more consistent measurement for all responses in a community.

Recommendation 75: The SLCFD should establish response time standards that utilize fractile measurements. The establishment of response time standards should be a reflective process that is characteristic of each community. These standards should be established after careful evaluation of the resources required to meet a specific standard and a determination regarding the community desire (both for service level and the associated costs). It is critical, however, that individual units be evaluated on a periodic basis (preferably monthly or quarterly) to determine how well each unit complies with the overall standard.

The review of response time data for an entire system alone will not provide the types of insight needed to truly manage the quality of service delivery. The tracking of the extended response times (greater than eight minutes for first responders), must also be examined. This evaluation should look at the frequency and locations of these occurrences. If these trends are repeated, it may be necessary to take corrective action. For example, in high growth areas of a community, or when a new sub-division is built, one may observe a spike in extended response times. In most instances this may result when a new service area is served from a fire station that is beyond the travel distance necessary to maintain the standard. This evaluation may indicate the need for the construction of a new fire station or an expansion of the roadway system. In other instances when there are frequent occurrences of extended response times, this may be indicative of a station area that is becoming too busy. In this case the primary unit in that station is unavailable because they have frequent simultaneous calls. In this situation, the data will reflect that the extended response time is a product of a unit from outside the district responding to the call. The resolution for this situation may be the placement of an additional unit in that station.

Recommendation 76: The SLCFD should track calls that result in extended response times (greater than eight minutes for first responder arrival). This information, combined with overall response time information, location of incidents, call volumes, and call duration (time spent on a call) can enhance the Department's ability to consider redeployment strategies or to develop justifications for needed expansion. In many urbanized systems, unit call volumes reaching 2,500 to 3,000 calls per year would be indicative of high unit call volume. This could be a trigger to elicit a more in-depth evaluation of the call activity of that unit. This occurrence is dependant upon a number of factors:

- What is the typical call duration?
- Is the unit or its personnel involved in transporting patients?
- What is the location of the hospital to which transports are made?
- Are off-loading times at the hospital extended?

Individual Employee Measures – The establishment of performance measures that evaluate only system-wide indicators will not be enough in developing or maintaining a high performance EMS delivery system. Individual measures that monitor and track the quality of an employee's work product and are tied to the performance appraisal process must be utilized. EMS provides a wide range of skills assessment and measurement tools that can be crafted into viable individual performance measures. The following are several areas that may be considered:

- Proficiency ratings during quarterly assessment
- Proficiency in report writing (error count, completeness, timely submission, etc.)
- Frequency of protocol violations (minor/major)
- Success rates (IVs, intubations, ECG recognition, etc.)
- Adherence to CDC's Universal Precautions
- Compliance with restocking and clean-up guidelines
- Compliance with medication expensing procedures and replacement of expired inventories

Recommendation 77: The SLCFD should establish a series individual performance measures for all employees involved in the delivery of EMS. As with any new policy or procedure, the method in which these measurements are introduced will be critical to their effectiveness. It is recommended that the department utilize a participatory process to both develop these measurement tools and to determine the implementation process. Participation by the medical director and the IAFF chapter is critical.

VIII. PREVENTION

The Fire Prevention Bureau is responsible for a broad range of fire prevention activities. The services include structure and fire protection systems plans review, new construction inspections, code enforcement inspections of existing buildings, annual licensing inspections, fire and arson investigations, hazardous material investigations, preparation of state fire incident reports to the National Fire Incident Reporting System (NFIRS), and public education programs on fire and personal safety. These are typical services provided in other full-service prevention bureaus.

Background

The Salt Lake City Fire Department (SLCFD) has a 110-year tradition of proactive fire prevention in both the Fire Prevention Bureau (FPB) and line fire companies. In 1894, James Devine, an architect by training, was appointed Fire Chief. He instituted 19 points of life safety construction that were required in all structures built in Salt Lake City. Today, most fire departments in the United States are trying to achieve what has long been the standard in Salt Lake City by instilling prevention into the fire service as a core function.

The historical importance placed on prevention is evidenced in the SLCFD mission statement: "To protect life, the environment and property from events or occurrences that could otherwise have a detrimental impact on our quality of life. Our mission is accomplished through:

- Community education and prevention
- Emergency response
- Preparation and planning
- Networking with other agencies and jurisdictions."[53]

Although the emphasis of the SLCFD mission is on protecting the citizens from events primarily through community education and prevention: in actuality, the focus of the fire department has shifted to fire suppression in the past several years through staffing four-man crews. Since fiscal year (FY) ending 2002, this shift in focus is demonstrated by reductions in FPB staffing, decreases in inspections performed, reassignment of key personnel outside prevention and stated intentions to eliminate the only public education resource in FPB.

Reductions in Prevention Staffing: (See Appendix B) – The bureau staff has been reduced by 30 percent from a high of 20 positions in FY02 to a low of 15positions in

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[53] Salt Lake City Fire Department Annual Report, July 1, 2002–June 30, 2003, back cover.

FY05.[54] During the same period, total fire department staff has been reduced from 366 to 358 positions, or slightly over a 2 percent reduction.

Since FY02, 5 out of 8 or 62.5 percent of the positions cut from the fire department have been in prevention–exactly the wrong strategy for going forward. Prevention has more leverage on the bottom line of duties, injuries, and dollar loss, and should be receiving and increased, not decreased, emphasis.

There is no overall risk targeting or coordination of the entire public education effort. The captain's position that formerly supervised public education was eliminated about two years ago; and as a result, the adult and children programs are operated independently.

Decreases in Inspections Performed: (See Appendix C) – From FY02 to FY04, the actual number of inspections performed by the bureau fell by 30 percent or by 2,141 inspections (from 7,009 to 4,868).

During the same period, the number of code enforcement inspections and pre-fire planning surveys performed by fire companies rose by almost 13 percent or 481 (from 3,814 to 4,295). Data are not available to delineate code enforcement inspections from pre-fire surveys.

The total number of inspections (prevention bureau and fire companies) fell by over 15 percent or 1,660 (from 10,823 to 9,163).

The percentage of bureau performed inspections to the total inspections performed has decreased from 65 percent to 53 percent (7,009 / 10,823 to 4,868 / 9,163) during this same period.

Reassignment of Key Public Education Personnel – The Public Education Coordinator for adult education was moved from prevention to the EMS, Safety and Wellness division in 2003. Based interviews, TriData feels that not enough of the Public Education Coordinator's time is spent on public education activities. A large percentage of his time is also spent as a training instructor for fire department EMS training.

Intent to Eliminate Public Education in FPB – Since the Biennial Budget Adoption on June 14, 2001, it has been the stated intent of the City Council "that the Administration explores the feasibility of training non-sworn civilian staff or volunteers to perform community education services to Salt Lake City schools."[55] This would result in eliminating the City's only civilian resource for fire safety and injury prevention education for children.

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[54] The budget still has 15 positions in FPB; however, the Public Educator Coordinator was transferred to EMS, Safety & Wellness and is not counted in FPB.

[55] From the 5 Year Plan Department Performance Measures provided by John Vuyk, Assistant Financial Manager.

Over the past several years, increasing responsibilities and training requirements have been placed on fire companies that invariably reduced the focus on fire inspections.

In the 1980's, there was a strong expectation that at least one inspection would be completed by each shift each day which equates to 1,059 per company per year.[56] Today, the overall performance goal for all companies (24) for both inspections and pre-fire plans is 1,800 or more inspections per year or an average of 75 per company per year. (See Appendix D.)

Fire companies now respond to medical emergencies, which has significantly increased their workload, and decreased time for prevention.

Fire companies also are charged with the responsibility of conducting a visual and functional inspection, which may include pressure testing, on fire hydrants at least once a year.[57]

The SLCFD has not embraced the concept that prevention and education are core services of the agency. There seems to be a real disconnect between Operations and Fire Prevention. This cultural divide is not unique to Salt Lake City, as it has been a problem with a number of other departments we have reviewed. The most effective fire departments, however, have bridged that gap by providing joint training and sharing in prevention responsibilities. Efficiencies can be realized by assigning suppression personnel some education and inspection activity. Shift personnel can adopt a local elementary school and assist not only in fire safety programs but other educational or school activities as well. An inspector and the hazardous materials team can do inspections of businesses storing hazardous materials jointly. The first-due engine company could visit new target hazards or other major structures along with the inspector and conduct their familiarization and pre-fire planning while the inspector checks sprinkler systems, etc. This regular sharing of information increases employees' knowledge, develops an appreciation for their co-workers, and aids in creating a more holistic, efficient organization.

Authority and Codes Enforced

The Utah Code in accordance with Title 53, Chapter 7, Section 204, Utah Code Annotated 1952, as amended, adopts the rules which govern the Utah Fire Prevention Board "to provide minimum rules for safeguarding life and property from the hazards of fire and explosion."[58] As part of these rules, the International Fire Code (IFC), 2003 edition, promulgated by the International Code Council, Inc., is incorporated as the Utah Fire Code by reference.[59] The following codes "are also incorporated by reference and supersede the adopted standards

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[56] 1 inspection per shift for 3 shifts a day for 353 days per year (365 days less 12 holidays) = 1,059 inspections per company per year.
[57] Salt Lake City Fire Department Manual, Section 07-02.
[58] Utah Code, Title 53, Chapter 7, R710-9 Title, Authority and Adoption of Codes, paragraph 1.3.
[59] Utah Code, Title 53, Chapter 7, R710-9 Title, Authority and Adoption of Codes, paragraph 1.4.1.

listed in the International Fire Code (IFC), 2003 edition, Chapter 45, Referenced Standards"
except as amended by provisions listed in R710-9-6, et. seq.:

- National Fire Protection Association (NFPA) 10, Standard for Portable Fire Extinguishers, 2002 edition. [60]
- NFPA 13, Standard for Installation of Sprinkler Systems, 2002 edition.[61]
- NFPA 13D, Standard for Installation of Sprinkler Systems in One and Two Family Dwellings and Manufactured Homes, 2002 edition.[62]
- NFPA 13R, Standard for Installation of Sprinkler Systems in Residential Occupancies up to and including Fore Stories in Height, 2002 edition.[63]
- NFPA 70, National Electric Code, 2002 edition as adopted by the Uniform Building Standards Act, Title 58. Chapter 56, Section 4, Utah Code Annotated 1953 and the Utah Administrative Code R156-56-701.[64]
- NFPA 72, National Fire Alarm Code, 2002 edition.[65]
- NFPA 101, Life Safety Code, 2003 edition.[66]
- NFPA 160, Standard for Flame Effects Before an Audience, 2001 edition.[67]
- NFPA 96, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations, 2001 edition.[68]
- NFPA 1403, Standard on Live Fire Training Evolutions, 2003 edition.[69]

Local governments are granted the authority by the Utah Fire Prevention Board to adopt more stringent local fire ordinances; however, Salt Lake City has not done so. Some local entities (e.g. cities and counties in South Florida) in areas prone to natural disasters (earthquakes, hurricanes, etc.) adopt more stringent fire and life safety construction standards. Salt Lake City should review the potential for earthquakes or other natural disasters to determine if the threat is sufficient to require local ordinances.

Some municipalities also adopt additional local standards for existing older construction to better insure fire and life safety. In the IFC, 2003 edition, some standards for existing building are established. For example, fire alarm systems are required to be installed in existing Group R-1 (hotels and motels more than three stories or with more than 20 guestrooms[70]), in certain existing Group R-1 (boarding and rooming houses),[71] in existing Group R-2 (apartment building

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[60] Utah Code, Title 53, Chapter 7, R710-9 Title, Authority and Adoption of Codes, paragraph 1.5.1.
[61] Utah Code, Title 53, Chapter 7, R710-9 Title, Authority and Adoption of Codes, paragraph 1.5.2.
[62] Utah Code, Title 53, Chapter 7, R710-9 Title, Authority and Adoption of Codes, paragraph 1.5.3.
[63] Utah Code, Title 53, Chapter 7, R710-9 Title, Authority and Adoption of Codes, paragraph 1.5.4.
[64] Utah Code, Title 53, Chapter 7, R710-9 Title, Authority and Adoption of Codes, paragraph 1.5.5.
[65] Utah Code, Title 53, Chapter 7, R710-9 Title, Authority and Adoption of Codes, paragraph 1.5.6.
[66] Utah Code, Title 53, Chapter 7, R710-9 Title, Authority and Adoption of Codes, paragraph 1.5.7.
[67] Utah Code, Title 53, Chapter 7, R710-9 Title, Authority and Adoption of Codes, paragraph 1.5.8.
[68] Utah Code, Title 53, Chapter 7, R710-9 Title, Authority and Adoption of Codes, paragraph 1.6.
[69] Utah Code, Title 53, Chapter 7, R710-9 Title, Authority and Adoption of Codes, paragraph 1.7.
[70] International Fire Code (IFC), 2003 edition, Section 907.3.1.5.
[71] International Fire Code (IFC), 2003 edition, Section 907.3.1.6.

with more than three stories or with more than 16 dwelling or sleeping units),[72] and in certain existing Group R-4 (residential care/assisted living facilities).[73] Salt Lake City should determine if more stringent local codes should be required for fire and life safety in existing buildings. Older buildings could be retrofitted over several years possibly with fire sprinkler systems, fire standpipe systems, or fire rated exiting corridors and stairwells, for instance.

Fire Code Enforcement Responsibilities – The main purpose of fire prevention is to ensure public and firefighter safety. It is the policy of SLCFD that all occupancies within the City should be inspected by the fire department, except one and two family dwellings and multiple dwelling units without a common area.[74]

By policy, the responsibilities for fire inspections are divided between the FPB and the Operations Division. The Operations Division is responsible for inspecting all existing occupancies within a two-year period that are not specified as the responsibility of the FPB.[75] Basically, fire companies perform the majority of periodic fire inspections on existing buildings and residential occupancies of three or more families (other than high rises). The State of Utah performs annual code enforcement inspections of schools and, when available, fire companies may assist. Having fire companies perform inspections is excellent practice that helps lower the overall costs of fire code enforcement and provides for better fire and life safety for the citizens in the existing structures in Salt Lake City.

The FPB is charged with inspecting buildings under construction and the more complex existing buildings such as high rises; occupancies containing hazardous materials; institutional occupancies in which the more vulnerable populations may dwell; assembly occupancies where large numbers of people may gather, etc. Specifically, the FPB is charged with inspecting the following:[76]

A. Group I occupancies providing 24-hour care for 6 or more young or aged.
B. Group I occupancies providing 24-hour care for sick or injured patients, including hospitals, nursing homes and sanitariums.
C. Group I occupancies where people are physically restrained including mental hospital, jails, prisons, reformatories, etc.
D. Group E occupancies providing day care for more than six children.
E. Residential Care Facilities

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[72] International Fire Code (IFC), 2003 edition, Section 907.3.1.7.
[73] International Fire Code (IFC), 2003 edition, Section 907.3.1.8.
[74] Salt Lake City Fire Department Manual, Section 07-01.
[75] Salt Lake City Fire Department Manual, Section 07-04.
[76] Salt Lake City Fire Department Manual, Section 07-01.

    F. Group A [assembly] occupancies with the following exceptions:
       1. Churches
       2. Group A occupancies with an occupant load of less than 300.
    G. Occupancies storing, using, dispensing, or manufacturing hazardous materials in quantities greater than the exempt amount allowed in the Fire Code.
    H. Buildings over 75 feet in height.
    I. Overseeing the testing and maintenance of new and existing sprinkler systems.
    J. Overseeing the testing and maintenance of new and existing alarm systems.
    K. All buildings under construction.
    L. Business Licenses Inspections
    M. Permits as required in the Fire Code.

The FPB does not perform all of the duties with which it is charged. Specifically the FPB does not:

- Inspect institutional occupancies (A, B, C) including jails, etc.
- Inspect residential care facilities (E) including assisted living facilities, etc.
- Inspect assembly occupancies (F) including restaurants, lounges, malls, etc.
- Oversee the testing and maintenance of new or existing sprinkler systems (I) nor alarm systems (J).
- Inspect all buildings for which business licenses are issued (M).
- Inspect buildings under construction (N).

Recommendation 78: The SLCFD FPB should perform all responsibilities assigned in Salt Lake City Fire Department Manual, Section 07-01. This will take reversing the trend in staffing prevention.

Specific Services Currently Performed by FPB

The FPB currently performs construction plans examinations; issues permits for various potential hazards; performs code enforcement inspections for annual licensing and for inspections of existing structures; performs code enforcement inspections for new business licenses; coordinates and provides fire safety and injury prevention for children. (See Appendix E for a list of specific duties currently performed by FPB.)

The services provided by SLCFD FPB are more limited than in other fire prevention bureaus. Some duties that are typically performed by certified fire inspectors in other bureaus are currently performed outside FPB. These include:

- Fire code enforcement inspections of site preparation and construction-in-process inspections of structures are primarily performed by building inspectors assigned to the Salt Lake City Building Services and Licensing Department (Building Services). Building inspectors are not certified fire inspectors. Fire inspectors from FPB provide technical assistance only when requested.

- Plumbing inspectors assigned to Building Services performs fire code enforcement inspections of fire protection/suppression systems. Again, these inspectors are not certified fire inspectors.
- Occupancy permits are issued by building inspectors assigned to Building Services without on-site inspections by certified fire inspectors. Fire inspectors may provide technical assistance to building inspectors on high-rise and large assembly final occupancy inspections.
- The Public Education Coordinator assigned to EMS, Safety and Wellness organization provides adult fire safety and community education.

Recommendation 79: SLCFD FPB should perform the duties listed above which include construction in-process inspections of structures and fire protection systems, on site inspections prior to issuing temporary occupancy permits, and coordinating adult and child fire and injury education. Plans are being developed to move some of these responsibilities from Building Services to FPB. They all need to be adequately staffed–they are keys to future safety.

Proposed Responsibility Changes – On October 1, 2004, initiatives were undertaken by the fire marshal in conjunction with the building official to significantly change the duties and processes performed by FPB; two of the changes are discussed below.

PROPOSED CHANGE 1: Fire code plan reviews will be out sourced to private companies.

A list of approved companies will be made available to contractors/citizens who will then be responsible to obtain 'stamped' plans that have been certified according to the fire code adopted by the state of Utah. These certified plans would then be provided to FPB. Some plans may be rechecked if time allows. This proposed process has the potential benefit to the contractor/citizen of obtaining faster turnaround time on plan reviews. Potential benefits to the City may include limited liability because certification is obtained through private industry. However, the potential downside to the overall plans approval process is that a 'one-stop shopping' concept cannot be implemented if plan reviews are out sourced. Also, it is likely that the overall plans review and approval process will be more cumbersome and possibly more costly for contractors/citizens than it would be for the City to provide these services. We strongly support the concept of 'one-stop shopping' for construction approval, permitting and inspections; therefore alternatives to out-sourcing should be considered.

Recommendation 80: Explore the costs of alternatives to outsourcing fire code plan review. Alternatives should be measured against the relative costs of each and the benefits derived from achieving the dual goals of providing the desired turnaround performance on fire plan review and implementing the 'one-stop shopping' concept for contractors and citizens.

PROPOSED CHANGE 2: Fire inspections for construction-in-process of structures and fire protection systems (alarms, sprinklers, standpipes, etc.) will be shifted from Building Services to FPB.

We strongly support this move, but do not support the planned method of implementing this change. Plans call for the two certified plan examiners/fire inspectors in FPB to discontinue examining plans and assume the construction inspection activities currently performed by building inspectors and plumbing inspectors. It is hoped that these two resources will be sufficient to handle the workload (although data was not available to estimate workload.) The option of using a qualified private sector inspector may be allowed as an option so that inspections can be performed on a more timely basis. We agree that FPB should perform the construction-in-process inspections of structures and fire protection systems. By policy, this is the responsibility of FPB, yet they have not been performing these duties.

There are several alternative methods of implementing these proposed changes:

Alternative 1. Contract with engineering companies to provide the resources to the FPB to examine construction plans and to conduct construction in process inspections. The FPB should supervise these resources.

Alternative 2. Move the responsibility for enforcing the fire code to Building Services.

We do not recommend this alternative because building departments do not have responsibilities for structures after construction or renovation is completed: fire prevention bureaus and fire departments do. Moving fire code enforcement for construction out of the fire department would diminish the focus on fire prevention within the fire department. Prevention is the most cost effective long-term approach to providing fire services.

We also do not think cost savings can be achieved by this alternative because Building Services does not have enough plan examiners to review plans for which they currently have responsibility. This would require either establishing another section for fire inspectors in Building Services or requiring building and plumbing inspectors to also become certified as fire inspectors.

Finally, one inspector cannot be expert in all disciplines (building structures, plumbing, mechanical, electrical and fire) and a generalist approach is not advisable in technical disciplines. The fire code focuses on ensuring fire and life safety aspects are included during construction, and that they are maintained throughout the years the structure is occupied.

Alternative 3. Assign the responsibility for enforcing the fire code to FPB yet use a mix of FPB and contract employees to provide the services at the desired level of performance.

For example: continue using FPB employees to examine construction and fire protection system plans and use either FPB or contract employees to perform fire code enforcement of construction in process.

We think the best alternative is for FPB to be responsible for all fire code enforcement which reflects the current fire department policy. This includes construction plan examinations, construction-in-process inspections and periodic inspections of existing structures. This can be accomplished with a mixture of SLCFD employees and contract employees. SLCFD employees should provide supervision and function as senior level fire inspectors / plan examiners while contract employees could be used to staff the peak construction activity periods.

Regardless of the alternative selected or the mix used, fire construction permit fees should be instituted to cover the fully loaded cost of providing the functions. Performance measures for plan review turnaround, inspection response and inspection quality also should be established, measured and controlled. And finally, if space could be provided, at least one fire plan examiner (if not all examiners) should be located at Building Services in order to implement the 'one-stop shopping' concept.

We have not seen fire code plan review out-sourced entirely to private companies and do not think that it advisable. However, we have seen some of the other alternatives work well. Salt Lake City should ultimately determine if the functions of fire plan review and fire code construction inspection should be turned over to private enterprise. The ultimate goal of these functions is to ensure public and firefighter safety through fire code enforcement during construction and throughout the life of the building.

Organization and Management

The SLCFD FPB is headed by a battalion chief who functions as the local fire marshal and who reports to the Deputy Chief of Support Services/Airport. Four FPB sections (license code enforcement, construction & hazards code enforcement, fire investigations and public education) report to the fire marshal. The license code enforcement section is supervised by a captain. The deputy fire marshal provides supervision for construction and hazards code enforcement. Neither the public education specialist nor the three fire investigators are assigned to supervisors, so these four employees report directly to the fire marshal. FPB administrative support is provided by the office facilitator who also reports to the fire marshal. Figure 22 shows the current organizational structure of FPB.

