CENTER FOR PUBLIC SAFETY MANAGEMENT, LLC

OPERATIONAL AND ADMINISTRATIVE ANALYSIS

KERN COUNTY, CALIFORNIA

FINAL REPORT

CPSM®

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ICMA

Exclusive Provider of Public Safety Technical Services for
International City/County Management Association

THE ASSOCIATION & THE COMPANY

The International City/County Management Association (ICMA) is a 100-year-old, nonprofit professional association of local government administrators and managers, with approximately 9,000 members spanning thirty-two countries.

Since its inception in 1914, ICMA has been dedicated to assisting local governments in providing services to their citizens in an efficient and effective manner. Our work spans all of the activities of local government — parks, libraries, recreation, public works, economic development, code enforcement, Brownfields, public safety, etc.

ICMA advances the knowledge of local government best practices across a wide range of platforms including publications, research, training, and technical assistance. Its work includes both domestic and international activities in partnership with local, state, and federal governments as well as private foundations. For example, it is involved in a major library research project funded by the Bill and Melinda Gates Foundation and is providing community policing training in Panama working with the U.S. State Department. It has personnel in Afghanistan assisting with building wastewater treatment plants and has had teams in Central America providing training in disaster relief working with SOUTHCOM.

The **ICMA *Center for Public Safety Management* (ICMA/CPSM)** was one of four Centers within the Information and Assistance Division of ICMA providing support to local governments in the areas of police, fire, EMS, emergency management, and homeland security. In addition to providing technical assistance in these areas we also represent local governments at the federal level and are involved in numerous projects with the Department of Justice and the Department of Homeland Security. In each of these Centers, ICMA has selected to partner with nationally recognized individuals or companies to provide services that ICMA has previously provided directly. Doing so will provide a higher level of services, greater flexibility, and reduced costs in meeting members' needs as ICMA will be expanding the services that it can offer to local governments. For example, The Center for Productivity Management (CPM) is now working exclusively with SAS, one of the world's leaders in data management and analysis. And the Center for Strategic Management (CSM) is now partnering with nationally recognized experts and academics in local government management and finance.

Center for Public Safety Management, LLC (CPSM) is now the exclusive provider of public safety technical assistance for ICMA. CPSM provides training and research for the Association's members and represents ICMA in its dealings with the federal government and other public safety professional associations such as CALEA. The Center for Public Safety Management, LLC maintains the same team of individuals performing the same level of service that it has for the past seven years for ICMA.

CPSM's local government technical assistance experience includes workload and deployment analysis using our unique methodology and subject matter experts to examine department organizational structure and culture, identify workload and staffing needs, and identify and disseminate industry best practices. We have conducted more than 269 such studies in 37 states and 204 communities ranging in size from 8,000 population (Boone, Iowa) to 800,000 population (Indianapolis, Ind.).

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CONTENTS

Contents iii
Tables vi
Figures ix
Section 1. Executive Summary 1
Recommendations 1
Section 2. Scope of Project 6
Section 3. Organization and Management 7
Governance and Administration 7
Kern County Fire Department–Overview 10
Staffing and Deployment 14
Fire Station Facilities 18
Apparatus and Fleet Management 25
Capital Equipment 35
Radio Interoperability and Coverage 36
Section 4. Analysis of Planning Approaches 38
Fire Risk Analysis 38
Hazardous Materials Response 41
Target Hazards and Fire Preplanning 43
Accreditation 45
Section 5. Operational Response Approaches 46
Kern County Response Protocols 47
Fire Response 47
Structure Fires 50
Integrated Risk Management 54
Wildland Fires 58
EMS Response and Transport 69
Mutual Aid/Automatic Response 71
Contracts for Service 75
Workload Analysis 81
Section 6. Response Time Analysis 94
Measuring Response Times 95
Kern County Response Times 96
Response Time by Type of Call – Bakersfield JPA 98
Response Time by Type of Call – Urban Areas 99

Response Time by Type of Call – Rural Areas 100
Response Time by Type of Call – Remote Areas 101
Section 7. Performance Measurement 109
Section 8. Essential Resources 113
Fire Prevention and Code Enforcement 113
ISO Rating 117
Fire Training and Education Programs 118
Emergency Management 122
Kern County Office of Emergency Services 122
Emergency Management Plan 123
Emergency Operations Center 123
Hazard Mitigation Plan 124
Emergency Communications Center (ECC) 125
IAED EMD and EFD Dispatch Protocol Manuals 126
Section 9. Considerations for Cost Reductions and Improved Solvency 128
Cost Reductions and Improved Solvency Measures 128
Section 10. Data Analysis 131
Methodology 131
Aggregate Call Totals and Dispatches 133
Calls by Type 133
Calls by Type and Duration 136
Average Calls per Day and per Hour 138
Units Dispatched to Calls 140
Workload: Calls and Total Time Spent 143
Runs and Deployed Time – All Units 143
Workload by Unit Type 147
Workload by Station 148
Analysis of Busiest Hours 156
Response Time 158
Response Time by Type of Call – Bakersfield JPA 160
Response Time by Type of Call – Urban Areas 163
Response Time by Type of Call – Rural Areas 166
Response Time by Type of Call – Remote Areas 169
Response Time by Hour – Bakersfield JPA 172
Response Time by Hour – Urban Areas 174
Response Time by Hour – Rural Areas 176

Response Time by Hour – Remote Areas 178
Response Time Distribution – Bakersfield JPA 180
Response Time Distribution – Urban Areas 183
Response Time Distribution – Rural Areas 186
Response Time Distribution – Remote Areas 190
Shared Response 193
Response Times 193
WildLand Fires 195
Attachment I 197
Attachment II 199
Attachment III 202
Attachment IV 204

TABLES

TABLE 3-1: Program Assignment Duties 16
TABLE 3-2: Station Ages and Construction Features 20
TABLE 3-3: KCFD Inventory of Apparatus 25
TABLE 3-4: Fire Pumper Life Expectancy by Type of Jurisdiction 35
TABLE 5-1: Fire Apparatus vs. Small Vehicle Maintenance/Response Cost Comparison 49
TABLE 5-2: Call Types 51
TABLE 5-3: Content and Property Loss – Structure and Outside Fires 53
TABLE 5-4: Number of Fires with Loss Above and Below $20,000 54
TABLE 5-5: Structure Fire Property Loss by Area 54
TABLE 5-6: Number of Units Dispatched to Calls by Call Type 57
TABLE 5-7: Wildland Fire Calls by Acres Burned and Duration 60
TABLE 5-8: Wildland Fire Calls by Number of Units Deployed 60
TABLE 5-9: Runs and Deployed Time for Wildland Fire Calls 60
TABLE 5-10: Wildland Fire Calls and Workload by Month 60
TABLE 5-11: Content and Property Loss – Outside Fires 61
TABLE 5-12: KCFD Unit Response Mode 69
TABLE 5-13: KCFD vs. Ambulance Arrival Order 70
TABLE 5-14: Average and 90th Percentile Ambulance Wait-Times 71
TABLE 5-15: Mutual Aid Provided by the KCFD 72
TABLE 5-16: Mutual Aid Received by the KCFD 73
TABLE 5-17: Contract City Allocated Cost – City of Taft 76
TABLE 5-18: Population vs Calls for Service Cost Comparisons 77
TABLE 5-19: JPA Call Distribution 80
TABLE 5-20: Workload by Unit 82
TABLE 5-21: Annual Runs and Deployed Time by Call Type 91
TABLE 5-22: Call Types by Analysis Subarea 93
TABLE 6-1: Summary of Response Times of First Arriving Unit (Minutes) 97
TABLE 6-2: Average Response Time - Bakersfield JPA 98
TABLE 6-3: 90th Percentile Response Time – Bakersfield JPA 98
TABLE 6-4: Average Response Time – Urban Areas 99
TABLE 6-5: 90th Percentile Response Time – Urban Areas 99
TABLE 6-6: Average Response – Rural Areas 100
TABLE 6-7: 90th Percentile Response Time – Rural Areas 100
TABLE 6-8: Average Response Time – Remote Areas 101
TABLE 6-9: 90th Percentile Response Time – Remote Areas 101
TABLE 6-10: Travel Times in 4, 6, 8, 15 and 20 Minute Intervals 104
TABLE 6-11: Extended Response Times by Area 108
TABLE 7-1: The Five GASB Performance Indicators 110
TABLE 8-1: KCFD Fire Prevention Division Major Activity Statistics 2014 - 2017 113

TABLE 8-2: Fire Investigations Division Statistics, 2014 - 2016 116
TABLE 10-1: Call Types 133
TABLE 10-2: Call Types by Analysis Subarea 135
TABLE 10-3: Calls by Type and Duration 136
TABLE 10-4: Number of Units Dispatched to Calls by Call Type 141
TABLE 10-5: Annual Runs and Deployed Time by Call Type 144
TABLE 10-6: Average Deployed Minutes by Hour of Day 146
TABLE 10-7: Call Workload by Unit Type 147
TABLE 10-8: Call Workload by Station and Battalion 148
TABLE 10-9: Total Annual Runs by Station and Battalion by Run Type 150
TABLE 10-10: Daily Average Deployed Minutes by Station and Battalion by Run Type 153
TABLE 10-11: Frequency Distribution of the Number of Calls 156
TABLE 10-12: Top 10 Hours with the Most Calls Received 156
TABLE 10-13: Summary of Response Times 159
TABLE 10-14: Average Response Time of First Arriving Unit, by Call Type – Bakersfield JPA 160
TABLE 10-15: 90th Percentile Response Time of First Arriving Unit, by Call Type – Bakersfield JPA 162
TABLE 10-16: Average Response Time of First Arriving Unit, by Call Type – Urban Areas 163
TABLE 10-17: 90th Percentile Response Time of First Arriving Unit, by Call Type – Urban Areas 165
TABLE 10-18: Average Response Time of First Arriving Unit, by Call Type – Rural Areas 166
TABLE 10-19: 90th Percentile Response Time of First Arriving Unit, by Call Type – Rural Areas 168
TABLE 10-20: Average Response Time of First Arriving Unit, by Call Type – Remote Areas 169
TABLE 10-21: 90th Percentile Response Time of First Arriving Unit, by Call Type – Remote Areas . 171
TABLE 10-22: Average and 90th Percentile Response Time of First Arriving Unit, by Hour of Day – Bakersfield JPA 172
TABLE 10-23: Average and 90th Percentile Response Time of First Arriving Unit, by Hour of Day – Urban Areas 174
TABLE 10-24: Average and 90th Percentile Response Time of First Arriving Unit, by Hour of Day – Rural Areas 176
TABLE 10-25: Average and 90th Percentile Response Time of First Arriving Unit, by Hour of Day – Remote Areas 178
TABLE 10-26: Cumulative Distribution of Response Time – First Arriving Unit to EMS Calls – Bakersfield JPA 181
TABLE 10-27: Cumulative Distribution of Response Time – First and Second Arriving Units to Fires – Bakersfield JPA 182
TABLE 10-28: Cumulative Distribution of Response Time – First Arriving Unit to EMS Calls – Urban Areas 184
TABLE 10-29: Cumulative Distribution of Response Time – First and Second Arriving Units to Fires – Urban Areas 185
TABLE 10-30: Cumulative Distribution of Response Time – First Arriving Unit to EMS Calls – Rural Areas 187
TABLE 10-31: Cumulative Distribution of Response Time – First and Second Arriving Units to Fire – Rural Areas 189
TABLE 10-32: Cumulative Distribution of Response Time – First Arriving Unit to EMS Calls – Remote Areas 191

TABLE 10-33: Cumulative Distribution of Response Time – First and Second Arriving Units to Fires – Remote Areas 192
TABLE 10-34: EMS Calls with Shared Response 193
TABLE 10-35: Response Time – EMS Calls with Shared Response 194
TABLE 10-36: Wildland Fire Calls by Acres Burned and Duration 195
TABLE 10-37: Wildland Fire Calls by Number of Units Deployed 195
TABLE 10-38: Runs and Deployed Time for Wildland Fire Calls 195
TABLE 10-39: Wildland Fire Calls and Workload by Month 196
TABLE 10-40: Actions Taken Analysis for Structure and Outside Fire Calls 197
TABLE 10-41: Content and Property Loss – Structure and Outside Fires 199
TABLE 10-42: Total Fire Loss Above and Below $20,000 199
TABLE 10-43: Fire Loss by Station and Battalion 200
TABLE 10-44: Workload of Administrative and Support Units 202
TABLE 10-45: Workload by Unit – Update Engine Types 204
TABLE 10-46: Runs by Unit and Run Type 213
TABLE 10-47: Average Deployed Minutes Per Day by Unit and Run Type 222

FIGURES

FIGURE 3-1: Kern County Cities and Census (2000) Designated Places 8
FIGURE 3-2: Kern County Table of Organization 9
FIGURE 3-3: Kern County Fire Station Map 10
FIGURE 3-4: Kern County Fire Department Table of Organization 11
FIGURE 3-5: Battery Operated Smoke Detectors in most KCFD Fire Stations 22
FIGURE 3-6: Vehicle Exhaust System Connectors that are not Compatible with the Assigned Apparatus 23
FIGURE 3-7: Example of Inadequate Sleeping Quarters 24
FIGURE 3-8: Example of Inadequate Apparatus Storage Area 24
FIGURE 5-1: Low-Risk Response–Exterior Fire Attack 46
FIGURE 5-2: Moderate Risk Response–Interior Fire Attack 47
FIGURE 5-3: Number of Units Dispatched to Calls 56
FIGURE 5-4: Wildland Resource Deployment on Low-Risk Wildfires 59
FIGURE 5-5: Wildland Resource Deployment on First Alarm High-Risk Wildfires 59
FIGURE 5-6: Kern County Fire Department Fire Planning Areas 63
FIGURE 5-7: Fire Hazard Severity Zones in SRA 65
FIGURE 5-8: Map of Area Covered by JPA 78
FIGURE 6-1: Fire Propagation Curve 95
FIGURE 6-2: Distribution of Fire Calls 105
FIGURE 6-3: Distribution of EMS Calls 106
FIGURE 6-4: Distribution of Other Calls 107
FIGURE 8-1: Emergency Operations Center (EOC) 124
FIGURE 8-2: Emergency Communications Center (ECC) 125
FIGURE 10-1: Map of Analysis Subareas 132
FIGURE 10-2: EMS and Fire Calls by Type 134
FIGURE 10-3: Average Calls per Day, by Month 138
FIGURE 10-4: Calls by Hour of Day 139
FIGURE 10-5: Number of Units Dispatched to Calls 140
FIGURE 10-6: Average Deployed Minutes by Hour of Day 145
FIGURE 10-7: Average Response Times by Analysis Subarea 159
FIGURE 10-8: Average Response Time of First Arriving Unit, by EMS Call Type – Bakersfield JPA 161
FIGURE 10-9: Average Response Time of First Arriving Unit, by Fire Call Type – Bakersfield JPA 161
FIGURE 10-10: Average Response Time of First Arriving Unit, by EMS Call Type – Urban Areas 164
FIGURE 10-11: Average Response Time of First Arriving Unit, by Fire Call Type – Urban Areas 164
FIGURE 10-12: Average Response Time of First Arriving Unit, by EMS Call Type – Rural Areas 167
FIGURE 10-13: Average Response Time of First Arriving Unit, by Fire Call Type – Rural Areas 167
FIGURE 10-14: Average Response Time of First Arriving Unit, by EMS Call Type – Remote Areas 170
FIGURE 10-15: Average Response Time of First Arriving Unit, by Fire Call Type – Remote Areas 170
FIGURE 10-16: Average Response Time of First Arriving Unit, by Hour of Day – Bakersfield JPA 173

FIGURE 10-17: Average Response Time of First Arriving Unit, by Hour of Day – Urban Areas..... 175
FIGURE 10-18: Average Response Time of First Arriving Unit, by Hour of Day – Rural Areas..... 177
FIGURE 10-19: Average Response Time of First Arriving Unit, by Hour of Day – Remote Areas 179
FIGURE 10-20: Cumulative Distribution of Response Time – First Arriving Unit to EMS Calls – Bakersfield JPA 180
FIGURE 10-21: Cumulative Distribution of Response Time – First and Second Arriving Units to Fires – Bakersfield JPA 181
FIGURE 10-22: Cumulative Distribution of Response Time – First Arriving Unit to EMS Calls – Urban Areas 183
FIGURE 10-23: Cumulative Distribution of Response Time – First and Second Arriving Units to Fires – Urban Areas 184
FIGURE 10-24: Cumulative Distribution of Response Time – First Arriving Unit to EMS Calls – Rural Areas 186
FIGURE 10-25: Cumulative Distribution of Response Time – First and Second Arriving Units to Fires – Rural Areas 188
FIGURE 10-26: Cumulative Distribution of Response Time – First Arriving Unit to EMS Calls – Remote Areas 190
FIGURE 10-27: Cumulative Distribution of Response Time – First and Second Arriving Units to Fires – Remote Areas 191

SECTION 1. EXECUTIVE SUMMARY

The Center for Public Safety Management, LLC (CPSM) was retained by Kern County to conduct an operational and administrative analysis for its fire department, including a detailed review of department operations, workload, staffing, and deployment practices. This analysis includes a thorough review of the organization structure, training, performance measures, prevention activities, and interactions with mutual aid and regional partners. Specifically, CPSM was tasked with providing recommendations and alternatives regarding fire department operations, staffing levels, and alternative modes of service delivery to identify any cost saving options that may address the financial shortfalls.

During the study, CPSM analyzed performance data provided by the Kern County Fire Department (KCFD) and also examined firsthand the department's operations. Fire departments tend to deploy resources utilizing traditional approaches that are rarely reviewed. To begin our review, project staff asked for certain documents, data, and information. The project staff used this information/data to familiarize themselves with the department's structure, assets, and operations. The provided information was supplemented with information collected during an on-site visit to observe the performance of the department, and to compare that performance to national benchmarks. CPSM will typically utilize benchmarks that have been developed by organizations such as the National Fire Protection Association (NFPA), Center for Public Safety Excellence, Inc. (CPSE), the ICMA Center for Performance Measurement, as well as others.

Project staff conducted a site visit on August 15-19, 2017, to observe fire department and agency-connected support operations, interviewing key department staff, and reviewing preliminary data and information. Telephone conference calls as well as e-mail exchanges were conducted between CPSM project management staff, the County Administrative Office, and the Fire Department so that CPSM staff could affirm the project scope and elicit further discussion regarding this analysis.

The Kern County Fire Department is a highly skilled organization that is responsible for emergency service delivery in a very large and geographically diverse setting. The workload in this area is significant and this demand is compounded by the complexity of call activity ranging from high-volume EMS, structural fire response, wildland fire, transportation incidents, and farming and manufacturing accidents. In addition, the Kern County service area is subject to drought, flood and seismic events. The personnel with whom CPSM interacted are truly interested in serving the county to the best of their abilities and demonstrated a unified goal in achieving excellence in service delivery. As service demands continue to increase and the fire department is required to provide expanded services, it is essential that the organization continue its strategic planning efforts, organizational team building, performance measurement, and goal setting. The challenges in Kern County are unique in many respects but are not insurmountable. CPSM will provide a series of observations and recommendations that we believe will enable the KCFD to become ***more efficient*** and ***smarter*** in the management of its emergency and nonemergency responsibilities.

RECOMMENDATIONS

The KCFD provides an excellent range of services to its citizens, local businesses, and visitors to the area. The department is well respected in the community and by county leadership. For organizations of the caliber of the KCFD, the recommendations provided in our analysis are minor in comparison to the department's performance and the recommendations do not

denote major flaws in day-to-day operations or overall efficiencies. In an organization such as the Kern County Fire Department, which is achieving a high level of performance, the real challenge becomes the ability to maintain optimum service delivery in an environment with reduced financial resources and increasing service demands.

Sixty-two recommendations are listed below and in the applicable sections within this report. The recommendations are based on best practices derived from the NFPA, CPSM, ICMA, the U.S. Fire Administration, the International Association of Emergency Managers (IAEM), and the Federal Emergency Management Agency (FEMA). These recommendations are listed in five categories; I. *Organization, Management and Personnel*; II. *Facilities and Capital; III. Planning and Risk Management; IV. Operations, Dispatch and Deployment; V. Training and Prevention*. There is a page reference after each indicating where each recommendation can be found.

In addition, CPSM has included in this study a section titled; ***"Considerations for Cost Reductions and Improved Solvency".*** Beginning on *page 128*, ten specific recommendations are provided that focus of cost savings and revenue enhancement efforts that may be considered.

I. Organization, Management and Personnel:

1. Kern County should renegotiate the contract provision with the Fire Union that requires all paid leave to be counted as time worked in the calculation of overtime. (p. 13)
2. Kern County should eliminate the current process that uses the standard biweekly pay amount (a type of pay cycle income averaging) and move to a payroll system that pays employees for the actual hours worked in each pay period. (p. 13)
3. Kern County should renegotiate the current department work schedule and impose a policy to limit the number of consecutive hours an employee can work. (p. 14)
4. KCFD should consider the expansion of program management duties to field personnel and utilize these assignments to enhance career development and subsequently use successful fulfillment of these duties as a factor in the promotional process. (p. 16)
5. The KCFD should institute an Internet-based video conferencing system to facilitate regular meeting forums (daily/weekly/monthly) to discuss departmental initiatives and new directives with on-duty personnel, chief officers, and support personnel. (p. 17)
6. KCFD should expand the training requirements, certifications, and college education prerequisites for the Fire Engineer, Captain, and Battalion Chief promotional processes. (p. 18)
7. KCFD should improve and expand the use of the employee performance appraisal process in the career development of all personnel. (p. 18)
8. The KCFD should investigate the practicality of incorporating regional centers and/or private company direct delivery options to supplement the distribution of equipment and supplies to the fire stations. (p. 35)
9. The KCFD should move towards obtaining 100 percent cost recovery for its hazardous materials program and should consider seeking financial support from those companies within Kern County that store, transport, or incorporate hazardous substances within their operations. (p. 43)
10. Kern County should consider a revision in the negotiated agreement with the firefighters' union that moves to full cash payment for holiday work and eliminate the option for taking time off in lieu of pay. (p. 49)

11. The KCFD should consider the broadening of its workforce to include civilian cadets, volunteers, and other sources to assist in fuel management efforts. (p. 68)
12. KCFD should revisit its current accounting for the costs associated with the wildland program and create a separate accounting for all costs associated with the program. (p. 68)
13. KCFD should improve its tracking mechanism for revenues received and amounts outstanding from each municipality that contracts with KCFD for fire services. (p. 75)
14. Kern County should modify its fee structure for cities that obtain services from KCFD so that the contract costs reflect the actual cost for providing these services. (p. 78)
15. Kern County should resume discussions with the City of Bakersfield in order to ensure that the JPA is current. (p. 80)
16. Kern County should consider negotiating an Aircraft Rescue & Fire Fighting (ARFF) services agreement at Meadows Field and Inyokern Airport. (p. 81)
17. KCFD should expand its performance measures in order to enable ongoing review of service outcomes. The process of developing these measures should utilize input from KCFD members, the community, the County Board of Supervisors, municipal contract representatives, and County Administration. (p. 111)
18. Kern County should negotiate the elimination of the educational incentive pay provision (Article XXI) and instead specify those education requirements as a component of the promotional process. (p. 121)
19. Kern County should negotiate to eliminate the Flat Rate Special Allowance (of 2 percent to 4 percent) included in Article XXIII, Section-D, and establish the maintenance of certain levels of physical fitness as a job requirement necessary to maintain employment. (p. 122)

II. Facilities and Capital:

20. The KCFD should consider the installation of automatic fire alarm systems (hard-wired smoke detectors) with heat, smoke, and carbon monoxide detection in all fire stations. (p. 22)
21. The KCFD should consider equipping all existing fire stations that are not being replaced in the near-term (five years or less) with automatic fire sprinkler systems. (p. 22)
22. The KCFD should complete an evaluation of its vehicle exhaust extraction systems to ensure their operability and availability at all fire stations. (p. 23)
23. The KCFD should initiate a capital program that installs automatic-start emergency generators at all fire stations to provide auxiliary power during power failures/outages. (p. 23)
24. Kern County and the KCFD should develop a comprehensive long-range facilities capital plan to address the operational and structural deficiencies at its fire station facilities. (p. 24)
25. The KCFD should reevaluate its purchasing practices for apparatus and consider other less expensive models or commercial rather than custom chassis. (p 32)
26. The KCFD should reevaluate its continued use of custom wildland engines and consider the utilization of U.S. Forestry Service-specified wildland engines. (p. 32)
27. The KCFD should consider the use of cooperative bid/purchasing programs for the acquisition of medium- and heavy-duty apparatus. (p. 32)
28. The KCFD should expand the apparatus specification and purchasing committee to include a wider range of employee stakeholders. (p. 32)

29. The KCFD should expand the training of its heavy equipment mechanics and pursue a goal to increase the number who are certified as Emergency Vehicle Technicians (EVTs). (p. 33)
30. The KCFD should track and analyze annual repair, maintenance, and service costs for its apparatus fleet and utilize this information in the development of the fire apparatus replacement schedule. (p. 33)
31. The KCFD should adopt a formal fire apparatus replacement schedule. (p. 34)
32. The KCFD should create a ten-year capital equipment and tools replacement program. (p. 36)
33. The KCFD should consider establishing an industry standard for the replacement of wildland heavy equipment and air response apparatus. (p. 68)

III. Planning and Risk Management:

34. The KCFD should develop a comprehensive strategic business plan. (p. 17)
35. The KCFD should conduct a comprehensive fire risk analysis that concentrates on critical and high-risk occupancies. (p. 40)
36. The KCFD should reexamine and formalize its definition regarding what constitutes a target hazard occupancy that is subject to prefire incident planning. (p. 44)
37. The KCFD should develop a county-wide master inventory list of target hazards and then maintain a tracking process for these files and for when updates are required. (p. 45)
38. The KCFD should continue in its effort to update and enter its prefire/incident plans on apparatus Mobile Data Terminals to provide real-time, quick retrieval of this information. (p. 45)
39. Kern County should consider CPSE fire accreditation in the future. (p. 45)
40. KCFD should develop an integrated risk management plan that focuses on structure fires throughout the County. (p. 55)
41. The Fire Safe Councils should review each of the regional assessments for continued relevance and consistency. (p. 65)

IV. Operations, Dispatch and Deployment:

42. The KCFD and its Emergency Communications Center (911) should continue to monitor deficiencies and evaluate new and emerging technologies to improve the overall emergency radio communications coverage throughout the county. (p. 37)
43. The KCFD should evaluate the use of peak-period, two-person EMS squad units, operating in roving patterns throughout the county. (p. 48)
44. The KCFD should consider the reassignment of 27 existing line fire personnel (three ladder companies on three shifts) into peak-period EMS squad positions and assign them to 10-hour daily assignments. (p. 48)
45. KCFD should consider a revision in the number of authorized vacation slots that are available for employees to take off on each shift. (p. 49)
46. The KCFD should consider renegotiating the contract with the state to expand the defined seasonal use of wildland crews for hazard mitigation efforts. (p. 67)
47. KCFD should work with its 911 Dispatch Center in improving efforts to reduce the mode of response to nonemergency and service assist-related EMS calls. (p. 70)
48. KCFD should work with its 911 Dispatch Center to improve dispatch handling times. (p. 102)

49. The 911 Dispatch Center should work with KCFD operations staff to implement a pre-alert dispatching process for priority calls. (p. 102)

V. Training and Prevention:

50. In an effort to better distribute the investigative workload, KCFD should consider expanding the training and use of wildland suppression personnel as wildland fire investigators. (p. 68)
51. The KCFD should ensure that all company officers receive Company Officer Inspector/Investigations Training offered through the California Office of the State Fire Marshal. (p. 114)
52. The KCFD should consider the implementation of an in-service fire company inspection fee. (p. 115)
53. The KCFD should continue its efforts to expand the utilization of civilian fire prevention inspectors and plans reviewers in the Fire Prevention Division. (p. 115)
54. The KCFD should consider a reorganization of the Fire Investigation program and evaluate efforts to improve its efficiency. (p. 117)
55. The KCFD should complete a comprehensive review and update of the department's training manual to reflect current industry best practices and KCFD operations. (p. 119)
56. The Training Division should implement an operational procedure and review process that documents the completion of all training activities and their entry into Target Solutions. (p. 120)
57. KCFD should designate a Fire Captain on each shift and each battalion to serve as the shift training coordinator to help facilitate in-service training activities, both for fire and EMS. (p. 120)
58. The KCFD should institute written and practical skills testing and proficiency evaluations as part of the department's comprehensive fire training program. (p. 121)
59. The KCFD should revise its current promotional requirements for Fire Engineer, Captain, and Battalion Chief and consider the inclusion of specific training requirements, certifications, and college-level education as prerequisites for these positions. (p. 121)
60. The KCFD Emergency Communication Center (911) should take steps to monitor and report dispatch call processing times.
(p. 126)
61. Kern County should strengthen the interface with Hall Ambulance so that the department can receive/observe the status of Hall units that are assigned to incidents. (p. 127)
62. The KCFD and the ambulance providers should improve unit-to-unit communications and data transmissions in managing EMS response activities. (p. 127).

SECTION 2. SCOPE OF PROJECT

The scope of this project was to provide an independent review of the services provided by the Kern County Fire Department (KCFD) so that the County Board of Supervisors and county officials, including officials of KCFD, could obtain an external perspective regarding the county's fire and EMS delivery system. This study provides a comprehensive analysis of the KCFD, including its organizational structure, workload, staffing, overtime, deployment, training, fire prevention, emergency communications (911), planning, and public education efforts. In addition, CPSM will provide its insights to help the department determine the appropriateness of the level of response and alternative delivery systems that could be utilized in meeting both current and projected service demand. In this analysis, CPSM provides recommendations where appropriate and offers input on a strategic direction for the future.

Key areas evaluated during this study include:

- Fire department response times (using data from the county's computer-aided dispatch system and the KCFD records management systems).
- Deployment, staffing, and overtime.
- Organizational structure and managerial oversight.
- Fire and EMS workloads, including unit response activities.
- KCFD support functions (training, fire prevention/code enforcement, and 911 dispatch).
- Essential facilities, equipment, and resources.
- An identification of cost-saving measures and their impacts on service delivery.

SECTION 3. ORGANIZATION AND MANAGEMENT

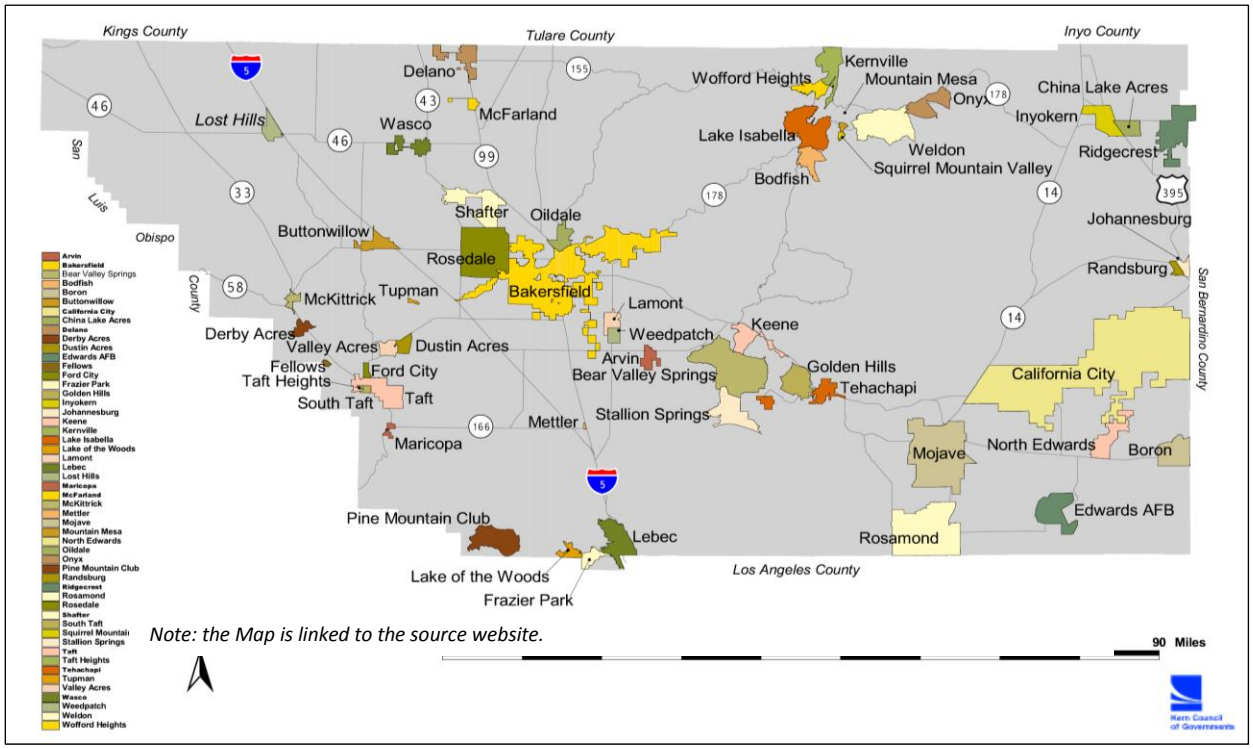
GOVERNANCE AND ADMINISTRATION

Kern County spans the southern end of the California Central Valley. Covering 8,161.42 square miles, it is the third-largest county by area in the state, and is larger than the areas of the states of Delaware, Rhode Island, and Connecticut combined. The county is bordered by Los Angeles and Ventura Counties on the south; San Bernardino County on the east; Inyo, Tulare, and Kings Counties on the north; and San Luis Obispo and Santa Barbara Counties on the west.

The county's population of 884,788[1] is concentrated in urban areas and along prominent transportation routes. Included in these numbers is the estimated population for the city of Bakersfield (376, 380), the combined population of the nine municipalities under contract for fire services (189,429), the unincorporated areas of Kern County (305,272), and California City (13,707). Several of the state's main highways also pass through Kern County, including Interstate 5 and State Highway 99. These two roadways branch off in the southern end of the county, at which point I-5 becomes California's principal north-south route. Highway 99 follows the eastern side of the San Joaquin Valley and serves Bakersfield and other rapidly growing cities along its route. US Highway 395 and State Highway 14 are the major thoroughfares on the eastern side of the Sierras. There are also 7 county airports and two railroad lines.

[1] "State & County Quick Facts". United States Census Bureau. Population of Housing Units Estimates. Retrieved from Wikipedia on June 9, 2017.

FIGURE 3-1: Kern County Cities and Census (2000) Designated Places2



The county has a large agricultural base and is a significant producer of chemicals, oil, natural gas, hydroelectric power, wind turbine power, and geothermal power. As of 2009, Kern was California's top oil-producing county, with 81 percent of the state's 52,144 active oil wells. The county accounts for one-tenth of overall U.S. oil production. Kern is also noted for its mineral wealth, including gold, borate, and kernite.

Kern County's main water sources include snowmelt from the Sierras that feed into the Kern River and other creeks, and the groundwater resources of the San Joaquin Valley and Mojave Desert. The Lake Isabella Dam on the Kern River is the major surface water impoundment in the County. Another important man-made body of water is the California Aqueduct, which carries up to 2 million gallons of water per minute south from the Sacramento River Delta, across Kern County, and into metropolitan Los Angeles.

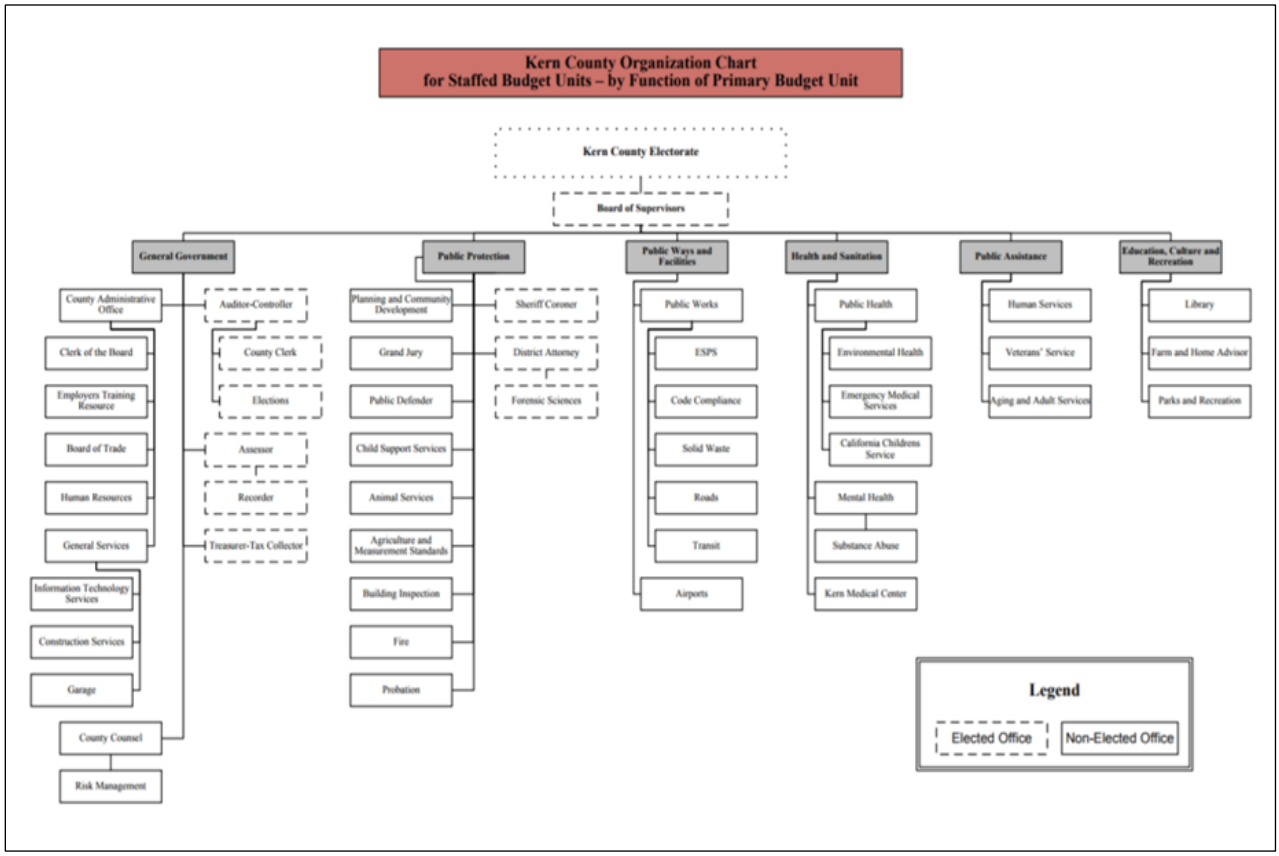
There is also a strong aviation, space, and military presence in Kern County. Edwards Air Force Base, the China Lake Naval Air Weapons Station, and the Mojave Air and Space Port are home to more than 60 companies engaged in flight development, advanced aerospace design, flight testing, and heavy rail industrial manufacturing.

The Board of Supervisors (Board) serves as the governing body of the County and various special districts. The Board consists of five non-partisan members, each elected for a four-year term from five separate geographical districts. In accordance with the authority and limits prescribed by the State Constitution and various state statutes, the Board enacts legislation governing the county and determines policies for operation. The Board oversees a number of standing and ad-

[2] Kern County Cities and Census (2000) Designated Places Map. https://www.kerncounty.com/econdev/pdf/city-cdp.pdf (retrieved on September 23, 2017).

hoc committees, including Finance and Administration, Health and Social Services, and Public Safety.

FIGURE 3-2: Kern County Table of Organization



The county is subject to several kinds of natural disasters; for example, major earthquakes have included the 1857 Fort Tejon earthquake (7.9 MMS) and the 1952 Kern County earthquake (7.3 MMS). Historically, Kern County has also been subject to flooding and significant wildfires. In 2016, the Erskine Fire burned in the area of Lake Isabella. It was the second-largest wildfire of the California wildfire season; it was the15th most destructive fire in state history, and the first fire of the year to result in fatalities.

Oil and gas production accounts for nearly 30 percent of the county's property tax revenues, a percentage that has been declining in recent decades. However, oil and gas activities are still a critical funding source for the county. In 2015, Kern County Supervisors declared a state of fiscal emergency because of slipping tax revenue due to the decline in oil prices.[3]

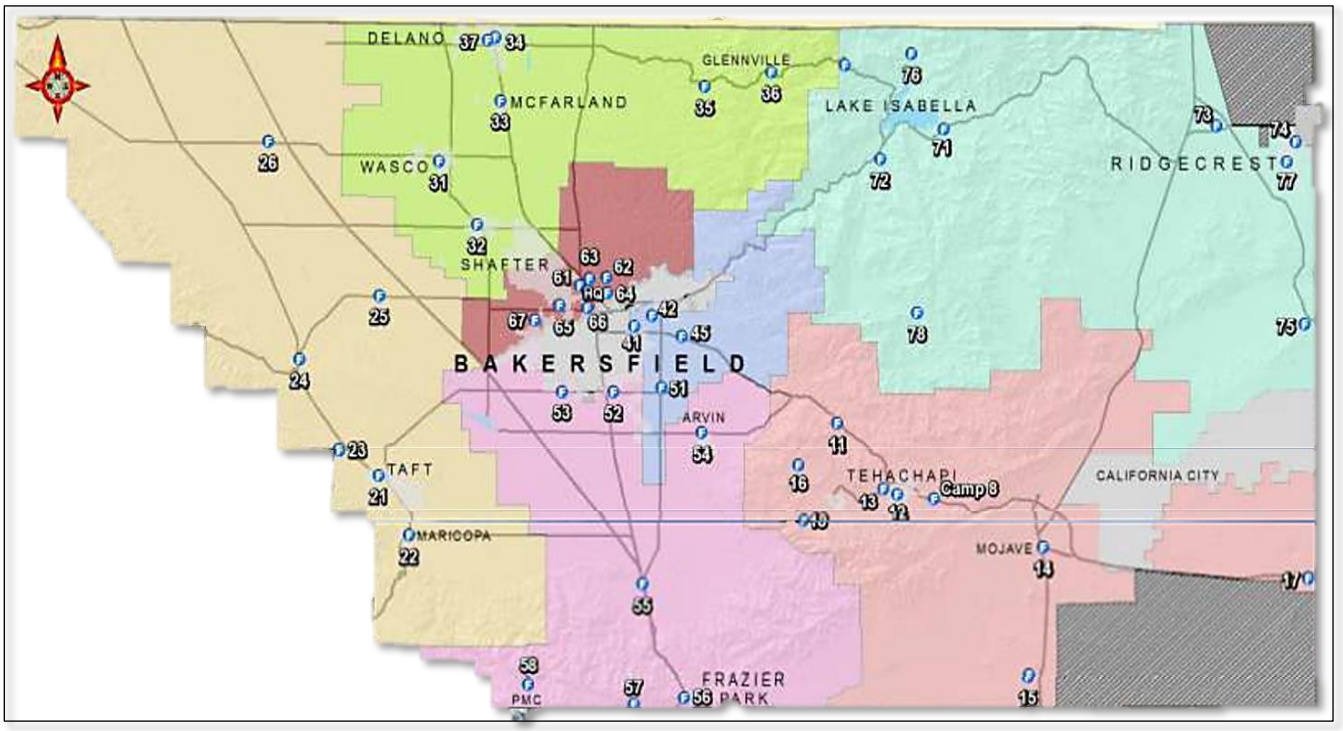
A special taxing district is a mechanism used by communities, wherein property owners elect to pay special assessments levied on their properties to receive public services and/or improvements that would not otherwise be provided. While Kern County currently has a variety of special taxing districts, including healthcare, hospitals, flood control, airport, and utilities, there are none covering public safety.

[3] Hsu, Tiffany. "Kern County declares a fiscal emergency amid plunging oil prices." *Los Angeles Times*, January 27, 2015.

KERN COUNTY FIRE DEPARTMENT–OVERVIEW

The Kern County Fire Department (KCFD) is a career fire department comprised of 687 personnel; 618 are permanent employees and 69 are part-time/temporary positions, primarily serving as seasonal wildland firefighters. The department is led by a Fire Chief who has overall responsibility for managing the department's day-to-day operations and provides administrative oversight. The Fire Chief is assisted by four Deputy Fire Chiefs who supervise activities in the department's four divisions: Operations, Administration, Logistics, and Support Services. The Operations Division is made up of 477 line personnel who are assigned to the 47 fire stations that are operational throughout the county and in the municipalities that contract for services.

FIGURE 3-3: Kern County Fire Station Map

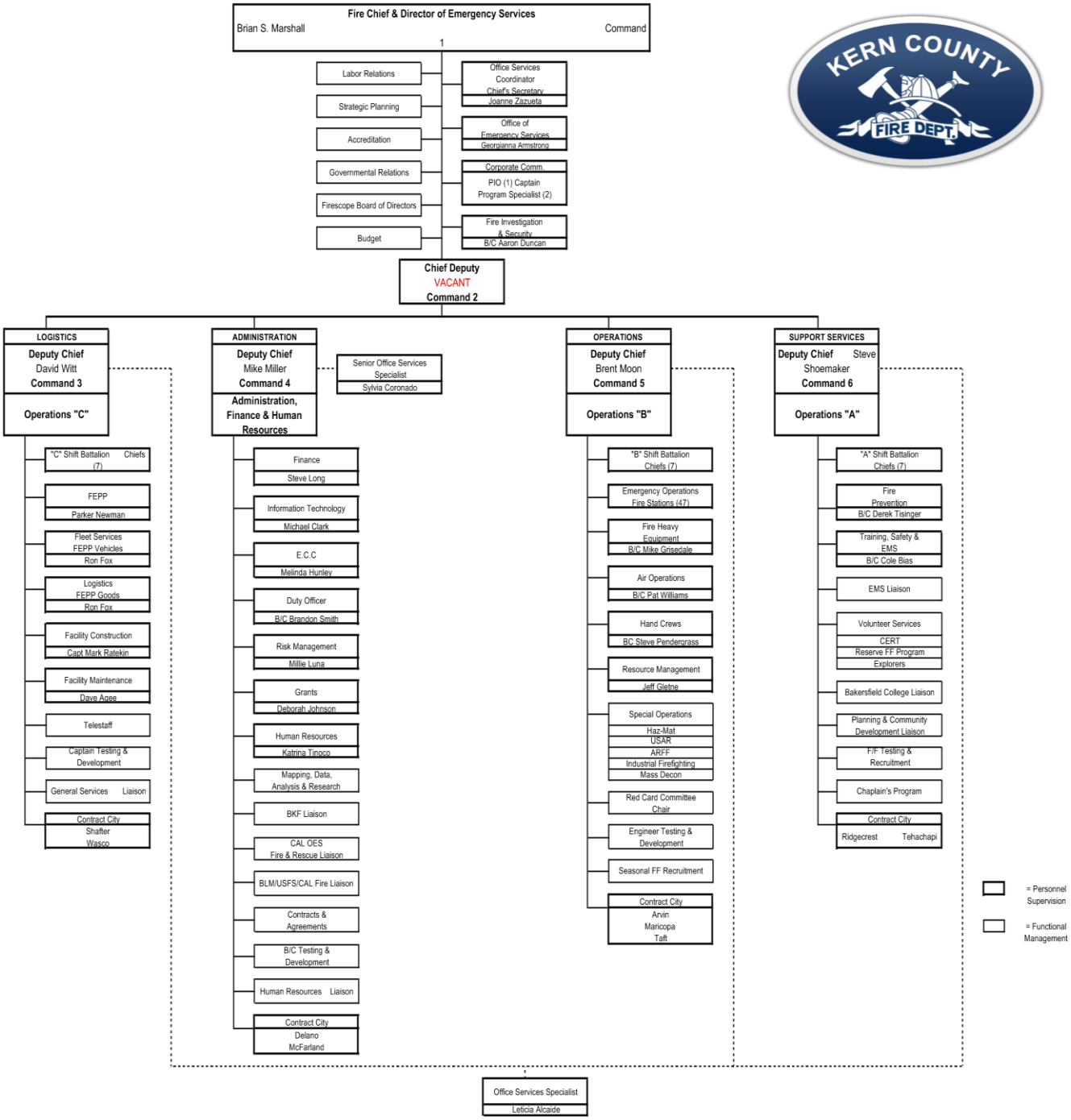


Included in the Operations Division is a Wildland Section, a Heavy Equipment Section (Dozers), Air Operations (Helicopters), and Special Operations. KCFD provides Crash Fire Rescue (CFR) services to Meadows Field and Inyokern Airport. KCFD also provides EMS first responder services in conjunction with four private ambulance providers (Hall Ambulance, Delano Ambulance, Care Ambulance, and Liberty Ambulance).

The department operates a Training Section, an Arson Investigations Unit, Fire Prevention & Plans Review, a Volunteer and Explorer Group, Information Technology, Fleet Services, Finance, Human Resources, and a 911 Communications Center.

Figure 3-4 illustrates the current organizational structure within the Kern County Fire Department.

FIGURE 3-4: Kern County Fire Department Table of Organization



The budget for Kern County Fire Department is estimated to be just under $155.7 million in FY 2016-17. The majority of the department's expenditures are for staffing and operating costs (approximately 85 percent). These expenditures are funded primarily through property taxes, contracts for services, and additional fees.

Due to a reduction in property tax revenue related to oil and gas price decreases accompanied by a steady increase in employee pension costs, there has been an ongoing shortfall in the needed funding to maintain KCFD operations. Subsequently, the Board approved

a seven-year, General Fund Contribution of $3.9 million annually to cover the escalating pension cost through FY 2020-21, if needed. The actual deficit is expected to increase over the next two years since employee costs are anticipated to grow. The Kern County Administrator noted in the recommended 2017-18 budget that further expenditure reductions or new revenue sources will be needed in the coming years to achieve a sustainable fire budget.

The Operations Division is responsible for providing the department's emergency response functions for a wide array of fire, rescue, wildland, and emergency medical services. KCFD operates from 47 fire stations subdivided into seven battalions. The department provides emergency services to nine municipalities that contract with the county for these services. In addition, KCFD operates under a Joint Powers Agreement (JPA) with the City of Bakersfield to provide joint response to calls in either the city or the county from a combined force of both agencies. The department staffs four ladder trucks, 46 engines, seven BC/Command Units, and three ARFF units. These units are operational 24 hours per day, 7 days a week. In addition, KCFD operates an Air Unit, Wildland Unit, and a Dozer/Heavy Equipment Unit. The Wildland Unit is supported by upwards of 69 seasonal wildland firefighters who provide hand crews, and wildland response services. The Special Operations Unit, which utilizes a cross-staffing model with engine companies, provides hazardous materials response and urban search and rescue (USAR).

KCFD utilizes a constant staffing model for its 24-hour line personnel. All trucks and engines are staffed with three personnel. Command units are each staffed with one person, the two ARFF units at Meadows field are also staffed with one person, and the single ARFF unit at Inyokern Airport is staffed with one person. The daily on-duty staffing is established at 161 personnel. Staffing levels will not deviate from this daily minimum, so whenever anyone is absent because of vacation, sick leave, disability, or other lost-time categories, overtime is utilized to fill these vacancies. Under current department policy, upwards of 23 personnel are allowed off daily for the various leave types and this results in multiple overtime assignments each day.

During the one-year period of this study from July 1, 2016 through June 30, 2017, KCFD responded to 49,766 incidents, of which 53 percent were EMS-related. KCFD has a higher volume of outside fires and wildland incidents due to the expansive areas of remote mountain terrain and wilderness environments. In addition, the call analysis included nearly 7,400 canceled responses (approximately 15 percent of total responses), which is much higher than we normally observe (typically in the 5 percent range). We attribute the higher number of canceled calls to the extended travel distances that are being covered and the frequency of KCFD units being canceled prior to their arrival.

KCFD operates in what is often termed a ***Two-Tiered EMS Delivery System***. In this arrangement the fire department is the primary first responder for EMS calls and private ambulance providers (primarily Hall Ambulance Service) are co-responders. The private ambulance services provide ***Advanced Life Support Services (ALS)*** and transport services. KCFD units operate at the ***Basic Life Support (BLS)*** level, with most units staffed with emergency medical technicians (EMTs). In the Pine Mountain Club, KCFD operates at an ALS level. Ambulance units operate at an ALS level and are staffed with paramedics who deliver a higher level of prehospital care. In addition to transport services, the private ambulance companies also provide ***inter-facility transport services***. These services typically are non-emergency in nature and involve the movement of non-ambulatory patients from one medical facility to another. KCFD receives no fees for its delivery of EMS first response activities.

In addition to emergency response duties, KCFD personnel also provide a wide range of customer service and community outreach efforts. These include blood pressure screenings, tours of fire stations and apparatus, smoke detector installations, and fire and life safety

presentations. In-service emergency personnel also conduct periodic fire inspections at select occupancies in the county and contract municipalities.

Operations personnel work a very unique three-platoon schedule. Personnel are on duty for 48 consecutive hours followed by 48 hours off. This cycle of 48 on and 48 off is repeated three times and then employees are off for 192 consecutive hours. This schedule equates to a 56-hour workweek if averaged throughout the year. Overtime guidelines relating to municipal fire personnel are specified under the Fair Labor Standards Act (FLSA) and the "***7(k) exemption,***" which allows municipal fire personnel to work up to 53 hours each week before an overtime premium is required.[4] FLSA only requires overtime pay when the actual hours worked are in excess of the designated workweek. FLSA does not require that this calculation include time not worked, such as vacation time, sick leave, or holidays (federal or otherwise).[5] Kern County has negotiated in the current labor agreement (Article IX, Sect. B-2) a provision that counts any lost time as time worked in the calculation for overtime eligibility.

> ***Recommendation: Kern County should renegotiate the contract provision with the Fire Union that requires all paid leave to be counted as time worked in the calculation of overtime.***

It is difficult to estimate the actual savings that would be realized if Kern County were to modify its interpretation of "paid leave as time worked." However, if this change is adopted, CPSM believes that there will be a significant reduction in the amount of overtime paid, given the estimated $2.9 million of FLSA overtime that is paid annually.

Another issue related to the current payroll cycle is the averaging of hours worked in the biweekly payroll cycle. Because of the varying hours worked within each of the cycles, there can be significant variance in the actual number of hours worked by each of the three-platoons. This variance ranges from a low of 192 hours in the short cycle to a high of 264 hours in the longest cycle. To equalize the hours paid in each two-week pay period, Kern County has chosen to utilize a standard biweekly pay schedule so that employees are paid for a consistent number of hours each pay period. However, this standard biweekly pay amount inadvertently results in a higher overtime pay rate during the shorter work cycles.

> ***Recommendation: Kern County should eliminate the current process that uses the standard biweekly pay amount (a type of pay cycle income averaging) and move to a payroll system that pays employees for the actual hours worked in each pay period.***

The Kern County Auditor-Controller's office performed an analysis of approximately 26 pay periods in 2015 and 2016 to compare the two payroll methods (standard vs actual). On the basis of this analysis it was estimated that the standard payroll averaging method results in excess of $250,000 in additional overtime payments when compared to the actual hours worked method. The county and the firefighters' union have an MOU in effect that formalizes the current process; CPSM recommends that this issue be adjusted in the upcoming contract negotiations.

Under the current work schedule, employees are allowed to exchange their shifts, and this often results in employees working 144 consecutive hours (six consecutive 24-hour days) without relief. There have been a number of studies done involving firefighter work schedules and a schedule's

[4] See 29 USC §207(k).
[5] U.S. Department of Labor, Wage and Hour Division, Overtime Pay: General Guidance.

effects on sleep patterns.[6] Kern County does not have in place policy that restricts the number of consecutive on-duty hours a department employee can work. CPSM believes that the County should review this situation and impose limits on the consecutive hours employees can work.

> ***Recommendation: Kern County should renegotiate the current fire department work schedule and impose a policy to limit the number of consecutive hours an employee can work.***

CPSM also believes that the current work schedule is conducive to extended periods of fatigue, given the normal fire and EMS workload combined with the frequent wildland assignments. A standard 48 / 96-hour schedule (48 hours on duty followed by 96 hours off duty) would be an improvement over the current schedule and should be considered for negotiations in the upcoming contract deliberations.

STAFFING AND DEPLOYMENT

Individual unit staffing and minimum daily staffing levels are perhaps the most contentious aspects of managing fire operations in the U.S. today. There are a number of factors that have fueled the staffing debate. Aside from FAA requirements for minimum staffing levels at commercial airports and certain federal requirements for wildland assignments***, there are no state or federal requirements for the staffing of fire apparatus for structural firefighting.*** The U.S. Occupational Safety and Health Administration (OSHA) has issued a standard that has been termed the ***"Two-in-Two-Out"*** provision. This standard affects most public fire departments across the U.S., including the KCFD. Under this standard, firefighters are required to operate in teams (of no fewer than two personnel) when engaged in ***interior structural firefighting.*** The environment in which interior structural firefighting occurs is further described as areas that are immediately dangerous to life or health (an IDLH atmosphere) and subsequently require the use of self-contained breathing apparatus (SCBA). When operating in these conditions, firefighters are required to operate in pairs and they must remain in visual or voice contact with each other and must have at least two other employees located outside the IDLH atmosphere. This assures that the "***two in***" can monitor each other and assist with equipment failure or entrapment or other hazards, and the "***two out***" can monitor those in the building, initiate a rescue, or call for back up if a problem arises.[7] This standard does not specify staffing on individual apparatus but instead specifies a required number of personnel be assembled on-scene when individuals are in a hazardous environment. There is, however, a provision within the OSHA standard that allows two personnel to make entry into an IDLH atmosphere without the required two back-up personnel outside. This is allowed when they are attempting to rescue a person or persons in the structure before the entire team is assembled.[8]

A second factor that contributes to the staffing debate is the National Fire Protection Agency (NFPA) 1710 publication, *Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments* (2016 Edition Sec., 5.2.1.), which specifies that the staffing level on responding engine and ladder companies be established at ***a minimum of four on-duty personnel***. Unlike the OSHA guideline, which is a mandatory provision, the ***NFPA 1710 guideline is advisory***; communities (including Kern County) are not required to adhere to this NFPA guideline. NFPA

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[6] See: https://www.usfa.fema.gov/current_events/081717.html, https://fireflow.blog/2017/08/18/shift-work-linked-to-poor-sleep-quality-study-suggests/
[7] OSHA-Respiratory Protection Standard, 29CFR-1910.134(g)(4).
[8] Ibid, Note 2 to paragraph (g).

1710 also provides guidance regarding staffing levels for units responding to EMS incidents; however, the provision is less specific and does not specify a minimum staffing level for EMS response units. Instead the standard states; "*EMS staffing requirements shall be based on the minimum levels needed to provide patient care and member safety.*"[9] The difficulty that many agencies have is the co-utilization of fire companies and EMS companies in responding to both fire and EMS calls. Working fires involving hazardous environments are labor intensive and more personnel are needed to effectively manage these incidents. EMS calls are typically managed with fewer personnel, and the majority of EMS calls can be handled with a single rescue company of two fire personnel. In the call-screening process, those calls that require additional personnel are typically identified at the dispatch level and additional personnel can be assigned when needed.

Typically, KCFD operates 53 primary fire suppression companies that are staffed on a daily basis (46 engines, 4 ladders, and 3 ARFF units). In addition, there are seven BC/Command units. The KCFD delivers field operations and emergency response services through a clearly defined division of labor that includes an Executive Officer (Deputy Fire Chief) who is the ranking officer in charge of all field operations. KCFD also operates with seven middle managers (Battalion Chiefs), who have regional command and administrative oversight in seven defined geographic areas of the county. The Fire Captain serves as first-line unit supervisor for each responding unit, and technical specific staff includes Drivers and Firefighters.

As noted, KCFD operates 60 emergency response units with a minimum daily staffing that has been set at 161 personnel. Most fire stations operate with a single crew that consists of a Fire Captain, Driver Engineer, and a Firefighter. All response personnel are cross-trained and certified as Emergency Medical Technicians (EMTs) and some employees possess paramedic certifications. Four fire stations in Kern County (Stations 21, 41, 55 and 65) operate both an engine and a ladder truck. These stations are each staffed with six personnel (three on the engine and three on the ladder). Most fire stations are equipped with various vehicle types that are cross-staffed with the assigned personnel and the most appropriate apparatus is utilized when a call is assigned. These vehicle types include; Type-3 Wildland Engines, Type-6 Wildland Patrol Units, Water Tenders, USAR, Hazardous Response Unit, and an array of reserve units of various types. Battalion headquarters are at Stations 11, 21, 33, 41, 55, 65 and 71. KCFD typically responds to EMS calls in its fire apparatus, typically an engine or ladder truck.

Many agencies often assign the oversight of program management duties to those staff officers and chief officers who are assigned to 40-hour assignments. CPSM believes it is critical that many of the program management duties required in the operation of a modern fire and EMS organization be delegated and under the direction of field personnel. KCFD has made a number of assignments of support duties to line personnel and this is commendable. These assignments are limited in number, however, and in many instances do not include all Captains and Battalion Chiefs. The ability to properly manage key organizational duties is beneficial from a career development perspective. In addition, the assumption of program management duties and the effectiveness with which an individual performs in these assignments is a viable consideration in the promotional process. Table 3-1 lists a variety of program management duties that could be considered for assignment to field personnel.

[9] (NFPA) 1710, *Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments* (2016 Edition Sec., 5.3.32.).

TABLE 3-1: Program Assignment Duties

Program Description	Assignment Level
Promotional Testing	Battalion Chief
Performance Appraisals	Battalion Chief
Haz Mat/Technical Rescue	Battalion Chief
Employee Recognition/Awards	Battalion Chief
CISM/EAP	Battalion Chief
Sick Leave/Absenteeism Review	Battalion Chief
Budget Committee	Battalion Chief
Payroll / Executive Time Auditing	Battalion Chief
Police Department Liaison	Battalion Chief
EMS Protocols	Captain
Station Maintenance/Upkeep and Supplies	Captain
Fire Reporting QA	Captain
Hose Testing	Captain/Engineer/FF
Hydrant Testing	Captain/Engineer/FF
Radio Programming	Captain/Engineer
Mapping	Captain/Engineer
Fire Pre-incident Planning	Captain
Infectious Disease Control	Captain/Paramedic
EMS Supplies/Decon/Bio Disposal	Captain/Engineer/FF
911 Liaison	Captain
Station Response Area Designation	Captain
Response Protocols	Captain
Fire Investigations	Captain/Engineer
Safety/ReHab/Risk Management	Captain
SOP/Ops Committee	Captain/Engineer/FF
Fitness Committee	Captain/Engineer/FF
Shift Training Coordinator	Captain
Recruit Training/Proctoring	Captain
Public Information Officer	Captain/Engineer/FF
Driver Training/EVOC	Captain/Engineer
Fleet Maintenance/Repair Record Keeping	Captain/Engineer
Internal Communications/Newsletter	Captain/Engineer/FF
Social Media/FD Web Page	Captain/Engineer/FF
FF/EMS Recruitment Committee	Captain/Engineer/FF
Car Seat Installation	Captain/Engineer/FF
Smoke Detector Replacement	Captain/Engineer/FF

Recommendation: KCFD should consider the expansion of program management duties to field personnel and utilize these assignments to enhance career development and subsequently use successful fulfillment of these duties as a factor in the promotional process.

The ability to communicate work assignments, new program initiatives, or merely to update employees on departmental programs or the strategic direction of the organization requires ongoing outreach, specifically from the Fire Chief and chief officers in the organization. There are a number of communication tools currently available that can be used to conduct video conference calls and information exchanges among multiple work settings (for example, see GoTo Meeting™, WebEX™, Skype for Business™, and AnyMeeting™, etc.). These tools are inexpensive and in some cases, once the initial software is purchased, there are no recurring charges. CPSM believes that the KCFD will benefit greatly from an expanded information exchange, which would also prove useful in coordinating daily training assignments, shift activities, personnel movements, etc.

Recommendation: The KCFD should institute an Internet-based video conferencing system to facilitate regular meeting forums (daily/weekly/monthly) to discuss departmental initiatives and new directives with on-duty personnel, chief officers, and support personnel.

In his online message to the community,[10] Chief Marshall shares a clear mission and vision statement and lists the department's core values. He also acknowledges the value of establishing guiding documents, consistent with the strategic plan previously drafted by the Board. In like manner, KCFD's posted annual report is comprehensive in its sharing of significant events, response data, fleet data, and budget allocations. However, the department does not currently have a strategic plan, and the last annual report was drafted for 2015.

Recommendation: The KCFD should develop a comprehensive strategic business plan.

Essential to the sustainability of any organization is the concept of career development and professional growth of the workforce. Fire service organizations are extremely regimented in the oversight of personnel issues, typically guided by civil service rules, collective bargaining agreements, and public personnel guidelines. The fire service promotional process is very competitive and provides an exceptional opportunity to develop individual skills and to institute organizational philosophies. The ability to direct the learning effort in developing the needed skill sets is a key function that can be orchestrated through the promotional testing process. This factor is essential in the development of the future workforce and in creating or perhaps changing the culture of an organization. In the promotional and testing process, management has the ability to identify and utilize the source materials for testing and to establish the prerequisite training criteria for promotional eligibility. The ability to establish prerequisites that include components such as college coursework, associate's and bachelor's degrees, specific training certifications, project management experience, and fitness and performance appraisal achievements is extremely important. The KCFD promotional process is very limited, only requiring basic certifications for EMT and wildland fire fighting. There are no supervisory training requirements, computer or technical training, nor are officers required to complete Incident Command Training (ICS) or to obtain an Associate's or Bachelor's Degree.

[10] Kern County Fire Department. *Fire Chief's Message*, http://www.kerncountyfire.org/about-us/fire-chief-s-message.html (accessed on September 15, 2017).

Recommendation: KCFD should expand the training requirements, certifications, and college education prerequisites for the Fire Engineer, Captain, and Battalion Chief promotional processes.

Another key component of an effective promotional testing and career development process is a comprehensive employee performance appraisal system. Performance appraisals that utilize a series of personal development tools that are built around goal setting and career development can be instrumental in organizational succession planning. The performance appraisal process requires an ongoing review and interaction between the supervisor and subordinate. Periodic meetings are needed (monthly/quarterly) to review the progress that is being made with regard to established goals and the ability to provide feedback or remediation in the process. Supervisors must be trained in the administration of a good subordinate performance review and must be fully appraised in the steps necessary to make observations and write a narrative that is constructive and realistic. Finally, the performance appraisal process must be all-inclusive in the organization, with all levels and ranks having reviews done. The scoring of these reviews should be included as a consideration in the promotional process.

Recommendation: KCFD should improve and expand the use of the employee performance appraisal process in the career development of all personnel.

FIRE STATION FACILITIES

Fire stations are a critical community public safety asset. Fire stations in a modern fire department are designed to do much more than simply provide a garage for apparatus and a place for firefighters to wait for a call. Fire stations are exposed to some of the most intense and demanding uses of any public local government facility, as they are occupied 24 hours a day.[11] The very nature of the fire department's operations necessitate that all stations be functional, adequate to fulfill the department's core missions, and be well-maintained.

A fire/EMS station should, at a minimum, provide adequate, efficiently designed space for the following functions:

- Housing of fire apparatus and ambulances, with adequate space for apparatus length and height (and the housing of all equipment, including staff, service. and support vehicles including trailers).
- On-duty crew quarters, with sufficient toilet/shower/locker room space for individual privacy and to accommodate gender differences.
- Adequate sized sleeping facilities (as necessary).
- Kitchen and eating areas.
- Training and meeting space.
- Administrative offices.
- Vehicle maintenance (as necessary).
- Hose drying and storage (as necessary).

[11] Compton and Granito, eds., *Managing Fire and Rescue Services*, 219.

- Supply and equipment storage.
- Public entrance/reception area.

National best practices, such as guidance provided by the National Fire Protection Association (NFPA) and the Federal Emergency Management Agency (FEMA), recommend that among other things the following features be included in modern fire station capabilities:

- Seismic-resistant construction (based on local risk assessment).
- Flood hazard protection (based on local risk assessment).
- Automatic fire sprinkler system and smoke detection system.
- Carbon monoxide detectors.
- Vehicle exhaust extraction system.
- Capability to decontaminate, launder, and dry personal protective equipment, station uniforms, and tools and equipment.
- Adequate facility security.
- Emergency power supply and system redundancy.
- Exercise and training area(s).
- Compliance with the Americans with Disabilities Act (ADA).
- Compliance with current fire and building codes.
- Adequate storage for supplies and equipment, including emergency medical and disaster supplies.
- Adequate parking for on-duty personnel, administrative staff, and visitors.
- Capability for future expansion.

The adequacy, quality, and appearance of fire station facilities have a significant impact on the performance of the department as a whole. Well-designed fire and EMS facilities enable staff to perform their duties effectively, efficiently, and safely. As a facility ages, it may no longer meet the needs of an evolving workforce and/or community, thus negatively affecting morale, efficiency, safety, security, technology, and overall efforts to provide quality fire, rescue, and emergency medical services. It may also hamper the ability of the department to keep pace with an increasing and/or expanding number of requests for, and/or levels of, service. Older and/or obsolete facilities are also expensive to maintain. When these conditions occur, typical remedies include expanding, renovating, and/or replacing the existing facilities.

The KCFD operates from 47 fire stations strategically located throughout the county and the cities to which contract services are provided. In addition, the department has an administration building, training center, vehicle maintenance shop, warehouse, bulldozer facility, and air operations base. The latter two facilities are located adjacent to county fire stations. The county owns all the stations from which it deploys units from with the exception of Delano Station 34 and Delano West Station 37, which are owned by the City of Delano.

The existing fire stations range in age from 62 years of age (Keene Station 11 and Kernville Station 76), to 4 years of age for the newest facility (Pine Mountain Station 58). All told, the county has seven fire stations that are more than 50 years old and four that are between 40 and 50 years of age. At the other end of the age spectrum the county has 23 stations that are 30 years or less in

age. A significant number of new stations were constructed in 1989 and 1990. Additional new stations have been constructed periodically since then.

Typically, fire stations have an anticipated service life of approximately 50 years. In most cases, facilities require replacement because of the size constraints of the buildings, a need to relocate the facility to better serve changing population centers, the absence of needed safety features or service accommodations, and the general age and condition of the facility. Properly maintaining mechanical and structural components is critical to the longevity of the facility. Deferring routine maintenance creates inefficiencies and increases costs for replacement and repairs. It can also shorten the station's serviceable life.

Table 3-2 lists all County fire stations along with whether they are equipped with such important features as emergency generators, vehicle exhaust systems, fire detection and/or suppression systems, and whether they are designed and built to withstand a significant seismic event.

