



Sasamat Fire Department Communications Review

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Executive Summary

The Sasamat Fire Department was formed in 1978 to protect the Villages of Anmore and Belcarra. It presently operates under Metro Vancouver Bylaw 965¹ which was passed in 2001 and reports to a board of trustees appointed by the regional district.

The Sasamat Fire Department (SFD) operates primarily within the boundaries of the Villages of Anmore and Belcarra but is also a participant with the Metro Vancouver mutual aid agreement by which it may be requested to respond outside of its regular boundaries and may also receive support from neighbouring fire departments for any incident beyond its capabilities. There is also an automatic aid agreement with the Port Moody Fire/Rescue Department for responses to at least one structure in Anmore.

The call volume for the SFD has increased gradually since its inception as shown in the following graph.

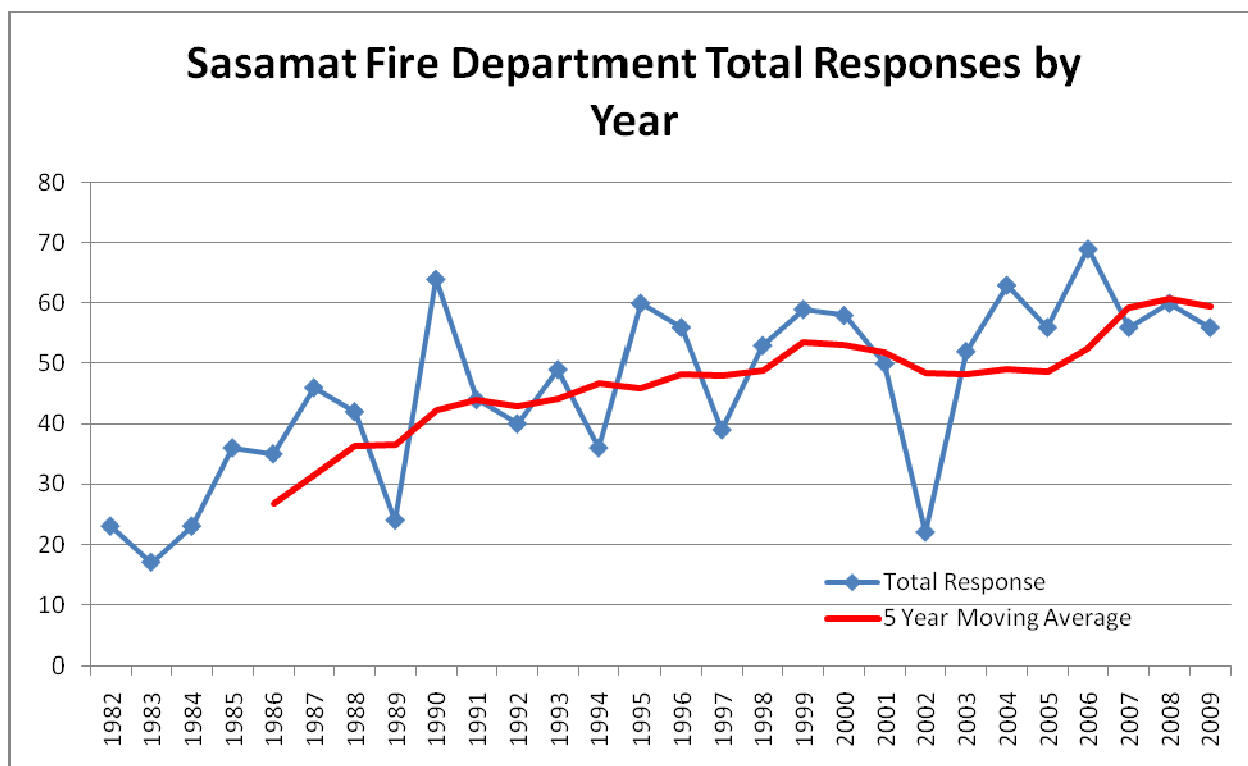


Figure 1: SFD Total Call Volume by Year

¹ The full title of the bylaw is: Sasamat Volunteer Fire Department Bylaw No. 965, 2001; a Bylaw to Provide for the Administration and Operation of the Sasamat Volunteer Fire Department.