Figure 22: Current Organization Chart for SLCFD Fire Prevention Bureau
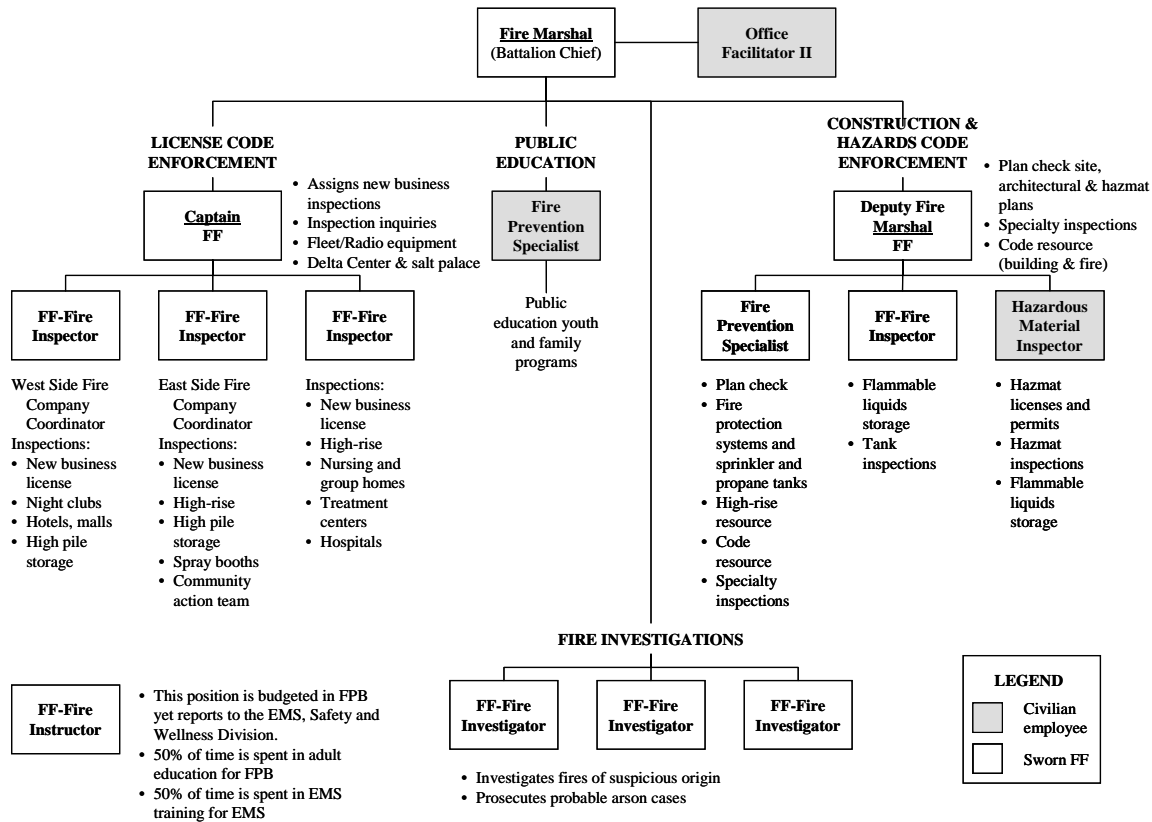
There are 15 full time positions budgeted in FPB yet only 14.5 equivalent full time positions work for FPB. Of these full time positions, 3 are professional positions (2 Fire Prevention Specialists and 1 Hazardous Material Inspector) and 1 is a clerical position, all filled by civilian employees. Positions filled by civilians are illustrated above as crosshatched boxes. The Firefighter Instructor position is shown above as assigned to EMS, Safety and Wellness and working 50 percent for FPB.

Eleven of the 15 positions are filled by sworn firefighters, captains or a battalion chief. Most of the employees have been in the FPB for many years and are not routinely rotated back to the fire service. The use of sworn employees to staff professional positions in fire prevention is more costly in terms of salaries, benefits (pension, time off, etc.) and continuing education requirements not directly related to fire prevention (e.g., firefighting and EMT certifications).

Recommendation 81: Convert all employees except four in FPB to civilian employees over a period of time through attrition. The fire marshal and the 3 sworn fire investigators should remain sworn positions. Sworn firefighters should be replaced with civilian certified fire inspectors as they either retire or choose to return to the fire suppression service.

This use of civilians as certified fire inspectors has proven successful in many prevention bureaus across the country. It is an excellent way to minimize the personnel cost of fire

inspectors by hiring typically lower paid civilians with lower pension and lower training costs. It also provides greater flexibility in hiring civilians experienced in engineering, fire protection systems, building and other related occupations can become certified as fire inspectors.

Opportunity for career advancement within FPB becomes even more important when civilian employees are used because their only opportunity for advancement is in FPB. In addition to establishing senior and deputy fire marshal supervisory levels, multiple levels (perhaps three levels) of fire inspector and fire investigator would provide more career advancement opportunities.

Recommendation 82: SLCFD should request City human resources to develop position descriptions for at least two and possibly three levels of fire inspector, fire investigator, and plans examiners so that internal progression is available based on experience, education and training. This career ladder should be within the non-supervisory ranks of plans examiners, fire inspectors, and fire investigators. There also could be lateral progression from fire inspector to plan examiner.

The fire marshal should remain a sworn battalion chief level. Ideally, battalion chiefs would rotate through (on a 2 to 3 year rotation) operations, fire prevention, EMS and support services before being qualified for promotion to Deputy Chief so that they can develop more in-depth functional knowledge of each area.

Fire investigators should continue to be sworn firefighters as their duties involve peace officer duties as well. Firefighter knowledge and the knowledge of how fires occur is most important in fire investigations.

The one clerical position in FPB is not sufficient to perform all the duties assigned. Certified fire inspectors are used to cover the phone duties for 2.5 hours per day for lunch and late afternoons when the office facilitator leaves for the day. Therefore, about 650 hours or the equivalent of 40 percent of a sworn fire inspector's annual available time is spent during clerical duties.[77] This is very costly and creates inspector inefficiency.

Recommendation 83: Obtain additional clerical support for FPB by hiring a new full-time or half-time clerical employee. The other clerical staff in the department is sufficiently busy that they probably can not be used to cover the phones and perform other clerical duties when the office facilitator is not scheduled to work.

The current FPB organization is relatively flat with little opportunity for career advancement. The deputy fire marshal and the captain function as managers/supervisors.

Recommendation 84: Fire prevention should be reorganized into four functional groupings with managers/supervisors over each function. The functional groupings should be

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[77] See Appendix D for the computation of available and productive time calculations.

construction code enforcement, operational code enforcement, prevention education and fire investigations.

Below is a chart that depicts the proposed prevention organization for four functions. This is a typical organization for prevention bureaus. This organization provides a single point of contact for each primary function and provides career advancement opportunities from fire inspector to senior fire inspector to deputy fire marshal or functional manager within the organization.

Figure 23: Proposed Organization Chart for SLCFD Fire Prevention Bureau (with 4 primary functions)
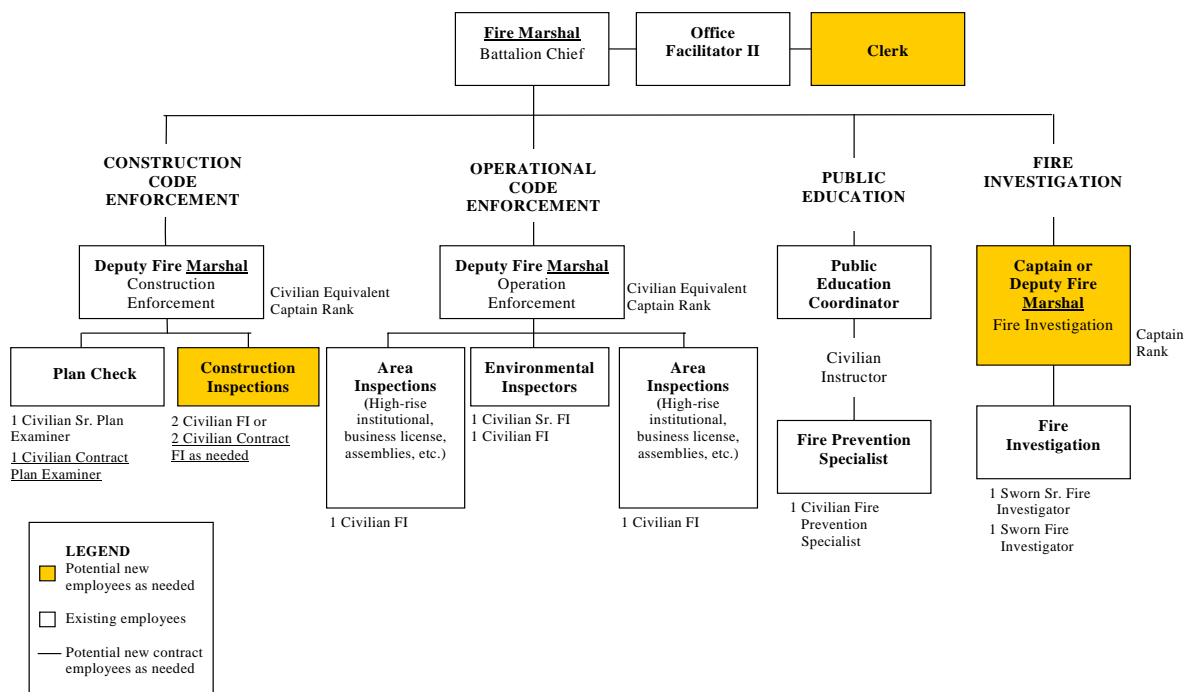
The proposed organizational chart incorporates several important assumptions, as shown in Table 72.

Table 72: Assumptions

Assumptions
1) Plan checking will not be out-sourced to private companies.
2) Fees should be charged to offset the cost of the FPB staff and/or contractors to do this review. The current deputy fire marshal will have little time for plans checking so 1 to 1.5 contract plan examiners will be needed. The current Fire Prevention Specialist should continue to do plans examinations. This will allow a 'one-stop shopping' concept to be implemented.
3) FPB will undertake the new function of fire code construction inspections.
4) Two inspectors (one hazardous material inspector and one firefighter inspector) will continue to do environmental inspections.
5) The Public Educator Coordinator who is in the EMS, Safety, and Wellness division should be moved back to prevention.
6) The civilian Public Education Specialist should be retained to provide adult and children programs.
7) One-half to 1 new clerical position is needed to provide 5–10 hour day coverage for reception and phone duties.
8) The Deputy Fire Marshal for fire investigation (captain's rank) may not be needed at this time because the current District Attorney provides much of the direction needed to properly collect evidence and prepare cases

Recommendation 85: Establish fees for fire construction permits that are sufficient to cover the cost of the entire construction code enforcement function including fire plan review and fire construction inspection.

Recommendation 86: Contract with 1 or 1.5 civilian certified fire plan examiners (or private companies) to provide fire code plan checking services at FPB.

The deputy fire marshal and the fire prevention specialist who currently do plan checking have not been able to complete reviews within the needed turnaround time. Therefore, it is safe to assume that more than two positions are needed for fire plan review. Hiring 1 to 1.5 contract plan examiners will add the equivalent of between one half to one plan examiner because 50 percent to 100 percent of the deputy fire marshal's time will be shifted to other duties including establishing the new construction inspection function. He must plan, hire, train, and develop processes and procedures for this function. For a period of time, perhaps six months to 1 year, most of the deputy fire marshal's time should be spent establishing this new function.

After a year or two, a permanent plan examiner should be hired to replace some of the contract examiners. By that time, data should be available to document the on going need for permanent employees to perform this function. Contract employees should continue to be used to meet peak or seasonal needs until a trend is established that would necessitate hiring permanent employees.

The FPB will undertake the new function of fire code construction inspections.
These inspections are currently done by building inspectors and plumbing inspectors in Building

Services who are not certified fire inspectors. Because sufficient data are not available to evaluate the staffing needed, FPB hopes that two positions will be enough to perform this new function.

> ***Recommendation 87: Two certified fire inspector contractors (or 1 full-time civilian and 1 contract fire inspector) should be employed until data can be developed to assess the permanent staffing level needed to conduct these inspections.*** Again, the fire construction permit fees should offset the cost of these inspectors as well as the plans review function.

> Two inspectors (one hazardous material inspector and one firefighter inspector) will continue to do environmental inspections. They will be moved to the operational code enforcement section so they can provide assistance to the area fire inspectors and fire companies as time allows.

> ***Recommendation 88: The hazardous material inspector should become certified as a fire inspector to allow greater flexibility in assignment****. Then both environmental inspectors could handle any overflow of existing structure and new business inspections.

> ***Recommendation 89: The Public Educator Coordinator who is in the EMS, Safety and Wellness division should be moved back to prevention.*** The duties of EMS training should be moved to someone else or should be contacted with local private companies. The coordinator should work full time on fire prevention and injury public education and should coordinate both the adult and children programs.

> ***Recommendation 90: The civilian Public Education Specialist should be retained to provide adult and children programs.***

> ***Recommendation 91: One-half (1/2) to 1 new clerical position is needed to provide 5 - 10 hour day coverage for reception and phone duties****. The cost per hour will be substantially reduced by using clerical staff rather than certified fire inspectors to perform these duties. This change also frees up 40 percent of one fire inspector to perform more inspections.

> ***Recommendation 92: The Deputy Fire Marshal for fire investigation (captain's rank) may not be needed at this time because the current District Attorney provides much of the direction needed to properly collect evidence and prepare cases.*** However, the managerial responsibilities of analyzing the unit's performance and reporting to upper management are not being routinely performed. Additionally, there is inefficiency in all three investigators reporting to the fire marshal. The fire investigations unit should eventually be headed by either a working senior fire investigator (lieutenant rank) or a deputy fire marshal (captain rank).

> The proposed changes in the number and type of employees in the proposed organization are shown in Table 73.

Table 73: Changes in the Proposed Organizational Structure

Position Titles	Current Organizational Chart		Proposed Organizational Chart		
	No. of Employees	No. of Sworn Employees	No. of Sworn Employees	No. of Civilian Employees	No. of Total Employees
Battalion Chief	1	1	1	0	1
Captain[78]	1	1	0	0	0
Deputy Fire Marshal	1	1		2	2
Firefighter Inspector	4	4		0	0
Civilian Senior Fire Inspector				1	1
Civilian Fire Inspectors				3	3
Firefighter Instructor[79]	1	1		0	0
Public Education Coordinator (Civ.)				1	1
Firefighter Investigator	3	3	1	0	1
Deputy Fire Marshal - Investigations			1	0	1
Firefighter Sr. Fire Investigator[80]			1	0	1
Fire Prevention Specialist (Civilian)	2			1	1
Civilian Senior Plan Examiner				1	1
Hazardous Material Inspector (Civ)	1			0	0
Civilian Fire Inspector				1	1
Clerical (Civilian)	1			1	1
Clerical (Civilian) PT or FT				.5 to 1	.5 to 1
Sub-Total FPB Permanent Staff	1	11	4	12.5 to 13	15.5 to 16
Civilian Contract Plan Examiner				**1**	**+1**
Civilian Contract Fire Inspectors				**2**	**+2**
Sub-Total FPB Contract Staff			0	3	3
Total FPB Staff	**15**	**11**	**4**	**15.5 to 16**	**18.5 to 19**

The changes recommended are outlined below:

Civilians replace 7 out of 11 sworn positions. The 7 positions replaced (through attrition) are: 1 captain, 1 deputy fire marshal, 4 firefighter inspectors, and 1 firefighter instructor. Four (4) sworn positions remain in the proposed organization chart: 1 battalion chief, 1 deputy fire marshal (captain rank) for fire investigations, 4 firefighter inspectors, firefighter instructor.

The Public Education Coordinator begins working full-time for FPB instead of half time and supervises the public education function.

- 1 fire inspector position is raised to a civilian senior fire inspector.
- 1 sworn fire investigator position is raised to a deputy fire marshal at captain level.

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[78] Convert this position to a deputy fire marshal position in charge of fire investigations.
[79] Only half of this position's duties are fire prevention: the other half is EMS training.
[80] Lieutenant rank.

- 1 sworn fire investigator position is raised to a senior fire investigator at lieutenant rank.
- 1 civilian fire prevention specialist is raised to a civilian senior plan examiner.
- 1 civilian hazardous material inspector is raised to a civilian fire inspector.
- One half to one position is added for clerical support.
- 1 civilian contract plan examiner is added to handle the work load and to free 50 percent to 100 percent of the deputy fire marshal of construction enforcement time.
- 2 civilian contract fire inspectors are added to handle the additional workload created by shifting the construction inspection responsibilities from Building Services.

Only 5 of these employees (1 firefighter investigator, 1 senior firefighter investigator, 1 firefighter investigator deputy chief, 1 fire prevention specialist and 1 public education coordinator) should be funded by the general fund. The fully loaded costs of the remaining 15.5 to 16 employees and contractors should be covered by fees charged for services they perform.

SLCFD FPB has many outstanding management practices that are better than most prevention bureaus. These include:

- Historical culture of prevention throughout the fire department.
- Use of fire companies to perform most of the inspections on existing buildings helps insure that prevention is a top goal in fire operations as well as meeting pre-fire planning needs.
- Well qualified fire inspectors that are required to be certified as an IFCI International Fire Code Inspector prior to appointment. Several inspectors have either a second level of certification (IFC Instructor) or multiple certifications.
- Use of standard inspection and review forms for bureau inspectors and fire companies.
- Use of checklists sent to high-rise property owners prior to inspection.
- Use of Hazardous Materials Questions & Answers attached to the hazardous materials permit application.
- Use of cell phones to improve communication and personal safety.

The primary weaknesses of the SLCFD prevention bureau are:

- Lack of automated systems to collect, report and analyze activities, inspection results, building history and workload and performance data
- Use of uniform firefighters as fire inspectors (instead of civilians)
- Insufficient resources assigned to public fire and safety education
- Inadequate supervision of each major function
- Inadequate fees to support fire construction and operational enforcement
- Lack of on-going prevention training programs for fire companies
- Limited career advancement within fire prevention
- Inadequate clerical staff costs.

FPB has taken many prudent steps to become more cost effective. The less technical inspections of existing structures are assigned to fire companies. Almost 50 percent (47 percent in FY04) of the inspections conducted are done by fire companies. Three professional employees (1 certified fire inspector, 1 plans examiner and 1 public education specialist) are civilians. Only the more technical or potentially higher risk new business occupancies are inspected. Consideration is being given to instituting a self-inspection program. Plans are being refined to obtain software products which will support improving FPB efficiency. Citizens are being trained in CPR, first aid heart saver and use of AEDs. Consideration is being given to re-structuring the fire construction code enforcement function. A grant for $50,000 was obtained this year for partially implementing a school administered Risk Watch® program.

Construction and Fire System Plan Review

The FPB currently reviews site plans, architectural and fire system plans for adherence to the 2003 International Fire Code. This is an excellent practice that we think should be continued. However, due to the inability of the FPB to meet the desired plan review turnaround time, consideration is being given to out-sourcing this function. Alternatives to this solution have been discussed above.

It is preferably for this function to be done by FPB supervised resources (whether permanent civilian employees or contract employees). These resources as well as construction fire inspectors should be funded by fees for fire construction permits. Further these resources should be located at the FPB or more preferably at Building Services so that the 'one stop shopping' concept can be implemented more smoothly. If space is not available at Building Services for all FPB plan examiners, at least one plan examiner should be located there during all operating hours, if space can be found.

Construction Inspections – As discussed previously, building and plumbing inspectors in Building Services currently perform inspections on construction in-process and fire systems. It is hoped that fire code compliance is being included in these inspections. The fire marshal and the building official are in agreement that these inspections should be moved to the FPB and we concur. Although data was not available to estimate the number of inspectors needed in the FPB to perform this new function, it is hoped that two fire inspectors will be sufficient to do fire code compliance inspections of construction and fire systems. In the organizational discussion above, we recommended that a mix of FPB inspectors and contract inspectors perform these duties until data is available to estimate the permanent staff needed.

New Business Inspections – When new business licenses are issued by Building Services, the FPB is notified. Fire inspections are supposed to be done prior to or shortly after

the business opens. Inspections are to certify that the appropriate fire and life safety systems are present and operational. Inspections may uncover changes in occupancy use, which could potentially require more stringent fire and life safety systems. In 2004, the FPB performed fire inspections on only about 16 percent of the new businesses granted licenses.

Table 74: New Businesses Sent to FPB for Inspection

Calendar Year	No. of New Businesses Sent to FPB	No. of Businesses Inspected	No. of Signoffs	Percent Inspected
2002	886	218	668	25%
2003	1184	190	994	16%
2004	1758	276	1482	16%

Recommendation 93: Identify the risk criteria for assigning priorities for inspecting new businesses. When there are not enough resources to do all, some type of screening is needed–or do at random. If not all are inspected, the criteria should not be advertised. Knowing that your business might be inspected itself can be a deterrent.

Recommendation 94: Develop a scientific sampling methodology to identify which of the higher risk criteria new businesses to inspect within a time-sensitive response window (i.e., prior to the business opening). If all higher than average risk businesses can be inspected within the time-sensitive response window, inspect them all. If some of the lower than average risk businesses can be inspected within the time-sensitive response window, use the sampling methodology to identify which ones to inspect.

Recommendation 95: Assign the less time-sensitive new businesses to FPB fire inspectors to conduct inspections, as time is available over several months. Again, new businesses assigned for inspection should be determined by the sampling methodology.

Recommendation 96: Assign the less time-sensitive new business inspections to fire companies. Companies need to know when new businesses enter their area. Again, new businesses assigned for inspection should be determined by the sampling methodology.

Self-Inspections – As mentioned previously, consideration is being given to introduce a self-inspection program. As a cost saving technique to reduce the need for on-site inspections by certified fire inspectors or fire companies. When successful, self-inspection programs both educate business owners on fire safety and achieve voluntary fire code compliance. We strongly endorse these programs; however, they must be actively advocated and managed.

Recommendation 97: Establish a self-inspection program for the lower risk businesses. This program should be administered by prevention. Until e-commerce is available, self-inspection forms can be mailed or delivered by fire companies to these businesses. Returned forms can be evaluated by fire companies and forwarded to prevention for analysis and follow-up. Periodically, every three to five years, an on-site fire inspection could be performed.

Fire Company Prevention Activities – Compared to many other fire departments, SLCFD does a good job in the use of fire companies to maximize the number of structures that

are inspected periodically. In FY04, fire companies performed 47 percent of the total inspections done. Over the past several years, emphasis on company inspections has decreased and the quality of company inspections is not known. Additionally, the fire companies have not been trained in the 2003 International Fire Code.

Recommendation 98: Develop a formal training curriculum and materials for FPB Battalion Coordinators to use in training fire companies on how to conduct fire inspections. There should be training in the new fire code, 2003 edition, and on-going training and quality control of fire company inspections.

Recommendation 99: Consider requiring fire Captains and/or Battalion Chiefs to become certified as fire inspectors so they can supervise company inspections and conduct on-going inspections training programs.

In addition, public education responsibility is shared between the Operations Bureau and FPB. Fire companies are responsible for all public fire educational activity in their service area except the following activities for which FPB is primarily responsible[81]:

- Fire prevention and safety education classes in elementary schools, including assemblies.
- Community emergency response team (CERT) training.
- CPR and automatic external defibrillator (AED) training.
- Special exhibits for malls, conventions, fairs, etc.

In FY 2004, fire companies conducted 364 training events that had 4,774 participants. (See Appendix D).

FPB does not perform many inspections of assembly occupancies during the active late night and weekend hours.