TABLE 3-2: Station Ages and Construction Features

Station		Location	Age							
Station	Battalion	Station Name	Year of Construction	Age to 2015	Coverage Area (in sq miles)	Diesel Exhaust Removal System	Backup Power	Automatic Fire System	Fire Sprinkler System	Seismic Design / Construction
11	1	Keene	1953	62	134	Y	Y	N	N	N
12	1	Tehachapi**	1982	33	229	Y	Y	N	N	N
14	1	Mojave	1957	58	427	Y	N	N	N	N
15	1	Rosamond	2006	9	239	Y	N	N	Y	Y
16	1	Bear Valley	1984	31	55	Y	N	N	N	N
17	1	Boron	1969	46	144	Y	N	N	N	N
18	1	Stallion Springs	1967	48	60	N	N	N	N	N
21	2	Taft	1989	26	148	Y	Y	N	Y	Y
22	2	Maricopa	1989	26	248	Y	N	N	Y	Y
23	2	Fellows	1990	25	56	Y	N	N	Y	Y
24	2	McKittrick	1989	26	213	Y	N	N	Y	Y
25	2	Buttonwillow	1989	26	247	Y	N	N	Y	Y
26	2	Lost Hills	1988	27	772	Y	Y	N	N	N
31	3	Wasco	1984	31	180	Y	Y	N	N	N
32	3	Shafter	1987	28	140	Y	Y	N	N	N
33	3	McFarland	1989	26	165	Y	Y	N	Y	Y
34	3	Delano *			54	Y	Y	N	N	N
35	3	Woody	1989	26	205	Y	Y	N	Y	Y
36	3	Glennville	1958	57	157	N	N	N	N	N
37	3	Delano West *			71	Y	Y	N	N	N
41	4	Virginia Colony	1966	49	13	Y	N	N	N	N

Station		Location	Age							
Station	Battalion	Station Name	Year of Construction	Age to 2015	Coverage Area (in sq miles)	Diesel Exhaust Removal System	Backup Power	Automatic Fire System	Fire Sprinkler System	Seismic Design / Construction
42	4	Niles	1989	26	63	Y	Y	N	Y	Y
45	4	Edison	1958	57	162	Y	N	N	N	N
51	4	Lamont	1976	39	48	Y	N	N	N	N
52	4	Greenfield	1990	25	67	Y	Y	N	Y	Y
53	4	Old River	1950	65	179	N	N	N	N	N
54	5	Arvin	1988	27	132	Y	N	N	N	N
55	5	Tejon	2006	9	346	N	Y	N	Y	Y
56	5	Lebec	1958	57	234	N	Y	N	N	N
57	5	Frazier Park	1970	45	59	N	N	N	N	N
58	5	Pine Mountain	2013	2	65	Y	Y	N	Y	Y
61	6	Norris	1970	45	20	Y	N	N	N	N
62	6	Meadows Field	1996	19	2	Y	N	N	Y	Y
63	6	Highland	1969	46	147	Y	N	N	N	N
64	6	Riverview	1961	54	5	Y	N	N	N	N
65	6	Greenacres	2012	3	16	Y	Y	N	Y	Y
66	6	Landco	1987	28	5	Y	N	N	N	N
67	6	Rosedale	1998	17	56	Y	N	N	Y	N
71	7	Southlake	1985	30	445	Y	Y	N	N	N
72	7	Lake Isabella	1953	62	169	N	N	N	N	N
73	7	Inyokern	2005	10	440	Y	Y	N	Y	Y
74	7	Ridgecrest	1978	37	9	Y	N	N	N	N
75	7	Randsburg	1997	18	288	Y	N	N	Y	Y
76	7	Kernville	1953	62	110	Y	N	N	N	N
77	7	Ridgecrest Heights	1989	26	63	Y	N	N	Y	Y
78	7	Piute	1987	28	259	Y	N	N	N	N

*NOTE: Stations'34 and 37 are owned by the City of Delano
**NOTE: Station 13 was excluded because it is a Temporary Facility operating from a Mobile Home.

FIGURE 3-5: Battery Operated Smoke Detectors in most KCFD Fire Stations

Of the KCFD's 47 stations, none are equipped throughout with automatic fire detection systems and carbon monoxide detectors. It was noted in several stations that the fire detection system consisted of solely one or two battery operated smoke detectors in the sleeping area or adjacent hallway. Eighteen stations are equipped with fully automatic fire suppression systems; all these stations were constructed after 1989.

Recommendation: The KCFD should consider the installation of automatic fire alarm systems (hard-wired smoke detectors) with heat, smoke, and carbon monoxide detection in all fire stations.

CPSM believes that all stations should be equipped with both audible and visible warning devices. As well, alarms should be configured to automatically transmit an alarm to either the department's dispatch center or an approved central monitoring station.

Recommendation: The KCFD should consider equipping all existing fire stations that are not being replaced in the near-term (5 years or less) with automatic fire sprinkler systems.

Fire stations are very prone to fire resulting from appliances and cooking materials being left unattended as personnel rapidly exit the facility when responding to emergency incidents. A fire occurring in a fire station is a very embarrassing event and once this facility becomes inoperable the situation is compounded by the inability to provide service in the area during repairs or replacement.

The KCFD received an Assistance to Firefighters Grant (AFG) in 2007 to install vehicle exhaust emissions systems in its stations. However, there are seven stations that have not been outfitted with these systems. CPSM was informed that in several stations the systems have been inoperable for extended periods of time. We were also advised that several stations have vehicles assigned that are not compatible with the emissions evacuation connectors. It was also noted that in some stations with multiple apparatus bays, such as Station 64, the exhaust systems were not available for all first response vehicles.

FIGURE 3-6: Vehicle Exhaust System Connectors that are not Compatible with the Assigned Apparatus

The purpose of these types of systems is to reduce the discharge of both diesel and gasoline engine exhaust emissions into the living areas of the fire station. There have been several studies that show that there is an elevated health risks to individuals who are regularly exposed to vehicle exhaust emissions.[12] In addition, there is concern that personal protective equipment (PPE), which is stored in the apparatus bays in many stations, can be exposed to deposits of soot and other exhaust emission products, which may then result in a secondary exposure hazard to personnel when worn during periods of exertion.

> ***Recommendation: The KCFD should complete an evaluation of its vehicle exhaust extraction systems to ensure their operability and availability at all fire stations.***

CPSM determined that 18 KCFD stations are equipped with emergency generators. The absence of auxiliary power at key emergency facilities limits the capabilities of these resources during periods of power failures/outages. Generators are a basic and vital component to continuity of operations for an emergency services provider.

> ***Recommendation: The KCFD should initiate a capital program to install automatic-start emergency generators at all fire stations to provide auxiliary power during power failures and outages.***

Though most of the KCFD fire stations are modern and well-equipped, CPSM did note some station conditions that require repair and renovation. In some instances, HVAC, roofing, paving, and plumbing issues were noted, some dormitory and bathroom facilities are deficient, and some equipment and apparatus storage areas are inadequate. CPSM believes that KCFD should conduct a major facility evaluation process and develop a comprehensive capital program to address these concerns.

[12] See: https://www.osha.gov/SLTC/dieselexhaust/ and https://www.arb.ca.gov/toxics/dieseltac/factsht1.pdf

FIGURE 3-7: Example of Inadequate Sleeping Quarters

FIGURE 3-8: Example of Inadequate Apparatus Storage Area

Recommendation: Kern County and the KCFD should develop a comprehensive long-range facilities capital plan to address the operational and structural deficiencies at its fire station facilities.

APPARATUS AND FLEET MANAGEMENT

Fire departments utilize a wide range of fire apparatus, along with tools and equipment, in carrying out their core mission. Apparatus generally include emergency response vehicles such as pumpers (engines), tenders/tankers (water supply vehicles), aerial apparatus/quints13, rescue vehicles, and ambulances. In addition, some departments may utilize specialized apparatus such as Type-3 and Type-6 wildland engines. Additional trailers are used to carry specialized equipment when needed. This includes hazardous materials response/equipment, decontamination devices and diking materials, structural collapse equipment, portable air filling stations, scene lighting, foam units, and mass casualty incident supplies. In addition, a wide range of utility vehicles, including command vehicles and emergency communications units, staff vehicles, and maintenance trucks can be part of the fleet.

The mission, duties, demographics, geography, and construction features within the community all play a major role in the makeup of the apparatus and equipment inventory that is needed. These factors, as well as the funding available, must be taken into consideration when specifying and purchasing apparatus and equipment. Every effort should be made to make new apparatus as versatile and multifunctional as is possible and practical.

The KCFD operates a fleet of 164 frontline and reserve units, including a broad range of structure and wildland pumpers (55), aerial apparatus (3 trucks and 2 quints), water tenders (5), helicopters (2), hazmat (1), airport crash rescue vehicles (3), bulldozers (12), and trailers. The department also has a light-duty fleet of sedans and SUVs assigned as administrative and battalion response vehicles (7). Type 3 and Type 6 wildland engines, are in service at all stations.

The department has a long history of purchasing its heavy apparatus from Pierce Manufacturing. The models purchased include the Dash (1997/2000), the Saber (1997, 1998, and 2000) and more recently, the Pierce Quantum (2005). Table 3-3 breaks down the KCFD fleet based on location, age, frontline or reserve status, mileage, and total maintenance cost over the current life of the apparatus.

TABLE 3-3: KCFD Inventory of Apparatus

PIERCE DASH (custom chassis)						
Unit	**Year**	**Age**	**Frontline**	**Reserve**	**Miles**	**Total Maintenance Cost**
E-15	1997	20	x		330,000	$107,169
E-23	1997	20	x		207,628	$88,209
E-75	1997	20	x		211,160	$76,733
E-13	1997	20	x		232,952	$107,960
E-72	1997	20	x		255,284	$114,861
E-76	1997	20	x		219,419	$96,065
E-17	1997	20	x		99,012	$156,769
E-77	1997	20	x		171,399	$96,060
E-22	1997	20	x		120,000	$47,514
Average Age: 20 years			**9**	**0**	**Average Miles: 205,206**	**Average Maint. Cost: $99,038**

[13] A "quint" serves the dual purpose of an engine and a ladder truck. The name "quint" refers to the five functions that these units provide: fire pump, water tank, fire hose, aerial device, and ground ladders.

PIERCE SABER (custom chassis)						
Unit	**Year**	**Age**	**Frontline**	**Reserve**	**Miles**	**Total Maintenance Cost**
E-434	1998	19		x	84,344	$84,344
E-451	1998	19		x	66,051	$66,051
E-415	1998	19		x	91,130	$91,130
E-474	1998	19		x	68,226	$68,226
E-432	1998	19		x	88,624	$111,265
E-454	1998	19		x	145,692	$80,433
E-471	1998	19		x	134,001	$95,524
E-18	1998	19	x		110,000	$59,113
E-424	2001	17		x	105,551	$69,346
E-464	2001	17		x	108,956	$89,514
E-24	2001	17	x		71,254	$100,447
E-426	2001	17		x	39,870	$86,044
E-467	2001	17		x	28,967	$65,751
E-442	2001	17	x		35,882	$86,735
Average Age: 18.4 years			**3**	**11**	**Average Miles: 84,162**	**Average Maint. Cost: $82,423**
Pierce Quantum (custom chassis)						
Unit	**Year**	**Age**	**Frontline**	**Reserve**	**Miles**	**Total Maintenance Cost**
E-14	2005	12	x		214,122	$59,167
E-34	2005	12	x		60,000	$71,460
E-56	2005	12	x		50,000	$198,193
E-66	2005	12	x		96,000	$42,859
E-73	2005	12	x		145,000	$37,493
E-25	2006	11	x		14,8946	$58,198
E-53	2006	11	x		102,770	$47,881
E-54	2006	11	x		30,662	$148,104
E-55	2006	11	x		41,326	$156,290
E-63	2006	11	x		35,641	$74,920
E-11	2007	10	x		139,000	$51,675
E-26	2007	10	x		12,5461	$49,989
E-31	2007	10	x		13,5518	$77,638
E-74	2007	10	x		19,624	$63,168
E-52	2008	9	x		7,358	$44,953
E-21	2008	9	x		74,113	$40,008
E-33	2008	9	x		13,5765	$45,849
E-51	2008	9	x		26,764	$31,901
E-67	2008	9	x		18,949	$33,270
E-71	2008	9	x		47,528	$46,576
E-45	2009	8	x		112,883	$22,301
E-32	2009	8	x		12,3337	$38,561
E-37	2009	8	x		12,709	$34,119

E-61	2009	8	x		106,229	$63,434
E-65	2009	8	x		95,978	$29,030
E-41	2014	3	x		46,537	No Data
E-42	2014	3	x		11,852	No Data
E-64	2014	3	x		46,209	No Data
Average Age: 9.2 years			**28**	**0**	**Average Miles: 78,939**	**Average Maint. Cost: $62,682**
For the purpose of this analysis, three 2014 Pierce Quantums were eliminated from the data sets, due to the lack of information related to the total maintenance costs.						
Pierce Aerials (custom chassis)						
Unit	**Year**	**Age**	**Frontline**	**Reserve**	**Make**	**Total Maintenance Cost**
T-21 P	2000	17	x		Dash	$118,838
T-55 P	2004	13	x		Arrow XT	$43,692
T465 P	2000	17	x		Dash	$181,171
LV	2001	16		x		$0.00
T-65 T	2008	9	x		Quantum	$52,171
T-41 T	2010	7	x		Quantum	$16,098
Average Age: 13.2 years			**5**	**1**	**Average Miles: Not available**	**Average Maint. Cost: $82,394**
P – Platform; T – Tiller. Maintenance costs excluded on the 2001 Quantum reserve truck.						
Training Engines, Pierce Saber (custom chassis)						
Unit	**Year**	**Age**	**Frontline**	**Reserve**	**Miles**	**Total Maintenance Cost**
Training	1998	19		x	159134	$55,285
Training	1998	19		x	92356	$56,446
Training	1998	19		x	89661	$75,053
Training	1998	19		x	158798	$58,735
Training	1998	19		x	143569	$37,493
Training	1998	19		x	159134	$55,285
Average Age: 19 years			**0**	**6**	**Average Miles: 128,704**	**Average Maint. Cost: $56,602**
BECK/IHC (commercial chassis; KCFD added a pump)						
Unit	**Year**	**Age**	**Frontline**	**Reserve**	**Miles**	**Total Maintenance Cost**
E-416	1991	26		x	No Data	$475
E-435	1991	26		x	90,000	$283,255
E-436	1991	26		x	60,000	$44,718
E-476	1991	26		x	102,002	$39,856
Average Age: 26 years			**0**	**4**	**Average Miles: 84,001**	**Average Maint. Cost: $92,076**
1998 MASTERBODY/IHC: KCFD converted a Pierce Type 1 commercial chassis to a Type 3						
Unit	**Year**	**Age**	**Frontline**	**Reserve**	**Miles**	**Total Maintenance Cost**
E-363	1998	19	x		95,562	$57,055
E-356	1998	19	x		117,371	$63,887

E-314	1998	19	x		95,000	$53,636
E-371	1998	19	x		23,695	$52,748
E-326	1998	19	x		90,000	$103,288
Average Age: 19 years			**5**	**0**	**Average Miles: 84,326**	**Average Maint. Cost: $66,123**
Type 3 IHC/Pierce						
Unit	**Year**	**Age**	**Frontline**	**Reserve**	**Miles**	**Total Maintenance Cost**
E-312	2014	3	x		5,892	No Data
E-357	2014	3	x		31,054	No Data
E-376	2014	3	x		21,266	No Data
Average Age: 3 years			**3**	**0**	**Average Miles: 19,404**	**Average Maint. Cost: No Data**
Type 3; IHC-HME (OES Engines)						
Unit	**Year**	**Age**	**Frontline**	**Reserve**	**Miles**	**Total Maintenance Cost**
8531/25	2014	3	x		17,467	No Data
8532/55	2014	3	x		17,781	No Data
8533/33	2014	3	x		16,210	No Data
Average Age: 3 years			**3**	**0**	**Average Miles: 17,153**	**Average Maint. Cost: No Data**
CHEVY/GMC PATROLS (custom in-house chassis/gas engine)						
Unit	**Year**	**Age**	**Frontline**	**Reserve**	**Miles**	**Total Maintenance Cost**
P-411	1999	18		x	80,000	$45,244
P-72	1999	18	x		80,625	$53,188
P-414	1999	18		x	72,328	$48,152
P-463	1999	18		x	100,000	$48,166
P-431	1999	18		x	120,000	$36,705.
P-66	1999	18	x		82,000	$46,002
RP-1	1999	18	x		112,000	$48,800
P-445	1999	18		x	110,000	$40,355
P-472	1999	18		x	114,329	$30,856
P-426	1999	18		x	113,578	$26,860
RP-2	1999	18	x		150,000	$45,059
P-433	1999	18		x	100,000	$38,871
P-477	1999	18		x	130,000	$24,193
Average Age: 18			**4**	**9**	**Average Miles: 104,989**	**Average Maint. Cost: $40,958**
Ford Patrols V10 Gas Motor (custom in-house/commercial chassis)						
Unit	**Year**	**Age**	**Frontline**	**Reserve**	**Miles**	**Total Maintenance Cost**
P-23	2001	16	x		155,000	$35,144
P-36	2001	16	x		130,000	$48,421
P-456	2001	16		x	125,000	$37,852
P-74	2001	16	x		123,000	$26,789
P-77	2001	16	x		110,000	$19,429

Average Age: 16 years			4	1	Average Miles: 128,600	Average Maint. Cost: $33,527
Ford Patrols 6.0 and 6.4L Diesel Motors (custom chassis)						
Unit	**Year**	**Age**	**Frontline**	**Reserve**	**Miles**	**Total Maintenance Cost**
P-18	2005	12	x		13,2226	$30,917
P-51	2006	11	x		59 847	$19,610
P-12	2007	10	x		10,5339	$27,660
P-13	2007	10	x		23,6658	$107,960
P-16	2007	10	x		132,226	$30,917
P-33	2007	10	x		44,722	$12,830
P-34	2007	10	x		24,007	$9,571
P-42	2007	10	x		52,106	$12,103
P-52	2007	10	x		69,143	$9,421
P-53	2007	10	x		109,454	$28,316
P-54	2007	10	x		51,744	$11,647
P-64	2007	10	x		33,206	$11,726
P-71	2007	10	x		134,038	$95,524
P-73	2007	10	x		54,959	$11,903
P-15	2008	9	x		63,000	$18,187
P-22	2008	9	x		78,346	$21,405
P-24	2008	9	x		47,000	$19,269
P-31	2008	9	x		34,000	$5,507
P-58	2008	9	x		36,000	$13,731
P-61	2008	9	x		39,000	$13,003
P-65	2008	9	x		37,000	$19,083
P-67	2008	9	x		40,000	$18,464
P-72	2008	9	x		56,698	$16,380
P-75	2008	9	x		72,000	$26,119
P-76	2009	8	x		76,000	$13,398
P-17	2009	8	x		53,000	$7,352
P-25	2009	8	x		70,000	$28,312
P-32	2009	8	x		43,000	$14,415
P-35	2009	8	x		38,000	$11,029
P-37	2009	8	x		30,000	$11,593
P-41	2009	8	x		34,000	$17,429
P-57	2009	8	x		60,000	$72,935
Average Age: 9.3 years			**32**	**0**	**Average Miles: 63,318**	**Average Maint. Cost: $23,991**
Ford Patrols with 6.7 Motors (custom chassis)						
Unit	**Year**	**Age**	**Frontline**	**Reserve**	**Miles**	**Total Maintenance Cost**
P-11	2014	3	x		26,808	No Data
P-21	2014	3	x		9,644	No Data
P-55	2014	3	x		17,781	No Data
P-78	2014	3	x		23,284	No Data

P-72	2017	1	x		No Data	P-72 Duplicate #
Average Age: 2.6 years			**5**	**0**	**Average Miles: 19,379**	**Average Maint. Cost: No Data**
P-72 has been excluded from the data set for figuring average miles.						
Water Tenders: Pierce/IHC						
Unit	**Year**	**Age**	**Frontline**	**Reserve**	**Miles**	**Total Maintenance Cost**
WT-11	2008	9	x		37,126	$17,864
WT-55	2001	16	x		47,822	$34,569
WT-67	2001	16	x		49,044	$111,164
WT-73	2008	9	x		18,541	$8,258
Average Age: 13 years			**4**	**0**	**Average Miles: 38,133**	**Average Maint. Cost: $42,964**
USAR: Peirce Quantum						
Unit	**Year**	**Age**	**Frontline**	**Reserve**	**Miles**	**Total Maintenance Cost**
USAR-52	2009		x		23,541	$10,031.80
USAR-61	2010		x		10,526	$12,159.21
Average Age: 6.5 years			**2**	**0**	**Average Miles: 17,033.5**	**Average Maint. Cost: $11,096**
Breathing Support: Pierce/IHC and IHC						
Unit	**Year**	**Age**	**Frontline**	**Reserve**	**Miles**	**Total Maintenance Cost**
BS-66	2009	18	x		26,823	$18,027.29
Air 24	1985	32	x		170,256	$25,922.99
BS -77	1982	35	x		72,415	$17,113.35
Average Age: 15 years			**3**	**0**	**Average Miles: 89,831**	**Average Maint. Cost: $20,354.54**

Observations:

- The KCFD has purchased custom chassis for its Type-1 Engines for over 20 years.
- 100 percent of the older Dash (9) Engines remain in frontline service; while only 21 percent of the Saber (3) Engines remain in frontline service; the rest (11) have been placed in reserve. 100 percent of the Quantum (28) Engines remain is service.
- The Pierce Dash (20 years old) and Saber (18.4 years old) are within 1.6 years of each other, and yet the Dash has 41 percent more average miles than the Saber, but only 17 percent higher average maintenance cost.
- The Quantum (9.2 years) is less than half as old as the Saber (18.4 years), but has nearly as many average miles (94 percent).
- The average maintenance cost per mile for the Pierce Engines is as follows:
  - Dash – 48 cents per mile.
  - Saber – 98 cents per mile.
  - Quantum – 79 cents per mile.
- Three of the Quantum pumpers have had unusually high maintenance costs:

- E-56: 50,000 miles and $198,193.
- E-54: 30,662 miles and $148,104.
- E-55: 41,326 and $156,290.

- Fleet Services notes that spikes in maintenance costs can be attributed to costly repairs or replacements of a motor, seal(s), pump, or transmission. There is an understanding that maintenance costs will increase as a piece of equipment continues to age and experiences extended use.
  - The average age of the KDFC frontline Aerials (5) is 11.5 years old. The two reserves are 16 and 17 years old.
  - The KCFD has 11 Type-3 frontline Engines and 4 reserves (27 percent).
  - A Type-3 or Type-6 wildland response unit is assigned to every station.
  - Fleet Services has modified most of the Patrols in-house. Many began with commercial chassis and were provided various degrees of customization.
  - The KCFD has 41 frontline Patrols and 10 in reserve (19.6 percent).
  - Eighteen (18) Chevy, GMC, and Ford Patrols have gas motors (33 percent), and 37 are equipped with diesel (67 percent).
  - The average age of the gas-powered Patrols is just under 17 years old; the 6.0 and 6.4L Fords are at 9.3 years old.
  - The average maintenance cost of the older gas-powered Patrols has been 16 cents per mile; while the diesel motors have been nearly double that at 38 cents per mile.
- In discussions with a Pierce sales representative through the KCFD Fleet Services, the following contemporary pricing was offered for those custom apparatus currently on the market: [14, 15]
  - Dash – $715,000. Note: the standard Dash is no longer available; however, Pierce does currently offer an upgraded Dash CF version.
  - Quantum - $700,000.
  - Arrow XT - $685,000.
  - Sabre - $400,000.

The KCFD has been purchasing the Pierce Quantum since 2005 (28 pumpers, 2 aerials, and 2 USAR vehicles). The apparatus is generally considered a top-of-the-line piece of equipment. It has a number of customized features that other manufacturers do not offer. As with most vehicles, the initial cost and ongoing maintenance are directly related to the additional technology.

For the purposes of maintaining consistent training, parts, and service, Fleet Services desires to continue standardizing the apparatus. The Fleet Supervisor believes that remaining with Pierce will continue to allow the specialized training of its mechanics, and provide an ability to increase its stock of parts, which in turn can reduce out-of-service time for those apparatus that require service or repair. CPSM believes that standardizing some aspects of the fleet is a reasonable approach. However, Pierce does offer a number of lower-cost custom and commercial models

[14] Quotes received from Pierce through, Ron Fox (KCFD Fleet Supervisor). Phone call on September 26, 2017.
[15] Chassis configurations available through Pierce. Pierce Fire Apparatus. Retrieved on September 23, 2017.

from which to choose. These may still provide for a measure of consistency, while lowering the overall cost to maintain the fleet.

Recommendation: The KCFD should reevaluate its apparatus purchase practices and consider other less expensive models or commercial rather than custom chassis.

The KCFD also has a history of customizing its wildland Patrols (Type-6), and has switched from gas to diesel motors. The department deploys 17 custom Ford F450 and F550 trucks outfitted with a Power Stroke diesel engine. While diesels account for about 25 percent of all F-Series sales, Power Stroke has earned a reputation for being unreliable. A number of industry professionals report that the engine has been plagued with leaky fuel injectors, oil leaks, broken turbochargers, wiring harness troubles, faulty sensors, defective exhaust gas recirculation valves, and bad computers, particularly with the models using 6.0L and 6.4L engines. Ford has acknowledged that its warranty costs for repair on these motors have been significant.

Type-3 and Type-6 wildland engines are used extensively by the U.S. Forest Service. This apparatus is offered to local agencies under cooperative purchase agreements and may be purchased under U.S. Forestry bid specifications at considerable savings.

Recommendation: The KCFD should reevaluate its continued use of custom wildland engines and consider the utilization U.S. Forestry Service-specified wildland engines.

Apparatus manufacturers, their dealers, and end users have begun to embrace the concept of purchasing apparatus through one of the many national, state, and regional cooperative contracts. By piggy-backing off of these publicly solicited contracts, a fire department can save staff time and money without having to go through its own request for proposal (RFP) process. With some limitations, the KDFC would still be free to provide unique department specifications within the build process and still achieve its procurement goals.

Recommendation: The KCFD should consider the use of cooperative bid/purchasing programs for the acquisition of medium- and heavy-duty apparatus.

The KCFD makes it a practice to assign new apparatus to its busiest companies. Sequentially, these vehicles are then reassigned to slower stations before finally being placed into reserve status. The last three Quantum Type 2 pumpers were assigned to Stations 41, 42, and 64; these are among the busiest stations in the county. CPSM believes that cycling new apparatus to the busiest stations with a lower level of activity in order to extend vehicle operational life span, is a ***Best Practice***.

KDFC staff reports that the purchase of fire apparatus, their design, and specification writing is primarily the responsibility of KCFD senior officers, with some assistance from mechanical staff and Fleet Services personnel. CPSM believes that incorporating a broad range of stakeholders, including Driver Engineers, Captains, Training Staff, wildland personnel, etc., in the purchasing and bid specification process can generate new ideas, afford a user's perspective, and provide for career development.

Recommendation: The KCFD should expand the apparatus specification and purchasing committee to include a wider range of employee stakeholders.

Routine servicing of the department's apparatus, along with any necessary repairs, is performed by the department's fleet maintenance shop. The fleet shop tries to perform most work in-house if the appropriate expertise, training, and equipment are available. When needed, specialized services are contracted out to third-party vendors.

The proposed budget for FY 2017-18 shows Fleet Services is currently staffed with 20 full-time employees:

- 1 – Equipment Maintenance Superintendent.
- 11 – Fire Equipment Mechanics.
- 3 – Supervisor Heavy Equipment Mechanics.
- 3 – Fire Equipment Service Workers.
- 1 – Automotive Parts Storekeeper I/II.
- 1 – Fiscal Support Technician.

NFPA 1071 (2016) *Standard for Emergency Vehicle Technician (EVT) Professional Qualifications* identifies and defines the minimum job performance requirements for EVTs. Requirements apply to anyone engaged in the inspection, diagnosis, maintenance, repair, and testing of emergency response vehicles. NFPA 1071 clearly delineates requirements based on the three levels of EVT:

- EVT I responsible for operational checks.
- EVT II responsible for performance checks.
- EVT III responsible for supervision and managerial skills.[16]

The Fleet Services Supervisor notes that the KCFD shop mechanics are skilled and regularly attend specialized training, but none are certified as EVTs.

> ***Recommendation: The KCFD should expand the training of its heavy equipment mechanics and pursue a goal to increase the number who are certified as Emergency Vehicle Technicians (EVTs).***

The capability to track the annual cost of operations, including mechanical repair costs, is critical in determining whether a vehicle is costing excessive amounts to be maintained. This can include vehicle repairs, labor costs, and parts. This information is critical in determining when replacement is warranted or can be anticipated in upcoming budget cycles. At the time of this assessment, Fleet Services was utilizing the ***CAMS system*** to develop and track repair orders, labor, and parts. The Fleet Services Supervisor describes CAMS as an accounting software system not specifically designed for tracking, querying, or running apparatus maintenance reports. Currently, Fleet Services runs random reports by request of the Fire Chief; it has not conducted a detailed analysis of the fleet data and repair costs to help plan for the scheduling of fire apparatus replacement.

> ***Recommendation: The KCFD should track and analyze annual repair, maintenance, and service costs for its apparatus fleet and utilize this information in the development of the fire apparatus replacement schedule.***

[16] 2016 NFPA 1071, NFPA 1071: *Standard for Emergency Vehicle Technician Professional Qualifications*, 2016 Edition. Quincy, MA.

NFPA 1901, *Standard for Automotive Fire Apparatus*, 2016 edition, serves as a guide to the manufacturers that build fire apparatus and the fire departments that purchase them. The document is updated every five years, using input from the public/stakeholders through a formal review process. The committee membership is made up of representatives from the fire service, manufacturers, consultants, and special interest groups. The committee monitors various issues and problems that occur with fire apparatus and attempts to develop standards that address those issues. A primary interest of the committee over the past years has been improving firefighter safety and reducing fire apparatus accidents.

The Annex Material in NFPA 1901 contains recommendations and work sheets to assist in decision making in vehicle purchasing. With respect to recommended vehicle service life, the following excerpt is noteworthy:

> *"It is recommended that apparatus greater than 15 years old that have been properly maintained and that are still in serviceable condition, be placed in reserve status and upgraded in accordance with NFPA 1912, Standard for Fire Apparatus Refurbishing, to incorporate as many features as possible of the current fire apparatus standard. This will ensure that, while the apparatus might not totally comply with the current edition of the automotive fire apparatus standards, many improvements and upgrades required by the recent versions of the standards are available to the firefighters who use the apparatus."*[17]
>
> *"Apparatus that were not manufactured to the applicable apparatus standards or that are over 25 years old should be replaced."*[18]

Department staff acknowledged that in the past it has attempted to adopt a formal policy for apparatus replacement. Using an amortization schedule, it was determined that total value of the fleet was estimated to be $76,350,000, and that the department would need to designate approximately $5 million annually to keep pace with the replacement schedule. However, due to County-wide budget restraints, the plan failed to take root. Instead, the department has been reliant on grant funding and other one-time funding to purchase capital assets and equipment. When funds do become available, apparatus are purchased and distributed according to where Fleet Services determines there is the greatest need. The department does not utilize a formal process for defining the order of exchange.

Replacement criteria for department-owned vehicles should be determined through some form of point system. The more points a vehicle receives, the more critical it is to replace that vehicle. The point system is generally based on the following factors:

- Age.
- Miles/Hours of Usage.
- Type of Service.
- Historical Maintenance and Repair Costs.

> ***Recommendation: The KCFD should adopt a formal fire apparatus replacement schedule.***

Most agencies utilize a combination of funding methods for apparatus replacements. These include capital replacement funds, bond initiatives or simply through annual budget allocations. The key however is to develop an ongoing funding source to fund the replacement of apparatus when their useful life has occurred.

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[17] NFPA 1901, Standard for Automotive Fire Apparatus, 2016 Edition. Quincy, MA.
[18] NFPA 1901, Standard for Automotive Fire Apparatus, 2016 Edition. Quincy, MA.

In a 2004 survey of 360 fire departments in urban, suburban, and rural settings across the nation, Pierce Manufacturing reported on the average life expectancy for fire pumpers. The results are shown in Table 3-4.

TABLE 3-4: Fire Pumper Life Expectancy by Type of Jurisdiction

Demographic	First-line Service	Annual Miles Driven	Reserve Status	Total Years of Service
Urban	15 Years	7,629	10 Years	25
Suburban	16 Years	4,992	11 Years	27
Rural	18 years	3,034	14 Years	32

Note: Survey information was developed by Added Value Inc. for Pierce Manufacturing in, "Fire Apparatus Duty Cycle White Paper," Fire Apparatus Manufacturer's Association (FAMA), August 2004.

Of special note, in discussions with the Fleet Services Supervisor, it was determined that, on an interim basis, this individual has also assumed a supervisory role within the Logistics division. One significant challenge continues to be the transportation of equipment, turnout gear, and supplies to the 47 fire stations across over 8,000 square miles. There was some acknowledgement that, while space in their vehicle is limited, each of the Battalion Chiefs has assisted, but could standardize their efforts to transport materials when they make their rounds. The practicality of drawing from regional distribution centers and/or contracting with a private contractor to transport the equipment and supplies was also discussed.

> ***Recommendation: The KCFD should investigate the practicality of incorporating regional centers and/or private company direct delivery options to supplement the distribution of equipment and supplies to the fire stations.***

Capital Equipment

Fire apparatus are equipped with various types of tools and equipment that are utilized in providing fire and EMS services. Many of the tools and much of the equipment carried on fire apparatus are specified in NFPA and ISO guidelines. Fire and EMS equipment includes such items as hose, couplings, nozzles, various types of ladders, foam, scene lighting, oxygen tanks, AEDs, defibrillators, small hand tools, fire extinguishers, mobile and portable radios, salvage covers, and medical equipment and supplies. Many of the small tools and equipment are considered disposable items and are replaced with ongoing operating funds. However, some pieces of equipment are very expensive, and thus require ongoing planning for their useful life and replacement. Capital equipment is generally replaced on a ten-year replacement cycle. The more expensive pieces of capital equipment include:

- Self-contained breathing apparatus (SCBA) and fill stations.
- Firefighting PPE (personal protective equipment).
- Hydraulic/pneumatic extrication equipment.
- ECG Monitors/Defibrillators/AEDs.
- Thermal imaging cameras.
- Mobile/portable and base radios.
- Mobile data computers.

- Gas monitoring and detection devices.

The development of the KCFD budget has focused primarily on the annual operational needs of the department. Facility improvements and replacements, outside of general maintenance, are budgeted in the Fire Fund within two budget units, capital projects and major maintenance. The department does receive an allocation from contracts with Cal Fire for capital improvements that is placed into the capital outlay fund. Some contributions for major maintenance and replacements have been made from the capital outlay fund but this has been limited to improvements or replacements to the 16 stations that protect State Responsibility Areas (SRA). Aside from this, the department does not have a scheduled capital replacement program.

> ***Recommendation: The KCFD should create a ten-year capital equipment and tools replacement program.***

RADIO INTEROPERABILITY AND COVERAGE

In general, interoperability refers to seamless radio communications between emergency responders using differing communication systems or products. Wireless communication interoperability is the specific ability of emergency responders to use voice and data communication in real time, without delay. For example, police, fire, and emergency medical services responding to an incident are interoperable when they can all communicate with one another over their individual and perhaps shared communication channels. Interoperability makes it possible for first responders from any jurisdiction to communicate with one another at larger incidents and allows for emergency planners and personnel to coordinate their efforts in advance of major events.[19]

The public safety agencies that serve Kern County operate on several different radio frequency spectrums. The KCFD radio system utilizes 20 different radio channels, all on VHF frequencies. Bakersfield fire also utilizes VHF frequencies for its radio system. The Sheriff's department and ambulance companies utilize radio systems that operate on UHF frequencies. However, Hall Ambulance utilizes a low-band frequency for its ambulance sign-on channel. All of the ambulance companies have fire department channels in their radios but there are rarely any direct communications between them.

The county communications system does have interoperability capabilities for units on VHF and UHF to communicate directly with each other. However, it was reported that the common radio channels for multi-agency interoperability are rarely used. The county also has five radio channels, all on VHF frequencies, which are designated for mutual aid or large-scale incidents. Large-scale EMS incidents can be coordinated on Med Channel 9, which is a VHF EMS frequency.

Due to its large geographic area and large areas of undeveloped wilderness, there are many areas in the county where effective and consistent communications are problematic. Some areas that were specifically identified to CPSM include, but are certainly not limited to, Kern Canyon, Walker Pass, Sand Canyon, and the desert areas along Highway 395. To help lessen the critical life-safety issues related to these difficulties, mobile repeaters have been installed in all fire department vehicles.

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[19] SAFECOM, U.S. Department of Homeland Security, "Interoperability," http://www.safecomprogram.gov/SAFECOM/interoperability/default.htm.

The lack of cellular towers in many of the undeveloped areas of the county also severely restricts the use of cellular phones. Many of these areas are the same ones where radio coverage is problematic. In these areas the department utilizes satellite phones to attempt to maintain effective communications.

Recommendation: The KCFD and its emergency communications center (911) should continue to monitor deficiencies and evaluate new and emerging technologies to improve the overall emergency radio communications coverage throughout the county.

SECTION 4. ANALYSIS OF PLANNING APPROACHES

FIRE RISK ANALYSIS

The cost of providing fire protection to a community continues to escalate; therefore, the need to examine the planning processes involved in providing services is paramount. Each jurisdiction decides what degree of risk is acceptable in that jurisdiction; the determination is based on criteria that have been developed to define the levels of risk (e.g., of fire) within all areas of the community. As a result, many jurisdictions are asking the fundamental question of whether the level of risk in their jurisdiction is commensurate with the type of protective force that is being deployed. To this end, the completion of a fire risk and hazard analysis is essential in providing a more objective assessment of a community's level of risk, and can assist with a comprehensive planning process.

During the fire risk analysis process a fire department collects and organizes risk evaluation information about individual properties and on the basis of a number of evaluation factors can derive a "fire risk score" for each individual property. The fire risk score for each property is derived on the basis of these factors:

- Needed fire flow if a fire were to occur.
- Probability of an occurrence based on historical events.
- The consequence of an incident in that occupancy (to both occupants and responders).
- The cumulative effect of these occupancies and their concentration in the community.

The fire risk score is then used to categorize the property as one of low-, moderate-, or high/maximum-risk. The NFPA *Fire Protection Handbook* defines these hazards as:

> **High-hazard occupancies:** Schools, hospitals, nursing homes, explosives plants, refineries, high- rise buildings, and other high life-hazard or large fire-potential occupancies.
>
> **Medium-hazard occupancies:** Apartments, offices, and mercantile and industrial occupancies not normally requiring extensive rescue by firefighting forces.
>
> **Low-hazard occupancies:** One-, two-, or three-family dwellings and scattered small business and industrial occupancies.[20]

To assist in this endeavor, there are retail software products currently available that can rate a property based on information inputs. Plotting the rated properties on a map will provide a better understanding of how fire stations, response run cards, and staffing patterns can be used to provide a higher concentration of resources for worst-case scenarios or, conversely, fewer resources for lower levels of risk.[21] The community fire risk assessment may also include determining and defining the differences in fire risk between a detached single-family dwelling, a multifamily dwelling, an industrial building, and a high-rise building by placing each in a

[20] Cote, Grant, Hall & Solomon, eds., *Fire Protection Handbook* (Quincy, MA: NFPA 2008), 12.
[21] *Fire and Emergency Service Self-Assessment Manual*, Eighth Edition, (Center for Public Safety Excellence, 2009), 49.

separate category. Further, an overall community risk profile can be linked to historical response time data. That analysis can then be used to establish response time baselines and benchmarks.

Since the fire department is often the first emergency service responders to a wide range of emergencies and must be operationally prepared to deal with many different types of situations beyond just structure fires, the completion of a community-wide all-hazards risk and vulnerability assessment is the next step beyond the fire risk component.

Although it has not completed a thorough, and formal, vulnerability analysis, the KCFD has identified a number of potential hazards that can affect the county as a whole. This analysis has identified those events that would have the highest potential for occurrence and the greatest devastation. These include:

- Earthquakes that could occur on any of the fault lines that run through or near the county. The San Andreas and White Wolf faults are the largest and of greatest concern.
- Transportation accident (air, rail, shipping) on numerous transportation corridors through the county.
- Flooding, particularly unexpected flash floods in canyons and valleys being used for recreational purposes. The fire department has developed flood and dam maps for facilities of concern such as the Lake Isabella Dam. However, these maps are generally more historical than predictive of possible future occurrences.
- Severe weather.
- Wildland fires and the urban interface are probably the greatest hazard vulnerability faced by the county. There are millions of acres of wildland and forests located in the county, including more than 1.6 million acres of state resource lands. In June 2016, the Erskine Fire in the Lake Isabella area burned more than 70 square miles, destroyed more than 200 homes, and resulted in two fatalities. Wildland fires occur annually throughout California and can quickly tax and even overwhelm a fire department's resources.
- Terrorism/ workplace & school violence.
- Energy shortage/ disruption.
- Hazardous materials incidents that can occur anywhere on the transportation corridors but also at any of the numerous petroleum production, refining, and storage facilities throughout the county. There are also numerous other manufacturing and warehouse facilities where hazardous materials are stored or utilized.
- Water emergencies/droughts have been an ongoing problem in California for more than a decade.

CPSM was informed that the county and the fire department are now in the process of beginning to identify secondary risk and vulnerability concerns.

While KCFD has completed a preliminary risk assessment list, it does not have a written internal risk management plan in place. In order for the list to be an effective tool it needs to be put into the following operative framework, which will provide the broad outline of the internal risk management plan.

- **Risk identification:** Actual or potential hazards.
- **Risk Evaluation:** The potential of occurrence of a given hazard and the severity of its consequences.

- **Prioritizing risk:** The degree of a hazard based upon the frequency and severity of occurrence.
- **Risk control:** Solutions for eliminations or reduction of real or potential hazards by implementing an effective control measure.
- **Risk monitoring:** Evaluation of effectiveness of risk control measures.[22]

Many of the known and most significant of the hazards are addressed in the county's emergency operations plan. However, these are often done in broader, more general terms rather than detailed specifics. An advisory committee of the county's Emergency Council has been working on trying to get some proverbial "boots on the ground" to help better quantify and thus prioritize the risks identified and to identify potential risk reduction, control, or mitigation options. The Office of Emergency Services has worked with the county's General Services Department to map out and document fault lines, flood areas, etc. The county's planning efforts should also focus on the support and organizational systems that would be necessary to respond and sustain ongoing relief efforts during times of disaster. Included in these efforts are:

- Continuity of operations planning (COOP).
- Public awareness and public information.
- Succession planning (continuity of government).
- Automatic and mutual aid on a regional basis.
- Utilization of volunteers and management of donations.
- Automatic and mutual aid on a regional basis.

Community fire risk and all hazards vulnerability assessments are essential elements in a fire department's planning process. Linking the fire department's operational functionality to the county's risk and its vulnerability assessment can be a useful in assisting the department's senior staff in refining their preparedness efforts. According to a National Fire Protection Association (NFPA) paper on assessing community risk vulnerability, fire department operational performance is a function of three considerations: resource availability/reliability, department capability, and operational effectiveness.[23] These elements can be further defined as:

- **Resource availability/reliability:** The degree to which the resources are ready and available to respond.
- **Department capability:** The ability of the resources deployed to manage an incident.
- **Operational effectiveness:** The product of availability and capability. It is the outcome achieved by the deployed resources or a measure of the ability to match resources deployed to the risk level to which they are responding.[24]

Although Kern County and the KCFD have identified a wide range of potential hazards that are present in the County, and have done some planning and mapping, a comprehensive and formal community fire risk and all hazard vulnerability assessment has not been performed.

Recommendation: The KCFD should conduct a comprehensive fire risk analysis that concentrates on critical and high-risk occupancies.

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[22] NFPA 1500 (2007). *Standard for a Fire Department Occupational Safety and Health Program*, Annex D.
[23] Fire Service Deployment, Assessing Community Vulnerability: From http://www.nfpa.org/assets/files/pdf/urbanfirevulnerability.pdf.
[24] National Fire Service Data Summit Proceedings, U.S. Department of Commerce, NIST Tech Note 1698, May 2011.

The assessments recommended above should be done in conjunction with the fire and EMS calls for service demand analysis provided in this report, along with the department's effort to identify, plot, and analyze high-hazard risks and vulnerabilities throughout the county.

HAZARDOUS MATERIALS RESPONSE

The Kern County Operational Area (OA) serves as the coordination and communication link between the cities and special districts within the county's boundaries at the time of a significant emergency. County government serves as the lead agency of the OA and the Kern County Office of Emergency Services (OES) provides oversight and administrative support to the OA.

"Hazardous material" means any material that, because of its quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment.

The Hazardous Materials Response Team (HMRT) was created through the formation of a joint powers agreement and establishes the first joint county-wide emergency response team for hazardous incidents. The JPA includes the Cities of: Arvin, Bakersfield, Delano, Maricopa, McFarland, Ridgecrest, Shafter, Taft, Tehachapi, and Wasco; the County of Kern Fire and Environmental Health Departments, and the Kern Delta Water District. California City is considered a mutual aid agreement partner and is not in the JPA agreement.[25]

There are three HMRT teams in Kern County:

- Kern County Environmental Health Services Division (KCEHSD).
- Kern County Fire Department (3000 Landco Drive; Engine 66, Patrol 66, Breathing Support 66, and HM66).
- Bakersfield Fire Department (1415 Buena Vista Rd; Engine 15, Truck 15, and HazMat 15).

Four levels of hazardous materials emergencies have been developed by Kern County OES to assist in determining the level of response needed during a hazardous materials incident. The descriptions for the four levels of response, which are I, II, III, and IV, were taken from the HMRT JPA. Emergency levels are established and coordinated through proper communication/dispatch protocols with all of the dispatch centers of the participating agencies. The response level is the determination of the incident commander, under the National Incident Management System (NIMS) and State Emergency Management System (SEMS). KCEHSD will provide input to the IC.

- **Level I: Investigative/Minor Incident:** Response can be managed by an individual jurisdiction.
- **Level II: Unknown Substance/Additional Assistance:** Incident response is to an unknown substance or a determination if additional assistance is required. HMRT activation is requested to provide additional personnel and equipment from a single jurisdiction.
- **Level III: Extended Impact:** A HMRT upgrade is requested to include multiple jurisdictions and resources.

[25] Kern County Operation Area Hazardous Materials Area Plan. Updated Oct. 2004. http://kernpublichealth.com/wp-content/uploads/2015/01/Final-Kern-County-Area-Plan-updated-10.2014.pdf (accessed on September 15, 2017).

- Level IV: Major Impact: This is the highest level of incident response. All HMRT resources have been utilized and regional and state hazardous materials teams are requested.

In Kern County, incidents can occur in the production, use, transport, and disposal of hazardous materials due to the agricultural economy, proliferation of fuel tanks, and transmission facilities, intricate canal systems, and the confluence of major surface arteries and rail systems. Incident potential is increased near roads and railways that are frequently used for the transportation of hazardous materials, as well as in areas with agricultural facilities that use, store, handle, or dispose of hazardous materials.

High-risk hazards specific to Kern County include possible hazardous material incidents involving agricultural chemical plants, transportation of hazardous materials through the county, pesticide drift, geothermal plants, oil and natural gas fields, large refinery complexes, military facilities, and various industrial facilities. Each fire agency is responsible for determining the necessity of prefire inspections.

The airspace within Kern County is primarily uncontrolled, with the exception of those designated for the military. At times, military aircraft may find it necessary to declare an in-flight emergency or land outside of military controlled airspaces at a civilian airport or other areas. Although they may be located outside of military property, the aircraft remain the responsibility of the Department of Defense (DOD). Hazardous materials in the aviation industry that could be involved in hazardous materials incidents include: aviation fuels, on-board oxygen systems, de-icing chemicals, explosive devices, overspray from pesticide applications, and aircraft munitions.

Geothermal power generating plants are located in various areas of Kern County. These facilities utilize large amounts of chemicals, including isopentane and hydrochloric acid, which could result in hazardous materials incidents.

Due to the large scale of agricultural operations in Kern County, the use of pesticides presents a large source of hazardous materials. Most of the productive farmland is located on the fringe of developing areas. As a result, airborne drift of chemicals from pesticide and crop dusting may adversely affect the residential population. The use, storage, and transportation of pesticides are strictly regulated by California Environmental Protection Agency (CalEPA). The County AG, CalEPA, and the California Department of Pesticide Regulation (DPR) are the major enforcement agencies responsible for controlling and monitoring pesticide use.

The KCFD HMRT is located at Station 66. A captain, two engineers, and two firefighters cross-staff the hazardous materials unit (HM66) with Engine 66, Patrol 66, and Breathing Support 66. All are qualified Hazardous Material Specialists. As part of the county JPA, HM66 provides Type 2 hazardous materials response to all 47 Kern County fire station primary response areas. HM66 is supported by three decontamination trailers for mass decontamination needs. The trailers are towed to a scene with a Patrol. Stations 15, 33, and 51 house and staff these trailers. HM66 ran a total of 50 calls in 2016, with an average of 80 minutes per call.

The state is preparing to partner with the KCFD to establish a second Type 2 hazardous response vehicle (OES HM51) in Mojave. The unit will be staffed by KCFD personnel. The area has a major railway, interstate, chemical plants, and the Mojave Spaceport. This is the primary route for commodities not shipped on Interstate 5. CPSM recognizes that the JPA, regional response plan, and cross-staffing are ***Best Practices*** that should be continued.

The KCFD reports that, aside from the state's agreement to provide an OES response vehicle (HM51) and equipment, the hazardous response program does not receive full cost recovery. California Assembly Bill-408 does provide that those expenses related to a hazardous spill can be charged against the person "whose negligence caused the incident if the incident necessitated

an evacuation from the building, structure, property, or public right-of-way where the incident originates, or the incident results in the spread of hazardous substances or fire beyond the building, structure, property, or public right-of-way where the incident originates."

The Kern County Fire and Safety Group, a nonprofit group established in 1985, has purchased a foam trailer (located at Station 92) and a large supply of foam; however, there are no other existing cost-sharing relationships with petroleum, rail, aerospace, or chemical companies located in the county.

> ***Recommendation: KCFD should move towards obtaining 100 percent cost recovery for its hazardous materials program and should consider seeking financial support from those companies within Kern County that store, transport, or incorporate hazardous substances within their operations.***

TARGET HAZARDS AND FIRE PREPLANNING

The process of identifying target hazards and performing pre-incident planning are basic preparedness efforts that have been key functions in the fire service for many years. In this process, critical structures are identified based on the risk they pose. Target hazards are those occupancies or structures that are unusually dangerous when considering the potential for loss of life or the potential for property damage. Once the target hazards are identified then tactical considerations are established for fires or other emergencies in these structures. Consideration is given to the activities that take place (manufacturing, processing, etc.), the number and types of occupants (elderly, youth, handicapped, imprisoned, etc.), and other specific aspects relating to the construction of the facility, or any hazardous or flammable materials that are regularly found in the building. The occupancies that are typically identified as target hazards and specified for the development of pre-incident plans, or "preplans," are as follows:

- Healthcare facilities including hospitals and nursing homes.
- Large assembly facilities.
- Schools and other educational facilities.
- Detention and correction facilities.
- Mid- and high-rise business and residential buildings.
- Residential board and care and assisted living facilities.
- Mercantile occupancies including big box retail stores, and strip shopping centers.
- Business uses such as office buildings and office parks.
- Industrial facilities.
- Warehouse and storage facilities.

NFPA Standard 1620, *Recommended Practice for Pre-Incident Planning*, identifies the need to utilize both written narrative and diagrams to depict the physical features of a building, its contents, and any built-in fire protection systems. The information contained in pre-incident fire plans allows firefighters and officers to have a familiarity with the building/facility, its features, characteristics, operations, and hazards, thus enabling them to more effectively, efficiently, and safely conduct firefighting and other emergency operations. Pre-incident fire plans should be reviewed regularly and tested by periodic table-top exercises and on-site drills for the most

critical occupancies. Information collected for prefire/incident plans includes, but is certainly not limited to, data such as:

- The occupancy type.
- Floor plans/layouts.
- Building construction type and features.
- Fire protection systems (sprinkler system, standpipe systems, etc.).
- Utility locations.
- Hazards to firefighters and/or firefighting operations.
- Special conditions in the building.
- Apparatus placement plan.
- Fire flow requirements and/or water supply plan.
- Forcible entry and ventilation plan.

The definition of what is considered a target hazard by the KCFD varies somewhat depending upon the station area where the target is located. Given the huge diversity found in varying parts of the county there is some validity to this approach. As a general rule of thumb, the department considers a target hazard to be any building or occupancy that may result in an extra alarm response for a fire. This was further clarified to be generally a third alarm or above. CPSM believes that this definition is too restrictive and thus excludes many facilities that most fire departments do classify as target hazards. It was specifically mentioned to the CPSM team that the KCFD does not consider big box type retail occupancies or hotels/motels to be target hazards. There are most likely hundreds, if not thousands, of occupancies throughout the County that are not currently classified as target hazards and that CPSM believes pose a more significant risk that would justify prefire planning.

> ***Recommendation: The KCFD should reexamine and formalize its definition regarding what constitutes a target hazard occupancy that is subject to prefire incident planning.***

CPSM's evaluation found the KCFD to be deficient in its preplanning efforts. The department previously performed prefire/incident planning activities as part of the company utilization inspection program. However, the preplanning component of that program was discontinued several years ago during a downsizing of the department. At the time the program was eliminated the Department was utilizing standardized preplan forms and collecting a considerable amount of data.

Currently, the Captains at each individual station are supposed to identify their own target hazards with the approval of their Battalion Chief. Each shift is supposed to complete a designated number of preplans per year (12 was given as the referenced number). However, there is not a defined list of what facilities require prefire planning and there is little coordination regarding the effort to carry out these reviews. On a triannual basis, each shift is supposed to do a walk-through of the locations identified as target hazards and which have preplans. An exercise is supposed to be conducted annually. The department does not have a schedule for reviewing or updating existing preplans, and the plans that exist were not up to date.

Recommendation: The KCFD should develop a county-wide master inventory list of target hazards and maintain a tracking process for these files to trigger updates when required.

The department has recently completed the installation of mobile data terminals (MDTs) in all first line apparatus. MDTs are meant to provide real-time access to incident information for responding personnel. Pre-incident fire plans have not been loaded into the fire department MDTs. Department officials have indicated an on-going effort to populate the MDTs with the prefire plans, but no estimate was given as to an anticipated completion of this effort.

Recommendation: The KCFD should continue in its effort to update and enter its prefire/incident plans on apparatus MDTs in order to provide real-time quick retrieval of this information.

ACCREDITATION

Accreditation is a comprehensive self-assessment and evaluation model that enables organizations to examine past, current, and future service levels. It is used to evaluate internal performance and compares this performance to industry best practices. The intent of the process is to improve service delivery.

The Center for Public Safety Excellence (CPSE) provides an extensive evaluation process, on a fee basis, to member agencies and which ultimately leads to accreditation. CPSE is governed by the Commission on Fire Accreditation International (CFAI), an 11-member commission representing a cross-section of the fire service, including fire departments, city and county management, code councils, the U.S. Department of Defense, and the International Association of Firefighters.

The CPSE Accreditation Program is built around the following key measurements:

- Determine community risk and safety needs.
- Evaluate the performance of the department.
- Establish a method for achieving continuous organizational improvement.

Local government executives face increasing pressure to "do more with less" and justify expenditures by demonstrating a direct link to improved or measured service outcomes. Particularly for emergency services, local officials need criteria to assess professional performance and efficiency.

CPSE accreditation has national recognition and is widely used throughout the fire service. The key to its success is that it allows communities to set their own standards that are reflective of their needs and a service delivery model that is specific to these needs. In addition, it is a program that is based on ongoing improvement and continuous monitoring. The CPSE accreditation model may be well suited for Kern County.

Recommendation: Kern County should consider CPSE fire accreditation in the future.

KCFD has indicated its intent to undertake the fire accreditation process in the near future and has begun an orientation to familiarize itself with this effort. CPSM believes this will be a very worthwhile effort that should be continued.

SECTION 5. OPERATIONAL RESPONSE APPROACHES

As mentioned previously, many agencies incorporate the use of prefire plans to provide a response and tactical strategy for those more critical or complex occupancies in the community. Figures 5-1 and 5-2 illustrate the critical tasks and resources required on low-risk incidents and moderate-risk structure fires. Understanding the community's risk greatly assists fire department planning and through ongoing training these activities improve overall effectiveness and responder safety.

FIGURE 5-1: Low-Risk Response–Exterior Fire Attack

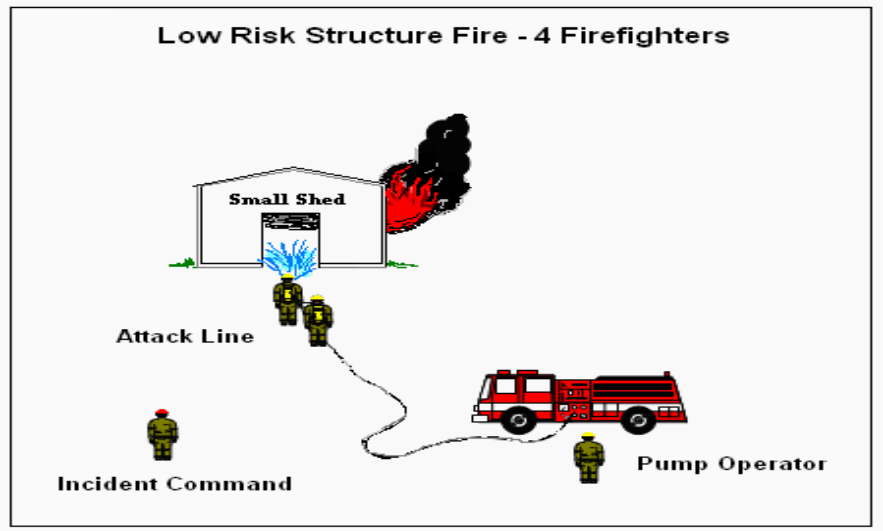
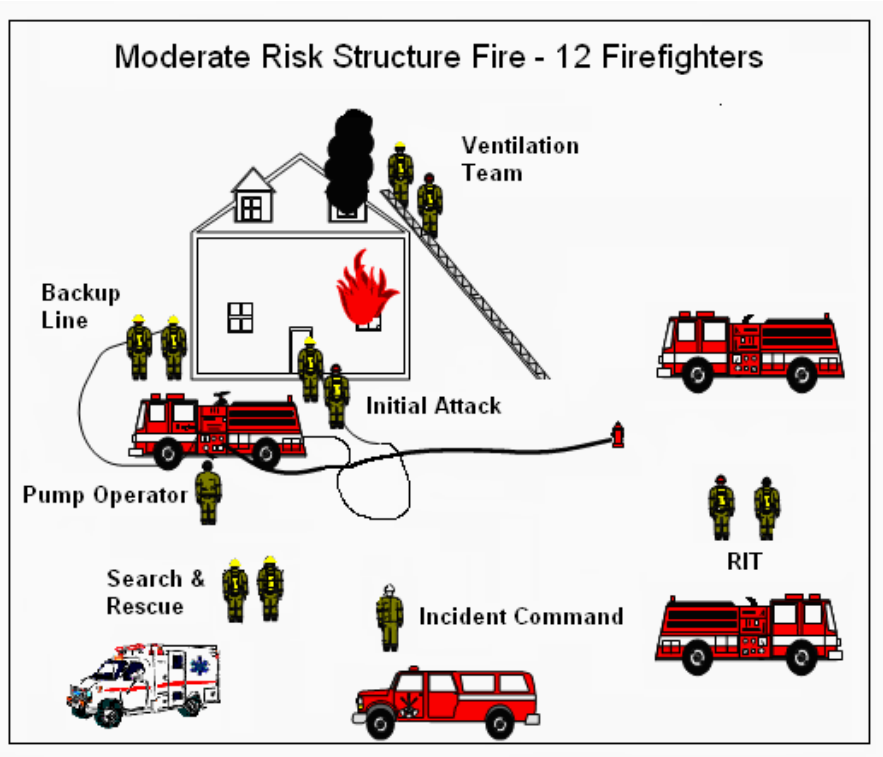


Figure 5-2 represents the critical task elements for a moderate-risk structure fire. Some jurisdictions add additional response resources to meet, and in some cases exceed, the national benchmarking provided by the National Fire Protection Association (NFPA) 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Departments*, 2014 Edition. NFPA 1710 calls for the ***initial assignment of 14 personnel on a single family residential structure fire*** when an aerial ladder is not utilized. Kern County is able to assemble a full complement of resources for a single family residential structure fire from its on-duty resources. In fact, on the initial assignment to a residential structure fire, KCFD will typically assemble upwards of 17 personnel. Compounding the issue in Kern County is the broad expanse of the service area and the extended distances between stations in those rural or remote sections of the county. In these cases, the initial response assignment will be dispatched, but it may be in excess of 30 minutes before the full assignment of resources can be assembled at the scene.

FIGURE 5-2: Moderate Risk Response–Interior Fire Attack



KERN COUNTY RESPONSE PROTOCOLS

Fire Response

The ability to assemble the necessary resources to effectively manage even a smaller residential or commercial structure fire is significant. As mentioned above, the NFPA standard (NFPA 1710) recommends a minimum of 14 personnel as the initial response to a fire at a single family residential structure. An actual fire of any significance will require 14 to 17 personnel or more for extended periods of time. As the incident grows in size and complexity, it is not unusual to see staffing needs that can exceed 30 to 40 personnel. This would be the case in a fire at a big-box retail center like a Home Depot or Walmart, or a fire at an apartment complex. A wildfire of any significance will require an initial response of upwards of 40 personnel and this assignment will be increased during high fire danger or red flag conditions. Though these larger incidents do not occur frequently, when they do occur, the ability to assemble sufficient resources rapidly can significantly impact the outcome.

The decision as to what is the proper staffing level for a specific community's protection is perhaps the most difficult assessment faced by policy makers and fire department leadership across the nation. As communities adjust this level of response, the costs associated with maintaining this level of readiness will have significant financial implications. Kern County presents a very unique and complex environment when considering the most appropriate staffing level and deployment practices. A number of factors contribute to this situation. CPSM recognizes that Kern's call volumes may be considered as moderate, with isolated areas

having what may be considered as high workloads. On average there are nearly 50,000 incidents occurring annually, which translates to approximately 136 incidents each day. Eight of the 47 stations are responding to 2,500 or more incidents each year. There were 185 structure fires in which the individual fire loss for each event was $20,000 or higher. In addition, there were 40 wildfire events that burned 10 acres or more and 21 of the wildfires lasted in excess of 12 hours. This combined workload and the extensive transportation networks, the mixture of urban and rural concentrations, and the nine separate municipal service contracts all contribute to the diversity of the workload and overall call volume.

Two of the costliest aspects of service delivery in the fire service today involve the ***static staffing model*** and the ***exclusive use of full-time uniformed firefighter positions*** to fill fire, EMS, and wildland assignments. The static staffing model is generally less efficient in that it maintains the same number of on-duty personnel for the entire 24-hour shift, though workload and personnel demands vary significantly between daytime and nighttime hours. As mentioned above, KCFD maintains the same number of employees on duty at 3:00 a.m. as it does from 3:00 to 5:00 p.m. in the afternoon. In addition, most line personnel are full-time certified firefighters working the 48-hour schedule. KCFD does not utilize any peak-period staffing in managing its fire and EMS responsibilities. There is an extensive use of seasonal personnel in the wildland arena, but little to no variance in staffing that reflects the daily the shifts in the workload for fire and EMS call activity.

> ***Recommendation: The KCFD should evaluate the use of peak-period, two-person EMS squad units, operating in roving patterns throughout the county.***

Overall, EMS workloads equate to approximately 53 percent of the department's total call volume. Kern units respond to over 26,000 EMS calls annually, or an average of nearly 72 EMS calls per day. However, when we look at the percentage of EMS calls in the primarily urban areas and those areas surrounding Bakersfield, the percentage of EMS-related calls jumps to nearly 65 percent of the overall call activity. In addition, KCFD units respond to nearly 7,400 canceled calls annually, with over 78 percent of these being EMS-related. In reality, the actual EMS workload is in the range of 65 percent to 70 percent of the total call activity.

The KCFD operates four ladder trucks that are positioned primarily around the City of Bakersfield and operating within the JPA and the adjacent unincorporated areas of the county. In addition, the City of Bakersfield Fire Department also operates three ladder trucks. In looking at the call volume of the four ladder trucks, it is very apparent that these units respond primarily to calls other than structure fires. In fact, less than 5 percent of the nearly 4,300 total responses for all of the ladder trucks combined were to structure fires. We would also speculate that on most of these fire responses, ladder personnel were utilized to supplement staffing levels rather than operating the ladder for the purpose of conducting a rescue or providing an elevated master stream.

> ***Recommendation: The KCFD should consider the reassignment of 27 existing line fire personnel (three ladder companies on three shifts) into peak-period EMS-squad positions and assign them to 10-hour daily assignments.***

The reassignment of 27 personnel will provide sufficient staffing to operate seven two-person EMS squad units that can be operated 7-days each week for 10-hour shifts each day. This deployment will provide an expanded capacity to handle the EMS and nonemergency workloads and will provide a reduction in the wear-and tear of the larger ladder trucks. In addition, the three ladder trucks can be maintained for operational readiness and cross-staffed with engine companies so that they are available if needed.

An analysis of repair costs for fire apparatus compared to lighter weight alternative response vehicle offers a striking contrast. The cost comparisons shown in Table 5-1 were utilized by the Shreveport Fire Department in helping to make its decision to initiate the ***Sprint Program***, which is a cross-staffing model for fire apparatus and lighter weight alternative response vehicles. CPSM believes this concept is extremely viable in Kern County, particularly with its current ladder truck deployment.

TABLE 5-1: Fire Apparatus vs. Small Vehicle Maintenance/Response Cost Comparison

Service	Fire Apparatus (Engine)	Alternative Response Vehicle
Oil and filter change	$175	$25.95
Set of tires	$1,800	$625
Complete brake job	$3,600	$270
Battery replacement	$429	$53.95
Alternator replacement	$1,195	$125
Windshield replacement	$2,400	$600
Fuel efficiency	3-5 MPG	15-20 MPG

Another area that appears to provide opportunities for improved efficiencies is the manner in which holiday time is managed. The county provides 144 hours of holiday pay each year to line fire employees. Line fire employees also have the option to request time off in lieu of holiday pay. Due to the constant staffing policy, whenever someone takes time off, overtime is required to fill the vacated slot. In the one-year period in FY-2015-16, the County Auditor-Controller estimated nearly $300,000 in overtime pay was paid for coverage of time lost because of holiday leave. In addition, this analysis also showed that between FY2012-13 and FY2015-16, the amount of holiday leave time taken had increased by 35 percent. It was also estimated in the Auditor-Controller's analysis that if all employees took time off in lieu of holiday pay, the overtime cost would increase by over $600,000 annually. From this perspective, it would be beneficial from both a financial standpoint and from a staffing enhancement standpoint, to move to a process that only pays line fire personnel for holiday leave and to discontinue the option of taking time off in lieu of being paid.

> ***Recommendation: The County should consider a revision in the negotiated agreement with the firefighters' union that moves to the full cash payment for holiday leave and eliminates the option for taking time off in lieu of pay.***

Perhaps even more impactful then the holiday leave issue is the amount of vacation time that is allowed off each day. Under current KCFD policy, 23 vacation slots are authorized for each 24-hour shift. Throughout the course of the year this would equate to approximately 66,792 hours of vacation time available for each shift (23 slots X 24 hours X 121 shifts = 66,792 hours). Under the current Fire Union contract language, the maximum annual accrual of vacation time (for a 16-year employee) is 280 hours. If each employee is permitted to use 280 hours of vacation leave annually, the total amount of leave that would be taken would be just over 45,000 hours annually (280 hours X 161 line personnel = 45,080). The difference in these two calculations equates to approximately seven 24-hour vacation slots for each 24-hour shift. From this perspective, it appears the current authorization of 23 vacation slots each day can be reduced.

> ***Recommendation: KCFD should consider a revision in the number of authorized vacation slots that are available for employees to take off on each shift.***

Combined, a reduction in the amount of lost time attributable to both holiday and vacation leave can effectively add upwards of ten more people on duty each day. These additional personnel would effectively reduce the current expenditures being paid for overtime coverage or could increase the daily deployment of personnel and response vehicles.

Structure Fires

When an actual structure fire occurs, many variables will impact the suppression outcomes. These include:

- The age and type of construction of the structure.
- The contents stored in the structure and its flammability.
- The presence of any flammable liquids, explosives, or compressed gas canisters.
- The time of detection, notification, and ultimately response of fire units.
- The presence of any built-in protection (automatic fire sprinklers) or fire detection systems.
- Weather conditions and the availability of water for extinguishment.

Subsequently, in those situations in which there are extended delays in the notification process or the fire has progressed significantly, prior to the arrival of responding units, there is actually very little that can be done to limit the extent of damage to the entire structure and its contents. In these situations, suppression efforts will focus on the protection of nearby or adjacent structures with the goal being to limit the spread of the fire beyond the building of origin. This is often termed ***protecting exposures.*** When the damage is extensive and the building becomes unstable, firefighting tactics typically move to what is called a ***defensive attack***, or one in which hose lines and more importantly personnel are on the outside of the structure and their focus is to merely discharge large volumes of water until the fire goes out. In these situations, the ability to enter the building is very limited and if victims are trapped in the structure, there are very few safe options for making entry.

There is an active debate in the fire service about the options of interior firefighting vs. exterior firefighting. These terms are self-descriptive in that an ***interior fire attack*** is one in which firefighters enter a burning building in an attempt to find the seat of the fire and from this interior position extinguish the fire with limited amounts of water. An ***exterior fire attack*** is a tactic in which firefighters initially discharge water from the exterior of the building, either through a window or door and knock down the fire before entry in the building is made. The concept is to introduce larger volumes of water initially from the outside of the building, cool the interior temperatures, and reduce the intensity of the fire before firefighters enter the building. An exterior attack is most applicable in smaller structures, typically single family, one-story detached units which are typically smaller than 2,500 square feet in total floor area.

There are several factors that have fueled this debate, the first and most critical of which is staffing level. As fire departments operate with reduced levels of staffing, and this staff is arriving at the scene from greater distances, there is little option for a single fire unit with two, three, or four personnel but to conduct an exterior attack. When using an exterior attack, the requirement of having the four persons assembled on-scene prior to making entry would not apply. Recent studies by UL have evaluated the effectiveness of interior vs. exterior attacks in certain simulated fire environments. These studies have found that the exterior attack to be equally effective in these simulations.[26] This debate is deep-seated in the fire service and traditional tactical measures have always proposed an interior fire attack, specifically when

[26] "Innovating Fire Attack Tactics", U.L.COM/News Science, Summer 2013.

there is a possibility that victims may be present in the burning structure. The long-held belief in opposition to an exterior attack is that this approach is thought to actually push the fire into areas that are not burning or where victims may be located. The counterpoint supporting the exterior attack centers on firefighter safety. The exterior attack limits firefighters from making entry into those super-heated structures that may be susceptible to collapse. KCFD has recognized the importance of this tactical approach and has built the option of an exterior or transitional attack into its departmental SOPs and training regimens. CPSM recognizes this effort as a ***Best Practice***.

Table 5-2 shows the aggregate call totals for the 12-month period evaluated. EMS calls represent the largest percentage of calls for service at almost 53 percent. In most communities that we have reviewed, EMS calls are the predominant call activity. However, in Kern County the percentage of EMS call activity is significantly lower than we typically see. In many systems, EMS call activity will account for upwards of 70 to 80 percent of the total call activity. Another interesting occurrence regarding the Kern data is the high percentage of fire-related calls, nearly 30 percent of the overall call activity. Our experience is that these fire call categories typically account for approximately 15 to 20 percent of the overall activity. The volume of canceled calls in Kern (nearly 15 percent of all responses) is a much higher percentage when compared to other systems. We rarely see canceled calls exceeding 5 percent of the workload. It is also interesting to note that most canceled calls in Kern are EMS-related (over 78 percent). Actual fires (structural and outside) represent 6.2 percent of the overall calls, with outside fires (including wildland incidents) accounting for more than double the number of structure fires. Hazard, false alarms, good intent, and public service calls represent the largest percentage of the fire calls (79.1 percent).