For the past 5 years, the call volume has been averaging 59 responses per year. In the most recent year (2009) the breakdown of responses was:

- First Medical Responder: 58%
- Fires: 22%
- Motor Vehicle Incident: 15%²

This pattern of responses has been reasonably consistent for a number of years.

Since its inception, the SFD has been dispatched by the Port Moody Police Department, which also provided dispatch service for the Port Moody Fire/Rescue Department until 2002. Dispatch of a fire department by a police department is an anomaly in British Columbia; in Metro Vancouver all other fire departments are dispatched by one of four dedicated fire dispatch providers³. In the remainder of British Columbia virtually all fire departments are dispatched by dedicated fire dispatch providers, in most cases this is performed by consolidated, regionalized services.

There are a number of reasons why fire dispatching is seen as a separate discipline from Police and these relate to different standards of service as well as specialization of computer aided dispatch systems along with ancillary peripheral devices and services such as rip & run printers, mobile workstations and pre-plans.

The standards of service for fire dispatching are those defined by the National Fire Protection Association⁴ (NFPA). These include the standard for dispatcher training and competence (NFPA 1061) and the standard for all dispatch processes and technology (NFPA 1221). The standards for on-scene communications and scene management are found in NFPA 1561 and for the operation and maintenance of a volunteer fire department, in NFPA 1720.

One recommendation of this report will be a transition for the Sasamat Fire Department from its current dispatch provider, to one that provides dedicated fire dispatchers. It must be clearly stated that this report does not make any claim about any lack of professionalism by the Port Moody Police Department. Their dispatchers provide service to an urban police department using current police technology with staff that are professionally selected, trained and managed.

Instead, the recommendation for change relates to the specific call management standards and technology required to support a contemporary fire department. These include a focus on a dispatch cycle that cannot exceed 60 seconds, in addition to a tight integration with a fire

² Source: Sasamat Fire Department web site.

³ E-Comm (providing dispatch for Vancouver, Port Moody, Delta, New Westminster and Richmond Fire Departments), Surrey (providing dispatch for Surrey, North Vancouver City & District, West Vancouver, Port Coquitlam, White Rock, Langley City & Township, Pitt Meadows and Maple Ridge Fire Departments), Burnaby (dispatch for Burnaby Fire Department), and Coquitlam (dispatch for Coquitlam Fire Department).

⁴ www.nfpa.org

service record management system and an interface with the BC Ambulance dispatch system to provide simultaneous dispatch of first responder calls.

The additional change that is recommended will be a transition to the regional radio system. At the present time, Sasamat Fire operates on a legacy VHF system that does not provide for interoperability with municipal police, the RCMP, the BC Ambulance Service or its immediately adjacent fire departments such as Coquitlam and Port Moody. As part of the communications review, members of the SFD conducted a series of tests of the regional radio system using radios provided by E-Comm. The usable coverage area was found to be superior to the current system and provided seamless coverage within the SFD response area.

In terms of priorities for the recommendations in this report, the change of dispatch provider and the acquisition of dispatch and record management technologies is the most immediate priority. The transition to the regional radio system is also important and the SFD should be strongly encouraged to implement this simultaneously with the change of dispatch providers. However for budget reasons and project management challenges, the change to the radio system could be done following the dispatch change.

Project Scope & Methodology

The scope of the communication review included fire dispatch as well as dispatch technologies such as computer aided dispatch (CAD), record management systems (RMS) and mobile radio. The major requirement was to conduct a complete review of emergency communication issues for the Sasamat Fire Department and to make recommendations for all aspects of this including fire call taking & dispatch as well as consideration for technologies such as computer aided dispatch (CAD), record management systems (RMS) and mobile radio. The review was to consider these issues in terms of the relevant benchmark standard⁵ published by the National Fire Protection Association (NFPA).

Dispatch

With regard to fire dispatch, the objective was to review the service provided by the current dispatch service in terms of the applicable standards of service and to consider a change of service provider if warranted. As part of this review, an on-site review of the current dispatch service was conducted with personnel from the Port Moody Police Department (PMPD) along with the Fire Chief and Deputy Fire Chief.

As part of that review, the dispatch CAD system was examined, and a discussion of training as well as policies and procedures for dispatch was considered. The availability of a disaster recovery model was also reviewed. There was also a discussion regarding the degree to which the dispatch providers were aware of the NFPA standards of service that apply.