Recommendation 100: The potential use of fire companies to conduct assembly inspections or 'walk-throughs' should be explored. Walk-throughs or unannounced inspection trips by fire inspectors or fire companies should be made of assembly occupancies during their peak hours of operations (often after 10:00 PM and on weekend nights). These inspections help to insure that fire exits are not blocked and that no other fire code violations are evident. They also help educate owners of potential safety hazardous and keep safety foremost in their minds.

Recommendation 101: An inventory of assembly occupancies should be developed by fire station to help implement Recommendation 23.

Recommendation 102: Priorities should be developed for assembly inspections. Assemblies with 50 or more capacity that serve liquor and have entertainment may be candidates for top priority.

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[81] Salt Lake City Fire Department Manual, Section 07-03.

Funding Sources and Fees

All of the FPB positions are funded through the general fund. Fees collected by FPB for permits are returned to the general fund. We suggest that a different philosophy of fees be considered: that all functions within fire prevention should be self-funding to the extent possible, except prevention education and fire investigations. The rationale for this philosophy is that the users of the service should bear the cost of the service since all citizens do not require the service. The users of fire prevention code enforcement services are those involved in construction; in enterprises (businesses and institutions) that require annual licensing; in using or storing hazardous materials and in owning and managing residential homes and apartments. (A counter argument is that all citizens benefit from the safety of all properties, but many committees adopt this policy.)

Although we were not able to independently confirm this, there may be a Utah state restriction on the percentage of the cost of services that can be charged which amounts to 70 percent of the cost of the function. This should be investigated to verify or discard this perceived restriction.

Fees are not instituted for all permits allowed – The 2003 International Fire Code, Section 105.1.2 allows for two types of permits to be issued by the fire code official. Construction permits allow the applicant to install or modify systems and equipment for which a permit is required."[82] Fire permits are not currently issued for construction or modification of structures or for fire protection systems.

Recommendation 103: Fire construction permits with fees should be issued for the construction and renovation of permanent or temporary structures and for all fire protections systems (alarms, mains, standpipes, sprinklers, hood, etc.).

An operational permit "allows the applicant to conduct an operation or a business for which a permit is required."[83] In section 105.2.2 of the code, "the fire code official is authorized to inspect the premises to determine compliance with this code" before a new operational permit is approved. There are 47 required operational permits listed in section 105.6 of the 2003 International Fire Code. Currently, fees are established for only 14 types of permits. In Salt Lake City, there are also operating permits for annual business licensing and for annual state licensing. The fees for all these operational permits should cover the fully loaded cost of the operational code enforcement section of the FPB.

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[82] 2004 International Fire Code, section 105.1.2.
[83] 2003 International Fire Code, section 105.1.2

Recommendation 104: Fees should be established for the 47 required operational fire permits in section 105.6 of the 2003 International Fire Code. Consideration should be given to establishing a simple fee structure rather than establishing 47 different fees.

In calendar year 2003, permit fees totaled $175,578. The revenue collected is listed in Table 75 by permit type. Hazmat permits were by far the largest source of fees.

Table 75: FPB Fees Collected in calendar year 2003

Fee/Permit Description	Fees Collected
Blasting Permits	–
Fire Reports	$1,065
Fireworks Permits	$2,470
Tank Permits	$3,830
Inspections (Health Care, Hospitals, Daycare)	$7,050
Keybox Permits	$2,625
Photos	$78
Aircraft Refueling Permits	$1,840
Tent Permits	$10,220
High Rise Permits	$9,450
High Rise Permits with Hazardous Material	$5,275
Hazardous Material Permits	$125,425
Late Fees	$5,250
Total Fees Collected	**$174,578**

Fees are not charged for all operational inspection services provided by FPB. The only operational inspection fees seem to be for high rises, high rises with hazardous materials, alternative daycare, and state licensed health care and hospital inspections.

Recommendation 105: Fees should be instituted for initial inspections and re-inspections for all operational code enforcement inspections. They should cover the cost of that type of inspection. These fees along with the permits fees should be sufficient to cover the cost of the operational inspection function. For example: fees for inspecting existing high rise buildings should be based on the amount of time required to finalize the inspection. Over time, data can be collected to develop cost-based fees. Perhaps inspection fees for high rises might be based on the number of floors and the square footage per floor. The size and numbers of floors directly relate to the amount of time an inspection should require.

Recommendation 106: Time required to conduct inspections should be recorded for each type of inspection and re-inspection performed so that fees can be set to cover the cost of each type of inspection.

Fees are not charged for operational inspections performed by fire companies. Fire companies conduct most of the operational inspections (except for new businesses, institutional and group care facilities, high rises and assemblies).

Recommendation 107: Fees should be instituted for initial inspections and re-inspections conducted by fire companies. These fees should cover the fully loaded employee costs, all direct, indirect and capital cost associated with conducting these inspections and performing the follow-up and administrative work required to develop and maintain records on these inspections.

Just like fees charged by building code enforcement departments for building, plumbing, electrical and sometimes mechanical permits, fire permits fees should be charged that cover the cost of providing the construction code enforcement function (plan checking and construction inspections). With fees being tied to the cost to provide the service, fees can be adjusted as construction activity fluctuates.

A consolidated construction permitting (zoning, building, fire, etc.) and fee collection function is more efficient than independent functions located in various departments. Such consolidated functions also support the 'one-stop shopping' concept. However, the building official does not think the existing staff can manage the additional workload created by this consolidation.

Recommendation 108: Evaluate the feasibility of Building Services issuing all permits and collecting all fees associated with construction, regardless of the type of permit (building, zoning, plumbing, fire, etc.). This is probably more efficient than the Fire Department setting up its own billing service.

Fire and Safety Public Education

Improving its public education program is the most important thing a fire department can do to improve safety and reduce future costs. It is probably the most cost-effective aspect of fire protection, yet received the least attention.[84]

In SLC, the emphasis on prevention education has been reduced from a high of 5 positions in fiscal year 1998 to 4 position in fiscal year 2002, to the current 2 equivalent positions. Only 1 full time position for a civilian fire prevention specialist remains in FPB. The other position is the public education coordinator (firefighter instructor position) that was moved from prevention to EMS, Safety and Wellness division in July 2003.

Even though resources have been significantly reduced, the number of adult classes and the number of participants has remained high (Table 76). With a decrease of about 2.5 positions or a 62.5 percent decrease (from 4 to 1.5) in prevention education resources, there was a 28 percent decrease (271 to 196) in the number of adult classes conducted in FY03 as compared to FY02. From FY03 to FY04 there was a 13 percent increase (196 to 222) in the number of adult classes conducted. The number of participants reached fell from a high of 13,026 in FY02 to

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[84] P. S. Schaenman, *Overcoming Barriers to Public Fire Education,* TriData Corporation, 1987.

10,172 in FY03 or about 25 percent decrease. The number of participants increased by about 15 percent or 1,568 from 10,172 in FY03 to 11,740 in FY04. During the same period of time, the productivity has risen from 6.99 participants reached per resource hour to 8.77 in FY03 and 8.33 in FY04. It is doubtful that future increases can be achieved without increases in staffing.

Table 76: Public Education Programs and Participants*

Class Description	FY02 No. of Classes	FY02 No. of Part.	FY03 No. of Classes	FY03 No. of Part.	FY04 No. of Classes	FY04 No. of Part.
CERT	69	1,118	49	1,233	34	499
CPR	108	1,323	89	1,184	83	924
Fire Extinguisher	32	891	28	1,433	40	1,070
Emergency Preparedness	15	761	4	355	10	200
Fire Safety	23	1,309	16	317	16	666
Safety Fairs	24	8,087	10	5,650	12	7,700
EMT					27	681
Total Classes/Participants	**271**	**13,489**	**196**	**10,172**	**222**	**11,740**
Revenue Generated	$10,904		$15,483		$13,026	
Teaching Resource Hours	1,929		1,160		1,410	
Number of Resources	4		1.5		1+ to 1.5	
Average Hours/Resource	482.25		773.33		1,410 to 940	
Number of Participants Reached/Resource Hour		6.99		8.77		8.33

*Data obtained from Richard Soltis, Public Education Coordinator, Salt Lake City Fire Department Public Education fiscal year reports.

With 11,740 adult participants in FY04, only 6.3 percent of the population of 187,000 is being reached, at most. (Some may be counted in more than one class.) In the grade schools, 304 life and fire safety presentations were conducted in FY04 that reached, at most 17,500 students. Data was not available on the percentage of students reached.

Adequate prevention education staffing is needed not just to prevent injuries and fires that lead to more calls, but to help control demand by teaching the public not to call for non-emergencies. A general rule of thumb is that at least 1 full-time public fire and safety educator is needed per 100,000 population. With a population of 187,000, Salt Lake City should have 2 full-time prevention educators as a minimum.

Recommendations were made in the Management and Organization section of this report to retain the civilian public education specialist in FPB and to move the public education coordinator (a firefighter instructor position) back to FPB and change the position to a civilian position through attrition.

The City council has expressed a desire to use school teachers and citizen volunteers to increase the overall prevention education efforts and thereby improve the overall cost effectiveness. We strongly support the increasing trend toward using teachers and other citizens to enhance the number of children and adults reached by fire and safety prevention education; however, the fire department should retain the technical expertise to train teachers and citizens, to seek and manage grants and to plan and direct the overall prevention efforts.

Salt Lake has taken a major step in the right direction. With the aid of the City grant writer, the fire department received a $50,000 grant this year to buy materials to institute the Risk Watch® program in the public schools. This is an excellent nation-wide program and represents a significant step in Salt Lake City toward achieving the stated intent of the City council. It involves teachers in fire and safety education by providing curriculum and testing materials and training to teachers within the K-12 school system. The Risk Watch® program has been incorporated into the core curriculum for the state of Utah. However, it will take several years to institute the program in all Salt Lake City schools and then it will take constant administration by a prevention educator to maintain.

The primary strengths of prevention education are the new grant for the Risk Watch® program for public schools, the strong adult and childhood education programs that have been conducted for many years and providing public safety information in Spanish. The public education program is supplemented by an excellent public information effort called the "Fire Tip of The Week" that is distributed through radio and television.

The primary weakness is the reduced focus on prevention education through personnel reductions. Many programs such as a Citizen Fire Academy, evacuation drills for senior facilities and reaching ethnic populations (Spanish speaking, Southeast Asian's, etc.) could be implemented if resources were dedicated to prevention education.

Although the data are no longer available, a possible indication of the success of the Salt Lake children's prevention programs was completed in 1994 by comparing the Salt Lake's childhood death rate per 100,000 population to the national average published in the *NFPA Fire In America*. During the late 1990's, there were 3 years without a childhood death in a fire. It is felt this success was due in large part to the method of teaching the youth through the use of characters (i.e., Fire Chief Lee Matchless, Fireman Al and safety Dr. Ben E. Fishery) as well as an active Juvenile Fire Setters program. The use of such characters is seen by some as superfluous; yet it is a proven method to extend children's recall of the fire safety lessons throughout childhood. We applaud the use of these characters as an effective teaching method that should be continued.

TriData has done much research on measuring the effectiveness of prevention, especially public fire and injury education programs. We also have researched ideas for improving their effectiveness. We will provide copies of our reports on these subjects – *Proving Public Education Works*, *Reaching the Hard to Reach*, and *Overcoming Barriers to Public Fire Education* – to the Fire Marshal. The effectiveness measurement concepts also are presented in a chapter on Evaluation Techniques for Fire and Life Safety Education in the NFPA 18th edition Fire Protection Handbook (which came from the TriData report). The reports contain many recommendations and specific examples of successful programs, and explain how to measure performance of public education. We recommend that those measurement concepts be used to evaluate public education programs and to explain its shortcomings. The basic concept is to use a hierarchy of measures starting with outreach, then gain in knowledge, change in behaviors or environment, and, ultimately, the bottom line of fires, deaths, injuries, and dollar loss.

Recommendation 109: SLC should measure the effectiveness of its public education program. A few suggestions of public education performance measures are made in the Workload and Performance Measurement section near the end of this chapter.

Fire Investigations

Fire investigation is another major function performed by fire prevention bureaus. Having an effective Fire Investigations Unit (FIU) is critical because it helps prevent fires and deter arson activity through aggressive investigation and prosecution of potential arson cases. Accurate statistical data regarding the types of fires, causes of fires, areas of origin and dollar loss are some of data that can provide insight on where future prevention efforts should be targeted. These data help fire marshals and fire chiefs identify trends and make decisions on how best to combat problems. This data can also assist in determining the type of local fire and life safety codes that should be adopted for the community.

Salt Lake City's FIU (SLCFIU) is extremely effective and ahead of many units across the country. The cooperative effort between agencies involved in fire investigations in the Salt Lake area is outstanding. SLCFIU received praise by peers and other agencies with whom they work.

Investigations Management and Organization – As organized, the SLCFIU contains three sworn fire investigators all of whom report to the fire marshal. These three fire investigators are well trained and highly motivated. They have exhibited initiative by writing a Standard Operating Procedure Manual for Fire Investigations. Even though they report to the fire marshal, they perform their duties without a direct supervisor.

There is no chain of command within fire investigations; therefore, there is no formal organizational mechanism to ensure that proper policies and procedures are followed. However,

the current District Attorney is excellent in performing this role through informal cooperation, but when he leaves, the review structure most probably will disappear. In the proposed organization chart, we recommend that a supervisory structure be developed over time in SLCFIU. We portray the structure as headed by a deputy fire marshal (captain rank) supervising two investigators. Placing a captain over the function provides the necessary rank structure within the function and provides for the formal supervisory structure.

> ***Recommendation 110: The Deputy Fire Marshal (captain) over investigations should be a working captain active in fire investigations.*** He should have expertise in fire investigations including criminal evidence gathering and prosecution and should be a sworn peace officer.

Until the captain's position is created and a qualified applicant is found, the three fire investigators could perform the non-supervisory activities of the position on a rotating basis. This would include preparing reports on the activities of the function and acting as the conduit between the investigation function and the fire marshal.

All fire investigators are the same classification, which does not provide career progression within SLCFIU. Fire investigations are a specialized function that requires specialized training and experience to develop expertise. It is desirable that careers are spent in investigations rather than moving back and forth to fire operations.

> ***Recommendation 111: A career progression of positions should be developed for fire investigators***. The fire marshal should work with City human resources to develop at least two or three fire investigator classifications to accommodate professional development and career growth within the function.

Qualifications and Training – Investigators are fully sworn law enforcement officers and receive authority under Utah State Annotated Code, Section 53-13-103. As part of their required training, fire investigators receive Peace Officer Standards and Training (POST). Overall, the training provides excellent instruction to prepare them for all aspects of fire investigations, including arrest procedures, suspect civil rights, interview and interrogation processes, and evidence collection and courtroom testimony. POST also acquaints investigators with preparation and submittal of criminal cases to the district or City attorney.

To be effective, fire investigators are also required to have good understanding of fire behavior (determining how and where fires start) as well as follow due process of law. Current policy of providing additional criminal training is extremely beneficial and makes the SLCFIU a good example of how to train investigators. The current model of training and organization of SLCFIU means they have the ability to provide prompt and complete fire/arson investigations without the need to call for assistance from local law enforcement authorities. This results in

fires being investigated promptly and effectively, without tying up other law enforcement authorities; an arrangement that is optimum to the resolution of cases.

Recommendation 112: Maintain the current training model of providing fire investigators with cause and origin training as well as training in criminal prosecutions. Not only does the current model work well from an organizational view, it also allows better coordination with the states attorney's office; coordination that pays dividends when all parties are familiar with the procedures of gathering evidence and prosecuting criminal arson cases.

Local Arson Task Force – The SLCFIU along with the Unified Fire Authority (the county's) FIU and the Bureau of Alcohol Tobacco and Firearms (ATF) joined forces in 1990 to establish an informal Local Arson Task Force. This task force has proven to be a very effective method for making better use of resources (staffing and equipment) and sharing intelligence to increase effectiveness. This Local Arson Task Force is an excellent example of a well-coordinated effort to address the crime of arson and should be applauded. The Local Arson Task Force is mentioned throughout this report since it is associated with many aspects of SLCFIU including staffing, fire investigations activity, and reporting.

Cooperation with Other **Agencies** – The agencies that most often provide support to the SLCFIU include the United Fire Authority FIU, the Bureau of Alcohol Tobacco and Firearms (ATF), the Salt Lake City Police Department, the Salt Lake City Forensic Crime Laboratory, the Salt Lake County's District Attorney's Office and the Salt Lake City's Prosecutors Office.

The Bureau of Alcohol Tobacco and Firearms (ATF) has a regional field office in Salt Lake City. This office is a part of the Phoenix Field Division, which covers five states: Arizona, Colorado, New Mexico, Utah, and Wyoming. The Salt Lake City office is staffed with eight agents, including one acting resident agent-in charge and seven special agents. There is one Certified Fire Investigator (CFI) assigned to the office but she is currently on military leave in Iraq.

The local ATF field office speaks highly of Salt Lake City's FIU and cites it as an example of the type of relationship they are trying to build across the nation. ATF says the local task force agreement with Salt Lake City and the Unified Fire Authority has yielded tremendous results in the past two years. They cited the recent success of several high profile cases and the number of arrests by these two jurisdictions as an example of the cooperative work and intelligence sharing.

Prosecuting Attorney's Office – Another crucial part of this process involves the prosecutors offices at the local, state and, occasionally, the federal level. The relationship between the District Attorney's Office and the SLCFIU is outstanding and has helped contribute to recent successful prosecutions. Arson-related crimes within Salt Lake City may be prosecuted

a number of ways. The Salt Lake City Prosecutor's Office can prosecute misdemeanor charges related to arson. The County District Attorney's Office manages all felony cases and the majority of misdemeanor cases. The Deputy District Attorney, interviewed for this study, was extremely supportive of prosecuting arson and believes that "the City can make no better investment than in Fire Investigations." He stated that the money, resources, and personnel dedicated to addressing the arson problem is an excellent return on investment, which helps with providing better safety for the citizens and addressing an existing chronic fire problem.

The Deputy District Attorney has served in his current position for four years. He was a public defender for two years prior to that. In addition, the Deputy District Attorney who handles the majority of cases for the City has been sworn in as a Special Assistant US Attorney (SAUSA), enabling him to prosecute cases at the federal level. One such case was taken forward this year and resulted in a successful prosecution. The ability of local FIUs and the Bureau of Alcohol, Tobacco, and Firearms to utilize this attorney and his expertise has greatly added to the efficiency and effectiveness of their operations.

Table 77: Arson Arrests for Salt Lake City

Year	Arsons/ Adult	Arsons/ Juvenile
2002	11	3
2003	15	4

In 2002 the Prosecutors office filed 11 felony arson charges, nine of which pled guilty as charged. In 2002, when a previous Deputy Attorney held the position, three cases were brought in by fire investigators and declined for prosecution. Since that time, these three declinations have been taken by the office and are awaiting either trial or disposition. This is due to the renewed effort by the current Deputy District Attorney and the Local Arson Task Force.

This past year a multi-agency investigation involving the City and seven other agencies resulted in the arrest of two serial arsonists who plagued the area. At the time of this report, one of the suspects was convicted and the other was in pre-trial motions.

The Deputy District Attorney has been to the ATF Prosecutor School and to the Department of Justice's National Advocacy Center in Columbia, South Carolina. He is on the Local Metro Arson Training Committee and he provides legal updates to fire investigators and police officers involved. He also holds moot courts where law students, law clerks, and fire investigators participate in the investigation and prosecution of set arson fires. This interaction and its accompanying network has created enthusiasm, built skills, and developed a tight community for information sharing and success in apprehending and prosecuting arsonists. This

collaborative effort between the Arson Task Force, the Prosecutor's Office, Salt Lake City FIU, UFAFIU, ATF, Police and Sheriff's Departments should be a model for the nation.

Local Task Force Staffing – The task force concept utilizes the three personnel from both SLCFIU and UFAFIU to make for a more efficient use of staffing. This arrangement results in SLCFIU investigating fires in the United Fire Authority area and visa versa. To-date, this arrangement apparently has been advantageous to Salt Lake City.

Table 78: Local Task Force Fire Investigations by Fire District*

Category	2001	2002	2003
Salt Lake City Cases handled by SLCFIU	76	74	134
Mutual Aid United Fire Authority into SLC	68	95	65
Total No. Salt Lake City Cases	144	169	199
Mutual Aid Salt Lake City into UFA	34	51	71
Total Caseload for Local Task Force	178	220	270

*Caseload for UFAFIU was not obtained.

Using a total of six personnel to cover off-duty hours seems better than using just three. The most important advantage is that workers are less subject to burnout due to long work-hours on top of their already scheduled hours. Needed training and vacation can be scheduled without undue burden on employees. Management ensures greater coverage without an increase in overtime cost. The primary investigator "on call" can request the secondary investigator when needed, thereby providing greater safety in certain conditions.

Table 79 depicts the activity of the Local Arson Task Force for the years 2002 and 2003. The clearance rate was reported as 18.3 percent for 2003 which is above the national average of 16 percent.

Table 79: Arson Task Force Activity for Fire Investigators

Task Force Activity	2002	2003
Cases Investigated	264	270
Incendiary	136	120
Accidental	72	95
Undetermined	56	45
Adult Arrests	18	22
Arson Clearance Rate-CR	15.60%	18.30%
CR w/ Juveniles Firesetting	16.90%	20.80%

* The Task Force consists of SLCFIU, United Fire Authority FIU and ATF.

Work Schedule – Fire investigators work a 40-hour workweek Monday through Friday, usually consisting of four ten-hour days. In addition to their normal duty hours personnel are assigned a duty week every third week, running from 5:00 PM Friday until the following Friday at 5:00 PM. Investigators assigned to this duty are "on-call" for incidents that occur during non-office hours and are compensated with one hour of straight time per day. If investigators are notified to respond on an incident, a minimum of 4 hours of "call-back" pay is given.

Both Salt Lake City and the United Fire Authority fire investigators work "on-call" during nights and weekends and rotate the primary and secondary fire investigator positions. When a confirmed fire occurs during this time period, the primary investigator scheduled to work is sent to the incident. The fire investigators are equipped with take-home vehicles and cell phones for this task.

Call-Out Policy – The SLCFIU has established SOP 09-06 which details fire investigators response to incidents. The SLCFD cites the following categories of incidents to be investigated by the FIU:

- Fires or explosions that result in a significant loss in personal injury requiring transport to a medical facility, or in the death of a human being, regardless of the known or suspected cause of such fire or explosion *at the discretion of the incident commander.*
- Fires or explosions where arson is suspected, regardless of the amount of property damage, injury or death.
- Attempted arson to real or real or personal property, even though no fire or explosion has occurred.
- Any fire or explosion involving property owned by the City of Salt Lake City.
- In the event of a rekindle of a previous fire shall be investigated.
- These procedures help to orient newly assigned personnel, eliminate confusion, reduce the possibility of mistakes, and improve consistency of operations.

Recommendation 113: Consider having fire investigators respond to any fire involving a structure or property loss greater than $10,000 when fire suppression crews cannot determine the cause of the fire. The actual dollar amount could be adjusted to anywhere from $5,000 to $50,000 depending on the caseload and activity of fires in Salt Lake City. Fire crews can frequently determine the cause of fire in simple cases, but they may need additional assistance and expertise as greater fire destruction occurs. In addition, every effort should be made to determine the cause of accidental fires, so efforts can be made to reduce these types of incidents through education, recall of faulty equipment, or adopting more stringent local codes.