TABLE 5-2: Call Types

Call Type	Number of Calls	Calls per Day	Call Percentage
Breathing difficulty	3,478	9.5	7.0
Cardiac and stroke	4,783	13.1	9.6
Fall and injury	4,210	11.5	8.5
Illness and other	7,157	19.6	14.4
MVA	2,722	7.5	5.5
Overdose and psychiatric	869	2.4	1.7
Seizure and unconsciousness	3,067	8.4	6.2
EMS Total	**26,286**	**72.0**	**52.8**
False alarm	1,995	5.5	4.0
Good intent	4,853	13.3	9.8
Hazard	1,646	4.5	3.3
Outside fire	2,112	5.8	4.2
Public service	3,195	8.8	6.4
Structure fire	973	2.7	2.0
Fire Total	**14,774**	**40.5**	**29.7**
Canceled	7,392	20.3	14.9
Mutual aid	1,314	3.6	2.6
Total	**49,766**	**136.3**	**100.0**

Observations:

Overall

- The department received an average of 136.3 calls, including 20.3 canceled and 3.6 mutual aid calls, per day.
- EMS calls for the year totaled 26,286 (53 percent of all calls), an average of 72.0 per day.
- Fire calls for the year totaled 14,774 (30 percent of all calls), an average of 40.5 per day.

EMS

- Illness and other calls were the largest category of EMS calls at 27 percent of EMS calls.
- Cardiac and stroke calls made up 18 percent of the EMS calls.
- Motor vehicle accidents made up 10 percent of the EMS calls.

Fires

- Structure and outside fires combined for a total of 3,085 calls during the year, an average of 8.5 calls per day.
- A total of 973 structure fire calls accounted for 7 percent of the fire calls.
- A total of 2,112 outside fire calls accounted for 14 percent of the fire calls.
- Good intent calls were the largest fire call category, with 33 percent of the fire calls.
- False alarm calls made up 14 percent of the fire calls.

In looking in more detail at the fire workload in Kern we find that there were 973 structure fires and 2,112 outdoor fires. Of the ***973 structure fires***, it was determined that for ***438*** of these events, there was ***no reported fire damage***. When we looked at the time spent on structure fire incidents, we found that on 608 of the structure fires, the call duration for these incidents was 60 minutes or less. This is indicative of a relatively minor occurrence. However, 175 structure fire calls saw a duration of greater than one hour and 190 lasted for more than two hours. This would indicate a more significant event.

The total fire loss (structure and contents) for all structural fires in the 12-month evaluation period was estimated to be $16,572,061. Fire damage estimates are done by KCFD investigators and the responding company officer in charge. For the calls in which damage was reported (structure and contents), we estimate that the average damage for each fire was approximately $17,032. We can compare this experience to average fire loss nationwide for structure fires. NFPA estimates that in 2016 the average fire loss for a structure fire was $16,610.27 From this perspective the average fire loss in Kern County is very consistent with the amount of loss found in many communities across the nation. Another indication that we use in our analysis of structure fire occurrence is the frequency in which an individual event results in a combined loss that exceeds $20,000. The $20,000 demarcation is relevant from two perspectives; first, this is close to the national average for fire loss in a structure fire, and second, it indicates a fire loss that from CPSM's perspective is representative of a more significant fire event that requires fire department extinguishment. In the period evaluated, there were 184 structure fires in which the combined fire loss exceeded $20,000. The largest combined fire loss (structure and contents) for a single event was $500,000. It must be pointed out that the combined fire loss for outside fires, including wildland fires, was approximately $16.1 million in additional fire loss.

[27] Hylton Haynes, Fire Loss in the United States during 2016, NFPA September 2017.

For purposes of analyzing call activities, the county was divided into four subareas:

- The Bakersfield Joint Protection Area (JPA),
- Urban Areas,
- Rural Areas,
- Remote Areas,

The ***JPA*** is defined by an agreement between KCFD and the Bakersfield Fire Department (BFD) and covers all of BFD's jurisdiction, the airport, and all or part of the first due areas for KCFD stations 41, 42, 45, 51, 52, 53, 61, 63, 64, 65, 66, and 67. The ***Urban Areas*** include a very limited portion of Bakersfield that does not fall within the JPA and the cities of Arvin, Delano, Maricopa, McFarland, Ridgecrest, Shafter, Taft, Tehachapi, and Wasco. The ***Rural Areas*** include all areas outside of city limits but within eight miles of a KCFD station as measured along the most direct roads of travel. ***Remote Areas*** are areas outside of city limits that are more than eight miles from a KCFD station as measured along the shortest road distance. It is interesting to note the difference in average fire loss for structure fires across the four service categories served in Kern County. The average fire loss for structure fires in the Bakersfield JPA was the lowest recorded while structure fires in the Rural Areas of the county had the highest average fire loss. This is understandable given the extended travel times to the Rural Areas and the sparsity of response units in these areas. Nearly 45 percent of all structure fires occurred in the JPA while only about 5 percent of the structure fires occurred in those remote sections of the county.

Tables 5-3, 5-4 and 5-5 provide an analysis of fire loss in Kern County during the year-long evaluation period.

TABLE 5-3: Content and Property Loss – Structure and Outside Fires

	Content Loss		Property Loss	
Call Type	**Number of Calls**	**Loss Value**	**Number of Calls**	**Loss Value**
Outside fire	862	$3,233,706	879	$12,851,676
Structure fire	529	$3,456,382	535	$13,115,679
Total	**1,391**	**$6,690,088**	**1,414**	**$25,967,355**

Note: This includes only calls with recorded loss greater than $2.

Observations:

Outside Fires

- Out of 2,112 outside fires, 879 had recorded property loss, with a combined $12,851,676 in loss.
- 862 outside fires also had content loss with a combined $3,233,706 in loss.
- The highest total loss for an outside fire was $1,500,001.

Structure Fires

- Out of 973 structure fires, 535 had recorded property loss, with a combined $13,115,679 in loss.
- 529 structure fires also had content loss with a combined $3,456,382 in loss.
- The average total loss for all structure fires was $17,032.
- The highest total loss for a structure fire was $500,000.

TABLE 5-4: Number of Fires with Loss Above and Below $20,000

Call Type	No Loss	Under $20,000	$20,000 plus
Outside fire	1,233	718	161
Structure fire	438	351	184
Total	**1,671**	**1,069**	**345**

Observations:

- 1,233 outside fires and 438 structure fires had no recorded loss.
- 161 outside fires and 184 structure fires had $20,000 or more in loss.

TABLE 5-5: Total Structure Fire Loss by Area

Area	Call Type	Fires w/ Loss	Total Loss	Average Loss	Fires w/ $20K+ Loss
Bakersfield JPA	Structure fire	238	$5,894,732	$24,768	70
Urban Areas	Structure fire	133	$4,308,735	$32,397	43
Rural Areas	Structure fire	138	$5,394,437	$39,090	60
Remote Areas	Structure fire	26	$974,157	$37,468	11
Total		**535**	**$13,115,679**	**$30,976**	**184**

Integrated Risk Management

Fire suppression and response, although necessary to minimize property damage, have little impact on preventing fires. Rather, public fire education, fire prevention, and built-in fire protection and notification systems are essential elements in protecting citizens from death and injury due to fire. The term *integrated risk management*, first developed in the United Kingdom, refers to a planning methodology that focuses on citizen safety and the protection of property and the environment through a community-wide fire reduction effort. This is accomplished by assessing the risk faced, taking preventive action, and deploying the proper resources in the right place at the right time.[28]

An integrated risk management model uses incident data (location, construction types, population density, demographics, etc.) to assess all types of fire, health, and safety risk in the community. The model is then used to manage risk through targeted, community-based risk reduction strategies and flexible approaches to incident response (See Merseyside Fire and Rescue Service and Nanaimo Fire Rescue). It helps deploy the fire department's response and prevention resources to best meet the frequency and location of incidents. It also aids in all-hazard risk assessment, and increases the value of risk reduction efforts (such as fire prevention education for the elderly and children, the populations that are the most vulnerable to fire). Finally, the model measures the fire department services' workload, and assesses the efficiency and outcome of the delivery of each service, adjusting as needed. In essence, integrated risk management pulls together all the different planning aspects of community hazard and vulnerability analysis, fire department risk management, resource allocation, and performance

[28] National Fire Protection Association, *Fire Protection Handbook* (2008 Edition), 12-3.

measurement into one unified, cohesive whole. ***The end product of this effort is the reduction of fire incidents.***

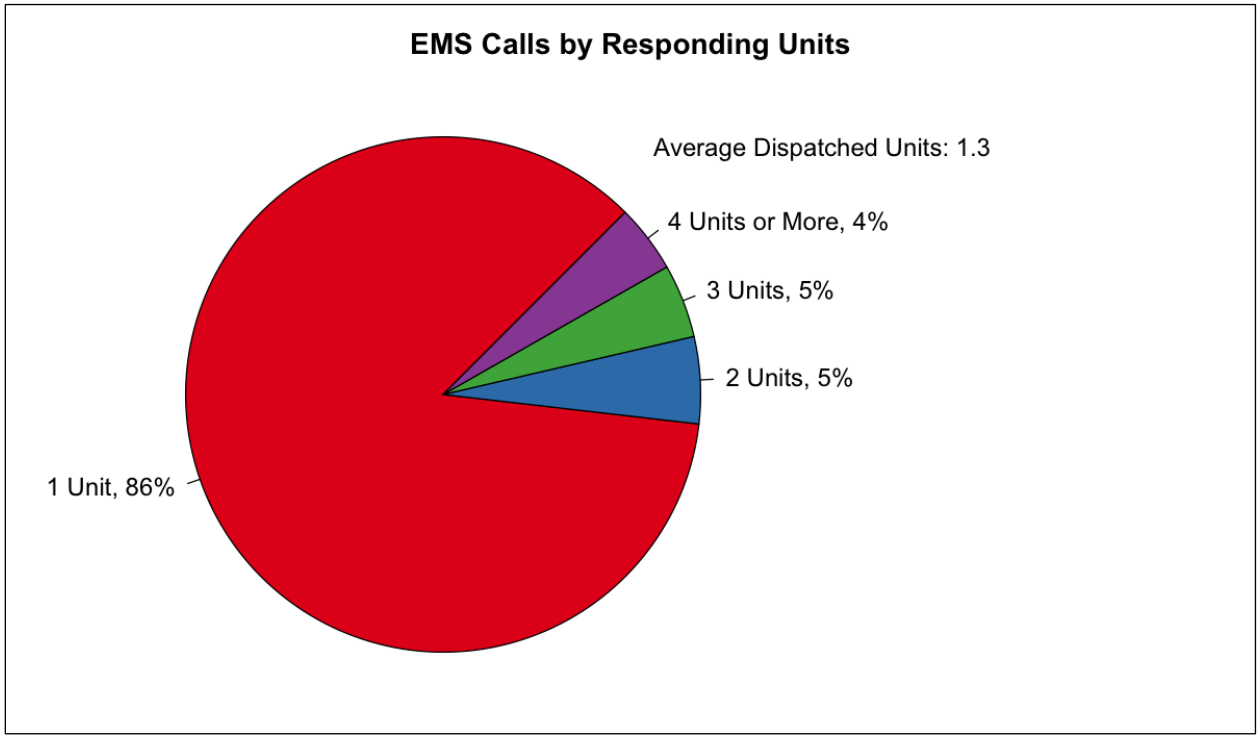
> ***Recommendation: KCFD should develop an integrated risk management plan that focuses on structure fires throughout the County.***

The frequency and magnitude of structure fires in the county were significant in the period evaluated. It behooves every agency to constantly monitor the frequency and types of fire in its community so as to be able to recognize any trends or patterns that can then be the focus of fire prevention and code enforcement efforts. It is important that this vigilance is ongoing, and that the department identify any uptick in the occurrence of fire that merits an orchestrated response.

KCFD is extremely progressive in its efforts to handle its volume of call activity and the management of its resources in responding to the full spectrum of incidents occurring. It is important to note that in most emergency delivery systems there are a large number of calls that are nonemergency in nature. Kern County also experiences a large number of citizen requests that are service-related calls in which the public utilizes emergency responders to mitigate situations that do not require an emergency response. Some of these responses are accidental or there is a perceived problem that when investigated is found to be nonemergency in nature. Many calls, however, are public assists in which individuals request assistance through the 911 system because they know the response will be immediate and there are typically no charges attached with these responses. As noted previously, Kern County does not utilize an alternate response vehicle concept or a service response pattern that dispatches a smaller service vehicle to those known nonemergency or service-related calls. All calls for service receive a full fire contingent, usually in a fire engine or ladder truck.

Two key factors impact response activities and workload as agencies respond to the range of citizen requests. The first is the number and types of units that respond to the various requests and the second is the mode of response. KCFD understands the necessity of adjusting the number and types of units responding and its mode of response. Both the Kern County Fire Department and the 911 Center are extremely effective in adjusting the number of units that respond to the various call types; however, the mode of response (hot vs. cold), particularly during EMS responses, could be improved.

FIGURE 5-3: Number of Units Dispatched to Calls



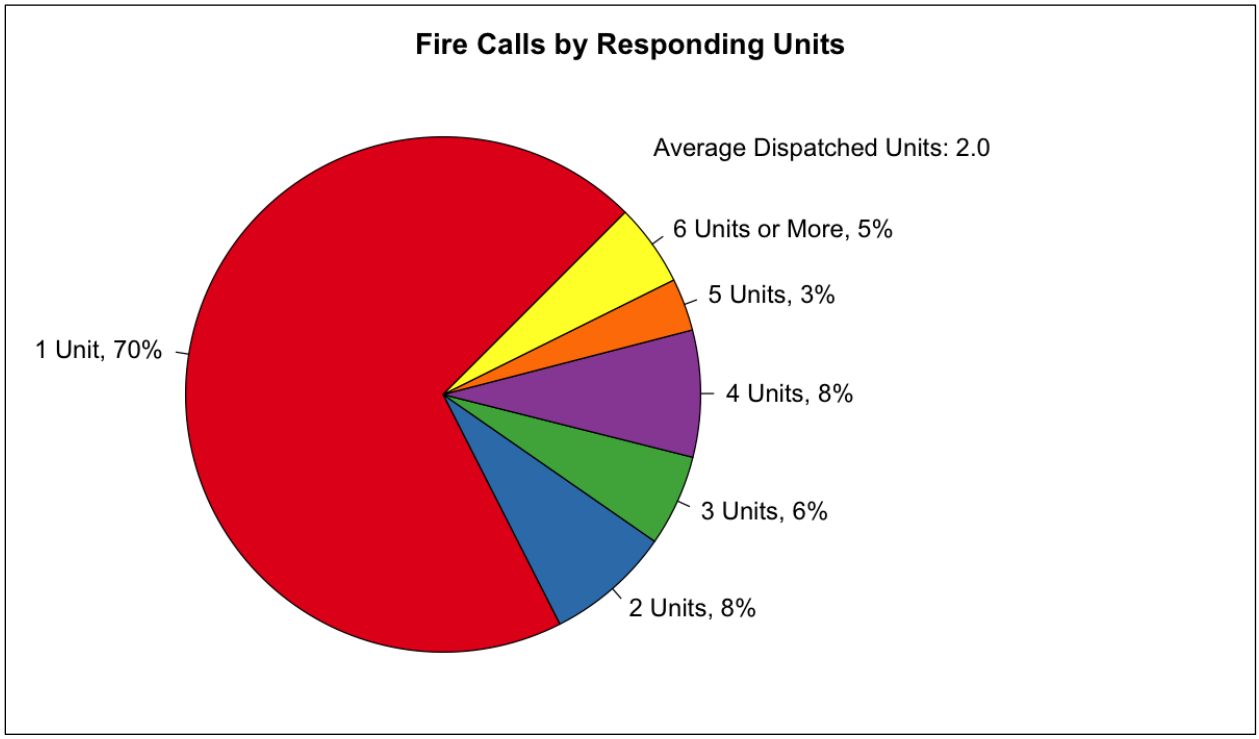


TABLE 5-6: Number of Units Dispatched to Calls by Call Type

Call Type	Number of Units					Total Calls
	One	Two	Three	Four	Five or More	
Breathing difficulty	3,331	142	4	0	1	3,478
Cardiac and stroke	4,524	242	13	2	2	4,783
Fall and injury	3,931	245	21	7	6	4,210
Illness and other	6,763	319	23	14	38	7,157
MVA	225	304	1,146	721	326	2,722
Overdose and psychiatric	830	35	4	0	0	869
Seizure and unconsciousness	2,916	145	4	2	0	3,067
EMS Total	**22,520**	**1,432**	**1,215**	**746**	**373**	**26,286**
False alarm	1,162	168	188	362	115	1,995
Good intent	4,094	287	262	132	78	4,853
Hazard	1,117	196	98	152	83	1,646
Outside fire	851	208	168	310	575	2,112
Public service	2,883	233	37	24	18	3,195
Structure fire	234	68	94	195	382	973
Fire Total	**10,341**	**1,160**	**847**	**1,175**	**1,251**	**14,774**
Canceled	5,917	675	362	264	174	7,392
Mutual aid	904	220	101	44	45	1,314
Total	**39,682**	**3,487**	**2,525**	**2,229**	**1,843**	**49,766**
Percentage	**79.7**	**7.0**	**5.1**	**4.5**	**3.7**	**100.0**

Observations:

Overall

- On average, 1.5 units were dispatched to all calls, and for 80 percent of calls only one unit was dispatched.
- Overall, five or more units were dispatched to 4 percent of calls.

EMS

- On average, 1.3 units were dispatched per EMS call.
- For EMS calls, one unit was dispatched 86 percent of the time; two units were dispatched 5 percent of the time; three units were dispatched 5 percent of the time; four units were dispatched 3 percent of the time; and five or more units were dispatched 1 percent of the time.

Fires

- On average, 2.0 units were dispatched per fire call.
- For fire calls, one unit was dispatched 70 percent of the time; two units were dispatched 8 percent of the time; three units were dispatched 6 percent of the time; four units were dispatched 8 percent of the time; and five or more units were dispatched 8 percent of the time.

- For structure fire calls, three units were dispatched 10 percent of the time; four units were dispatched 20 percent of the time; and five or more units were dispatched 39 percent of the time.
  - On average, 7 units were dispatched to calls that saw five or more units dispatched.
- For outside fire calls, three units were dispatched 8 percent of the time; four units were dispatched 15 percent of the time; and five or more units were dispatched 27 percent of the time.
  - On average, 8 units were dispatched to calls that saw five or more units dispatched.

Wildland Fires

California has dry, windy, and often hot weather conditions from late spring through autumn and which can produce moderate to devastating wildfires. At times, these wildfires are fanned or made worse from strong, dry airstreams known as Diablo Winds in the northern part of the state and Santa Ana Winds to the south. Wildfires in California are growing more dangerous and costly. Recent drought conditions have also led to rising tree mortality, often caused by an infestation of the bark beetle. Kern County has thousands of dead and dying trees that add to the wildfire threats to public safety and infrastructure.

Kern County hosts a wide range of geographic, demographic, and weather variables that make addressing the threat of wildfire a significant challenge. It's also home to a number of landmarks that require special attention in planning and response:

- The Mojave Desert.
- Kern National Wildlife Refuge.
- The Bitter Creek National Wildlife Refuge.
- The Giant Sequoia National Monument.
- Los Padres National Forest.
- Sequoia National Forest.

Wildland Fires within KCFD Response Area

The type and number of KCFD resources deployed on wildland responses vary greatly, depending on the geographic zone, topography, weather, season/fuel moisture, and threat to structures and life. Figures 5-4 and 5-5 illustrate the differences in resource deployment on low-risk, moderate risk, and high-risk wildfires.

FIGURE 5-4: Wildland Resource Deployment on Low-Risk Wildfires

Minimal Response - Small lot areas within urban areas. This deployment would not change due to weather. During high risk weather patterns, an additional Type 1 Engine and a Battalion Chief would respond.

- 1 – Engine (Type 1 or Type 3)
- 2 – Engines (Type 3 or Type 6)
- BC – Notification

FIGURE 5-5: Wildland Resource Deployment on First Alarm High-Risk Wildfires

Standard wildland response during "high" weather patterns throughout Kern County.

- 1- Battalion Chief
- Battalion 8 is notified
- 1 – Engine (Type 1 or 3)
- 4 – Engines (Type 4 or 6)
- 1 Water Tender
- 1 – Hand Crew
- 1 – Dozer
- 1 – Helicopter; 2 – Helitac Crews; 2 – Air Tankers (SRA on Temblor zone only)

Of the 49,766 calls for service in 2016, 2,112 (14 percent) were classified as wildland calls within KCFD's jurisdiction; 48,552 acres were attributed to the Erskine Fire,[29] where 285 homes were destroyed, and two people lost their lives. A total of 1,555 wildland fires (74 percent) lasted less than one hour; 361 outside fires (17 percent) lasted between one and two hours; and 196 outside fires (9 percent) lasted more than two hours. While the county is seasonally subject to major wildland fires, 66 percent of wildland fires burned 10 acres or less and 85 percent were extinguished in less than 12 hours.

Tables 5-7 through 5-11 quantify response to wildfires in the 12-month evaluation period.

[29] "Erskine Fire". InciWeb. Retrieved June 29, 2016.

TABLE 5-7: Wildland Fire Calls by Acres Burned and Duration

Acres Burned	Duration			Total Calls
	Under 12 Hours	12 to 24 Hours	More than 24 Hours	
Less than 1	9	0	0	9
1 to 10	78	0	3	81
More than 10	26	1	13	40
Unknown	2	2	2	6
Total	**115**	**3**	**18**	**136**
Avg. Duration (Hours)	**3.1**	**14.9**	**110.3**	**17.5**

TABLE 5-8: Wildland Fire Calls by Number of Units Deployed

Number of Units	Number of Calls	Average Units per Call
1 – 10	50	6.4
11 – 20	75	14.5
20+	11	26.2
Total	**136**	**12.5**

TABLE 5-9: Runs and Deployed Time for Wildland Fire Calls

Duration	Total Annual Runs	Avg. Runs per Call	Total Annual Hours	Avg. Deployed Hours per Run
Under 12 hours	1,252	10.9	2,433.3	1.9
12 to 24 hours	56	18.7	322.5	5.8
More than 24 hours	452	25.1	15,392.7	34.1
Total	**1,760**	**12.9**	**18,148.5**	**10.3**

Note: The average runs per call are higher than average units per call because some units had more than one run per call.

TABLE 5-10: Wildland Fire Calls and Workload by Month

Year	Month	Number of Calls	Avg. Runs per Call	Percent of Total Annual Hours
2016	August	21	17.9	54.2
	September	11	12.0	2.9
	October	5	11.8	0.6
	November	6	9.5	0.5
2017	April	10	9.8	1.3
	May	26	11.7	6.7
	June	34	11.8	10.3
	July	23	14.5	23.4
Total		**136**	**12.9**	**100.0**

Note: There were no wildfires in December 2016 or January through March 2017. Total deployed hours in a month based on when the call began and may include time worked in the following month(s).

Observations:

- More than half the workload for wildland fires was for calls starting in August 2016.
- On average, 12.5 units were deployed to wildland fires with more than 20 units deployed to 8 percent of calls.
- 18 calls (13 percent) lasted more than 24 hours and were responsible for 85 percent of the total deployed time.
- Mutual aid calls fires lasting 24 hours or more accounted for 0.2 percent of total runs (147) and 35 percent (24,963.5 hours) of the total workload.
- Combined, outside fires and mutual aid calls lasting 12+ hours accounted for 0.9 percent of total runs (667) and 57 percent (40,702.5 hours) of the total workload.
- Wildland crews and teams had the second highest total annual deployed time and the highest average deployed time per run (64.4 hours or 2.9 days).

Nearly all fires had more than zero dollars in loss recorded; however, 58 percent of the outside fires with recorded loss had a total of $2 in loss. In these cases, there was $1 in property loss and $1 in content loss. This is likely a reporting issue and not reflective of actual loss amounts. These calls were counted as having no loss in the analysis below.

TABLE 5-11: Content and Property Loss – Outside Fires

Call Type	Content Loss		Property Loss	
	Number of Calls	Loss Value	Number of Calls	Loss Value
Outside fire	862	$3,233,706	879	$12,851,676

Note: This includes only calls with recorded loss greater than $2.

Observations:

Outside Fires

- Out of 2,112 outside fires, 879 had recorded property loss, with a combined $12,851,676 in loss.
- 862 outside fires also had content loss with a combined $3,233,706 in loss.
- The highest total loss for an outside fire was $1,500,001.

The KCFD has developed numerous contractual relationships and mitigation efforts to address the threat of wildfire within the county. The department also actively participates in the State Master Mutual Aid system and has operating agreements with the USDA Forest Service Sequoia and Los Padres National Forests, the Bakersfield and Cal Desert Districts of the USDI Bureau of Land Management, CAL FIRE & Department of Forestry, and the Fish and Wildlife Service.

Fire Hazard Reduction Program

The goal of the KCFD Fire Hazard Reduction Program is to protect life and property by providing an effective public education and regulation program that reduces hazards resulting from improper and/or inadequate defensible spacing. This reduction of hazards increases firefighter and public safety, as well as improves the ability to protect property in the event of a fire.

The Kern County Tree Mortality Task Force was assembled to develop a response plan for removing dead and dying hazard trees. The goal of the Task Force is to collaborate with local, as well as private and public partners to identify and remove dead and dying trees that

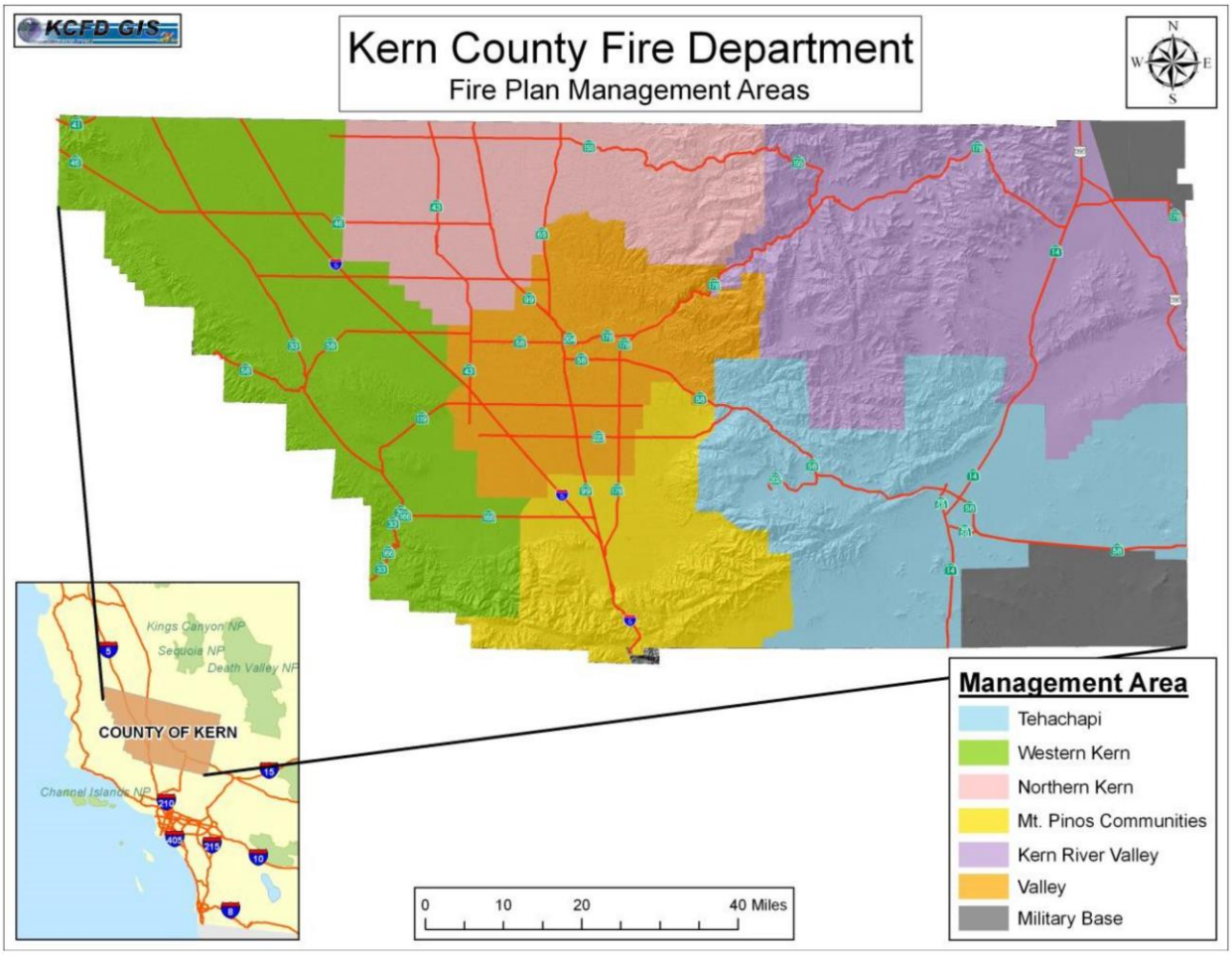
threaten public safety and infrastructure (power lines, water systems, roads/highways, communication lines, etc.). County staff continues to work towards mitigating the threat of dead and dying trees with partners.

Wildland Fire Management Plan (WFMP)

The WFMP was first drafted in 2004 and updated in 2009. CPSM was provided a more updated version called the Unit Strategic Fire Plan. It was last updated in 2012. However, it appears to still be in draft form. The components of each are relatively the same.

The plan was collaboratively developed and managed by federal, state, city, and county stakeholders. It serves to identify and prioritize prefire and post-fire management strategies and tactics meant to reduce the threat of a loss of life and property. The goal of the plan is to minimize costs and losses from wildfire by protecting assets at risk through focused prefire management prescriptions and increasing initial attack success. Based on this assessment, preventive measures are implemented, based on six wildfire protection zones that have been created.

FIGURE 5-6: Kern County Fire Department Fire Planning Areas



Battalion 1 – Tehachapi includes the southeastern portion of Kern County. It is divided by State Highway 58 that runs east/west and by State Highway 14 that runs north/south. The California Aqueduct, running north and south, establishes the eastern edge of the State Responsibility Area (SRA).

Battalion 2 – Western Kern comprises most of the west side of the County of Kern. West of State Highway 33 and most of what is adjacent to State Highway 166 is either SRA or Federal Responsibility Area (FRA).

Battalion 3 – Northern Kern includes the north central portion of the county. Relative to the State Responsibility Area, the most important feature is State Highway 65, the western boundary for most of the SRA.

Battalion 5 – Mt. Pinos is the extreme South/South West portion of the County; it is bordered by Los Angeles County and Ventura County.

Battalion 4 &6 – Valley/Foothill is predominantly Local Responsibility Area (LRA) on the south and east sides of Bakersfield. There is some SRA in the eastern portion of the battalion that adjoins the Sequoia National Forest.

Battalion 7 – Kern River Valley includes the northeast portion of Kern County. It is a diverse mixture of Direct Protection Areas with Federal Responsibility Areas, both Forest Service and Bureau of Land Management and SRA (253,776 acres). North/south highways include State Highways 178 and 14 and the main east/west highway being State Highway 155.

Battalion 8 is an administrative battalion used for wildland units and calls and does not cover a specific geographical area or stations.

As part of the planning process, citizen advisory groups and appointed and elected officials, prepared long-range plans that reflect local community desires for public safety, public health, public welfare, and environmental quality of life. Many areas of Kern County have more localized community plans or area plans containing safety and conservation elements. Wildland fire issues and county land use zoning and development are considered in the Wildland Fire Management Plan.

Representatives involved in the development of the Unit Strategic Fire Plan are as follows:

- Kern County Supervisors — Local Government
- Bakersfield Fire Department — City Fire Protection
- Ventura County Fire — Local Government/SRA Fire
- Los Angeles County Fire — Local Government/SRA Fire
- Cal Fire/Department of Forestry — State
- Santa Barbara County Fire — Local Government/SRA Fire
- Kern County Parks Department — Local Government
- Kern County Road Department — Local Government
- US Forest Service Los Padres — US Government
- US Forest Service Sequoia — US Government
- Bureau of Land Management — US Government
- Department of Fish and Game — State
- U.S. Fish and Wildlife Service — US Government
- California State Parks — State
- Local Community Service Districts — Local Government
- Local Property Owner Assns. — Local Government
- Cal Trans — State
- Air Pollution Control Districts — State/County
- Tejon Ranch Inc. — Private

Fire Safe Councils have been instrumental in bringing a representative group of stakeholders to the table. The councils shed light on many concerns within communities and expose information relating to the effectiveness of the KCFD's fire safe efforts. The department is able to respond and adapt activities to address many of the concerns from the different stakeholders involved with the fire safe councils. Through the councils' diversity, agencies have been able to develop Community Wildfire Protection Plans (CWPP) that otherwise may never have been developed.

These plans primarily focus on geographic, parcel-by-parcel assessments, fuel management strategies, structure protection, evacuation plans, and public education.

The variance in motivation, resources, and turnover in ownership should lead to some concern. The assessments were last completed between 11 and 13 years ago, CPSM acknowledges that fire safe councils and their grant funded assessments are a ***Best Practice***. However, some work should go into refreshing the assessments to identify whether conditions have changed enough to warrant updating fuel management and evacuation plans, and additional public education.

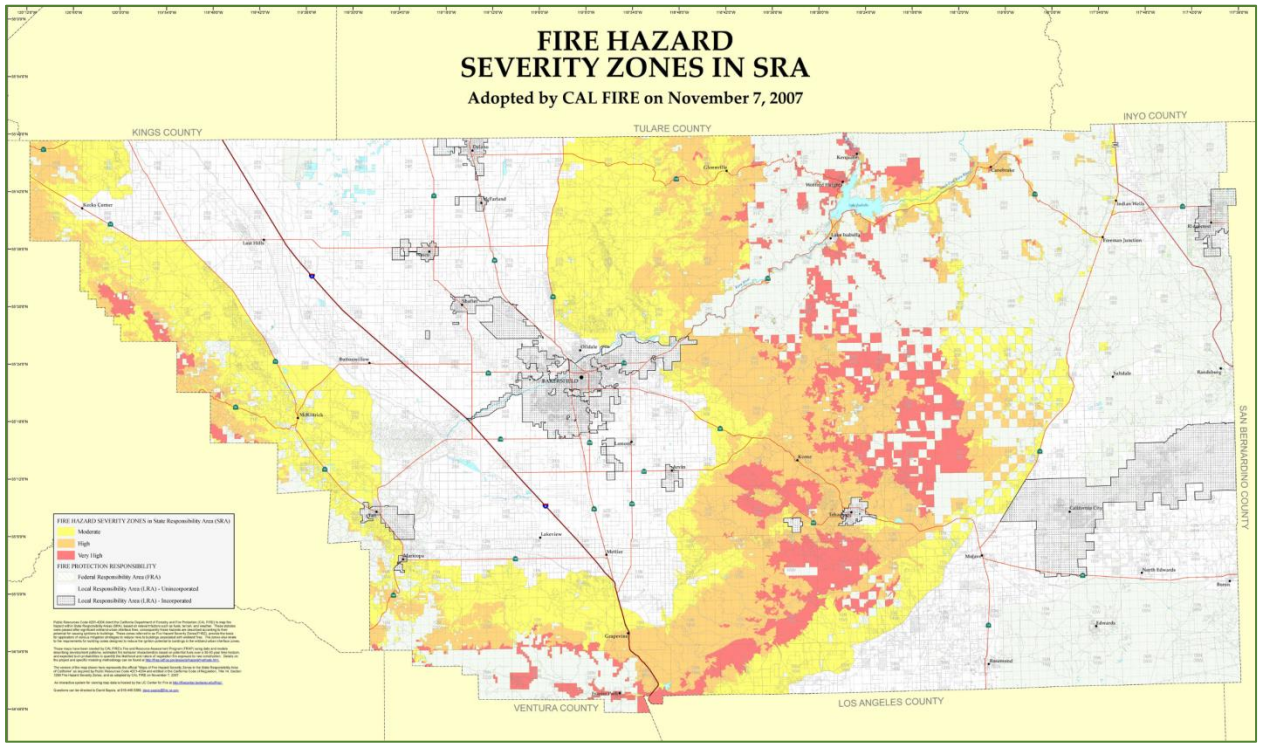
> ***Recommendation: The Fire Safe Councils should review each of the regional assessments for continued relevance and consistency.***

California Department of Forestry and Fire Protection (CDF) Contract

The contractual Fire Protection Agreements between the state and the contract counties recognize four separate areas of responsibility:

- State Responsibility Area (SRA) - Areas exclusive of cities and federal lands, regardless of ownership, which are classified by the State Board of Forestry and Fire Protection as areas in which the primary financial responsibility for preventing and suppressing wildfires is that of the State or its agent (the KCFD is the State's agent within Kern County).

FIGURE 5-7: Fire Hazard Severity Zones in SRA



Note: the Map is linked to the source website.

- Local Responsibility Area (LRA) – Lands exclusive of an SRA classification or federal ownership that a county or other local jurisdiction is responsible for providing fire protection. LRA can include cities, fire districts, and unincorporated county areas as well as some unincorporated areas classified as wildland.

- County SRA Protection Area (CPA) – Those areas classified as SRA within a county, which fall outside a Federal Direct Protection Area and that, by law and pursuant to the terms of the Agreement are provided wildland fire protection by the county.
- Federal Direct Protection Area (Federal DPA) – For the purpose of this Operating Plan, those areas classified as SRA that by law and agreement are provided wildland fire protection by a Federal Forest Agency within a county.

Under Title 14 of the California Code of Regulations, the California Department of Forestry and Fire Protection (CDF) has the primary responsibility for implementing wildfire planning and protection for the SRA. The CDF develops fire safe regulations and issues fire safe clearances for land within a fire district of the SRA. More than 31 million acres of California's privately-owned wildlands are under the jurisdiction of the CDF.

In addition to wildland fires, the CDF's planning efforts involve responding to other types of emergencies that may occur on a daily basis, including residential or commercial structure fires, automobile accidents, heart attacks, drowning victims, lost hikers, hazardous material spills on highways, train wrecks, floods, and earthquakes. Through contracts with local government, the CDF provides emergency services in 36 of California's 58 counties.

The counties of Kern, Los Angeles, Marin, Orange, Santa Barbara, and Ventura have assumed the responsibility to provide protection to approximately 3,389,436 acres of SRA. Each year, state funding is allocated to these ***"Contract Counties"*** to support an initial attack organization for wildland fires, as outlined in the "Gray Book." This funding is based on the objective of suppressing 95 percent of SRA wildland fires, which occur within the county at 10 acres or less. Gray Book funding represents compensation to the contract counties for fire prevention activities, pre-suppression force preparedness, and basic initial attack in lieu of Cal Fire having to duplicate services/resources within the SRA. The state's Emergency Fund (E-Fund) is made available to Contract Counties to support fire suppression efforts that exceed the budgeted allocation for initial attack.

As noted in the 2014-17 agreement between Kern County and Cal Fire, the county may use and bill the state for county-funded engine companies, bulldozers, hand crews, aircraft, specialized equipment, and overhead personnel when used to protect state interests. For the county to be considered for state reimbursement, a wildland fire must be either burning on or threatening SRA within the county. For initial attack resources to be eligible for reimbursement, KCFD resources must be:

- Used to protect State interests and;
- Identified within the Kern/Cal Fire Operating Plan as pre-approved first and second alarm initial attack resources, and/or;
- Approved by a Cal Fire agency representative.

For a wildfire to be considered as an extended attack, a KCFD incident commander is responsible for making this determination using the following criteria:

- Fire cannot be contained within two hours from a report of fire; and/or
- The number of resources assigned exceed the pre-approved first and second alarm initial attack response level; or
- Fire cannot be controlled within the first burning period.

The Fiscal Year (FY) 2016/17 Gray Book shows that Kern County was budgeted for six months (May 15 to November 15, 2017), with the peak fire season designated for four of those months

(June 15 to October 15, 2017). These funds ($17,720,585) were provided to support suppression and pre-fire management salaries and benefits as well as equipment, capital, and other operating expenses.

Within the same fiscal year, the Gray Book indicates that other counties were budgeted for differing periods of time:

- Marin County – 5 months.
- Los Angeles County – 8 months.
- Orange County – 8 months.
- Santa Barbara County – 8 months.
- Ventura County – 8 months.

The contract illustrates some flexibility to make permanent and on-time adjustments based on increases in personnel operating costs. The Gray Book also shows a cyclical history of providing additional funds to support year-round staffing, depending on existing budget constraints.

> ***Recommendation: The KCFD should consider renegotiating the contract with the state to expand the defined seasonal use of wildland crews for hazard mitigation efforts.***

Seasonal employees are hired based on a determined need and availability of funds. While drought and flood subsidies may augment the budget, it has been acknowledged that the duration of funding for seasonal employees in Kern County is not guaranteed. This may have a negative impact on off-season fuel management and flood response efforts, as well as recruiting available employees before they accept positions with BLM or CDF. If grants are not obtained, all seasonal employees dedicated to fuel management are funded by the county.

Seasonal employees are required to obtain up to 120 hours of training each year before being deployed. They work between 4 and 10 hours per day, and are managed by a sworn (badged) fire officer.

Seasonal employees operate out of three regional areas:

- Golden Empire, Crew 10 operates out of Battalion 5 in Lebec.
  - Participates in local and state missions.
- Mountain, Crew 11 operates out of Battalion 1; Camp 8 is their home base in Tehachapi.
  - Participates in local and state missions.
- Rio Bravo Hot Shots, Crew 7 operates out of Battalion 7 in Lake Isabella.
  - In 2001 Rio Bravo became the first nationally recognized local government Interagency Hotshot Crew.

While seasonal employees have been provided the requisite training in response and hazard mitigation efforts, some opportunities may exist that could complement existing fuel management efforts. Examples that could provide some limited supplementation include reapplying for grant dollars, in cooperation with regional Fire Safe Councils, tapping into an existing volunteer work force, and integrating students from college fire science programs.

Recommendation: The KCFD should consider the broadening of its workforce to include civilian cadets, volunteers, and other sources to assist in fuel management efforts.

KCFD staff assigned to dozer and air operations have described their heavy equipment as being outdated. Each staff also acknowledged that there is not an apparatus/equipment standard or replacement plan.

Recommendation: The KCFD should consider establishing an industry standard for the replacement of wildland heavy equipment and air response apparatus.

Aside from ground attack, dispatch, and prefire management, the state also compensates the KCFD for the use of Captains (6) as fire investigators. In 2015, the Fire Investigative Unit investigated over 300 fires, resulting in 39 arrests. It is estimated that annually the FIU is being reimbursed approximately $50,000 to $65,000 for this investigative work. The department could reduce its investigator's workload and improve time management by incorporating the California State Fire Marshal (CSFM) training programs in fire investigation within the department's officer development program.

Recommendation: In an effort to better distribute the investigative workload, KCFD should consider expanding the training and use of wildland suppression personnel as wildland fire investigators.

From a budgetary perspective, the wildland program is reimbursed dollar-for-dollar (plus a 10 percent administrative fee) by the state for qualified expenses. The FY 2017-18 budget notes that those charges for services associated with reimbursement revenue from other agencies for fire suppression costs is budgeted (as a placeholder) at $3 million. Historically, reimbursements fluctuate dramatically depending on the severity and number of wildland fires during any given year. The department may receive additional revenue throughout the fiscal year. Additional funds would be recognized and appropriated mid-year to cover overtime and other costs associated with fire response on behalf of other agencies. The FY 2015-16 line item for "Actual Charges for Services" was just over $4,000,000 from what was initially projected.

It appears that overtime, which is the major cost associated with the wildland program, is tracked in a "macro" sense. There are no specific codes that specify how it is divided within each fund (training, operations, or wildland deployment/fuel management). CPSM believes that this can lead to misperceptions relating to time management, resource prioritization, and what costs are recoverable versus those that are not.

Recommendation: KCFD should revisit its current accounting for the costs associated with the wildland program and create a separate accounting for all costs associated with the wildland program.

Under the current accounting method, it is difficult to determine the level of cost recovery that is being achieved through the wildland program. The multitude of funding sources, contract arrangements, and reimbursements for expenses compound the ability to assess the overall costs of these operations. CPSM believes that KCFD should revise its budget process so that the entire wildland program can be looked at as a separate cost center within the overall fire budget and its level of cost recovery be clearly established in its regular financial reporting.

EMS Response and Transport

EMS calls make up the predominant volume of workload within the KCFD system. As already mentioned, nearly 53 percent of all call activities reviewed in our analysis involve EMS-related responses. In addition, a large volume of the canceled calls in the Kern County system are also EMS-related. If these canceled EMS calls are added to the total EMS response category, EMS calls would make up 64 percent of total call activity. As mentioned above, KCFD operates in a two-tiered EMS delivery system. This means that on most EMS calls a fire unit and a private ambulance are dispatched to each call. KCFD does not utilize alternative response vehicles or EMS squad units for its EMS response activities. CPSM has recommended that this deployment practice be reevaluated.

Our assessment regarding Kern County's ability to adjust and downscale the mode of response of KCFD units is that it needs improvement. Though the 911 Dispatch Center is very effective in its efforts to identify the severity of the call through the dispatch interrogation process, the corresponding mode of response, particularly with EMS-related calls, is not altered significantly. Our analysis of the call data showed that for the more than 26,000 EMS calls handled by KCFD units, over 95 percent were responded to "hot." Table 5-12 shows the distribution of call types and their associated response mode.

TABLE 5-12: KCFD Unit Response Mode

Call Type	Number of Calls			Percent Emergency
	Emergency	Non-emergency	Total	
EMS	25,124	1,162	26,286	95.6
Fire	6,870	7,904	14,774	46.5
Other	6,227	2,479	8,706	71.5
Total	**38,221**	**11,545**	**49,766**	**76.8**

A ***"hot"*** response is when units respond with lights and sirens; in this mode they may pass red lights and stop signs and utilize other response patterns that expedite their rate of travel. A ***"cold"*** response is when a unit responds without its lights and sirens and follows the normal flow of traffic, stopping for red lights, stop signs, etc. The ability to respond the fewest number of units and have these units respond in a "cold mode of response" results in the maximization of resources and improved responder safety. Emergency response units that are responding with lights and sirens are more susceptible to traffic accidents. Accidents involving fire vehicles responding to emergencies are the second highest cause for line-of-duty deaths of firefighters.[30] It is estimated that more than 30,000 fire apparatus are involved in accidents when responding to emergencies each year in the U.S.[31] Responding fewer units and having these units respond in a nonemergency mode makes sense in terms of safety and efficiency.

In comparison, for the more than 14,000 fire calls, only 46 percent resulted in a hot response. This issue is compounded by the higher than normal number of canceled calls tabulated in the KCFD response data. When we looked at the canceled calls, the overwhelming majority were EMS-related (78 percent), most of which were responded to in a hot mode.

[30] "Analysis of Firetruck Crashes and Associated Firefighter Injuries in the U.S." Association for the Advancement of Automotive Medicine. October-2012.
[31] Ibid.

Recommendation: KCFD should work with its 911 Dispatch Center in improving efforts to reduce the mode of response to nonemergency and service assist-related EMS calls.

In addition, many agencies often struggle with the question of the most appropriate level of EMS first response. The concern is whether it is best to provide EMS first response at a BLS level or if an ALS-level first response is more appropriate. CPSM has observed a number of ALS first response systems that have changed to a BLS level of response in recent years. In fact, a number of recent clinical studies have found that there are limited impacts on patient outcomes when EMS first response services are at the BLS level vs ALS[32]. CPSM believes that the current delivery system that utilizes a BLS level of care among fire first responders is very appropriate in the Kern County system.

In addition, Kern County like many similar communities, is experiencing a changing demographic in which the population is growing older and thus more likely to utilize EMS services. This fact is compounded by the ever-evolving healthcare and medical insurance industries, which tends to foster an increase in the frequency in which residents utilize government-based emergency responders for their basic healthcare needs. The well-known responsiveness of the 911 system and the more frequent utilization of this service to address a full array of individual needs, results in a higher utilization of the EMS first response network.

Our review of the joint response outcomes between KCFD and the various ambulance companies servicing the unincorporated areas along with the contract municipalities was very positive. In most instances, a KCFD unit would arrive before the private ambulance (about 66.7 percent of the time). When the KCFD unit arrived first, the private ambulance would typically follow, on average in approximately five minutes. The average wait time varied from the JPA to Remote areas, but these differences were not excessive (just over two minutes). At the 90th percentile, the times were somewhat longer, but still not unreasonable. Tables 5-13 and 5-14 break out the arrival order for the fire department and an ambulance service in our four geographic designations in the county.

TABLE 5-13: KCFD vs. Ambulance Arrival Order

Area	KCFD First	Ambulance First
Bakersfield JPA	74.0	26.0
Urban Areas	60.1	39.9
Rural Areas	61.0	39.0
Remote Areas	69.4	30.6
Overall	**66.7**	**33.3**

[32] See: https://www.amr.net/about/medicine/articles/outcomes-of-als-vs-bls.pdf, and; "EFFECTIVENESS OF FIRST RESPONSE PARAMEDICS" By Thomas M. Dunn, Ph.D., NREMT-B, I William W. Dunn, BA, NREMT-P,23 Michael Krowka, BS, NREMT-P I Benjamin Dengerink, BS, NREMT-P I and Micah Ownbey, BS, NREMT-P I University of Northern Colorado, Greeley; 2 Denver Health Paramedic Division; 3 Eagle County (CO) Ambulance District Corresponding Author: thomas.dunn@unco.edu.

TABLE 5-14: Average and 90th Percentile Ambulance Wait-Times

Area	Number of Calls	Average Wait	90th Percentile Wait
Bakersfield JPA	7,128	4.1	6.9
Urban Areas	3,273	4.5	6.3
Rural Areas	3,984	6.4	15.9
Remote Areas	513	6.3	14.8
Overall	**14,898**	**4.9**	**9.1**

Note: Includes only calls where both KCFD and the ambulance company arrived and only when KCFD arrived first.

Mutual Aid/Automatic Response

Local governments use many types of intergovernmental arrangements to enhance fire protection and EMS services. These arrangements take various shapes and forms and range from a simple automatic response agreement that will respond with a single unit to a minor vehicle accident or EMS call, to a more complex regional hazardous materials team or a helicopter trauma service that involves multiple agencies and requires a high level of coordination.

These "mutual aid agreements" are generally drafted to define the type of resources each agency will provide in case of a natural or manmade emergency. Local fire and rescue resources include those available through automatic and/or day-to-day mutual aid agreements with neighboring jurisdictions.

The KCFD has a written local mutual aid agreement for immediate need with California City (1993), and similar response provisions within a contractual Joint Powers Agreement (JPA) with the Bakersfield Fire Department (BFD). As is noted in Tables 5-15 and 5-16, in 2016, mutual aid was rendered to California City a total of 155 times and received 86 times (80 percent given more than received). Over the same period, mutual aid was provided to BFD 921 times and received 551 times (67 percent given more than received). A relationship also exists with the correctional institutes in the county; however, there were no instances within the data set indicating that the KCFD provided aid, only that it was received. The number of times aid was received from these correctional institutes were: California Correctional Institute (6), North Kern State Prison FD (7), and the Wasco State Prison Fire Department (8).

TABLE 5-15: Mutual Aid Provided by the KCFD

Department	Call Type				
	Canceled	EMS	Fire	Unknown	Total
Inyo County LRA	0	2	0	0	2
Bakersfield Fire Department	468	109	344	0	921
Cal Fire - Riverside County Fire Department	0	0	1	0	1
California City Fire Department	136	5	14	0	155
California Forestry	0	0	2	0	2
CDF-Modoc County	0	0	1	0	1
CDF-Fresno County	0	0	5	0	5
CDF -Los Angeles County	21	1	16	0	38
CDF -Mariposa County	0	0	1	0	1
CDF -San Bernardino County	0	17	4	0	21
CDF -San Luis Obispo County	1	0	1	0	2
CDF -Santa Barbara County	1	1	0	0	2
CDF -Santa Clara County	0	0	1	0	1
CDF -Tulare County	0	4	0	0	4
CDF -Ventura County	0	1	1	0	2
Kern County Fire - Cal Fire SRA (see note)	0	0	1	0	1
Kings County Fire Department	1	1	0	0	2
Los Angeles County Fire Department	27	2	15	0	44
Los Angeles Fire Department	0	0	1	0	1
San Bernardino County Fire Protection District	1	35	14	0	50
Tulare County Fire Department	1	5	7	0	13
USDA Forest Service Summit R.D.	0	0	1	0	1
Ventura County Fire Protection District	5	25	7	0	37
Unknown	568	369	297	3	1,237
Total	**1,230**	**577**	**734**	**3**	**2,544**

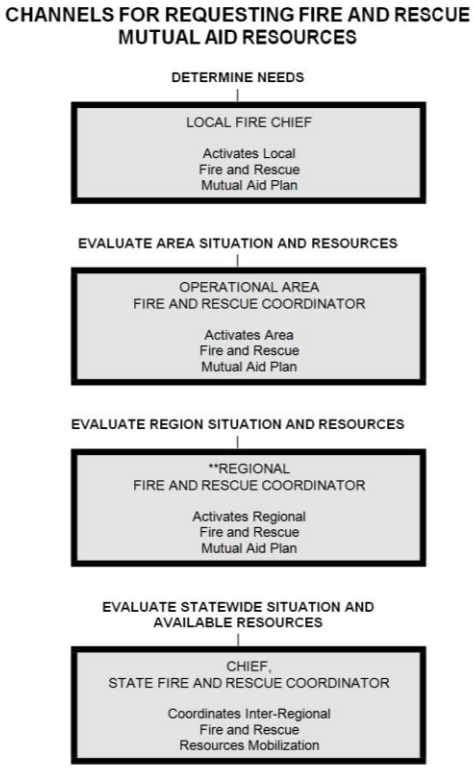
TABLE 5-16: Mutual Aid Received by the KCFD

Department	EMS	Fire	Canceled	Total
Inyo County LRA (see note for aid given)	1	0	0	1
Bakersfield Fire Department	113	360	78	551
California City Fire Department	24	41	21	86
California Correctional Institute	0	5	1	6
CDF-Los Angeles County	4	4	7	15
CDF -San Bernardino County	2	1	0	3
CDF -San Luis Obispo County	2	1	1	4
CDF -Santa Barbara County	0	1	0	1
CDF -Tulare County	3	0	0	3
Kings County Fire Department	2	1	4	7
Los Angeles County Fire Department	6	12	3	21
North Kern State Prison FD	0	7	0	7
San Bernardino County Fire Protection District	3	2	0	5
Tulare County Fire Department	3	4	0	7
Wasco State Prison Fire Department	2	6	0	8
Unknown	9	82	0	91
Total	**174**	**544**	**115**	**833**

The California Fire Service and Rescue Emergency Mutual Aid Plan is entered into between the State of California, its various departments, agencies, and political subdivisions, municipal corporations, and other public agencies of the State of California to facilitate implementation of Chapter 7 of Division 1 of Title 2 of the Government Code entitled "***California Emergency Services Act***." The plan provides a practical and flexible pattern for the orderly development and operation of mutual aid on a voluntary basis between cities, cities and counties, fire districts, special districts, county fire departments, and applicable state agencies. Normal fire department operating procedures are utilized, including day-to-day mutual aid agreements, and plans that have been developed by local fire and rescue officials.

Under normal conditions, fire and rescue mutual aid plans are activated in ascending order; i.e., local, county, region, inter-region. However, circumstances may exist that make mobilization of significant fire and rescue forces from within the area or region of disaster impractical and imprudent. Inter-regional mutual aid is, therefore, not contingent upon mobilization of uncommitted resources within the region of disaster.

- **Operational Area (OA) Fire and Rescue** resources are those which are made available to a participating agency through the approved and adopted OA (county) Fire and Rescue Emergency Mutual Aid Plan. Mobilization of OA resources is activated by the Operational Area Fire and Rescue Coordinator, or his representative, in response to a request for assistance from an authorized fire and rescue official of the participating agency in need. The Operational Area Fire and Rescue Coordinator[33] must notify the Regional Fire and Rescue Coordinator of area resources committed.



- **Regional Fire and Rescue** resources include all available to a participating agency through the approved and adopted Regional Fire and Rescue Emergency Mutual Aid Plan. Operational Area (county) plans are significant elements of regional plans. Mobilization of regional fire and rescue resources is activated by the Regional Fire and Rescue Coordinator in response to a request for assistance from an Operational Area Fire and Rescue Coordinator. Regional Fire and Rescue Coordinators must notify the Chief, Cal OES Fire and Rescue Division, of resources committed.

- Inter-regional Fire and Rescue mutual aid is mobilized through the Cal OES Fire and Rescue Coordinator in the afflicted mutual aid region. Selection of region(s) from which resources are to be drawn is made in consideration of the imminence of threat to life and property and conditions existing in the various regions. Fire and rescue forces will be mobilized in the strike team mode for inter-regional fire and rescue mutual aid response. Strike teams will normally consist of five engines and a qualified strike team leader unless unusual circumstances prevent assemblage in these numbers. (Each Cal OES engine will be staffed by three or more trained firefighters.) Regional Fire and Rescue Coordinators must be notified of any strike team with less than five engines. This information must be relayed to the requesting agency. Strike teams of resources other than fire engines are identified within state ICS plans. Regional Fire and Rescue Coordinators requesting aid must specify the number, kind, and type of strike teams and support.

CPSM recognizes that local, regional, state, and federal mutual aid plans are a ***Best Practice*** that should be maintained.

[33] The Operational Area Fire and Rescue Coordinator Organizes and acts as chairperson of an Operational Area Fire and Rescue Coordinating Committee.

CONTRACTS FOR SERVICE

Kern County has multiple agreements to provide fire and life safety services to nine contract cities. The nine municipalities utilize two primary sources of funding for these agreements: Fire Fund property taxes[34] (11 percent of the 1 percent general levy distributed among many agencies on a county-wide basis), and direct payments by the cities from other municipal revenues sources. For the current fiscal year, KCFD anticipates payments for these services in the amount of $4.3 million through direct municipal payments and an additional $4 million in fire fund revenues.[35] All payments are posted to an account termed "Other Services for Governmental Agencies" within the department's budget.

> ***Recommendation: KCFD should improve its tracking mechanism for revenues received and amounts outstanding from each municipality that contracts with KCFD for fire services.***

KCFD has estimated that the annual cost to operate each of its fire stations, including equipment and personnel, to be approximately $1.8 million. KCFD also estimates that for those fire stations serving municipalities, it receives on average, 48 percent of these costs through the municipal contracts. Typically, fire stations that serve municipalities also serve those unincorporated areas of the county adjacent to the municipal contract areas. Thus, for the purposes of full cost recovery, each contract city would only be responsible for their portion of the expense necessary to maintain a station(s) within their jurisdiction. The county has adopted a per capita methodology in developing its fee schedule for municipal fire contracts.

The annual fee is based upon each city's incorporated area boundaries and unique service requirements. The methodology for cost allocation is based upon:

- Direct costs are determined by using the prior fiscal year's expenditures for KCFD programs of operations, fire prevention, arson investigation, hazardous materials, technical rescue, and reserves. The annual amortized apparatus/equipment replacement costs are added to direct costs to determine Total Direct Costs. Total Direct Costs are then divided by the county-wide protected population to determine the Direct Cost Per Capita.
- The total on-duty staffing of all city stations is divided by the department's total on-duty staffing county-wide. This factor is applied against the Direct Cost Per Capita county-wide and is used to discount the net costs allocated to each city. The on-duty staffing ratio accounts for the availability of resources to provide fire protection services.
- The Direct Cost Per Capita county-wide is multiplied by the number of station(s) on-duty staffing to arrive at each city's Direct Cost Per Capita. The Direct Cost Per Capita is then multiplied by the protected population of the city to determine the Allocated Direct Cost.
- Indirect costs are applied to a city's Allocated Direct Cost. The indirect cost factor is based on the department's prior fiscal year indirect billing rate.
- A city's Allocated Direct and In-Direct Costs are then added together to identify the Allocated Total Cost.

[34] County of Kern Countywide 1% Allocation (AB8) Factors. Auditor-Controller-County Clerk. Retrieved on September 30, 2017.
[35] Email exchange with Steve Long on September 29, 2017.

As an example, Table 5-17 illustrates the contract costs for the City of Taft. The department does not include the depreciation of structures in its calculations of cost. However, it does include the amortized apparatus cost.

TABLE 5-17: Contract City Allocated Cost – City of Taft

KERN COUNTY FIRE DEPARTMENT
Contract City Allocated Costs - City of Taft

Billing Year, based on: Prior, Prior Year	FY2017-18 FY2015-16	FY2018-19	FY2019-20	FY2020-21	FY2021-22	Totals
PPY Actuals or Estimated Actuals	117,032,156	117,032,156	117,032,156	117,032,156	117,032,156	
Amortized Apparatus/Equipment	1,955,250	1,955,250	1,955,250	1,955,250	1,955,250	
Total Direct Costs	**$118,987,406**	**$118,987,406**	**$118,987,406**	**$118,987,406**	**$118,987,406**	
Total KRN Protected Population (based on estimated population by response area)	537,328	537,328	537,328	537,328	537,328	
Direct Cost Per Capita Countywide	**$221.44**	**$221.44**	**$221.44**	**$221.44**	**$221.44**	
Cities' Stations On-Duty Staffing	31.337	31.337	31.337	31.337	31.337	
On-Duty Staffing Countywide	161	161	161	161	161	
Cities' Stations On-Duty Staffing Ratio	19.4639%	19.4639%	19.4639%	19.4639%	19.4639%	
(To accounty for Availability of Cities' Stations Resources)						
Cities' Direct Cost Per Capita	**$43.10**	**$43.10**	**$43.10**	**$43.10**	**$43.10**	
PPY Indirect Rate	12.71%	12.71%	12.71%	12.71%	12.71%	
Estimated Net Costs - City of Taft						
Estimated City Population (KernCOG)	9,456	9,456	9,456	9,456	9,456	
City's Allocated Direct Cost	407,567	407,567	407,567	407,567	407,567	
City's Allocated Indirect Cost	51,802	51,802	51,802	51,802	51,802	
City's Allocated Total Cost	459,369	459,369	459,369	459,369	459,369	
Less City Fire Fund Equivalent Property Tax Revenue	(153)	(153)	(153)	(153)	(153)	
Net City Allocated Costs - City of Taft (Calculated Estimates)	**$459,216**	**$459,216**	**$459,216**	**$459,216**	**$459,216**	
Proposed Net City Allocated Costs - City of Taft	**$459,216**	**$468,859**	**$478,705**	**$488,758**	**$499,022**	**$2,394,561**
	FY2012-13	FY2013-14	FY2014-15	FY2015-16	FY2016-17	
Prior contract amounts	**$390,515**	**$411,547**	**$433,737**	**$457,147**	**$481,844**	**$1,825,688**

Within each contract, services provided by the KCFD are written to reflect those provided within other parts of the county. They include:

- Fire inspection services.
- Title 19 California Code of Regulations plan checks.
- Annual fire hydrant inspections.
- Dispatch services.
- A minimum staffing of three Captains, three Engineers, and three Firefighters (one of each per shift).

Other contractual stipulations include:

- The KCFD Fire Chief is provided full authority to manage all aspects of the fire department, including fire prevention and suppression, emergency medical responses, rescues, hazardous materials responses, fire cause and arson investigation, support services, supervision, dispatching, training, equipment maintenance, supplies, and procurement.
- The county remains solely responsible for all matters relating to the payment of its employees.

- Fees are paid to the county, without a provision for increasing annual fees.
- Nothing in the agreements preclude the future expansion, closure, consolidation, or relocation of the fire stations if such action is mutually beneficial to and agreed upon by both the cities and county.
- A provision exists for calculating fees for late payments.
- With the exception of Delano, the county retains the ownership and responsibility for maintenance of each fire station. Delano is the only city that owns and fully maintains its fire stations (Stations 34 and 37).

Observations:

- One of the city contracts have expired.
- Until August 2017, when the Kern County Board of Supervisors voted to renegotiate McFarland's rate, this rate had not been updated since June 30, 1989.
- There are no clear data patterns related to the number of calls per capita or square mile.
- By any measurement, the county is not receiving full cost recovery for its public safety services to the cities.

The population-based methodology results in a cost recovery outcome that is lower than the actual cost of providing these services. Table 5-18 illustrates the difference between using the current methodology of charging a fee based on population of the contract city, and one using the annual calls for service within each jurisdiction, as a basis for determining a proportional cost of operating its station. In this comparison we utilize the cost of $1.8 million to operate each station annually, and divide this amount by the percentage of total calls for service generated by each contract city.

TABLE 5-18: Population vs Calls for Service Cost Comparisons

Contract City	2018-19 Contract Fees Plus Fire Fund Revenue	Calls for Service Contract Fee Estimates
Arvin	$895,153*	$1,170,000
Delano	$2,347,610**	$2,304,000
Maricopa	$57,317	$882,000
McFarland	$370,670***	$792,000
Ridgecrest	$1,506,478	$1,368,000
Shafter	$1,128,020	$990,000
Taft	$469,012	$630,000
Tehachapi	$442,435	$1,080,000
Wasco	$1,039,211	$1,224,000
Total	**$8,255,909**	**$10,440,000**

*__Note:__ Indicates that the current contract has expired.
**__Note:__ Two Fire Stations operate in Delano.
***__Note:__ Negotiated two-year agreement.

We have estimated that, for those ten fire stations that are the primary service providers to the municipalities under contract, the call distribution is approximately 65 percent for calls in these cities versus 35 percent for calls into those unincorporated areas adjacent to these municipalities. CPSM is not recommending that some type of call distribution approach for

contract services is the best approach in establishing contract fees for the individual cities. This analysis is intended to show that the current population-based methodology is resulting in less than 100 percent cost recovery for these services while the workload is predominantly in the municipal contract areas. CPSM believes that Kern County should revisit its current fee structure for contract municipalities and devise a new methodology that is more aligned with the actual cost of providing these services.

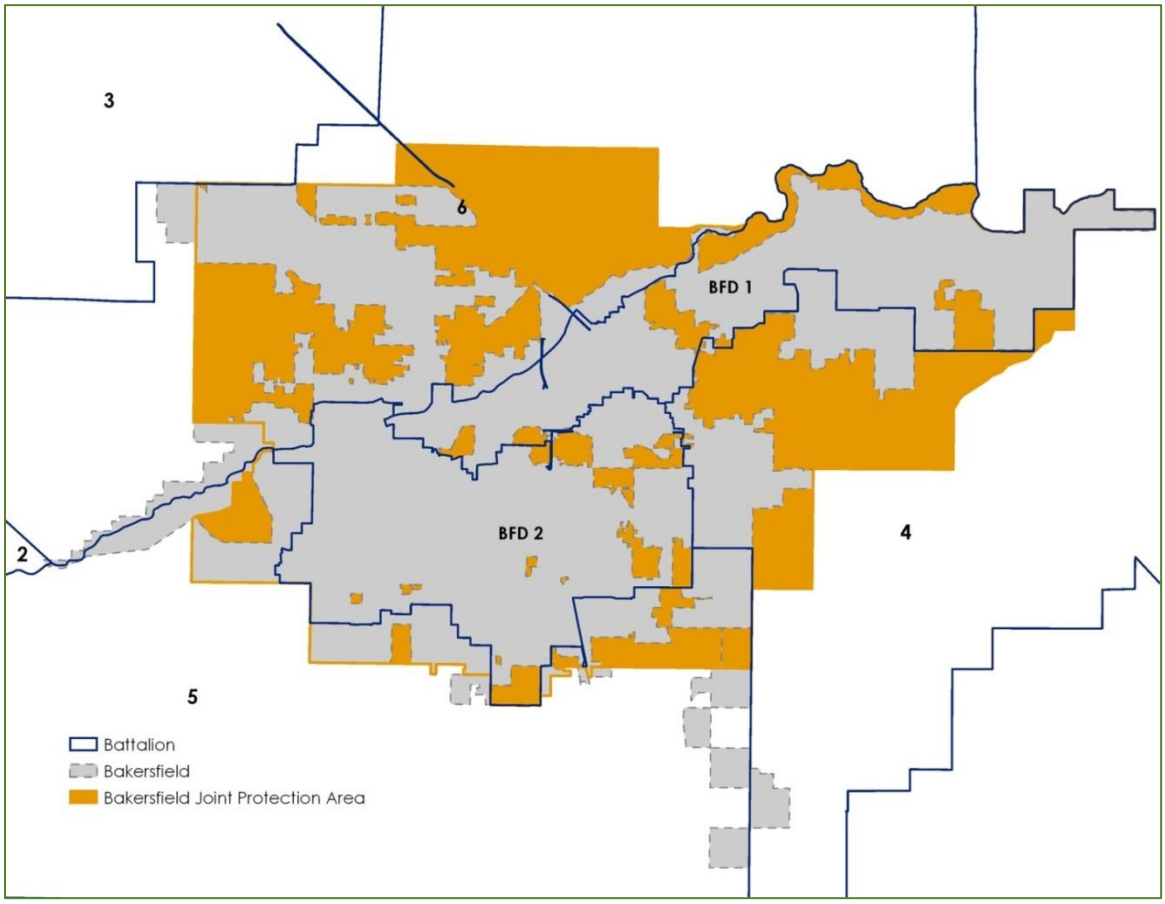
> ***Recommendation: Kern County should modify its fee structure for cities that obtain services from KCFD so that the contract costs reflect the actual cost for providing these services.***

Joint Powers Agreement (JPA) with the City of Bakersfield

Kern County currently has a joint powers agreement (JPA) with the City of Bakersfield to provide joint response for fire and EMS protection, dispatch/radio communication services, and the use of the Olive Drive Fire Training Facility. The JPA originated on May 7, 1980 and was updated in its current form on September 19, 2005. Use of the Emergency Communications Center (ECC) was added on February 21, 1990.

The agreement encompasses both the unincorporated portions of the county and incorporated areas of the city, as outlined in Figure 5-8.

FIGURE 5-8: Map of Area Covered by JPA



The stated purpose of the JPA is to "provide cost-effective and uniform fire protection within the metropolitan Bakersfield area, to eliminate duplication of services and provide for the continuing development of public fire protection resources" to both the city and county.

The principal features of the JPA include:

- The city and county agree to maintain for a period of five years all data and documents related to the establishment of information necessary to preserve an accurate database.
- The entity providing fire protection service to an area shall receive the Fire Fund revenue or Fire Fund equivalent revenue for that area.
- The county and city share operating expenses based on a ratio of the number of emergency responses dispatched by the ECC within each party's fire protection service area multiplied by the actual cost of the shared operational expense item.
- The county and city have developed a staffing and resource sharing methodology for use of the Olive Drive Training Facility. Capital expenditures, such as buildings, and major equipment and maintenance are funded on a 50-50 basis.
- Each agency agrees to make themselves available for response at the request of the other within the defined service area.
- The Agreement shall be reviewed by the city and the county no later than every five years.
- With these objectives in mind, an analysis of the equity between the county and the city may be evaluated using the following data:
- Between July 1, 2016, and June 30, 2017, 21,885 calls for service (EMS - 10,623; Fire: 6,453; Other: 4,809) were requested within the boundaries of the JPA.
- The KCFD provided mutual aid to the Bakersfield Fire Deparment (BFD) a total 921 times. Units were cancelled 468 times (51 percent); the remaining were EMS (109/12 percent) and fire (344/37 percent) calls for service.
- The KCFD received mutual aid from the BFD 551 times. Units were cancelled 78 (14 percent) times; the remaining were EMS (113/21 percent) and fire (360/65 percent) calls for service.
- For EMS calls with shared response, the KCFD arrived first 64 percent of the time (6,907).
- For 53 percent of EMS calls, the response time of the first arriving unit was less than 8 minutes.
- For 11 percent of structure and outside fire calls, the response time of the first arriving unit was less than 6 minutes.
- Just over 20 percent of all responses were considered "extended," using a 10-minute threshold as a guide.