Computer Aided Dispatch (CAD)

The CAD system used by the PMPD is police-specific and does not currently offer the ability to easily configure it for fire dispatch. The police CAD system is deployed throughout British Columbia and is used by all police services. It supports police specific mobile workstations but does not currently have the ability to provide rip & run printouts or pre-plans for fire departments.

Record Management Systems (RMS)

The RMS currently utilized by the PMPD is also police-specific and quite understandably is governed by very strict security requirements. At the current time, the vendor does not provide a contemporary fire service version of an RMS.

Mobile Radio

The current radio system used by the SFD was reviewed with the Chief and Deputy and a comparison with the current regional system was conducted. The current system is not compatible with other regional emergency services and with a few exceptions, most emergency services have upgraded from such legacy systems.

⁵ NFPA 1221: Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems (2010).

Response Analysis

One of the principal requirements for a fire department is to provide timely response to emergency fire, rescue and medical assist events. This is in addition to the non-emergency responses such as fire inspections, public education, pre-planning and other less visible activities. The former activities are the ones with the highest profile, and the ones with the largest degree of risk to residents, property owners and responding fire fighters; for all of these, the NFPA 1221⁶ standard applies.

In every sense of the expression, these are 'mission critical' responses and it is useful to understand the series of steps that must take place between the call for assistance by a resident and the arrival on scene of a fire department crew. Each of the steps that will be described can in most cases be analyzed to understand the total time until arrival of fire fighters using real-time data from existing systems⁷. Where this data is non-existent in a computer aided dispatch (CAD) system, it can be measured by direct observation.

Figure 1 that follows summarizes the processes from the point at which an incident occurs and a call for help is placed. This illustrates how the communication steps (the 9-1-1 process is shown in light blue/green, the fire dispatch is shown in orange) are gating items for the completion of response and arrival activities of the fire service (shown in red).

⁶ NFPA 1221: Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems, 2010 edition, ©National Fire Protection Association.

⁷ This data would be found in computer aided dispatch or record management systems or other dispatch records.