Fires or explosions that do not meet the Fire Investigations Response criteria are investigated by company officers that utilize the Fire Incident Report. This report asks fire suppression personnel for the ignition source, material first ignited, and cause of ignition if it can be determined.

If a request for a fire investigator is made, fire suppression crews must secure and maintain custody of the scene until their arrival. If warranted by the severity of the fire, additional investigators may be requested to assist with the on-scene investigation. Normally incidents/cases are prioritized by the order in which they are received. The fire investigator may use discretion when faced with multiple dispatches and may consider such factors as severity of the fire and location of suspects and or witnesses at the scene of an incident.

Fire Investigation Training – All fire investigators in Salt Lake City must attend certified law enforcement officer training, as outlined in the Utah State Code 53-13-103. After successful completion of the basic course at a certified law enforcement officer training academy, fire investigators are granted full police powers, including the power of arrest. In order to maintain their certification, personnel are required to attend an additional 40 hours per year of training in law enforcement continuing education requirements.

Fire investigators also attend the National Fire Academy's (NFA) two-week class on fire investigations. If applicants are accepted into the NFA program, the federal government covers both the cost of travel and training. Fire investigators from Salt Lake City also participate in the Local Metro Arson Training Committee. This committee consists of numerous participating agencies including the District Attorney's Office. It meets periodically to train on issues relevant to fire and arson investigations. Review of fire investigators' training records indicates a consistent accumulation of relevant training classes that enable them to continually update their skills. In conclusion, training is currently adequate for maintaining the Fire Investigators capabilities.

Firefighter Recruit Training – All recruit firefighters are given a class in basic fire scene investigations while enrolled in the academy. Developing a training program concerning fire scene investigations for company officers and senior firefighters who may serve in their capacity could also be of benefit, perhaps reducing the number of fires on which a fire investigator must be called.

Recommendation 114: Develop a fire/arson investigations class for company officers and/or firefighters in SLC.

This type of class could provide officers with the ability to determine the need for a fire investigator and educate personnel about when to make the call on accidental fires. This additional training could decrease the number of times fire investigators are requested on the scene, which might result in decreased overtime. The additional training would also help ensure that evidence is not destroyed prior to the investigators arrival. The knowledge gained would remind suppression personnel to note the characteristics of smoke and flame upon arrival and note unusual circumstances surrounding the fire. This information and evidence can be crucial to determining the cause of the fire and developing strong arson cases.

Fire Investigator Performance Evaluations – The fire marshal completes annual performance evaluations for the three fire investigators. The National Fire Protection Association (NFPA) 1033 and 921 Standards, which include conducting fire scene assessments, report writing, collecting evidence, and interview and interrogation skills, were used in evaluating their specific performance. The current system was reported to work well for the FIU; however, having a captain over fire investigations will result in a functional expert assessing the performance.

Case Management – The SLCFIU does not have a formal case a management system. However, it does use peer review when dealing with significant cases. The Fire Marshal who is responsible for supervising the investigators is unable to monitor cases actively due to the number of tasks and responsibilities involved in managing the Fire Prevention Bureau. Each investigator works independently and manages his or her caseload and prioritizes which cases get worked.

The investigators, the Fire Department and the City have an excellent relationship with the current Deputy District Attorney. This individual makes himself available to the investigators 24 hours a day. The working relationship between this attorney and the investigators has several benefits, including constant feedback from the prosecutor from the inception of the call up through the prosecution of the suspect. This outstanding relationship helps to ensure that cases are being conducted in a proper and thorough manner, and is unique to the functioning of this department.

A logbook is maintained which contains information such as case number, date, time, address, primary investigator, cause and case status, on every incident investigated. This is a common practice and should be continued.

Table 80: Fire Investigator Caseload

Category	2001	2002	2003
No. of Investigators in SLCFD	3	2	3
No. of Investigators in United Fire Authority	3	3	3
Total Investigators	6	5	6
Total no. of SLC Cases / SLC Investigators*	48/year 4/month	84.5/year 7/month	66.3/year 5.5/month
SLC Cases Handled by SLC Investigators	25.5/year	37.0/year	44.7/year
SLC Cases Handled by United Fire Authority	22.7/year	31.7/year	23.7/year
UFA Cases handled by SLC Investigators	11.3	25.2	23.7

* Assumes no Mutual Aid assists by United Fire Authority.

Reporting – In July of 2004, SLCFIU purchased Fire Files, a fire investigations records management system specifically developed for fire investigations. Prior to this, fire investigators used a standardized reporting format that is accessible through individual computers. The information was not in any type of retrievable automated reporting format; therefore, all activity or searches for information had to be done manually. Using an automated records management system such as Fire Files should help to standardize reporting, lead to greater consistency, support data analysis and allow for more flexibility in creating customized searches and reports.

The SLC FIU has a SOP 09-14 for to report procedures. It states that fire investigators shall complete reports in a timely manner. Criminal cases and the necessary reports and forms are outlined in detail. Currently the basic investigation report used by the FIU is the Officer's Report. There may be times that an additional cause and origin report is needed to support this Officer's Report. If cause and origin reports are not done in a timely manner, pertinent information may be lost.

Recommendation 115: The Fire Department should consider establishing deadline goals for completing and filing the initial fire investigative report.

Fire Investigations Activity – These data were provided by the SLCFIU. It appears that there are some inconsistencies in statistics as compiled. This is due, in part, to the lack of a good records management system and the difficulties in separating incident activity both within and outside of the City's limits. In general, the caseload and activity level appear to be adequate to support the number of personnel in the FIU office.

Table 81: SLCFIU Activity/Cause/Arrests

Category	2002	2003
Cases Investigated	201	198
Incendiary	107	88
Accidental	52	75
Undetermined	42	35
Adult Arrests	11	15
Juvenile Arrests	3	4

Table 82: SLCFIU Fire Incidents by Type

Category	2002	2003
Structure	98	109
Vehicle	53	43
Other*	49	46

* Other includes incendiary devices with minor damage, grass
fires, dumpster fires, and small nuisance fires.

Table 83: Fatalities and Injuries in Salt Lake City

Category	2002	2003
Fire Fatalities	3	1
Civilian Injuries	29	31
Firefighter Injuries	9	4

Note: As a part of the Task Force SLC Fire Investigators
responded to an additional 2 fatalities in 2002, and 2 in 2003
outside City Limits.

It is essential that the fire department is able to generate accurate statistical information concerning fire activity. In Salt Lake City's case there is a need to establish statistics for activity inside the City as well as activity in the Local Arson Task Force. These measurements should be used to determine trends, evaluate caseloads, evaluate staffing requirements and ensure proper utilization of resources.

Recommendation 116: The FIU should continue utilizing the new records management system and find a way to break down activity for both inside and outside the City limits.

Each fire investigator is responsible for purchasing his or her own weapon. While weapons are to the required specifications and standards, the burden of the purchase of these weapons should be shifted away from the investigators.

Recommendation 117: Develop a policy and procedure for the Police Department to purchase standard issue weapons through their normal purchasing process and charge the fire department for weapons issued to fire investigators.

This purchase could very likely result in a reduction of the overall cost of the weapon as well as a standard mechanism for issuance. Tracking and logging of specialized equipment is critical especially with items relating to firearms.

Equipment – Fire Investigators are generally well equipped. They have four wheel drive vehicles which they take home so they can respond to emergencies. Some vehicles were in excess of 100,000 miles, but they are in an apparatus replacement program. Investigators are also equipped with cell-phones and desktop computers with Internet and network capability; however, laptops or mobile data terminals are not in the vehicles.

Recommendation 118: Consider purchasing laptop computers for fire investigative personnel to use in the field.

This would allow investigators to search Criminal Justice Information on line enabling them to research persons of interest encountered during an investigation without having to return to the office. Fire investigators may be able to determine if persons they are interviewing have outstanding warrants or previous convictions. Other pertinent information can be obtained on-line including property ownership. This information may prove to be crucial throughout the early stages of an investigation and during initial interviews and follow-ups done on scene of an incident. Fire Files reports to have developed a Hot Sync Edition, which gives investigators the ability to create and work a case on a laptop and in the field without being connected to the central database on the office network.

Forensic Laboratory – The Forensic Laboratory in Salt Lake City follows the American Society for Testing and Materials (ASTM) guidelines for processing evidence. The laboratory uses gas chromatography and mass spectrometry (GCMS) technology to analyze fire debris secured as evidence for traces of chemical accelerant. All findings concerning evidence are validated for accuracy. SLCFIU submits all evidence through the State Laboratory in the City. Currently, the criminalist that analyzed the fire and explosives evidence has left the laboratory for work elsewhere. The Supervisor of the Chemistry Section has taken over those duties until a replacement can be found. This shortage of personnel has resulted in approximately four weeks of additional turnaround time for results.

The Supervisor of the Chemistry section indicated that fire investigators were collecting, and packaging evidence properly. Once fire investigators drop off evidence for analysis, the laboratory has a system for tracking evidence and identifying materials. After the formal findings of the laboratory are reached, fire investigators are notified to pick up and secure the evidence. The Salt Lake City Fire Department has a storage trailer located at Station 1.

Recommendation 119: The SLCFD should ensure that the evidence trailer/storage locker meets the National Fire Protection Associations standards.

Arson Hotline – The City Police Department has a "Tip a Cop" program 799-TIPS, which provides monetary rewards for felony crime solving tips. Felony arsons qualify for the program and information is sometimes generated about potential witnesses and suspects. A local Arson Hotline (877-57ARSON) is maintained by the Unified Fire Authority but is also used by the SLCFIU.

Accelerant Canine Detection Team (ADC) – The SLCFD has an Accelerant Detection Canine Team (ADC) that has completed an extensive program in Alfred, Maine. The canine and handler have been in service in Salt Lake City since 2001. The State Farms Scholarship Program donated the dog to SLCFD. This program covers the acquisition of the dog, the cost of training the dog and handler, room and board and transportation costs. State Farm has been invested in this program since 1993 because they want to provide law enforcement with the tools necessary to combat the crime of arson.

SOP 09-01 outlines the ADC program and discusses the availability, use, conditions, and circumstances when the team will be used. The Arson K-9 Team will be used:

- At fire scene investigations,
- To sniff apparel, items, vehicles, or items worn carried or used by a suspect,
- At public relations programs,
- At arson awareness programs, and
- At all fatal fires where arson is suspected.

Uniform Crime Report (UCR) – The Federal Bureau of Investigations (FBI) develops the criteria for the Uniform Crime Report (UCR) and statistics are collected from police departments across the Nation. The arson statistics collected by the police department are stored and reported independently of fire department numbers. The FBI defines arson as "any willful or malicious burning or attempting to burn, with or without intent to defraud, a dwelling, house, public building, motor vehicle or aircraft, personal property of another, etc. Only when fires determined through investigation to have been willfully or maliciously set is classified as arsons. Fires of suspicious or unknown origins are excluded." Both fire and police departments use different coding systems in order to report incidents specific to their organization's primary mission.

Table 84 shows the statistics for Salt Lake City for the years 2001 and 2002.

Table 84: FBI Uniform Crime Report for Salt Lake City

Uniform Crime Report	2001	2002
Incidents	65	87

National Fires Incident Reporting System (NFIRS) – SLCFD uses NFIRS 5.0 and since August of 2004, there is a paperless system. The state gave Salt Lake City the opportunity to input directly into the system since the office facilitator in prevention received the NFIRS instructor training. She taught station personnel, over a three-week time period, how to log all station response data. This eliminated the need for developing hard copies of the information, which would later be entered by office facilitator. This is an outstanding practice.

The elimination of paper copies and direct entry by station personnel makes the system more efficient in a number of ways:

- It eliminates the need for redundant work,
- It saves time by reducing the workload of a data entry person,
- It allows data to be input in a more timely manner, and
- It should increase the accuracy of information reported.
- It was reported that firefighters entering the data are doing a good job with this task and they understand the importance of the process. This is due to the training they received.

Records Management System – Fire Files (see page 93) was designed specifically for fire investigations of all types including arson, accidental, open, and under investigation. The NFIRS Arson Report is limited to arsons and does not have a method for tracking investigations on accidental, undetermined or under investigations incidents. Fire Files allows fire investigators to use a standardized reporting format, which helps to develop consistency. A records management system should give the jurisdiction the ability to generate a variety of standard reports including: weekly, monthly, number of arrests, investigator caseloads, fire by property type, profile by time of day and day of week and case status. Customized searches can be generated on statistical information to analyze specific data that can be used for management decisions and prevention efforts.

Juvenile Firesetter Program – SLCFD Juvenile Firesetters Program has been in operation since the late 1980s. Dr. Marcel Chappuis helped develop the program and train personnel within SLCFD as counselors for juvenile firesetters. The program has continued to provide services for voluntary referrals, but no infusion of funds has been made in recent years for additional training. In 2003, SLCFD applied for a Fire Act Grant related to Fire Prevention through the Federal Emergency Management Agency (FEMA). An award of $50,000 for the purposes of funding both the Risk Watch and the Juvenile Firesetters Program was made in 2004.

Providing programs for Juvenile Firesetters is critical. In 2002, the FBI's Uniform Crime Report shows that nearly half (49.4 percent) of all persons arrested for the crime of arson nationally were under the age of 18. The Office of Juvenile Justice and Delinquency Prevention (OJJDP) reports three categories of juvenile firesetters. The first category involves curiosity

firesetters, who are largely responsible for accidental fires. The second group involves young firesetters in the 8 to 12 year old range who start fires intentionally. The third group and the one that is most serious is the crisis firesetters who have a long history of intentional criminal behavior.

Young children, who start out setting fires as a part of curiosity, may benefit from juvenile firesetters programs and keep them from escalating into more serious behaviors. The potential for possible injury and death as well as extensive property damage makes juvenile firesetting an area of great concern. The juvenile fire problem must be addressed in an attempt to reduce the tendency of children to relapse into fire setting and other antisocial behavior.

SLCFD addresses the curiosity firesetters through a totally voluntary program. The City's juvenile firesetters program is coordinated by the office facilitator in prevention. Several firefighters stationed throughout the City have been trained in how to counsel juveniles. Firefighters are not compensated for their training or for counseling of juveniles. The majority of referrals to this program come through requests from parents who have concerns regarding their child. Fire investigators who come in contact with juveniles who are active in fire play suggest that parents enroll their child in the program, to educate the child about the dangers of fire. In addition, referrals may come from schools, fire suppression crews or fire investigators. The hope is that early identification and intervention can reduce the rate of recidivism of these juveniles.

Recommendation 120: The responsibility for administering the juvenile firesetters program should be moved from the prevention office facilitator to fire investigations. Moving this responsibility to fire investigations insures that they know the potential repeat offenders. This will also take a burden off the office facilitator who is over worked.

The court system in Utah does have a mechanism for referring juveniles charged with a fire offense. Table 85 shows the number of juvenile firesetters handled by the Salt Lake City Fire Department in the last four years.

Table 85: Number of Juveniles Referred Through SLCFIU Voluntary Program

Year	Referrals
2001	20
2002	16
2003	6
2004	10*

* Statistic is for referrals to SLCFIU
through August of 2004.

Recommendation 121: Consider working on enhancing the referral system so that a whole range of services from various agencies could be provided to firesetters and their families. A coalition group from numerous organizations such as social services, schools or the

local board of education, the juvenile justice system, judges, and parole and probation officers, Valley Mental Health, police departments, as well as the fire department could network to determine the best course of action to be taken for each child.

Prevention Workload and Performance Measures

Plan Check – As is typical in most prevention bureaus, plans for fire protection systems (sprinklers, mains, pumps, fire alarm systems, fire hoods, and fuel tanks) are reviewed to assure compliance with the applicable fire codes and standards. SLCFD evaluates all architectural plans for new, additions and alterations of commercial structures for adherence to the International Fire Code. This is an outstanding practice; however, this process may be out-sourced to private companies.

Data is not collected on the number of plans reviewed by type of plan; however, the fire marshal estimated there were 40 to 60 plans reviewed each month by the 2 examiners.

Recommendation 122: Workload data on the number of plans reviewed and the amount of time spent on each type of plan should be collected and reported monthly and yearly for several years to identify trends. Data should be collected on initial plans review and re-submitted plans review by type of plan so that ultimately workload and performance standards can be set. This can be done prior to implementing software to support inspections. This data should be collected regardless of who does the work, even if plan checking is out-sourced.

Recommendation 123: The amount of time required to review each type of plan should also be reported and analyzed to determine improvements that could be made in the processes. Again, this data should be collected regardless of who does the work.

Recommendation 124: The primary performance measure for plan review is turnaround time, the number of days that elapse from receipt of plan to return of plan. This measure should be implemented, and collected by type of plan reviewed. The Building Services department should be involved in establishing the turnaround performance goals.

Inspection Measures (New Construction and Operational) – Regardless of the type of inspections performed, the workload and performance measurements are similar. Currently, Building Services perform construction inspections, but a change is underway to move this responsibility to FPB. We strongly support this move. Building inspectors conduct fire code compliance inspections of new and modified structures and plumbing inspectors conduct fire code compliance inspections on fire alarms, fire sprinkler systems, standpipes and other fire protection systems. FPB plan examiners become involved only on a consultative basis as needed. Collecting and analyzing data becomes even more important as FPB takes on this new function.

Recommendation 125: Workload data on the number of initial inspections and re-inspections by type of inspection should be routinely gathered, reported monthly and yearly and analyzed over time. This data should be reported at a detail level of inspection. For example, fire sprinkler system rough-in inspection and re-inspection should be reported separately from the hydrostatic test.

Recommendation 126: The amount of time spent on each type of construction inspection or re-inspection should be recorded with averages reported monthly, yearly and over time. Ideally, travel time would be reported separately, but most departments that report inspection time include travel time to the inspection site as inspection time.

Data on inspections that is collected on the Monthly Inspection Report is good in that the number and type of inspections are recorded. However, this data is not maintained from year to year and is not analyzed to modify procedures. Building Services did not have data on the number of inspections done relating to the fire code. Without this data neither workload nor the number of inspectors needed, can be estimated. It is hoped the two inspectors can handle the workload.

Workload standards do not exist for the number of inspections that should be performed.

Recommendation 127: Establish an overall workload goal for the number of inspections to be done on a daily and yearly basis. Eventually, workload standards should be developed for each type of inspection.

Actual performance of individual inspectors should be measured against workload standards. Ideally, standards should be set by type of inspection; however, setting detailed standards requires averaging actual data over a period of time (e.g., at least 3 months to one year). Until detail standards can be established, overall standards should be used as guidelines and reasons for variations from this standard should be understood.

The first step in developing inspection workload standards is determining how much time is available for productive work by each employee. Appendix F, Computation of Available Time for Productive Work in FPB, illustrates how to determine available time.

For sworn firefighter fire inspectors, there are 1,666 hours or (about 80 percent of 2,080 total hours) available for productive work. Based on a 10-hour day, this equates to 167 days available for productive inspection work each year.

For sworn firefighter plan examiners, there are 1,650 hours or 165 days per year available for productive work each year.

For civilian fire inspectors, there are 1,712 hours or 171 days per year available for productive work.

For civilian plan examiners, there are 1,696 hours or 170 days per year available for productive work.

Experience has shown that inspectors using manual inspection recording and filing systems should be able, to perform 4 to 6 inspections each day in an 8-hour period, or 1 inspection every 2 to 1.3 hours. Of course many variables influence how many actual inspections

can be done. Two of the more significant variables are type of inspection performed and the amount of travel time. When this overall average standard is converted from an 8-hour day to a 10-hour day, the expected average number of daily inspections rises to a range of 5 to 7 inspections per day.

Recommendation 128: The workload standard of 5 to 7 inspections per day should be established for FPB inspectors as a goal. Adjustments to this standard should be made when actual data is available to set more appropriate standards by type of inspection.

Very important measures of performance for inspections are the number of properties inspected as a percentage of the total number to be inspected. For example: it was estimated there are about 800 properties with hazardous material that require inspection. What percentage is inspected within the licensing period? How many inspectable properties are there in each fire company's area to inspect in a two year period and what percentage of these inspections is accomplished within that period?

Recommendation 129: Develop an inventory of inspectable properties that require inspections by occupancy type and by fire station area. Then collect data on the number of unique properties inspected within each occupancy type.

We tried to obtain this data from the City's tax assessor's office and the county's recorder. At the time of this report, data had not been received. This data is usually available.

On new construction, the number of estimated inspections could be developed from the number of plans reviewed by type of plan. For example, site plans would require one on-site inspection with an estimated percentage requiring one re-inspection. The number and type of inspections also can be estimated by the number of fire protection system plans reviewed by type of plan (sprinkler, alarm, hoods, smoke control, etc.). Estimating the potential number of new construction inspections could further be refined by analyzing building permit data and/or building plans review data. This would help anticipate the number of inspectors needed 6 months to 1 year out.

Architectural plans might require several inspections that closely coincide with Building Services inspections (e.g., foundation, framing, plumbing rough-in and final, electrical final and occupancy permit).

Recommendation 130: FPB should work with Building Services to establish a notification process for fire inspections when certain building, plumbing and electrical inspections are requested. This provides better customer service because 1 inspection request could trigger multiple types of inspections.

The City IMS department plans to acquire an Interactive Voice Recognition system for the use of all City departments. This type of system accommodates contractors/citizens

requesting inspection times via an automated voice system. This is an excellent tool for scheduling new construction and other on-request inspections.

> ***Recommendation 131: FPB should request to be included in the implementation of an IVR system.***

Performance measurement of inspection services is comprised of measuring at least two aspects of inspections: how fast is the response to a request and how good is the quality of the inspection. Rarely are these aspects measured, but we recommend the following approaches and measures be instituted:

> ***Recommendation 132: Report and analyze data on response time as the number of days elapsed between the request and the actual initial inspection.*** Over time as more automated tools become available to the inspectors, response time may become hours.

> ***Recommendation 133: Report and analyze data on the percentage of inspections by type of inspection that require 1, 2 and 3 re-inspections before compliance is achieved.*** This is an indirect measure of the extent to which the fire code is widely understood and degree of voluntary compliance. The goal of fire code inspection is compliance not how many violations or citations can be issued.

> ***Recommendation 134: Report and analyze data on the percentage of inspections reviewed by supervision that meet the quality standards established for that type of inspection.*** This measures the consistency of fire code application across time and individual inspectors.

Public Education Fire and Safety Measures – As previously mentioned, TriData has published several guides on measuring the effectiveness of public fire and safety education programs, which should be used. Among these are the percentages of the population reached by various programs. For example, report the percentage of a particular population (children and adults in age groups, Spanish speaking, Southeast Asian, etc.) that is reached by each type of program.

IX. SUPPORT SERVICES

To support actual fire and rescue operations, fire departments allocate resources for activities like training, communications, research, and fleet management. These are important services that allow a department to provide emergency service effectively. During difficult financial times, support functions are often the first to incur reductions. Though larger than Salt Lake City, Phoenix and Dallas are two departments with strong support services that get national recognition as best-in-class departments.

This chapter of the report discusses the support areas of the Salt Lake City Fire Department (SLCFD). Included are discussions on dispatch and communications, administrative services and information technology.