TABLE 5-19: JPA Call Distribution

Area	Call Type	Total Calls
Bakersfield-JPA	EMS	3,081
	Fire	1,997
	Canceled	197
	Total	**5,275**
Bakersfield-Non-JPA	EMS	71
	Fire	30
	Canceled	4
	Total	**105**
JPA-Unincorporated	EMS	7,392
	Fire	4,250
	Canceled	496
	Total	**12,138**
Total		**17,518**

Numbers are based on all non-mutual aid calls. Therefore, the Bakersfield JPA numbers reflect only calls in KCFD's primary response area within the JPA. Calls were also excluded if response time information was incomplete.

Observations:

- The JPA copy provided to CPSM was last updated in 2005; the stipulations within the document require that it is refreshed at least every five years.
- There is a requirement to maintain at least five years of operational data; absent an internal review, it would be difficult to know if the spirit of the JPA is still being observed.
- The ratio between when the KCFD arrives (453) and the BFD arrives (473) to provide service is relatively close. The key difference in overall response is that the KCFD is canceled 51 percent of the time, compared to BFD's 14 percent of the time.

While the general terms outlined within the JPA likely remain relevant, it is probable that changes in each agency's demographic and operational needs have occurred since this agreement was last reviewed. One sign that this may be the case is the 51 percent call cancellation rate that the KCFD faces when responding into Bakersfield.

Recommendation: Kern County should resume discussions with the City of Bakersfield in order to ensure that the JPA is current.

Aircraft Rescue Fire Fighting (ARFF) Services at Local Airports

The KCFD currently provides specialized ARFF response services to two local airports:

- Meadows Field is the main airport for the Bakersfield area, and one of two international airports in the San Joaquin Valley. Meadows Field is served with regional jet aircraft. American Eagle and United Express are the passenger airlines that are contracted to use the field; as is Ameriflight and FedEx for the purposes of distributing cargo. KCFD Station 62 serves the airport. In 2016, Fire Station 62 responded to 62 emergency calls for service; 50 were identified as "hazard." KCFD deploys two ARFF vehicles, each staffed 24-7 with a Fire Captain and Fire Engineer (six personnel assigned).

- The Inyokern Airport is a facility located just north of the town of Inyokern in the extreme northeast portion of the county. It is located in the Indian Wells Valley adjacent to the city of Ridgecrest and provides limited use general aviation for the area. Aircraft operations include less than 100 flights each day; 80% general aviation, 10% military, 6% air-taxi and 5% scheduled commercial. KCFD Station 73 serves the airport; one additional Engineer is assigned to the station and operates an ARFF unit to serve this facility (three personnel assigned). In 2016, the station responded on 790 calls for service; 29 were identified as "hazard".

ARFF services are specialized and regulated in Federal Aviation Administration (FAA) Regulation-Part 139 (Title 14, Code of Federal Regulations (CFR), Part 139 (14 CFR Part 139). These regulations are utilized in the certification of all commercial airport operations including the ARFF services that are required. Typically, airport operations fund the ARFF services that are required. In Kern County these services are funded through the KCFD budget and no charges or cost recovery is obtained. CPSM believes that some type of reimbursement for equipment, personnel, and daily operations is warranted.

Recommendation: Kern County should consider negotiating an Aircraft Rescue & Fire Fighting (ARFF) services agreement at Meadows Field and Inyokern Airport.

WORKLOAD ANALYSIS

The current workload being handled by the Kern County Fire Department is considered moderate, with only four to five units experiencing what CPSM typically would classify as a high workload, that is, greater than 2,500 runs annually. Overall, KCFD units combined are responding to nearly 50,000 calls annually or approximately 137 calls each day. Engine 64 was the busiest unit, handling 4,991 calls in the 12-month study period. This is a very high workload. That translates to nearly 14 calls per day or roughly 4.1 hours of in-service time on alarms each 24-hour duty period. Engine 41 was the next busiest unit in the system, responding to 3,760 calls in the 12-month period and an average daily in-service time of approximately 3.9 hours. Ladder 21 was the least busy unit in the system, responding to an average of 1.4 calls daily and a daily in-service time of just 28 minutes. On average, aside from KCFD's busiest units, most units are assigned to three to four calls each day and are on active assignments typically less than two hours each 24-hour period.

Tables 5-20 shows the annual runs, deployed time, and average runs per day for the primary KCFD response units.

TABLE 5-20: Workload by Unit

Battalion & Station		Unit Type	Unit ID	Avg. Deployed Min. per Run	Total Annual Hours	Avg. Deployed Mins. Per Day	Total Annual Runs	Avg. Runs per Day
1	11	Engine	E11	31.4	217.1	35.7	415	1.1
		Battalion Chief	KB1	56.0	969.1	159.3	1,038	2.8
		Engine	P11	88.5	271.3	44.6	184	0.5
		Water Tender	WT11	292.9	707.9	116.4	145	0.4
		Total		**72.9**	**2,165.4**	**356.0**	**1,782**	**4.9**
	12	Engine	E12	22.4	446.3	73.4	1,197	3.3
		Engine	E312	140.8	91.5	15.0	39	0.1
		Engine	P12	59.1	232.5	38.2	236	0.6
		Total		**31.4**	**770.3**	**126.6**	**1,472**	**4.0**
	13	Engine	E13	25.6	483.6	79.5	1,132	3.1
		Engine	P13	52.5	216.1	35.5	247	0.7
		Total		**30.4**	**699.7**	**115.0**	**1,379**	**3.8**
	14	Engine	E14	19.9	578.5	95.1	1,745	4.8
		Engine	E314	227.7	280.8	46.2	74	0.2
		Reserve Engine	P414	43.0	73.2	12.0	102	0.3
		Total		**29.1**	**932.5**	**153.3**	**1,921**	**5.3**
	15	Engine	E15	21.8	700.0	115.1	1,929	5.3
		Reserve Engine	E415	16.1	1.1	0.2	4	0.0
		Engine	P15	53.0	67.1	11.0	76	0.2
		Total		**22.9**	**768.1**	**126.3**	**2,009**	**5.5**
	16	Engine	E16	35.2	299.6	49.2	510	1.4
		Engine	P16	47.3	163.0	26.8	207	0.6
		Total		**38.7**	**462.6**	**76.0**	**717**	**2.0**
	17	Engine	E17	26.4	312.8	51.4	712	2.0
		Engine	P17	34.9	21.5	3.5	37	0.1
		Total		**26.8**	**334.3**	**55.0**	**749**	**2.1**

Battalion & Station		Unit Type	Unit ID	Avg. Deployed Min. per Run	Total Annual Hours	Avg. Deployed Mins. Per Day	Total Annual Runs	Avg. Runs per Day
1	18	Engine	E18	30.6	147.8	24.3	290	0.8
		Engine	E318	2,706.9	857.2	140.9	19	0.1
		Engine	P18	59.4	95.1	15.6	96	0.3
		Total		**163.0**	**1,100.1**	**180.8**	**405**	**1.1**
	Total			**41.6**	**7,233.0**	**1,189.0**	**10,434**	**28.6**
2	21	Engine	E21	17.5	526.0	86.5	1,805	4.9
		Battalion Chief	KB2	54.4	520.9	85.6	575	1.6
		Engine	P21	124.7	143.4	23.6	69	0.2
		Ladder Truck	TK21	19.8	170.2	28.0	517	1.4
		Total		**27.5**	**1,360.6**	**223.7**	**2,966**	**8.1**
	22	Engine	E22	34.0	200.3	32.9	353	1.0
		Reserve Engine	E422	38.6	1.3	0.2	2	0.0
		Engine	P22	66.2	46.3	7.6	42	0.1
		Total		**37.5**	**247.9**	**40.7**	**397**	**1.1**
	23	Engine	E23	30.8	126.9	20.9	247	0.7
		Engine (OES)	E280	12,391.8	413.1	67.9	2	0.0
		Engine	P23	71.8	107.8	17.7	90	0.2
		Total		**114.6**	**647.7**	**106.5**	**339**	**0.9**
	24	Engine	E24	34.2	119.1	19.6	209	0.6
		Engine	P24	60.5	71.6	11.8	71	0.2
		Total		**40.9**	**190.7**	**31.3**	**280**	**0.8**
	25	Engine	E25	30.6	333.1	54.8	653	1.8
		Engine (OES)	E8531	3,213.4	1,606.7	264.1	30	0.1
		Engine	P25	49.3	76.4	12.6	93	0.3
		Total		**155.9**	**2,016.2**	**331.4**	**776**	**2.1**

Battalion & Station		Unit Type	Unit ID	Avg. Deployed Min. per Run	Total Annual Hours	Avg. Deployed Mins. Per Day	Total Annual Runs	Avg. Runs per Day
2	26	Engine	E26	43.2	388.6	63.9	540	1.5
		Engine	E326	1,090.4	963.2	158.3	53	0.1
		Reserve Engine	P426	53.7	32.2	5.3	36	0.1
		Total		**132.0**	**1,384.0**	**227.5**	**629**	**1.7**
	Total			**65.1**	**5,847.0**	**961.2**	**5,387**	**14.8**
3	31	Engine	E31	19.0	624.7	102.7	1,976	5.4
		Engine	P31	83.6	125.4	20.6	90	0.2
		Water Tender (OES)	WT51	390.7	586.0	96.3	90	0.2
		Total		**37.2**	**1,336.1**	**219.6**	**2,156**	**5.9**
	32	Engine	E32	19.7	636.9	104.7	1,943	5.3
		Reserve Engine	E432	26.1	2.6	0.4	6	0.0
		Engine	P32	47.1	57.3	9.4	73	0.2
		Total		**20.7**	**696.8**	**114.5**	**2,022**	**5.5**
	33	Engine	E33	23.6	531.6	87.4	1,349	3.7
		Engine (OES)	E8533	6,257.5	1,668.7	274.3	16	0.0
		Battalion Chief	KB3	90.5	1,664.7	273.7	1,104	3.0
		Reserve Engine	P433	123.1	141.6	23.3	69	0.2
		Total		**94.7**	**4,006.6**	**658.6**	**2,538**	**7.0**
	34	Engine	E34	20.1	530.1	87.1	1,582	4.3
		Reserve Engine	E434	31.9	28.7	4.7	54	0.1
		Engine	P34	36.5	34.7	5.7	57	0.2
		Total		**21.0**	**593.4**	**97.5**	**1,693**	**4.6**
	35	Engine	E335	137.3	343.4	56.4	150	0.4
		Reserve Engine	E435	1,327.8	66.4	10.9	3	0.0
		Engine	P35	111.5	128.2	21.1	69	0.2
		Total		**145.4**	**538.0**	**88.4**	**222**	**0.6**

Battalion & Station		Unit Type	Unit ID	Avg. Deployed Min. per Run	Total Annual Hours	Avg. Deployed Mins. Per Day	Total Annual Runs	Avg. Runs per Day
3	36	Engine	E336	106.4	266.1	43.7	150	0.4
		Reserve Engine	E436	126.0	16.8	2.8	8	0.0
		Engine	P36	141.3	164.8	27.1	70	0.2
		Total		**117.8**	**447.7**	**73.6**	**228**	**0.6**
	37	Engine	E37	23.1	537.2	88.3	1,393	3.8
		Engine	P37	69.2	93.4	15.4	81	0.2
		Total		**25.7**	**630.6**	**103.7**	**1,474**	**4.0**
	Total			**47.9**	**8,249.2**	**1,356.0**	**10,333**	**28.3**
4	41	Engine	E41	18.3	1,008.5	165.8	3,313	9.1
		Battalion Chief	KB4	36.2	1,140.7	187.5	1,891	5.2
		Engine	P41	142.8	380.7	62.6	160	0.4
		Ladder Truck	TK41	17.9	629.3	103.4	2,105	5.8
		Total		**25.4**	**3,159.2**	**519.3**	**7,469**	**20.5**
	42	Engine	E42	18.9	1,103.5	181.4	3,511	9.6
		Reserve Engine	E442	12.4	2.5	0.4	12	0.0
		Engine	P42	79.9	324.9	53.4	244	0.7
		Total		**22.8**	**1,430.8**	**235.2**	**3,767**	**10.3**
	45	Engine	E345	215.0	526.7	86.6	147	0.4
		Engine	E45	26.9	454.0	74.6	1,014	2.8
		Engine	P445	235.6	184.6	30.3	47	0.1
		Total		**57.9**	**1,165.2**	**191.5**	**1,208**	**3.3**
	51	Engine	E51	21.2	544.8	89.6	1,540	4.2
		Engine	P51	63.4	151.0	24.8	143	0.4
		Total		**24.8**	**695.8**	**114.4**	**1,683**	**4.6**
	52	Engine	E52	21.7	623.9	102.6	1,728	4.7
		Engine	P52	87.0	136.3	22.4	94	0.3
		Engine	REM52	96.0	1.6	0.3	1	0.0
		USAR	USR52	34.4	64.8	10.7	113	0.3
		Total		**25.6**	**826.6**	**135.9**	**1,936**	**5.3**

Battalion & Station		Unit Type	Unit ID	Avg. Deployed Min. per Run	Total Annual Hours	Avg. Deployed Mins. Per Day	Total Annual Runs	Avg. Runs per Day
4	53	Engine	E53	30.7	348.8	57.3	682	1.9
		Engine	P53	371.4	445.6	73.3	72	0.2
		Total		**63.2**	**794.5**	**130.6**	**754**	**2.1**
	Total			**28.8**	**8,072.1**	**1,326.9**	**16,817**	46.1
5	54	Reserve Engine	E454	30.7	4.1	0.7	8	0.0
		Engine	E54	22.6	514.2	84.5	1,367	3.7
		Engine	P54	98.1	187.9	30.9	115	0.3
		Total		**28.4**	**706.2**	**116.1**	**1,490**	**4.1**
	55	Engine	E55	32.2	339.0	55.7	632	1.7
		Engine (OES)	E8532	1,385.2	946.5	155.6	41	0.1
		Battalion Chief	KB5	73.6	809.8	133.1	660	1.8
		Engine	P55	97.4	137.9	22.7	85	0.2
		Ladder Truck	TK55	25.8	181.5	29.8	422	1.2
		Water Tender	WT55	109.4	293.5	48.2	161	0.4
		Total		**81.2**	**2,708.2**	**445.2**	**2,001**	**5.5**
	56	Engine	E356	392.1	254.9	41.9	39	0.1
		Engine	E56	25.0	295.5	48.6	708	1.9
		Reserve Engine	P456	90.3	13.5	2.2	9	0.0
		Total		**44.8**	**563.9**	**92.7**	**756**	**2.1**
	57	Engine	E357	40.8	481.8	79.2	709	1.9
		Engine	P57	66.9	47.9	7.9	43	0.1
		Total		**42.3**	**529.7**	**87.1**	**752**	**2.1**
	58	Reserve Engine	E458	38.7	5.8	1.0	9	0.0
		Engine	E58	38.3	206.7	34.0	324	0.9
		Engine	P58	45.7	86.0	14.1	113	0.3
		Total		**40.2**	**298.5**	**49.1**	**446**	**1.2**
	Total			**53.0**	**4,806.5**	**790.1**	**5,445**	**14.9**

Battalion & Station		Unit Type	Unit ID	Avg. Deployed Min. per Run	Total Annual Hours	Avg. Deployed Mins. Per Day	Total Annual Runs	Avg. Runs per Day
6	61	Engine	E61	17.0	583.1	95.9	2,059	5.6
		Engine	P61	119.1	240.1	39.5	121	0.3
		USAR	USR61	28.0	35.0	5.8	75	0.2
		Total		**27.9**	**1,787.3**	**293.8**	**3,841**	**10.5**
	62	ARFF	ARFF1	27.5	13.7	2.3	30	0.1
		ARFF	ARFF2	37.8	19.5	3.2	31	0.1
		ARFF	ARFF3	30.8	1.0	0.2	2	0.0
		Total		**32.7**	**34.3**	**5.6**	**63**	**0.2**
	63	Engine	E363	508.0	855.2	140.6	101	0.3
		Engine	E63	18.8	842.9	138.6	2,697	7.4
		Reserve Engine	P463	65.2	35.9	5.9	33	0.1
		Total		**36.8**	**1,734.0**	**285.0**	**2,831**	**7.8**
	64	Reserve Engine	E464	12.8	1.1	0.2	5	0.0
		Engine	E64	16.0	1,288.1	211.7	4,818	13.2
		Engine	P64	73.5	211.8	34.8	173	0.5
		Total		**18.0**	**1,501.0**	**246.7**	**4,996**	**13.7**
	65	Engine	E65	17.8	680.1	111.8	2,293	6.3
		Battalion Chief	KB6	35.1	929.1	152.7	1,586	4.3
		Engine	P65	63.6	103.9	17.1	98	0.3
		Ladder Truck	TK65	18.0	392.1	64.5	1,305	3.6
		Total		**23.9**	**2,105.2**	**346.1**	**5,282**	**14.5**
	66	Breathing Support Truck	BS66	96.1	126.6	20.8	79	0.2
		Engine	E66	18.3	302.7	49.8	991	2.7
		Hazardous Materials	HM66	79.8	66.5	10.9	50	0.1
		Engine	P66	70.0	113.1	18.6	97	0.3
		Total		**30.0**	**608.9**	**100.1**	**1,217**	**3.3**

Battalion & Station		Unit Type	Unit ID	Avg. Deployed Min. per Run	Total Annual Hours	Avg. Deployed Mins. Per Day	Total Annual Runs	Avg. Runs per Day
6	67	Reserve Engine	E467	22.8	12.5	2.1	33	0.1
		Engine	E67	21.6	500.3	82.2	1,390	3.8
		Engine	P67	86.5	95.1	15.6	66	0.2
		Water Tender	WT67	138.7	210.3	34.6	91	0.2
		Total		**31.1**	**818.2**	**134.5**	**1,580**	**4.3**
	Total			**25.2**	**7,659.9**	**1,259.2**	**18,224**	**49.9**
7	71	Engine	E371	756.8	655.9	107.8	52	0.1
		Reserve Engine	E471	15.0	2.0	0.3	8	0.0
		Engine	E71	33.5	575.3	94.6	1,029	2.8
		Battalion Chief	KB7	53.4	555.5	91.3	624	1.7
		Engine	P71	176.4	244.1	40.1	83	0.2
		Total		**67.9**	**2,032.7**	**334.1**	**1,796**	**4.9**
	72	Reserve Engine	E472	30.4	0.5	0.1	1	0.0
		Engine	E72	29.9	672.3	110.5	1,349	3.7
		Engine	P72	92.4	217.2	35.7	141	0.4
		Total		**35.8**	**889.9**	**146.3**	**1,491**	**4.1**
	73	ARFF	ARFF7	23.3	1.6	0.3	4	0.0
		Engine	E73	29.4	344.5	56.6	703	1.9
		Engine	P73	78.6	56.3	9.3	43	0.1
		Water Tender	WT73	420.8	280.5	46.1	40	0.1
		Total		**51.9**	**682.8**	**112.2**	**790**	**2.2**
	74	Engine	E74	20.0	589.6	96.9	1,772	4.9
		Engine	P74	40.5	27.6	4.5	41	0.1
		Total		**20.4**	**617.2**	**101.5**	**1,813**	**5.0**
	75	Engine	E75	38.9	167.3	27.5	258	0.7
		Engine	P75	55.7	47.3	7.8	51	0.1
		Total		**41.7**	**214.6**	**35.3**	**309**	**0.8**

Battalion & Station		Unit Type	Unit ID	Avg. Deployed Min. per Run	Total Annual Hours	Avg. Deployed Mins. Per Day	Total Annual Runs	Avg. Runs per Day
7	76	Engine	E376	596.5	954.3	156.9	96	0.3
		Reserve Engine	E476	3,918.6	522.5	85.9	8	0.0
		Engine	E76	30.5	417.9	68.7	822	2.3
		Engine	P76	90.6	113.2	18.6	75	0.2
		Engine	P79	1,323.8	595.7	97.9	27	0.1
		Total		**152.0**	**2,603.6**	**428.0**	**1,028**	**2.8**
	77	Breathing Support Truck	BS77	104.0	3.5	0.6	2	0.0
		Engine	E77	20.7	402.2	66.1	1,167	3.2
		Engine	P77	45.1	29.3	4.8	39	0.1
		Total		**21.6**	**435.0**	**71.5**	**1,208**	**3.3**
	78	Engine	E378	115.0	335.5	55.2	175	0.5
		Engine	P78	153.5	122.8	20.2	48	0.1
		Total		**123.3**	**458.3**	**75.3**	**223**	**0.6**
	Total			**55.0**	**7,934.2**	**1,304.3**	**8,658**	**23.7**
8		Handcrew	CREW10	1,049.5	997.0	163.9	57	0.2
		Handcrew	CREW11	1,354.3	1,218.9	200.4	54	0.1
		Handcrew	CREW7	1,910.3	1,400.9	230.3	44	0.1
		Bulldozer	DOZ1	1,081.8	522.9	86.0	29	0.1
		Bulldozer	DOZ2	951.5	95.2	15.6	6	0.0
		Bulldozer	DOZ3	308.1	508.3	83.6	99	0.3
		Bulldozer	DOZ4	824.9	357.5	58.8	26	0.1
		Bulldozer	DOZ5	338.1	518.5	85.2	92	0.3
		Bulldozer	DOZ6	2,778.0	601.9	98.9	13	0.0
		Bulldozer	DOZ7	2,182.5	618.4	101.7	17	0.0
		Dozer Manager	DZMGR	393.2	137.6	22.6	21	0.1
		Helicopter	H407	1,248.3	2,413.4	396.7	116	0.3
		Helicopter	H408	155.9	488.6	80.3	188	0.5

Battalion & Station	Unit Type	Unit ID	Avg. Deployed Min. per Run	Total Annual Hours	Avg. Deployed Mins. Per Day	Total Annual Runs	Avg. Runs per Day
8	Handcrew Supervisor	KB8	302.8	106.0	17.4	21	0.1
	Single Resource	RU1	15,581.9	11,167.0	1,835.7	43	0.1
	Total		**1,536.5**	**21,152.0**	**3,477.0**	**826**	**2.3**
Wildland Strike Teams	Engine	ST5220F	786.3	13.1	2.2	1	0.0
	Engine	ST9320C	3,159.9	105.3	17.3	2	0.0
	Crew Superintendent	SUP40B	136.4	2.3	0.4	1	0.0
	Task Force	TF5230	25,110.0	418.5	68.8	1	0.0
	Task Force	TF5231	1,999.6	33.3	5.5	1	0.0
	Task Force	TF5232	35.1	0.6	0.1	1	0.0
	Total		**4,912.5**	**573.1**	**94.2**	**7**	**0.0**

Note: Battalion 8 is an administrative battalion used for wildland units and calls and does not cover a specific geographical area or stations. Some units had so few runs that the average runs per day, when rounded to the nearest one-tenth, appear to be zero.

It is also interesting to note the break-out of call activity and the call durations amongst the various call types.

TABLE 5-21: Annual Runs and Deployed Time by Call Type

Run Type	Avg. Deployed Min. per Run	Total Annual Hours	Percent of Total Hours	Avg. Deployed Hours per Day	Total Annual Runs	Avg. Runs per Day
Breathing difficulty	18.7	1,130.9	1.6	3.1	3,634	10.0
Cardiac and stroke	23.4	1,980.4	2.8	5.4	5,070	13.9
Fall and injury	21.4	1,624.5	2.3	4.5	4,555	12.5
Illness and other	21.9	2,848.4	4.0	7.8	7,810	21.4
MVA	23.2	3,492.4	4.9	9.6	9,015	24.7
Overdose and psychiatric	21.9	334.4	0.5	0.9	915	2.5
Seizure and unconsciousness	21.1	1,133.0	1.6	3.1	3,228	8.8
EMS Total	**22.0**	**12,544.0**	**17.5**	**34.4**	**34,227**	**93.8**
False alarm	13.8	961.5	1.3	2.6	4,167	11.4
Good intent	12.3	1,317.6	1.8	3.6	6,451	17.7
Hazard	28.9	1,401.4	2.0	3.8	2,913	8.0
Outside fire <12 hours	50.2	6,139.9	8.6	16.8	7,345	20.1
Outside fire 12+ hours	1,816.0	15,739.0	22.0	43.1	520	1.4
Public service	19.8	1,219.1	1.7	3.3	3,698	10.1
Structure fire	63.2	4,461.9	6.2	12.2	4,234	11.6
Fire Total	**63.9**	**31,240.3**	**43.7**	**85.6**	**29,328**	**80.4**
Canceled	9.6	1,676.9	2.3	4.6	10,456	28.6
Mutual aid <12 hours	33.5	1,102.4	1.5	3.0	1,973	5.4
Mutual aid 12+ hours	10,189.2	24,963.5	34.9	68.4	147	0.4
Total	**56.4**	**71,527.1**	**100.0**	**196.0**	**76,131**	**208.6**

Note: Total deployed time for outside fires and mutual aid runs lasting 12+ hours may be higher than total time spent working due to rest periods on calls lasting 24+ hours.

Observations:

Overall

- Total deployed time for the year was 71,527 hours. The daily average was 196.0 hours for all units combined.
  - When outside fire and mutual aid runs lasting 12+ hours are excluded, the daily average deployed time was 84.5 hours for all units combined.
- There were 76,131 runs, including 2,120 runs dispatched for mutual aid calls. The daily average was 208.6 runs.
- The average deployed time per run was 56.4 minutes. When not including outside fire and mutual aid runs lasting 12+ hours, the average time was 24.5 minutes per run.

EMS

- EMS calls accounted for 18 percent of the total workload.
  - Excluding mutual aid calls, EMS runs accounted for 28 percent of the total workload.
- The average deployed time on EMS runs was 22.0 minutes. The deployed time for all units dispatched on EMS runs averaged 34.4 hours per day.

Fires

- Fire runs accounted for 44 percent of the total workload.
  - When excluding outside fire calls lasting 12+ hours, fire runs accounted for 38 percent of total workload.
  - Runs for outside fires lasting 12 hours or more accounted for half of the total fire workload, and 22 percent of total workload.
- There were 12,099 runs for structure and outside fire calls, with a total workload of 26,341 hours. This accounted for 37 percent of the total workload.
  - When excluding outside fire calls lasting 12+ hours, there were 11,579 runs for structure and outside fire calls, with a total workload of 10,602 hours. This accounted for 15 percent of the total workload.
- The average deployed time for structure fire calls was 63.2 minutes; the average deployed time for outside fire calls lasting under 12 hours was 50.2 minutes; and the average deployed time for outside fire calls lasting 12+ hours was 1,816.0 minutes (30.3 hours).

Outside Fires and Mutual Aid Lasting 12+ Hours

- Mutual aid fire calls lasting 24 hours or more accounted for 0.2 percent of total runs (147) and 35 percent (24,963.5 hours) of the total workload.
- Combined, outside fires and mutual aid calls lasting 12+ hours accounted for 0.9 percent of total runs (667) and 57 percent (40,702.5 hours) of the total workload.

It is clear from this analysis that the wildland fire workload is significant in the Kern County system. These calls require a large amount of resources and the calls have prolonged durations. In terms of hours worked, the wildland activity both within Kern County and in neighboring jurisdictions accounts for 57 percent of the total workload.

When we look at the distribution of call activity among the various geographic subareas of the county, we see a very distinct pattern. Call activity in the Bakersfield JPA and the Urban Areas (municipal contract areas) account for nearly two-thirds (65.8 percent) of the overall call activity. This is understandable given the greater population concentrations in these areas and the highest volume of traffic movements. Table 5-23 is the distribution of call activity among the various subareas.

TABLE 5-22: Call Types by Analysis Subarea

Analysis Subarea	EMS Calls	Fire Calls	Other Calls	Total
Bakersfield JPA	10,623	6,453	4,809	21,885
Urban	6,322	3,086	1,438	10,846
Rural	8,304	4,555	1,833	14,692
Remote	1,037	680	451	2,168
Out of county	—	—	175	175
Total	**26,286**	**14,774**	**8,706**	**49,766**

Observations:

Overall

- The department received an average of 136.3 calls, including 20.3 canceled and 3.6 mutual aid calls, per day.
- EMS calls for the year totaled 26,286 (53 percent of all calls), an average of 72.0 per day.
- Fire calls for the year totaled 14,774 (30 percent of all calls), an average of 40.5 per day.

EMS

- Illness and other calls were the largest category of EMS calls at 27 percent of EMS calls.
- Cardiac and stroke calls made up 18 percent of the EMS calls.
- Motor vehicle accidents made up 10 percent of the EMS calls.

Fires

- Structure and outside fires combined for a total of 3,085 calls during the year, an average of 8.5 calls per day.
- A total of 973 structure fire calls accounted for 7 percent of the fire calls.
- A total of 2,112 outside fire calls accounted for 14 percent of the fire calls.
- Good intent calls were the largest fire call category, with 33 percent of the fire calls.
- False alarm calls made up 14 percent of the fire calls

SECTION 6. RESPONSE TIME ANALYSIS

Response times are typically the primary measurement used in evaluating fire and EMS services. Most deployment models attempt to achieve a ***four-minute initial travel time for EMS*** calls and an ***eight-minute, full-force travel time for fire calls***. A full-force travel time indicates the time it takes for the initial response of all resources assigned for the call to arrive on the scene. Though these times have validity, the actual impact of a speedy response time is limited to very few incidents. For example, in a full cardiac arrest, analysis shows that successful outcomes are rarely achieved if basic life support (CPR) is not initiated within four minutes of the onset. However, cardiac arrests occur very infrequently; on average they are 1 percent to 1.5 percent of all EMS incidents.[36] There are also other EMS incidents that are truly life threatening and the time of response can clearly impact the outcome. These involve drownings, electrocutions, and severe trauma (often caused by gunshot wounds, stabbings, and severe motor vehicle accidents, etc.). Again, the frequency of these types of calls are limited.

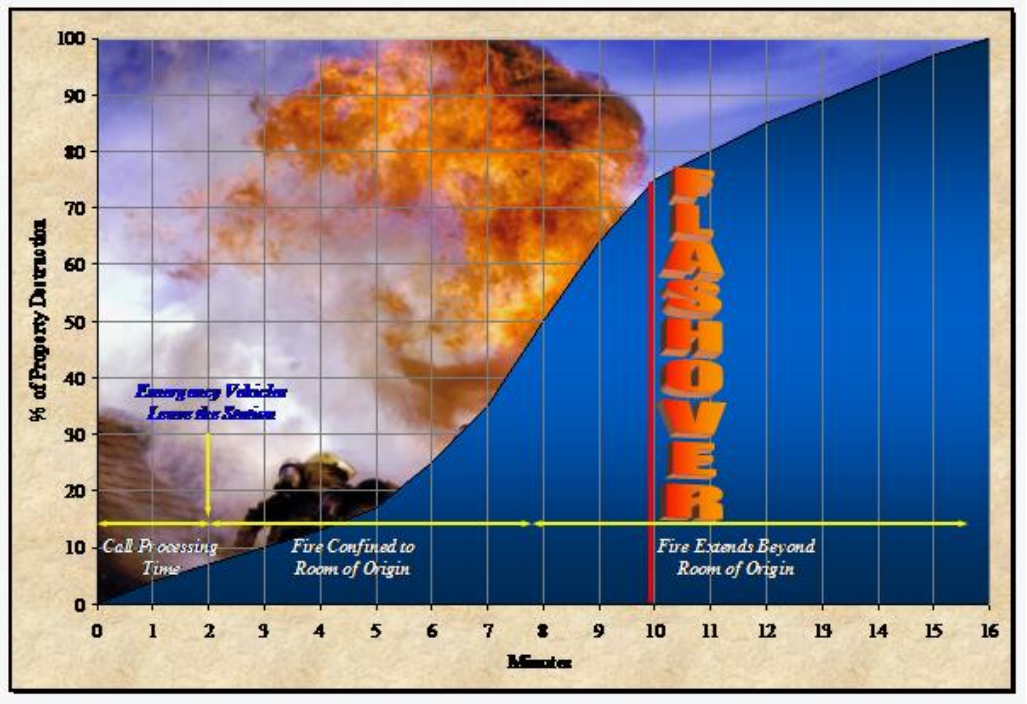
Regarding response times for structure fire incidents, the frequency of actual structure fires in Kern County is relatively low, approximately 2 percent of all responses. There were 973 structure fires in the 12-month period evaluated. The criterion for the structural fire response time is based on the concept of "flashover." This is the state at which super-heated gasses from a fire in an enclosed area trigger a near-simultaneous ignition of the combustible material in the area. In this situation, usually after an extended period of time (eight to twelve minutes), the fire expands rapidly and is much more difficult to contain. When the fire reaches this hazardous state, a larger and more destructive fire occurs. Figure 6-1 illustrates the flashover phenomenon and its potential for increased damage.

Response time measures as they relate to wildland fires are not consistent with the timelines and standards utilized for both EMS calls and structural fires. The general nature of a wildfire is one in which early intervention is beneficial, but the timelines and tactical approach in containing a wildfire are very different from that of a structure fire. In a wildfire scenario, the general tactical approach is to fight the fire by removing the fuel source, thus allowing the fire to burn itself out and subsequently to be contained or better managed. Only when the wildfire threatens buildings, infrastructure, or transportation corridors, or when the fire involves smaller grass areas or light vegetation, will the tactics be to attempt to extinguish the fire rather then remove its fuel source. These tactical differences, combined with the larger expanse generally associated with wildfire, do not point to an operational response time measure as we typically see in structural fire or EMS scenarios.

Another important factor in the whole response time question is what we term "***detection time***." This is the time it takes to detect a fire or a medical situation and notify 911 to initiate the response. In many instances, particularly at night or when automatic detection systems (fire sprinklers and smoke detectors) are unavailable or inoperable, the detection process can be extended. Fires that go undetected and are allowed to expand in size become more destructive and are difficult to extinguish.

[36] Myers, Slovis, Eckstein, Goodloe et al. (2007). "Evidence-based Performance Measures for Emergency Medical Services System: A Model for Expanded EMS Benchmarking." *Pre-hospital Emergency Care*.

FIGURE 6-1: Fire Propagation Curve



MEASURING RESPONSE TIMES

There have been no documented studies that have made a direct correlation between response times and outcomes in fire and EMS events. No one has been able to show that a four-minute response time is measurably more effective than a six-minute response time. The logic has been "faster is better," but this has not been substantiated by any detailed analysis. Furthermore, the ability to measure the difference in outcomes (patient saves, reduced fire damage, or some other quantifiable measure) between a six-minute, eight-minute, or ten-minute response is not a performance measure often utilized in the fire service. So, in looking at response times it is prudent to design a deployment strategy around the actual circumstances that exist in the community and the fire problem that is perceived to exist. This requires a "fire risk assessment" and a political determination as to the desired level of protection for the community. It would be imprudent, and very costly, to build a deployment strategy that is based solely upon response times. It would also be imprudent to establish a singular response time measure that is consistent throughout the broad expanse of area that exists in Kern County.

For the purpose of this analysis, ***response time*** is a product of three components: ***dispatch time***, ***turnout time***, and ***travel time***.

- *Dispatch time* is the time interval that begins when the alarm is received at the communication center and ends when the response information is transmitted via voice or electronic means to the emergency response facility or emergency response units in the field. Dispatch time is the responsibility of the 911 Center and will not be impacted by the actions of field units.
- *Turnout time* is the time interval that begins when the notification process to emergency response facilities and emergency response begins through an audible alarm or visual

announcement or both and ends at the beginning point of travel time. The field response units will have the greatest control over this segment of the total response time measurement.

- *Travel time* is the time interval that initiates when the unit is en route to the call and ends when the unit arrives at the scene.
- *Response time*, also known as total response time, is the time interval that begins when the call is received by the primary dispatch center and ends when the dispatched unit arrives on the scene to initiate action.

KERN COUNTY RESPONSE TIMES

For purposes of analyzing response time, the county was divided into four subareas: the Bakersfield Joint Protection Area (JPA), Urban Areas, Rural Areas, and Remote Areas. The JPA is defined by an agreement between KCFD and the Bakersfield Fire Department (BFD) and covers all of BFD's jurisdiction, the airport, and all or part of the first due areas for KCFD stations 41, 42, 45, 51, 52, 53, 61, 63, 64, 65, 66 and 67. Urban Areas include the cities of Arvin, Delano, Maricopa, McFarland, Ridgecrest, Shafter, Taft, Tehachapi, and a limited portion of Bakersfield that is not within the JPA. The Rural Area includes all areas outside of city limits but within eight miles of a KCFD station as measured along the most direct roads of travel. Remote Areas are areas outside of city limits that are more than eight miles from a KCFD station as measured along the roads.[37]

In this response time analysis, we included all emergency calls to which at least one non-administrative KCFD unit responded; we excluded canceled and mutual aid calls. Also, Battalion Chiefs were treated as administrative units. We included only those responses which allowed us to calculate each segment of response time. We removed any call with a missing time stamp or when there were identical timestamps (e.g., for dispatch and en route). We also excluded calls with extended total response time as these are likely the result of reporting errors. However, we segmented the four subarea groupings so that calls exceeding 30 minutes were excluded from the JPA and Urban subareas. For the Rural Areas, calls exceeding 45 minutes were excluded and for the Remote Areas, we excluded calls with times excluding 90 minutes.

For the Bakersfield JPA we excluded 4,779 canceled and mutual aid calls; 3,216 calls responded to without lights and sirens; 29 calls with response times over 30 minutes; 53 non-canceled calls where no unit recorded an on-scene time; 2 calls where only an administrative unit recorded an on-scene time; and 153 calls with time stamps that resulted in at least one response time segment of zero seconds. As a result, for the Bakersfield JPA area, a total of 13,614 calls are included in the analysis.

For the Urban Areas, based on the methodology above, we excluded 1,438 canceled and mutual aid calls; 2,060 calls responded to without lights and sirens; 17 calls with response times over 30 minutes; 27 non-canceled calls where no unit recorded an on-scene time; 1 call where only an administrative unit recorded an on-scene time; and 109 calls with time stamps that resulted in at least one response time segment of zero seconds. As a result, for the Urban Areas, a total of 7,194 calls are included in the analysis.

[37] Rural and remote area definitions are based on NFPA definitions. NFPA uses the U.S. Census Bureau's definition of rural, which is an area with fewer than 500 people per square mile, and defines remote areas as areas with a travel distance of at least eight miles from a fire station. National Fire Protection Association, *NFPA Glossary of Terms 2016 Edition*. Most, but not all unincorporated areas of Kern County have fewer than 500 people per square mile.

For the Rural Areas, based on the methodology above, we excluded 1,833 canceled and mutual aid calls; 3,288 calls responded to without lights and sirens; 14 calls with response times over 45 minutes; 42 non-canceled calls where no unit recorded an on-scene time; and 211 calls with time stamps that resulted in at least one response time segment of zero seconds. As a result, for the Rural Areas, a total of 9,304 calls are included in the analysis.

For the Remote Areas, based on the methodology above, we excluded 451 canceled and mutual aid calls; 499 calls responded to without lights and sirens; 2 calls with response times over 90 minutes; 14 non-canceled calls where no unit recorded an on-scene time; 1 call where only an administrative unit recorded an on-scene time; and 19 calls with time stamps that resulted in at least one response time segment of zero seconds. As a result, for the Remote Areas, a total of 1,182 calls are included in the analysis.

According to NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Departments,* 2014 Edition, the alarm processing time or dispatch time should be less than or equal to 60 seconds 90 percent of the time. This standard also states that the turnout time should be less than or equal to 80 seconds (1.33 minutes) for fire and special operations 90 percent of the time, and travel time shall be less than or equal to 240 seconds for the first arriving engine company 90 percent of the time.

TABLE 6-1: Summary of Response Times of First Arriving Unit (Minutes)

Analysis Subarea	Call Type	Response Time		Number of Calls
		Average	90th Percentile	
Bakersfield JPA	EMS	8.2	11.1	10,301
	Fire	9.1	12.5	3,313
	Total	**8.4**	**11.4**	**13,614**
Urban	EMS	8.2	11.2	5,915
	Fire	8.8	12.4	1,279
	Total	**8.3**	**11.5**	**7,194**
Rural	EMS	10.6	15.7	7,450
	Fire	11.4	17.2	1,854
	Total	**10.8**	**16.0**	**9,304**
Remote	EMS	20.9	30.1	932
	Fire	21.2	28.9	250
	Total	**21.0**	**30.1**	**1,182**

Response Time by Type of Call – Bakersfield JPA

TABLE 6-2: Average Response Time - Bakersfield JPA

Call Type	Dispatch	Turnout	Travel	Total	Number of Calls
Breathing difficulty	2.1	1.0	4.9	7.9	1,433
Cardiac and stroke	2.3	1.0	4.8	8.1	2,009
Fall and injury	2.6	1.0	4.9	8.5	1,660
Illness and other	2.4	1.0	4.9	8.2	2,701
MVA	2.2	1.0	4.6	7.8	702
Overdose and psychiatric	2.8	1.0	5.0	8.9	417
Seizure and unconsciousness	2.5	1.0	4.9	8.4	1,379
EMS Total	**2.4**	**1.0**	**4.9**	**8.2**	**10,301**
False alarm	2.9	0.9	5.7	9.5	284
Good intent	2.4	1.2	5.4	9.0	2,214
Hazard	3.1	1.0	6.1	10.2	135
Outside fire	2.7	1.1	5.8	9.6	206
Public service	2.8	0.9	5.3	9.0	322
Structure fire	2.4	1.1	4.8	8.2	152
Fire Total	**2.5**	**1.1**	**5.4**	**9.1**	**3,313**
Total	**2.4**	**1.0**	**5.0**	**8.4**	**13,614**

TABLE 6-3: 90th Percentile Response Time – Bakersfield JPA

Call Type	Dispatch	Turnout	Travel	Total	Number of Calls
Breathing difficulty	3.2	1.9	7.0	10.4	1,433
Cardiac and stroke	3.5	1.8	7.1	10.9	2,009
Fall and injury	4.0	1.9	7.2	11.2	1,660
Illness and other	3.7	1.8	7.2	11.2	2,701
MVA	3.5	1.8	7.1	10.5	702
Overdose and psychiatric	4.6	1.8	7.6	12.2	417
Seizure and unconsciousness	3.8	1.9	7.2	11.3	1,379
EMS Total	**3.7**	**1.8**	**7.2**	**11.1**	**10,301**
False alarm	4.7	1.7	8.8	13.3	284
Good intent	4.0	2.2	7.8	12.3	2,214
Hazard	5.4	2.2	10.3	14.4	135
Outside fire	4.3	2.2	10.1	14.3	206
Public service	4.3	1.7	8.0	12.0	322
Structure fire	4.2	2.0	7.0	11.0	152
Fire Total	**4.2**	**2.1**	**8.1**	**12.5**	**3,313**
Total	**3.8**	**1.9**	**7.4**	**11.4**	**13,614**

Response Time by Type of Call – Urban Areas

TABLE 6-4: Average Response Time – Urban Areas

Call Type	Dispatch	Turnout	Travel	Total	Number of Calls
Breathing difficulty	2.1	1.0	4.8	7.9	873
Cardiac and stroke	2.5	1.0	4.8	8.2	1,055
Fall and injury	2.7	0.9	4.7	8.4	961
Illness and other	2.2	1.0	4.8	8.0	1,676
MVA	2.4	1.0	4.8	8.1	465
Overdose and psychiatric	2.9	1.0	4.8	8.8	153
Seizure and unconsciousness	2.7	0.9	4.6	8.2	732
EMS Total	**2.4**	**1.0**	**4.8**	**8.2**	**5,915**
False alarm	2.9	0.9	5.1	8.9	132
Good intent	2.4	1.1	5.3	8.7	802
Hazard	3.2	0.9	6.4	10.6	67
Outside fire	2.2	1.0	5.6	8.8	60
Public service	2.7	1.0	5.0	8.6	142
Structure fire	2.5	1.0	5.1	8.6	76
Fire Total	**2.5**	**1.0**	**5.3**	**8.8**	**1,279**
Total	**2.4**	**1.0**	**4.9**	**8.3**	**7,194**

TABLE 6-5: 90th Percentile Response Time – Urban Areas

Call Type	Dispatch	Turnout	Travel	Total	Number of Calls
Breathing difficulty	3.3	1.8	7.0	10.5	873
Cardiac and stroke	4.1	1.8	7.0	11.4	1,055
Fall and injury	4.2	1.8	6.9	11.3	961
Illness and other	3.8	1.8	7.1	11.2	1,676
MVA	4.0	1.7	7.9	12.5	465
Overdose and psychiatric	4.6	1.9	6.8	11.8	153
Seizure and unconsciousness	4.3	1.7	6.5	10.9	732
EMS Total	**4.0**	**1.8**	**7.0**	**11.2**	**5,915**
False alarm	5.5	1.5	7.6	12.5	132
Good intent	4.1	1.9	7.9	12.1	802
Hazard	5.4	1.7	10.8	16.1	67
Outside fire	3.4	1.9	9.3	13.1	60
Public service	4.1	1.8	7.6	12.5	142
Structure fire	4.1	1.7	7.8	12.4	76
Fire Total	**4.2**	**1.8**	**7.9**	**12.4**	**1,279**
Total	**4.0**	**1.8**	**7.2**	**11.5**	**7,194**

Response Time by Type of Call – Rural Areas

TABLE 6-6: Average Response – Rural Areas

Call Type	Dispatch	Turnout	Travel	Total	Number of Calls
Breathing difficulty	2.2	1.1	6.5	9.8	1,031
Cardiac and stroke	2.6	1.0	7.0	10.5	1,378
Fall and injury	2.8	1.0	6.6	10.4	1,169
Illness and other	2.6	1.0	6.7	10.3	1,847
MVA	3.0	1.1	8.1	12.3	1,027
Overdose and psychiatric	3.3	1.0	6.9	11.1	226
Seizure and unconsciousness	2.9	1.0	6.9	10.7	772
EMS Total	**2.7**	**1.0**	**6.9**	**10.6**	**7,450**
False alarm	3.5	0.9	7.6	12.0	165
Good intent	2.8	1.1	6.9	10.8	1,136
Hazard	3.5	1.2	8.7	13.4	116
Outside fire	3.4	1.1	9.0	13.6	196
Public service	2.8	1.1	7.5	11.4	153
Structure fire	2.9	1.2	7.1	11.2	88
Fire Total	**3.0**	**1.1**	**7.4**	**11.4**	**1,854**
Total	**2.7**	**1.0**	**7.0**	**10.8**	**9,304**

TABLE 6-7: 90th Percentile Response Time – Rural Areas

Call Type	Dispatch	Turnout	Travel	Total	Number of Calls
Breathing difficulty	3.5	2.1	10.1	13.9	1,031
Cardiac and stroke	4.1	1.8	11.4	15.2	1,378
Fall and injury	4.5	1.8	11.0	15.2	1,169
Illness and other	4.3	1.9	11.0	15.4	1,847
MVA	4.9	2.1	12.8	17.6	1,027
Overdose and psychiatric	5.3	1.9	11.0	16.7	226
Seizure and unconsciousness	4.5	1.8	10.8	15.1	772
EMS Total	**4.3**	**1.9**	**11.3**	**15.7**	**7,450**
False alarm	5.8	1.9	13.6	19.0	165
Good intent	4.6	2.1	11.1	15.5	1,136
Hazard	5.6	2.6	14.2	19.6	116
Outside fire	6.3	2.2	14.6	19.9	196
Public service	4.7	2.1	12.8	17.1	153
Structure fire	6.3	2.6	11.1	17.9	88
Fire Total	**5.1**	**2.1**	**12.3**	**17.2**	**1,854**
Total	**4.5**	**1.9**	**11.4**	**16.0**	**9,304**

Response Time by Type of Call – Remote Areas

TABLE 6-8: Average Response Time – Remote Areas

Call Type	Dispatch	Turnout	Travel	Total	Number of Calls
Breathing difficulty	2.6	1.1	17.7	21.4	84
Cardiac and stroke	2.9	1.0	17.3	21.2	147
Fall and injury	3.0	1.1	17.6	21.7	105
Illness and other	3.9	1.0	16.0	20.8	183
MVA	3.7	1.2	15.6	20.4	328
Overdose and psychiatric	5.8	1.3	17.6	24.7	10
Seizure and unconsciousness	3.4	1.0	16.5	20.9	75
EMS Total	**3.4**	**1.1**	**16.4**	**20.9**	**932**
False alarm	3.4	1.0	17.8	22.2	16
Good intent	3.5	1.0	15.8	20.3	104
Hazard	4.2	0.8	19.9	24.9	23
Outside fire	4.4	1.4	15.1	20.9	72
Public service	5.9	0.9	15.7	22.5	19
Structure fire	4.2	0.9	15.3	20.4	16
Fire Total	**4.0**	**1.1**	**16.0**	**21.2**	**250**
Total	**3.6**	**1.1**	**16.3**	**21.0**	**1,182**

TABLE 6-9: 90th Percentile Response Time – Remote Areas

Call Type	Dispatch	Turnout	Travel	Total	Number of Calls
Breathing difficulty	4.5	1.9	26.0	30.3	84
Cardiac and stroke	4.7	1.9	25.6	29.6	147
Fall and injury	4.9	1.9	26.3	30.2	105
Illness and other	6.2	1.9	24.5	31.0	183
MVA	6.9	2.3	23.1	30.1	328
Overdose and psychiatric	12.7	2.8	23.9	36.9	10
Seizure and unconsciousness	5.2	1.8	23.0	26.8	75
EMS Total	**5.8**	**2.0**	**24.8**	**30.1**	**932**
False alarm	10.3	2.1	31.7	38.6	16
Good intent	6.4	1.8	21.8	25.3	104
Hazard	9.5	1.8	30.5	35.7	23
Outside fire	8.8	2.9	21.8	28.9	72
Public service	11.1	1.7	39.3	45.5	19
Structure fire	13.2	2.0	21.9	28.5	16
Fire Total	**7.9**	**2.1**	**23.5**	**28.9**	**250**
Total	**6.2**	**2.0**	**24.5**	**30.1**	**1,182**

There are a number of observations that can be made from the response time findings. Turnout times for KCFD units are very consistent and rapid throughout the system. This is a key element in the response time process that perhaps is the only element that can be impacted by fire department personnel. Average turnout times are consistently in the one-minute range and at the 90th percentile these times are typically under two minutes. CPSM recognizes the consistency of unit turnout times as a ***Best Practice***.

Overall, the travel times observed, particularly in the Rural and Remote subareas were relatively good given the extended distances that are typically encountered in these locations. Times in the JPA were the lowest and this was expected. Average travel times of seven minutes in the Rural Areas and 16 minutes in the Remote Areas were much better than expected. We did observe some higher travel times for several call categories, particularly in the "Hazard" call type" and "False Alarms." This is a common occurrence and we often attribute this to a natural slowing down of the response in these call categories as responders anticipate a nonemergency or public assist situation and slow down their response.

A major concern observed, however, was the extended dispatch times observed in all subareas. Average dispatch times ranged from 2.4 minutes for the JPA to 3.6 minutes for Remote Areas. At the 90th percentile, dispatch times ranged from 3.8 in the JPA to 6.2 in the Remote Areas. CPSM believes that improvements can be made in dispatch handling overall and it is not unrealistic to achieve improvements at the 90th percentile to reduce these times to a two-minute range.

> ***Recommendation: KCFD should work with its 911 Dispatch Center to improve dispatch handling times.***

The effective interrogation of a 911 caller is a comprehensive process that when done correctly can take several minutes to complete. Many call screening systems incorporate a quick assessment process that identifies the nature of the call and enables the dispatcher to notify responding units of a pending response (pre-alert). Once the dispatcher completes the full inquiry they can then provide follow-up information to the responding units that have initiated their response. CPSM believes that a pre-alerting process would be beneficial in Kern County in expediting the call processing times.

> ***Recommendation: The 911 Dispatch Center should work with KCFD operations staff to implement a pre-alert dispatching process for priority calls.***

The fire station is a critical link in service delivery and where these facilities are located is the single most important factor in determining overall response times and workload distribution. As noted previously, the fire department operates from 47 fire stations, including the airport station at Meadows Filed, and Station 73 which serves the Inyokern Airport along with adjoining properties. The KCFD fire stations are located as follows:

- Station 11: 30356 Woodford-Tehachapi Rd, Keene 93531
- Station 12: 800 South Curry St., Tehachapi 93561
- Station 13: 21415 Reeves St., Tehachapi 93561
- Station 14: 1953 Hwy 58, Mojave 93501
- Station 15: 3219 35th St. West, Rosamond 93560
- Station 16: 28946 Bear Valley Rd., Tehachapi 93561
- Station 17: 26965 Cote St., Boron 93516
- Station 18: 28381 Braeburn Place #22, Stallion Springs 93561

- Station 21: 303 10th Street, Taft 93268
- Station 22: 801 Stanislaus, Maricopa 93252
- Station 23: 100 Broadway, Fellows 93224
- Station 24: 23246 2nd St., McKittrick 93251
- Station 25: 100 Mirasol Ave., Buttonwillow 93206
- Station 26: 14670 Lost Hills Rd., Lost Hills 93249
- Station 31: 2424 7th St., Wasco 93280
- Station 32: 325 Sunset Ave., Shafter 93263
- Station 33: 700 W. Perkins Ave., McFarland 93250
- Station 34: 1001 12th Ave., Delano 93215
- Station 35: 17977 Hwy 155, Woody 93287
- Station 36: 10511 Hwy 155, Glennville 93226
- Station 37: 132 W. 11th St., Delano 93215
- Station 41: 2214 Virginia Ave., Bakersfield 93307
- Station 42: 2011 Fairfax Rd., Bakersfield 93306
- Station 45: 11809 Edison Hwy., Bakersfield 93307
- Station 51: 8225 McKee Rd., Lamont 93241
- Station 52: 312 Taft Hwy., Bakersfield 93307
- Station 53: 9443 Taft Hwy., Bakersfield 93311
- Station 54: 301 Campus Dr., Arvin 93203
- Station 55: 5441 Dennis McCarthy Dr., Lebec 93243
- Station 56: /1548 Lebec Service Rd., Lebec 93243
- Station 57: 729 West End Dr., Frazier Pk. 93225
- Station 58: 2410 Symonds Dr., Pine Mtn. Club 93222
- Station 61: 6400 Fruitvale Ave., Bakersfield 93308
- Station 62: 1652 Sunnyside Court, Bakersfield 93308 (Meadows Field)
- Station 63: 101 Universe Ave., Bakersfield 93308
- Station 64: 101 E. Roberts Ln., Bakersfield 93308
- Station 65: 10051 Meacham Rd., Bakersfield 93312
- Station 66: 3000 Landco Dr., Bakersfield 93308
- Station 67: 14341 Brimhall Rd., Bakersfield 93312
- Station 71: 9000 Navajo Ave., Weldon 93283
- Station 72: 4500 Lake Isabella Blvd., Lake Isabella 93240
- Station 73: 6919 Monache Mtn. Ave., Inyokern 93527 (Kern Valley Airport)
- Station 74: 139 E. Las Flores, Ridgecrest 93555

- Station 75: 26804 Butte Ave., Randsburg 93554
- Station 76: 11018 Kernville Rd., Kernville 93238
- Station 77: 815 W. Dolphin Ave., Ridgecrest 93555
- Station 78: 16001 Walker Basin Rd., Caliente 93518

Table 6-10 illustrates the distribution of travel times in 4-minute, 6-minute, 8-minute, 15-minute, and 20-minute intervals for each of the four geographic subareas of the county. These break downs are the actual travel time quantifications for the 12-month period evaluated.

Figures 6-2, 6-3, and 6-4 show the actual locations of fire, EMS, and other emergency responses carried out by the Kern County Fire Department. It is apparent from this graphic that most responses in the county cluster around the City of Bakersfield and the nine municipal contract areas.

TABLE 6-10: Travel Times in 4, 6, 8, 15 and 20 Minute Intervals

Area	Call Type	≤4 Min	≤6 Min	≤8 Min	≤15 Min	≤20 Min
Bakersfield JPA	EMS	35.0%	78.6%	94.0%	—	—
	Fire	23.1%	61.1%	83.1%	—	—
	Canceled	31.9%	67.0%	87.6%	—	—
	Total	**30.6%**	**71.8%**	**89.8%**	**—**	**—**
Urban Areas	EMS	40.5%	81.8%	93.3%	—	—
	Fire	28.3%	66.3%	86.5%	—	—
	Canceled	29.8%	71.0%	87.8%	—	—
	Total	**36.3%**	**76.6%**	**91.0%**	**—**	**—**
Rural Areas	EMS	18.3%	47.6%	70.3%	—	—
	Fire	14.0%	37.9%	59.7%	—	—
	Canceled	17.8%	44.5%	66.7%	—	—
	Total	**16.9%**	**44.3%**	**66.6%**	**—**	**—**
Remote Areas	EMS	1.8%	3.4%	5.3%	46.4%	78.3%
	Fire	2.7%	4.1%	5.9%	40.4%	72.0%
	Canceled	3.5%	4.7%	4.7%	50.0%	76.7%
	Total	**2.2%**	**3.7%**	**5.5%**	**44.3%**	**75.9%**
Total		**26.4%**	**61.5%**	**79.3%**	**—**	**—**

FIGURE 6-2: Distribution of Fire Calls

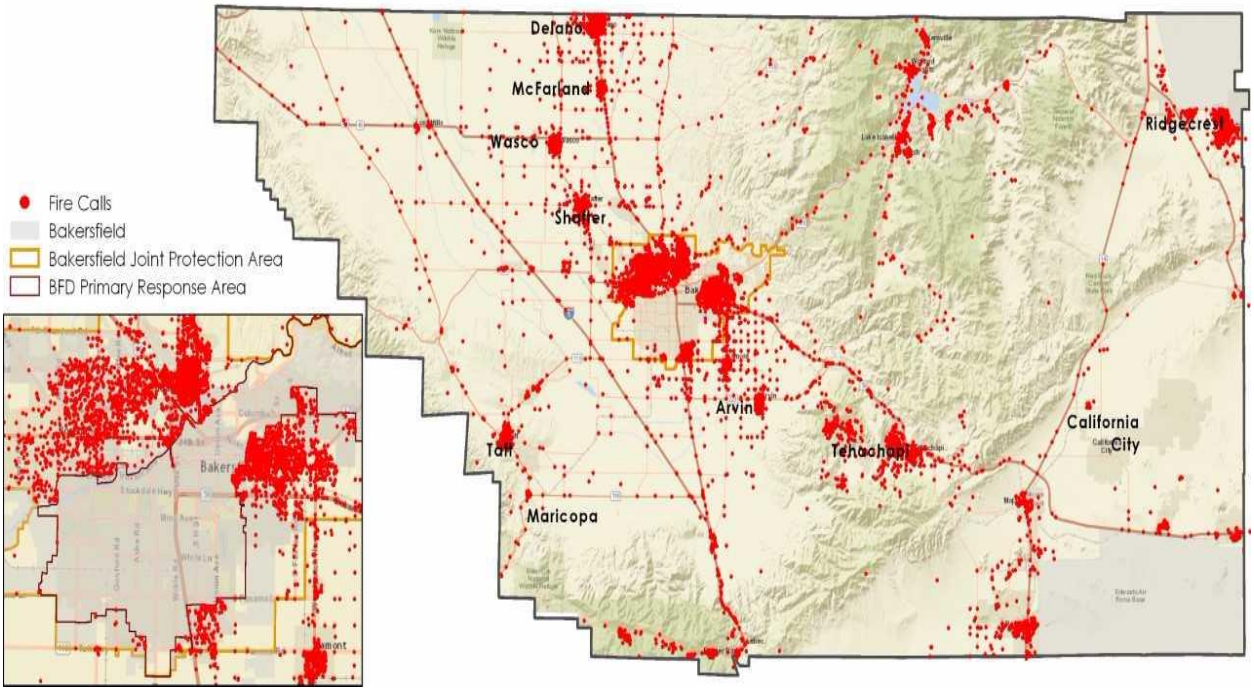


FIGURE 6-3: Distribution of EMS Calls

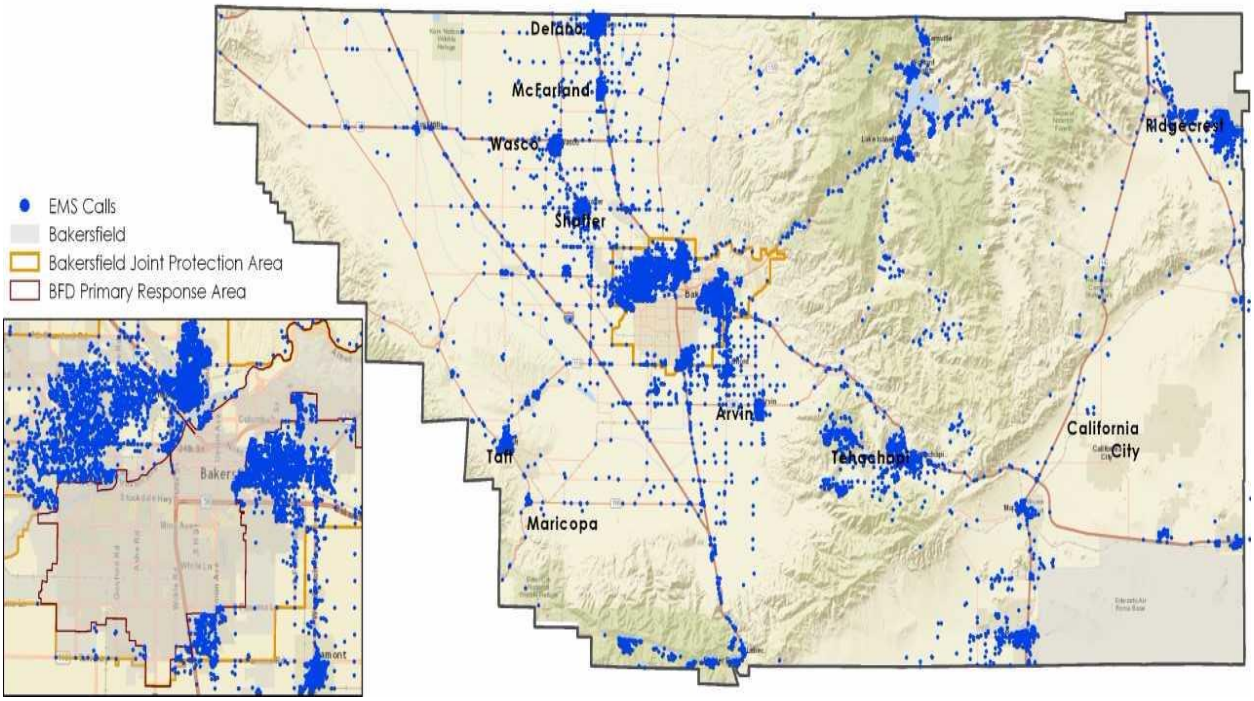
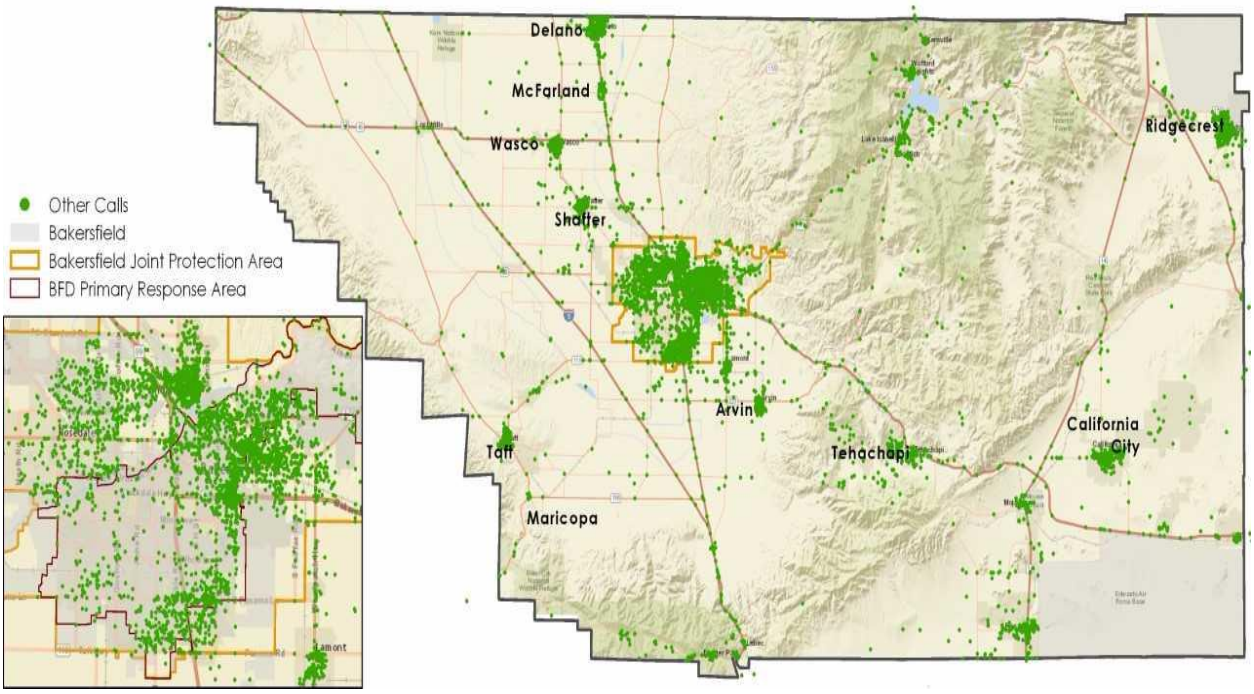


FIGURE 6-4: Distribution of Other Calls



We also looked at the distribution of those calls with extended response times. For the purpose of this study we classified "extended" response times in three groupings. In both the JPA and Urban Areas, extended times were those calls in which the total response time (dispatch, turn-out, and travel) for the first arriving unit was greater than 10 minutes. For the Rural Areas, extended calls were those exceeding 20 minutes and in the Remote Areas, all calls in which the initial response was greater than 30 minutes were considered as extended. On the basis of these classifications, the JPA is experiencing just over 20 percent of its calls with extended response times (EMS 17.5 percent, fire 28.8 percent). Urban Areas were slightly lower at 18.6 percent in the extended category (EMS 17.1 percent, Fire 25.6 percent). In the Rural Areas, approximately 4 percent of the calls were in the extended category (greater than 20 minutes). In the Remote Areas we observed approximately 10 percent of all calls in the extended category (greater than 30 minutes). Table 6-11 is the composite of these findings for each of the four subareas.

TABLE 6-11: Extended Response Times by Area

Area	Call Type	Calls Included in Response Time Analysis	Calls with Extended Response	Percent with Extended Response	Limit Used
Bakersfield JPA	EMS	10,301	1,804	17.5	10 Minutes
	Fire	3,313	954	28.8	
	Total	**13,614**	**2,758**	**20.3**	
Urban Areas	EMS	5,915	1,009	17.1	10 Minutes
	Fire	1,279	328	25.6	
	Total	**7,194**	**1,337**	**18.6**	
Rural Areas	EMS	7,450	276	3.7	20 Minutes
	Fire	1,854	99	5.3	
	Total	**9,304**	**375**	**4.0**	
Remote Areas	EMS	932	97	10.4	30 Minutes
	Fire	250	23	9.2	
	Total	**1,182**	**120**	**10.2**	

SECTION 7. PERFORMANCE MEASUREMENT

Fire suppression, EMS delivery, prevention and forest mitigation programs need to be planned and managed so that these efforts achieve specific, agreed-upon results. This requires establishing a set of goals for the activities of any given program. Determining how well an organization or program is doing requires that these goals be measurable and that they are measured against desired results. This is the goal of performance measurement.

Simply defined, performance measurement is the ongoing monitoring and reporting of progress toward pre-established goals. It captures data about programs, activities, and processes, and displays data in standardized ways that help communicate to service providers, customers, and other stakeholders how well the agency is performing in key areas. Performance measurement provides an organization with tools to assess performance and identify areas in need of improvement. In short, ***what gets measured gets improved***.

The need to continually assess performance requires adding new words and definitions to the fire service lexicon. Fire administrators need to be familiar with the different tools available and the consequences of their use. In *Managing the Public Sector*, business professor Grover Starling applies the principles of performance measurement to the public sector. He writes that the consequences to be considered for any given program include:

Administrative feasibility: How difficult will it be to set up and operate the program?

Effectiveness: Does the program produce the intended effect in the specified time? Does it reach the intended target group?

Efficiency: How do the benefits compare with the costs?

Equity: Are the benefits distributed equitably with respect to region, income, gender, ethnicity, age, and so forth?

Political feasibility: Will the program attract and maintain key actors with a stake in the program area?[38]

Performance measurement systems vary significantly among different types of public agencies and programs. Some systems focus primarily on efficiency and productivity within work units, whereas others are designed to monitor outcomes produced by major public programs. Still others track the quality of services provided by an agency and the extent to which citizens are satisfied with these services.

Within the fire service, performance measures tend to focus on inputs (the amount of money and resources spent on a given program or activity) and short-term outputs (the number of fires, number of EMS calls, response times, etc.). One of the goals of any performance measurement system should be also to include efficiency and cost-effectiveness indicators, as well as explanatory information on how these measures should be interpreted. An explanation of these types of performance measures are shown in Table 7-1.

[38] Grover Starling, *Managing the Public Sector*, (Cengage Learning), 396.

TABLE 7-1: The Five GASB Performance Indicators[39]

Category	Definition
Input indicators	These are designed to report the amount of resources, either financial or other (especially personnel), that have been used for a specific service or program.
Output indicators	These report the number of units produced or the services provided by a service or program.
Outcome indicators	These are designed to report the results (including quality) of the service.
Efficiency (and cost-effectiveness) indicators	These are defined as indicators that measure the cost (whether in dollars or employee hours) per unit of output or outcome.
Explanatory information	This includes a variety of information about the environment and other factors that might affect an organization's performance.

One of the most important elements of performance measurement within the fire service is to describe service delivery performance in a way that both citizens and those providing the service have the same understanding. The customer will ask, "Did I get what I expected?" the service provider will ask, "Did I provide what was expected?"

Ensuring that the answer to both questions is "yes" requires alignment of these expectations and the use of understandable terms. The author of the "Leadership" chapter of the 2012 edition of ICMA's *Managing Fire and Emergency Services* "Green Book" explains how jargon can get in the way:

> *Too often, fire service performance measures are created by internal customers and laden with jargon that external customers do not understand. For example, the traditional fire service has a difficult time getting the public to understand the implications of the "time temperature curve" or the value of particular levels of staffing in the suppression of fires. Fire and emergency service providers need to be able to describe performance in a way that is clear to customers, both internal and external. In the end, simpler descriptions are usually better.*[40]

The KCFD has instituted a limited number of performance measures to analyze its services. There are seven performance measures that are part of the annual budget process and which are updated quarterly. These include average response times in both suburban and rural areas, and a fairly static measure regarding on-duty firefighter staffing, public education contacts, disaster preparedness hours, and two issues relating to wild fires (fuel breaks and the percentage of wildfires contained at 10 acres or less). These measures have limited distribution and were known only by the executive staff in the KCFD and County Administration and rarely distributed among line personnel and community stakeholders.

