

“Worst Case Scenario” analysis



In the fire service there is typically significant variability in the number of calls from hour to hour. One special concern relates to the fire resources available for the highest workload hours. Fire departments often attempt to staff and equip for the “worst case scenario, when in reality that level of staffing can never be achieved. Whatever “worst case” one can envision, a “worse” case can always be developed. Fire departments in such situations are, in effect, buying insurance and there is no limit to what can be spent. The issue becomes much more complicated when there are many individual fire departments. Often in such cases, departments duplicate equipment needs without analyzing the mutual aid capabilities of surrounding communities.

What is needed is the ability to analyze what the historical busiest periods are in a particular community or in several communities collectively, and compare that demand the agencies’ ability to respond adequately.

ICMA has the capability to do just that. We tabulate the data for each of 8760 hours in the year. We are then able to analyze, minute by minute, the workload of the agencies and contrast that with the availability of resources to respond to an emergency. Further, we are capable of determining what resources remain in service and available to respond to another incident for each of these minutes.

Illustration of Analysis

The following illustrates such an analysis in an agency with 17 pieces of apparatus located in 14 stations.

Approximately twice a week the fire department will respond to more than 11 calls in an hour. This is 1.1% of the total number of hours. Twice during the entire year, there were more than 20

calls in a single hour. In studying these call totals, it is important to remember that an EMS run lasts on average only 13 minutes and a fire category call lasts 22 minutes. For the vast majority of these high volume hours, the total workload of all units combined is equivalent to 3 or fewer units busy the entire hour. For the ten highest volume hours, 0.1% of the hours, the total workload exceeded 3 hours.

The hour with the most work was between 1000 and 1100 on September 12, 2009. The 21 calls involved 34 runs. The combined workload was 417 minutes. This is equivalent to 7 firefighting units being busy the entire hour. However, in the city there are 17 units staffed all of the time. During the worst portion of the hour, there were always at least 5 units still available to respond immediately. Only 5 of the 17 units were busy more than 30 minutes during this hour.

The hour with the most calls was between 1400 and 1500 on October 13, 2009. The 23 calls involved 28 runs. The combined workload was 379 minutes. This is equivalent to between 6 and 7 firefighting units being busy the entire hour. However, in the city there are 17 units staffed all of the time. During the worst portion of the hour, there were always at least 7 units still available to respond immediately. Only 3 of the 17 units were busy more than 30 minutes during this hour.

Frequency Distribution of the Number of Calls

Number of Calls in an Hour	Frequency
0-5	6397
6-10	2263
11-15	98
16 or more	2

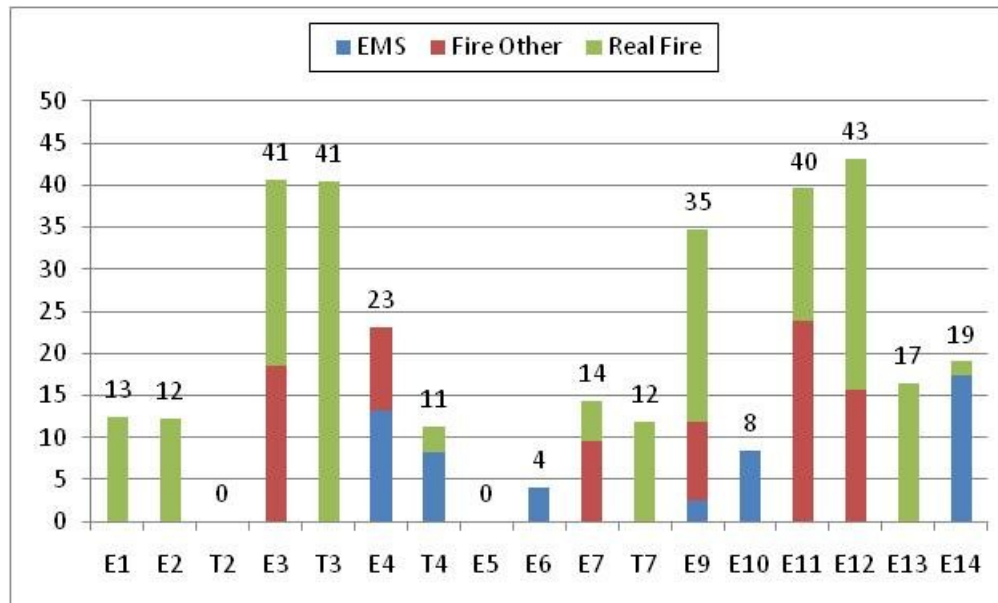
Top 10 hours with the most calls received