Support services are an important component of the SLCFD organizational structure. Often, it is these services that go unrecognized or under appreciated until there is a problem. While emergency response is the core mission of SLCFD, support services and the activities they perform often determine whether emergency response is carried out effectively, and whether personnel are adequately trained and prepared when they do reach the scene of the emergency.

Information Technology

The Salt Lake City Fire Department is currently hampered by its fragmented, insufficient technology. Several software programs are outdated and not user friendly, while others have never functioned effectively.

Typical of fire departments across the country, specific software was purchased to support a single function, each requiring its own expertise, with little or no collaboration or integration. This was corroborated when TriData analysts interviewed representatives from the City Information Management Service (IMS) department. IMS related that the city council wants to be on the "leading" edge with technology but, in fact, most City services are in much better shape than the SLCFD.

Recognizing this, the Salt Lake City Fire Department solicited help from the City's IMS department to analyze the current systems, make recommendations on improvements, and assist and support the implementation and maintenance of those new systems. In August of 2004, the City IMS department presented a report to the Fire Department on its information technology needs and proposed an action plan for implementing the needed enhancements. A team approach was recommended, consisting of several IT experts within the IMS department (to be dedicated full-time to this project) and representatives of the SLCFD who have specific user knowledge.

TriData has reviewed this Needs Assessment, and concurs with IMS's analysis and action plan. As the team moves through this process, it will be important to communicate team decisions to the end users in order to get buy-in from line staff and increase the chance of success.

City Services – The City IMS department provides guidance and implementation of technology enhancements, virus protection, and maintenance of hardware. It also provides the Local Area Network (LAN) and main server that allow all fire stations to be linked for access to e-mail and software programs. As an enterprise fund, IMS charges all other City departments (enterprise departments pay for everything, general fund departments such as SLCFD pay for equipment only). Currently, the fire department leases its hardware from IMS, but in prior years they purchased/owned their equipment. All City computers are the same model (presently a Compaq Pentium III), which allows for more efficient maintenance. The IMS department also provides a help desk for use by all City agencies.

The relationship between IMS and SLCFD is extremely positive. IMS has prioritized the fire department's needs and committed a number of its staff to addressing those needs. Their approach allows for line staff input, and final decisions lie with the user department. The Needs Assessment and proposed action plan appear reasonable, and both parties are excited about the opportunities for collaboration.

Recommendation 135: The SLCFD should continue to rely on the expertise and support of the City IMS department for addressing technology needs. The cooperative team approach outlined in the August 2004 IMS Needs Assessment should continue to be fostered. Team members should include line staff from operations, dispatch, prevention, and support services to ensure end user satisfaction. The use of IMS will broaden the expertise of IMS members, provide a greater knowledge of Fire Department needs outside the SLCFD, and broaden the expertise of SLCFD representatives. The relocation of the SLCFD database administrator to the IMS office is the first step toward sharing that expertise and knowledge.

Hardware – Each fire station has at least one computer (stations with a Battalion Chief have two computers) linked to the City network for access to the Intranet, internet, and e-mail. All hardware is leased on a three-year basis from the City IMS department for $20 per month, and is automatically upgraded at the end of that three-year period. Scanners and printers are acquired either through lease from IMS or purchased by the department on its own. The City has a policy that limits some types of purchases, but the Purchasing Office routinely approves most equipment requests. The Salt Lake City Fire Department has one scanner, a host of network printers in each location, and currently no plotters. The equipment we observed on our site visit appeared to be fairly new, in good condition, and satisfactorily serving the needs of the employees.

Computer Aided Dispatch (CAD) System – The Department's CAD system functions adequately for the dispatching of emergency units; however, its records management component has been virtually untouched, due to lack of expertise and resources. It was purchased from FDM of Canada five years ago and uses an Informex database. It has not been updated since its original purchase, although the most recent update available utilizes an SQL database, which would make it easier for IMS to support as there are more staff resources available with expertise in SQL for ongoing maintenance and custom report writing.

The SLCFD has assigned a full-time employee to be the system administrator in an effort to make use of the records management system. The Department, however, has had little support from FDM and has had to have its own employees learn specific programming and data management skills in an attempt to make use of the product and data.

The City plans to pilot test the SQL upgrade in the next month or so in order to make a determination whether it can possibly serve the Fire Department's needs or if an alternate product should be purchased. The FDM contract expires in approximately one year, so this should remain a top priority in the technology action plan.

Records Management System – The SLCFD is extremely limited in its ability to capture and analyze services and activities of the department. In a climate that is fiscally conservative (constrained), the importance of this analysis cannot be overstated. Monitoring of activities, service levels, and quality of performance are key to justifying the continued existence of core programs. Included in the FDM product are the following modules: computer-aided dispatch, records management, inspections and permits, event calendar, asset management and preventive maintenance, building premise and hydrant information, personnel records including training and fitness, as well as a staffing roster module.

While analysis of all departmental services would be the ultimate goal, the most critical need is reviewing the emergency service delivery system where the lion's share of the budget is spent. Information critical to fire suppression activities such as hydrant locations, building premise information, and hazardous materials storage should be available at the time an incident occurs, and preferably directly to the first responding units. The assembly of this type of material can be very labor intensive; therefore, compatibility with existing systems should be considered in the hope of eliminating manual entry. Today, most successful fire departments not only analyze what they do (number of emergency calls), but how well they do it and what positive outcome their interventions had on the incident. The topic of data analysis will be discussed in further detail later in this section.

Recommendation 136: The SLCFD and IMS should quickly make a determination as to the functionality of the current FDM software for records management purposes. If a decision is made to continue utilizing the FDM product and implement additional modules, the new contract with the vendor should clearly state the responsibilities of FDM in regard to training, future upgrades, maintenance and other support. The opportunity may exist to negotiate additional services as part of the contract to ensure better performance of additional modules as they are brought on line. [Note: The SLCFD is in the process of reviewing new records management systems. In the meantime, data is being recorded and stored so that it may be accessed and analyzed when the new system in online.]

City Software Programs – The standard package for word processing, spreadsheets, and presentations is Microsoft Office 2000. The City also uses Microsoft Outlook for e-mail and calendar scheduling, and all fire stations are linked to this network. IFAS is the City's budget/finance/personnel software system. It also runs on an Informex database that needs to be updated to SQL. There are two employees (the Payroll Administrator and the Fiscal Supervisor) who can run queries to the IFAS system. The Fiscal Supervisor conducts all queries related to budget and finance; however, when he is preparing internal analysis, he often re-enters information into Excel for ease in manipulating data and developing graphs and charts. This certainly could be made more efficient when IFAS is upgraded to SQL. A number of fire departments (Henrico County, Virginia; Palm Beach County, Florida; and Osceola County, Florida) have had great success with Crystal Report Writer (very similar to Microsoft Access), which can access the SQL database and import it directly into Excel. These agencies have trained one or two fire department members in order to write their own *ad hoc* queries and have immediate access to all stored data fields.

Department Specific Software Programs – The SLCFD has a multitude of software programs it utilizes to carry out its mission. On the emergency operations side, the agency utilizes the FDM system for dispatching, and has recently moved to NFIRS 5.0 for fire incident reporting. The medical incident reports are currently being hand-written by the paramedics on the state-mandated SMIRFS report and then only basic fields are entered into FDM by a clerk in Fire Administration.

In fire prevention, Fire Files is used for Arson Investigations, which recently replaced the BCI program. The Office Facilitator II in Fire Prevention captures hazardous materials permits in an Access database. Fire Inspection information is captured on the FDM system; however, it has not met the needs of the division. Because it is cumbersome and difficult to use, the Department has not used the inspection-scheduling component and also uses Excel to re-enter the same data for compiling monthly and annual reports.

GIS – The FDM system is supposed to be capable of interfacing with ESRI Map Objects; however, this too, has not been utilized by the SLCFD. Those fire departments throughout the

country that are adept at analyzing emergency incident data and depicting it graphically tend to have a dedicated civilian position that may have a planning/analysis background and GIS expertise (Colorado Springs, CO; Phoenix, AZ; Charlotte, NC; Palm Beach County, FL). There is often a large learning curve for this type of position. Candidates either have a strong, analytical background and a need to learn the fire operational aspects, or they are line operational personnel who must learn the technical aspects of planning, data analysis, report writing, and GIS. The City IMS department can be of great assistance in the development of this position and expertise within the Fire Department.

Internet/Intranet, Web Design –InfoBase is utilized by the City for Intranet applications. All fire stations and work locations have access to the City Intranet site, which includes all City policies and procedures, employee job descriptions, and other basic information to all City employees. While on site, several members of the Department utilized this tool to provide responses to our requests. It appears to be easy to use and informative.

Currently, the SLCFD has its Department procedures and other correspondence in Microsoft Outlook, which is available at all work locations. There is a large opportunity to provide a wealth of valuable information to the employees via the Intranet as well as provide web-based training for recertification of its employees. The SLCFD, like most fire departments, has a logistical challenge of providing necessary continuing education to its members. The current policy is to take half the units out of service at a time for one to two hours of training. Ultimately, this requires the same class be taught six times (two times for each of the three shifts), requiring a large number of instructor hours. Many fire departments have moved to video and web-based training, allowing the student to take a test online to finish the class. This keeps personnel and emergency units in their primary response zones and available for calls.

The decentralization of fire department personnel and the 24-hour nature of the job are also factors that make a department intranet so valuable. Publishing critical safety messages and accessing up-to-date policies and procedures provide shift personnel with valuable information any time of the day or on weekends. The Austin (TX) Fire Department has even established a policy requiring each employee to sign on to their e-mail system on a daily basis to retrieve/read all new mail. In this way, the agency has some assurance that messages from management are relayed in a timely and consistent manner.

Recommendation 137: The SLCFD should expand their Intranet site, in cooperation with the IMS department. This site should allow employees to access relevant information about the Department from each work location or from a remote location such as their home while off duty. The site should include resources such as policies, procedures, protocols, and manuals and forms, and should provide timely posting of safety messages and alerts. It should also include a method for on-line training and testing of personnel.

Data Analysis – The SLCFD is extremely limited by its available technology resources to analyze levels of service and determine more effective/efficient performance. In general, the information that is presently captured by separate software programs is difficult to retrieve. Systems are not integrated, so duplicate effort is required to extract information from one system and input it into another. Staff resources are also extremely limited, so prioritization of any enhancements should also take into consideration the efficiency it will produce. For example, while Department IT team members might indicate the tracking of training hours as a priority, another project (the restructuring of the staffing and overtime processes) would reduce redundancies and probably free up a substantial amount of time spent by three or four administrative officers.

Recommendation 138: The SLCFD and IMS departments should consider benefits such as gained efficiencies or staff hours when prioritizing projects on the IT action plan. The entire staffing, roster, overtime, payroll process is an example of a priority area where the Department could gain efficiency by eliminating redundant, manual processes.

Recommendation 139: The SLCFD should hire an analyst to assist the Department management in reviewing the emergency services delivery system as well as other activities provided by its personnel. Levels of service and performance should be developed that link to the department's goals. Monitoring of performance is a key element missing in the SLCFD. In order to support the City's focus on efficiency and effectiveness, the SLCFD needs the ability to measure which programs and activities are really making a difference (having a positive outcome) and where adjustments may need to be made. Agencies faced with continual budget cutbacks are often those that fail to adequately illustrate their effectiveness. Some examples of data that should be monitored on an ongoing basis include:

- Amount of emergency responses;
- Types of emergencies;
- Response time performance;
- Number of calls by day of week and hour of day;
- Cause and origin of fires;
- Number and time spent on accompanying transports;
- Number of cardiac saves; amount of time on scene;
- Unit workload and availability;
- Inspections performed and violations corrected;
- Number of community education programs delivered; and
- The impact of those educational programs (knowledge gained, behavior modified, or decrease in number of cooking fires).

Future Plans – Representatives of the SLCFD and IMS departments clearly understand what kind of technological devices exist that could strengthen the Fire Department's programs. Automatic vehicle locators, mobile data terminals, and hand-held computers for field incident/inspection reporting are all projects that would benefit the SLCFD. However, the

department has more critical needs before embarking on these other projects that substantiate the fundamental emergency services and fire prevention programs. Opportunities exist, and the support is available, to streamline processes, create linkages between existing software products, and upgrade reporting mechanisms for data review and analysis. Grant funds should also be considered for some of these projects, particularly if they address on-scene issues for first responders.

TriData supports the plan outlined by the City Information Management Services Department and encourages the continued prioritization and budgeting of needed enhancements to bring the Salt Lake City Fire Department up to the standard of other City services.

Recommendation 140: The City should prioritize funding those technology improvements that support fundamental fire department programs. A high priority should be placed on those enhancements that will address safety of its members and provide critical on-scene information to first responders. Another high priority should be those enhancements that will eliminate duplicate effort, reduce administrative staff time, and provide valuable information on the effectiveness and efficiency of activities performed. Grant funds should be considered to fund some of these improvements.

Recommendation 141: The City should consider purchase of statistical analysis software. GBSTAT, a low-cost, easy-to-learn statistical analysis program is one option. Other options include SPSS and SASS.

Dispatch and Communications

Dispatch and communications includes the technical support and operations of the dispatch center. The Fire Department's communication function comprises secondary 911 call receiving, dispatch communications, and radio technical support.

There are a number of observations and recommendations for the City to consider for future benefits to citizens and public safety. Decisions by the City Council will be necessary on recommendations including: establishing 911 communication funding and equipment enhancement/replacement for fire dispatch operations; adequate staffing for the communications center; technical consolidation with the Information Management Services for radio support; dispatch facility plans; and Computer Aided Dispatch interoperability between 911, Police; and Fire Dispatch, along with mobile computing devices for field operations.

Organization – The organizational structure of the communications center is serving the City and department well. The all-civilian work force consisting of communications professionals are enthusiastic about their jobs, well trained, and dedicated.

Approximately two years ago a consolidated 911, police, and fire dispatch center was divided; 911 and police dispatch remained with the Police Department, and fire and secondary

911 answering and dispatch went back to the Fire Department. Generally, this is working well. The Fire Department has a greater level of satisfaction with dispatch service today as a result of the policy decision to de-centralize 911 and police/fire dispatch operations. However, it should be noted this operational design does require transfer of fire and medical calls from 911 within police dispatch to fire dispatch. Transfers of fire and medical calls equate to additional time for call processing, which results in a slight increase in time for emergency response.

Additionally, as a result of de-centralization, there are turf and morale issues between police and fire dispatch staff. One example of a possible solution might be the creation of a 911 steering committee that includes representation from police, fire, dispatch, emergency management and finance. Such a committee could provide oversight, direction and a communications forum directed at the 911 issues facing the city and its respective agencies.

Recommendation 142: Executives in charge of the Police and Fire Department dispatch centers and the fire and police chiefs should make a concerted effort to work together to improve relations within the public safety communications professionals serving the City. All are members of the public safety team with the same goals serving the community. The turf battles ultimately can negatively impact those in need and it is imperative to improve the working relationships.

Vision, Mission, and Values Statement – A clear vision, mission, and value statement is valuable to every organization. This provides the opportunity for insightful thinking as to what an organization strives to be, defines its core mission, and articulates core principles and values to operate. This forms the foundation of the organization. Currently, a mission statement does not exist.

Recommendation 143: The fire dispatch employees should be charged with developing a new vision, mission, and values statement for fire dispatch communications. With deconsolidation, the fundamental foundation needs to be rebuilt. Involving the personnel will more accurately reflect the vision, mission, and values of fire dispatch and will begin to solidify the direction of the organization.

Staffing – A staffing analysis has determined that the workload of the fire communications operations center requires a total of 20 employees. This is based on four positions continuously staffed 24 hours a day, with one supervisor and 3 fire dispatchers. Today the center has a total of 16 operational employees: 12 fire dispatchers and four supervisors plus one Communications Director and one Radio Technician.

Recommendation 144: There is a need to increase the fire communications operations staff by four full time employees. This is based on a national staffing formula recommended by APCO. The formula is based on a 24 hour a day, 365-day operation. The formula includes breaks, training time, and sick leave in order to handle the call volume and serve the population.

When the communications center is adequately staffed, dispatcher overtime will decrease, which will ultimately increase productivity, and provide a better work environment. Today there is a significant overtime cost factor built into the budget for fire dispatch operations due to the lack of necessary staff for 24-hour fire dispatch operations.

Training – Fire/medical call takers and dispatchers require extensive training and experience to gain and maintain necessary skills and knowledge. To maximize efficiency, all personnel, (new and tenured) should receive thorough initial training and on-going in-service training to develop and reinforce their skills and maintain accreditation.

The Department's commitment to a high level of emergency medical service is commendable. The use of Medical Priority Dispatch and pre-arrival instruction meets the national standard. The fire dispatch center has a good track record including quality improvement review, accreditation and re-accreditation. Additionally, ride-alongs for dispatch personnel are mandated and firefighter/paramedics spend time in the communication center as part of their training. This is considered best practice for the industry and also is to be commended. In fact, the SLC fire dispatch center is a model to which other communications centers should aspire. The leadership and staff should be commended for this program as it is at the core of all medical and pre-hospital care for every patient who enters the system in Salt Lake City.

The only area we saw for improvement is in the continued education of the tenured staff. This is not because there is a lack of interest or ability but more a lack of adequate shift coverage so that personnel have time to be released for advanced training opportunities. Where there is adequate staffing, continual advanced training is needed.

Personnel Performance Evaluations – The new procedure recently implemented is an improved process for the fire dispatcher's on-the-job performance evaluation. This is important for the continued job performance of every employee.

Recommendation 145: The new personnel performance evaluation procedure should be reviewed and revised as appropriate in order to remain current. The fire dispatch personnel can only realize personal improvement with quality feedback that is standard, consistent, and at regular intervals.

Employee Recruitment and Retention – Sound recruitment, selection, and hiring practices are needed to attract and retain qualified personnel. While there is currently general

satisfaction within the personnel following decentralization two years ago, there will be a need in the future to ensure there is a quality replacement plan for existing staff when they decide to retire, relocate, or change jobs. It is important that fire dispatch communications be prepared for these personnel changes given there are tenured personnel who will leave in the near future. Good pay, meaningful career advancement opportunities, and positive recognition are important considerations in future personnel planning.

Recommendation 146: A well thought out employee replacement plan should be given priority today so that when the time arrives, the department is adequately prepared to attract quality fire dispatch personnel.

Technology – Consideration should be giving to improving the City's position on obtaining new technology. One policy change to consider is consolidation of all IT technical support within the Information Management Services Department. A second is the establishment of an equipment enhancement/replacement plan for fire dispatch operations to ensure Fire Department communications are serving the needs of the department in today's information age world. A third is to implement mobile computing devices in the fire apparatus for greater technology and information in the field.

Recommendation 147: A new direction should be established for technical support in order to effectively coordinate, operate, maintain, and replace the City's communications technology investments. The SLCFD has only one technical support position and no real plan to enhance current communications technology capabilities or replace dispatch communications technology for the Department.

Recommendation 148: The radio technician position within the Fire Department communications division should be consolidated into the Information Management Services Department. The consolidation of technology expertise will provide better 24-hour technical support for the Department and is very important given the reliance the Fire Department has on communications technology.

There is no plan for enhancement or replacement of existing communications technology infrastructure for the Fire Department. Given the importance of the operating systems including the telephone, radio, voice recording, and CAD systems, it is imperative to develop a fiscal plan to annually enhance and (at the appropriate life cycle) replace existing infrastructure. Technology is changing very fast and the Fire Department must be prepared to enhance and improve technology, ensuring a planned strategic approach. These systems are as important to the Department's operations as the firefighter's safety and response equipment. They are literally part of the successful operations of the Department in saving lives.

Currently, the Department has technology in communications, but the responder end lacks the technology links to improve dispatch communications and speed response time.

Recommendation 149: To further improve communication capabilities and response times, mobile computing devices within Fire Department apparatus should be considered.

The CAD system is one of the systems providing the foundation of a modern public safety fire communications system. The system used by the SLCFD is not interoperable with 911 and police dispatch systems. The CAD system utilized by Salt Lake City Fire Department has been in operation for approximately four years. There is good maintenance on the existing system. However, there is a tremendous need to enhance the CAD system to meet the current needs of the Department. Additionally, it is reported there is a lack of customer service provided by the CAD vendor to SLCFD and thus only a moderate level of satisfaction with the current system.

Recommendation 150: The SLCFD should develop and implement a strategic plan to meet the evolutionary needs of SLCFD CAD communications system.

Community Input and Evaluation Plan – Fire departments should ensure that fire communications centers continue to meet the needs of citizens and of the fire department itself. Customer work groups that include a member of the fire/paramedic response team, a member of the hospital/medical community, a representative of the communications department, and a member of the public served can effectively serve this purpose. The purpose of the work group is to consider continual improvement for the public with the fire dispatch communications center. After all, this is the citizen's entry point for their experience with the Fire Department as a whole.

Recommendation 151: A customer service work group that includes all of the above components should be formed to report to the Chief of the Fire Department.

Customer surveys are suggested to gain input and insight from those with first-hand experience through calling 911 and reaching fire dispatch, to the radio contact with field responders, to the medical facilities that house those who have used the 911 system. This recommendation is for the purpose of gaining valuable first-hand insight from a broad base of individuals who interact with fire dispatch communication center with the goal of continual quality improvement.

Dispatch Facility – Although space in the current facility is very limited it is well designed. However, the space limitations could impact future population growth and advanced technology changes for 911 public safety dispatch communications.

Recommendation 152: Given the space needs and future technology needs, it is essential that a plan for 911 public safety commutations, including police, fire, and medical dispatch facilities, are included in strategic space planning for Salt Lake City.

Additionally, considerations for adequate backup facilities should be considered in the strategic space planning process. Today, the backup fire dispatch communications center is located at Fire Station 1. This facility will not be adequate to meet future backup operational needs for the fire dispatch communications center given the reliance and changes in technology or the need to occupy the back up facility for an extended period of operation.

911 Funding – 911 funds received from the state are recommended to be equally shared between 911 police and 911 fire communications. (Very little funding and equipment has been passed down to the FD from the PD. The FD has addressed this on many occasions with the PD with limited success.) Equipment in the past has been funded for fire dispatch as the secondary Public Safety Answering Point; however, there have been no monies received. Given the policy direction of the City to have both a primary and secondary 911 configuration in operations, it is reasonable that 911 funding be considered to serve the entire 911 police, fire, and medical operations of the City.

X. FITNESS AND WELLNESS

A key to the success of safety and wellness programs is the ability to periodically assess the effectiveness of the program components. This chapter discusses current safety and wellness programs and makes recommendations to improve program effectiveness, firefighter health, wellness, and ultimately job performance, while reducing the number of work-related injury claims and associated costs. Available information on the costs of existing programs and predicted return on investment for the recommendations made is discussed.

Introduction

Fire departments recognize the necessity of investing into their greatest asset, their firefighters, a task accentuated by the escalating costs of comprehensive employee health benefits. These costs were estimated to rise an additional 15 percent in 2004. While the national average for an employer's contribution to a benefits package was estimated to reach $7,009 in 2004, Salt Lake City managed to maintain its cost at 87.6 percent of the average or $6,140 per employee.