It is critical that KCFD develop a series of internal reporting processes that provide a direct link to department goals or specific target measures. It is also critical that these measures be both

[39] From Harry P. Hatry et al., eds. *Service Efforts and Accomplishments Reporting: Its Time Has Come* (Norwalk, CT: GASB, 1990).
[40] I. David Daniels, "Leading and Managing," in *Managing Fire and Emergency Services* (ICMA: Washington, DC: 2012), 202.

quantitative and qualitative in nature and reflect on multiple areas of service delivery within the organization. This type of ongoing analysis and the monitoring of trends are most useful to justify program budgets and to measure service delivery levels.

In developing any measure, staff throughout the organization should participate in their development. In addition to helping facilitate department-wide buy-in, this could provide an opportunity for upper management to better understand what the line staff believes to be critical goals—and vice versa. For the same reason, the process of developing performance measures should include citizen input, specifically with regard to service level preferences. Translating this advice from the citizens into performance measures will link the citizens and business community to the department and will identify clearly if the public's expectations are being met.

> ***Recommendation: KCFD should expand its performance measures to enable ongoing review of service outcomes. The process of developing these measures should utilize input from KCFD members, the community, the County Board of Supervisors, municipal contract representatives, and County Administration.***

The following are a number of performance measures that may be considered:

Operations:

- Response times (fire and percentile/average/frequency of excessive times).
  - Alarm/dispatch handling times.
  - Turnout times.
  - Travel times.
  - On-scene time.
  - Call duration.
  - Canceled en route.
- Workload measures.
  - Emergency vs. nonemergency responses.
  - EMS transports–ALS/BLS (Conducted by the Ambulance provider).
  - Response to automatic fire alarms/frequency and outcomes.
  - Company inspections/area occupancy familiarization.
  - Fire preplanning.
  - Public education: contact hours/numbers by age group.
- Outcome measures
  - EMS/save rates/action taken.
  - EMS protocol compliance.
  - Fire loss/limit of fire spread–point of origin, room of origin, etc.
  - On-duty injuries/workers' comp claims.
  - Lost time–sick/injury.

- Vehicle accidents.
- Equipment lost or broken.

Training:

- Fire and EMS hours.
- Officer development.
- Skills assessment compliance.
- Specialty training.
- Professional development/formal education/certifications.
- Fitness performance.

Prevention:

- Plans review (numbers/valuation amount/completion time).
- Inspections (new and existing).
  - Numbers.
  - Completion time.
  - Violations (found/corrected).
  - Quantification by type of violation and occupancy type.
- Fire investigations.
  - Numbers and determinations.
  - Occupancy types, time of occurrence, ignition source.
  - Fire loss/structure and contents.
  - Arson arrests/convictions.
  - Fire deaths (demographics/occupancy type/cause and origin).

Miscellaneous:

- Customer service surveys (by engine/by shift).
  - Following emergency response.
  - Public assist.
  - Inspections (prevention and company).
  - Public education.
  - In-service training (employee assessments).
- Financial/budgetary.
  - Overtime expenditures and cause.
  - Apparatus repair costs and out-of-service time.
  - Wildland response and cost recovery.
  - Municipal service contracts and cost recovery.

SECTION 8. ESSENTIAL RESOURCES

FIRE PREVENTION AND CODE ENFORCEMENT

Fire prevention activities are one of the most important missions in a modern-day fire department. A comprehensive fire prevention program should include, at a minimum, the key functions of fire prevention, code enforcement, inspections, and public education. Preventing fires before they occur, and limiting the impact of those that do occur, should be a priority of every fire department. Educating the public about fire safety and teaching them appropriate behaviors on how to react should they be confronted with a fire is also an important life safety responsibility of the fire department.

Fire prevention is a key responsibility of every member of the fire department. On-duty personnel can be assigned with the responsibility for "in-service" inspections to identify and mitigate fire hazards in buildings, to familiarize firefighters with the layout of buildings, identify risks that may be encountered during firefighting operations, and to develop prefire plans. On-duty personnel in many departments are also assigned responsibility for permit inspections and public fire safety education activities.

Fire prevention activities in Kern County are supervised by a Battalion Chief/Fire Marshal. The Fire Prevention Division is staffed with 15 full-time prevention personnel. Of these, four are Captains, three are Engineers, and two are civilian Fire Inspectors. There are also four personnel who are designated as extra help who assist with relieving the workload of the other fire prevention staff. Two positions, a Fire Plans Examiner and a Fiscal Support Specialist, are currently vacant

The Fire Prevention Division has a wide range of duties. These include plans review and code compliance regarding both new buildings while under construction, as well as ongoing maintenance inspections after the building or business is occupied. A significant percentage of these inspections are mandated as part of the California State Building and Fire Codes. The remainder are performed in accordance with nationally recognized standards and best practices. In total, more than 12,000 fire-related inspections per year are performed by KCFD staff. Of these, about 4,000 are conducted by the Fire Prevention Division. The remaining 8,000 are performed by the in-service fire companies in their respective response areas.

TABLE 8-1: KCFD Fire Prevention Division Major Activity Statistics 2014 - 2017

	2014	2015	2016	2017*
Title 19 Fire Inspections	1,495	1,320	1,095	619
Other Inspections	2,469	2,740	2,857	1,485
Total Inspections	**3,964**	**4,060**	**3,952**	**2,104**
Permits Issued (Includes RFS permits)	1,910	1,950	1,928	1,271
Residential Fire Sprinkler (RFS) Permits Issued	722	844	936	517
Fire Prevention Revenue (Fiscal Year)	**$763,309.77**	**$761,894.55**	**$950,174.76**	**$160,790.00****

* Six months through 6/30/17.
** Single month of revenue for fiscal year 2017-2018 which started 7/1/17.

Kern County currently utilizes the 2016 California Fire Code with local ordinance adoptions. Since 2011, the California Building and Fire Codes have mandated the installation of automatic fire sprinklers in all new residential occupancies. At the state level the fire code is designated as

Title 19 of the California Code of Regulations. Division 1 of Title 19 covers the activities of the California State Fire Marshal. Division 1 contains 16 chapters that cover the fire prevention code requirements for a wide range of occupancies and operations. The Title 19 inspections referred to in the statistics are those that are mandated to be performed on a regular basis.

The KCFD has a very active in-service fire company inspection program. Most of these inspections are conducted on an annual basis; however, there are certain occupancies that must be inspected bi-annually. The engine companies conduct approximately 8,000 company inspections at residential, medical, manufacturing, and retail business establishments throughout the county. The process is coordinated through the Fire Prevention Division, with oversight by the respective field Battalion Chiefs. The inspections that are due are tracked through the Sun Pro records management system. CPSM learned, however, that the department conducts very limited training for field personnel to perform these inspections. The California Office of the State Fire Marshal offers a very comprehensive Company Officers Inspector training program.[41]

> ***Recommendation: The KCFD should ensure that all company officers receive Company Officer Inspector/Investigations Training offered through the California Office of the State Fire Marshal.***

Overall, the in-service company inspection process in Kern County is very comprehensive and aggressive in identifying fire code violations and ensuring life-safety protections. CPSM believes that the KCFD in-service inspection program is a ***Best Practice***.

The Fire Prevention Division has established a fee schedule that covers a wide range of permits, inspections, and services it provides. The most recent fee schedule took effect on April 15, 2017. The fee schedule includes:

- Operating Permits – $50 to $520
- Construction Permits – $35 to $1,000
- Fireworks Permit – $325
- Plan Review – $130 to $195
- Special Inspections – $450 to $520 and $140/hour (minimum two hours)
- Fire Safety Inspections and Standbys (all two-hour minimum) –$140/hour to $455/hour
- Administrative Fees –$10 to $1,000

Beginning with FY-2005-2006 and through the first month of the FY 2017-18, the Fire Prevention Division's fee schedule has generated $5,646,804.66 in revenue. The revenue generated has increased each year during this period except for one. Revenue for FY 2017-18 is projected to be $1.3 million. The recent legalization of marijuana cultivation in the state and the expected influx of legal growing operations are expected to expand permit and inspections revenues for the department.

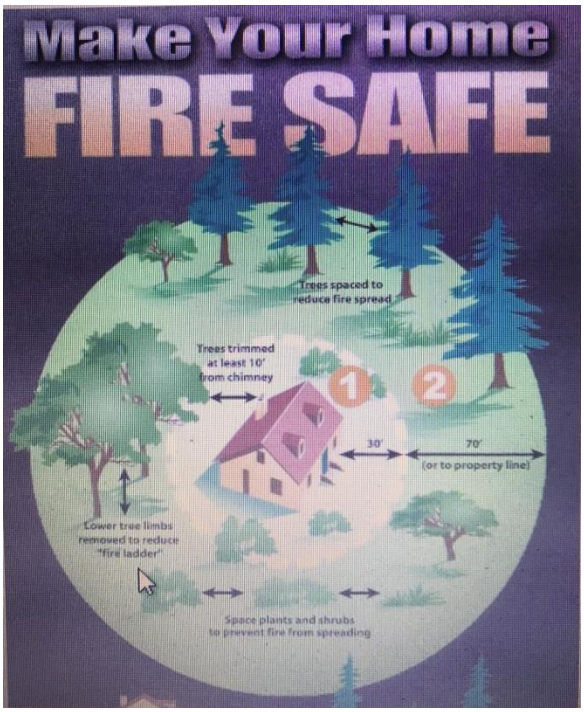
Despite the significant revenue the division generates, the department currently does not assess any type of inspection fee for the 8,000 inspections that are performed annually by the in-service fire companies. Many agencies nationally have adopted in-service company inspection fees and if implemented in Kern County, CPSM believes the revenue potential would be significant.

[41] http://osfm.fire.ca.gov/training/pdf/Curriculum/CompanyOfficer2C-CoursePlan.pdf

Recommendation: The KCFD should consider the implementation of an in-service fire company inspection fee.

The Kern County Fire Department's Fire Hazard Reduction Program is intended to reduce the threat of wild fires and is directed toward property owners whose properties are located within a State Responsibility Area (SRA). The program's goal is to protect life and property by providing effective public education and regulations that attempt to reduce the hazards of wild fires. The county ordinance requires that each year property owners perform hazard vegetation clearance. This effort is intended to increase firefighter and public safety, as well as improve the department's ability to protect property in the event of a wild fire. If the hazard reduction requirements are not met, property owners can be subjected to an administrative citation.

Under the fire hazardous vegetation reduction program, the required clearance guidelines are as follows:



- 100-foot clearance around ALL structures.
- Two zones make up the required 100 feet of defensible space.
  - Zone 1— Extending 30 feet from the structure, remove ALL non-ornamental combustible fuels in this area.
  - Zone 2 – 30 feet to 100 feet from the structure, reduce ALL combustible fuels in this area.
- 10-foot clearance around stovepipe/chimney outlets.
- 10-foot clearance around LPG tanks.
- 10-foot clearance around ALL property lines of vacant lots that encroach on the 100-foot defensible space of neighboring structures.
- Remove accumulation of combustible fuels on vacant properties that can be deemed a fire hazard.
- Remove all dead limbs that are overhanging any structures.
- Remove lower limbs of all non-ornamental trees to a height of 6 feet off the ground.
- Clear roof of all combustible vegetation and debris.

CPSM considers the KCFD's Hazard Reduction Program to be a ***Best Practice***.

CPSM was informed that KCFD has been considering a plan to replace many of the uniformed personnel assigned to Fire Prevention with civilian personnel. The use of civilian personnel offers cost savings in terms of employee salaries, reduces training requirements, and expands the opportunities for greater diversity of the workforce.

Recommendation: The KCFD should continue its efforts to expand the utilization of civilian fire prevention inspectors and plans reviewers in the Fire Prevention Division.

Fire Investigations

Fire investigations are conducted by a stand-alone Fire Investigation Unit (FIU) within the KCFD. The FIU is led by a Battalion Chief and is staffed with six full-time investigators who all hold the rank of Captain. The Investigation Unit is also supported by one full-time administrative assistant and one seasonal administrative assistant for wildfire season. All investigators have law enforcement powers and are authorized to carry a weapon. The unit's primary function is the investigation of significant and/or suspicious fire incidents.

Over the three-year period from 2014 through 2016, the Investigation Unit averaged 289 investigations per year, twelve of which were on SRA lands. Of this total, an average of 149 fires were determined to be incendiary in nature and on average 33 arrests are made annually.

TABLE 8-2: Fire Investigations Division Statistics, 2014 - 2016

	2014	2015	2016
Incendiary Fires	114	192	141
Accidental Fires	28	47	49
Undetermined Fires	56	62	115
Other Fire Cause	20	35	9
Total Fire Investigations	**218**	**336**	**314**
Arrests	33	39	29
Investigations on SRA Lands	2	18	16
Fireworks Task Force Calls Received		1,112	1,224
Fireworks Task Force Citations	78	104	83
Pounds of Fireworks Seized	3,000	2,500	2,800
Background Investigations Conducted	140	161	248
Juvenile Firesetters Referred	71	81	37
Juvenile Firesetters Counseled	31	30	16
Record Requests			919
Subpoenas for Personnel	151	76	195
Subpoenas for Records	42	53	55

Fire investigations has traditionally been a key component of American fire service. In today's arena in which the frequency of actual fires, particularly structural fires, has been reduced, the arson investigative process has little practical impact on reducing the number of fires or any measurable impact on curbing fire loss. CPSM believes that efficiencies can be gained through cross-training, the expanded us of civilian personnel and re-organization.

Recommendation: The KCFD should consider a reorganization of the Fire Investigation program and evaluate efforts to improve its efficiency.

At the time of this evaluation, Battalion Chiefs and Captains have the initial responsibility to investigate any fire to determine its cause and origin. When arson is suspected, this becomes a criminal offense that ultimately is a responsibility of law enforcement and the insurance industry. There is training readily available for company officers in basic fire investigations if needed.

The Fire Investigation Unit does generate a small amount of revenue each year, primarily related to citations issued for possession of illegal fireworks. Over the three-year period evaluated, the amount ranged from $44,522.32 in 2014 to $23,019.68 in 2016. In addition, fire investigations involving wildfires on state lands have generated an estimated $50,000 to $65,000 annually.

Under current operations, the Fire Investigation Unit generates limited analysis on fire loss in the county or any analysis of fires occurring in various occupancy types, neighborhoods, demographics, and etc. This omission precludes the ability to identify any patterns or trends that could be the basis for a public education or enforcement outreach that would attempt to reduce or minimize the frequency of these occurrences.

ISO RATING

ISO collects data for more than 48,000 communities and fire districts throughout the country. These data are then analyzed using a proprietary Fire Suppression Rating Schedule (FSRS). This analysis then results in a PPC (Public Protection Classification) score between 1 and 10 for the community, with Class 1 representing "superior property fire protection" and Class 10 indicating that an area doesn't meet the minimum criteria set by the ISO. In 2013, the revised FSRS was released; it adds an emphasis on a community's effort to limit loss before an incident occurs (fire prevention). ISO does not review any elements related to wildfire or wildfire mitigation.

In developing a PPC, the following major categories are evaluated:

- Emergency Communications: Fire alarm and communication systems, including telephone systems, telephone lines, staffing, and dispatching systems.
- Fire Department: The fire department, including equipment, staffing, training, and geographic distribution of fire companies.
- Water Supply: The water supply system, including the condition and maintenance of hydrants and the amount of available water compared to the amount need to suppress fires.
- Fire Prevention: Programs that contain plan review; certificate of occupancy inspections; compliance follow-up; inspection of fire protection equipment; and fire prevention regulations related to fire lanes on area roads, hazardous material routes, fireworks, barbecue grills, and wildland-urban interface areas.
- Public Fire Safety Education Programs: Fire safety education training and programs for schools, private homes, and buildings with large loss potential or hazardous conditions, and a juvenile firesetter intervention program.

Kern County was last reviewed in October 2016. The review process for the county was unique in that the county received separate reviews for each of the seven geographical areas of the unincorporated areas of the county that generally follow the Battalion service areas. In addition, each of the nine municipalities under contract with the county were reviewed separately and received their own ISO class ratings. In all, the various ratings ranged from a Class 2-2X rating for the City of Taft and KCFD #6, to a Class 4-4X rating for KCFD #1, #3, and #4. Most areas received a Class 3-3X rating. A Class 3-3X rating is a significant achievement for a community the size of Kern County and is a tribute to the fire department, the 911 communications system, and the

water utility systems. ISO estimated in 2015 that fewer than 4,000 agencies nationwide received a Class-3 or better rating. This puts Kern County in the top 10 percent of those agencies reviewed by ISO

There were three notable points in the review that warrant further discussion. For the dispatch center, KCFD received 8 out of 10 possible points. One shortfall cited in the dispatch center review was the lack of emergency dispatch protocols that facilitate the correct categorization and prioritization of calls (KCFD officials have advised that this issues has been corrected). The second area related to fire department training. Under the training category, KCFD received 6.65 points out of a possible 9 points. Two areas of deduction related to the hours earmarked for structure fire training and existing driver training. KCFD also received significant deductions regarding the Deployment of Resources and the number of on-duty staffing. In both categories, KCFD received approximately 35 percent of the possible point availability in these two areas (8.64 out of a possible 25 points).

FIRE TRAINING AND EDUCATION PROGRAMS

Training is one of the most important functions that a fire department should be performing on a regular basis. One could even make the argument that training is, in some ways, more important than emergency responses because a department that is not well-trained, prepared, and operationally ready will be unable to effectively and safely fulfill its emergency response obligations. A comprehensive, diverse, and ongoing training program is critical to the fire department's level of success.

An effective fire department training program must cover all the essential elements of that department's core missions and responsibilities. The program must include an appropriate combination of technical/classroom training, manipulative or hands-on/practical evolutions, and training assessment to gauge the effectiveness of these efforts. Most of the training, but particularly the practical, standardized, hands-on training evolutions should be developed based upon the department's own operating procedures and operations while remaining cognizant of widely accepted practices and standards that could be used as a benchmark to judge the department's operations for any number of reasons.

Certain Occupational Safety and Health Administration (OSHA) regulations dictate the minimum training that must be completed on an annual basis, including:

- A review of the respiratory protection standard, self-contained breathing apparatus (SCBA) refresher and user competency training, SCBA fit testing (29 CFR 1910.134).
- Blood Borne Pathogens Training (29 CFR 1910.1030).
- Hazardous Materials Training (29 CFR 1910.120).
- Confined Space Training (29 CFR 1910.146).
- Structural Firefighting Training (29 CFR 1910.156).

In addition, National Fire Protection Association (NFPA) standards contain recommendations for training on various topics such as a requirement for a minimum of 24 hours of structural firefighting training annually for each fire department member.

Education and training programs also help to create the character of a fire service organization. Agencies that place a real emphasis on their training are more proficient in carrying out day-to-day duties. The prioritization of training also fosters an image of professionalism and instills pride in

the organization. Overall, the KCFD training program is intent of fulfilling its core training mission, and there exists a dedicated effort focused on a wide array of training activities.

The KCFD Training Division is a stand-alone unit within the department that is supervised by a Battalion Chief who has been in this position for a little more than one year. The training chief is assisted by five Captains and three civilian support staff. Each of the nine training personnel are assigned to various operations, programs, and liaison duties. All the uniformed personnel also have responsibility to function as department safety officers. In this role they respond to significant fires and other incidents, are responsible for conducting accident investigations, and ensure various exposure reports are properly completed.

Kern County operates a joint training center — known as the Olive Drive Fire Training Facility (ODFTF) — with the Bakersfield Fire Department. The ODFTF is comprised of two classroom buildings, an office building, burn building, training tower, confined space rescue, hazardous materials training, ventilation, and forcible entry training props, apparatus bays, and a weight room. The classrooms are equipped with the latest technology that enable the use of computer generated simulations to create scenario-based promotional examinations on a wide variety of incidents based on real-life scenarios. The ODFTF site is designated as a regional training site by the State Fire Marshal, State Office of Emergency Services, and the California Wildland Fire Training Group.

The ODFTF has been used to train nearly 25 recruit academies in the past 20 years. A number of these academies have been joint academies between the KCFD and the Bakersfield Fire Department, and one was conducted in conjunction with the Bakersfield College Firefighter I program. At the time of the CPSM field visit the KCFD had a class of 17 recruits who were going through the 14-week academy. The ODFTF ensures that most training for all three organizations can be held in one centralized location, eliminating the need for wasted travel time and expenses. The county and city both contribute financially to the operation of the training center including a percentage of the administrative support staff's salaries. CPSM considers the operation of the joint Olive Drive Fire Training Facility to be a ***Best Practice*** for which Kern County, the City of Bakersfield City, and Bakersfield College should be commended and encouraged to continue.

The department has a partial training manual in place. However, parts of it appear outdated; in some cases, it utilizes materials from the late 1970s and early 1980s. The division's personnel have indicated that they are attempting to update the training programs, including many of the manuals. Many of these updates should have been made over the past several decades. To facilitate this process, the department should involve additional field operations personnel of all ranks to assist with the effort.

> ***Recommendation: The KCFD should complete a comprehensive review and update of the department's training manual to reflect current industry best practices and KCFD operations.***

When it is completed, the KCFD should have a comprehensive training manual that addresses, but is not limited to: mandatory OSHA training; recommended NFPA, ISO, and California State Fire Marshal training; every operational mission and responsibility of the department; and specialized training including personnel/officer development. The training should comply with accepted and/or recommended practices and standards, should include standardized evolutions, and should be consistent with the KCFD's operations and procedures.

The Training Division has developed a thorough and very professionally compiled Training Plan and Shift Responsibilities for 2017. This 27-page document establishes the annual training plan for

the entire department. A table at the beginning delineates monthly training by mandated topics, by rank-specific tasks, and by specialty disciplines. It also identifies a company drill topic. The manual then establishes a wide range additional equipment and station inspection and maintenance tasks assigned by shifts.

The KCFD utilizes Target Solutions as its platform for all department training. Target Solutions is a robust course catalog for fire and EMS training that can be utilized to meet all federal, state, and local public safety training mandates. Its inventory is comprised of more than 1,000 on line courses. The Training Chief has recently posted NFPA 1500 materials on line for personnel to reference. The training schedule should be posted prominently on Target Solutions and accessible to all personnel.

CPSM was informed that the training records were unreliable and not being kept up to date. Staff also indicated that they were uncertain if all station training records were being entered into the department reporting system.

> ***Recommendation: The Training Division should implement an operational procedure and review process that documents the completion of all training activities and their entry into Target Solutions.***

According to department policy, all personnel are required to drill a minimum of two hours each day, and 50 percent of this training is designated to be manipulative (hands on) training. This training is supposed to be a combination of activities assigned by the Training Division and additional topics identified by the respective shift Captains and Battalion Chiefs. All shifts are required to also have a monthly safety meeting. CPSM learned that compliance with the daily training requirements was sporadic and the lack of enforcement perpetuated non-compliance.

CPSM was advised that in the past the department utilized line officers (Captains) to oversee the completion of training activities at the battalion and shift level. These were Captains who were assigned to a station in the battalion and they were charged with coordinating the training in the battalion on their respective shift. For reasons that were not clearly explained, this program was dropped several years ago. It is our belief that a return to this program would be beneficial to the department's training program. From a broader perspective, the expansion of program management duties to include field personnel can be an important part of career development and can be used as a component in the promotional assessment process.

> ***Recommendation: KCFD should designate a Fire Captain on each shift and each battalion to serve as the shift training coordinator to help facilitate in-service training activities, both for fire and EMS.***

In 2017, a new department-wide initiative was implemented in which all personnel were to complete an annual wildland fire refresher training program. This is hands-on practical training involving wildland tactics, evolutions, command strategies, and safety practices. CPSM believes that the annual wildfire refresher training is a ***Best Practice*** that should be continued.

KCFD officers typically provide feedback to personnel regarding their performance in training exercises, but there is no formal testing or skills assessments for fire training in the department. Training is a vital activity in the fire service and the ability to incorporate a formal testing process as part of the learning effort is essential. EMS skills assessments, both practical and written, are regularly incorporated into EMS training. Traditionally, fire departments are reluctant to incorporate skills testing into their fire training activities.

Recommendation: The KCFD should institute written and practical skills testing and proficiency evaluations as part of the department's comprehensive fire training program.

The capability to monitor and record training test scores is beneficial from an overall proficiency standpoint. In addition, training scores should be incorporated into the annual performance appraisal process for both the employee, his or her supervisor, and the training staff. In addition, the concept of adding a testing process to each training evolution adds to the importance and seriousness with which these activities are carried out.

The KCFD utilizes a formal ***Task Book*** process to provide training guidance and position orientation. Task books are in place for Firefighter, Engineer, Captain, and Battalion Chief. It was surprising to note that the completion of the designated task book is not a prerequisite for promotion. In addition, specific training, including Incident Command certifications, wildland firefighting positional qualifications, and college-level education were not required for promotion to Captain and Battalion Chief. Most positions merely require time-in-grade qualifications and generalized positional competencies.

Recommendation: The KCFD should revise its current promotional requirements for Fire Engineer, Captain, and Battalion Chief and consider the inclusion of specific training requirements, certifications, and college-level education as prerequisites for these positions.

Kern County operates under a civil service system in which changes in the promotional processes must be reviewed and approved. CPSM believes that a directed effort is needed to strengthen and improve the qualifications required for key technical and supervisory positions. By requiring necessary and recognized training certifications, formal education, and objective skills assessments, the quality of the promotional process will be improved and will become more reflective of those promotional practices and prerequisites that are being utilized in today's fire and EMS delivery systems.

The current memorandum of understanding (MOU) between Kern County and the firefighters' union contains two financial incentives related to education and employee wellness and fitness. The first is contained in Article XXI, *Educational Incentive Pay*, which provides a 12 percent educational incentive for employees who possess a Fire Science Certificate. The second provision provides a *Wellness and Physical Fitness* stipend (Article XXIII), of between 2 percent and 4 percent depending on scoring on an annual fitness test.

CPSM has concerns about the true benefit of continuing to award an educational incentive based on a generic fire science certificate with little input regarding its components and applicability to Kern County. The estimated annual cost of the educational incentive is approximately $4.2 million. We believe that the county would be better served in the long term by eliminating this educational incentive and instead making the attainment of certain educational levels either a prerequisite for promotion, or at a minimum, allow for additional points in the promotional process.

Recommendation: Kern County should negotiate the elimination of the educational incentive pay provision (Article XXI) and instead specify education requirements as a component of the promotional process.

Firefighting is an extremely demanding endeavor that requires those who undertake it to be physically fit. Nearly 50 percent of firefighter fatalities annually are the result of cardiovascular-related events. Wellness and fitness training should be an every-day activity for firefighters. As a

condition of employment, all firefighters should maintain a high level of physical fitness and endurance to perform their job safely and effectively. CPSM believes that this should not be an option; all employees should be tested annually in order to meet a minimum fitness requirement necessary to carry out their duties.

NPFA Standard 1583, *Standard for Health-Related Fitness Programs for Fire Department Members*, is a document intended to provide minimum recommended standards to enable firefighters to do their job and reduce injury and death. The standard's scope states it "establishes the minimum requirements for the development, implementation, and management of a health-related fitness program (HRFP) for members of the fire department involved in emergency operations." The standard includes chapters that detail a fitness assessment, along with exercise and fitness programs, and it references several other companion standards such as NFPA standards 1500[42] and 1582.[43] The annual costs for the fitness incentive are estimated to be $1.6 million per year. CPSM believes that employee fitness is best identified as a condition of employment for all emergency response personnel. Achieving the required level of fitness should not be optional, nor should a pay incentive be provided for meeting minimum fitness requirements.

Recommendation: Kern County should negotiate to eliminate the Flat Rate Special Allowance (of 2 percent to 4 percent) included in Article XXIII, Section-D, and establish the maintenance of certain levels of physical fitness as a requirement for maintaining employment.

EMERGENCY MANAGEMENT

Emergency management is the discipline and profession of applying science, technology, planning, and management to deal with extreme events that can injure or kill large numbers of people, do extensive damage to property, and disrupt community life. When such events do occur and cause extensive harm, they are called disasters.[44]

Kern County is responsible for providing emergency management services for the municipalities in Kern County along with the unincorporated areas of the county. Kern County has a total area of over 8,100 square miles and a current population of nearly 900,000. The county occupies the southern portion of the Central Valley of California, approximately 110 miles northwest of Los Angeles.

Kern County Office of Emergency Services

The Kern County Fire Department is responsible for the coordination of emergency management services for Kern County. Its Office of Emergency Services (OES) is supervised by the Fire Chief and operates under the direction of an Emergency Services Manager and three full time staff positions. The current Emergency Services Manager is a Certified Emergency Manager (CEM) and appears extremely organized in this effort. The Emergency Services Manager is responsible for maintaining the various planning documents and operational guides and keeping them up to date. She coordinates the various emergency management drills and exercises in the County,

[42] NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*.
[43] NFPA 1582, *Standard on Comprehensive Occupational Medical Program for Fire Departments*.
[44] *Emergency Management: Principles and Practice for Local Government*. Eds. Thomas E. Drabek, Gerard J. Hoetmer. International City Management Association, 1991. p. xvii

the training of the EOC staff, support agencies, VOAD and volunteer groups and serves as the liaison to the California Office of Emergency Services (Cal OES).

Emergency Management Plan

The Kern County Emergency Operations Plan (EOP) is a usable and thorough document that was last updated and distributed in August 2008. The County is currently pursuing funding to update the 2008 EOP. The plan is designed in a modular format that includes a Basic Plan, General Procedures, Functional Annexes and Contingency Plans. The plan provides for the integration and coordination of planning efforts of the County/Operational Area (OA) with those of its cities, special districts and the state region. The plan defines the various roles and authorities of the key decision-making groups including the Emergency Council. The Emergency Council is composed of the County's Principal Executive Officers, who during a locally declared emergency becomes the Kern County Emergency Management Group (EMG).

The EOP and the guiding structure of California law, through its Standardized Emergency Management System (SEMS), delegates to local government the authority and responsibility to manage and coordinate the overall response and recovery activities within its jurisdiction. This includes the restoration of services and the safety of people and properties impacted by the event. County government is responsible for the broader duties of the operational area in supporting local government by providing resources, and providing linkages to regional and state agencies.

The KERN County EOP utilizes the Incident Command System, which is an integral part of the National Incident Management System. The plan includes clearly defined and assigned responsibilities for policy, coordination, and operational groups, as well as the detailed tasks and responsibilities for the individual departments and agencies involved. Operationally the plan is based upon the concept that the emergency functions of the plan align closely with the normal day-to-day responsibilities of the agency or department assigned those duties. CPSM considers the Kern County approach towards emergency management as being very effective and a ***Best Practice***.

The county has developed a Continuity of Government (COG) plan for the county as a whole. The purpose of continuity of government planning is to ensure that essential services are provided in the wake of catastrophic or disruptive events. Continuity of operations planning is the process by which government formally reviews and makes contingency plans in the event that government can no longer operate under normal conditions. The continuity plan looks at the potential inability of a local government to utilize key public buildings, including fire stations or police stations, the county administrative building, or other key structures. The planning process identifies alternative sites that could be utilized if these facilities are no longer functional. COG also looks at contingencies if current service levels must be curtailed due to wide-scale employee absences. Agencies are asked to formulate plans if their workforce is reduced by various increments (15 percent, 25 percent, 50 percent, etc.). This exercise requires each department to define its plan for which of its services will continue and which other services could be modified or discontinued.

Emergency Operations Center

The county has a dedicated Emergency Operations Center (EOC) at 2601 Panorama Dr., Building B. An alternative EOC is designated at an off-site location; it is fully functional and can be brought on-line if needed. The EOC is spacious and has designated locations for specific emergency functions and support groups. The EOC has auxiliary power from an on-site generator that enables the center to be operational during power outages. The EOC is

designed for face-to-face coordination among the staff who must make emergency decisions and provide a central location from which:

- Centralized strategic management is performed.
- Multiple Incidents with individual Incident Command Posts (ICPs) are managed;
- Support and resources are provided to field response units.
- Public information and dissemination on incident updates are provided

FIGURE 8-1: Emergency Operations Center (EOC)

Hazard Mitigation Plan

Hazard mitigation is the effort to reduce loss of life and property by lessening the impact of disasters. Federal, state, and local governments engage in hazard mitigation planning to identify natural hazards that impact them, identify strategies and activities to reduce any losses from those hazards, and establish a coordinated approach to implementing the plan, taking advantage of a wide range of resources. Mitigation plans are key to federal, state, and local governments' efforts to break the cycle of disaster damage, reconstruction, and repeated damage.

Developing hazard mitigation plans enables federal, state, and local governments to:

- Increase education and awareness around threats, hazards, and vulnerabilities.
- Build partnerships for risk reduction involving government, organizations, businesses, and the public.
- Identify long-term strategies for risk reduction that are agreed upon by stakeholders and the public.
- Identify cost-effective mitigation actions, focusing resources on the greatest risks and vulnerabilities.
- Align risk reduction with other community objectives.
- Communicate priorities to potential sources of funding.

Kern County has undertaken the necessary planning efforts to ensure that hazard mitigation strategies and investments meet the needs of the county. CPSM recognizes the emergency preparedness and hazard mitigation strategies of Kern County as a ***Best Practice***. The level of effort we observed and the degree of coordination is truly commendable.

EMERGENCY COMMUNICATIONS CENTER (ECC)

Kern County's 9-1-1 Dispatch/Emergency Communications Center (ECC) is operated under the supervision of the KCFD but is a joint endeavor between the county and the City of Bakersfield. The city pays for a share of the center's operating expenses based upon the quarterly call distribution. Service is also provided, under contract, to California City. In 2016 the center handled approximately 106,000 emergency incidents.

The ECC is a state-of-the-art facility that has been operational at its current location for approximately three years. It was designed and built with seismic protection and is equipped with a generator for a back-up power supply. It also has UPS (uninterrupted power supply) batteries at each console to provide constant power until the generator powers up. Kern County's Emergency Operations Center (EOC) is also located in the same building as the ECC. If the ECC became inoperable, a back-up location in Classroom C at the fire training center has been identified.

FIGURE 8-2: Emergency Communications Center (ECC)

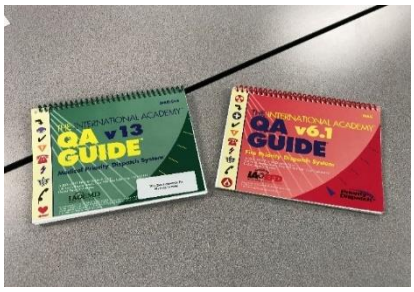
The ECC is a secondary public safety answering point (PSAP) for Kern County, the City of Bakersfield, and California City. Calls are also transferred to the center from 17 other public safety agencies (primarily cities). In addition, the center provides dispatching services for several prison facilities in the county.

The center's computer-aided dispatch (CAD) system was brought on-line in March 2015. It is the New World Aegis, which has subsequently been purchased by Tyler Technologies. The center uses a Zoll Records Management System and its consoles are Motorola CentraCom Gold units. The phones are part of a VoIP system (Voice over Internet Protocol). All communications into and out of the ECC are recorded utilizing a Verint System. The CAD and records management

system clocks are synchronized. The center has the capability for both Phase I and Phase II cell phone locating capabilities. Addresses are always verified twice.

IAED EMD and EFD Dispatch Protocol Manuals

The ECC has achieved accreditation from the International Academy of Emergency Dispatchers (IAED), the largest public safety communications organization. It utilizes the IAED emergency medical dispatch (EMD) and emergency fire dispatch (EFD) protocols as the foundation for center operations. Motorola radios are utilized throughout the system for communications. All radios are reported to be P25 compliant. Bendix King Radios are utilized for wildland incidents. Although the center and most of its technology are state-of-the-art, there are some challenges. The fire department's station alerting system is more than 20 years old and based on outdated technology.



The ECC is typically staffed 24/7 with five call takers/dispatchers and one supervisor on duty. However, recent staffing shortages have led to a reduction in the recommended staffing to three dispatchers and one supervisor. The center does utilize a "power shift" to staff up during the busiest times of the day between 10:00 a.m. and 10:00 p.m.

There is normally one primary dispatcher assigned for Kern County Fire and one for the City of Bakersfield Fire. In addition to its complement of full-time personnel the center also employs two additional seasonal dispatchers to provide increased staffing during wildfire season. Two newly hired dispatchers were going through the training process at the time of our site visit.

The ECC has adopted a performance measure that calls for answering an incoming 9-1-1 call in 15 seconds or less, 90 percent of the time. However, the center does not produce regular reporting regarding dispatch processing time.

> ***Recommendation: The KCFD Emergency Communications Center (911) should take steps to monitor and report dispatch call processing times.***

When a 9-1-1 call is received for a serious medical emergency or similar type of incident, the initial call taker remains on the line to provide emergency medical dispatch (EMD) instructions while the incident is dispatched and units begin their response. The ECC provides EMD for all incidents in Kern County and the cities it serves. Hall Ambulance is the primary emergency medical services transport provider (Liberty Ambulance, Care Ambulance and Delano Ambulance also provide service to designated areas of the county) for most of the county and all of Bakersfield. Hall provides dispatch services for the other ambulances so all EMS calls are transferred to Hall for dispatch of the appropriate ambulance. The ECC transfers an average of 7,400 calls to Hall each month.

On the most serious medical calls ("C" and "D" type emergencies) the KCFD is also dispatched. For these types of emergencies, the department responds "hot" (with lights and sirens). The fire department is also dispatched on some less serious emergencies depending upon the expected EMS ambulance response time. These types of responses are typically in a "cold" response mode (no lights or sirens).

CPSM has identified several areas that require additional review regarding the current dispatching procedures and practices related to EMS call handling. The first involves the transferring of calls from the ECC to Hall Ambulance. In this process the ECC will transfer the call

to the Hall dispatch center, but receives no acknowledgement in return that the call has been received and units are responding. This requires the call taker or dispatcher to make another call to Hall to make sure the incident that was transferred was received. In addition, the current process requires an emergency caller to be potentially transferred twice – primary PSAP to KCFD and then KCFD to Hall Ambulance. Each transfer adds seconds to the time it takes to initiate a response and increases the risk of the call getting dropped in the transfer. In addition, there is frustration on the part of the caller in having to interact with multiple agencies before getting their situation addressed.

Recommendation: Kern County should strengthen the interface with Hall Ambulance so that the department can receive/observe the status of Hall units that are assigned to incidents.

All the ambulance providers in Kern County have access to the KCFD radio channels as well as the county EMS channel. However, CPSM learned that KCFD units and the responding ambulance units rarely communicate directly with each other while responding to incidents. This includes vital communications involving patient locations, patient status, needed equipment, or the estimated time of arrival. In addition, ambulance arrival information, unit identification, or the recording of voice communications are not captured by Kern County. As a result, any type of reliable statistics on EMS arrival times, actions taken, or time on scene are not readily available. If the fire officer on the scene relays ambulance arrival information to the ECC, it is not entered as a normal time entry; rather, it is entered as a part of the narrative. As such it is not a searchable field of data that can be analyzed. The inability to capture or monitor these data creates a significant gap in the ability to analyze the overall effectiveness of the EMS response system and how well it is achieving response time standards.

Recommendation: The KCFD and the ambulance providers should improve unit-to-unit communications and data transmissions in managing EMS response activities.

The ECC employs a full-time Quality Assurance (QA) person who reviews 3 percent of each dispatcher's calls. There is also a QA committee comprised of various stakeholders that meets quarterly to review the QA reports and address any issues that have developed. This committee is comprised of the ECC director; one paramedic from KCFD; one paramedic from Bakersfield; representatives from the Hall, Care, Liberty, and Delano ambulance services; and a representative from the EMS dispatch center. CPSM considers these quality assurance efforts to be Best Practices that should be continued.

SECTION 9. CONSIDERATIONS FOR COST REDUCTIONS AND IMPROVED SOVANCY

As part of this Operational and Administrative Analysis, CPSM was asked to provide recommendations that may be considered for cost reductions and improved solvency in the operation of the Kern County Fire Department. Many of these proposals are included in the Operational and Administrative Analysis that proceeds this section. This section is intended to summarize these findings and highlight them in order to assist in this review. The order in which these recommendations are presented is not intended to prioritize the order of importance of any proposal or give any indication regarding an implementation strategy. The cost-saving estimates and revenue projections given for these measures are estimates that CPSM has developed in our analysis and in discussions with Kern County staff. The actual financial impacts will likely differ depending upon the level to which these proposals are implemented, their timing, or any refinements that may be considered. The estimated financial impacts are provided in 2017 dollars. It is anticipated that the implementation of these proposals can be carried out over a multiyear timeframe and will be subject to extensive public debate, possible negotiations with the firefighters' union, and ultimately driven by administrative and political oversight.

Ten recommendations are listed below. These recommendations attempt to provide options to consider for cost reductions and revenue enhancements. In addition, we have included recommendations for modifying the current contract formula for municipal service contracts and the adoption of a fire impact fee.

COST REDUCTIONS AND IMPROVED SOLVENCY MEASURES

1. **Renegotiate a reduction or elimination of Educational Incentive Pay:**
   CPSM believes that there is limited benefit in terms of service delivery and employee performance that results from the distribution of these funds. The qualifications for eligibility have little if any impact on employee performance.
   Estimated Savings: Up to $4.2 million annually.

2. **Renegotiate a reduction or elimination of Fitness Incentive Pay:**
   CPSM believes that employees working in a public safety environment should be required to maintain a level of fitness that is tested annually as a condition of employment. An additional incentive for maintaining a minimum fitness level is unwarranted.
   Estimated Savings: Up to $1.6 million annually

3. **Renegotiate the time-worked provision in determining overtime eligibility:**
   Federal Department of Labor requirements (FLSA) do not require that lost time occurring in the regular payroll cycle (sick leave, vacation, holiday, disability, etc.) be counted as time worked for the purpose of calculating overtime. Kern County has included this allowance as part of the current collective bargaining MOU; CPSM believes that this provision should be renegotiated.
   Estimated Savings: Up to $1.5 million annually

4. **Eliminate the standard biweekly income averaging process and move to payment for actual hours worked:**
   The current process being utilized in averaging the hours worked during the biweekly payroll cycle adversely affects overtime payments. If employees are paid for the actual hours worked in each biweekly payroll cycle, there will be a substantial annual savings in the overtime paid.
   Estimated Savings: Up to $250,000 annually

5. **Revise the pricing model for municipal service contracts:**
   The current methodology that uses a per-capita population ratio for establishing municipal service contract fees does not achieve 100 percent cost recovery. CPSM believes that the methodology used should be more reflective of the actual costs for providing these services.
   Estimated Savings: Up to $1.5 Million annually

6. **Move to full cash payment for holiday time:**
   The current policy allows the option of providing holiday time as either a cash payment or as time off. CPSM recommends that the county move to solely a cash payment method and eliminate the time-off option. This will result in a reduction of annual overtime expenditures.
   Estimated Savings: In excess of $200,000 annually

7. **Move to a fee basis for ARFF Services at county airports:**
   KCFD currently does not charge any fees or receive reimbursement for ARFF services at Meadows Field and Kern County Airport. These specialized services are required under FAA regulations and typically are funded by airline service fees. CPSM believes that services contracts with the individual airports should be established to offset these costs.
   Estimated Savings: Up to $2 million annually

8. **Revisit fire apparatus acquisition practices:**
   KCFD has maintained a practice of purchasing top-of-the-line, custom fire apparatus for both structural and wildland fire fighting. As the county moves towards replacing its fleet, CPSM recommends that KCFD consider the use of less expensive fire pumpers and Type-3 and Type-6 Wildland units.
   Estimated Savings: From $15,000 to $30,000 per unit purchased

9. **Reduce the number of field employees allowed off for vacation each shift:**
   Under KCFD's current policy upwards of 23 employees are allowed off each day for vacation leave. CPSM believes that this number can be reduced significantly and still provide ample time for employees to take their allotted vacation time. By reducing the number allowed off for vacation, more people would be available to cover daily vacancies and thus reduce overtime expenditures.
   Estimated Savings: Up to $1.5 million annually

10. **Consider the adoption of a fire impact fee:**
    Impact fees are a viable method for providing funding to maintain the county's capacity to provide emergency services in a growing

environment. The development of a fire impact fee requires a detailed analysis to ensure that the level of the impact fee is appropriately set to reflect the current value of the infrastructure and the ability to maintain this level of investment as the community grows. Many fire impact fees have been set at in the $500 to $700 range for a new single family home. A separate rate structure for business and industry is typically based on square footage and proportionately based on service demand. The potential revenues from a fire impact fee in Kern County could be significant.

Estimated Revenue: Estimated at $500 to $700 per new single family residence

SECTION 10. DATA ANALYSIS

This data analysis was prepared as a key component of the study of the Kern County Fire Department (KCFD), which was conducted by the Center for Public Safety Management, LLC. This analysis examines all calls for service between July 1, 2016, and June 30, 2017, as recorded in the Kern County 911 Dispatch Center's computer-aided dispatch (CAD) system and the KCFD's National Fire Incident Reporting System (NFIRS).

This analysis is made up of six parts. The first part focuses on call types and dispatches. The second part explores time spent and workload of individual units. The third part presents an analysis of the busiest hours in the year studied. The fourth part provides a response time analysis of KCFD units. The fifth part analyzes calls where both KCFD and at least one other agency's unit responded. The sixth, and final, part takes a detailed look at wildland fire response.

During the year covered by this study, KCFD operated out of 47 full-time stations and one seasonal station utilizing 43 Type-2 engines, 13 Type-3 engines, 42 Type-6 engines, seven battalion chiefs, seven bulldozers, five water tenders, four aircraft rescue firefighting units, four ladders, three breathing support trucks, two helicopters, two urban search and rescue units, and one hazmat unit. The department also operated 35 reserve engines, 14 support vehicles (e.g., bulldozer transports and delivery trucks), and 39 administrative units. Wildland firefighting crews, including hand crews, strike teams, and task force crews, were also used.

During the year studied, the Kern County Fire Department responded to 49,766 calls, of which 53 percent were EMS calls. The total combined workload (deployed time) for all KCFD units was 71,527 hours. The average dispatch time for the first arriving KCFD unit was 2.4 minutes for calls in the Bakersfield Joint Protection area and urban areas, 2.7 minutes for calls in rural areas, and 3.6 minutes for calls in remote areas. The average response time of the first arriving KCFD unit was 8.4 minutes for calls in the Bakersfield Joint Protection area, 8.3 minutes for calls in the urban areas, 10.8 minutes for calls in rural areas, and 21.0 minutes for calls in remote areas. The 90th percentile dispatch time was 3.8 minutes for calls in the Bakersfield Joint Protection area, 4.0 minutes for calls in urban areas, 4.5 minutes for calls in rural areas, and 6.2 minutes for calls in remote areas. The 90th percentile response time was 11.4 minutes for calls in the Bakersfield Joint Protection area, 11.5 minutes for calls in urban areas, 16.0 minutes for calls in rural areas, and 30.1 minutes for calls in remote areas.

METHODOLOGY

In this report, CPSM analyzes calls and runs. A call is an emergency service request or incident. A run is a dispatch of a unit. Thus, a call might include multiple runs.

We received CAD data and NFIRS data for the Kern County Fire Department. We first matched the NFIRS and CAD data based on incident numbers provided. Then, we classified the calls in a series of steps. We first used NFIRS incident type to identify canceled calls. We used the NFIRS mutual aid designation and the call location to identify mutual aid calls.

NFIRS incident types were used to classify the remaining calls as EMS, motor vehicle accident (MVA), or one of six fire call types. Calls classified as EMS were then assigned to detailed call types based on the Clawson codes contained within the Emergency Medical descriptions in CAD. For calls without a NFIRS incident type or Clawson code, a call type was assigned using the CAD incident type description

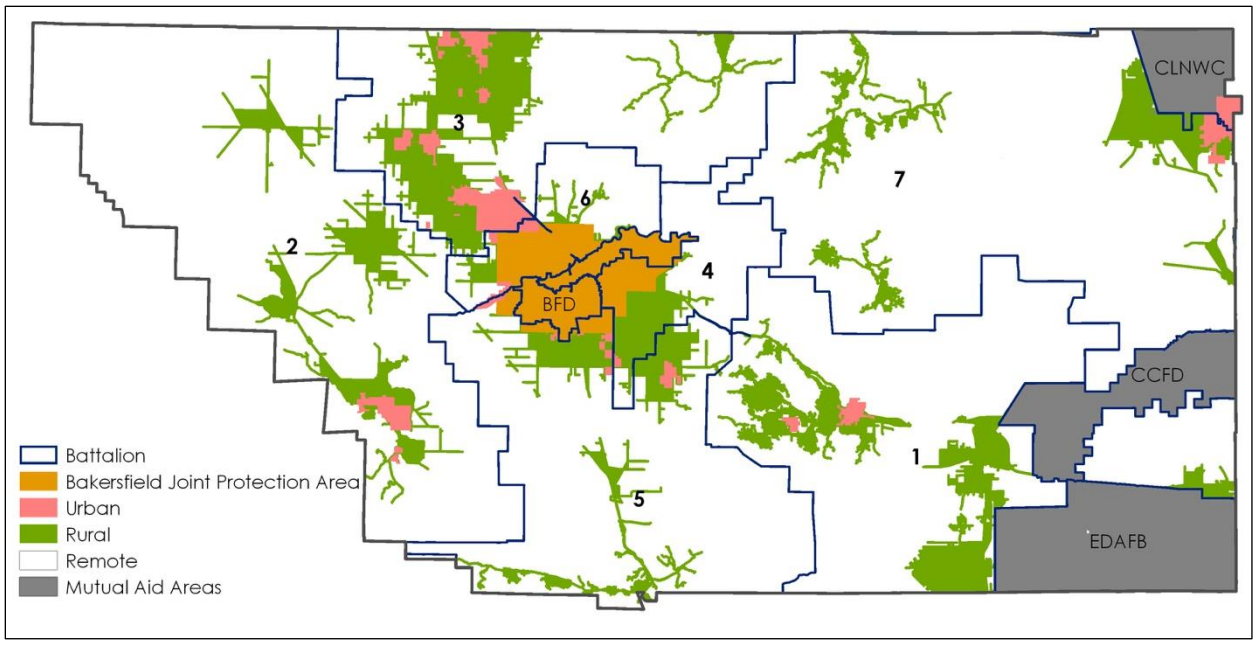
We removed 184 test calls, 39 calls with no responding KCFD units, 4 notification-only calls, and 2 follow-up investigations (which affects administrative units only). We also removed units with only dispatch and clear times, which resulted in the removal of 444 canceled calls, 22 mutual aid calls, 20 EMS calls, and 21 fire calls.

In addition, 39 incidents to which the command or administrative units were the sole responders are not included in the analysis sections of the report. However, the workload of administrative units is documented in Attachment III.

We broke the county down into smaller areas as shown in Figure 10-1 for portions of the analysis. The areas are: the Bakersfield Joint Protection Area (JPA), Urban Areas, Rural Areas, and Remote Areas. The JPA is defined by an agreement between KCFD and BFD and covers all of BFD's jurisdiction, the airport, and all or part of the first due areas for KCFD stations 41, 42, 45, 51, 52, 53, 61, 63, 65, and 67. The Urban Area includes the portions of Bakersfield that do not fall within the JPA and the cities of Arvin, Delano, Maricopa, McFarland, Ridgecrest, Shafter, Taft, and Tehachapi. The Rural Area includes all areas outside of city limits but within eight miles of a KCFD station as measured along the roads. Remote Areas are areas outside of city limits that are more than eight miles from a KCFD station as measured along the roads.[45]

In this report, canceled and mutual aid calls are included in all analyses other than the response time analyses.

FIGURE 10-1: Map of Analysis Subareas



[45] Rural and remote area definitions are based on NFPA definitions. NFPA uses the U.S. Census Bureau's definition of rural, which is an area with fewer than 500 people per square mile, and defines remote areas as areas with a travel distance of at least eight miles from a fire station. National Fire Protection Association, NFPA Glossary of Terms 2016 Edition. Most, but not all unincorporated areas of Kern County have fewer than 500 people per square mile.

AGGREGATE CALL TOTALS AND DISPATCHES

During the year studied, KCFD responded to 49,766 calls. Of these, 973 were structure fire calls and 2,112 were outside fire calls within KCFD's jurisdiction. Each dispatched unit is a separate "run." As multiple units are dispatched to a call, there are more runs than calls. The department's total runs and workload are reported in the second part of this analysis.

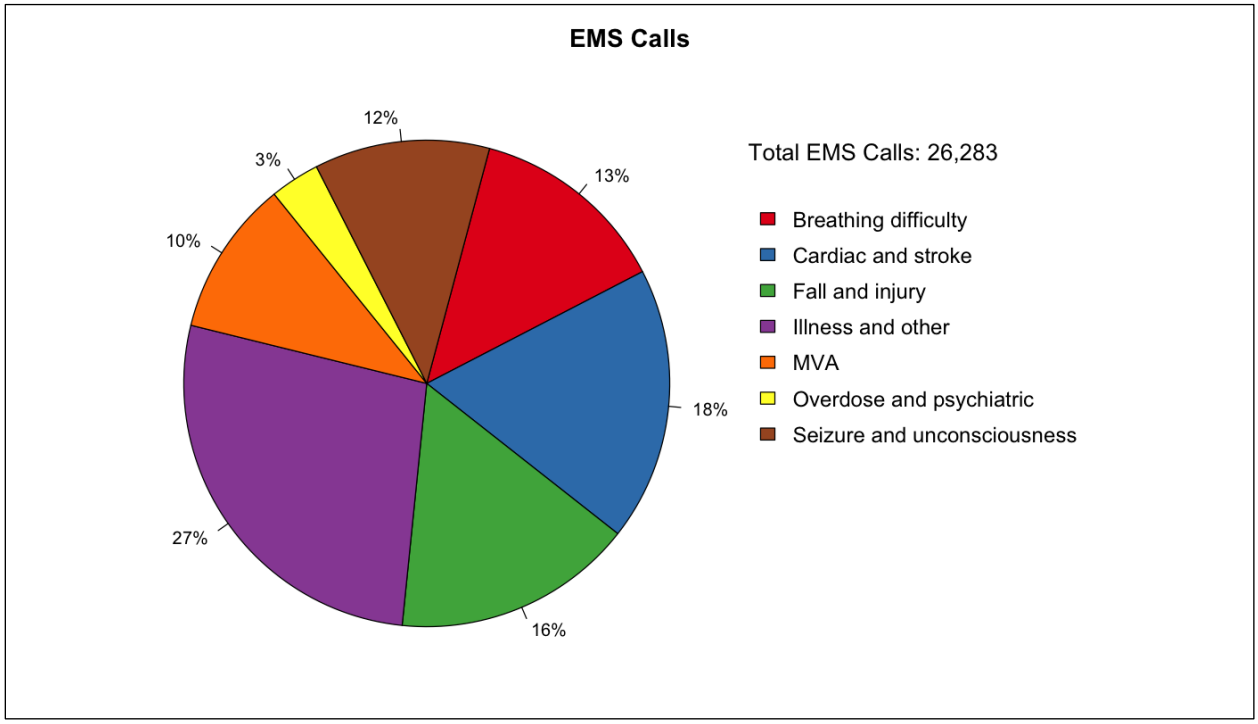
Calls by Type

Table 10-1 and Figure 10-2 show the number of calls by call type, average calls per day, and the percentage of calls that fall into each call type category. Table 10-2 shows the number of calls by call type for the four analysis areas.

TABLE 10-1: Call Types

Call Type	Number of Calls	Calls per Day	Call Percentage
Breathing difficulty	3,478	9.5	7.0
Cardiac and stroke	4,783	13.1	9.6
Fall and injury	4,210	11.5	8.5
Illness and other	7,157	19.6	14.4
MVA	2,722	7.5	5.5
Overdose and psychiatric	869	2.4	1.7
Seizure and unconsciousness	3,067	8.4	6.2
EMS Total	**26,286**	**72.0**	**52.8**
False alarm	1,995	5.5	4.0
Good intent	4,853	13.3	9.8
Hazard	1,646	4.5	3.3
Outside fire	2,112	5.8	4.2
Public service	3,195	8.8	6.4
Structure fire	973	2.7	2.0
Fire Total	**14,774**	**40.5**	**29.7**
Canceled	7,392	20.3	14.9
Mutual aid	1,314	3.6	2.6
Total	**49,766**	**136.3**	**100.0**

FIGURE 10-2: EMS and Fire Calls by Type



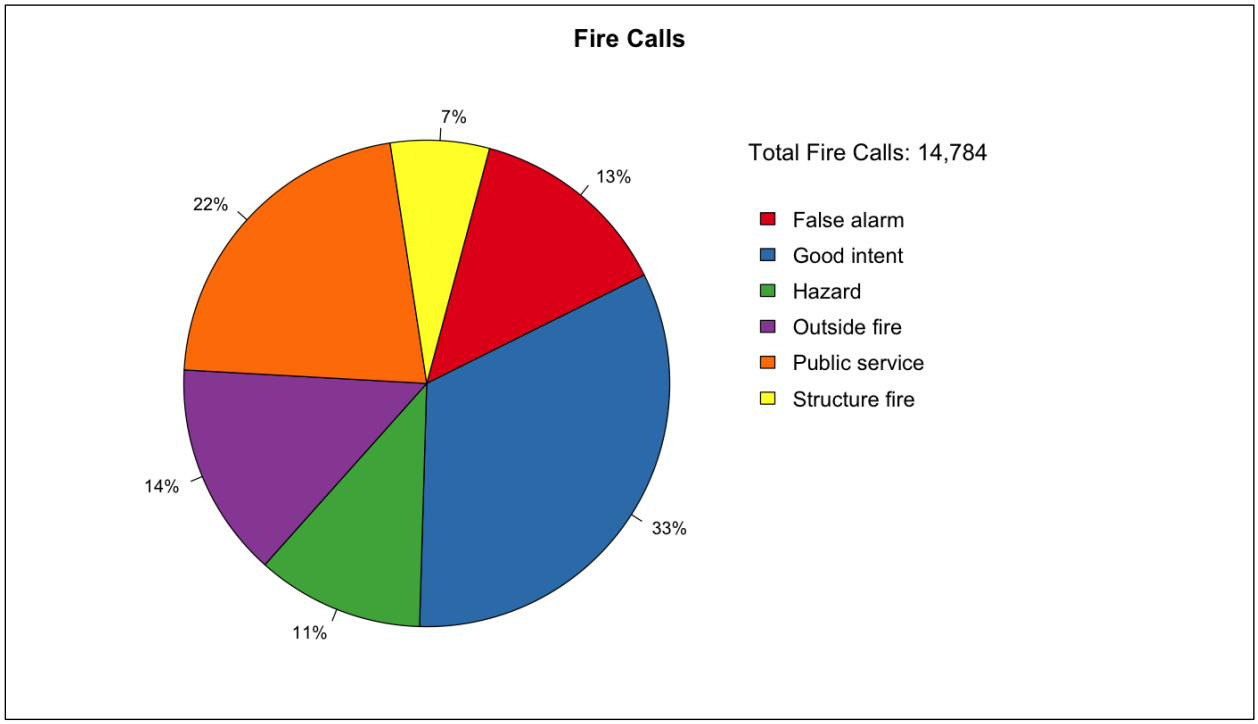


TABLE 10-2: Call Types by Analysis Subarea

Analysis Subarea	EMS Calls	Fire Calls	Other Calls	Total
Bakersfield JPA	10,623	6,453	4,809	21,885
Urban	6,322	3,086	1,438	10,846
Rural	8,304	4,555	1,833	14,692
Remote	1,037	680	451	2,168
Out of county	—	—	175	175
Total	**26,286**	**14,774**	**8,706**	**49,766**

Observations:

Overall

- The department received an average of 136.3 calls, including 20.3 canceled and 3.6 mutual aid calls, per day.
- EMS calls for the year totaled 26,286 (53 percent of all calls), an average of 72.0 per day.
- Fire calls for the year totaled 14,774 (30 percent of all calls), an average of 40.5 per day.

EMS

- Illness and other calls were the largest category of EMS calls at 27 percent of EMS calls.
- Cardiac and stroke calls made up 18 percent of the EMS calls.
- Motor vehicle accidents made up 10 percent of the EMS calls.

Fires

- Structure and outside fires combined for a total of 3,085 calls during the year, an average of 8.5 calls per day.
- A total of 973 structure fire calls accounted for 7 percent of the fire calls.
- A total of 2,112 outside fire calls accounted for 14 percent of the fire calls.
- Good intent calls were the largest fire call category, with 33 percent of the fire calls.
- False alarm calls made up 14 percent of the fire calls.

Calls by Type and Duration

Table 10-3 shows the duration of calls by type using four duration categories: less than 30 minutes, 30 minutes to one hour, one to two hours, and more than two hours.

TABLE 10-3: Calls by Type and Duration

Call Type	Less than 30 Minutes	30 Minutes to One Hour	One to Two Hours	More than Two Hours	Total
Breathing difficulty	3,145	293	39	1	3,478
Cardiac and stroke	3,872	679	206	26	4,783
Fall and injury	3,513	602	79	16	4,210
Illness and other	6,115	876	141	25	7,157
MVA	1,625	799	241	57	2,722
Overdose and psychiatric	710	144	15	0	869
Seizure and unconsciousness	2,630	363	68	6	3,067
EMS Total	**21,610**	**3,756**	**789**	**131**	**26,286**
False alarm	1,776	192	25	2	1,995
Good intent	4,621	182	43	7	4,853
Hazard	1,112	322	142	70	1,646
Outside fire	957	598	361	196	2,112
Public service	2,797	302	73	23	3,195
Structure fire	436	172	175	190	973
Fire Total	**11,699**	**1,768**	**819**	**488**	**14,774**
Canceled	7,156	199	30	7	7,392
Mutual aid	914	211	103	86	1,314
Total	**41,379**	**5,934**	**1,741**	**712**	**49,766**

Observations:

EMS

- A total of 25,366 EMS category calls (97 percent) lasted less than one hour, 789 EMS category calls (3 percent) lasted between one and two hours, and 131 EMS category calls (1 percent) lasted more than two hours.
- On average, there were 2.5 EMS category calls per day that lasted more than one hour.
- A total of 4,551 cardiac and stroke calls (95 percent) lasted less than one hour, and 232 cardiac and stroke calls (5 percent) lasted more than an hour.
- A total of 2,424 motor vehicle accident calls (89 percent) lasted less than one hour, and 298 motor vehicle accident calls (11 percent) lasted more than an hour.

Fire

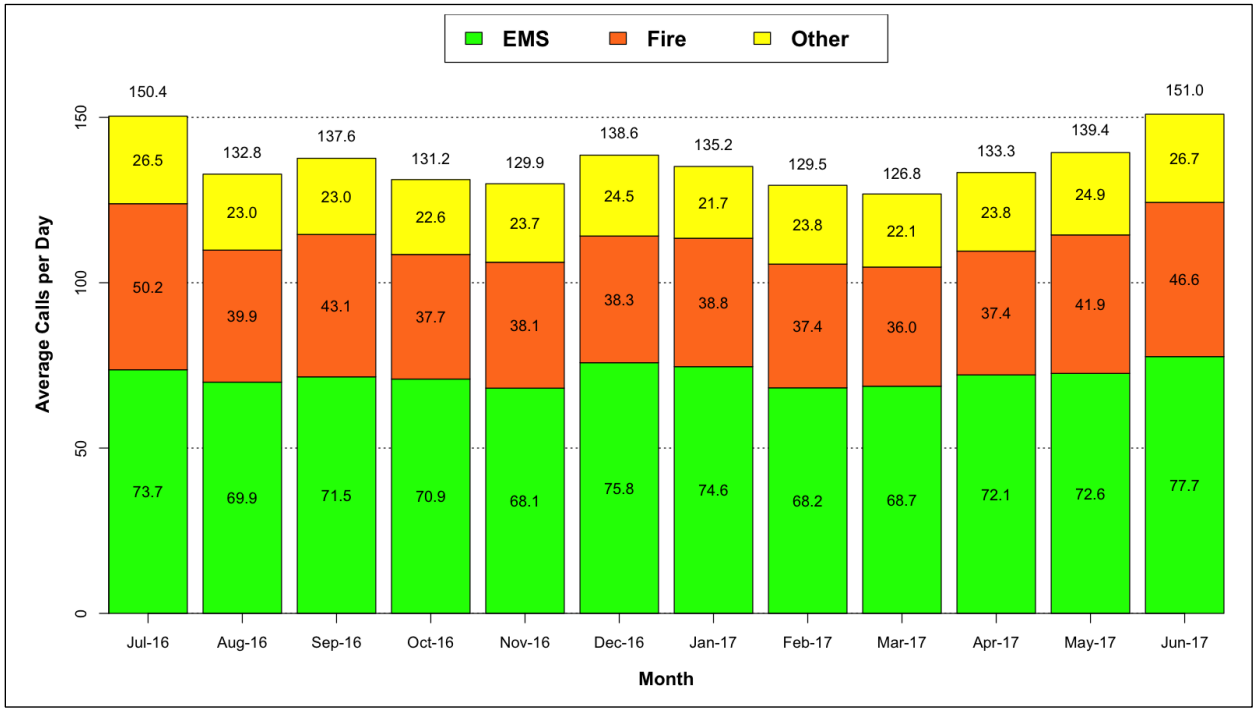
- A total of 13,467 fire category calls (91 percent) lasted less than one hour, 819 fire category calls (6 percent) lasted between one and two hours, and 488 fire category calls (3 percent) lasted more than two hours.
- On average, there were 3.6 fire category calls per day that lasted more than one hour.

- A total of 608 structure fires (62 percent) lasted less than one hour, 175 structure fires (18 percent) lasted between one and two hours, and 190 structure fires (20 percent) lasted more than two hours.
- A total of 1,555 outside fires (74 percent) lasted less than one hour, 361 outside fires (17 percent) lasted between one and two hours, and 196 outside fires (9 percent) lasted more than two hours.
- A total of 1,968 false alarms (99 percent) lasted less than one hour, and 27 false alarms (1 percent) lasted more than an hour.

Average Calls per Day and per Hour

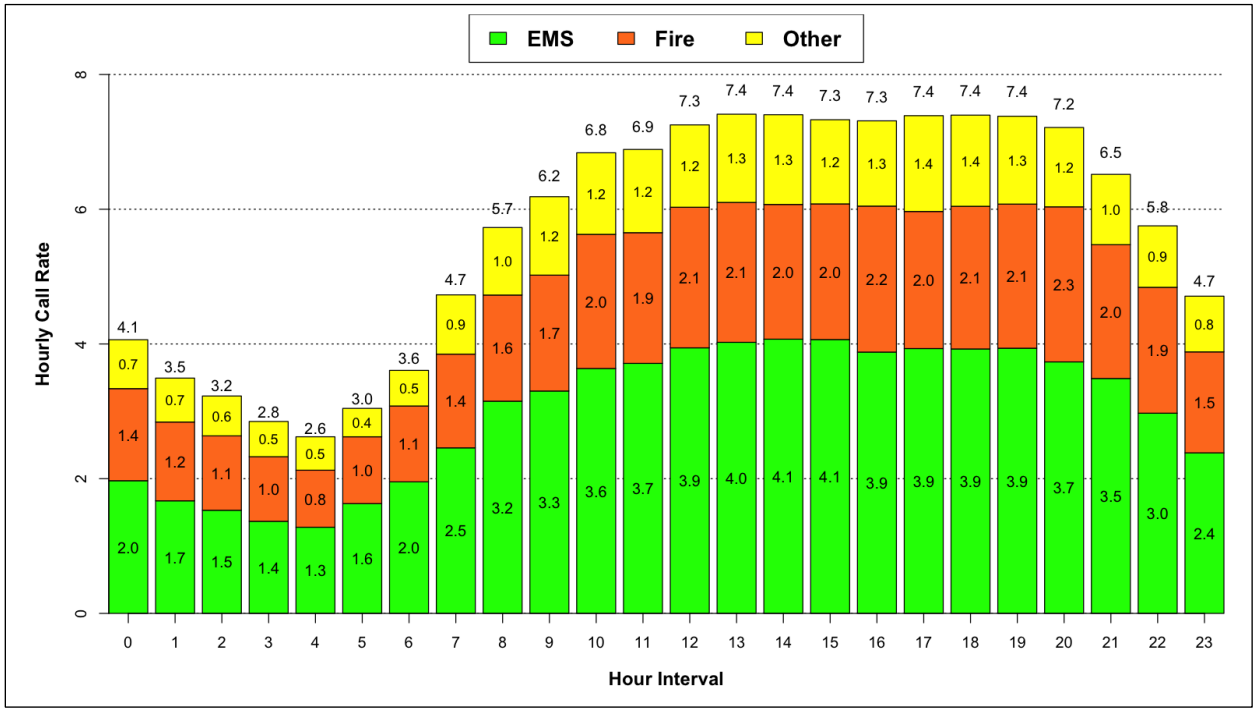
Figure 10-3 shows the monthly variation in the average daily number of calls handled by the KCFD during the year studied. Similarly, Figure 10-4 illustrates the average number of calls received each hour of the day over the course of the year.

FIGURE 10-3: Average Calls per Day, by Month



Note: The total of each call type may not add up to the total shown for the month due to rounding.

FIGURE 10-4: Calls by Hour of Day



Note: The total of each call type may not add up to the total shown for the month due to rounding.

Observations:

Average Calls per Day

- Average calls per day ranged from a low of 126.8 calls per day in March 2017 to a high of 151.0 calls per day in June 2017. The highest monthly average was 19 percent greater than the lowest monthly average.
- Average EMS calls per day ranged from a low of 68.1 calls per day in November 2016 to a high of 77.7 calls per day in June 2017.
- Average fire calls per day ranged from a low of 36.0 calls per day in March 2017 to a high of 50.2 calls per day in July 2016.
- Average other calls per day ranged from a low of 21.7 calls per day in January 2017 to a high of 26.7 calls per day in June 2017.
- The highest number of calls received in a single day was 248, which occurred on July 4, 2016.

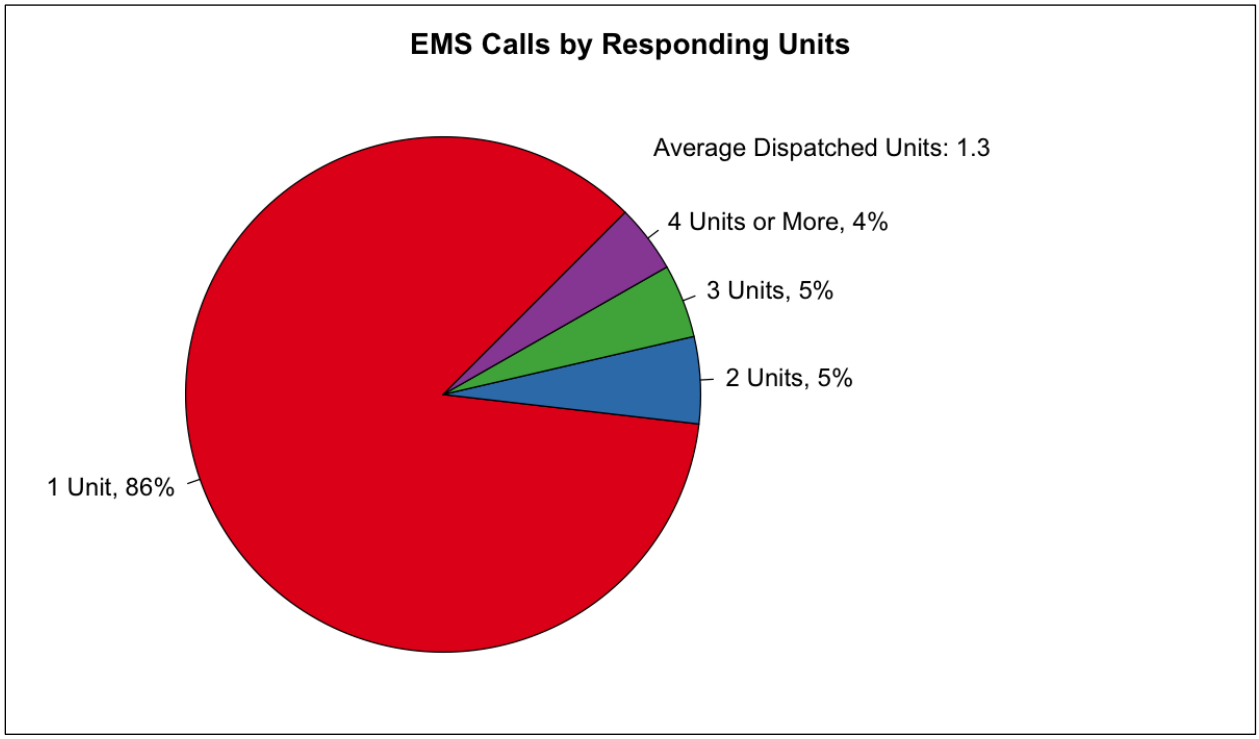
Average Calls per Hour

- Average hourly call rates ranged from 2.6 to 7.4 calls per hour.
- Call rates were highest between 1:00 p.m. and 8:00 p.m., averaging 7.3 to 7.4 calls per hour.
- Call rates were lowest between 4:00 a.m. and 5:00 a.m., averaging 2.6 calls per hour.