HOURS		Number of Calls	Number of Runs	Total Busy Minutes
13-oct-2009	1400	23	28	379
12-sep-2009	1000	21	34	417
20-jun-2009	2000	15	16	252
02-feb-2009	1900	15	16	213
10-jul-2009	1000	14	15	226
15-feb-2009	1900	14	20	317
29-jul-2009	1700	14	18	274
23-feb-2009	1100	14	15	180
17-mar-2009	1500	14	17	193
01-mar-2009	1800	13	14	185

Between 10 a.m. to 11 a.m. on 12-Sep-2009

Station	1			2		3		4		5	6	7		9	10	11	12	13	14	Number of Units	
Unit	E1	E2	T2	E3	T3	E4	T4	E5	E6	E7	T7	E9	E10	E11	E12	E13	E14	Busy	Free		
0-5																		3.3	1	16	
5-10		1.9		0.7														5	3	14	
10-15	3.1	5		5								3.7		0.6	4.8		5	7	10		
15-20	5	4.3		5	0.5							5		5	4.4		4	8	9		
20-25	4.4	1.1		4.4	5							3.8		5	5			7	10		
25-30				5	5							5		5	5			5	12		
30-35				4.6	5							5		5	2.7			5	12		
35-40				5	5	3.1						5		5	1.3			6	11		
40-45				5	5	5				1.2		0.7	0.7	4.9	5	1.6		9	8		
45-50				5	5	5	1.8			5	1.8		1.9	1.6	5	4.9	1.7	11	6		
50-55				0.9	5	5	4.5		3.3	5	5	2.5	0.8	2.5	5	5		12	5		
55-60					5	5	5		0.8	3.1	5	4.1	5	5	5	5		11	6		
Total	12.5	12.3	0.0	40.6	40.5	23.1	11.3	0.0	4.1	14.3	11.8	34.8	8.4	39.6	43.2	16.5	19.0				

Note: The numbers in the cells are the busy minutes within the 5 minute block. The cell values greater than 2.5 are coded as red.



Between 2 p.m. to 3 p.m. on 13-Oct-2009

Station	1		2		3		4		5	6	7		9	10	11	12	13	14	Number of Units	
	E1	E2	T2	E3	T3	E4	T4	E5	E6	E7	T7	E9	E10	E11	E12	E13	E14	Busy	Free	
0-5						3.1				0.8	5							3	14	
5-10						5					3							2	15	
10-15				0.6	1.2	1.5											4.4	4	13	
15-20				5	5				0.5					3.1				5	5	12
20-25				5					5			4.5	5					5	5	12
25-30				5		1.7			1.9			5	5	1			2.5	7	10	
30-35		2.1		5		2						2.6	4.8	5	3.5			7	10	
35-40		5		4.9		5	0.5			4.6			2.7	4.9	5	1.4	4.3	10	7	
40-45		3.9		5		5	5		0.8	5				5	5			5	9	8
45-50				5		4.9	5		5	5		1.4		3.5	5			5	9	8
50-55				5		5	5		0.4	2.9	0.1	5		2.7	4.8		2.4	10	7	
55-60				5		5	5		3.9	4.2	5	5		5	1.9			9	8	
Total	0.0	11.0	0.0	45.5	6.2	38.2	20.5	0.0	17.5	22.5	13.1	23.5	20.6	27.1	25.2	1.4	33.6			