In general, fire departments have come to realize the need to strengthen the foundation of firefighter health if firefighters are to withstand the years of wear and tear associated with their job. This naturally manifests itself into healthier and more productive careers and retirement. In 1997, the International Association of Firefighters (IAFF) and the International Association of Fire Chiefs (IAFC) joined together to develop a comprehensive wellness system, focused on positive and progressive improvements in overall wellness. This Wellness-Fitness Initiative (WFI), currently adopted by nearly 50 fire departments and growing, continues to develop a comprehensive wellness program that is holistic, positive, rehabilitating, and educational. The four core components of the WFI include:

- Assessment (medical exams and fitness evaluations)
- Education (nutrition, ergonomics, infection control, toxic exposure)
- Implementation (physiological, psychological, occupational, emotional, financial, and spiritual programs)
- Evaluation (data collection and reporting)

The development of the WFI included adopting existing NFPA 1582 and 1583 standards while including a new component to test fire candidate physical abilities. This test, appropriately called the Candidate Physical Abilities Test (CPAT), has become the benchmark for evaluating candidate abilities for job performance. Unfortunately, no standardized test has yet been established for incumbent firefighters, although some fire departments have opted to retest with the CPAT.

Medical Assessments

In 2003, all 365 employees of the Salt Lake City Fire Department (SLCFD) completed mandatory NFPA 1582-compliant physicals through Concentra Medical Center, a local medical service provider, for a total of $88,500 or $242 per employee. The cost of the NFPA medical exams negotiated with Concentra lies well within the $220–$300 range charged to fire departments nationally, although this agreement makes no provisions for vaccinations for industrial or occupational employees. While we are unable to identify the additional costs of vaccinations, it was estimated that the cost was minimal.

The SLCFD accounts for about 40 percent of Concentra's business at its location on 1735 South Redwood, 6 miles from the Department's administrative offices. Concentra is nearing completion of a second facility in response to growth to better serve the citizens and Fire Department of Salt Lake City. This facility is located in Sandy, south of the city, 14 miles from the administrative offices and scheduled to open February 24, 2005. After- hours attention (after 9:00 pm on weekdays and weekends) is provided by three facilities, although the University of Utah facility appears to be the most popular. The city successfully negotiated zero co-pay for firefighters, and medical services are offered at cost. The zero co-pay is, however, carried over to the city under the Department's medical budget. Appointment scheduling has been identified a problem at the University of Utah clinic.

Upon completion of a physical, Concentra mails a formal letter indicating whether a firefighter is fit or unfit for active duty. Firefighters deemed unfit may be sent to their personal physician for further evaluation or testing if necessary, a cost incurred by the department.

Recommendation 153: Maintain the existing partnership with Concentra. The inconvenience of one central medical location may be reduced with the opening of the second facility, although its location is less than optimal for the Department. The Department should also investigate the possibility of conducting NFPA 1582-compliant exams at both centers, for convenience of the firefighters. The Department should investigate the need for and the costs associated with unfit firefighters being referred to their personal physicians.

Wellness Benefits

Healthy Utah is a state-funded benefits program free to all firefighters as part the Public Employee Health Plan (PEHP). This health and wellness program is offered to all state of Utah employees and their spouses and is readily accessible via the internet. The benefits program includes:

- Wellness seminars available onsite
- Confidential health assessments of vitals and health parameters
- Online audiovisual library of health information

- Smoking cessation programs
- Weight management program hosted by a dietitian
- Health enhancement programs to optimize the quality of life
- Consultation opportunities with registered dieticians, exercise physiologists, counselors, etc.
- Establishing department wellness councils to assist departments implement wellness programs and drive participation
- Cash incentives to achieving specific health and fitness goals. PEHP will reimburse $50–$150 annually to members who achieve their desired goals.

Wellness promotion and marketing is carried out extensively by the Human Resources department. The department stages events and orientations throughout the year and markets the program via a monthly *Healthy Utah* newsletter and e-bulletin distributed to each firefighter. These programs are offered at multiple locations around the city.

The Wellness and Safety office also pays an annual $200 annual subscription fee to Oakdale Publishers who publish *Top Health*, a monthly 1-page, double-sided newsletter, and a monthly Wellness and Safety e-bulletin. Both newsletters are distributed to all firefighters and station houses by the EMS, Safety and Wellness Division's office. All firefighters have a department-issued email address and access to email (via high speed internet).

Despite its promotion, the wellness program, according to the Benefits Coordinator, is utilized by only 10 percent of the firefighter pool. As an example of the department's poor utilization of the wellness program include the latest fire department orientation, scheduled at a local station house during the 2003–2004 fiscal year, had only a handful of firefighters attend. Additionally, the city recently hosted "SLC gets Fit", an active lifestyles team-walking program with free enrollment, incentives and gifts (pedometer, t-shirt, water bottle and Clif bar, plus prizes upon completing 100 day program). While 60 city employee teams participated, only two teams represented the fire department.

For FY04, The Safety and Wellness Division negotiated a $2,200 capitated, plus discounted employee rate at 24hour Fitness for firefighters and family. Given the poor utilization of this discounted program, the department opted to not renew the agreement for the current fiscal year. The city does continue to offer an exchange for unused sick and wellness time to purchase memberships at local health clubs, but the fire department opted out of this opportunity, citing the availability of firehouse equipment as a reason.

Healthy Utah, coupled by the city's Employee Assistance Program, offered at a cost of $2.35 per employee per month addresses the dimensions of physical, emotional and psychological fitness as recommended by the IAFF WFI.

Recommendation 154: SLCFD should create strategies to increase the availability of physical, emotional and psychological programs for firefighter wellness which are already in place but underutilized. The current marketing strategies appear ineffective in motivating firefighter participation. The city and department should consider alterative marketing strategies to nurture peer camaraderie and competition. Ideas include intra- and inter-departmental challenges; and programs endorsed by the Mayor and Fire Chief, incentivized by products and services derived from unused sick-leave funds. Public recognition and lapel pins, etc are also effective strategies to stimulate participation. Additionally, the city may want to consider outsourcing program markets to a local marketing firm to develop effective strategies tailored to the firefighter population. The transfer of wellness marketing from Human Resources to a Fire Department-designated champion probably can improve firefighter buy-in.

Wellness Programs and Equipment

Recent implementations of wellness programs and initiatives are in response to the Mayor issuing a mandate to the Department for performance or skill-based evaluations for incumbents. Consequently the Department partnered with Health Metrics, Inc/ARA Human Factors (HMI), a company devoted to developing and validating job-related fitness standards and offering fitness programs to both public safety departments and private corporations. This call for standardization would necessitate annual physical abilities testing of all firefighters. Failed candidates would be allowed a specified number of opportunities to re-test before suffering punitive action, although this is pending agreement from the local union. Currently only Fire Department recruits are required to complete an entrance physical abilities test, the CPAT. A forthcoming task analysis conducted by HMI will assess critical job functions and offer some legally-defensible justification for establishing Department standards. Under consideration are the notion that the nature of the punitive action taken be dictated by the portion of skill test failed and how that skill correlates to job performance. This policy may remove firefighters from active duty until those key skills are passed.

Successful exercise or activity programming requires the inclusion of key components– namely, union and management support, appropriate personnel resources, facilities, and equipment. The impression made is that both management and the union have a strong buy-in for developing and implementing a comprehensive wellness program. The department has established a fitness/wellness committee, which includes a union board member and meets on a quarterly basis. The department has also committed to these initiatives by the appointment of an additional job position within the EMS Safety & Wellness department in 2005. While this individual would primarily oversee EMS functions, his or her scope of duties could feasibly include database administration of the physiological assessments and physical abilities tests.

Another available resource stems from the $21,000 agreement with HMI to complete a departmental task/job analysis from which standards will be created. This analysis will require

the collaborative efforts of Human Resources, Risk Management, Local Union 1645, and Fire Administration to identify critical field and station house functions using a sample population group of firefighters. Through the administration of questionnaires, interviews, and videotape analysis of activities, HMI will analyze movement technique and tempo, exertion levels, injury potential, etc. and develop a needs assessment tool for firefighter fitness. This plan will then call for HMI to train a specific group of department personnel to oversee training and program implementation to fellow firefighters. In 2004, the Department invested $6,000 with HMI to certify nine Certified Fitness Consultants (CFC), trainers identified to deliver training and programs to the firefighters. The Department has plans to invest in certifying an additional 15 CFCs through a grant of $37,000. These funds would certify a total of 30 CFCs (15 for SLCFD and the balance to surrounding departments), utilizing the remaining balance to purchase exercise equipment. HMI is estimating a 6–9 month period to fully implement the programs generated from the task/job analysis.

In 1997, in response to the growing evidence of firefighter fatalities attributed to heart disease and inactivity, 10 metropolitan fire departments convened with the IAFF, IAFC, and civilian experts in health and fitness to develop the WFI. Recognizing the need to partner with a credible fitness certifying agency, the IAFF turned to the American Council on Exercise (ACE), a nationally accredited certifying agency for personal trainers, to develop the Peer Fitness Trainer (PFT) program. The development of the ACE-PFT certification and workshop was created by these participating agencies to establish a valid, legally defensible, and competent fitness professional standard and evaluation process. Firefighters holding this certification have demonstrated competency and possess the necessary knowledge, skills, and abilities to train and develop functional training programs specific to the fire services. The ACE-PFT program has been validated through psychometricians at Wasdyke and CASTLE Worldwide, Inc., companies that also specialize in developing and validating job-related standards.

For any certification program there must be concurrent implementation of continuing education opportunities to ensure professional development of the certified individuals. The IAFF has turned to ACE, given its breadth of expertise in this area, to establish continuing education opportunities for their PFTs. The CFC program, while noble in its intentions and certainly an excellent parallel to the PFT (although not endorsed by the IAFF or IAFC), lacks this continuing education component, outside of giving CFC credit for re-taking the exam every two years. One must ask how this opportunity constitutes professional development. A certification without continuing education opportunities is of questionable value to skilled professionals.

Recommendation 155: While the department has made the commitment to the HMI-CFC program, it must now evaluate the means for delivering continuing education for CFCs. This component will prove instrumental in demonstrating a positive return on the investment made to HMI. More importantly, given HMI's scope of services in this area, this component should probably be outsourced to or partnered with an organization with the expertise in continuing education.

The Department's training facility created a CPAT orientation guide, derived from the IAFF/IAFC/ACE Peer Fitness Trainer Reference Manual. This orientation guide provides all CPAT candidates with an excellent and detailed orientation to the CPAT, its individual components, and a conditioning program specific to CPAT preparation. The training facility recently merged with neighboring fire departments to create the Salt Lake City Fire Alliance for firefighter recruits. As an alliance, the center will accommodate two recruit classes per year, totaling 30–40 recruits between the participating departments and bring all available resources together for training. Notable mention must be made of the training facility's impressive track record of no recruit injuries necessitating more than basic first aid (cuts lacerations, sprains, and strains) or requiring a recruit to miss training.

The Training Captain supervises the both the aerobic and anaerobic conditioning programs, implementing programs designed by Martha Ellis, a CFC and ex-woman's combat challenge champion. Strength and conditioning of the recruits is supervised by a Captain of the West Jordan Fire Department. He has a background in power-lifting, subscribing to the training principles of Dr. Fred Hatfield and the BYU Strength and Conditioning programs, both appropriate for athletic and firefighting populations. He is near completing a BS degree in behavioral psychology and recently completed a "*Fitness for Life*" 1.0-unit course taught by Salt Lake City Community College (SLCCC). He utilizes those course materials as a resource for his recruit class. Through conversations with SLCCC and a review of its online/video course, it appears that there is inherent value of incorporating the conditioning material into recruit training and perhaps again for incumbents on a 2–3 year cycle. This recommendation is further justified by the lack of any formal academic foundation in Exercise Science by the SLCFD Captain and his staff.

The costs of recruits attending SLCCC is cost-prohibitive as SLCCC charges $254, while an equivalent course (3.0 units) at the University of Utah costs an even higher $536. All firefighter training is typically conducted onsite, often scheduling a few stations houses simultaneously to control costs. This process is obviously not cost effective; hence consideration must be given by the training division to explore web-based/video/DVD training modalities. Programs similar to "*Fitness for Life*" or those illustrating firefighter-specific training should be considered. Given the Department's limited audio-visual resources and available manpower, this

project may need to be outsourced for production. Developmental costs of this product for a commercial vendor will run in the range of $200 (manual-based) to $2,000 (DVD/web-based). This standard production charge is estimated from delivery of completed and camera-ready written content and images. An estimate of the costs to deliver content (paid to subject matter experts) would be $2,500–$3,000

Recommendation 156: The Department should prefer a foundational education in Exercise Science for training personnel who oversee conditioning. At a minimum, this should include achieving certification from an accredited organization such as the National Strength and Conditioning Association (NSCA) or ACE. The Department should recruit or contract for subject matter experts to develop a web-based or DVD/VHS program/manual on health and fitness education that is incorporated as required reading for recruits and incumbents. The development of the health-fitness and exercise programs for firefighters onto VHS/DVD probably can be sold to adjacent departments to recoup some development costs.

Several firefighter survival challenges have been developed over the past years, notably by Steve Crandell. These programs, initially offered on a voluntary basis, have since become adopted as a mandatory practice for all firefighters in Salt Lake City. While these programs are functionally oriented, addressing tasks specific to the job of firefighters, there is a concern that some firefighters may lack the adequate conditioning to complete the challenges without significant risk of injury. At the time of the project team's visit with the department, four firefighters were currently either on light duty or had suffered injuries while participating in the challenge. While the data is anecdotal, two injuries were apparently related to the lower back area, an area of potential concern. Due to the recent inclusion of this challenge as mandatory training, no valid or longitudinal data is currently available to demonstrate the long-term efficacy of these challenges; on first impression, however, it appears that there is a need for an introductory conditioning program developed and implemented by the CFCs. This may prevent any further injuries and costs to the department. This introductory program will essentially bridge the gap between current conditioning levels and the levels required to complete the first challenge.

Recommendation 157: The Department should eliminate mandatory participation in the firefighter challenges until an effective and functional introductory conditioning program is developed and implemented. This program should be a prerequisite to the challenges, which can later be re-introduced. Develop a database to track firefighter performance and injury with the challenges to demonstrate the program's long-term efficacy. [Note: The Department reviewed this program and has discontinued it as of January 2005 pending further review.]

Every station appears well equipped with at least one cardiovascular piece and an assortment of free weights and benches, including a universal-type station at two houses (stations 4 and 13). Cardiovascular equipment is standardized to a treadmill at each station and a variety or pieces ranging from ellipticals and climbers to upright bikes and spinners. Inventory is all

relatively new, purchased from a local vendor, Champion Fitness, who has allowed station houses to demo and try equipment on a trial basis. All requests are submitted to the Safety Office on a calendar basis and acquired according to available funds made available in the budget and created from expenditures from the preceding fiscal year. Most stations have a dedicated weight room or area with the equipment currently being maintained by a local vendor (Inner Mountain Gym). The Battalion Chief in charge of health/wellness is currently seeking a longer-term maintenance contract and awaiting bids from competing providers. Table 86 shows fitness and equipment inventory by station.

Table 86: Station House Fitness Equipment Inventory

Fire Station #	Cardiovascular	Resistance
1	Treadmill, Elliptical	Free weights
2	Treadmill, Elliptical	Free weights
3	Treadmill, Stair Climber, Spin Bicycle	Free weights
4	Treadmill	Universal Multi-station set
5	Treadmill, elliptical, Upright Bicycle	Free weights
6	Treadmill, Elliptical	Free weights
7	Treadmill, Elliptical	Free weights
8	Treadmill, Stair Climber, Upright Bicycle	
9	Treadmill	Free weights
10	Treadmill	Free weights
11	Two Treadmills ,Two Upright Bicycles	Free weights
12	Two Treadmills ,Two Upright Bicycles	Free weights
13	Treadmill	Universal Multi-station set
14	Treadmill, Elliptical	Free weights
Training	Treadmill	Free weights

While the stations maintain a basic inventory of exercise equipment, the training center and Station 8 are in need of some additional equipment, specifically free weights, accessories, and some cardiovascular pieces. Station 8 has not expressed any urgent desire to procure free weights, but the training center has created a wish list in line with their philosophical approach to training: the gains made in the weight room have optimal carry-over into job performance. Additionally, the opportunity to instill a sense of discipline and commitment to long-tem exercise compliancy with the recruit is of immeasurable worth. Table 87 shows fitness equipment requested for the training center.

Table 87: Fitness Equipment Requested for Training Center

Item	Units	Unit Price	Total
Fitness balls: (2-55cm, 2-65cm, 2-75cm) – Spri Products	1	$146	$146
Xerball Medicine balls: (1-2lb, 1-4lb, 1-6lb) – Spri Products	1	$80	$80
Hoist Power Cage CF-2364 – Hoist Fitness	1	$1,190	$1,190
Olympic Bar with Collars – Hoist Fitness	1	$110	$100
Standard Olympic Gray Enamel Plates – Gym Tech	300 lbs	$150	$150
Cap Barbell 2" Rubber Coated Plates – Gym Tech	350 lbs	$490	$490
Hoist Standard Weight Tree	2	$65	$130
Precor EFX 544 commercial elliptical (refurbished with warranty) – Gym Tech	1	$1,995	$1,995
Lifestride 9100HR-T commercial treadmill (refurbished with warranty) - Gym Tech *	1	$1,785	$1,785
8' x 8' Lifting Platform – built from materials by training division	1	$200	$200
Heavy Duty 4' x 6' x ½" commercial grade rubber flooring – Gym Tech	2	$70	$70
Total **			**$6,336**

* Optional (this would reduce the total price to $4,551)

** Prices exclude all applicable taxes and delivery/installation charges. Estimate 16–18% of charge

Recommendation 158: Purchase the additional equipment requested by the training captain for the training center, as listed in Table 87. The price is low relative to the potential for preventing injury.

Firefighters have requested 1–1½ hours of uninterrupted shift time dedicated to exercise using the provided equipment. It must be said that the SLCFD administration encourages firefighters to exercise while on shift, however, the units remain in service to respond to emergency calls so as not to degrade response coverage. The Department provides exercise rooms and equipment for firefighters to use free of charge.

The project team found a decrease in injury claim rate and cost with the elimination of work-site exercise programs during firefighter shifts (Figure 24). The savings on these injury costs were put back into the Department to purchase products and services requested by the Department. However, it must be noted that the nature of work-site exercise activities has changed due to the acquisition of new indoor equipment. Until the recent acquisition of exercise equipment, the viable options for firefighters exercising during their shifts were less controllable, higher risk outdoor recreational activities (like basketball). The acquisition of indoor equipment now provides controlled indoor options with a lower risk of injury. The benefits of structured exercise programming during shifts can certainly improve exercise participation, firefighter wellness, and ultimately job performance. However the concern still exists over selection of those same higher-risk outdoor activities. This would necessitate the development of clearly-defined policies and practices, and perhaps even a test period wherein data on exercise-related injuries and claims are tracked. The current decision by the Department against certain types of

on-shift exercise and activity (for instance, basketball and racquetball) stems from a longitudinal report investigating injury frequency and claims between 1997 and 2002.

Figure 24: Firefighter Exercise-Related Injuries
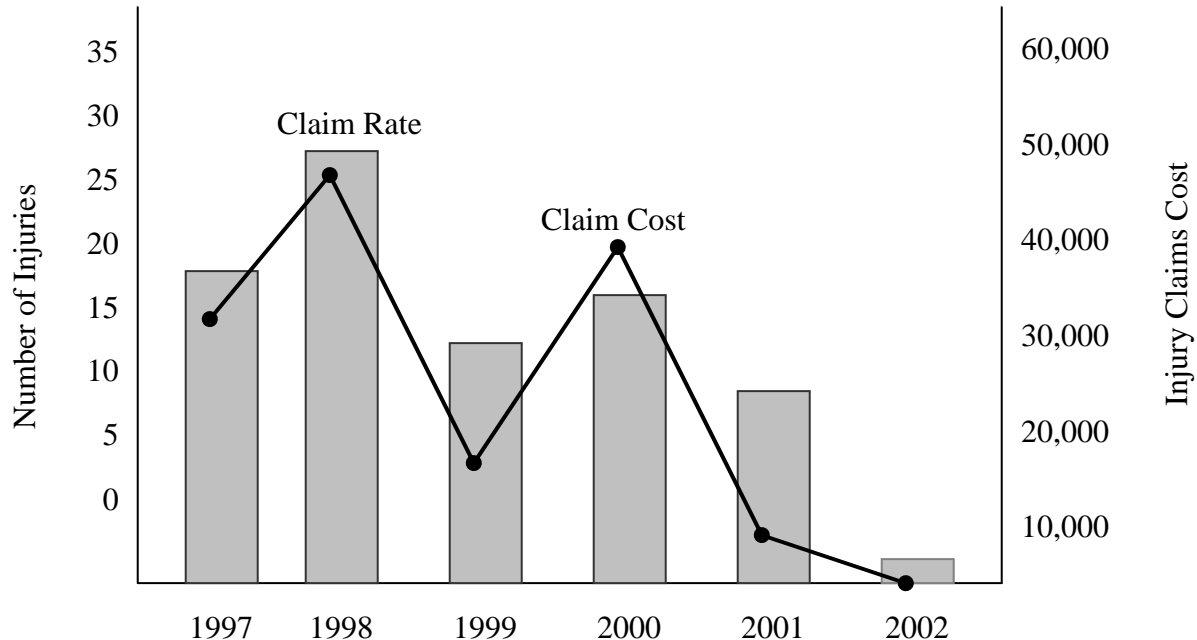
Injury Reporting, Investigation and Programs

In general, policies and procedures for reporting and treating injuries, changing employee work status following injury/exposure, modified duty, and a return to work are labor-intensive and confusing; poor compliancy rates are normally witnessed within departments. The SLCFD established a goal to facilitate compliancy with injury reporting by minimizing multiple levels of communications and the paper documentation needed. Injury reporting is conducted electronically via email notification from the firefighter's shift supervisor to the Safety and Wellness Office and Pinnacle Risk Management Services concurrently. While the state of Utah allows six months for injury reporting, the Fire Department's protocol requires reporting within 24 hours. SLCFD claims to have only missed 3–4 injuries over the past 9–10 years where firefighters have failed to comply with this protocol. Pinnacle is very accessible to employees, manning a customer service bank with representatives between 8:00 A.M.–10:00 P.M., 7 days a week or accepting reports filed online. The Department has clearly delineated procedures for the treatment of injuries suffered on the job. During workday hours, firefighters report either to the Concentra Medical Center (8:00 A.M.–5:00 P.M.) or Work Care Industrial Clinic (5:00 P.M.–9:00 P.M.). After hours (9:00 P.M.–8:00 A.M.) or weekend injuries are to report directly to the University of Utah Medical Center, St. Mark's Hospital, or the Latter Day Saints Hospital.

Upon receipt of notification, Pinnacle completes a firefighter claim application, and submits it to the firefighter who then completes personal information and re-submits it to Pinnacle. After visiting the clinic or hospital, the facility sends a formal injury report, including proposed treatment plan, to Pinnacle, who then forwards copies of the formal report and completed claim to the Wellness and Safety Office for filing. With the exception of reporting on bloodborne pathogens, which occur with great frequency, the Department demonstrates excellent compliancy in reporting. By state law, the compensation for injuries allows two options for firefighters, as described below.