Units Dispatched to Calls

Figure 10-5 and Table 10-4 detail the number of KCFD units dispatched to calls overall and broken down by call type.

FIGURE 10-5: Number of Units Dispatched to Calls



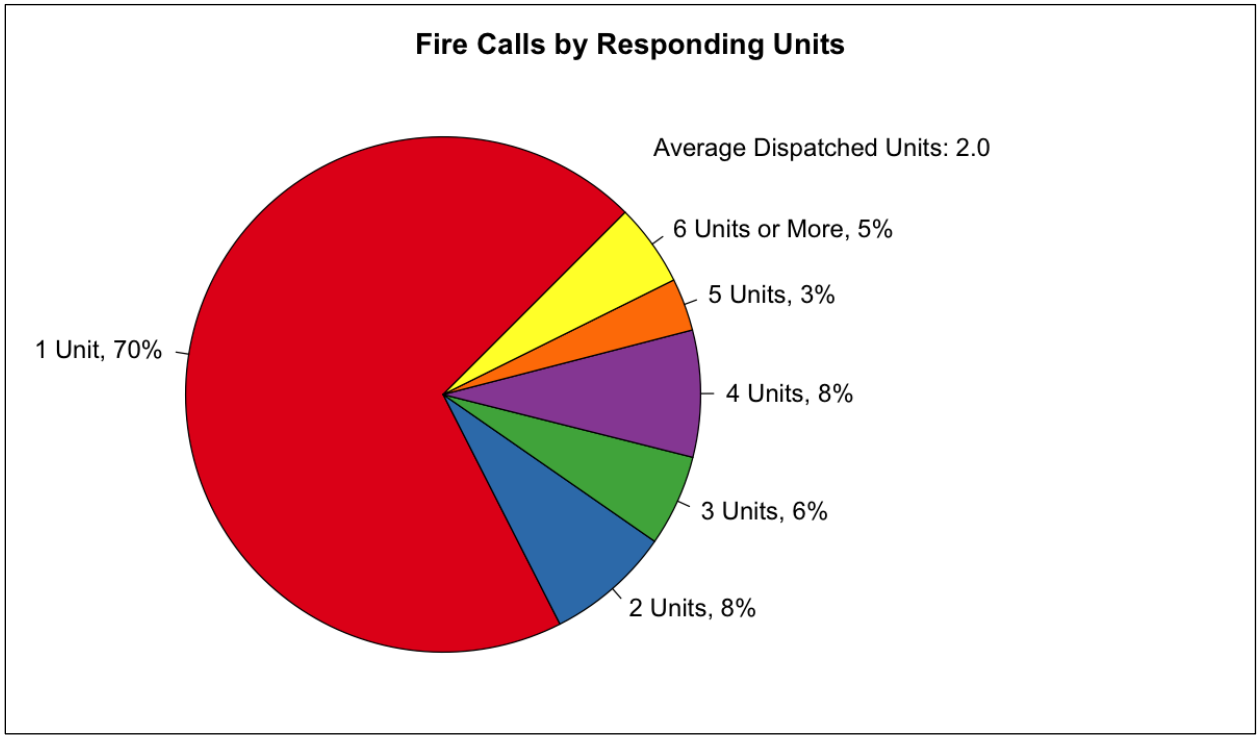


TABLE 10-4: Number of Units Dispatched to Calls by Call Type

Call Type	Number of Units					Total Calls
	One	Two	Three	Four	Five or More	
Breathing difficulty	3,331	142	4	0	1	3,478
Cardiac and stroke	4,524	242	13	2	2	4,783
Fall and injury	3,931	245	21	7	6	4,210
Illness and other	6,763	319	23	14	38	7,157
MVA	225	304	1,146	721	326	2,722
Overdose and psychiatric	830	35	4	0	0	869
Seizure and unconsciousness	2,916	145	4	2	0	3,067
EMS Total	**22,520**	**1,432**	**1,215**	**746**	**373**	**26,286**
False alarm	1,162	168	188	362	115	1,995
Good intent	4,094	287	262	132	78	4,853
Hazard	1,117	196	98	152	83	1,646
Outside fire	851	208	168	310	575	2,112
Public service	2,883	233	37	24	18	3,195
Structure fire	234	68	94	195	382	973
Fire Total	**10,341**	**1,160**	**847**	**1,175**	**1,251**	**14,774**
Canceled	5,917	675	362	264	174	7,392
Mutual aid	904	220	101	44	45	1,314
Total	**39,682**	**3,487**	**2,525**	**2,229**	**1,843**	**49,766**
Percentage	**79.7**	**7.0**	**5.1**	**4.5**	**3.7**	**100.0**

Observations:

Overall

- On average, 1.5 units were dispatched to all calls, and for 80 percent of calls only one unit was dispatched.
- Overall, five or more units were dispatched to 4 percent of calls.

EMS

- On average, 1.3 units were dispatched per EMS call.
- For EMS calls, one unit was dispatched 86 percent of the time; two units were dispatched 5 percent of the time; three units were dispatched 5 percent of the time; four units were dispatched 3 percent of the time; and five or more units were dispatched 1 percent of the time.

Fires

- On average, 2.0 units were dispatched per fire call.
- For fire calls, one unit was dispatched 70 percent of the time; two units were dispatched 8 percent of the time; three units were dispatched 6 percent of the time; four units were dispatched 8 percent of the time; and five or more units were dispatched 8 percent of the time.

- For structure fire calls, three units were dispatched 10 percent of the time; four units were dispatched 20 percent of the time; and five or more units were dispatched 39 percent of the time.
  - On average, 7 units were dispatched to calls that saw five or more units dispatched.
- For outside fire calls, three units were dispatched 8 percent of the time; four units were dispatched 15 percent of the time; and five or more units were dispatched 27 percent of the time.
  - On average, 8 units were dispatched to calls that saw five or more units dispatched.

WORKLOAD: CALLS AND TOTAL TIME SPENT

The workload of each unit is reported in two ways: deployed time and runs. A dispatch of a unit is defined as a run; thus, one call might include multiple runs, which results in a higher total number of runs than total number of calls. The deployed time of a run is from the time a unit is dispatched through the time the unit is cleared.

Outside fires includes wildland fires as well as other nonstructure fires such as in dumpsters and vehicles. Because some wildland fires result in multiday deployed times, in this section we separated outside fires into those lasting under 12 hours and those lasting 12 hours or more. Because a significant number of mutual aid calls were for wildland fires, mutual aid calls were also separated by duration in the categories of under or over 12 hours. Additional discussion of wildland fires is provided later in a section focused on those types of fires.

Runs and Deployed Time – All Units

Deployed time, also referred to as deployed hours, is the total deployment time of all the units deployed on all calls. Table 10-5 shows the total deployed time, both overall and broken down by type of call for KCFD units during the year studied. Figure 10-6 and Table 10-6 show the daily average deployed minutes by hour of the day. Wildland fires and mutual aid for wildland fires were excluded from the average deployed minutes by hour because of the effect they have on overall averages.

TABLE 10-5: Annual Runs and Deployed Time by Call Type

Run Type	Avg. Deployed Min. per Run	Total Annual Hours	Percent of Total Hours	Avg. Deployed Hours per Day	Total Annual Runs	Avg. Runs per Day
Breathing difficulty	18.7	1,130.9	1.6	3.1	3,634	10.0
Cardiac and stroke	23.4	1,980.4	2.8	5.4	5,070	13.9
Fall and injury	21.4	1,624.5	2.3	4.5	4,555	12.5
Illness and other	21.9	2,848.4	4.0	7.8	7,810	21.4
MVA	23.2	3,492.4	4.9	9.6	9,015	24.7
Overdose and psychiatric	21.9	334.4	0.5	0.9	915	2.5
Seizure and unconsciousness	21.1	1,133.0	1.6	3.1	3,228	8.8
EMS Total	**22.0**	**12,544.0**	**17.5**	**34.4**	**34,227**	**93.8**
False alarm	13.8	961.5	1.3	2.6	4,167	11.4
Good intent	12.3	1,317.6	1.8	3.6	6,451	17.7
Hazard	28.9	1,401.4	2.0	3.8	2,913	8.0
Outside fire <12 hours	50.2	6,139.9	8.6	16.8	7,345	20.1
Outside fire 12+ hours	1,816.0	15,739.0	22.0	43.1	520	1.4
Public service	19.8	1,219.1	1.7	3.3	3,698	10.1
Structure fire	63.2	4,461.9	6.2	12.2	4,234	11.6
Fire Total	**63.9**	**31,240.3**	**43.7**	**85.6**	**29,328**	**80.4**
Canceled	9.6	1,676.9	2.3	4.6	10,456	28.6
Mutual aid <12 hours	33.5	1,102.4	1.5	3.0	1,973	5.4
Mutual aid 12+ hours	10,189.2	24,963.5	34.9	68.4	147	0.4
Total	**56.4**	**71,527.1**	**100.0**	**196.0**	**76,131**	**208.6**

Note: Total deployed time for outside fires and mutual aid runs lasting 12+ hours may be higher than total time spent working due to rest periods on calls lasting 24+ hours.

Observations:

Overall

- Total deployed time for the year was 71,527 hours. The daily average was 196.0 hours for all units combined.
  - When outside fire and mutual aid runs lasting 12+ hours are excluded, the daily average deployed time was 84.5 hours for all units combined.
- There were 76,131 runs, including 2,120 runs dispatched for mutual aid calls. The daily average was 208.6 runs.
- The average deployed time per run was 56.4 minutes. Without outside fire and mutual aid runs lasting 12+ hours, the average time was 24.5 minutes per run.

EMS

- EMS calls accounted for 18 percent of the total workload.
  - Excluding mutual aid calls, EMS runs accounted for 28 percent of the total workload.

- The average deployed time on EMS runs was 22.0 minutes. The deployed time for all units dispatched on EMS runs averaged 34.4 hours per day.

Fires

- Fire runs accounted for 44 percent of the total workload.
  - When excluding outside fire calls lasting 12+ hours, fire runs accounted for 38 percent of total workload.
  - Runs for outside fires lasting 12 hours or more accounted for half of the total fire workload, and 22 percent of total workload.
- There were 12,099 runs for structure and outside fire calls, with a total workload of 26,341 hours. This accounted for 37 percent of the total workload.
  - When excluding outside fire calls lasting 12+ hours, there were 11,579 runs for structure and outside fire calls, with a total workload of 10,602 hours. This accounted for 15 percent of the total workload.
- The average deployed time for structure fire calls was 63.2 minutes; the average deployed time for outside fire calls lasting under 12 hours was 50.2 minutes; and the average deployed time for outside fire calls lasting 12+ hours was 1,816.0 minutes (30.3 hours).

Outside Fires and Mutual Aid Lasting 12+ Hours

- Mutual aid calls fires lasting 24 hours or more accounted for 0.2 percent of total runs (147) and 35 percent (24,963.5 hours) of the total workload.
- Combined, outside fires and mutual aid calls lasting 12+ hours accounted for 0.9 percent of total runs (667) and 57 percent (40,702.5 hours) of the total workload.

FIGURE 10-6: Average Deployed Minutes by Hour of Day

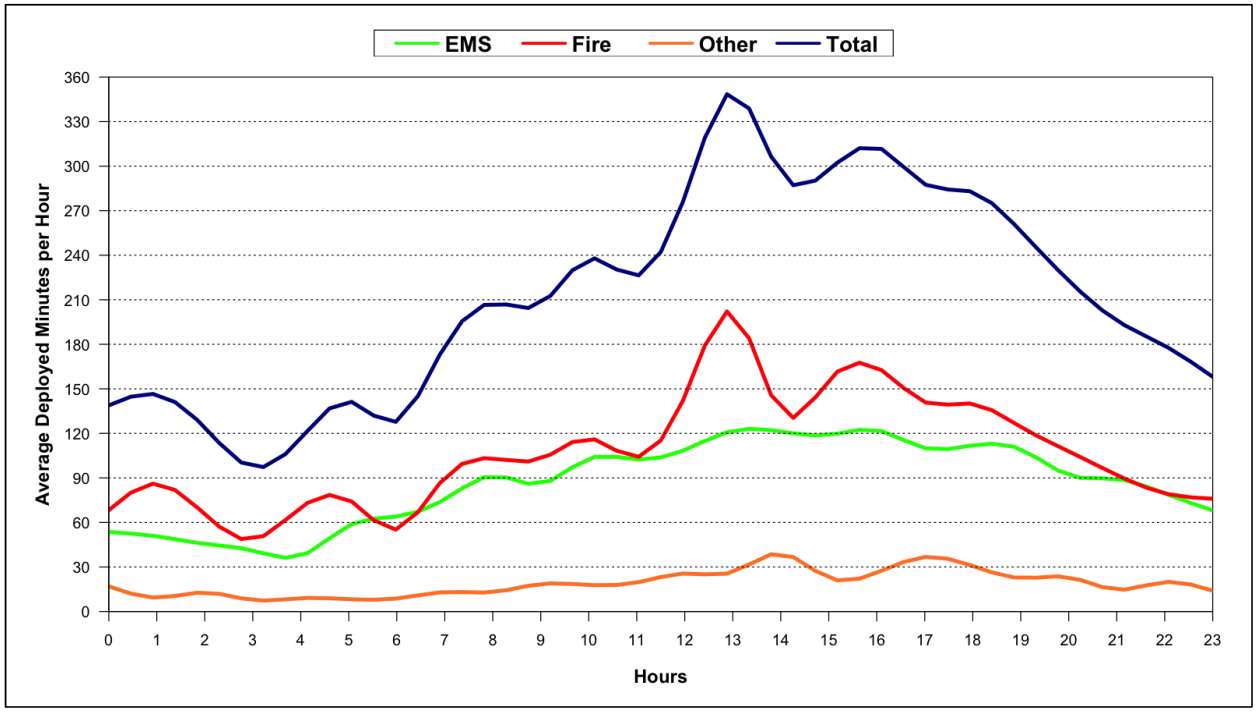


TABLE 10-6: Average Deployed Minutes by Hour of Day

Hour	EMS	Fire	Other	Total
0	53.6	68.3	17.0	138.9
1	50.7	86.2	9.3	146.2
2	45.6	65.5	12.9	123.9
3	41.1	48.3	7.7	97.1
4	37.3	70.1	9.0	116.5
5	58.0	75.4	8.3	141.6
6	64.0	55.3	8.8	128.0
7	75.6	90.3	13.1	179.0
8	91.5	103.2	13.1	207.8
9	85.8	102.7	18.6	207.1
10	103.1	116.7	17.9	237.7
11	102.5	104.1	19.5	226.1
12	108.9	144.9	25.7	279.4
13	121.8	201.8	26.5	350.1
14	121.2	134.2	39.2	294.7
15	118.9	156.0	22.5	297.4
16	122.3	164.5	26.1	312.9
17	110.1	141.0	36.7	287.8
18	112.0	139.9	30.6	282.5
19	109.4	124.3	22.5	256.2
20	91.8	107.9	23.2	222.8
21	89.4	92.0	14.6	196.0
22	79.6	79.6	19.8	179.0
23	68.1	76.0	14.0	158.1
Daily Avg.	**2,062.0**	**2,548.2**	**456.9**	**5,067.1**

Observations:

- Hourly deployed time was highest during the day from noon to 7:00 p.m., averaging between 279 minutes (4 hours and 39 minutes) and 350 minutes (5 hours and 50 minutes).
- Average deployed time peaked between 1:00 p.m. to 2:00 p.m., averaging 350 minutes (5 hours and 50 minutes).
- Hourly deployed time was lowest between 3:00 a.m. and 4:00 a.m., averaging 97 minutes.

Workload by Unit Type

Table 10-7 provides a summary of workload by unit type. Engine groups include both active and reserve units. Wildland crews and teams includes hand crews, strike teams, task force crews, individual resources, and nonadministrative crew supervisors. Workload for individual units is included in Attachment IV.

TABLE 10-7: Call Workload by Unit Type

Unit Type	Avg. Deployed Min. per Run	Total Annual Hours	Avg. Deployed Hours per Day	Total Annual Runs	Avg. Runs per Day
ARFF	32.1	35.9	0.1	67	0.2
Battalion chief	52.9	6,589.8	18.1	7,478	20.5
Breathing support truck	96.3	130.1	0.4	81	0.2
Bulldozer	665.4	3,360.2	9.2	303	0.8
Engine	23.0	21,626.0	59.2	56,310	154.3
Engine – Type 3	351.8	11,088.2	30.4	1,891	5.2
Engine – Type 6	92.5	6,714.3	18.4	4,357	11.9
Hazmat	79.8	66.5	0.2	50	0.1
Helicopter	572.8	2,902.0	8.0	304	0.8
Ladder truck	18.9	1,373.1	3.8	4,349	11.9
USAR	31.9	99.8	0.3	188	0.5
Water tender	236.6	2,078.3	5.7	527	1.4
Wildland crews/teams	4,105.2	15,462.9	42.4	226	0.6
Total	**56.4**	**71,527.1**	**196.0**	**76,131**	**208.6**

Note: Deployed time for may be higher than total time spent working due to rest periods on calls lasting 24+ hours.

Observations:

- Engines made the most runs (56,332 or an average of 154.3 per day) and had the highest total annual deployed time (21,653 hours or an average of 59 hours per day).
- Battalion Chiefs made the second most runs (7,478 or an average of 20.5 per day) and had the fifth highest total annual deployed time (6,590 hours or an average of 18 hours per day).
- Wildland crews and teams had the second highest total annual deployed time and the highest average deployed time per run (64.4 hours or 2.9 days).

Workload by Station

Table 10-8 provides a summary of each station and battalion's workload overall. Tables 10-9 and 10-10 provide a more detailed view of workload, showing each station's runs broken out by run type (Table 10-9) and the resulting daily average deployed time by run type (Table 10-10). Station workload is the sum of workload for all units housed in a station regardless of where the call occurred, except for wildland units, which are grouped together.

TABLE 10-8: Call Workload by Station and Battalion

Battalion & Station		Avg. Deployed Min. per Run	Total Annual Hours	Avg. Deployed Hours per Day	Total Annual Runs	Avg. Runs per Day
1	11	72.9	2,165.4	5.9	1,782	4.9
	12	31.4	770.3	2.1	1,472	4.0
	13	30.4	699.7	1.9	1,379	3.8
	14	29.1	932.5	2.6	1,921	5.3
	15	22.9	768.1	2.1	2,009	5.5
	16	38.7	462.6	1.3	717	2.0
	17	26.8	334.3	0.9	749	2.1
	18	163.0	1,100.1	3.0	405	1.1
	Total	**41.6**	**7,233.0**	**19.8**	**10,434**	**28.6**
2	21	27.5	1,360.6	3.7	2,966	8.1
	22	37.5	247.9	0.7	397	1.1
	23	114.6	647.7	1.8	339	0.9
	24	40.9	190.7	0.5	280	0.8
	25	155.9	2,016.2	5.5	776	2.1
	26	132.0	1,384.0	3.8	629	1.7
	Total	**65.1**	**5,847.0**	**16.0**	**5,387**	**14.8**
3	31	37.2	1,336.1	3.7	2,156	5.9
	32	20.7	696.8	1.9	2,022	5.5
	33	94.7	4,006.6	11.0	2,538	7.0
	34	21.0	593.4	1.6	1,693	4.6
	35	145.4	538.0	1.5	222	0.6
	36	117.8	447.7	1.2	228	0.6
	37	25.7	630.6	1.7	1,474	4.0
	Total	**47.9**	**8,249.2**	**22.6**	**10,333**	**28.3**
4	41	25.4	3,159.2	8.7	7,469	20.5
	42	22.8	1,430.8	3.9	3,767	10.3
	45	57.9	1,165.2	3.2	1,208	3.3
	51	24.8	695.8	1.9	1,683	4.6
	52	25.6	826.6	2.3	1,936	5.3
	53	63.2	794.5	2.2	754	2.1
	Total	**28.8**	**8,072.1**	**22.1**	**16,817**	**46.1**

Battalion & Station		Avg. Deployed Min. per Run	Total Annual Hours	Avg. Deployed Hours per Day	Total Annual Runs	Avg. Runs per Day
5	54	28.4	706.2	1.9	1,490	4.1
	55	81.2	2,708.2	7.4	2,001	5.5
	56	44.8	563.9	1.5	756	2.1
	57	42.3	529.7	1.5	752	2.1
	58	40.2	298.5	0.8	446	1.2
	Total	**53.0**	**4,806.5**	**13.2**	**5,445**	**14.9**
6	61	22.8	858.2	2.4	2,255	6.2
	62	32.7	34.3	0.1	63	0.2
	63	36.8	1,734.0	4.8	2,831	7.8
	64	18.0	1,501.0	4.1	4,996	13.7
	65	23.9	2,105.2	5.8	5,282	14.5
	66	30.0	608.9	1.7	1,217	3.3
	67	31.1	818.2	2.2	1,580	4.3
	Total	**25.2**	**7,659.9**	**21.0**	**18,224**	**49.9**
7	71	67.9	2,032.7	5.6	1,796	4.9
	72	35.8	889.9	2.4	1,491	4.1
	73	51.9	682.8	1.9	790	2.2
	74	20.4	617.2	1.7	1,813	5.0
	75	41.7	214.6	0.6	309	0.8
	76	152.0	2,603.6	7.1	1,028	2.8
	77	21.6	435.0	1.2	1,208	3.3
	78	123.3	458.3	1.3	223	0.6
	Total	**55.0**	**7,934.2**	**21.7**	**8,658**	**23.7**
8	Wildland	1,536.5	21,152.0	58.0	826	2.3
Wildland Strike Teams		4,912.5	573.1	1.6	7	0.0

Note: Battalion 8 is an administrative battalion used for wildland units and calls and does not cover a specific geographical area or stations.

TABLE 10-9: Total Annual Runs by Station and Battalion by Run Type

Battalion & Station		EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Mutual Aid	Total
1	11	522	125	188	88	366	29	168	254	42	1,782
	12	703	97	139	49	143	100	77	148	16	1,472
	13	630	71	159	78	119	96	70	146	10	1,379
	14	860	68	232	52	138	71	57	397	46	1,921
	15	938	73	296	64	98	127	41	352	20	2,009
	16	352	35	34	76	59	82	34	45	0	717
	17	322	22	35	57	24	28	20	172	69	749
	18	229	13	15	14	49	23	32	28	2	405
	Total	**4,556**	**504**	**1,098**	**478**	**996**	**556**	**499**	**1,542**	**205**	**10,434**
2	21	1,455	179	300	139	234	118	180	360	1	2,966
	22	209	20	18	19	47	18	37	28	1	397
	23	91	26	20	29	78	8	55	31	1	339
	24	85	20	12	5	79	7	45	27	0	280
	25	427	27	19	20	129	23	27	93	11	776
	26	329	23	11	17	124	13	19	87	6	629
	Total	**2,596**	**295**	**380**	**229**	**691**	**187**	**363**	**626**	**20**	**5,387**
3	31	1,088	104	189	79	206	126	102	259	3	2,156
	32	1,173	118	89	65	155	89	91	242	0	2,022
	33	1,249	254	76	125	319	55	185	254	21	2,538
	34	901	127	117	58	138	48	91	203	10	1,693
	35	83	6	14	10	47	10	31	16	5	222
	36	70	14	9	12	41	16	38	24	4	228
	37	780	120	72	49	159	43	92	156	3	1,474
	Total	**5,344**	**743**	**566**	**398**	**1,065**	**387**	**630**	**1,154**	**46**	**10,333**
4	41	2,387	423	773	243	771	237	491	1,362	782	7,469
	42	1,749	210	378	78	344	238	126	489	155	3,767

Battalion & Station		EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Mutual Aid	Total
4	45	384	77	98	38	289	36	101	165	20	1,208
	51	725	51	226	64	222	73	69	248	5	1,683
	52	833	67	92	48	176	81	61	392	186	1,936
	53	276	15	35	23	99	21	28	164	93	754
	Total	**6,354**	**843**	**1,602**	**494**	**1,901**	**686**	**876**	**2,820**	**1,241**	**16,817**
5	54	692	66	138	31	218	61	76	208	0	1,490
	55	740	114	91	74	454	34	115	355	24	2,001
	56	294	36	26	30	112	30	13	179	36	756
	57	323	21	74	26	35	111	12	106	44	752
	58	298	10	10	31	9	45	14	24	5	446
	Total	**2,347**	**247**	**339**	**192**	**828**	**281**	**230**	**872**	**109**	**5,445**
6	61	1,026	155	268	73	140	131	98	361	3	2,255
	62	4	2	0	50	2	2	0	3	0	63
	63	1,505	110	254	80	225	192	130	311	24	2,831
	64	2,295	122	800	124	275	270	178	796	136	4,996
	65	2,231	452	372	265	398	284	466	717	97	5,282
	66	371	94	166	52	136	41	123	183	51	1,217
	67	862	100	34	46	170	97	69	183	19	1,580
	Total	**8,294**	**1,035**	**1,894**	**690**	**1,346**	**1,017**	**1,064**	**2,554**	**330**	**18,224**
7	71	968	124	105	58	141	66	157	162	15	1,796
	72	892	78	129	44	83	74	48	142	1	1,491
	73	383	66	23	29	69	50	87	77	6	790
	74	1,015	83	155	58	52	212	67	164	7	1,813
	75	116	26	2	5	20	12	39	44	45	309
	76	579	38	51	48	63	53	57	129	10	1,028
	77	653	59	98	38	53	101	72	116	18	1,208
	78	94	14	7	6	44	9	25	24	0	223
	Total	**4,700**	**488**	**570**	**286**	**525**	**577**	**552**	**858**	**102**	**8,658**

Battalion & Station	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Mutual Aid	Total
8	35	12	2	146	508	7	20	30	66	826
Wildland Strike Teams	1	0	0	0	5	0	0	0	1	7

Note: Battalion 8 is an administrative battalion used for wildland units and calls and does not cover a specific geographical area or stations.

TABLE 10-10: Daily Average Deployed Minutes by Station and Battalion by Run Type

Battalion & Station		EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Mutual Aid	Total
1	11	32.7	5.1	9.3	6.2	197.6	2.4	29.0	8.2	65.6	356.0
	12	44.5	4.2	4.6	2.9	44.8	5.9	14.7	3.4	1.7	126.6
	13	42.9	3.6	5.6	5.6	33.3	5.5	12.8	4.9	0.8	115.0
	14	46.6	3.4	7.7	2.4	58.9	4.2	13.9	10.8	5.3	153.3
	15	63.9	2.4	11.4	3.3	17.6	6.2	9.7	10.1	1.6	126.3
	16	32.4	1.9	1.9	6.4	18.0	6.9	7.0	1.5	0.0	76.0
	17	26.2	1.1	1.7	4.0	3.0	1.8	3.5	5.4	8.3	55.0
	18	19.8	0.4	0.3	0.5	90.0	1.8	4.8	1.0	62.3	180.8
	Total	**309.0**	**22.1**	**42.4**	**31.5**	**463.1**	**34.6**	**95.3**	**45.4**	**145.6**	**1,189.0**
2	21	76.3	6.3	8.7	7.0	79.6	4.2	27.7	9.5	4.5	223.7
	22	17.2	0.9	1.0	1.7	10.0	1.3	7.2	1.4	0.1	40.7
	23	5.6	0.7	0.3	1.9	77.7	0.2	8.0	0.9	11.1	106.5
	24	7.8	0.9	0.7	0.3	15.1	0.4	5.4	0.7	0.0	31.3
	25	35.0	1.3	1.1	2.0	89.5	1.2	5.2	3.4	192.7	331.4
	26	37.2	1.7	0.7	2.5	59.8	0.9	2.0	5.7	117.0	227.5
	Total	**179.2**	**11.9**	**12.6**	**15.4**	**331.6**	**8.2**	**55.3**	**21.6**	**325.3**	**961.2**
3	31	53.3	3.8	5.7	6.4	92.2	5.0	19.7	5.7	27.9	219.6
	32	57.9	4.6	3.0	6.6	19.3	4.5	13.6	5.2	0.0	114.5
	33	70.0	7.3	2.5	8.8	152.3	2.5	31.6	6.3	377.3	658.6
	34	48.3	4.5	3.4	4.1	15.9	2.8	13.2	3.7	1.5	97.5
	35	8.3	0.2	0.6	0.5	33.0	0.6	5.4	1.1	38.7	88.4
	36	13.0	0.6	0.8	1.8	35.9	2.0	9.5	1.2	8.8	73.6
	37	45.8	4.8	2.4	4.6	24.4	3.1	15.1	3.2	0.3	103.7
	Total	**296.6**	**25.9**	**18.3**	**32.9**	**372.9**	**20.5**	**108.1**	**26.3**	**454.6**	**1,356.0**
4	41	118.3	15.8	22.8	12.3	157.2	12.3	70.9	29.7	80.0	519.3
	42	88.6	7.5	12.4	4.2	61.6	11.2	23.1	10.9	15.8	235.2

Battalion & Station		EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Mutual Aid	Total
4	45	25.9	2.9	3.4	1.7	88.9	1.5	15.1	4.8	47.4	191.5
	51	39.7	2.0	7.6	4.7	37.2	4.0	11.9	6.0	1.3	114.4
	52	54.7	2.6	3.6	2.8	37.3	4.1	10.2	9.0	11.5	135.9
	53	22.4	0.7	1.6	2.4	31.8	1.3	7.0	4.2	59.1	130.6
	Total	**349.7**	**31.5**	**51.4**	**28.2**	**414.0**	**34.4**	**138.1**	**64.7**	**215.0**	**1,326.9**
5	54	34.5	2.6	5.3	3.4	50.9	3.7	10.6	5.1	0.0	116.1
	55	55.4	5.1	4.6	6.1	243.4	2.4	14.8	10.6	102.8	445.2
	56	23.7	1.5	1.8	2.3	39.3	1.8	1.9	4.6	15.8	92.7
	57	25.3	1.0	2.8	2.0	10.1	6.3	2.0	3.6	34.0	87.1
	58	32.8	0.6	0.5	4.4	4.4	2.9	1.7	1.4	0.3	49.1
	Total	**171.7**	**10.8**	**15.0**	**18.2**	**348.1**	**17.2**	**31.0**	**25.3**	**153.0**	**790.1**
6	61	51.6	5.9	8.2	4.4	44.0	5.9	11.5	7.4	2.1	141.1
	62	0.4	0.1	0.0	3.1	1.2	1.0	0.0	0.0	0.0	5.6
	63	73.3	3.5	7.7	5.7	40.3	7.1	19.6	6.4	121.3	285.0
	64	102.7	4.3	21.1	7.7	45.1	12.3	27.2	15.3	10.9	246.7
	65	104.6	14.9	10.6	14.2	111.9	13.5	52.7	14.8	8.9	346.1
	66	20.1	2.4	5.5	6.3	26.9	5.8	25.5	3.7	3.8	100.1
	67	55.1	2.9	1.3	3.0	52.3	5.0	8.9	4.0	2.0	134.5
	Total	**407.7**	**34.1**	**54.4**	**44.4**	**321.6**	**50.6**	**145.5**	**51.8**	**149.1**	**1,259.2**
7	71	81.1	4.9	5.8	3.7	92.4	5.5	41.0	6.8	93.0	334.1
	72	64.1	3.7	5.4	3.1	44.1	5.6	15.9	4.2	0.1	146.3
	73	28.5	2.7	0.6	2.3	45.5	3.2	24.8	2.7	2.0	112.2
	74	54.9	4.0	4.4	4.4	6.4	9.1	14.5	3.2	0.7	101.5
	75	12.8	1.0	0.1	0.4	4.8	0.5	8.5	2.4	4.8	35.3
	76	46.7	1.5	2.5	4.3	289.9	4.8	19.8	5.4	53.0	428.0
	77	36.4	2.3	2.9	2.4	6.7	4.2	12.6	2.6	1.5	71.5
	78	16.1	1.1	0.8	1.0	46.4	1.5	7.1	1.5	0.0	75.3
	Total	**340.5**	**21.3**	**22.4**	**21.6**	**536.2**	**34.3**	**144.1**	**28.7**	**155.1**	**1,304.3**

Battalion & Station	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Mutual Aid	Total
8	7.3	0.5	0.0	38.2	726.0	0.6	16.1	12.1	2,676.2	3,477.0
Wildland Strike Teams	0.4	0.0	0.0	0.0	82.9	0.0	0.0	0.0	10.9	94.2

Note: Battalion 8 is an administrative battalion used for wildland units and calls and does not cover a specific geographical area or stations.

ANALYSIS OF BUSIEST HOURS

There is significant variability in the number of calls from hour to hour. One special concern relates to the resources available for hours with the heaviest workload. We tabulated the data for each of the 8,760 hours in the year. Table 10-11 shows the number of hours in the year in which there were zero to four or more calls during the hour. Table 10-12 shows the 10 one-hour intervals during the year with the most calls.

TABLE 10-11: Frequency Distribution of the Number of Calls

Calls in an Hour	Frequency	Percentage
0	129	1.5
1	424	4.8
2	786	9.0
3	974	11.1
4	1,104	12.6
5	1,107	12.6
6	1,019	11.6
7	918	10.5
8	766	8.7
9	548	6.3
10	395	4.5
11	242	2.8
12+	348	4.0

TABLE 10-12: Top 10 Hours with the Most Calls Received

Hour	Number of Calls	Number of Runs	Total Deployed Hours
07/04/2016 – 10:00 p.m. to 11:00 p.m.	42	69	16.7
07/04/2016 – 9:00 p.m. to 10:00 p.m.	28	56	12.0
07/04/2016 – 8:00 p.m. to 9:00 p.m.	24	30	7.6
01/22/2017 – noon to 1:00 p.m.	23	40	19.5
07/04/2016 – 11:00 p.m. to midnight	21	32	22.5
07/02/2016 – 9:00 p.m. to 10:00 p.m.	21	31	4.9
07/03/2016 – 10:00 p.m. to 11:00 p.m.	21	30	24.1
07/02/2016 – 8:00 p.m. to 9:00 p.m.	20	31	8.5
04/01/2017 – 7:00 p.m. to 8:00 p.m.	19	24	6.0
01/22/2017 – 10:00 a.m. to 11:00 a.m.	18	24	8.0

Note: Total deployed hours is the total time spent responding to calls received in the hour, and which may extend into the next hour or hours. Number of runs and deployed hours only includes KCFD units.

Observations:

- There were 348 hours (4 percent of all hours) in which 12 or more calls occurred; in other words, the department responded to 12 or more calls in an hour roughly once a day.
- The highest number of calls to occur in an hour was 42, which happened once.

- Four of the top ten busiest hours occurred on July 4, 2016, and three more occurred in the two days prior. 41 of the 94 calls during the busiest three hours were fireworks-related.
- Two of the top ten hours occurred on January 22, 2017. The county experienced a wind storm that day.
- The hour with the most calls was 10:00 p.m. to 11:00 p.m. on July 4, 2016. The hour's 42 calls involved 69 individual dispatches resulting in 16.7 hours of deployed time. These 42 calls included 18 public service calls, 5 outside fire calls, 4 canceled calls, 4 hazard calls, 3 motor vehicle accidents, 2 cardiac and stroke calls, 2 fall and injury calls, 1 breathing difficulty call, 1 false alarm call, 1 good intent call, and 1 structure fire call.
- The hour with the second most calls was 9:00 p.m. to 10:00 p.m. on July 4, 2016. The hour's 28 calls involved 56 individual dispatches resulting in 12 hours of deployed time. These 28 calls included 6 canceled calls, 6 public service calls, 4 outside fire calls, 2 false alarm calls, 2 good intent calls, 2 mutual aid calls, 2 seizure and unconsciousness calls, 1 cardiac and stroke call, 1 fall and injury call, 1 illness and other call, 1 one structure fire call.

RESPONSE TIME

In this part of the analysis we present response time statistics for different call types.

Different terms are used to describe the components of response time. Dispatch time is the difference between the time a call is received and the time a unit is dispatched. Dispatch time includes call processing time, which is the time required to determine the nature of the emergency and types of resources to dispatch. Turnout time is the difference between dispatch time and the time a unit is en route. Travel time is the difference between the time a unit is en route and its arrival on scene. Response time is the total time elapsed between receiving a call to arriving on scene. All times given in the tables and figures are number of minutes.

For purposes of analyzing response time, the county was divided into four subareas: the Bakersfield Joint Protection Area (JPA), remaining Urban Areas, Rural Areas, and Remote Areas. An explanation of how these areas were determined is included in the *Methodology* section at the beginning on the report.

In this response time analysis, we included all emergency calls to which at least one non-administrative KCFD unit responded; we excluded canceled and mutual aid calls. Also, battalion chiefs were treated as administrative units. We focused on those responses which allowed us to calculate each segment of response time. We removed any unit with a missing time stamp or with a pair of timestamps (e.g., dispatch and en route) that were identical. Calls with a total response time exceeding 30, 45, or 90 minutes, depending on the area, were also excluded.

For the Bakersfield JPA, based on the methodology above, we excluded 4,779 canceled and mutual aid calls; 3,216 calls responded to without lights and sirens; 29 calls with response times over 30 minutes; 53 noncanceled calls where no unit recorded an on-scene time; 2 calls where only an administrative unit recorded an on-scene time; and 153 calls with time stamps that resulted in at least one response time segment of zero seconds. As a result, for the Bakersfield JPA area, a total of 13,614 calls are included in the analysis.

For the Urban Areas, based on the methodology above, we excluded 1,438 canceled and mutual aid calls; 2,060 calls responded to without lights and sirens; 17 calls with response times over 30 minutes; 27 noncanceled calls where no unit recorded an on-scene time; 1 call where only an administrative unit recorded an on-scene time; and 109 calls with time stamps that resulted in at least one response time segment of zero seconds. As a result, for the Urban Areas, a total of 7,194 calls are included in the analysis.

For the Rural Areas, based on the methodology above, we excluded 1,833 canceled and mutual aid calls; 3,288 calls responded to without lights and sirens; 14 calls with response times over 45 minutes; 42 noncanceled calls where no unit recorded an on-scene time; and 211 calls with time stamps that resulted in at least one response time segment of zero seconds. As a result, for the Rural Areas, a total of 9,304 calls are included in the analysis.

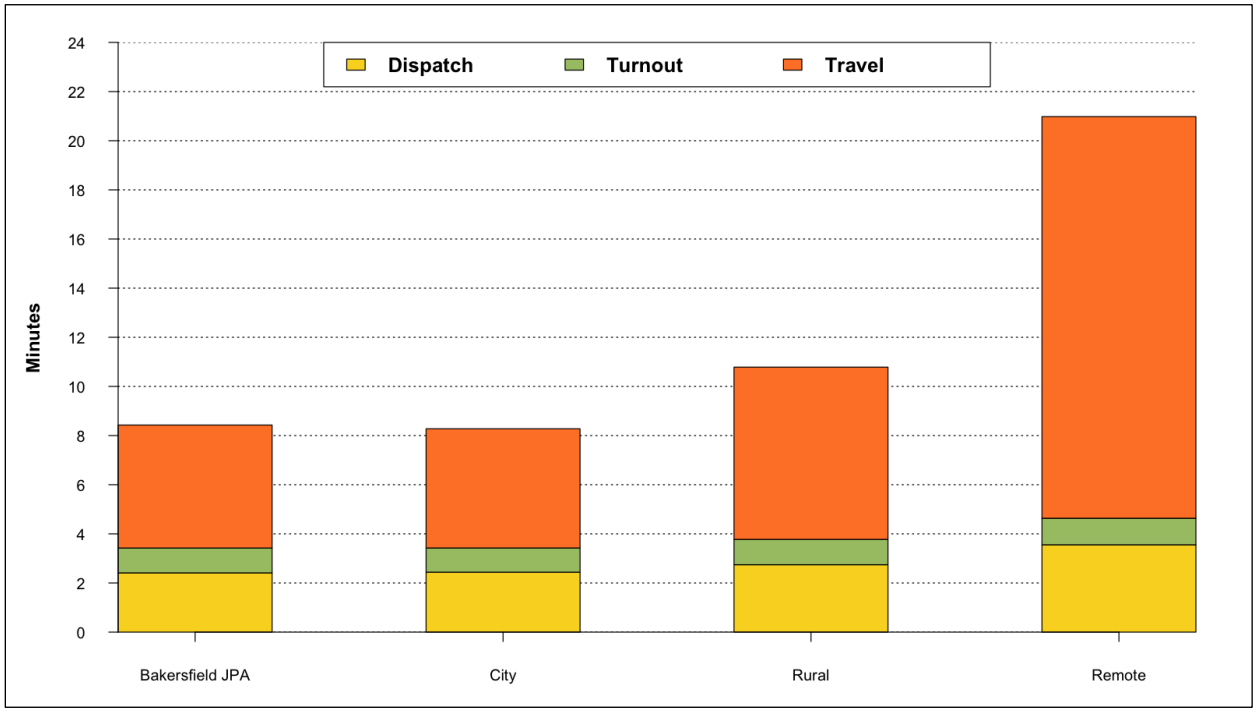
For the Remote Areas, based on the methodology above, we excluded 451 canceled and mutual aid calls; 499 calls responded to without lights and sirens; 2 calls with response times over 90 minutes; 14 noncanceled calls where no unit recorded an on-scene time; 1 call where only an administrative unit recorded an on-scene time; and 19 calls with time stamps that resulted in at least one response time segment of zero seconds. As a result, for the Remote Areas, a total of 1,182 calls are included in the analysis.

Table 10-13 and Figure 10-7 provide a summary of calls included and total response times for the four analysis subareas. Detailed analysis for each area follows.

TABLE 10-13: Summary of Response Times

Analysis Subarea	Call Type	Response Time		Number of Calls
		Average	90th Percentile	
Bakersfield JPA	EMS	8.2	11.1	10,301
	Fire	9.1	12.5	3,313
	Total	**8.4**	**11.4**	**13,614**
Urban	EMS	8.2	11.2	5,915
	Fire	8.8	12.4	1,279
	Total	**8.3**	**11.5**	**7,194**
Rural	EMS	10.6	15.7	7,450
	Fire	11.4	17.2	1,854
	Total	**10.8**	**16.0**	**9,304**
Remote	EMS	20.9	30.1	932
	Fire	21.2	28.9	250
	Total	**21.0**	**30.1**	**1,182**

FIGURE 10-7: Average Response Times by Analysis Subarea



Response Time by Type of Call – Bakersfield JPA

Tables 10-14 and 10-15 provide, respectively, average and 90th percentile dispatch, turnout, travel, and total response time for the first arriving unit to each call in the JPA, broken out by call type. Figures 10-8 (for EMS) and 10-9 (for fire) illustrate the average response times.

TABLE 10-14: Average Response Time of First Arriving Unit, by Call Type – Bakersfield JPA

Call Type	Dispatch	Turnout	Travel	Total	Number of Calls
Breathing difficulty	2.1	1.0	4.9	7.9	1,433
Cardiac and stroke	2.3	1.0	4.8	8.1	2,009
Fall and injury	2.6	1.0	4.9	8.5	1,660
Illness and other	2.4	1.0	4.9	8.2	2,701
MVA	2.2	1.0	4.6	7.8	702
Overdose and psychiatric	2.8	1.0	5.0	8.9	417
Seizure and unconsciousness	2.5	1.0	4.9	8.4	1,379
EMS Total	**2.4**	**1.0**	**4.9**	**8.2**	**10,301**
False alarm	2.9	0.9	5.7	9.5	284
Good intent	2.4	1.2	5.4	9.0	2,214
Hazard	3.1	1.0	6.1	10.2	135
Outside fire	2.7	1.1	5.8	9.6	206
Public service	2.8	0.9	5.3	9.0	322
Structure fire	2.4	1.1	4.8	8.2	152
Fire Total	**2.5**	**1.1**	**5.4**	**9.1**	**3,313**
Total	**2.4**	**1.0**	**5.0**	**8.4**	**13,614**

FIGURE 10-8: Average Response Time of First Arriving Unit, by EMS Call Type – Bakersfield JPA

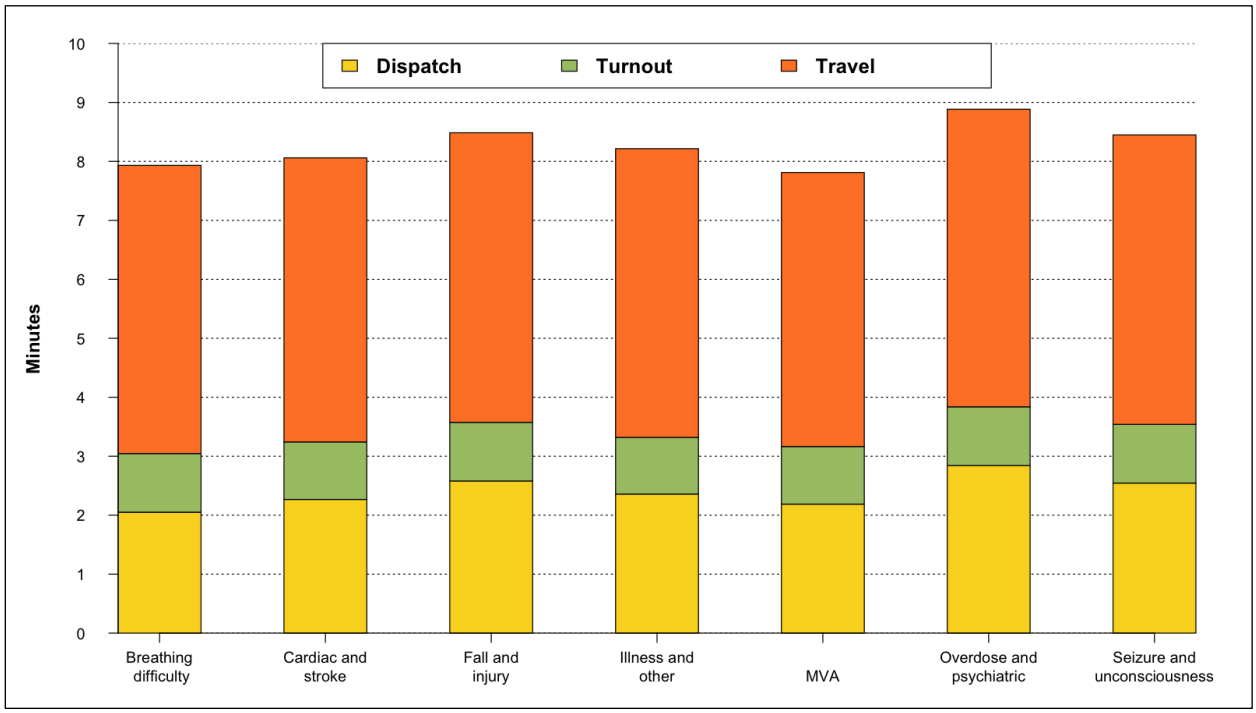


FIGURE 10-9: Average Response Time of First Arriving Unit, by Fire Call Type – Bakersfield JPA

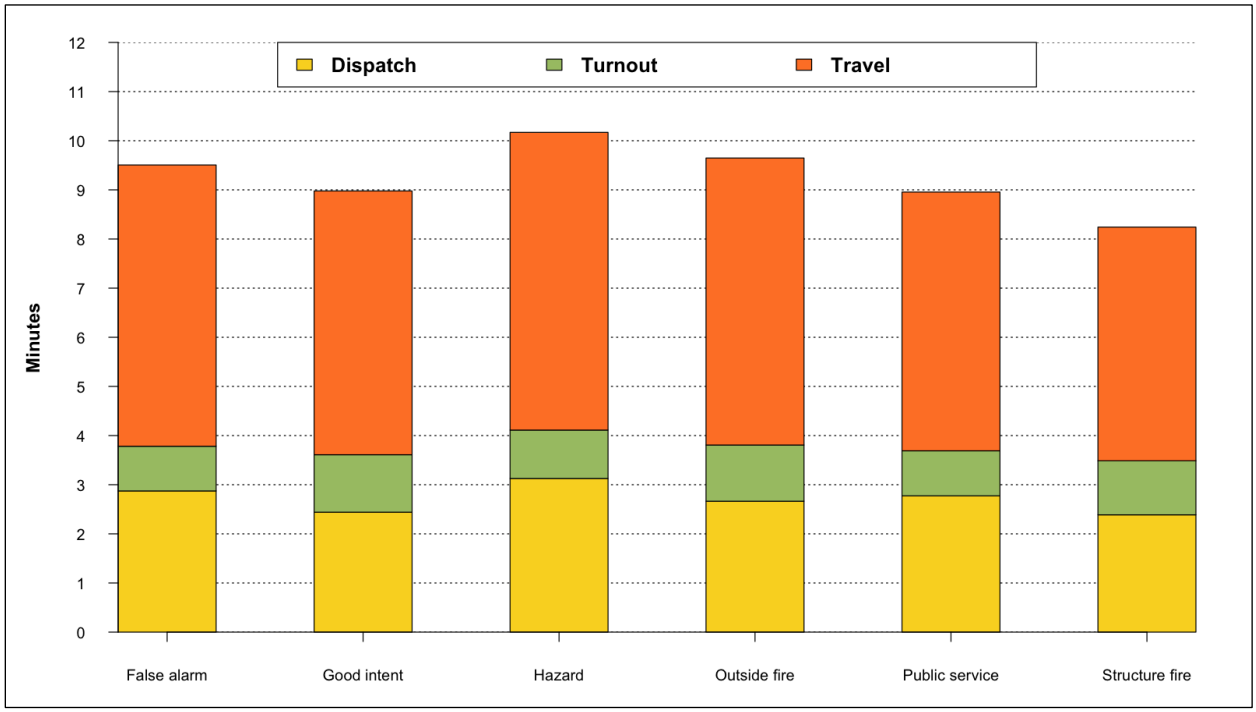


TABLE 10-15: 90th Percentile Response Time of First Arriving Unit, by Call Type – Bakersfield JPA

Call Type	Dispatch	Turnout	Travel	Total	Number of Calls
Breathing difficulty	3.2	1.9	7.0	10.4	1,433
Cardiac and stroke	3.5	1.8	7.1	10.9	2,009
Fall and injury	4.0	1.9	7.2	11.2	1,660
Illness and other	3.7	1.8	7.2	11.2	2,701
MVA	3.5	1.8	7.1	10.5	702
Overdose and psychiatric	4.6	1.8	7.6	12.2	417
Seizure and unconsciousness	3.8	1.9	7.2	11.3	1,379
EMS Total	**3.7**	**1.8**	**7.2**	**11.1**	**10,301**
False alarm	4.7	1.7	8.8	13.3	284
Good intent	4.0	2.2	7.8	12.3	2,214
Hazard	5.4	2.2	10.3	14.4	135
Outside fire	4.3	2.2	10.1	14.3	206
Public service	4.3	1.7	8.0	12.0	322
Structure fire	4.2	2.0	7.0	11.0	152
Fire Total	**4.2**	**2.1**	**8.1**	**12.5**	**3,313**
Total	**3.8**	**1.9**	**7.4**	**11.4**	**13,614**

Observations, Bakersfield JPA:

- The average dispatch time was 2.4 minutes.
- The average turnout time was 1.0 minutes.
- The average travel time was 5.0 minutes.
- The average response time was 8.4 minutes.
- The average response time was 8.2 minutes for EMS calls and 9.1 minutes for fire calls.
- The average response time for structure fires was 8.2 minutes, and for outside fires was 9.6 minutes.
- The 90th percentile dispatch time was 3.8 minutes.
- The 90th percentile turnout time was 1.9 minutes.
- The 90th percentile travel time was 7.4 minutes.
- The 90th percentile response time was 11.4 minutes.
- The 90th percentile response time was 11.1 minutes for EMS calls and 12.5 minutes for fire calls.
- The 90th percentile response time for structure fires was 11.0 minutes, and for outside fires was 14.3 minutes.

Response Time by Type of Call – Urban Areas

Tables 10-16 and 10-17 provide, respectively, average and 90th percentile dispatch, turnout, travel, and total response time for the first arriving unit to each call in the Urban Areas, broken out by call type. Figures 10-10 (for EMS) and 10-11 (for fire) illustrate the average response times.

TABLE 10-16: Average Response Time of First Arriving Unit, by Call Type – Urban Areas

Call Type	Dispatch	Turnout	Travel	Total	Number of Calls
Breathing difficulty	2.1	1.0	4.8	7.9	873
Cardiac and stroke	2.5	1.0	4.8	8.2	1,055
Fall and injury	2.7	0.9	4.7	8.4	961
Illness and other	2.2	1.0	4.8	8.0	1,676
MVA	2.4	1.0	4.8	8.1	465
Overdose and psychiatric	2.9	1.0	4.8	8.8	153
Seizure and unconsciousness	2.7	0.9	4.6	8.2	732
EMS Total	**2.4**	**1.0**	**4.8**	**8.2**	**5,915**
False alarm	2.9	0.9	5.1	8.9	132
Good intent	2.4	1.1	5.3	8.7	802
Hazard	3.2	0.9	6.4	10.6	67
Outside fire	2.2	1.0	5.6	8.8	60
Public service	2.7	1.0	5.0	8.6	142
Structure fire	2.5	1.0	5.1	8.6	76
Fire Total	**2.5**	**1.0**	**5.3**	**8.8**	**1,279**
Total	**2.4**	**1.0**	**4.9**	**8.3**	**7,194**

FIGURE 10-10: Average Response Time of First Arriving Unit, by EMS Call Type – Urban Areas

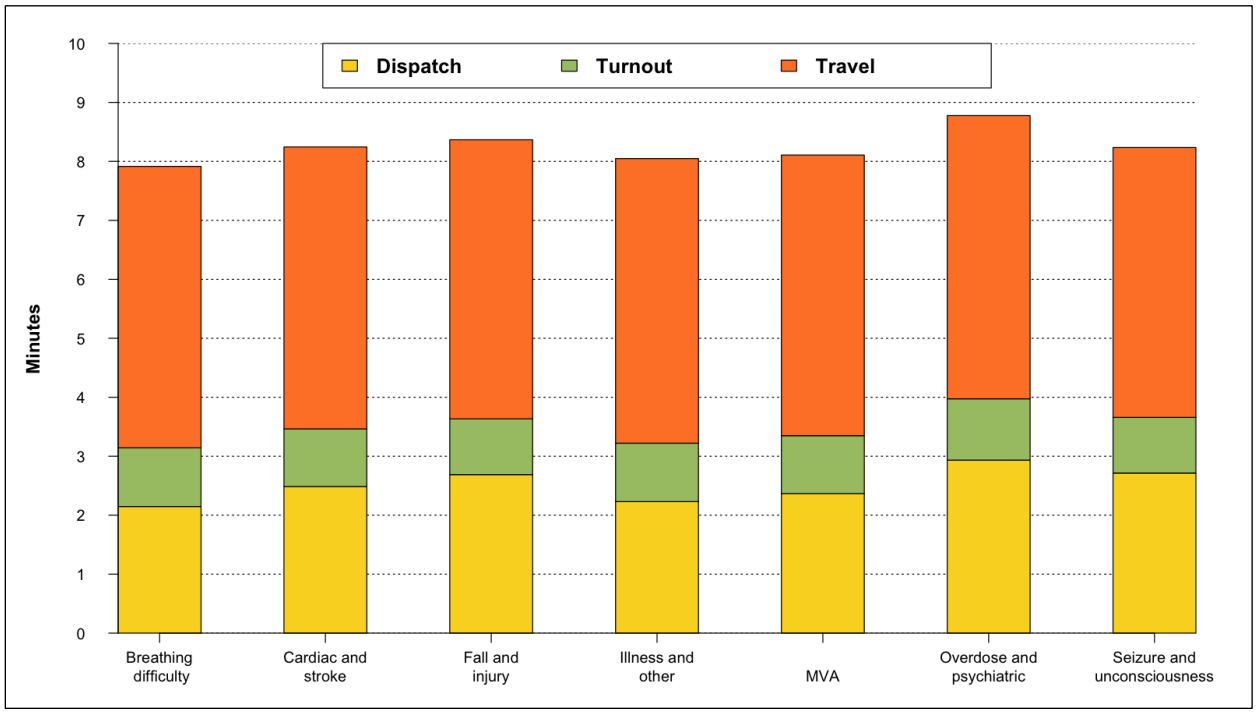


FIGURE 10-11: Average Response Time of First Arriving Unit, by Fire Call Type – Urban Areas

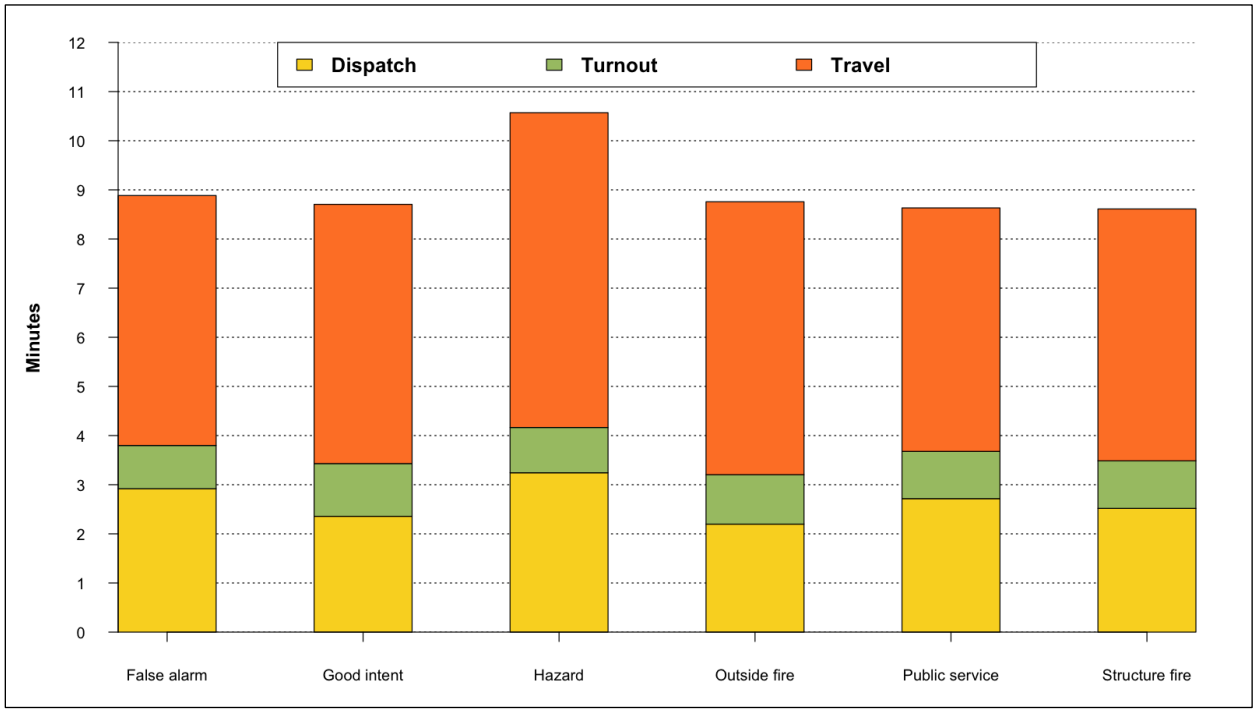


TABLE 10-17: 90th Percentile Response Time of First Arriving Unit, by Call Type – Urban Areas

Call Type	Dispatch	Turnout	Travel	Total	Number of Calls
Breathing difficulty	3.3	1.8	7.0	10.5	873
Cardiac and stroke	4.1	1.8	7.0	11.4	1,055
Fall and injury	4.2	1.8	6.9	11.3	961
Illness and other	3.8	1.8	7.1	11.2	1,676
MVA	4.0	1.7	7.9	12.5	465
Overdose and psychiatric	4.6	1.9	6.8	11.8	153
Seizure and unconsciousness	4.3	1.7	6.5	10.9	732
EMS Total	**4.0**	**1.8**	**7.0**	**11.2**	**5,915**
False alarm	5.5	1.5	7.6	12.5	132
Good intent	4.1	1.9	7.9	12.1	802
Hazard	5.4	1.7	10.8	16.1	67
Outside fire	3.4	1.9	9.3	13.1	60
Public service	4.1	1.8	7.6	12.5	142
Structure fire	4.1	1.7	7.8	12.4	76
Fire Total	**4.2**	**1.8**	**7.9**	**12.4**	**1,279**
Total	**4.0**	**1.8**	**7.2**	**11.5**	**7,194**

Observations, Urban Areas:

- The average dispatch time was 2.4 minutes.
- The average turnout time was 1.0 minutes.
- The average travel time was 4.9 minutes.
- The average response time was 8.3 minutes.
- The average response time was 8.2 minutes for EMS calls and 8.8 minutes for fire calls.
- The average response time for structure fires was 8.6 minutes, and for outside fires was 8.8 minutes.
- The 90th percentile dispatch time was 4.0 minutes.
- The 90th percentile turnout time was 1.8 minutes.
- The 90th percentile travel time was 7.2 minutes.
- The 90th percentile response time was 11.5 minutes.
- The 90th percentile response time was 11.2 minutes for EMS calls and 12.4 minutes for fire calls.
- The 90th percentile response time for structure fires was 12.4 minutes, and for outside fires was 13.1 minutes.

Response Time by Type of Call – Rural Areas

Tables 10-18 and 10-19 provide, respectively, average and 90th percentile dispatch, turnout, travel, and total response time for the first arriving unit to each call in the Rural Areas, broken out by call type. Figures 10-12 (for EMS) and 10-13 (for fire) illustrate the average response times.

TABLE 10-18: Average Response Time of First Arriving Unit, by Call Type – Rural Areas

Call Type	Dispatch	Turnout	Travel	Total	Number of Calls
Breathing difficulty	2.2	1.1	6.5	9.8	1,031
Cardiac and stroke	2.6	1.0	7.0	10.5	1,378
Fall and injury	2.8	1.0	6.6	10.4	1,169
Illness and other	2.6	1.0	6.7	10.3	1,847
MVA	3.0	1.1	8.1	12.3	1,027
Overdose and psychiatric	3.3	1.0	6.9	11.1	226
Seizure and unconsciousness	2.9	1.0	6.9	10.7	772
EMS Total	**2.7**	**1.0**	**6.9**	**10.6**	**7,450**
False alarm	3.5	0.9	7.6	12.0	165
Good intent	2.8	1.1	6.9	10.8	1,136
Hazard	3.5	1.2	8.7	13.4	116
Outside fire	3.4	1.1	9.0	13.6	196
Public service	2.8	1.1	7.5	11.4	153
Structure fire	2.9	1.2	7.1	11.2	88
Fire Total	**3.0**	**1.1**	**7.4**	**11.4**	**1,854**
Total	**2.7**	**1.0**	**7.0**	**10.8**	**9,304**

FIGURE 10-12: Average Response Time of First Arriving Unit, by EMS Call Type – Rural Areas

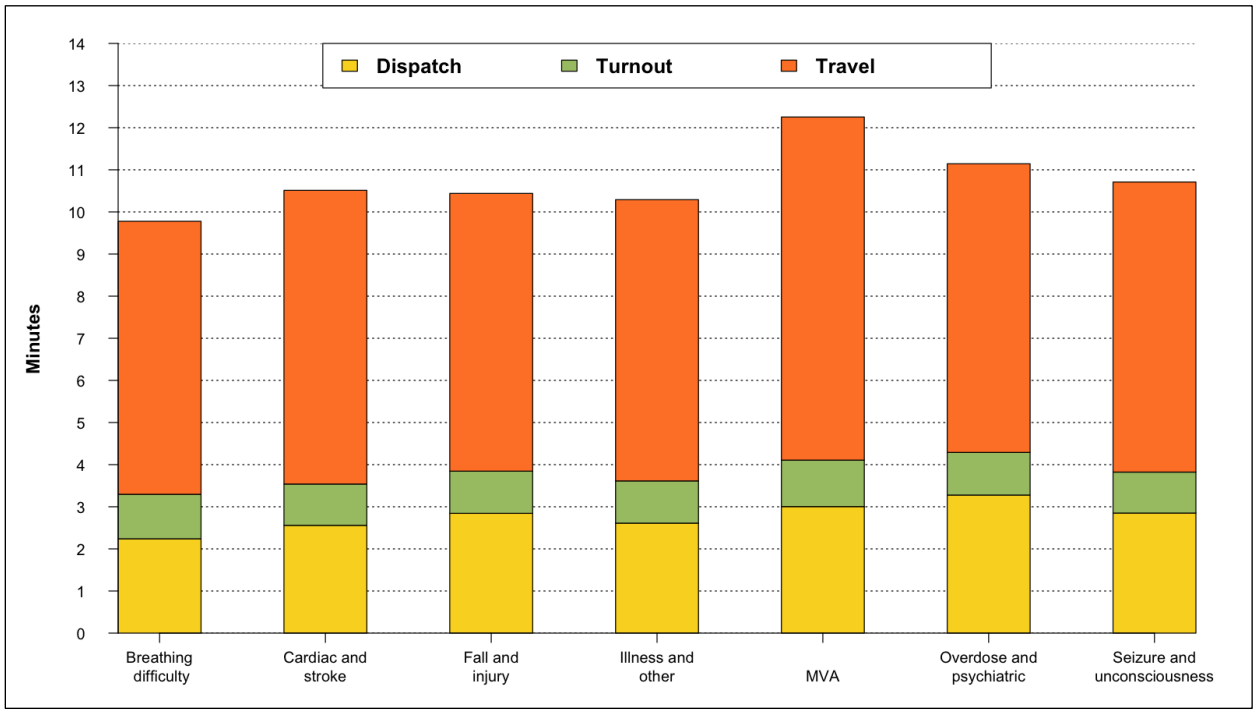


FIGURE 10-13: Average Response Time of First Arriving Unit, by Fire Call Type – Rural Areas

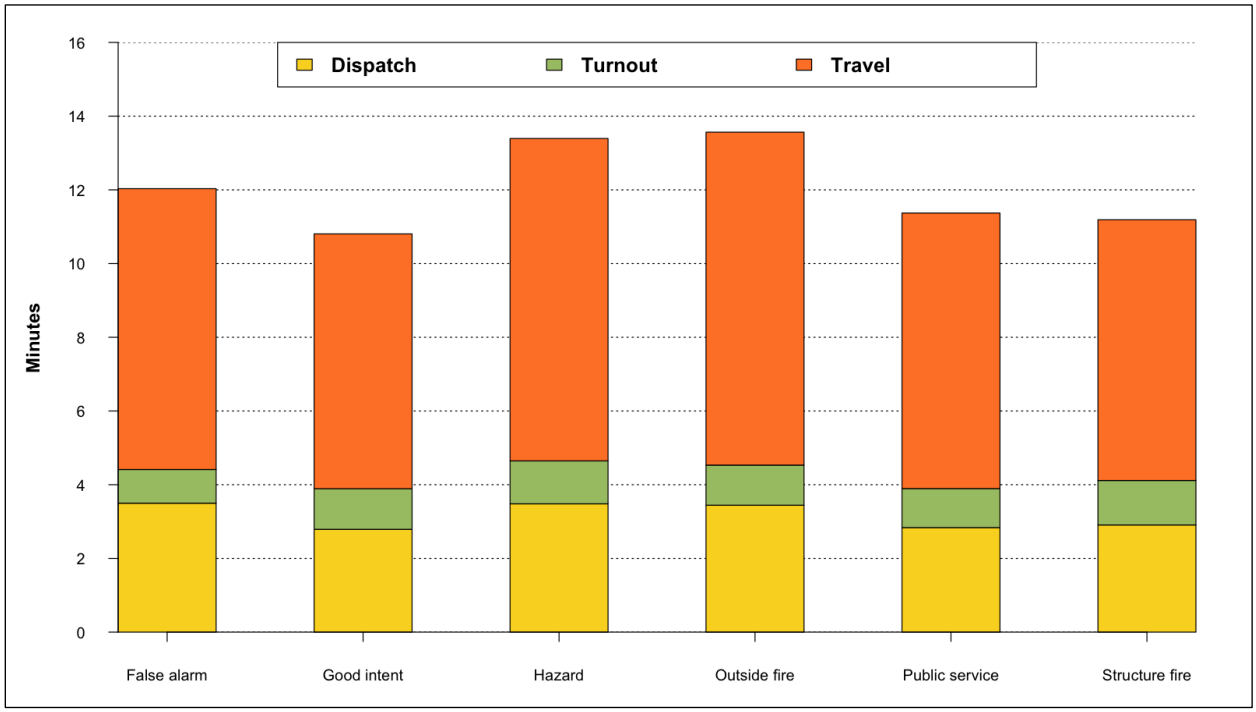


TABLE 10-19: 90th Percentile Response Time of First Arriving Unit, by Call Type – Rural Areas

Call Type	Dispatch	Turnout	Travel	Total	Number of Calls
Breathing difficulty	3.5	2.1	10.1	13.9	1,031
Cardiac and stroke	4.1	1.8	11.4	15.2	1,378
Fall and injury	4.5	1.8	11.0	15.2	1,169
Illness and other	4.3	1.9	11.0	15.4	1,847
MVA	4.9	2.1	12.8	17.6	1,027
Overdose and psychiatric	5.3	1.9	11.0	16.7	226
Seizure and unconsciousness	4.5	1.8	10.8	15.1	772
EMS Total	**4.3**	**1.9**	**11.3**	**15.7**	**7,450**
False alarm	5.8	1.9	13.6	19.0	165
Good intent	4.6	2.1	11.1	15.5	1,136
Hazard	5.6	2.6	14.2	19.6	116
Outside fire	6.3	2.2	14.6	19.9	196
Public service	4.7	2.1	12.8	17.1	153
Structure fire	6.3	2.6	11.1	17.9	88
Fire Total	**5.1**	**2.1**	**12.3**	**17.2**	**1,854**
Total	**4.5**	**1.9**	**11.4**	**16.0**	**9,304**

Observations, Rural Areas:

- The average dispatch time was 2.7 minutes.
- The average turnout time was 1.0 minutes.
- The average travel time was 7.0 minutes.
- The average response time was 10.8 minutes.
- The average response time was 10.6 minutes for EMS calls and 11.4 minutes for fire calls.
- The average response time for structure fires was 11.2 minutes, and for outside fires was 13.6 minutes.
- The 90th percentile dispatch time was 4.5 minutes.
- The 90th percentile turnout time was 1.9 minutes.
- The 90th percentile travel time was 11.4 minutes.
- The 90th percentile response time was 16.0 minutes.
- The 90th percentile response time was 15.7 minutes for EMS calls and 17.2 minutes for fire calls.
- The 90th percentile response time for structure fires was 17.9 minutes, and for outside fires was 19.9 minutes.

Response Time by Type of Call – Remote Areas

Tables 10-20 and 10-21 provide, respectively, average and 90th percentile dispatch, turnout, travel, and total response time for the first arriving unit to each call in Remote Areas, broken out by call type. Figures 10-14 (for EMS) and 10-15 (for fire) illustrate the average response times.

TABLE 10-20: Average Response Time of First Arriving Unit, by Call Type – Remote Areas

Call Type	Dispatch	Turnout	Travel	Total	Number of Calls
Breathing difficulty	2.6	1.1	17.7	21.4	84
Cardiac and stroke	2.9	1.0	17.3	21.2	147
Fall and injury	3.0	1.1	17.6	21.7	105
Illness and other	3.9	1.0	16.0	20.8	183
MVA	3.7	1.2	15.6	20.4	328
Overdose and psychiatric	5.8	1.3	17.6	24.7	10
Seizure and unconsciousness	3.4	1.0	16.5	20.9	75
EMS Total	**3.4**	**1.1**	**16.4**	**20.9**	**932**
False alarm	3.4	1.0	17.8	22.2	16
Good intent	3.5	1.0	15.8	20.3	104
Hazard	4.2	0.8	19.9	24.9	23
Outside fire	4.4	1.4	15.1	20.9	72
Public service	5.9	0.9	15.7	22.5	19
Structure fire	4.2	0.9	15.3	20.4	16
Fire Total	**4.0**	**1.1**	**16.0**	**21.2**	**250**
Total	**3.6**	**1.1**	**16.3**	**21.0**	**1,182**

FIGURE 10-14: Average Response Time of First Arriving Unit, by EMS Call Type – Remote Areas

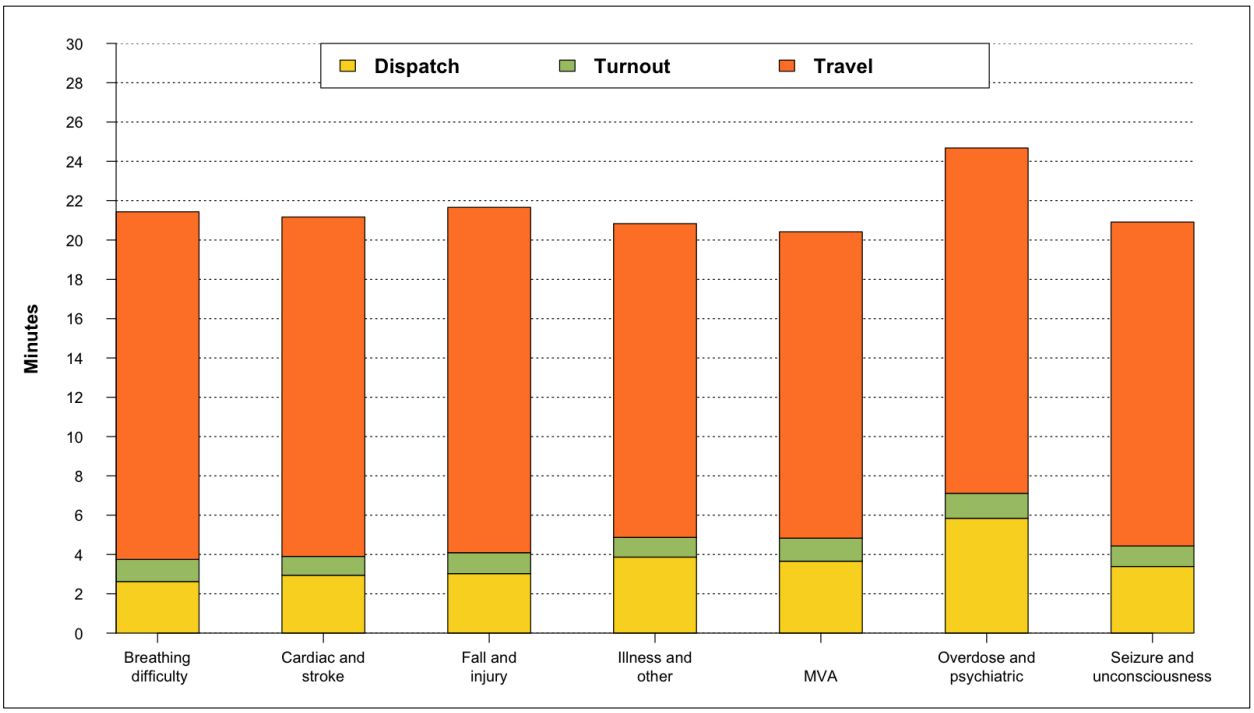


FIGURE 10-15: Average Response Time of First Arriving Unit, by Fire Call Type – Remote Areas

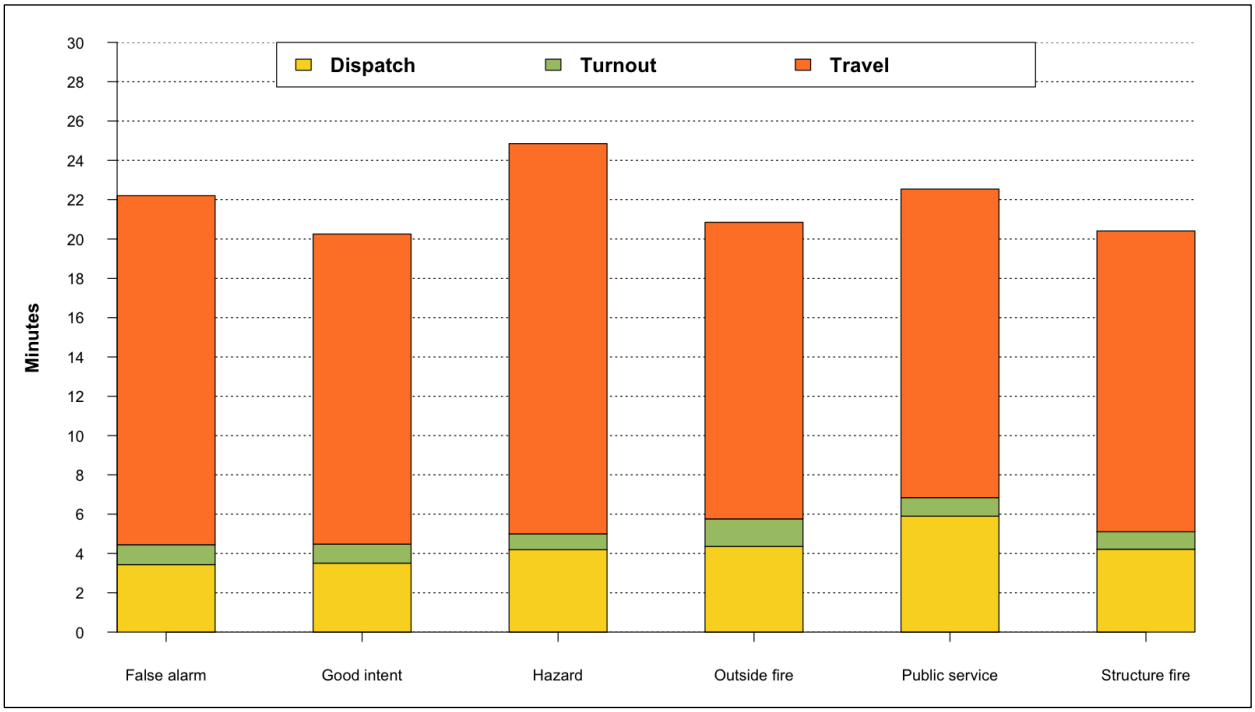


TABLE 10-21: 90th Percentile Response Time of First Arriving Unit, by Call Type – Remote Areas

Call Type	Dispatch	Turnout	Travel	Total	Number of Calls
Breathing difficulty	4.5	1.9	26.0	30.3	84
Cardiac and stroke	4.7	1.9	25.6	29.6	147
Fall and injury	4.9	1.9	26.3	30.2	105
Illness and other	6.2	1.9	24.5	31.0	183
MVA	6.9	2.3	23.1	30.1	328
Overdose and psychiatric	12.7	2.8	23.9	36.9	10
Seizure and unconsciousness	5.2	1.8	23.0	26.8	75
EMS Total	**5.8**	**2.0**	**24.8**	**30.1**	**932**
False alarm	10.3	2.1	31.7	38.6	16
Good intent	6.4	1.8	21.8	25.3	104
Hazard	9.5	1.8	30.5	35.7	23
Outside fire	8.8	2.9	21.8	28.9	72
Public service	11.1	1.7	39.3	45.5	19
Structure fire	13.2	2.0	21.9	28.5	16
Fire Total	**7.9**	**2.1**	**23.5**	**28.9**	**250**
Total	**6.2**	**2.0**	**24.5**	**30.1**	**1,182**

Observations, Remote Areas:

- The average dispatch time was 3.6 minutes.
- The average turnout time was 1.1 minutes.
- The average travel time was 16.3 minutes.
- The average response time was 21.0 minutes.
- The average response time was 20.9 minutes for EMS calls and 21.2 minutes for fire calls.
- The average response time for structure fires was 20.4 minutes, and for outside fires was 20.9 minutes.
- The 90th percentile dispatch time was 6.2 minutes.
- The 90th percentile turnout time was 2.0 minutes.
- The 90th percentile travel time was 24.5 minutes.
- The 90th percentile response time was 30.1 minutes.
- The 90th percentile response time was 30.1 minutes for EMS calls and 28.9 minutes for fire calls.
- The 90th percentile response time for structure fires was 28.5 minutes, and for outside fires was 28.9 minutes.

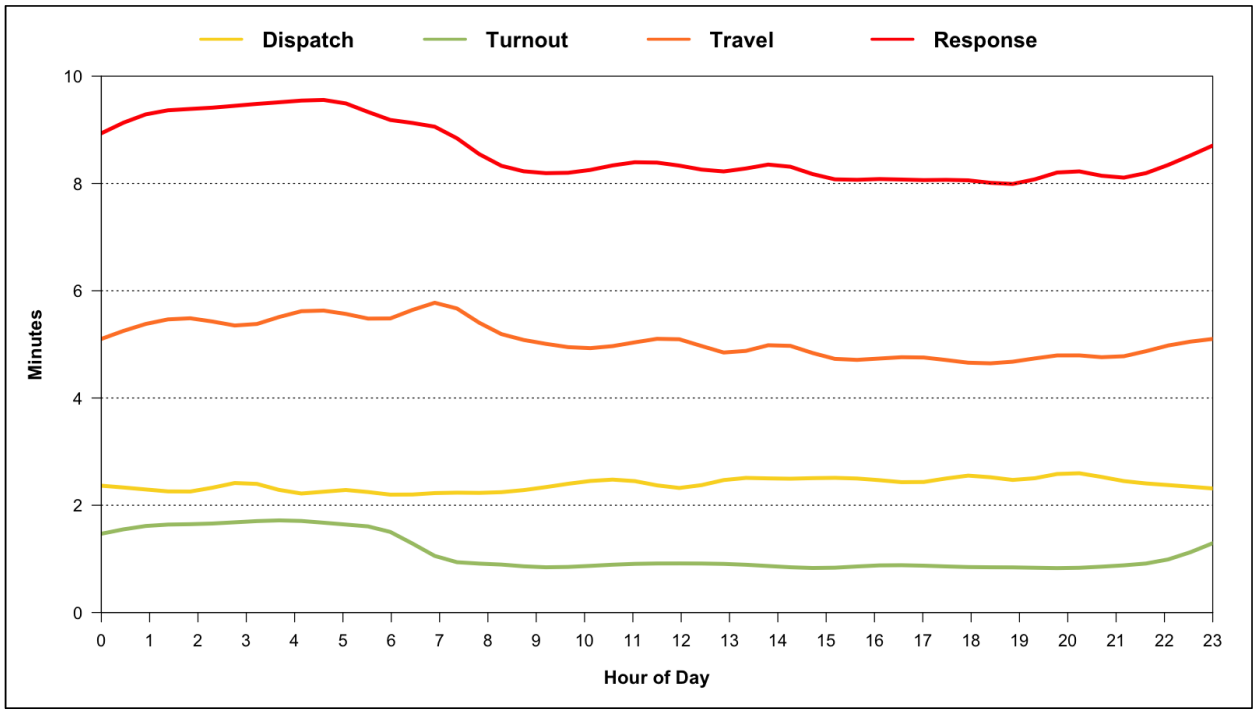
Response Time by Hour – Bakersfield JPA

Average dispatch, turnout, travel, and total response time by hour for calls in the Bakersfield JPA are shown in Table 10-22 and Figure 10-16. The table also shows 90th percentile time.

TABLE 10-22: Average and 90th Percentile Response Time of First Arriving Unit, by Hour of Day – Bakersfield JPA

Hour	Dispatch	Turnout	Travel	Response Time	90th Percentile Response Time	Number of Calls
0	2.4	1.5	5.1	8.9	11.6	421
1	2.3	1.6	5.4	9.3	12.4	352
2	2.3	1.6	5.5	9.4	12.3	334
3	2.4	1.7	5.3	9.5	12.4	242
4	2.2	1.7	5.6	9.5	12.6	225
5	2.3	1.6	5.6	9.5	12.4	298
6	2.2	1.5	5.5	9.2	11.7	362
7	2.2	1.0	5.8	9.0	12.1	455
8	2.2	0.9	5.3	8.4	11.3	605
9	2.3	0.8	5.0	8.2	11.1	625
10	2.4	0.9	4.9	8.2	11.2	712
11	2.5	0.9	5.0	8.4	11.4	643
12	2.3	0.9	5.1	8.3	11.4	725
13	2.5	0.9	4.8	8.2	11.3	778
14	2.5	0.9	5.0	8.4	11.6	738
15	2.5	0.8	4.8	8.1	11.3	719
16	2.5	0.9	4.7	8.1	11.2	731
17	2.4	0.9	4.8	8.1	11.1	727
18	2.6	0.8	4.7	8.1	11.3	702
19	2.5	0.8	4.7	8.0	11.1	784
20	2.6	0.8	4.8	8.2	11.1	746
21	2.5	0.9	4.8	8.1	10.8	668
22	2.4	1.0	5.0	8.3	11.0	544
23	2.3	1.3	5.1	8.7	11.4	478

FIGURE 10-16: Average Response Time of First Arriving Unit, by Hour of Day – Bakersfield JPA



Observations, Bakersfield JPA:

- Average dispatch time was between 2.2 minutes (4:00 a.m. to 5:00 a.m. and 6:00 a.m. to 9:00 a.m.) and 2.6 minutes (6:00 p.m. to 7:00 p.m. and 8:00 p.m. to 9:00 p.m.).
- Average turnout time was between 0.8 minutes (9:00 a.m. to 10:00 a.m., 3:00 p.m. to 4:00 p.m., and 6:00 p.m. to 9:00 p.m.) and 1.7 minutes (3:00 a.m. to 5:00 a.m.).
- Average travel time was between 4.7 minutes (4:00 p.m. to 5:00 p.m. and 6:00 p.m. to 8:00 p.m.) and 5.8 minutes (7:00 a.m. to 8:00 a.m.).
- Average response time was between 8 minutes (7:00 p.m. to 8:00 p.m.) and 9.5 minutes (3:00 a.m. to 6:00 a.m.).
- 90th percentile total response time by hour ranged from 10.8 minutes (9:00 p.m. to 10:00 p.m.) and 12.6 minutes (4:00 a.m. to 5:00 a.m.).

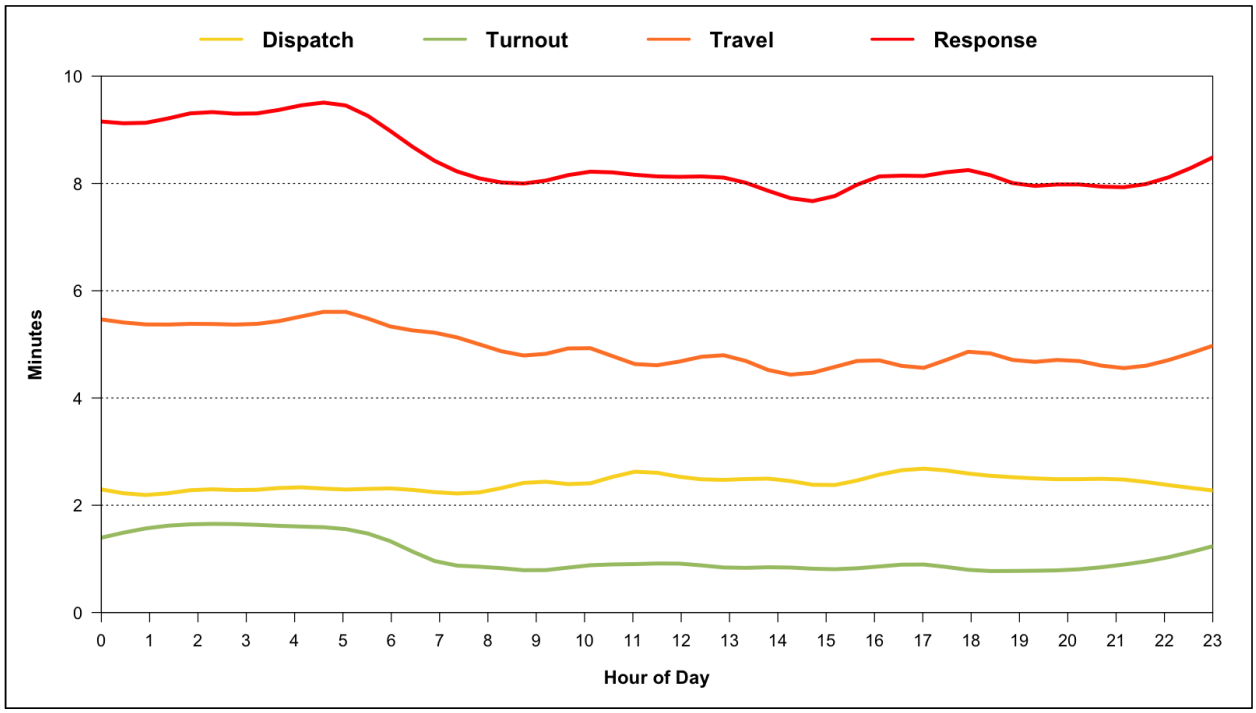
Response Time by Hour – Urban Areas

Average dispatch, turnout, travel, and total response time by hour for calls in the Urban Aareas are shown in Table 10-23 and Figure 10-17. The table also shows 90th percentile time.

TABLE 10-23: Average and 90th Percentile Response Time of First Arriving Unit, by Hour of Day – Urban Areas

Hour	Dispatch	Turnout	Travel	Response Time	90th Percentile Response Time	Number of Calls
0	2.3	1.4	5.5	9.2	11.9	232
1	2.2	1.6	5.4	9.1	11.8	194
2	2.3	1.6	5.4	9.3	12.0	177
3	2.3	1.6	5.4	9.3	11.5	158
4	2.3	1.6	5.5	9.4	12.6	141
5	2.3	1.6	5.6	9.5	12.8	163
6	2.3	1.3	5.3	9.0	11.4	165
7	2.2	0.9	5.2	8.4	11.0	222
8	2.3	0.8	4.9	8.1	11.0	283
9	2.4	0.8	4.8	8.0	11.4	334
10	2.4	0.9	4.9	8.2	11.2	371
11	2.6	0.9	4.6	8.2	11.4	416
12	2.5	0.9	4.7	8.1	11.6	378
13	2.5	0.8	4.8	8.1	11.3	375
14	2.5	0.8	4.5	7.8	11.4	359
15	2.4	0.8	4.5	7.7	10.8	380
16	2.5	0.9	4.7	8.1	11.8	392
17	2.7	0.9	4.6	8.1	12.0	396
18	2.6	0.8	4.9	8.2	12.0	391
19	2.5	0.8	4.7	8.0	11.3	373
20	2.5	0.8	4.7	8.0	11.1	371
21	2.5	0.9	4.6	7.9	10.8	334
22	2.4	1.0	4.7	8.1	11.2	335
23	2.3	1.2	5.0	8.5	11.1	254

FIGURE 10-17: Average Response Time of First Arriving Unit, by Hour of Day – Urban Areas



Observations, Urban Areas:

- Average dispatch time was between 2.2 minutes (1:00 a.m. to 2:00 a.m. and 7:00 a.m. to 8:00 a.m.) and 2.7 minutes (5:00 p.m. to 6:00 p.m.).
- Average turnout time was between 0.8 minutes (8:00 a.m. to 10:00 a.m.) and 1.6 minutes (1:00 a.m. to 3:00 a.m.).
- Average turnout time was between 0.8 minutes (1:00 p.m. to 4:00 p.m.) and 1.6 minutes (3:00 a.m. to 6:00 a.m.).
- Average turnout time was between 0.8 minutes (6:00 p.m. to 9:00 p.m.) and 1.6 minutes (1:00 a.m. to 4:00 a.m.).
- Average travel time was between 4.5 minutes (2:00 p.m. to 4:00 p.m.) and 5.6 minutes (5:00 a.m. to 6:00 a.m.).
- Average response time was between 7.7 minutes (3:00 p.m. to 4:00 p.m.) and 9.5 minutes (5:00 a.m. to 6:00 a.m.).
- 90th percentile total response time by hour ranged from 10.8 minutes (3:00 p.m. to 4:00 p.m. and 9:00 p.m. to 10:00 p.m.) and 12.8 minutes (5:00 a.m. to 6:00 a.m.).

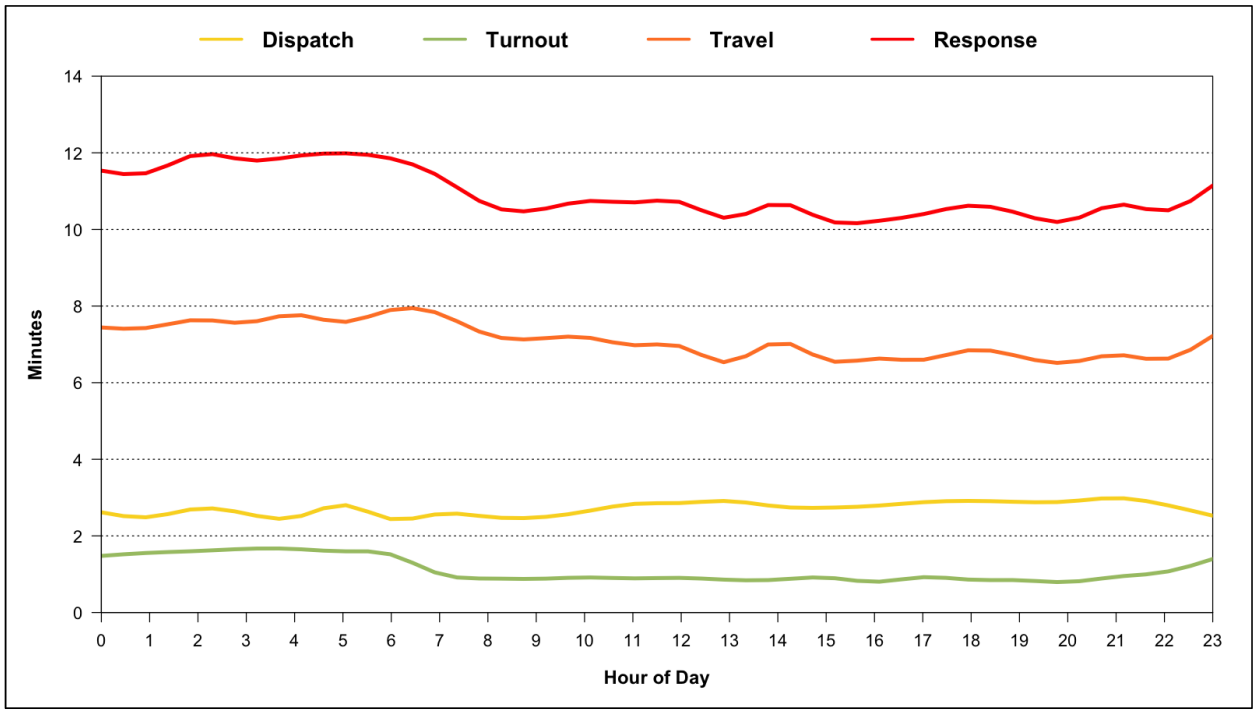
Response Time by Hour – Rural Areas

Average dispatch, turnout, travel, and total response time by hour for calls in the Rural Areas are shown in Table 10-24 and Figure 10-18. The table also shows 90th percentile time.

TABLE 10-24: Average and 90th Percentile Response Time of First Arriving Unit, by Hour of Day – Rural Areas

Hour	Dispatch	Turnout	Travel	Response Time	90th Percentile Response Time	Number of Calls
0	2.6	1.5	7.4	11.5	16.2	263
1	2.5	1.6	7.4	11.5	16.3	238
2	2.7	1.6	7.6	12.0	16.3	225
3	2.6	1.7	7.6	11.8	16.7	204
4	2.5	1.7	7.8	11.9	16.6	217
5	2.8	1.6	7.6	12.0	17.3	245
6	2.4	1.5	7.9	11.9	17.6	285
7	2.6	1.0	7.8	11.4	16.6	353
8	2.5	0.9	7.3	10.6	15.9	392
9	2.5	0.9	7.1	10.5	14.4	394
10	2.6	0.9	7.2	10.7	16.2	437
11	2.8	0.9	7.0	10.7	16.3	452
12	2.9	0.9	6.9	10.7	16.2	495
13	2.9	0.9	6.5	10.3	15.2	473
14	2.8	0.9	7.1	10.7	17.3	538
15	2.7	0.9	6.6	10.2	16.3	507
16	2.8	0.8	6.6	10.2	15.1	479
17	2.9	0.9	6.6	10.4	15.2	471
18	2.9	0.9	6.9	10.6	16.3	524
19	2.9	0.8	6.7	10.4	15.7	486
20	2.9	0.8	6.5	10.2	15.1	480
21	3.0	0.9	6.7	10.6	15.4	441
22	2.8	1.1	6.6	10.5	15.5	390
23	2.5	1.4	7.2	11.1	16.5	315

FIGURE 10-18: Average Response Time of First Arriving Unit, by Hour of Day – Rural Areas



Observations, Rural Areas:

- Average dispatch time was between 2.4 minutes (6:00 a.m. to 7:00 a.m.) and 3 minutes (9:00 p.m. to 10:00 p.m.).
- Average turnout time was between 0.8 minutes (4:00 p.m. to 5:00 p.m. and 7:00 p.m. to 9:00 p.m.) and 1.7 minutes (3:00 a.m. to 5:00 a.m.).
- Average travel time was between 6.5 minutes (1:00 p.m. to 2:00 p.m. and 8:00 p.m. to 9:00 p.m.) and 7.9 minutes (6:00 a.m. to 7:00 a.m.).
- Average response time was between 10.2 minutes (3:00 p.m. to 5:00 p.m. and 8:00 p.m. to 9:00 p.m.) and 12 minutes (2:00 a.m. to 3:00 a.m. and 5:00 a.m. to 6:00 a.m.).
- 90th percentile total response time by hour ranged from 14.4 minutes (9:00 a.m. to 10:00 a.m.) and 17.6 minutes (6:00 a.m. to 7:00 a.m.).

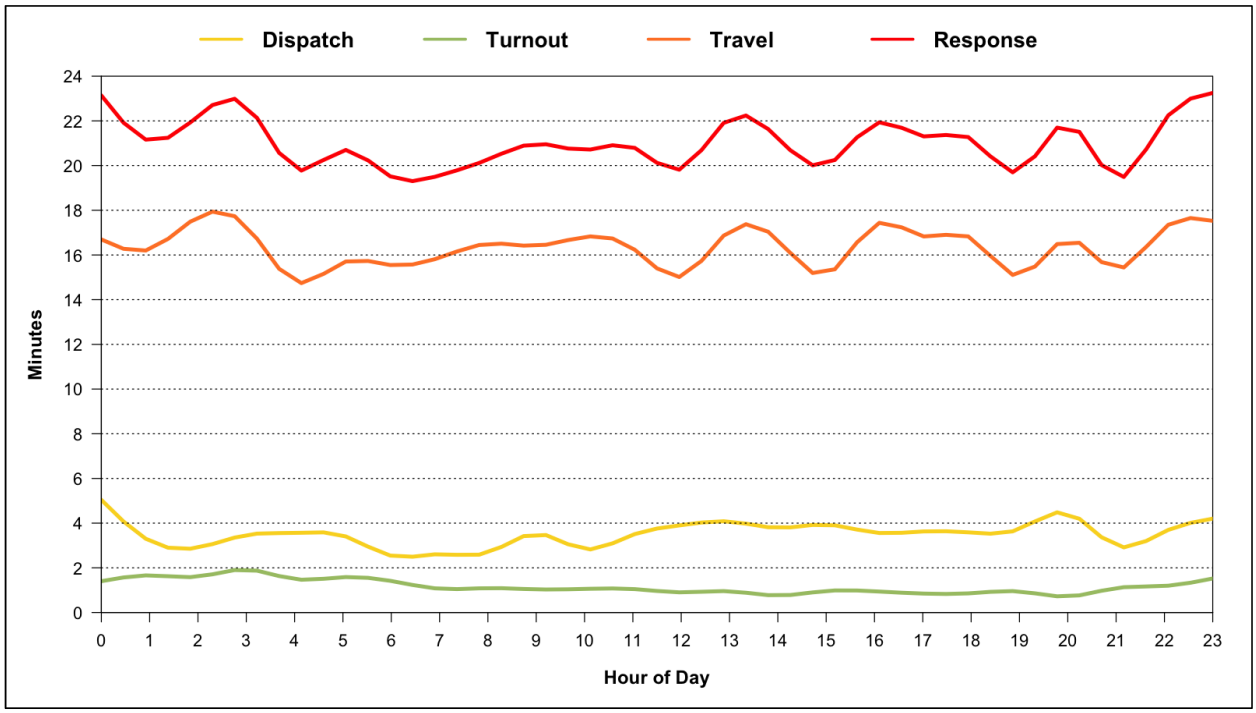
Response Time by Hour – Remote Areas

Average dispatch, turnout, travel, and total response time by hour for calls in the Remote Areas are shown in Table 10-25 and Figure 10-19. The table also shows 90th percentile time.

TABLE 10-25: Average and 90th Percentile Response Time of First Arriving Unit, by Hour of Day – Remote Areas

Hour	Dispatch	Turnout	Travel	Response Time	90th Percentile Response Time	Number of Calls
0	5.0	1.4	16.7	23.1	30.7	30
1	3.2	1.7	16.2	21.1	27.5	31
2	2.9	1.6	17.7	22.2	30.8	19
3	3.5	1.9	17.3	22.7	30.2	22
4	3.6	1.5	14.8	19.8	31.1	16
5	3.4	1.6	15.7	20.7	27.8	45
6	2.5	1.4	15.5	19.5	26.0	43
7	2.6	1.1	15.9	19.6	25.9	46
8	2.7	1.1	16.5	20.3	30.6	52
9	3.5	1.0	16.4	21.0	27.5	62
10	2.8	1.1	16.8	20.7	26.8	64
11	3.5	1.1	16.3	20.8	34.5	73
12	3.9	0.9	15.0	19.8	30.3	64
13	4.1	1.0	17.1	22.1	32.4	85
14	3.8	0.8	16.7	21.2	32.6	70
15	3.9	1.0	15.1	20.0	33.6	73
16	3.6	1.0	17.4	21.9	33.1	76
17	3.6	0.8	16.8	21.3	30.1	49
18	3.6	0.9	16.8	21.2	31.6	64
19	3.7	0.9	15.1	19.7	27.4	58
20	4.5	0.7	16.7	21.9	28.2	42
21	3.0	1.1	15.4	19.4	26.2	30
22	3.6	1.2	17.2	22.0	29.1	38
23	4.2	1.5	17.5	23.3	29.6	30

FIGURE 10-19: Average Response Time of First Arriving Unit, by Hour of Day – Remote Areas



Observations, Remote Areas:

- Average dispatch time was between 2.5 minutes (6:00 a.m. to 7:00 a.m.) and 5.0 minutes (midnight to 1:00 a.m.).
- Average turnout time was between 0.7 minutes (8:00 p.m. to 9:00 p.m.) and 1.9 minutes (3:00 a.m. to 4:00 a.m.).
- Average travel time was between 14.8 minutes (4:00 a.m. to 5:00 a.m.) and 17.7 minutes (2:00 a.m. to 3:00 a.m.).
- Average response time was between 19.4 minutes (9:00 p.m. to 10:00 p.m.) and 23.3 minutes (11:00 p.m. to midnight).
- 90th percentile total response time by hour ranged from 25.9 minutes (7:00 a.m. to 8:00 a.m.) and 34.5 minutes (11:00 a.m. to noon).

Response Time Distribution – Bakersfield JPA

A more detailed look at how response times to calls in the Bakersfield JPA are distributed is presented here. The cumulative distribution of total response time for the first arriving unit to EMS calls is shown in Figure 10-20 and Table 10-26. The cumulative distribution of total response time for the first and second arriving units to structure and outside fires combined is shown in Figure 10-21 and Table 10-27.

FIGURE 10-20: Cumulative Distribution of Response Time – First Arriving Unit to EMS Calls – Bakersfield JPA

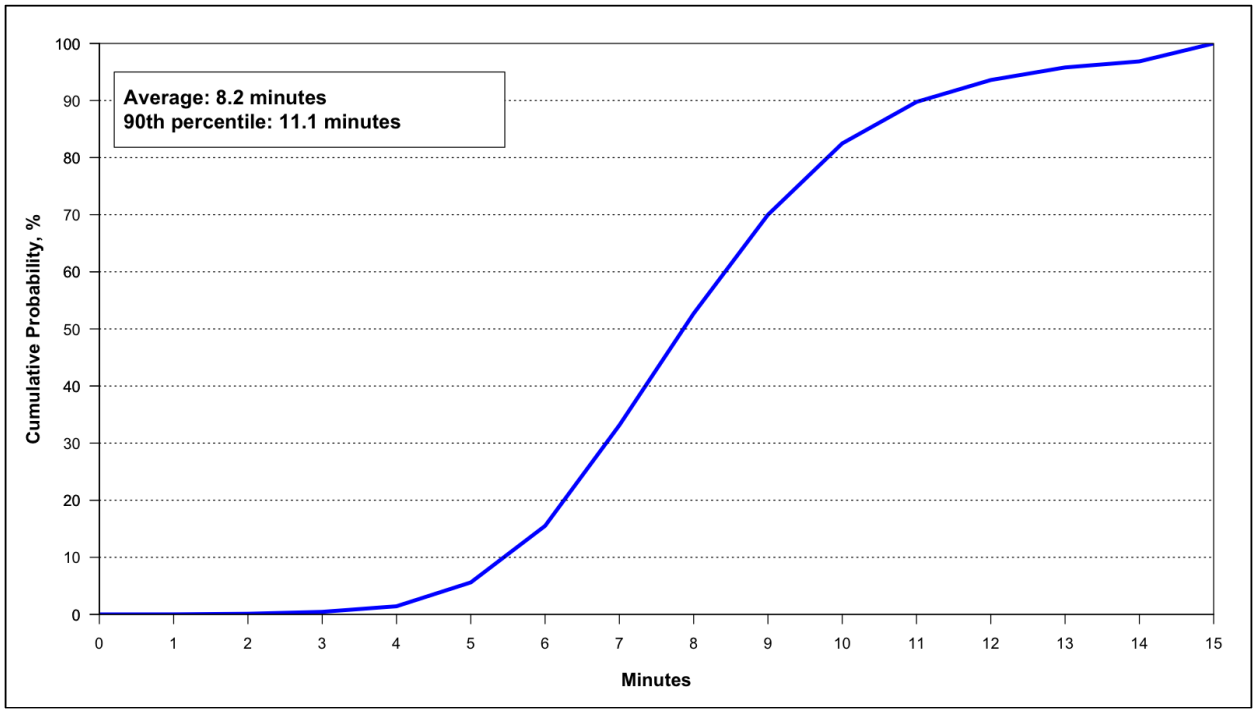


TABLE 10-26: Cumulative Distribution of Response Time – First Arriving Unit to EMS Calls – Bakersfield JPA

Response Time (minute)	Frequency	Cumulative Percentage
< 2	12	0.1
2 - 3	34	0.4
3 - 4	101	1.4
4 - 5	430	5.6
5 - 6	1,020	15.5
6 - 7	1,816	33.1
7 - 8	2,015	52.7
8 - 9	1,782	70.0
9 - 10	1,287	82.5
10 - 11	749	89.8
11 - 12	395	93.6
12 - 13	227	95.8
13 - 14	109	96.9
14+	324	100.0

FIGURE 10-21: Cumulative Distribution of Response Time – First and Second Arriving Units to Fires – Bakersfield JPA

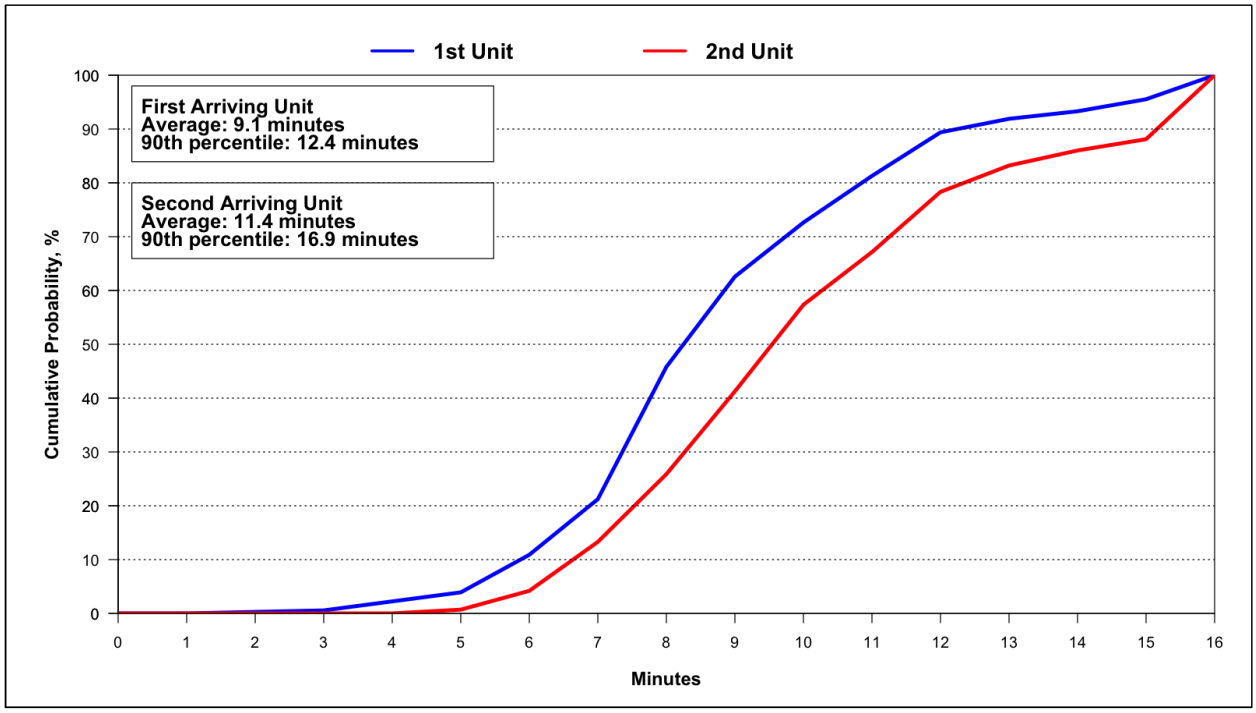


TABLE 10-27: Cumulative Distribution of Response Time – First and Second Arriving Units to Fires – Bakersfield JPA

Response Time (minute)	First Arriving Unit		Second Arriving Unit	
	Frequency	Cumulative Percentage	Frequency	Cumulative Percentage
< 2	1	0.3	0	0.0
2 - 3	1	0.6	0	0.0
3 - 4	6	2.2	0	0.0
4 - 5	6	3.9	1	0.7
5 - 6	25	10.9	5	4.2
6 - 7	37	21.2	13	13.3
7 - 8	88	45.8	18	25.9
8 - 9	60	62.6	22	41.3
9 - 10	36	72.6	23	57.3
10 - 11	31	81.3	14	67.1
11 - 12	29	89.4	16	78.3
12 - 13	9	91.9	7	83.2
13 - 14	5	93.3	4	86.0
14 - 15	8	95.5	3	88.1
15+	16	100.0	17	100.0

Observations, Bakersfield JPA:

- For 53 percent of EMS calls, the response time of the first arriving unit was less than 8 minutes.
- For 11 percent of structure and outside fire calls, the response time of the first arriving unit was less than 6 minutes.

RESPONSE TIME DISTRIBUTION – URBAN AREAS

A more detailed look at how response times to calls in the Urban Areas are distributed is presented here. The cumulative distribution of total response time for the first arriving unit to EMS calls is shown in Figure 10-22 and Table 10-28. The cumulative distribution of total response time for the first and second arriving units to structure and outside fires combined is shown in Figure 10-23 and Table 10-29.

FIGURE 10-22: Cumulative Distribution of Response Time – First Arriving Unit to EMS Calls – Urban Areas

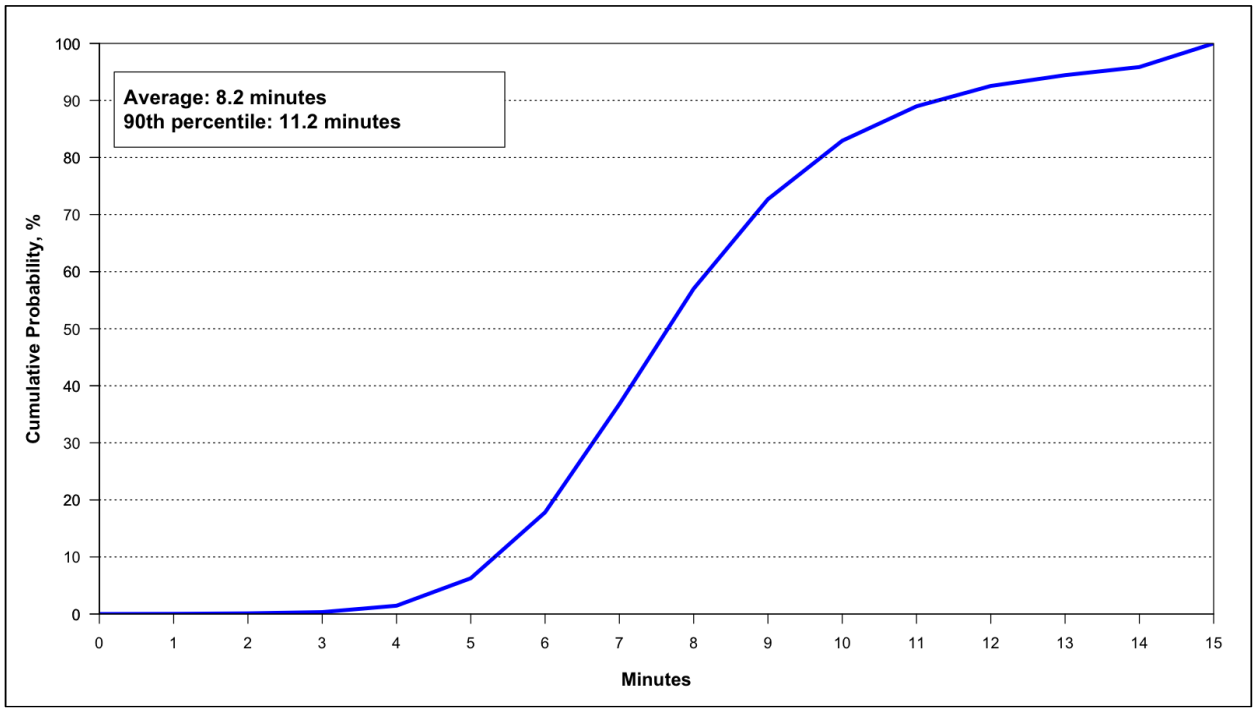


TABLE 10-28: Cumulative Distribution of Response Time – First Arriving Unit to EMS Calls – Urban Areas

Response Time (minute)	Frequency	Cumulative Percentage
< 2	7	0.1
2 - 3	13	0.3
3 - 4	66	1.5
4 - 5	285	6.3
5 - 6	683	17.8
6 - 7	1,122	36.8
7 - 8	1,196	57.0
8 - 9	928	72.7
9 - 10	606	82.9
10 - 11	357	89.0
11 - 12	211	92.5
12 - 13	112	94.4
13 - 14	84	95.9
14+	245	100.0

FIGURE 10-23: Cumulative Distribution of Response Time – First and Second Arriving Units to Fires – Urban Areas

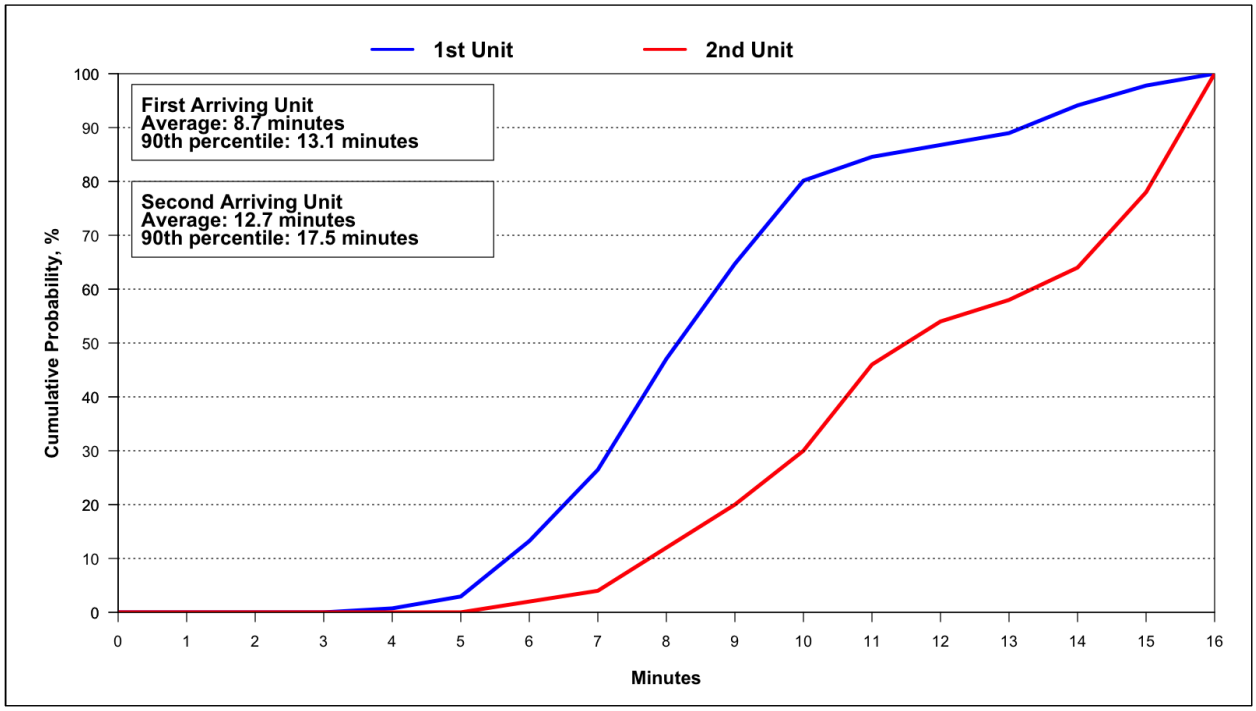


TABLE 10-29: Cumulative Distribution of Response Time – First and Second Arriving Units to Fires – Urban Areas

Response Time (minute)	First Arriving Unit		Second Arriving Unit	
	Frequency	Cumulative Percentage	Frequency	Cumulative Percentage
< 4	1	0.7	0	0.0
4 - 5	3	2.9	0	0.0
5 - 6	14	13.2	1	2.0
6 - 7	18	26.5	1	4.0
7 - 8	28	47.1	4	12.0
8 - 9	24	64.7	4	20.0
9 - 10	21	80.1	5	30.0
10 - 11	6	84.6	8	46.0
11 - 12	3	86.8	4	54.0
12 - 13	3	89.0	2	58.0
13 - 14	7	94.1	3	64.0
14 - 15	5	97.8	7	78.0
15+	3	100.0	11	100.0

Observations, Urban Areas:

- For 57 percent of EMS calls, the response time of the first arriving unit was less than 8 minutes.
- For 13 percent of structure and outside fire calls the response time of the first arriving unit was less than 6 minutes.

Response Time Distribution – Rural Areas

A more detailed look at how response times to calls in the Rural Areas are distributed is presented here. The cumulative distribution of total response time for the first arriving unit to EMS calls is shown in Figure 10-24 and Table 10-30. The cumulative distribution of total response time for the first and second arriving units to structure and outside fires combined is shown in Figure 10-25 and Table 10-31.

FIGURE 10-24: Cumulative Distribution of Response Time – First Arriving Unit to EMS Calls – Rural Areas

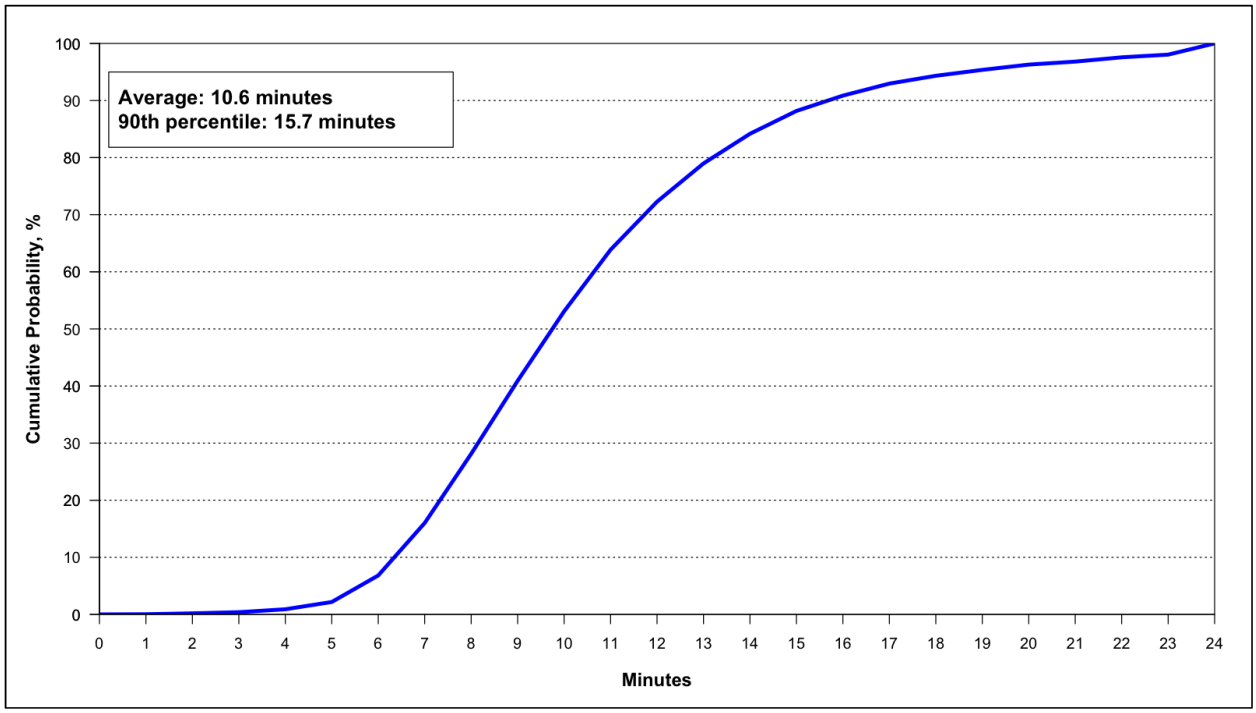


TABLE 10-30: Cumulative Distribution of Response Time – First Arriving Unit to EMS Calls – Rural Areas

Response Time (minute)	Frequency	Cumulative Percentage
< 2	14	0.2
< 3	15	0.4
3 - 4	38	0.9
4 - 5	95	2.2
5 - 6	346	6.8
6 - 7	685	16.0
7 - 8	902	28.1
8 - 9	953	40.9
9 - 10	906	53.1
10 - 11	804	63.9
11 - 12	627	72.3
12 - 13	499	79.0
13 - 14	387	84.2
14 - 15	298	88.2
15 - 16	200	90.9
16 - 17	157	93.0
17 - 18	102	94.3
18 - 19	77	95.4
19 - 20	69	96.3
20 - 21	39	96.8
21 - 22	56	97.6
22+	181	100.0

FIGURE 10-25: Cumulative Distribution of Response Time – First and Second Arriving Units to Fires – Rural Areas

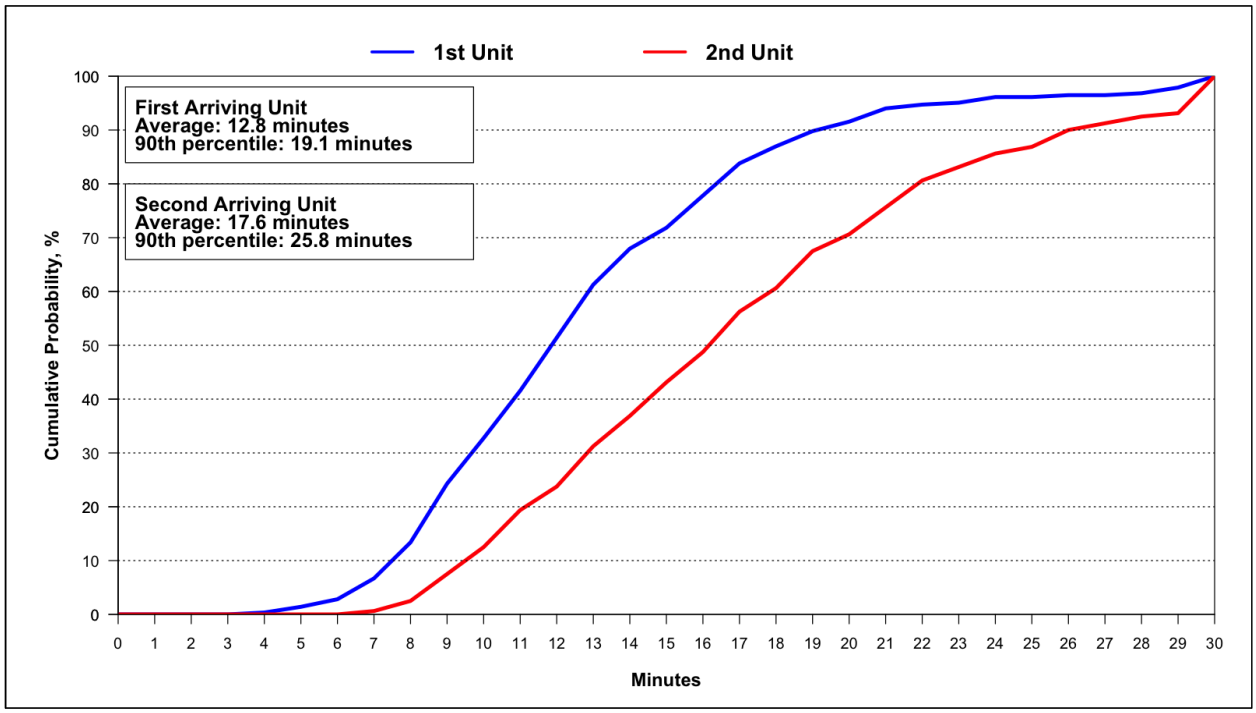


TABLE 10-31: Cumulative Distribution of Response Time – First and Second Arriving Units to Fire – Rural Areas

Response Time (minute)	First Arriving Unit		Second Arriving Unit	
	Frequency	Cumulative Percentage	Frequency	Cumulative Percentage
< 4	1	0.4	0	0.0
4 - 5	3	1.4	0	0.0
5 - 6	4	2.8	0	0.0
6 - 7	11	6.7	1	0.6
7 - 8	19	13.4	3	2.5
8 - 9	31	24.3	8	7.5
9 - 10	24	32.7	8	12.5
10 - 11	25	41.5	11	19.4
11 - 12	28	51.4	7	23.8
12 - 13	28	61.3	12	31.3
13 - 14	19	68.0	9	36.9
14 - 15	11	71.8	10	43.1
15 - 16	17	77.8	9	48.8
16 - 17	17	83.8	12	56.3
17 - 18	9	87.0	7	60.6
18 - 19	8	89.8	11	67.5
19 - 20	5	91.5	5	70.6
20 - 21	7	94.0	8	75.6
21 - 22	2	94.7	8	80.6
22 - 23	1	95.1	4	83.1
23 - 24	3	96.1	4	85.6
24+	11	100.0	23	100.0

Observations, Rural Areas:

- For 28 percent of EMS calls, the response time of the first arriving unit was less than 8 minutes.
- For 3 percent of structure and outside fire calls, the response time of the first arriving unit was less than 6 minutes.

Response Time Distribution – Remote Areas

A more detailed look at how response times to calls in the Remote Areas are distributed is presented here. The cumulative distribution of total response time for the first arriving unit to EMS calls is shown in Figure 10-26 and Table 10-32. The cumulative distribution of total response time for the first and second arriving units to structure and outside fires combined is shown in Figure 10-27 and Table 10-33.

FIGURE 10-26: Cumulative Distribution of Response Time – First Arriving Unit to EMS Calls – Remote Areas

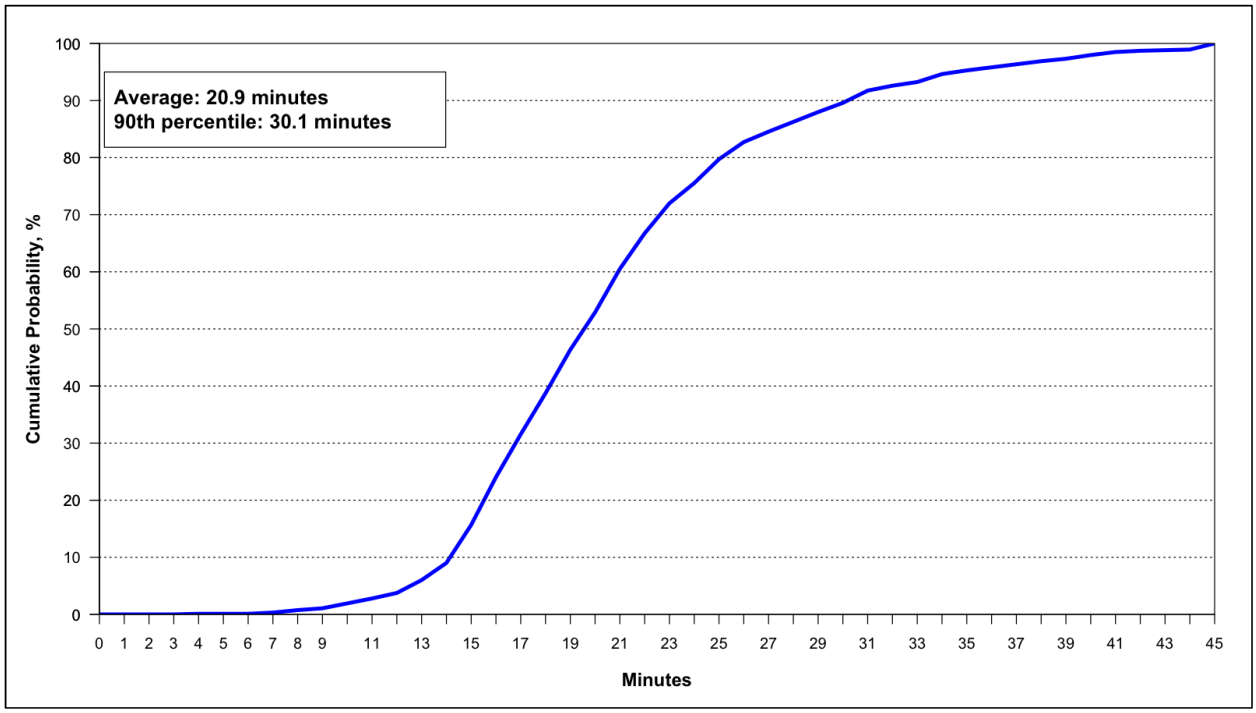


TABLE 10-32: Cumulative Distribution of Response Time – First Arriving Unit to EMS Calls – Remote Areas

Response Time (minute)	Frequency	Cumulative Percentage
< 8	7	0.8
8 - 10	11	1.9
10 - 12	17	3.8
12 - 14	49	9.0
14 - 16	140	24.0
16 - 18	137	38.7
18 - 20	132	52.9
20 - 22	129	66.7
22 - 24	82	75.5
24 - 26	67	82.7
26 - 28	33	86.3
28 - 30	31	89.6
30 - 32	28	92.6
32 - 34	19	94.6
34 - 36	11	95.8
36 - 38	10	96.9
38 - 40	10	98.0
40+	19	100.0

FIGURE 10-27: Cumulative Distribution of Response Time – First and Second Arriving Units to Fires – Remote Areas

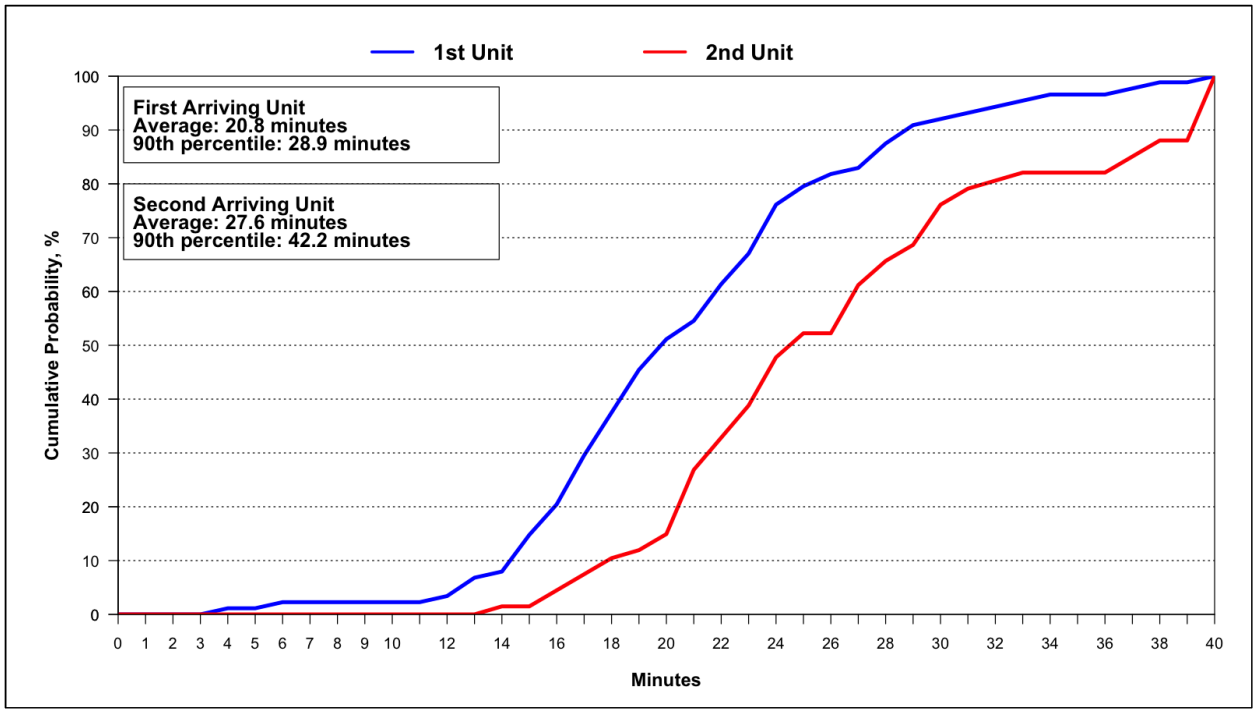


TABLE 10-33: Cumulative Distribution of Response Time – First and Second Arriving Units to Fires – Remote Areas

Response Time (minute)	First Arriving Unit		Second Arriving Unit	
	Frequency	Cumulative Percentage	Frequency	Cumulative Percentage
<12	3	3.4	0	0.0
12 - 14	4	8.0	1	1.5
14 - 16	11	20.5	2	4.5
16 - 18	15	37.5	4	10.4
18 - 20	12	51.1	3	14.9
20 - 22	9	61.4	12	32.8
22 - 24	13	76.1	10	47.8
24 - 26	5	81.8	3	52.2
26 - 28	5	87.5	9	65.7
28 - 30	4	92.0	7	76.1
30 - 32	2	94.3	3	80.6
32 - 34	2	96.6	1	82.1
34+	3	100.0	12	100.0

Observations, Remote Areas:

- For 1 percent of EMS calls, the response time of the first arriving unit was less than 8 minutes.
- Zero percent of structure and outside fire calls had a response time of less than 6 minutes.

SHARED RESPONSE

Multiple agencies provide emergency response services within Kern County. In this section, we look at how response by those agencies affect response times to KCFD calls. The agencies that KCFD shares response with the most are the Bakersfield Fire Department (BFD), California City Fire Department (CCFD), Delano Ambulance, Hall Ambulance, and Liberty Ambulance.

Shared response with BFD is primarily within the Bakersfield Joint Protection Area, where BFD and KCFD share coverage under a closest unit response agreement. Delano Ambulance provides service in and around the cities of Delano and McFarland; Liberty Ambulance provides service in and around Ridgecrest; and Hall Ambulance provides service in the rest of the county.

A full analysis of responses by other agencies in Kern County was beyond the scope of this study; however, we looked at the calls to which KCFD and one or more other agencies responded during the study period to measure call response time from a citizen's perspective. The analysis includes only calls to which KCFD was dispatched and went en route or arrived.

Response Times

We analyzed shared call response times for fire calls and EMS calls separately. When analyzing fire calls, we only included other responding fire departments. Another fire department was the first or only agency to arrive to less than one percent of KCFD fire calls. The effect on response time calculations was negligible.

For EMS calls, we included both ambulance companies and other fire departments. As with KCFD analysis, all administrative units were excluded. Response time calculations were performed in a manner like the previous section with one exception. As we only measure total response time, a unit only needed an arrival time to be included.

Table 10-34 shows the number of EMS calls by analysis subarea to which KCFD and one or more other agencies responded and whether KCFD or another agency arrived first when both arrived. Totals will be slightly larger than similar values for EMS calls in Table 10-13.

Table 10-35 shows the average response time of the first arriving unit based on analysis subarea for calls when KCFD arrived regardless of who arrived first.

TABLE 10-34: EMS Calls with Shared Response

	Calls with Arriving Unit				
	Both				
Analysis Subarea	KCFD First	Other First	KCFD Only	Other Only	Total
Bakersfield JPA	6,907	2,463	1,053	30	10,453
Urban	3,082	2,041	891	17	6,031
Rural	3,647	2,489	1,505	14	7,655
Remote	420	228	302	2	952

Note: Totals will be slightly larger than similar values for EMS calls in Table 10-13.

TABLE 10-35: Response Time – EMS Calls with Shared Response

Analysis Subarea	Response Time	
	Average	90th Percentile
Bakersfield JPA	7.7	10.4
Urban	7.5	10.3
Rural	9.7	14.4
Remote	19.7	28.7

Observations:

- Both KCFD and at least one other agency arrived at 85 percent of EMS calls.
- EMS calls in the Remote Areas were least likely to have two agencies arrive (68 percent) and calls in the JPA were most likely to have two agencies arrive (90 percent).
- Another agency was the first or only agency to arrive to 29 percent of EMS calls overall.
- Another agency was most likely to be the first or only agency to arrive to EMS calls in the Urban Areas (34 percent) and least likely to be the first or only agency in the Remote Areas (24 percent)
- When all agencies were considered, average response time to EMS calls decreased between 0.5 minutes (JPA) and 1.2 minutes (Remote Areas).
- 90th percentile response time to EMS calls decreased between 0.7 minutes (JPA) and 1.4 minutes (Remote Areas).

WILDLAND FIRES

In this section, we provide more detail on wildland fires in Kern County. A wildland fire for this analysis was defined as a vegetation fire in the Rural or Remote Areas and which burned at least one acre or had a duration of more than two hours and burned more than 0.01 acres. This excluded seven calls with durations between two and five hours but only 0.01 acres burned. Mutual aid calls for wildland fires were also excluded.

Tables 10-36 through 10-38 quantify wildfires in three ways: by acres burned and duration (Table 10-36), by number of units deployed (Table 10-37), and by workload (Table 1038). Table 10-39 gives a summary of how wildfire calls and workload are distributed through the year.

TABLE 10-36: Wildland Fire Calls by Acres Burned and Duration

Acres Burned	Duration			Total Calls
	Under 12 Hours	12 to 24 Hours	More than 24 Hours	
Less than 1	9	0	0	9
1 to 10	78	0	3	81
More than 10	26	1	13	40
Unknown	2	2	2	6
Total	**115**	**3**	**18**	**136**
Avg. Duration (Hours)	**3.1**	**14.9**	**110.3**	**17.5**

TABLE 10-37: Wildland Fire Calls by Number of Units Deployed

Number of Units	Number of Calls	Average Units per Call
1 – 10	50	6.4
11 – 20	75	14.5
20+	11	26.2
Total	**136**	**12.5**

TABLE 10-38: Runs and Deployed Time for Wildland Fire Calls

Duration	Total Annual Runs	Avg. Runs per Call	Total Annual Hours	Avg. Deployed Hours per Run
Under 12 hours	1,252	10.9	2,433.3	1.9
12 to 24 hours	56	18.7	322.5	5.8
More than 24 hours	452	25.1	15,392.7	34.1
Total	**1,760**	**12.9**	**18,148.5**	**10.3**

Note: Average runs per call is higher than average units per call because some units had more than one run per call.

TABLE 10-39: Wildland Fire Calls and Workload by Month

Year	Month	Number of Calls	Avg. Runs per Call	Percent of Total Annual Hours
2016	August	21	17.9	54.2
	September	11	12.0	2.9
	October	5	11.8	0.6
	November	6	9.5	0.5
2017	April	10	9.8	1.3
	May	26	11.7	6.7
	June	34	11.8	10.3
	July	23	14.5	23.4
Total		**136**	**12.9**	**100.0**

Note: There were no wildfires in December 2016 or January through March 2017. Total deployed hours in a month based on when the call began and may include time worked in the following month(s).

Observations:

- 66 percent of wildland fires burned 10 acres or less, and 85 percent were extinguished in less than 12 hours.
- On average, 12.5 units were deployed to wildland fires with more than 20 units deployed to 8 percent of calls.
- 18 calls (13 percent of calls) lasted more than 24 hours and were responsible for 85 percent of the total deployed time.
- More than half the workload for wildland fires was for calls starting in August 2016.

TABLE 10-40: Actions Taken Analysis for Structure and Outside Fire Calls

Action Taken	Number of Calls	
	Outside Fire	Structure Fire
Action taken, other	17	26
Fire control or extinguishment, other	8	11
Extinguishment by fire service personnel	1,737	730
Salvage & overhaul	73	190
Establish fire lines (wildfire)	59	1
Contain fire (wildland)	53	2
Confine fire (wildland)	6	0
Control fire (wildland)	72	5
Manage prescribed fire (wildland)	1	0
Search	2	3
Rescue, remove from harm	0	3
Recover body	1	1
Emergency medical services, other	1	0
Provide first aid & check for injuries	2	3
Provide basic life support (BLS)	5	3
Hazardous condition, other	1	1
Identify, analyze hazardous materials	2	0
Remove hazard	0	1
Decontaminate persons or equipment	1	0
Ventilate	0	29
Forcible entry	3	5
Evacuate area	0	2
Determine if materials are non-hazardous	1	0
Establish safe area	21	1
Restore fire alarm system	0	1
Shut down system	1	10
Assistance, other	2	0
Provide manpower	18	16
Provide equipment	0	1
Control traffic	1	0
Information, investigation & enforcement, other	9	6
Incident command	33	22
Notify other agencies.	24	8
Provide information to public or media	2	2
Refer to proper authority	23	6
Enforce codes	2	1

Action Taken	Number of Calls	
	Outside Fire	Structure Fire
Investigate	195	147
Investigate fire out on arrival	162	94
Standby	6	5
Total	**2,544**	**1,336**

Note: Totals are higher than the total number of structure and outside fire calls because some calls had more than one action taken.