First, experts and workman's compensation assess a percentage loss of functional capacity due to the injury. The injured firefighter is offered a one-time lump sum amount as compensation, whereafter the department and state is absolved of further financial accountability for the injury.

Second, the firefighter maintains medical coverage for the injury indefinitely, as long as he or she continues with rehabilitation or prescribed medication(s). The qualifying criterion is continued rehabilitation or medication at least once in a three-year period. This certainly opens the door to abuse for those so inclined.

The Department has no protocol or SOPs established for investigating injuries and accidents that occur on the job. Additionally, firefighters are not required to report for any formal shift check-in or check-out. Consequently, the Department has little control over the occurrence or tracking of injuries to firefighters. While it is the opinion of administration that this system is not generally abused, a firefighter injured off-duty may easily claim it as an on-duty injury in order to maintain compensation eligibility.

Recommendation 159: While it is unlikely that existing protocol will change, recommend more formal accident/ injury investigation SOPs, and shift check-in and check-out procedures.

Injuries and Worker's Compensation

According to a retrospective study performed by the USFA, Heart attacks continue to be the leading cause of firefighter deaths, accounting for 44 percent of all firefighter fatalities.[85] With firefighters over the age of 40 and 50 now representing 46 percent and 17 percent of the national fire service, respectively, departments now face escalating concerns over maintaining employee health and fitness. One of the USFA's main program goals is a 25 percent and 50 percent reduction, in firefighter fatalities over the next 5 and 10 years, respectively. Since 2001, the Department has fortunately not suffered any cardiac episodes with its employees. Table 88

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[85] USFA Firefighter Retrospective Study: 1990–2000

illustrates the claim rate and incurred costs of Fire Department personnel data from fiscal years
2001–2004.

Table 88: Claims and Costs of Injuries and Workers Compensation (FY01–04)

Year	Claims	Costs Incurred
FY01	87	$122,206
FY02	79	$115,555
FY03	64	$116,153
FY04	64	$78,736
Total	294	$432,650
Mean	73.5	$108,162

The claims rate and costs incurred trend significantly downwards between 2001 and
2004. Although FY05 data may validate the significant reduction in incurred costs in FY04, the
department did witness a 26.4 percent reduction in claim rate between FY01 and FY03, and
FY04. This translated to a 4.9 percent reduction in incurred costs to injury (between FY01 and
FY03). Through conversations with the Department and Human Resources, the only feasible
explanations offered for these reductions may be attributed to the provision of exercise
equipment within station houses and the increased awareness to wellness offered through both
Human Resources and the Wellness and Safety office. While firefighter participation in city-
wide wellness activities remains poor, it may appear that firefighter attitudes may be evolving
towards one of increased awareness to the benefits of wellness. If so, the Department has
successfully engaged the readiness towards change in behavior that will certainly demonstrate
strong returns on their investment made into a wellness program

Comparatively speaking, the Department's claim rates and incurred costs are
significantly lower than those of other departments. For example, when factoring for department
size, SLCFD experienced a 20.1 percent claim rate versus 29.6 percent and 30.9 percent for
Phoenix FD and Long Beach FD, respectively (two departments fro which we had comparable
data). Likewise, the Department's incurred costs averaged $108,162, a far cry from the
$1,501,974 averaged by Long Beach FD between 2001 and 2003. Granted, a significant portion
of Long Beach FD's costs can be attributed to differences in state compensation regulations
between California and Utah, and the absence of any significant and costly cardiac, pulmonary,
or metabolic claims within the SLCFD.

Table 89: Workers Compensation Claims and Costs for the SLCFD (2001–2004)
(Dollar Cost Averaging by Injury Type)

FY01			
Injury	**Claims**	**Incurred Claims**	**Average/Claim**
Sprain/Strains (Holding / Carrying)	1	$0	$0
Sprain/Strain (Push / Pull)	2	$27,706 *	$13,853
Sprain/Strain (Lifting)	10	$3,315	$331
Sprain/Strain (Twisting)	1	$571	$571
Sprain/Strain - Injury not specified	17	$40, 803 *	$2,400
Total Strain:	31	$72,395	$2,335
Exposure	3	$773	$258
Slips, Falls and Trips	15	$35,361*	$2,357
Strike / Falling Objects	12	$7,355	$613
Cuts, Abrasions, Punctures, Burns	11	$2,403	$218
Miscellaneous – not specified	7	$2,666	$381

FY02			
Injury	**Claims**	**Incurred Claims**	**Average/Claim**
Sprain/Strain (Push / Pull)	2	$18,113 *	$9,057
Sprain/Strain (Lifting)	7	$6,012 *	$859
Sprain/Strain (Twisting)	2	$3,078 *	$1,539
Sprain/Strain - Injury not specified	14	$2,762	$197
Total Strain:	25	$29,965	$1,199
Exposure	8	$36,377 *	$4,547
Slips, Falls and Trips	13	$11,049 *	$850
Strike / Falling Objects	5	$4,697	$939
Cuts, Abrasions, Punctures, Burns	13	$3,181	$247
Miscellaneous – not specified	8	$29,335 *	$3,667

FY03			
Injury	**Claims**	**Incurred Claims**	**Average/Claim**
Sprain/Strain (Push / Pull)	2	$2,419	$1,210
Sprain/Strain (Lifting)	9	$10,931 *	$1,215
Sprain/Strain (Twisting)	1	$18,560 *	$18,560
Sprain/Strain (Repetitive Motion)	2	$17,850 *	$8,925
Sprain/Strain - Injury not specified	10	$31,630 *	$3,163
Total Strain:	24	$81,390	$3,391
Exposure	11	$2,477	$225
Slips, Falls and Trips	3	$15,930 *	$5,310
Strike / Falling Objects	6	$3,587 *	$598
Cuts, Abrasions, Punctures, Burns	13	$9,144 *	$703
Miscellaneous – not specified	1	$219	$219

FY04			
Injury	**Claims**	**Incurred Claims**	**Average/Claim**
Sprain/Strain (Push / Pull)	1	$675	$675
Sprain/Strain (Lifting)	3	$2,192	$731
Sprain/Strain (Twisting)	3	$8,969	$2,990
Sprain/Strain (Bending)	1	$493	$493
Sprain/Strain - Injury not specified	18	$13,691 *	$761
Total Strain:	26	$26,020	$1,001
Exposure	10	$7,242	$724
Slips, Falls and Trips	10	$38,545 *	$3,855
Strike / Falling Objects	5	$2,717	$543
Cuts, Abrasions, Punctures, Burns	11	$3,217	$292

* Data skewed by one significant claim.

While the itemized workman's compensation claims do not specify the "Miscellaneous" category, the city's Risk Management Division, (RMD) provided data illustrating the general category of sprains/strains accounting for 52 percent of all injury claims and over 48.5 percent of all incurred costs between 2001 and 2004. While the "*Strain/Injury – not specified*" is the most frequently cited the lack of detail on this category makes it impossible to assess the specific nature of the injury, although a graphic breakout of body part has been determined. Lifting injuries, however, while most frequently cited, do not incur the magnitude of costs witnessed by pushing and pulling injuries.

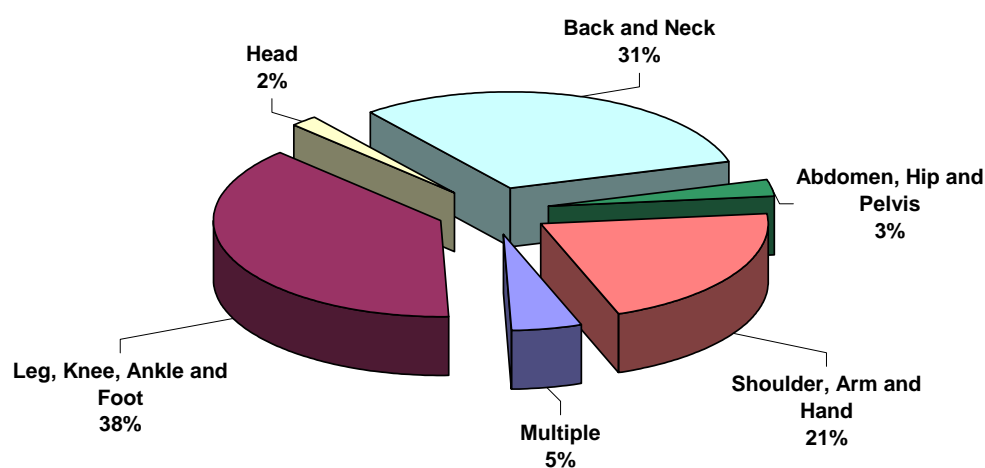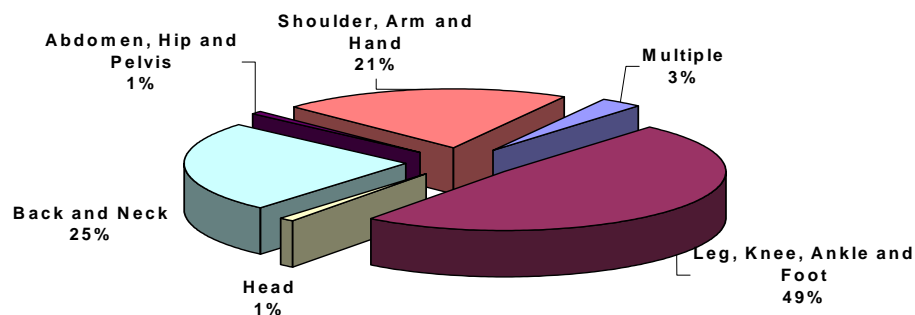**Figure 25: Sprain/Strain Location to Claim Frequency**

Figure 26: Sprain/Strain Location on Total Costs Incurred

An interesting observation is the frequency and costs associated with the lower extremity, which is atypical for professionals in this industry where one would expect a predominance of back and shoulder injuries. Bear in mind however, that this data may be skewed by those isolated and costly injuries for which we have no detailed information.

Table 90: Aggregated Data for Workers Compensation Claims and Costs
(Dollar cost averaging for injury type)

Aggregated Data for FY01 through FY04			
Injury	**Claims**	**Incurred Claims**	**Average/Claim**
Strains	106	$209,770	$1,979
Exposure	32	$46,869	$1,465
Slips, Falls and Trips	41	$100,885	$2,461
Strike / Falling Objects	28	$18,356	$656
Cuts, Abrasions, Punctures, Burns	48	$17,945	$374

Regardless, the two illustrations and the data presented above give strong justification for the development of functional training programs to strengthen the lower extremity, core, and low back areas of the body. Weaknesses in these areas are characteristic to lifting and push/pull-type muscular strains. The frequency of lower extremity injuries includes the ankle joint, raising the question of the frequency of ankle sprains. Further detail on the injury reports may illustrate the incidence of this type of sprain, necessitating an evaluation of the footwear used by firefighters. The implementation and participation by firefighters in a back mechanics/movement efficiency program that incorporates education, practical training, and strengthening of the identified areas may significantly impact these numbers and curtail some the incurred costs, justifying the

investment. More detailed information from the upcoming job analysis study by HMI may provide a better understanding to these injuries and enable the development of needs assessments from which exercise programs will be created.

The City's Risk Management Division (RMD) is very pleased with the Department's claim rate and incurred costs vs. other city departments. The Fire Department incurred only 4.75 percent of the City's total workman's compensation costs in comparison to the larger police department and public utilities department which incurred 37.1 and 32.2 percent, respectively. The RMD is amenable to considering alternative methods by which it can further reduce costs and injuries. In 2001, utilizing a worker's compensation fund for the Fire Department, the City produced a video on back safety, mechanics, and lifting technique for a cost of $1,200. While these videos are available to firefighters, the City has not followed up on utilization. Additionally, physical therapists are available for ergonomic assessments and for rehabilitation of injuries for all City employees (used more for office-type injuries). They will conduct observations and do training for an entire unit at a cost of $200/unit. The Fire Department has used this service twice in past 4–5 years.

Slips, falls, and trips represent the most costly injury claim at a rate of $2,461 per claim. It must be noted, however, that this data is skewed by isolated incidents that impacted the average claim cost. When excluding the 3 isolated incidents and averaging the remaining 38 claims, the average claim rate drops to $840 per claim, significantly lower. While detailed explanations on the nature of these injuries are not offered, it would appear that this gives justification for inspecting and perhaps improving engineering controls and personal protective equipment. The department should develop a formal accident/injury investigation protocol to better understand the nature of these injuries and develop corrective strategies.

While the average costs incurred due to exposure appear significant, they only appear so on account of one exposure incident in 2002 that cost the department $35,300. Excluding this single event lowers the average cost per claim to $373 versus $1,465.

Recommendation 160: Implement and mandate firefighter participation in a back mechanics/movement efficiency program that incorporates education, practical training, and strengthening of the identified areas. This program should be introduced through the academy, with ongoing education mandated for all firefighters every 2–3 years. To essentially reduce the ongoing cost of outsourcing to a vendor for this service, the department would be better served investing into training and certifying a CFC to deliver these programs which are clearly above the scope of practice of the current CFCs. The typical cost for training an individual to competently deliver such a program runs between $1,500 and $2,000. While the HMI job analysis will identify firefighter needs, it will not offer the educational and training personnel will need to effectively deliver the back mechanics program (needs assessments and menu writing).

Firefighter Programs

Modified Duty Program – This program is intended as an intermediate and vital step in the return of a firefighter to active duty. The Department values this return to work program immensely as evidenced by the annual cost that is covered by the Department budget and not by workers compensation. This current budget for this year is $350,000, an amount determined from the previous year and adjusted for inflation and cost of living index.

The Wellness and Safety Office also maintains a listing of temporary modified duty positions. It communicates electronically with stations on needs and opportunities for light duty. The communication to stations includes injury reporting and modified duty protocol, available job descriptions, and the necessary contact information for each available position. It oversees all firefighters reporting for light duty when notice is received from clinic after an injured firefighter consults with a physician. Placement within this program conforms to directives set forth by the presiding physician. It is the responsibility of the firefighter to communicate their start date for light duty or missed shifts will be deducted from their accrued benefits. A return to active duty requires a physical exam and a physician's clearance.

At the time data was collected, there were 5 uniformed firefighters on modified duty, a rate of 1.4 percent. The Department maintains between 1.0–1.5 percent consistent with other fire departments. In comparison, Phoenix, Long Beach and San Diego fire departments maintain averages between 0.67 to 1.5 percent on modified duty each month.

Recommendation 161: As the implementation of a effective wellness program requires detailed data tracking, assign longer term light-duty positions to the administration of data collection (to be discussed later).

Sick Leave Reduction Education Program – This 501c-9 program is only offered to firefighters to cash out unused sick leave for health insurance upon retirement. This program was created as firefighters, who typically hold a 30-year career, have little marketability after retirement unlike police, who after a standard 20-year career still have marketability and active careers after retirement. This plan allows all unused sick leave at end of year to be placed into a fund and upon retirement the value of that unused sick leave is paid towards health insurance to bridge the gap between retirement and eligibility for Medicare (age 65). The pay-out is paid at value of current rank value upon retirement. This is good incentive for longer terms of duty and helps explain the generally older retirement ages of firefighters within the department. The "*Memorandum of Understanding*" between Salt Lake City Corporation and the IAFF, Local 1645 outlines the program and benefits, but the Department does little to promote unused sick leave internally. A simple program or campaign would educate employees as to the benefits of not using sick leave and amassing it towards retirement to purchase health benefits. This

program could include rewards or recognitions of perfect attendance as a continual reminder of the Department's commitment to providing health insurance in retirement. A reward may include an hourly or daily pass, whereby those being awarded may be given priority for shift scheduling. SLCFD has a seniority bid system where senior firefighters get preferences on job assignments, and they generally opt for slower locations such as the airport and outlying locations. This program may act as a means for younger firefighters to gain certain perks.

While benefiting the firefighters themselves at retirement, this sick leave reduction program may include the impact both callback expenses and budgeted sick leave for the Department.

Recommendation 162: The Wellness and Safety Office, under the direction of the Fire Chief, should implement a Sick Leave Reduction Program to market the benefits of unused sick leave and recognize/reward firefighters for perfect attendance.

Callback Expense – The cost to the Department in FY03–2004 was $875,000 and is budgeted for $1,100,000 for FY04–2005. The Department has recognized that the most significant attribute of this budget is used by specialty positions such as ARFF (airport rescue FF), who have completed specialized training and operate in smaller crews, therefore necessitating more frequent use of callback when firefighters are absent. Obviously some callback expenses, including continued onsite training, are unavoidable, but the Department has not tracked the potential cost of injury for firefighters working during callback. In reviewing the injury claims, only one injury in 4 years is attributed to acute overexertion (cost of $1,539 in 2003), but no indication is made to the shift. The question pertaining to workers injuries claims occurring during callback is certainly worthy of investigation. Corpus Christi Fire Department tracked injury frequency on callback versus regular shifts and found a reduced incidence of injury during callback. This was attributed to greater diligence on the part of the firefighters given the extra earning potential firefighters have while working on callback.

Recommendation 163: Track injury frequency and costs on callback employees. This information would certainly provide valuable information in establishing callback expense budgets and evaluate the efficacy of callback to the Department.

Retiree Benefits – The Department currently does not track data on retirees, but estimates that longevity post retirement from service is poor. The DC of Operations did analyze data on pension and estimated longevity, and determined that firefighters retiring after 25 years of service would use 75 percent of their pension, while those retiring after 30 years would only use 70 percent of their pension before dying. If there is any validity to this analysis, it lends merit to the use of unused funds to purchase additional services for the Department to benefit retirees. Retirement is based on years of service, with up to 50 percent of wages for 20 years of service. After 20 years of service, firefighters earn an additional 2 percent per year, to a total of 70

percent. The Department's mean term before retirement is 28–30 years of service, with median retirement age between 55–58 years of age. The Department as a whole has a median age between 35 and 40 years. The frequency of early retirements with younger firefighters, essentially abusing the system to collect pensions, is virtually non-existent. The pension and injury payout structure for the state is designed to prevent such abuse.

For older firefighters with over 20 years of service, the full return to activity and participation in the modified duty program is evaluated if the injury sustained requires a lengthy rehabilitation process. The Department may elect to disallow eligibility in the modified-duty program, encouraging either an early retirement or reassignment to another City position. Retirement pension would be paid at a base salary from the last three years of service, whereas reassignment within the City may incur a lower wage structure, essentially reducing pension upon retirement.

Recommendation 164: Retirees do not qualify for Healthy Utah programs and may perhaps represent the population group most in need of the programs. The Benefits Coordinator for the City should inquire into the possibility of inclusion for retirees, a program that could be paid out from unused pensions and sick funds. Additionally, the Department should track data on retirees.

Wellness Program Components

The establishment of a comprehensive wellness program within the Department requires careful planning, development, and inclusion of the four key components:

- Assessment (medical exams and fitness evaluations)
- Education (nutrition, ergonomics, infection control, toxic exposure)
- Implementation (physiological, psychological, occupational, emotional, financial, and spiritual programs)
- Evaluation (data collection and reporting)

The partnership with Concentra provides the mandated annual NFPA 1582-complaint medical exams. The partnership with HMI and their forthcoming job analysis is intended to establish performance standards for all incumbent firefighters, a compliment to the CPAT recently implemented with the recruits.

The educational component for promoting health and wellness to the firefighters, while available through "*Healthy Utah*", is certainly not as detailed and comprehensive as the assessment component. While the department can generally be considered in good health, utilization and participation in wellness programs is poor. The only structured educational program offered appears to be delivered during recruit training via materials drawn for Sondra Adams "*Fitness for Life*" course. The back safety and mechanics program and video created by

the City has not been well utilized. This component of a wellness program must be developed and delivered in a formal fashion with union and administrative buy-in in order to demonstrate firefighter participation. One wonders if the health newsletters and e-bulletins forwarded to every firefighter have increased awareness to improved health. The drop in claim rate and cost since FY01 may indicate a positive impact, but without surveying personnel, one cannot form any conclusion.

The implementation component remains unclear. Conditioning programs have been created for the recruits, but no formal programs have yet been established for the incumbents. One can only hope the money invested into certifying CFCs along with the forthcoming job analysis, will provide a means to develop a long-tem program of structured and standardized programming for the active firefighters. As no designated champion to lead the certified CFCs as a group seems apparent, it is questionable whether this program will become survive. Standardized firefighter survival challenges, which may be inappropriate for many firefighters, are a step towards standardized and firefighter-specific programming.

While the implementation of physiological programs remains unclear, the City has implemented programs to assist with the psychological and occupational wellness components of overall fitness. The Department has a fully operational Emergency Incident Response (EIR) team that collaborates with the Red Cross at triage centers. The Department's biggest need for an EIR unit is primarily in response to cold, although heat exposure is sometimes an issue with the grassland fires by the lake due to train sparks from railroad. The Department also has a Critical Incident Stress Management (CISM) team consisting of doctors, nurses, firefighters (Station 7), and individuals trained in managing critical incidents. The need to call upon these teams by the Department has not been significant, but both are readily available. Additionally, an Employee Assistance Program (EAP) is available at a cost of $2.35 per employee per month paid by the City that offers counseling and other emotional, psychological, and financial services. Due to the confidentiality of these services, Human Resources does not collect data on utilization; hence we cannot estimate firefighter utilization.

The evaluation component of the comprehensive wellness program revolves primarily around data collection and the subsequent analysis of that data to demonstrate program effectiveness and possible return on investment (ROI). Currently, all medical information is completely maintained confidentially by Concentra. No aggregate data has been compiled to evaluate firefighter progress on an annual basis. Data collection needed to demonstrate program efficacy includes:

- Medical – track all medical exams, office visits, lab work and diagnosis
- Financial – track all associated costs for treatments, wellness programs and budget spending
- Leave management – maintains records of firefighter reassignments when injured or assigned to modified duty
- Retirees – keeps an ongoing medical history of retired personnel to ensure a proactive stance towards quality medical care of our retired firefighters
- Physiological – tracks annual information on firefighter fitness performance
- Exposure control – tracks exposures encountered by firefighters and analyzes health trends that may extend from occurrences.