Observations:

- A total of 1,737 outside fires were extinguished by fire service personnel, which accounted for 82 percent of outside fires.
- A total of 730 structure fires were extinguished by fire service personnel, which accounted for 75 percent of structure fires.

Nearly all fires had more than zero dollars in loss recorded; however, 58 percent of outside fires and 45 percent of structure fires with recorded loss had a total of $2 in loss. In these cases, there was $1 in property loss and $1 in content loss. This is likely a reporting issue and not reflective of actual loss amounts. These calls were counted as having no loss in the analysis below.

TABLE 10-41: Content and Property Loss – Structure and Outside Fires

Call Type	Content Loss		Property Loss	
	Number of Calls	Loss Value	Number of Calls	Loss Value
Outside fire	862	$3,233,706	879	$12,851,676
Structure fire	529	$3,456,382	535	$13,115,679
Total	**1,391**	**$6,690,088**	**1,414**	**$25,967,355**

Note: This includes only calls with recorded loss greater than $2.

Observations:

Outside Fires

- Out of 2,112 outside fires, 879 had recorded property loss, with a combined $12,851,676 in loss.
- 862 outside fires also had content loss with a combined $3,233,706 in loss.
- The highest total loss for an outside fire was $1,500,001.

Structure Fires

- Out of 973 structure fires, 535 had recorded property loss, with a combined $13,115,679 in loss.
- 529 structure fires also had content loss with a combined $3,456,382 in loss.
- The average total loss for all structure fires was $17,032.
- The average total loss for structure fires with loss was $30,976.
- The highest total loss for a structure fire was $500,000.

TABLE 10-42: Total Fire Loss Above and Below $20,000

Call Type	No Loss	Under $20,000	$20,000 plus
Outside fire	1,233	718	161
Structure fire	438	351	184
Total	**1,671**	**1,069**	**345**

Observations:

- 1,233 outside fires and 438 structure fires had no recorded loss.
- 161 outside fires and 184 structure fires had $20,000 or more in loss.

TABLE 10-43: Fire Loss by Station and Battalion

Battalion & Station		Outside Fires			Structure Fires			Total Losses
		With Loss	$20,000+ Loss	Average Loss	With Loss	$20,000+ Loss	Average Loss	
1	11	21	8	$46,282	3	0	$9,000	$998,920
	12	10	4	$34,461	8	1	$13,041	$448,929
	13	7	1	$5,272	12	6	$72,292	$904,407
	14	16	6	$116,044	12	7	$47,596	$2,427,863
	15	17	3	$8,865	11	4	$27,037	$448,111
	16	1	0	$5,001	3	2	$42,334	$132,002
	17	4	0	$5,100	5	1	$16,420	$102,502
	18	2	0	$7,751	1	1	$22,000	$37,501
	Total	**78**	**22**	**$43,612**	**55**	**22**	**$38,154**	**$5,500,235**
2	21	19	1	$5,498	32	13	$35,230	$1,231,829
	22	8	2	$29,597	2	1	$35,251	$307,277
	23	—	—	—	—	—	—	—
	24	7	0	$1,909	—	—	—	$13,363
	25	18	4	$27,876	5	1	$10,090	$552,213
	26	39	8	$13,921	5	3	$32,220	$704,020
	Total	**91**	**15**	**$15,377**	**44**	**18**	**$32,032**	**$2,808,702**
3	31	35	4	$10,004	20	6	$28,683	$923,808
	32	37	8	$13,590	17	3	$11,391	$696,472
	33	38	8	$21,451	8	4	$81,750	$1,469,131
	34	34	5	$7,612	19	5	$16,321	$568,901
	35	3	0	$214	—	—	—	$643
	36	1	0	$5,000	—	—	—	$5,000
	37	34	5	$11,150	13	6	$48,146	$1,004,991
	Total	**182**	**30**	**$12,701**	**77**	**24**	**$30,615**	**$4,668,946**
4	41	44	1	$3,286	41	18	$26,824	$1,244,368
	42	47	2	$3,914	31	9	$25,478	$973,776
	45	47	11	$22,135	3	0	$1,667	$1,045,324
	51	33	5	$27,707	18	5	$24,259	$1,350,985
	52	34	9	$23,073	13	4	$15,802	$989,895
	53	14	3	$11,250	5	2	$31,420	$314,605
	Total	**219**	**31**	**$14,727**	**111**	**38**	**$24,269**	**$5,918,953**
5	54	32	3	$8,895	14	8	$38,987	$830,439
	55	51	26	$47,619	2	1	$58,000	$2,544,591
	56	33	7	$23,013	1	0	$10,001	$769,417
	57	3	0	$3,167	5	2	$20,750	$113,252
	58	—	—	—	1	0	$1,500	$1,500
	Total	**119**	**36**	**$29,262**	**23**	**11**	**$33,785**	**$4,259,199**

Battalion & Station		Outside Fires			Structure Fires			Total Losses
		With Loss	$20,000+ Loss	Average Loss	With Loss	$20,000+ Loss	Average Loss	
6	61	19	4	$21,240	14	3	$19,018	$669,817
	62	1	1	$150,001	23	6	$14,956	$150,001
	63	29	3	$7,603	79	24	$24,923	$564,477
	64	48	4	$5,680	23	2	$9,688	$2,241,514
	65	16	1	$7,102	7	3	$100,587	$336,453
	66	18	4	$17,362	11	3	$35,876	$1,016,623
	67	20	3	$7,914	14	3	$19,018	$552,916
	Total	**151**	**20**	**$10,802**	**157**	**41**	**$24,845**	**$5,531,801**
7	71	—	—	—	11	5	$46,273	$509,003
	72	6	1	$22,434	8	4	$34,763	$412,705
	73	3	2	$45,667	7	2	$47,172	$467,201
	74	13	1	$13,380	22	7	$39,112	$1,034,406
	75	2	2	$75,051	1	1	$75,000	$225,101
	76	3	0	$3,199	7	5	$125,243	$886,297
	77	12	1	$2,424	11	5	$34,891	$412,894
	78	—	—	—	1	1	$22,000	$22,000
	Total	**39**	**7**	**$16,265**	**68**	**30**	**$49,048**	**$3,969,607**

Observations:

Outside Fires

- Station 55 had the most outside fires with loss (51), highest total outside fire loss ($2,428,591), and most outside fires with more than $20,000 in loss (26).
- Excluding areas with only one outside fire, Station 14 had the highest average loss on outside fires with recorded loss at $116,044 per fire.

Structure Fires

- Station 64 had the most structure fires with loss (79), highest total structure fire loss ($1,968,880), and most structure fires with over $20,000 in loss (24).
- Station 76 had the highest average loss on structure fires with recorded loss at $125,243 per fire.

TABLE 10-44: Workload of Administrative and Support Units

Unit ID	Unit Type	Annual Hours	Annual Runs
AU1	Arson Unit	9.1	4
AU11	Arson Unit	1.4	2
AU2	Arson Unit	367.9	82
AU3	Arson Unit	268.0	122
AU4	Arson Unit	139.1	85
AU5	Arson Unit	163.8	78
AU6	Arson Unit	111.0	67
AU7	Arson Unit	265.3	119
AU8	Arson Unit	72.9	28
AU9	Arson Unit	1.1	1
C3	Staff	0.2	3
C4	Staff	18.2	5
C5	Staff	83.9	4
C6	Staff	3.8	6
DO1	Duty Officer	3.9	5
DO2	Duty Officer	22.6	11
DO3	Duty Officer	44.9	11
KPIO	Public Information	382.5	103
KPIO2	Public Information	21.6	12
OES5265	Communications/Command Vehicle	0.5	1
PREV10	Fire Prevention Inspector	0.3	3
PREV11	Fire Prevention Inspector	194.9	30
PREV2	Fire Prevention Inspector	8.6	3
PREV3	Fire Prevention Inspector	10.4	5
PREV4	Fire Prevention Inspector	0.2	1
PREV5	Fire Prevention Inspector	3.7	2
PREV6	Fire Prevention Inspector	0.3	3
PREV7	Fire Prevention Inspector	8.5	6
PREV8	Fire Prevention Inspector	4.4	4
PREV9	Fire Prevention Inspector	11.4	11
SF1	Safety Officer	78.0	73
SF2	Safety Officer	76.6	56
SF3	Safety Officer	243.1	101
SF4	Safety Officer	79.6	77
SF5	Safety Officer	70.9	44
SF6	Safety Officer	253.9	127

Unit ID	Unit Type	Annual Hours	Annual Runs
SF7	Safety Officer	271.9	48
SUP10	Wildland Supervisor	0.1	1
SUP408	Wildland Supervisor	1.1	1
SUP7	Wildland Supervisor	36.4	25

TABLE 10-45: Workload by Unit

Battalion & Station		Unit Type	Unit ID	Avg. Deployed Min. per Run	Total Annual Hours	Avg. Deployed Mins. Per Day	Total Annual Runs	Avg. Runs per Day
1	11	Engine	E11	31.4	217.1	35.7	415	1.1
		Battalion Chief	KB1	56.0	969.1	159.3	1,038	2.8
		Engine	P11	88.5	271.3	44.6	184	0.5
		Water Tender	WT11	292.9	707.9	116.4	145	0.4
		Total		**72.9**	**2,165.4**	**356.0**	**1,782**	**4.9**
	12	Engine	E12	22.4	446.3	73.4	1,197	3.3
		Engine	E312	140.8	91.5	15.0	39	0.1
		Engine	P12	59.1	232.5	38.2	236	0.6
		Total		**31.4**	**770.3**	**126.6**	**1,472**	**4.0**
	13	Engine	E13	25.6	483.6	79.5	1,132	3.1
		Engine	P13	52.5	216.1	35.5	247	0.7
		Total		**30.4**	**699.7**	**115.0**	**1,379**	**3.8**
	14	Engine	E14	19.9	578.5	95.1	1,745	4.8
		Engine	E314	227.7	280.8	46.2	74	0.2
		Reserve Engine	P414	43.0	73.2	12.0	102	0.3
		Total		**29.1**	**932.5**	**153.3**	**1,921**	**5.3**
	15	Engine	E15	21.8	700.0	115.1	1,929	5.3
		Reserve Engine	E415	16.1	1.1	0.2	4	0.0
		Engine	P15	53.0	67.1	11.0	76	0.2
		Total		**22.9**	**768.1**	**126.3**	**2,009**	**5.5**
	16	Engine	E16	35.2	299.6	49.2	510	1.4
		Engine	P16	47.3	163.0	26.8	207	0.6
		Total		**38.7**	**462.6**	**76.0**	**717**	**2.0**
	17	Engine	E17	26.4	312.8	51.4	712	2.0
		Engine	P17	34.9	21.5	3.5	37	0.1
		Total		**26.8**	**334.3**	**55.0**	**749**	**2.1**

Battalion & Station		Unit Type	Unit ID	Avg. Deployed Min. per Run	Total Annual Hours	Avg. Deployed Mins. Per Day	Total Annual Runs	Avg. Runs per Day
1	18	Engine	E18	30.6	147.8	24.3	290	0.8
		Engine	E318	2,706.9	857.2	140.9	19	0.1
		Engine	P18	59.4	95.1	15.6	96	0.3
		Total		**163.0**	**1,100.1**	**180.8**	**405**	**1.1**
	Total			**41.6**	**7,233.0**	**1,189.0**	**10,434**	**28.6**
2	21	Engine	E21	17.5	526.0	86.5	1,805	4.9
		Battalion Chief	KB2	54.4	520.9	85.6	575	1.6
		Engine	P21	124.7	143.4	23.6	69	0.2
		Ladder Truck	TK21	19.8	170.2	28.0	517	1.4
		Total		**27.5**	**1,360.6**	**223.7**	**2,966**	**8.1**
	22	Engine	E22	34.0	200.3	32.9	353	1.0
		Reserve Engine	E422	38.6	1.3	0.2	2	0.0
		Engine	P22	66.2	46.3	7.6	42	0.1
		Total		**37.5**	**247.9**	**40.7**	**397**	**1.1**
	23	Engine	E23	30.8	126.9	20.9	247	0.7
		Engine (OES)	E280	12,391.8	413.1	67.9	2	0.0
		Engine	P23	71.8	107.8	17.7	90	0.2
		Total		**114.6**	**647.7**	**106.5**	**339**	**0.9**
	24	Engine	E24	34.2	119.1	19.6	209	0.6
		Engine	P24	60.5	71.6	11.8	71	0.2
		Total		**40.9**	**190.7**	**31.3**	**280**	**0.8**
	25	Engine	E25	30.6	333.1	54.8	653	1.8
		Engine (OES)	E8531	3,213.4	1,606.7	264.1	30	0.1
		Engine	P25	49.3	76.4	12.6	93	0.3
		Total		**155.9**	**2,016.2**	**331.4**	**776**	**2.1**

Battalion & Station		Unit Type	Unit ID	Avg. Deployed Min. per Run	Total Annual Hours	Avg. Deployed Mins. Per Day	Total Annual Runs	Avg. Runs per Day
2	26	Engine	E26	43.2	388.6	63.9	540	1.5
		Engine	E326	1,090.4	963.2	158.3	53	0.1
		Reserve Engine	P426	53.7	32.2	5.3	36	0.1
		Total		**132.0**	**1,384.0**	**227.5**	**629**	**1.7**
	Total			**65.1**	**5,847.0**	**961.2**	**5,387**	**14.8**
3	31	Engine	E31	19.0	624.7	102.7	1,976	5.4
		Engine	P31	83.6	125.4	20.6	90	0.2
		Water Tender (OES)	WT51	390.7	586.0	96.3	90	0.2
		Total		**37.2**	**1,336.1**	**219.6**	**2,156**	**5.9**
	32	Engine	E32	19.7	636.9	104.7	1,943	5.3
		Reserve Engine	E432	26.1	2.6	0.4	6	0.0
		Engine	P32	47.1	57.3	9.4	73	0.2
		Total		**20.7**	**696.8**	**114.5**	**2,022**	**5.5**
	33	Engine	E33	23.6	531.6	87.4	1,349	3.7
		Engine (OES)	E8533	6,257.5	1,668.7	274.3	16	0.0
		Battalion Chief	KB3	90.5	1,664.7	273.7	1,104	3.0
		Reserve Engine	P433	123.1	141.6	23.3	69	0.2
		Total		**94.7**	**4,006.6**	**658.6**	**2,538**	**7.0**
	34	Engine	E34	20.1	530.1	87.1	1,582	4.3
		Reserve Engine	E434	31.9	28.7	4.7	54	0.1
		Engine	P34	36.5	34.7	5.7	57	0.2
		Total		**21.0**	**593.4**	**97.5**	**1,693**	**4.6**
	35	Engine	E335	137.3	343.4	56.4	150	0.4
		Reserve Engine	E435	1,327.8	66.4	10.9	3	0.0
		Engine	P35	111.5	128.2	21.1	69	0.2
		Total		**145.4**	**538.0**	**88.4**	**222**	**0.6**

Battalion & Station		Unit Type	Unit ID	Avg. Deployed Min. per Run	Total Annual Hours	Avg. Deployed Mins. Per Day	Total Annual Runs	Avg. Runs per Day
3	36	Engine	E336	106.4	266.1	43.7	150	0.4
		Reserve Engine	E436	126.0	16.8	2.8	8	0.0
		Engine	P36	141.3	164.8	27.1	70	0.2
		Total		**117.8**	**447.7**	**73.6**	**228**	**0.6**
	37	Engine	E37	23.1	537.2	88.3	1,393	3.8
		Engine	P37	69.2	93.4	15.4	81	0.2
		Total		**25.7**	**630.6**	**103.7**	**1,474**	**4.0**
	Total			**47.9**	**8,249.2**	**1,356.0**	**10,333**	**28.3**
4	41	Engine	E41	18.3	1,008.5	165.8	3,313	9.1
		Battalion Chief	KB4	36.2	1,140.7	187.5	1,891	5.2
		Engine	P41	142.8	380.7	62.6	160	0.4
		Ladder Truck	TK41	17.9	629.3	103.4	2,105	5.8
		Total		**25.4**	**3,159.2**	**519.3**	**7,469**	**20.5**
	42	Engine	E42	18.9	1,103.5	181.4	3,511	9.6
		Reserve Engine	E442	12.4	2.5	0.4	12	0.0
		Engine	P42	79.9	324.9	53.4	244	0.7
		Total		**22.8**	**1,430.8**	**235.2**	**3,767**	**10.3**
	45	Engine	E345	215.0	526.7	86.6	147	0.4
		Engine	E45	26.9	454.0	74.6	1,014	2.8
		Engine	P445	235.6	184.6	30.3	47	0.1
		Total		**57.9**	**1,165.2**	**191.5**	**1,208**	**3.3**
	51	Engine	E51	21.2	544.8	89.6	1,540	4.2
		Engine	P51	63.4	151.0	24.8	143	0.4
		Total		**24.8**	**695.8**	**114.4**	**1,683**	**4.6**
	52	Engine	E52	21.7	623.9	102.6	1,728	4.7
		Engine	P52	87.0	136.3	22.4	94	0.3
		Engine	REM52	96.0	1.6	0.3	1	0.0
		USAR	USR52	34.4	64.8	10.7	113	0.3
		Total		**25.6**	**826.6**	**135.9**	**1,936**	**5.3**

Battalion & Station		Unit Type	Unit ID	Avg. Deployed Min. per Run	Total Annual Hours	Avg. Deployed Mins. Per Day	Total Annual Runs	Avg. Runs per Day
4	53	Engine	E53	30.7	348.8	57.3	682	1.9
		Engine	P53	371.4	445.6	73.3	72	0.2
		Total		**63.2**	**794.5**	**130.6**	**754**	**2.1**
	Total			**28.8**	**8,072.1**	**1,326.9**	**16,817**	46.1
5	54	Reserve Engine	E454	30.7	4.1	0.7	8	0.0
		Engine	E54	22.6	514.2	84.5	1,367	3.7
		Engine	P54	98.1	187.9	30.9	115	0.3
		Total		**28.4**	**706.2**	**116.1**	**1,490**	**4.1**
	55	Engine	E55	32.2	339.0	55.7	632	1.7
		Engine (OES)	E8532	1,385.2	946.5	155.6	41	0.1
		Battalion Chief	KB5	73.6	809.8	133.1	660	1.8
		Engine	P55	97.4	137.9	22.7	85	0.2
		Ladder Truck	TK55	25.8	181.5	29.8	422	1.2
		Water Tender	WT55	109.4	293.5	48.2	161	0.4
		Total		**81.2**	**2,708.2**	**445.2**	**2,001**	**5.5**
	56	Engine	E356	392.1	254.9	41.9	39	0.1
		Engine	E56	25.0	295.5	48.6	708	1.9
		Reserve Engine	P456	90.3	13.5	2.2	9	0.0
		Total		**44.8**	**563.9**	**92.7**	**756**	**2.1**
	57	Engine	E357	40.8	481.8	79.2	709	1.9
		Engine	P57	66.9	47.9	7.9	43	0.1
		Total		**42.3**	**529.7**	**87.1**	**752**	**2.1**
	58	Reserve Engine	E458	38.7	5.8	1.0	9	0.0
		Engine	E58	38.3	206.7	34.0	324	0.9
		Engine	P58	45.7	86.0	14.1	113	0.3
		Total		**40.2**	**298.5**	**49.1**	**446**	**1.2**
	Total			**53.0**	**4,806.5**	**790.1**	**5,445**	**14.9**

Battalion & Station		Unit Type	Unit ID	Avg. Deployed Min. per Run	Total Annual Hours	Avg. Deployed Mins. Per Day	Total Annual Runs	Avg. Runs per Day
6	61	Engine	E61	17.0	583.1	95.9	2,059	5.6
		Engine	P61	119.1	240.1	39.5	121	0.3
		USAR	USR61	28.0	35.0	5.8	75	0.2
		Total		**27.9**	**1,787.3**	**293.8**	**3,841**	**10.5**
	62	ARFF	ARFF1	27.5	13.7	2.3	30	0.1
		ARFF	ARFF2	37.8	19.5	3.2	31	0.1
		ARFF	ARFF3	30.8	1.0	0.2	2	0.0
		Total		**32.7**	**34.3**	**5.6**	**63**	**0.2**
	63	Engine	E363	508.0	855.2	140.6	101	0.3
		Engine	E63	18.8	842.9	138.6	2,697	7.4
		Reserve Engine	P463	65.2	35.9	5.9	33	0.1
		Total		**36.8**	**1,734.0**	**285.0**	**2,831**	**7.8**
	64	Reserve Engine	E464	12.8	1.1	0.2	5	0.0
		Engine	E64	16.0	1,288.1	211.7	4,818	13.2
		Engine	P64	73.5	211.8	34.8	173	0.5
		Total		**18.0**	**1,501.0**	**246.7**	**4,996**	**13.7**
	65	Engine	E65	17.8	680.1	111.8	2,293	6.3
		Battalion Chief	KB6	35.1	929.1	152.7	1,586	4.3
		Engine	P65	63.6	103.9	17.1	98	0.3
		Ladder Truck	TK65	18.0	392.1	64.5	1,305	3.6
		Total		**23.9**	**2,105.2**	**346.1**	**5,282**	**14.5**
	66	Breathing Support Truck	BS66	96.1	126.6	20.8	79	0.2
		Engine	E66	18.3	302.7	49.8	991	2.7
		Hazardous Materials	HM66	79.8	66.5	10.9	50	0.1
		Engine	P66	70.0	113.1	18.6	97	0.3
		Total		**30.0**	**608.9**	**100.1**	**1,217**	**3.3**

Battalion & Station		Unit Type	Unit ID	Avg. Deployed Min. per Run	Total Annual Hours	Avg. Deployed Mins. Per Day	Total Annual Runs	Avg. Runs per Day
6	67	Reserve Engine	E467	22.8	12.5	2.1	33	0.1
		Engine	E67	21.6	500.3	82.2	1,390	3.8
		Engine	P67	86.5	95.1	15.6	66	0.2
		Water Tender	WT67	138.7	210.3	34.6	91	0.2
		Total		**31.1**	**818.2**	**134.5**	**1,580**	**4.3**
	Total			**25.2**	**7,659.9**	**1,259.2**	**18,224**	**49.9**
7	71	Engine	E371	756.8	655.9	107.8	52	0.1
		Reserve Engine	E471	15.0	2.0	0.3	8	0.0
		Engine	E71	33.5	575.3	94.6	1,029	2.8
		Battalion Chief	KB7	53.4	555.5	91.3	624	1.7
		Engine	P71	176.4	244.1	40.1	83	0.2
		Total		**67.9**	**2,032.7**	**334.1**	**1,796**	**4.9**
	72	Reserve Engine	E472	30.4	0.5	0.1	1	0.0
		Engine	E72	29.9	672.3	110.5	1,349	3.7
		Engine	P72	92.4	217.2	35.7	141	0.4
		Total		**35.8**	**889.9**	**146.3**	**1,491**	**4.1**
	73	ARFF	ARFF7	23.3	1.6	0.3	4	0.0
		Engine	E73	29.4	344.5	56.6	703	1.9
		Engine	P73	78.6	56.3	9.3	43	0.1
		Water Tender	WT73	420.8	280.5	46.1	40	0.1
		Total		**51.9**	**682.8**	**112.2**	**790**	**2.2**
	74	Engine	E74	20.0	589.6	96.9	1,772	4.9
		Engine	P74	40.5	27.6	4.5	41	0.1
		Total		**20.4**	**617.2**	**101.5**	**1,813**	**5.0**
	75	Engine	E75	38.9	167.3	27.5	258	0.7
		Engine	P75	55.7	47.3	7.8	51	0.1
		Total		**41.7**	**214.6**	**35.3**	**309**	**0.8**

Battalion & Station		Unit Type	Unit ID	Avg. Deployed Min. per Run	Total Annual Hours	Avg. Deployed Mins. Per Day	Total Annual Runs	Avg. Runs per Day
7	76	Engine	E376	596.5	954.3	156.9	96	0.3
		Reserve Engine	E476	3,918.6	522.5	85.9	8	0.0
		Engine	E76	30.5	417.9	68.7	822	2.3
		Engine	P76	90.6	113.2	18.6	75	0.2
		Engine	P79	1,323.8	595.7	97.9	27	0.1
		Total		**152.0**	**2,603.6**	**428.0**	**1,028**	**2.8**
	77	Breathing Support Truck	BS77	104.0	3.5	0.6	2	0.0
		Engine	E77	20.7	402.2	66.1	1,167	3.2
		Engine	P77	45.1	29.3	4.8	39	0.1
		Total		**21.6**	**435.0**	**71.5**	**1,208**	**3.3**
	78	Engine	E378	115.0	335.5	55.2	175	0.5
		Engine	P78	153.5	122.8	20.2	48	0.1
		Total		**123.3**	**458.3**	**75.3**	**223**	**0.6**
	Total			**55.0**	**7,934.2**	**1,304.3**	**8,658**	**23.7**
8		Handcrew	CREW10	1,049.5	997.0	163.9	57	0.2
		Handcrew	CREW11	1,354.3	1,218.9	200.4	54	0.1
		Handcrew	CREW7	1,910.3	1,400.9	230.3	44	0.1
		Bulldozer	DOZ1	1,081.8	522.9	86.0	29	0.1
		Bulldozer	DOZ2	951.5	95.2	15.6	6	0.0
		Bulldozer	DOZ3	308.1	508.3	83.6	99	0.3
		Bulldozer	DOZ4	824.9	357.5	58.8	26	0.1
		Bulldozer	DOZ5	338.1	518.5	85.2	92	0.3
		Bulldozer	DOZ6	2,778.0	601.9	98.9	13	0.0
		Bulldozer	DOZ7	2,182.5	618.4	101.7	17	0.0
		Dozer Manager	DZMGR	393.2	137.6	22.6	21	0.1
		Helicopter	H407	1,248.3	2,413.4	396.7	116	0.3
		Helicopter	H408	155.9	488.6	80.3	188	0.5

Battalion & Station	Unit Type	Unit ID	Avg. Deployed Min. per Run	Total Annual Hours	Avg. Deployed Mins. Per Day	Total Annual Runs	Avg. Runs per Day
8	Handcrew Supervisor	KB8	302.8	106.0	17.4	21	0.1
	Single Resource	RU1	15,581.9	11,167.0	1,835.7	43	0.1
	Total		**1,536.5**	**21,152.0**	**3,477.0**	**826**	**2.3**
Wildland Strike Teams	Engine	ST5220F	786.3	13.1	2.2	1	0.0
	Engine	ST9320C	3,159.9	105.3	17.3	2	0.0
	Crew Superintendent	SUP40B	136.4	2.3	0.4	1	0.0
	Task Force	TF5230	25,110.0	418.5	68.8	1	0.0
	Task Force	TF5231	1,999.6	33.3	5.5	1	0.0
	Task Force	TF5232	35.1	0.6	0.1	1	0.0
	Total		**4,912.5**	**573.1**	**94.2**	**7**	**0.0**

Note: Battalion 8 is an administrative battalion used for wildland units and calls and does not cover a specific geographical area or stations. Some units had so few runs that the average runs per day, when rounded to the nearest one-tenth, appear to be zero.

TABLE 10-46: Runs by Unit and Run Type

Battalion & Station		Unit ID	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Mutual Aid	Total
1	11	E11	148	38	48	27	50	7	36	60	1	415
		KB1	332	72	120	47	151	16	100	159	41	1,038
		P11	40	9	17	12	71	5	11	19	0	184
		WT11	2	6	3	2	94	1	21	16	0	145
		Total	**522**	**125**	**188**	**88**	**366**	**29**	**168**	**254**	**42**	**1,782**
	12	E12	620	80	124	39	48	88	58	128	12	1,197
		E312	8	2	1	0	20	1	2	5	0	39
		P12	75	15	14	10	75	11	17	15	4	236
		Total	**703**	**97**	**139**	**49**	**143**	**100**	**77**	**148**	**16**	**1,472**
	13	E13	537	63	143	61	54	86	49	132	7	1,132
		P13	93	8	16	17	65	10	21	14	3	247
		Total	**630**	**71**	**159**	**78**	**119**	**96**	**70**	**146**	**10**	**1,379**
	14	E14	835	62	220	47	66	64	46	361	44	1,745
		E314	5	1	4	1	40	1	6	16	0	74
		P414	20	5	8	4	32	6	5	20	2	102
		Total	**860**	**68**	**232**	**52**	**138**	**71**	**57**	**397**	**46**	**1,921**
	15	E15	928	71	292	58	63	126	36	336	19	1,929
		E415	2	0	1	0	0	0	0	1	0	4
		P15	8	2	3	6	35	1	5	15	1	76
		Total	**938**	**73**	**296**	**64**	**98**	**127**	**41**	**352**	**20**	**2,009**
	16	E16	275	25	25	50	18	62	24	31	0	510
		P16	77	10	9	26	41	20	10	14	0	207
		Total	**352**	**35**	**34**	**76**	**59**	**82**	**34**	**45**	**0**	**717**
	17	E17	319	21	35	56	16	28	16	158	63	712
		P17	3	1	0	1	8	0	4	14	6	37
		Total	**322**	**22**	**35**	**57**	**24**	**28**	**20**	**172**	**69**	**749**

Battalion & Station		Unit ID	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Mutual Aid	Total
1	18	E18	180	11	14	11	13	17	23	21	0	290
		E318	3	0	0	0	13	1	0	0	2	19
		P18	46	2	1	3	23	5	9	7	0	96
		Total	**229**	**13**	**15**	**14**	**49**	**23**	**32**	**28**	**2**	**405**
	Total		**4,556**	**504**	**1,098**	**478**	**996**	**556**	**499**	**1,542**	**205**	**10,434**
2	21	E21	1,040	81	241	44	54	40	62	243	0	1,805
		KB2	231	46	19	31	114	2	67	65	0	575
		P21	8	1	2	0	49	1	4	3	1	69
		TK21	176	51	38	64	17	75	47	49	0	517
		Total	**1,455**	**179**	**300**	**139**	**234**	**118**	**180**	**360**	**1**	**2,966**
	22	E22	203	18	16	16	24	15	34	26	1	353
		E422	1	0	0	0	0	0	0	1	0	2
		P22	5	2	2	3	23	3	3	1	0	42
		Total	**209**	**20**	**18**	**19**	**47**	**18**	**37**	**28**	**1**	**397**
	23	E23	79	21	16	25	28	7	44	27	0	247
		E280 (OES)	0	0	0	0	1	0	0	0	1	2
		P23	12	5	4	4	49	1	11	4	0	90
		Total	**91**	**26**	**20**	**29**	**78**	**8**	**55**	**31**	**1**	**339**
	24	E24	77	17	10	5	33	7	39	21	0	209
		P24	8	3	2	0	46	0	6	6	0	71
		Total	**85**	**20**	**12**	**5**	**79**	**7**	**45**	**27**	**0**	**280**
	25	E25	407	25	14	19	65	20	23	80	0	653
		E8531 (OES)	1	0	0	0	18	0	0	0	11	30
		P25	19	2	5	1	46	3	4	13	0	93
		Total	**427**	**27**	**19**	**20**	**129**	**23**	**27**	**93**	**11**	**776**

Battalion & Station		Unit ID	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Mutual Aid	Total
2	26	E26	318	19	9	17	77	13	15	71	1	540
		E326	6	1	1	0	30	0	2	8	5	53
		P426	5	3	1	0	17	0	2	8	0	36
		Total	**329**	**23**	**11**	**17**	**124**	**13**	**19**	**87**	**6**	**629**
	Total		**2,596**	**295**	**380**	**229**	**691**	**187**	**363**	**626**	**20**	**5,387**
3	31	E31	1,064	101	187	75	104	113	90	242	0	1,976
		P31	21	2	1	2	38	12	3	10	1	90
		WT51 (OES)	3	1	1	2	64	1	9	7	2	90
		Total	**1,088**	**104**	**189**	**79**	**206**	**126**	**102**	**259**	**3**	**2,156**
	32	E32	1,156	116	85	61	116	86	87	236	0	1,943
		E432	1	0	1	1	1	0	1	1	0	6
		P32	16	2	3	3	38	3	3	5	0	73
		Total	**1,173**	**118**	**89**	**65**	**155**	**89**	**91**	**242**	**0**	**2,022**
	33	E33	756	123	32	59	121	47	75	135	1	1,349
		E8533 (OES)	0	0	0	0	5	0	1	0	10	16
		KB3	488	128	42	60	151	7	107	111	10	1,104
		P433	5	3	2	6	42	1	2	8	0	69
		Total	**1,249**	**254**	**76**	**125**	**319**	**55**	**185**	**254**	**21**	**2,538**
	34	E34	867	122	114	53	102	45	79	190	10	1,582
		E434	27	4	3	3	2	1	7	7	0	54
		P34	7	1	0	2	34	2	5	6	0	57
		Total	**901**	**127**	**117**	**58**	**138**	**48**	**91**	**203**	**10**	**1,693**
	35	E335	54	4	9	7	30	8	23	11	4	150
		E435	1	0	1	0	0	0	0	0	1	3
		P35	28	2	4	3	17	2	8	5	0	69
		Total	**83**	**6**	**14**	**10**	**47**	**10**	**31**	**16**	**5**	**222**

Battalion & Station		Unit ID	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Mutual Aid	Total
3	36	E336	46	10	6	9	20	11	30	14	4	150
		E436	1	0	0	0	5	0	1	1	0	8
		P36	23	4	3	3	16	5	7	9	0	70
		Total	**70**	**14**	**9**	**12**	**41**	**16**	**38**	**24**	**4**	**228**
	37	E37	773	117	69	49	111	40	82	149	3	1,393
		P37	7	3	3	0	48	3	10	7	0	81
		Total	**780**	**120**	**72**	**49**	**159**	**43**	**92**	**156**	**3**	**1,474**
	Total		**5,344**	**743**	**566**	**398**	**1,065**	**387**	**630**	**1,154**	**46**	**10,333**
4	41	E41	1,412	136	443	71	215	79	109	531	317	3,313
		KB4	509	143	142	80	375	21	230	263	128	1,891
		P41	7	2	6	0	90	3	1	21	30	160
		TK41	459	142	182	92	91	134	151	547	307	2,105
		Total	**2,387**	**423**	**773**	**243**	**771**	**237**	**491**	**1,362**	**782**	**7,469**
	42	E42	1,726	203	367	73	199	232	113	465	133	3,511
		E442	2	0	5	1	0	1	1	2	0	12
		P42	21	7	6	4	145	5	12	22	22	244
		Total	**1,749**	**210**	**378**	**78**	**344**	**238**	**126**	**489**	**155**	**3,767**
	45	E345	7	3	6	4	99	1	8	9	10	147
		E45	373	72	88	33	159	35	88	156	10	1,014
		P445	4	2	4	1	31	0	5	0	0	47
		Total	**384**	**77**	**98**	**38**	**289**	**36**	**101**	**165**	**20**	**1,208**
	51	E51	713	49	219	60	125	70	64	238	2	1,540
		P51	12	2	7	4	97	3	5	10	3	143
		Total	**725**	**51**	**226**	**64**	**222**	**73**	**69**	**248**	**5**	**1,683**
	52	E52	743	66	82	44	120	77	58	357	181	1,728
		P52	11	1	1	1	53	2	2	21	2	94
		REM52	1	0	0	0	0	0	0	0	0	1
		USR52	78	0	9	3	3	2	1	14	3	113
		Total	**833**	**67**	**92**	**48**	**176**	**81**	**61**	**392**	**186**	**1,936**

Battalion & Station		Unit ID	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Mutual Aid	Total
4	53	E53	272	15	31	21	58	20	22	154	89	682
		P53	4	0	4	2	41	1	6	10	4	72
		Total	**276**	**15**	**35**	**23**	**99**	**21**	**28**	**164**	**93**	**754**
	Total		**6,354**	**843**	**1,602**	**494**	**1,901**	**686**	**876**	**2,820**	**1,241**	**16,817**
5	54	E454	0	0	0	0	5	0	1	2	0	8
		E54	682	63	132	30	134	59	69	198	0	1,367
		P54	10	3	6	1	79	2	6	8	0	115
		Total	**692**	**66**	**138**	**31**	**218**	**61**	**76**	**208**	**0**	**1,490**
	55	E55	311	28	25	20	105	13	18	111	1	632
		E8532 (OES)	5	1	1	1	16	0	4	6	7	41
		KB5	226	45	35	24	141	13	62	100	14	660
		P55	15	5	3	1	39	1	4	16	1	85
		TK55	181	25	22	25	59	7	19	83	1	422
		WT55	2	10	5	3	94	0	8	39	0	161
		Total	**740**	**114**	**91**	**74**	**454**	**34**	**115**	**355**	**24**	**2,001**
	56	E356	5	0	1	1	16	1	2	7	6	39
		E56	288	36	24	29	90	28	11	172	30	708
		P456	1	0	1	0	6	1	0	0	0	9
		Total	**294**	**36**	**26**	**30**	**112**	**30**	**13**	**179**	**36**	**756**
	57	E357	305	19	72	25	25	110	11	100	42	709
		P57	18	2	2	1	10	1	1	6	2	43
		Total	**323**	**21**	**74**	**26**	**35**	**111**	**12**	**106**	**44**	**752**
	58	E458	5	0	1	1	0	1	0	0	1	9
		E58	224	6	7	18	2	34	10	20	3	324
		P58	69	4	2	12	7	10	4	4	1	113
		Total	**298**	**10**	**10**	**31**	**9**	**45**	**14**	**24**	**5**	**446**
	Total		**2,347**	**247**	**339**	**192**	**828**	**281**	**230**	**872**	**109**	**5,445**

Battalion & Station		Unit ID	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Mutual Aid	Total
6	61	E61	951	148	259	71	76	130	87	335	2	2,059
		P61	20	5	5	1	62	1	9	17	1	121
		USR61	55	2	4	1	2	0	2	9	0	75
		Total	**1,026**	**155**	**268**	**73**	**140**	**131**	**98**	**361**	**3**	**2,255**
	62	ARFF1	2	2	0	24	1	0	0	1	0	30
		ARFF2	2	0	0	24	1	2	0	2	0	31
		ARFF3	0	0	0	2	0	0	0	0	0	2
		Total	**4**	**2**	**0**	**50**	**2**	**2**	**0**	**3**	**0**	**63**
	63	E363	7	1	2	2	62	2	7	6	12	101
		E63	1,497	107	250	78	144	190	121	300	10	2,697
		P463	1	2	2	0	19	0	2	5	2	33
		Total	**1,505**	**110**	**254**	**80**	**225**	**192**	**130**	**311**	**24**	**2,831**
	64	E464	4	0	0	0	0	1	0	0	0	5
		E64	2,260	116	790	121	189	266	169	780	127	4,818
		P64	31	6	10	3	86	3	9	16	9	173
		Total	**2,295**	**122**	**800**	**124**	**275**	**270**	**178**	**796**	**136**	**4,996**
	65	E65	1,406	121	175	56	68	67	69	311	20	2,293
		KB6	444	160	123	103	247	18	270	191	30	1,586
		P65	21	2	4	5	41	3	6	11	5	98
		TK65	360	169	70	101	42	196	121	204	42	1,305
		Total	**2,231**	**452**	**372**	**265**	**398**	**284**	**466**	**717**	**97**	**5,282**
	66	BS66	6	0	2	2	8	1	58	1	1	79
		E66	345	89	160	32	63	35	56	170	41	991
		HM66	11	2	3	18	9	3	3	0	1	50
		P66	9	3	1	0	56	2	6	12	8	97
		Total	**371**	**94**	**166**	**52**	**136**	**41**	**123**	**183**	**51**	**1,217**

Battalion & Station		Unit ID	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Mutual Aid	Total
6	67	E467	16	2	3	2	2	4	1	2	1	33
		E67	833	95	30	44	60	88	57	171	12	1,390
		P67	13	2	0	0	33	5	3	6	4	66
		WT67	0	1	1	0	75	0	8	4	2	91
		Total	**862**	**100**	**34**	**46**	**170**	**97**	**69**	**183**	**19**	**1,580**
	Total		**8,294**	**1,035**	**1,894**	**690**	**1,346**	**1,017**	**1,064**	**2,554**	**330**	**18,224**
7	71	E371	11	2	1	2	25	1	3	6	1	52
		E471	4	1	0	0	1	0	0	2	0	8
		E71	648	42	70	33	31	53	60	92	0	1,029
		KB7	269	73	29	18	70	9	87	55	14	624
		P71	36	6	5	5	14	3	7	7	0	83
		Total	**968**	**124**	**105**	**58**	**141**	**66**	**157**	**162**	**15**	**1,796**
	72	E472	1	0	0	0	0	0	0	0	0	1
		E72	840	66	116	38	50	64	41	133	1	1,349
		P72	51	12	13	6	33	10	7	9	0	141
		Total	**892**	**78**	**129**	**44**	**83**	**74**	**48**	**142**	**1**	**1,491**
	73	ARFF7	1	1	0	1	0	0	0	0	1	4
		E73	372	59	23	28	30	45	71	71	4	703
		P73	10	4	0	0	14	4	6	5	0	43
		WT73	0	2	0	0	25	1	10	1	1	40
		Total	**383**	**66**	**23**	**29**	**69**	**50**	**87**	**77**	**6**	**790**
	74	E74	1,005	80	154	58	40	209	62	158	6	1,772
		P74	10	3	1	0	12	3	5	6	1	41
		Total	**1,015**	**83**	**155**	**58**	**52**	**212**	**67**	**164**	**7**	**1,813**
	75	E75	99	23	2	4	15	10	36	36	33	258
		P75	17	3	0	1	5	2	3	8	12	51
		Total	**116**	**26**	**2**	**5**	**20**	**12**	**39**	**44**	**45**	**309**

Battalion & Station		Unit ID	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Mutual Aid	Total
7	76	E376	31	3	4	9	22	5	6	14	2	96
		E476	5	0	0	0	1	0	2	0	0	8
		E76	501	32	41	34	17	45	39	107	6	822
		P76	30	3	6	3	13	3	8	7	2	75
		P79	12	0	0	2	10	0	2	1	0	27
		Total	**579**	**38**	**51**	**48**	**63**	**53**	**57**	**129**	**10**	**1,028**
	77	BS77	0	0	0	0	0	0	2	0	0	2
		E77	641	58	98	36	41	99	64	114	16	1,167
		P77	12	1	0	2	12	2	6	2	2	39
		Total	**653**	**59**	**98**	**38**	**53**	**101**	**72**	**116**	**18**	**1,208**
	78	E378	76	13	7	5	32	7	18	17	0	175
		P78	18	1	0	1	12	2	7	7	0	48
		Total	**94**	**14**	**7**	**6**	**44**	**9**	**25**	**24**	**0**	**223**
	Total		**4,700**	**488**	**570**	**286**	**525**	**577**	**552**	**858**	**102**	**8,658**
8		CREW10	2	0	0	2	46	0	1	2	4	57
		CREW11	1	1	0	1	47	0	2	2	0	54
		CREW7	0	1	0	0	31	0	1	2	9	44
		DOZ1	0	0	1	0	24	0	1	2	1	29
		DOZ2	0	0	0	0	3	0	1	1	1	6
		DOZ3	0	3	0	1	83	1	2	6	3	99
		DOZ4	0	0	0	0	26	0	0	0	0	26
		DOZ5	0	3	0	1	76	1	3	5	3	92
		DOZ6	0	0	0	0	11	0	1	0	1	13
		DOZ7	0	0	0	0	16	0	0	0	1	17
		DZMGR	0	0	0	0	17	0	3	1	0	21
		H407	10	1	0	57	41	2	2	1	2	116
		H408	21	3	0	84	69	2	1	5	3	188

Battalion & Station		Unit ID	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Mutual Aid	Total
8		KB8	1	0	1	0	15	0	2	2	0	21
		RU1	0	0	0	0	3	1	0	1	38	43
	Total		**35**	**12**	**2**	**146**	**508**	**7**	**20**	**30**	**66**	**826**
Wildland Strike Teams		ST5220F	0	0	0	0	1	0	0	0	0	1
		ST9320C	0	0	0	0	1	0	0	0	1	2
		SUP40B	1	0	0	0	0	0	0	0	0	1
		TF5230	0	0	0	0	1	0	0	0	0	1
		TF5231	0	0	0	0	1	0	0	0	0	1
		TF5232	0	0	0	0	1	0	0	0	0	1
		Total	**1**	**0**	**0**	**0**	**5**	**0**	**0**	**0**	**1**	**7**

Note: Battalion 8 is an administrative battalion used for wildland units and calls and does not cover a specific geographical area or stations.

TABLE 10-47: Average Deployed Minutes Per Day by Unit and Run Type

Battalion & Station		Unit ID	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Mutual Aid	Total
1	11	E11	11.7	1.2	2.8	2.5	9.2	0.5	5.9	1.9	0.0	35.7
		KB1	18.1	3.1	5.4	2.2	44.1	1.3	14.5	5.0	65.6	159.3
		P11	2.8	0.6	1.0	1.4	36.0	0.6	1.7	0.7	0.0	44.6
		WT11	0.1	0.2	0.1	0.1	108.4	0.0	7.0	0.6	0.0	116.4
		Total	**32.7**	**5.1**	**9.3**	**6.2**	**197.6**	**2.4**	**29.0**	**8.2**	**65.6**	**356.0**
	12	E12	38.1	3.3	4.1	2.5	6.5	5.0	9.7	2.8	1.3	73.4
		E312	0.5	0.1	0.0	0.0	13.3	0.0	0.9	0.2	0.0	15.0
		P12	5.8	0.8	0.5	0.4	24.9	0.9	4.1	0.4	0.4	38.2
		Total	**44.5**	**4.2**	**4.6**	**2.9**	**44.8**	**5.9**	**14.7**	**3.4**	**1.7**	**126.6**
	13	E13	36.4	3.2	5.1	4.2	11.8	4.6	8.9	4.5	0.6	79.5
		P13	6.5	0.4	0.4	1.4	21.4	0.9	3.9	0.4	0.2	35.5
		Total	**42.9**	**3.6**	**5.6**	**5.6**	**33.3**	**5.5**	**12.8**	**4.9**	**0.8**	**115.0**
	14	E14	44.4	3.2	7.3	2.2	8.9	3.8	11.0	9.3	5.0	95.1
		E314	0.4	0.1	0.1	0.0	43.9	0.0	1.2	0.5	0.0	46.2
		P414	1.8	0.2	0.2	0.2	6.2	0.4	1.6	1.1	0.3	12.0
		Total	**46.6**	**3.4**	**7.7**	**2.4**	**58.9**	**4.2**	**13.9**	**10.8**	**5.3**	**153.3**
	15	E15	63.5	2.4	11.2	3.0	9.8	6.1	8.3	9.3	1.5	115.1
		E415	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
		P15	0.3	0.1	0.1	0.3	7.8	0.1	1.5	0.8	0.1	11.0
		Total	**63.9**	**2.4**	**11.4**	**3.3**	**17.6**	**6.2**	**9.7**	**10.1**	**1.6**	**126.3**
	16	E16	26.2	1.5	1.5	4.3	5.7	4.8	4.2	1.0	0.0	49.2
		P16	6.2	0.4	0.4	2.1	12.3	2.1	2.8	0.5	0.0	26.8
		Total	**32.4**	**1.9**	**1.9**	**6.4**	**18.0**	**6.9**	**7.0**	**1.5**	**0.0**	**76.0**
	17	E17	25.8	1.1	1.7	3.8	2.2	1.8	2.4	5.0	7.6	51.4
		P17	0.4	0.1	0.0	0.1	0.8	0.0	1.1	0.4	0.7	3.5
		Total	**26.2**	**1.1**	**1.7**	**4.0**	**3.0**	**1.8**	**3.5**	**5.4**	**8.3**	**55.0**

Battalion & Station		Unit ID	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Mutual Aid	Total
1	18	E18	15.9	0.3	0.3	0.4	2.1	1.2	3.3	0.7	0.0	24.3
		E318	0.1	0.0	0.0	0.0	78.5	0.1	0.0	0.0	62.3	140.9
		P18	3.8	0.1	0.0	0.1	9.3	0.5	1.5	0.3	0.0	15.6
		Total	**19.8**	**0.4**	**0.3**	**0.5**	**90.0**	**1.8**	**4.8**	**1.0**	**62.3**	**180.8**
	Total		**309.0**	**22.1**	**42.4**	**31.5**	**463.1**	**34.6**	**95.3**	**45.4**	**145.6**	**1,189.0**
2	21	E21	51.7	2.8	6.8	2.2	7.0	1.1	9.7	5.3	0.0	86.5
		KB2	15.1	1.8	0.8	1.8	53.4	0.1	9.9	2.9	0.0	85.6
		P21	0.6	0.0	0.1	0.0	17.9	0.0	0.3	0.2	4.5	23.6
		TK21	9.0	1.7	1.0	3.0	1.3	3.0	7.8	1.1	0.0	28.0
		Total	**76.3**	**6.3**	**8.7**	**7.0**	**79.6**	**4.2**	**27.7**	**9.5**	**4.5**	**223.7**
	22	E22	16.4	0.8	1.0	1.4	4.5	1.1	6.4	1.2	0.1	32.9
		E422	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.2
		P22	0.8	0.1	0.1	0.2	5.5	0.2	0.7	0.0	0.0	7.6
		Total	**17.2**	**0.9**	**1.0**	**1.7**	**10.0**	**1.3**	**7.2**	**1.4**	**0.1**	**40.7**
	23	E23	5.0	0.7	0.3	1.8	5.6	0.2	6.7	0.8	0.0	20.9
		E280 (OES)	0.0	0.0	0.0	0.0	56.8	0.0	0.0	0.0	11.1	67.9
		P23	0.7	0.1	0.1	0.1	15.3	0.0	1.3	0.1	0.0	17.7
		Total	**5.6**	**0.7**	**0.3**	**1.9**	**77.7**	**0.2**	**8.0**	**0.9**	**11.1**	**106.5**
	24	E24	7.1	0.8	0.6	0.3	4.7	0.4	5.2	0.5	0.0	19.6
		P24	0.7	0.1	0.1	0.0	10.4	0.0	0.2	0.3	0.0	11.8
		Total	**7.8**	**0.9**	**0.7**	**0.3**	**15.1**	**0.4**	**5.4**	**0.7**	**0.0**	**31.3**
	25	E25	33.2	1.3	0.8	1.9	9.1	1.0	4.5	2.9	0.0	54.8
		E8531 (OES)	0.2	0.0	0.0	0.0	71.2	0.0	0.0	0.0	192.7	264.1
		P25	1.7	0.1	0.3	0.1	9.1	0.2	0.6	0.5	0.0	12.6
		Total	**35.0**	**1.3**	**1.1**	**2.0**	**89.5**	**1.2**	**5.2**	**3.4**	**192.7**	**331.4**

Battalion & Station		Unit ID	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Mutual Aid	Total
2	26	E26	35.9	1.4	0.6	2.5	16.2	0.9	1.8	4.4	0.1	63.9
		E326	0.7	0.1	0.0	0.0	39.8	0.0	0.1	0.7	116.9	158.3
		P426	0.6	0.2	0.1	0.0	3.7	0.0	0.1	0.6	0.0	5.3
		Total	**37.2**	**1.7**	**0.7**	**2.5**	**59.8**	**0.9**	**2.0**	**5.7**	**117.0**	**227.5**
	Total		**179.2**	**11.9**	**12.6**	**15.4**	**331.6**	**8.2**	**55.3**	**21.6**	**325.3**	**961.2**
3	31	E31	52.1	3.7	5.7	5.6	10.2	4.6	15.9	5.1	0.0	102.7
		P31	0.9	0.1	0.0	0.4	18.3	0.4	0.1	0.3	0.0	20.6
		WT51 (OES)	0.3	0.0	0.0	0.4	63.7	0.0	3.7	0.3	27.9	96.3
		Total	**53.3**	**3.8**	**5.7**	**6.4**	**92.2**	**5.0**	**19.7**	**5.7**	**27.9**	**219.6**
	32	E32	57.0	4.5	2.8	5.3	12.9	4.3	12.8	5.0	0.0	104.7
		E432	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.4
		P32	0.8	0.0	0.1	1.2	6.2	0.2	0.8	0.1	0.0	9.4
		Total	**57.9**	**4.6**	**3.0**	**6.6**	**19.3**	**4.5**	**13.6**	**5.2**	**0.0**	**114.5**
	33	E33	47.3	3.6	1.0	3.7	12.8	2.3	13.5	3.1	0.0	87.4
		E8533 (OES)	0.0	0.0	0.0	0.0	72.8	0.0	0.3	0.0	201.2	274.3
		KB3	22.3	3.6	1.4	4.5	45.1	0.2	17.7	2.7	176.1	273.7
		P433	0.4	0.1	0.1	0.6	21.5	0.0	0.1	0.4	0.0	23.3
		Total	**70.0**	**7.3**	**2.5**	**8.8**	**152.3**	**2.5**	**31.6**	**6.3**	**377.3**	**658.6**
	34	E34	46.2	4.4	3.2	3.9	10.6	2.3	11.5	3.5	1.5	87.1
		E434	1.6	0.1	0.1	0.2	0.9	0.3	1.4	0.1	0.0	4.7
		P34	0.5	0.0	0.0	0.1	4.5	0.3	0.3	0.1	0.0	5.7
		Total	**48.3**	**4.5**	**3.4**	**4.1**	**15.9**	**2.8**	**13.2**	**3.7**	**1.5**	**97.5**
	35	E335	5.2	0.1	0.4	0.4	17.5	0.6	3.6	0.6	28.0	56.4
		E435	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	10.8	10.9
		P35	3.0	0.1	0.1	0.1	15.4	0.0	1.8	0.5	0.0	21.1
		Total	**8.3**	**0.2**	**0.6**	**0.5**	**33.0**	**0.6**	**5.4**	**1.1**	**38.7**	**88.4**

Battalion & Station		Unit ID	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Mutual Aid	Total
3	36	E336	7.4	0.4	0.5	1.0	17.2	1.2	6.4	0.7	8.8	43.7
		E436	0.4	0.0	0.0	0.0	1.6	0.0	0.7	0.1	0.0	2.8
		P36	5.2	0.2	0.3	0.8	17.1	0.8	2.4	0.4	0.0	27.1
		Total	**13.0**	**0.6**	**0.8**	**1.8**	**35.9**	**2.0**	**9.5**	**1.2**	**8.8**	**73.6**
	37	E37	45.2	4.8	2.2	4.6	11.3	2.6	14.2	3.0	0.3	88.3
		P37	0.5	0.0	0.1	0.0	13.1	0.4	0.9	0.2	0.0	15.4
		Total	**45.8**	**4.8**	**2.4**	**4.6**	**24.4**	**3.1**	**15.1**	**3.2**	**0.3**	**103.7**
	Total		**296.6**	**25.9**	**18.3**	**32.9**	**372.9**	**20.5**	**108.1**	**26.3**	**454.6**	**1,356.0**
4	41	E41	70.3	6.0	13.7	3.7	17.1	3.9	20.8	12.2	18.0	165.8
		KB4	26.6	4.8	4.0	3.0	78.5	1.6	27.3	6.4	35.3	187.5
		P41	0.4	0.0	0.2	0.0	57.4	0.2	0.2	0.6	3.6	62.6
		TK41	21.0	5.0	4.9	5.6	4.2	6.5	22.7	10.5	23.1	103.4
		Total	**118.3**	**15.8**	**22.8**	**12.3**	**157.2**	**12.3**	**70.9**	**29.7**	**80.0**	**519.3**
	42	E42	87.2	7.2	12.1	4.0	19.0	11.0	20.1	10.2	10.7	181.4
		E442	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.4
		P42	1.3	0.3	0.2	0.1	42.6	0.2	2.9	0.6	5.1	53.4
		Total	**88.6**	**7.5**	**12.4**	**4.2**	**61.6**	**11.2**	**23.1**	**10.9**	**15.8**	**235.2**
	45	E345	0.4	0.1	0.3	0.1	38.9	0.0	1.0	0.3	45.5	86.6
		E45	25.4	2.7	3.0	1.6	20.8	1.5	13.3	4.5	1.9	74.6
		P445	0.1	0.0	0.2	0.0	29.2	0.0	0.8	0.0	0.0	30.3
		Total	**25.9**	**2.9**	**3.4**	**1.7**	**88.9**	**1.5**	**15.1**	**4.8**	**47.4**	**191.5**
	51	E51	38.9	1.9	7.0	4.2	16.5	3.5	11.5	5.7	0.2	89.6
		P51	0.8	0.0	0.6	0.5	20.7	0.5	0.4	0.3	1.1	24.8
		Total	**39.7**	**2.0**	**7.6**	**4.7**	**37.2**	**4.0**	**11.9**	**6.0**	**1.3**	**114.4**
	52	E52	45.4	2.6	3.0	2.3	16.5	3.7	10.1	8.0	10.9	102.6
		P52	0.5	0.0	0.1	0.1	20.5	0.1	0.1	0.6	0.4	22.4
		REM52	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
		USR52	8.6	0.0	0.5	0.5	0.3	0.3	0.0	0.4	0.1	10.7
		Total	**54.7**	**2.6**	**3.6**	**2.8**	**37.3**	**4.1**	**10.2**	**9.0**	**11.5**	**135.9**

Battalion & Station		Unit ID	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Mutual Aid	Total
4	53	E53	22.2	0.7	1.4	2.2	14.0	1.3	5.6	3.9	6.0	57.3
		P53	0.2	0.0	0.1	0.3	17.9	0.0	1.3	0.3	53.1	73.3
		Total	**22.4**	**0.7**	**1.6**	**2.4**	**31.8**	**1.3**	**7.0**	**4.2**	**59.1**	**130.6**
	Total		**349.7**	**31.5**	**51.4**	**28.2**	**414.0**	**34.4**	**138.1**	**64.7**	**215.0**	**1,326.9**
5	54	E454	0.0	0.0	0.0	0.0	0.5	0.0	0.1	0.1	0.0	0.7
		E54	33.8	2.5	4.8	3.3	22.0	3.6	9.6	4.8	0.0	84.5
		P54	0.7	0.1	0.5	0.0	28.4	0.1	0.9	0.2	0.0	30.9
		Total	**34.5**	**2.6**	**5.3**	**3.4**	**50.9**	**3.7**	**10.6**	**5.1**	**0.0**	**116.1**
	55	E55	27.3	1.7	1.2	1.6	16.5	0.9	2.9	3.6	0.1	55.7
		E8532 (OES)	0.4	0.0	0.0	0.2	74.6	0.0	0.4	0.2	79.7	155.6
		KB5	13.9	1.7	1.6	1.5	80.8	1.1	6.7	3.1	22.6	133.1
		P55	1.1	0.3	0.9	0.1	18.8	0.1	0.5	0.6	0.4	22.7
		TK55	12.7	1.1	0.7	2.6	7.9	0.3	2.2	2.2	0.0	29.8
		WT55	0.1	0.3	0.1	0.1	44.7	0.0	2.0	0.9	0.0	48.2
		Total	**55.4**	**5.1**	**4.6**	**6.1**	**243.4**	**2.4**	**14.8**	**10.6**	**102.8**	**445.2**
	56	E356	1.2	0.0	0.8	0.1	26.4	0.1	0.2	0.3	12.7	41.9
		E56	22.3	1.5	0.9	2.2	11.2	1.3	1.6	4.3	3.1	48.6
		P456	0.1	0.0	0.1	0.0	1.7	0.4	0.0	0.0	0.0	2.2
		Total	**23.7**	**1.5**	**1.8**	**2.3**	**39.3**	**1.8**	**1.9**	**4.6**	**15.8**	**92.7**
	57	E357	23.6	0.9	2.7	2.0	5.0	6.2	2.0	3.3	33.4	79.2
		P57	1.7	0.1	0.1	0.1	5.1	0.0	0.0	0.2	0.6	7.9
		Total	**25.3**	**1.0**	**2.8**	**2.0**	**10.1**	**6.3**	**2.0**	**3.6**	**34.0**	**87.1**
	58	E458	0.7	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	1.0
		E58	25.0	0.3	0.3	3.3	0.2	2.1	1.2	1.3	0.2	34.0
		P58	7.1	0.2	0.2	1.1	4.2	0.7	0.5	0.1	0.0	14.1
		Total	**32.8**	**0.6**	**0.5**	**4.4**	**4.4**	**2.9**	**1.7**	**1.4**	**0.3**	**49.1**
	Total		**171.7**	**10.8**	**15.0**	**18.2**	**348.1**	**17.2**	**31.0**	**25.3**	**153.0**	**790.1**

Battalion & Station		Unit ID	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Mutual Aid	Total
6	61	E61	45.7	5.6	8.0	4.3	8.5	5.8	10.2	6.7	1.0	95.9
		P61	1.3	0.3	0.1	0.0	35.4	0.0	0.8	0.4	1.1	39.5
		USR61	4.6	0.0	0.1	0.1	0.1	0.0	0.4	0.3	0.0	5.8
		Total	**51.6**	**5.9**	**8.2**	**4.4**	**44.0**	**5.9**	**11.5**	**7.4**	**2.1**	**141.1**
	62	ARFF1	0.2	0.1	0.0	1.4	0.6	0.0	0.0	0.0	0.0	2.3
		ARFF2	0.2	0.0	0.0	1.5	0.6	1.0	0.0	0.0	0.0	3.2
		ARFF3	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.2
		Total	**0.4**	**0.1**	**0.0**	**3.1**	**1.2**	**1.0**	**0.0**	**0.0**	**0.0**	**5.6**
	63	E363	0.3	0.0	0.1	0.1	19.8	0.0	0.5	0.2	119.7	140.6
		E63	72.9	3.4	7.5	5.6	16.2	7.0	18.9	6.0	1.0	138.6
		P463	0.1	0.1	0.2	0.0	4.3	0.0	0.3	0.3	0.6	5.9
		Total	**73.3**	**3.5**	**7.7**	**5.7**	**40.3**	**7.1**	**19.6**	**6.4**	**121.3**	**285.0**
	64	E464	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
		E64	100.2	4.1	20.9	7.6	17.0	12.1	25.8	14.9	9.2	211.7
		P64	2.3	0.3	0.3	0.1	28.1	0.1	1.5	0.4	1.7	34.8
		Total	**102.7**	**4.3**	**21.1**	**7.7**	**45.1**	**12.3**	**27.2**	**15.3**	**10.9**	**246.7**
	65	E65	71.2	4.4	5.6	3.0	6.3	2.3	10.0	7.2	2.0	111.8
		KB6	15.9	4.1	3.1	5.1	90.3	1.1	27.6	3.6	2.0	152.7
		P65	1.4	0.0	0.1	0.3	12.2	0.1	0.5	0.4	2.1	17.1
		TK65	16.1	6.4	1.8	5.8	3.1	10.0	14.6	3.7	2.9	64.5
		Total	**104.6**	**14.9**	**10.6**	**14.2**	**111.9**	**13.5**	**52.7**	**14.8**	**8.9**	**346.1**
	66	BS66	0.5	0.0	0.1	1.4	2.1	0.3	16.4	0.0	0.1	20.8
		E66	16.7	2.3	4.9	1.2	6.9	3.5	8.2	3.4	2.5	49.8
		HM66	2.4	0.0	0.5	3.8	1.7	1.9	0.4	0.0	0.3	10.9
		P66	0.4	0.1	0.0	0.0	16.3	0.1	0.6	0.3	0.9	18.6
		Total	**20.1**	**2.4**	**5.5**	**6.3**	**26.9**	**5.8**	**25.5**	**3.7**	**3.8**	**100.1**

Battalion & Station		Unit ID	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Mutual Aid	Total
6	67	E467	1.1	0.1	0.1	0.1	0.2	0.3	0.1	0.1	0.0	2.1
		E67	53.2	2.8	1.1	3.0	6.7	4.5	6.2	3.5	1.2	82.2
		P67	0.8	0.0	0.0	0.0	13.9	0.2	0.1	0.2	0.5	15.6
		WT67	0.0	0.0	0.0	0.0	31.4	0.0	2.5	0.3	0.3	34.6
		Total	**55.1**	**2.9**	**1.3**	**3.0**	**52.3**	**5.0**	**8.9**	**4.0**	**2.0**	**134.5**
	Total		**407.7**	**34.1**	**54.4**	**44.4**	**321.6**	**50.6**	**145.5**	**51.8**	**149.1**	**1,259.2**
7	71	E371	1.4	0.1	0.1	0.1	24.4	0.0	0.8	0.5	80.3	107.8
		E471	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
		E71	55.4	1.7	3.8	2.0	10.5	3.0	14.6	3.6	0.0	94.6
		KB7	19.9	2.7	1.4	1.2	26.6	1.8	22.8	2.3	12.7	91.3
		P71	4.2	0.4	0.4	0.4	30.8	0.7	2.8	0.4	0.0	40.1
		Total	**81.1**	**4.9**	**5.8**	**3.7**	**92.4**	**5.5**	**41.0**	**6.8**	**93.0**	**334.1**
	72	E472	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
		E72	58.9	3.0	4.7	2.6	22.0	4.3	11.1	3.8	0.1	110.5
		P72	5.1	0.7	0.7	0.5	22.1	1.3	4.8	0.5	0.0	35.7
		Total	**64.1**	**3.7**	**5.4**	**3.1**	**44.1**	**5.6**	**15.9**	**4.2**	**0.1**	**146.3**
	73	ARFF7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3
		E73	26.9	2.4	0.6	2.3	4.3	2.8	14.3	2.5	0.5	56.6
		P73	1.4	0.1	0.0	0.0	4.3	0.4	2.9	0.2	0.0	9.3
		WT73	0.0	0.1	0.0	0.0	36.9	0.0	7.7	0.0	1.4	46.1
		Total	**28.5**	**2.7**	**0.6**	**2.3**	**45.5**	**3.2**	**24.8**	**2.7**	**2.0**	**112.2**
	74	E74	54.0	3.9	4.4	4.4	4.6	9.0	13.1	3.0	0.6	96.9
		P74	0.9	0.1	0.0	0.0	1.8	0.1	1.4	0.2	0.1	4.5
		Total	**54.9**	**4.0**	**4.4**	**4.4**	**6.4**	**9.1**	**14.5**	**3.2**	**0.7**	**101.5**
	75	E75	10.3	0.8	0.1	0.1	3.2	0.4	7.5	1.9	3.4	27.5
		P75	2.4	0.2	0.0	0.3	1.7	0.1	1.1	0.5	1.5	7.8
		Total	**12.8**	**1.0**	**0.1**	**0.4**	**4.8**	**0.5**	**8.5**	**2.4**	**4.8**	**35.3**

Battalion & Station		Unit ID	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Mutual Aid	Total
7	76	E376	3.1	0.1	0.1	0.6	99.0	0.5	2.2	0.5	50.7	156.9
		E476	0.6	0.0	0.0	0.0	84.9	0.0	0.4	0.0	0.0	85.9
		E76	37.8	1.4	1.9	3.2	4.7	3.5	10.4	4.4	1.5	68.7
		P76	3.3	0.1	0.5	0.4	8.2	0.8	4.2	0.4	0.7	18.6
		P79	1.9	0.0	0.0	0.2	93.3	0.0	2.6	0.0	0.0	97.9
		Total	**46.7**	**1.5**	**2.5**	**4.3**	**289.9**	**4.8**	**19.8**	**5.4**	**53.0**	**428.0**
	77	BS77	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.6
		E77	35.4	2.3	2.9	2.2	4.6	4.2	11.0	2.5	1.2	66.1
		P77	1.0	0.0	0.0	0.2	2.1	0.0	1.0	0.1	0.3	4.8
		Total	**36.4**	**2.3**	**2.9**	**2.4**	**6.7**	**4.2**	**12.6**	**2.6**	**1.5**	**71.5**
	78	E378	12.3	1.1	0.8	1.0	33.0	1.0	5.0	1.1	0.0	55.2
		P78	3.8	0.1	0.0	0.0	13.4	0.5	2.1	0.4	0.0	20.2
		Total	**16.1**	**1.1**	**0.8**	**1.0**	**46.4**	**1.5**	**7.1**	**1.5**	**0.0**	**75.3**
	Total		**340.5**	**21.3**	**22.4**	**21.6**	**536.2**	**34.3**	**144.1**	**28.7**	**155.1**	**1,304.3**
8		CREW10	0.3	0.0	0.0	0.1	92.2	0.0	2.3	0.1	68.9	163.9
		CREW11	0.1	0.0	0.0	0.6	196.8	0.0	2.7	0.1	0.0	200.4
		CREW7	0.0	0.1	0.0	0.0	22.3	0.0	0.0	0.1	207.8	230.3
		DOZ1	0.0	0.0	0.0	0.0	77.6	0.0	0.5	0.1	7.7	86.0
		DOZ2	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	15.4	15.6
		DOZ3	0.0	0.1	0.0	0.1	46.7	0.1	1.7	0.3	34.7	83.6
		DOZ4	0.0	0.0	0.0	0.0	58.8	0.0	0.0	0.0	0.0	58.8
		DOZ5	0.0	0.1	0.0	0.0	47.1	0.0	2.8	0.3	34.9	85.2
		DOZ6	0.0	0.0	0.0	0.0	17.2	0.0	0.5	0.0	81.3	98.9
		DOZ7	0.0	0.0	0.0	0.0	20.4	0.0	0.0	0.0	81.3	101.7
		DZMGR	0.0	0.0	0.0	0.0	20.0	0.0	2.6	0.1	0.0	22.6
		H407	2.3	0.0	0.0	18.1	41.6	0.1	0.8	0.1	333.6	396.7
		H408	4.4	0.2	0.0	19.2	53.1	0.3	1.1	0.6	1.4	80.3

Battalion & Station		Unit ID	EMS	False Alarm	Good Intent	Hazard	Outside Fire	Public Service	Structure Fire	Canceled	Mutual Aid	Total
8		KB8	0.2	0.0	0.0	0.0	16.0	0.0	1.2	0.1	0.0	17.4
		RU1	0.0	0.0	0.0	0.0	16.0	0.0	0.0	10.3	1,809.3	1,835.7
	Total		**7.3**	**0.5**	**0.0**	**38.2**	**726.0**	**0.6**	**16.1**	**12.1**	**2,676.2**	**3,477.0**
Wildland Strike Teams		ST5220F	0.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0	2.2
		ST9320C	0.0	0.0	0.0	0.0	6.4	0.0	0.0	0.0	10.9	17.3
		SUP40B	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
		TF5230	0.0	0.0	0.0	0.0	68.8	0.0	0.0	0.0	0.0	68.8
		TF5231	0.0	0.0	0.0	0.0	5.5	0.0	0.0	0.0	0.0	5.5
		TF5232	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1
		Total	**0.4**	**0.0**	**0.0**	**0.0**	**82.9**	**0.0**	**0.0**	**0.0**	**10.9**	**94.2**

Note: Battalion 8 is an administrative battalion used for wildland units and calls and does not cover a specific geographical area or stations. Some units had such low total deployed time that the average minutes per run, when rounded to the nearest one-tenth