With the exception of retiree and physiological assessment data, the Department has collected this information, but has not assigned any individual or group to analyze it. This means to assess the program effectiveness involves four stages: namely evaluation and planning, data collection, data analysis, and reporting. Figure 27 illustrates the four stages:

Figure 27: The Human Resources Scorecard (adapted from Jack Phillips – Measuring Return on Investment, 1994)
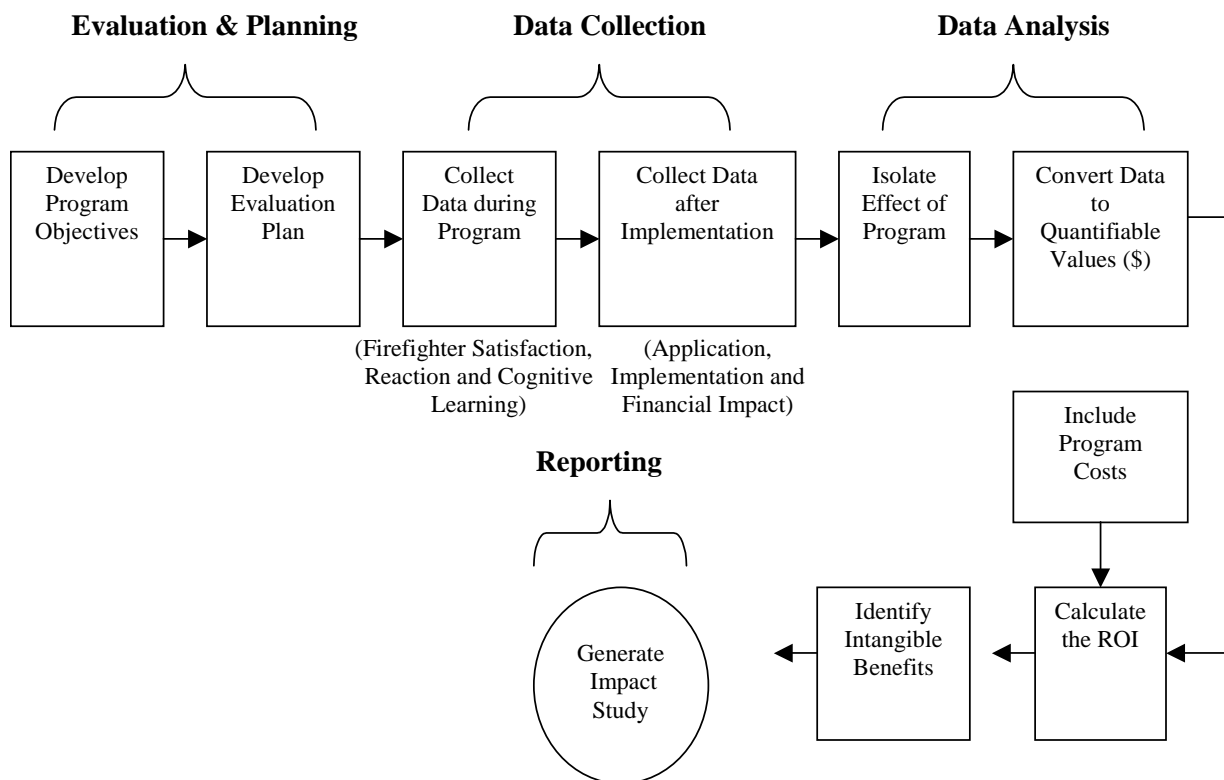
Examples of hard data include costs, claims, and participation numbers, while soft data includes health awareness, satisfaction, and perception of programs. Application and

implementation measures include behavioral changes, business impact, and department performance.

The Phoenix Fire Department (PFD) implemented a comprehensive wellness program for firefighters in 1987 and has been tracking firefighter data since 1989. The PFD, which is often viewed as a model fire department in a number of operational and administrative areas, has successfully managed to maintain an injury claim rate below 31 percent for its 1,398 sworn personnel (a total of 34 percent when factoring in re-injuries). A retrospective study of its data demonstrated a 26 percent decrease in injury frequency, a 42 percent decrease in injury severity, and a 75 percent decrease in re-injury rates over an 8-year period. Many similar studies have been conducted, demonstrating a strong ROI.

As seen in Phoenix, collecting data ensures the ability to perform long-term evaluation of programs, risks, and treatments of firefighters throughout their careers and into retirement. Tracking firefighter health trends provides invaluable information to improve both job performance and the working environment. This model certainly showcases itself as one that most departments should attempt to emulate.

Recommendation 165: Given the Department's commitment to wellness, it needs to develop all four components of a comprehensive plan. This includes an evaluation tool to measure program efficacy as outlined in the model presented.

Personnel

A comprehensive wellness program encompasses assessments, education, implementation, and evaluation. Given the current arrangement, SLCFD offers medical exams, resources to increasing firefighter health and wellness awareness, yet offers no standardized physiological testing, exercise or education programming, or data tracking. Given the magnitude of these responsibilities, the Department should promote a current CFC to join the Wellness and Safety Office as a Wellness Coordinator (WC) on a 0.5 FTE basis. Specifically, the WC will primarily be responsible for:

- Collaborate with HMI, Fire Administration, IAFF Local 1645, the Wellness and Safety Office and other fitness experts to establish validated and legally defensible fitness standards for the department.
- Collaborate with CFC's to develop firefighter-specific exercise programs based off HMI job analysis and workman's compensation claims.
- Procure department's physiological assessment equipment, train and supervise fellow CFC's to administer physiological testing of all firefighters at the training center.
- Collaborate with fire administration and the city's Risk Management division to create wellness a protocol to assess overall program effectiveness including an ROI.

- Manage the department's database, tracking the identified areas to measure program efficacy. This includes establishing effective communication channels with the city's Risk Management division to track injuries. Much of the responsibility of tracking aggregated data (while maintaining confidentiality) can be delegated to firefighters on longer-term modified duty.

- Collaborate with the Chief's Office (Admin. Assistant) to schedule annual physiological testing to coincide with annual medical exams.

- Develop fitness policies, an exercise manual with the assistance of CFC's and conduct training as needed. The creation of a fitness policy and exercise manual must be consistent with the most recent standards from the IAFF/IAFC Initiative of 1997–2000, the American College of Sport Medicine (ACSM), and the NFPA (NFPA 1583). Each station should have a hardcopy of the Department's fitness manual that contains fitness and wellness policies and procedures; program goals; acceptable activities; educational modules (heart disease, musculoskeletal injuries, cancer, obesity, diabetes, risk factors, stress, nutrition, exercise basics, program design and flexibility); policies and procedures pertaining to the fitness trainer program; fitness evaluation information; and fitness equipment inspection, maintenance, repair, and inventory logs.

- Collaborate with Human Resources to develop more effective marketing strategies to improve firefighter utilization of wellness programs.

- Develop a curriculum of formal ongoing wellness education. This includes the dissemination of wellness and fitness information including nutrition, weight control, and stress reduction into a deliverable format that is both relevant and appropriate for firefighters. This may include establishing ties within the local academic community. This WC may assume the responsibility of advancing themselves professionally to competently deliver the back mechanics program discussed.

These responsibilities are in accordance with those outlined in NFPA 1583 and the IAFF/IAFC wellness and fitness literature.

Table 91: Salt Lake City Wellness Program

		Annual Cost	
	Operating Proforma:	**Year 1**	**Year 2**
1	Wellness Coordinator Salary (0.5 FTE)	$23,000	$24,200
2	Benefits (est.)	$2,550	$2,675
3	Taxes (est.)	$2,550	$2,675
4	Training & Development (est.)	$2,500	$1,000
5	Other – Travel (est.)	$1,000	$1,000
	Total Employee-Related Expenses	**$31,600**	**$31,550**

Recommendation 166: Hire a full-time wellness coordinator.

Cost Savings and Return on Investment

Phoenix Fire Department demonstrated significant reductions in injury frequency, severity, costs and re-injury rate through its wellness program. A conservative 5 percent reduction in injuries could save the Department $5,400 in annual compensation costs. This amount reflects a decrease in claims costs alone, without any consideration to the savings attributed to the severity of the injury, re-injury rates, and all associated administrative costs of injury reporting, possible callback expenses, and modified duty. A concurrent 2–3 percent reduction in callback expense could save the Department $17,500–$26,250 (FY03–04).

**Table 92: Year 1: Return on Investment of Fitness and Wellness Program
(excludes non-tangibles – morale, employee perception/educational awareness)**

Line Item	Costs	Saving
Wellness Coordinator (including training/education)	$31,600	
Certification of Training Center Personnel	$500	
Video/DVD/Fitness Manual Production	$4,000	
Physiological Assessment Equipment *	$12,000	
Exercise Equipment – Training Center	$7,500	
Back Mechanics Program (training, materials, etc.)	$5,000	
General Wellness Development and Operational Costs	$5,000	
Total Expenses:	$65,600	
Outsourcing to Professional Vendors to:		
Conduct Physiological Assessments (1095hours x $35/hr)		$38,325
Conduct Back Mechanics Program (30hours x $45/hr)		$1,350
2½% decrease in injury claims (mean from FY01– 2004)		$2,704
1% decrease in callback expense ($875,000 budget)		$8,750
Total Savings:		$51,129
Net Expenses/Savings		- $14,471
ROI **		- 22.1%

* Costs for purchasing IAFF W/FI Physiological Assessment, including installation and training

** Does not include any quantification of intangible benefits

**Table 93: Year 2: Return on Investment of Fitness and Wellness Program
(excludes non-tangibles – morale, employee perception/educational awareness)**

Line Item	Costs	Saving
Wellness Coordinator (including training/education)	$31,550	
Video / DVD / Fitness Manual Production (updates)	$2,000	
Assessment Equipment Depreciation / Amortization (15 percent)	$1,800	
Exercise Equipment Depreciation / Amortization (15 percent)	$1,125	
Back Mechanics Program – Training Center	$1,000	
General Wellness Development and Operational Costs *	$5,250	
Total Expenses:	$42,725	
Outsourcing to Professional Vendors to:		
Conduct Physiological Assessments (1095hours x $37/hr) *		$40,515
Conduct Back Mechanics Program (30hours x $47/hr) *		$1,410
4% decrease in injury claims (mean from FY01–2004)		$4,326
2% decrease in callback expense ($1,100,000 budget)		$22,000
Total Savings:		$68,251
Net Expenses/Savings		$25,526
ROI **		59.7%

*   Accounting for < increase in cost of living index (CDI) and 5% inflation
** Does not include any quantification of intangible benefits

Understandably, the intent of this project is to reduce operating costs to achieve the
Department's target, but considering the absence of components of a comprehensive program,
the first year of implementation necessitates significant start-up costs. This is shown by the
negative ROI in Year 1.

APPENDIX A. FIRE DEPARTMENT RECRUITMENT EFFORTS

The Salt Lake City Fire Department entry-level written exam was given May 1, 2004. The Department began accepting names for test registration in the fall of 2003. Over 1,900 people registered to take the test. After being notified by mail, nearly 1,200 picked up (or requested by mail) the handbook and the official registration form. Eight hundred eighty nine (887) individuals actually tested.

Table 94: Candidates Participating in Written Exam

	2002 Exam	**2004 Exam**
Total	803	887
Male	734	831
Female	62 (7.7%)	54 (6.1%)
Didn't Identify Sex	7	2
White	716	791
Black	5 (0.6%)	6 (0.7%)
Hispanic	38 (4.7%)	42 (4.7%)
Asian/Pacific Island	19 (2.4%)	20 (2.2%)
Native American	4 (0.5%)	7 (0.8%)
Candidates Advancing		
To the Next Phase	198	181
Diverse Candidates	15	26
Females	9	8
Hispanics	5	14
Asian	1	3
Native American	1	

The Department used a two-part written exam: *Comprehensive Examination Battery* Exam and *Diverse Work Styles* Exam. They selected this more costly two-part exam as the selection device to level the playing field for all entry-level applicants. Candidates did not need any previous firefighter experience to score well in the test. (In the last test, candidates purchased a study manual and the test was a fire-related skills test.)

Past practice has been to invite the top-scoring candidates from the written exam to a panel interview. This year, the Department chose to use B-PAD (Behavioral Personnel Assessment Device) as the ranking tool. B-PAD is a video test. It is not a test of knowledge; rather it is a test of a candidate's judgment and interpersonal competence in dealing with different types of people in different job-specific situations. As it is not necessary to have previous Firefighter or Paramedic experience to be successful in obtaining a high score on the B-PAD test, the B-PAD exam ensures that all candidates have an equal opportunity of being successful. Data demonstrates that B-PAD has little or no adverse impact. The Department made

a decision to use this more costly tool ($25,000 for 5 year lease plus $80 testing cost per candidate) to ensure a bias-free selection process.

To further promote equality among the candidates, we lowered the EMT and Paramedic preference points added to the final score. EMTs received one point; Paramedics received two points.

In preparation for the 2004 Entry-level Firefighter Selection process, the Department utilized the following strategies in an effort to attract a more diverse pool of candidates:

- Placed Equal Employment Opportunity Statement/Recruitment advertisements in three national journals (The Department spent approximately $800 on each advertisement.):
  o Black Employment & Equal Opportunity, a minority placement and career development publication.
  o The Veterans National Journal
  o The Latino Journal
- Department formed a Recruitment Committee
  o In an effort to recruit a more diverse work force, the department formed a 15-member committee. The purpose of the committee is to utilize the talents and abilities of current department members to research, develop and implement a recruiting and testing process that will improve diversity within the department. The committee is composed of a diverse crew of firefighters, administration staff, and human resources.
- Crew members from the Department provided community education and diversity recruitment efforts at both the Cinco de Mayo activities at the Centro Civico Mexicana Center and a Hispanic Festival at the Gallivan Center.
- The Department staffed a booth and crew members provided community education and diversity recruitment efforts at the NAACP-sponsored Juneteenth event at the City Library.
- Placed Equal Employment Opportunity Statement / Recruitment advertisements in the following national sources:
  o Progressive Women's Employment Journal
  o Black Career (on-line website)
- Firefighters Rebecca Hall and Martha Ellis contacted approximately 20 gyms (especially targeting those with a large population of female clientele) and distributed recruitment materials and posters. The posters feature a photo of a diverse group of SLC firefighters.
- Human Resource Consultant Kirk Anderson met with the marketing staff of the Utah Cultural Celebration Center in West Valley City to discuss the possibility of having a SLC Fire Department recruitment booth at upcoming diverse cultural festivals. The Marketing Coordinator of the Center agreed to display recruitment posters in their facilities and also offered to run a recruitment advertisement in their monthly newsletter.

- Payroll Administrator Faye Hokafonu provided community education and diversity recruitment efforts at four Pacific Islander functions in August and September. As part of an ongoing diversity outreach effort, Faye continues to meet with leaders in the Tongan community to inform and educate them regarding fire service employment.

- Firefighters Vince Martinez, Rebecca Hall, and Chi Hwang staffed a booth and provided community education and diversity recruitment efforts at the Hispanic Festival at the City and County Building in September.

- The Department has ordered a professional backdrop to be used in booths at job fairs and various diverse festivals.

- With the input of Captain Devin Villa, Annette Hayward created a perforated pocket–size handout that firefighters can use in recruitment efforts when talking with interested individuals in target-rich settings. One side of the form contains a place for name, address, and contact number that firefighters returned to Annette to enter on the Department's interest/mailing list for the spring testing process. All crew members have the cards and additional handouts that can be given out on the scene or during inspections.

- Firefighter/video technician Martha Ellis completed a recruitment video that will be used at job fairs and various cultural events. The video features conversations with diverse Salt Lake City firefighters. Additionally, Martha is photographing firefighters of various ethnic backgrounds to display on the new backdrop for job fairs.

- Payroll administrator Faye Hokafonu continued to meet with leaders in the Tongan community. She also organized a recruitment team for the Samoan community.

- Firefighter Paul Harding placed recruitment fliers and firefighter interest cards at the University of Utah's Center of Emergency Programs.

- Faye Hokafonu, Captain Devin Villa, firefighter Gary Perkins, and firefighter Jeff Thomas staffed a job recruitment booth at the Indian Walk-In Center's Annual Health Fair and Pow-Wow.

- Ten members of the Fire Department attended the NAACP's 84th Annual Life Membership and Freedom Fund Banquet.

- The Fire Department purchased four tickets to the Asian American Achievement Awards Banquet.

- Gary Perkins and Paul Harding participated in the University of Utah's Job Fair, working in conjunction with the Office of Black Affairs.

- Chief Querry met with Aida Mattinly of the Filipino Community. Information, cards, and brochures were sent to the organization.

- Payroll administrator Faye Hokafonu staffed a job recruitment booth at a one-day job fair as part of the University of Utah's "2004 Pacific Islander Awareness Week."

- Firefighters Chi Hwang and Vince Martinez staffed a job recruitment booth at a job fair at East High School.

- Human Resources placed job announcements for the Entry Level Firefighter Exam in the Spanish Language Classified section of the Salt Lake Tribune.

- Human Resources placed an on-line job announcement for the Entry Level Firefighter Exam on the website for the International Association of Black Firefighters.

APPENDIX B

Table 95: Fire Prevention Bureau Staffing*

Position Title	FY01	FY02	FY03	FY04	FY05
Battalion Chief	1.0	1.0	1.0	1.0	1.0
Captain	2.0	2.0	2.0	2.0	1.0
Deputy Fire Marshal	1.0	1.0	1.0	1.0	1.0
Firefighter Inspector	6.0	8.0	4.0	4.0	4.0
Firefighter Instructor	1.0	1.0	1.0	0.5**	0.5**
Firefighter Investigator	2.0	2.0	3.0	3.0	3.0
Fire Prevention Specialist (Civilian)	2.0	2.0	2.0	2.0	2.0
Hazardous Material Inspector (Civilian)	1.0	1.0	1.0	1.0	1.0
Clerical (Civilian)	2.0	2.0	1.0	1.0	1.0
Total Fire Prevention Bureau Staff	18.0	20.0	16.0	7	7.0
Cumulative Increase/(Decrease) in Staff		2	(4.0)	(4.5)	(1.0)
Total Fire Department Staff	366.0	366.0	360.0	358.0	358.0
Cumulative Increase/(Decrease) in Staff			(6.0)	(8.0)	

* Data obtained in phone conversation with John Vuyk on October 8, 2004.

** An entire position fore firefighter instructor is still in FPB budget, but is assigned the EMS, Safety and Wellness. Therefore, only 1/2 of the positions is shown because that is the amount of time spent on public education.

APPENDIX C

Table 96: Inspections Performed by Station Firefighters (2002 Calendar Year)*

Station	No. of Fire Inspections	No. of Hydrant Inspections	No. of School Inspections
1	453	631	N/A
2	351	624	N/A
3	314	507	N/A
4	330	509	N/A
5	436	603	N/A
6	503	594	N/A
7	323	625	N/A
8	411	630	N/A
9	270	328	N/A
10	281	552	N/A
11	308	487	N/A
13	245	370	N/A
14	221	666	N/A
Total	**4,446**	**7,126**	**N/A**

*Data obtained from YTD Station Inspections-Hydrants reports provided by Kim Matthews.

Table 97: Inspections Performed by Station Firefighters (2003 Calendar Year)*

Station	No. of Fire Inspections	No. of Hydrant Inspections	No. of School Inspections
1	372	573	N/A
2	410	599	N/A
3	407	504	N/A
4	279	488	N/A
5	381	587	N/A
6	530	664	N/A
7	291	357	N/A
8	407	563	N/A
9	190	256	N/A
10	269	599	N/A
11	309	550	N/A
13	211	393	N/A
14	266	700	N/A
Total	**4,322**	**6,833**	**N/A**

*Data obtained from YTD Station Inspections-Hydrants reports provided by Kim Matthews.

Table 98: Inspections Performed by Station Firefighters
(2004 Calendar Year, Through July)*

Station	No. of Fire Inspections	No. of Hydrant Inspections	No. of School Inspections
1	170	650	2
2	244	692	7
3	197	591	3
4	126	475	2
5	185	364	9
6	302	422	4
7	159	603	6
8	230	492	4
9	113	288	0
10	151	490	5
11	151	667	3
13	163	353	10
14	117	636	2
Total	**2,308**	**6,723**	**57**

*Data obtained from YTD Station Inspections-Hydrants reports provided by Kim Matthews.

APPENDIX D

Table 99: Fire Prevention Performance Measures*

Performance Measure	Goal	Actual FY02	Actual FY03	Actual FY04
Fire Prevention Bureau				
Number of fire inspections completed by fire prevention bureau inspectors	>= 6,500	7,009	4,199	4,868
Number of training events completed by Public Education Specialist	>300	428	468	500
Fire Companies				
Number of fire inspections / building pre-plans completed by fire companies	>1,800	3,814	4,791	4,295
Number of training events completed by fire companies	> 350	406	417	364
Total of Prevention Activities				
Number of fire inspections / pre-plan completed	>8,300	10,823	8,990	9,163
Number of training events completed	>650	834	885	864
Number of participants in training events	>19,000	25,684	20,401	31,464**

* Data obtained from 5 Year Plan Department Performance Measures charts for FY 2002 and FY 2003 and from John Vuyk on October 8, 2004.

** 26,690 or 85 percent of the participants attended training events conducted by the public education specialist.

APPENDIX E

Specific Duties Currently Performed by FPB

Construction Plan Reviews – Review of plans for new and renovation construction, fire suppression systems (fire alarms, fire sprinklers, fire mains, standpipes, etc.), above and underground storage tanks, high pile storage facilities, and spray booths.

Permit Issuance and Code Enforcement Inspections – Issue permits for above and underground storage tank installations and removals, blasting operations and pyrotechnic displays (indoor or outdoor).

Inspections are performed of pyrotechnic displays, above ground and underground storage tank installations and removals

Annual permits are issued for hazardous materials storage, dispensing and processing sites and inspections are conducted.

Code Enforcement Inspections – Inspections are conducted of some structures when new business licenses are issued.

Annual inspections are performed for night clubs.

Annual inspections are done for state licensed facilities (nursing and group homes, medical treatment centers and hospitals).

Bi-annual inspections are performed of existing high rise structures (hotels, apartments and commercial offices).

Fire watch services (a fire inspector on-site during events) are provided for the Delta Center on a regular basis and for other large assemblies as requested.

Fire and Safety Education – Fire and safety education for school aged children is provided. This year a grant was obtained for a new program, Risk Watch. This program has been incorporated into the core curriculum for the State of Utah and is being implemented in as many Salt Lake City schools as funding allows.

Fire Investigations – The bureau is also responsible for investigating all fires of suspicious origin and prosecuting probable arson cases.

APPENDIX F

Table 100: Computation of Available Time for Productive Work in FPB

Description of Activities:	Hrs per Year Assigned to Non-Productive Tasks	Hrs. per Year Available for FPB Productive Tasks
FPB Employees work 40 hours per week (4 - 10 hour days)		
Total Work Hours per Year		**2,080**
Less Usable Non-work Hours:		
Holidays - 12 days per year (12 * 8 hours per day)	(96)	
Vacation (Used 22 days as an average * 8 hours per day)	(176)	
Sick Leave (For most employees it is 10 days * 8 hours per day)[86]	(8)	
Sub-Total of Work Hours Less Non-work Hours	**(280)**	**1,728**
Less Required Training Hours for Fire Inspector:		
Fire Inspector CEUs (1.5 CEU in 3 years)[87]	(16)	
Sub-Total of Work Hours for Fire Inspector	**(16)**	**1,712**
Less Additional Required Training Hours for Firefighters:		
EMT Basic Training (Required of firefighter fire inspectors)[88]	(30)	
Firefighter Training (Required of firefighter fire inspectors)	(16)[89]	
Sub-Total of Work Hours for Sworn Firefighter	**(46)**	**1,666**
Less Additional Required Training Hours for Plan Examiners:		
Certified Plan Examiner (1.5 CEU in 3 years)	(16)	
Sub-Total of Work Hours for Plan Examiner	**(16)**	**1,650**

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[86] For two employees in FPB, 120 hours are available for sick leave.

[87] 1.5 CEU in three years is equivalent to about 5 days. 5 days / 3 years = 1.7 or 2 days a year * 8 hours = 16 hours per year.

[88] Data obtained from Paul Harding.

[89] This is a guess. Data is needed from the fire marshal.