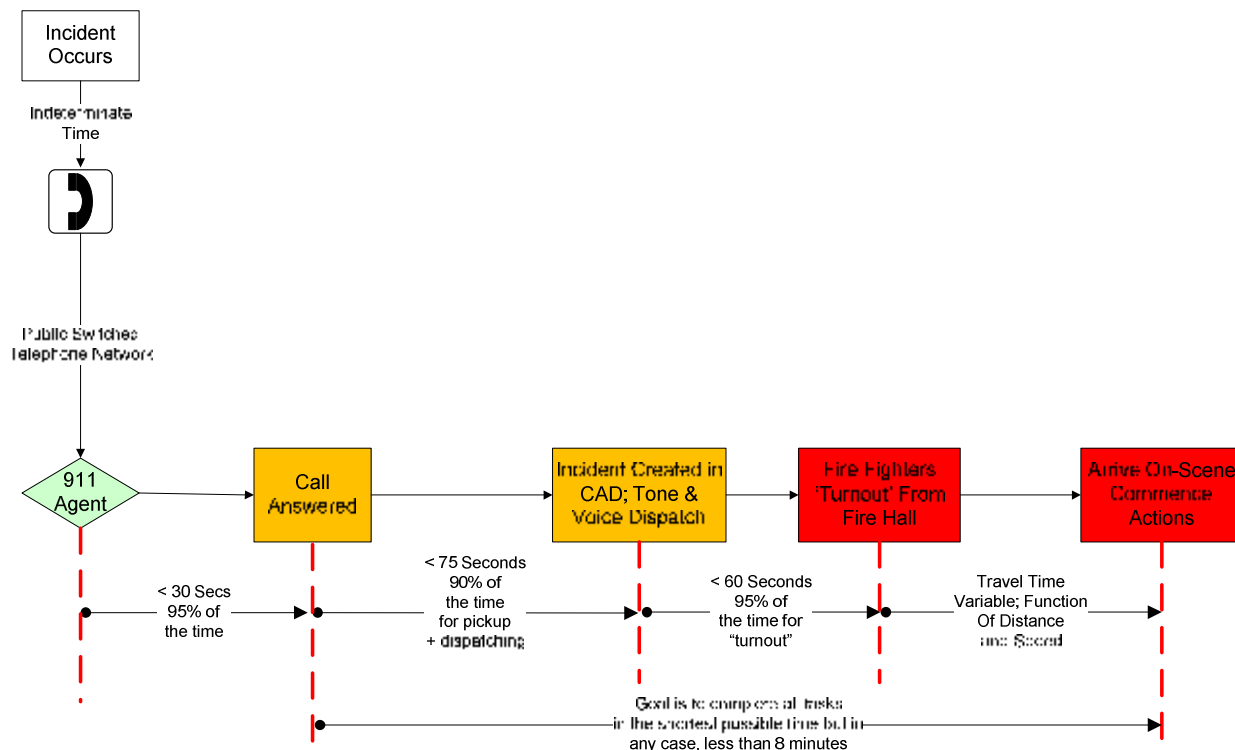


Figure 2: Event Sequence for Emergency Call Handling, Response and Arrival, with Time Lines

Each of these steps from the time the caller reaches the 9-1-1 centre, until the arrival of the fire apparatus at the scene is part of a sequence for which response time objectives have been identified. The standards of service for emergency communications in the fire service are described in the NFPA Standard 1221 as noted. NFPA 1221 provides an analysis model for key steps involved with emergency call taking and dispatch and prescribes time milestones in which these should occur⁸. It should also be noted that the call management response time objectives in NFPA 1221 apply equally to the career, composite and volunteer fire services.

Figure 3 is taken from the NFPA 1221 standard, and identifies four key processes with time milestones.

1. The time to place a call to 9-1-1 and to have it successfully 'down-streamed' to the fire department (30 seconds).
2. The time to pick up, or answer the call reporting an emergency (15 seconds).
3. The time to interrogate the caller, determine the emergency, create a 'dispatchable' event in the CAD system and alert crews (60 seconds).

⁸ NFPA 1221 additionally defines a standard with regard to business continuity, security, power and other system redundancy, CAD system operation, etc.

4. The time for responders to ‘turnout’ from the fire hall and begin their response to the scene (60 seconds)⁹.

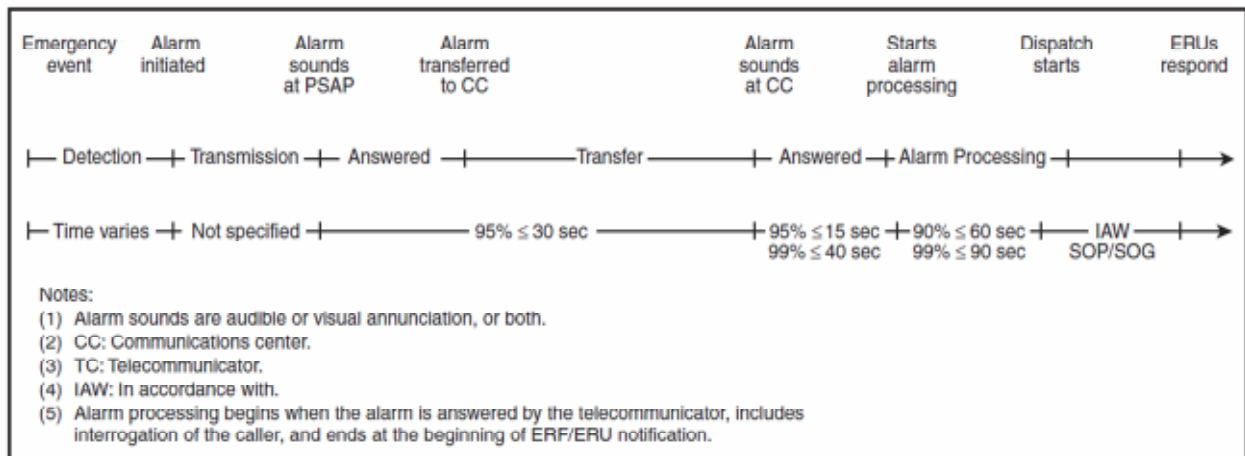


Figure 3: NFPA 1221: Emergency Call Management Analysis

In the diagram above, there are two timelines. The upper line describes the steps which occur from the moment at which the emergency event occurs, until the units respond to the incident. The lower line identifies the elapsed time at which these are expected to occur.

The overall process described above, with response time objectives can be described in the following manner.

- Emergency Event.
 - An emergency occurs (this can be either a fire or medical incident¹⁰).
 - Until emergency services are notified in the following steps, this emergency has not yet been noticed or reported.
- Detection.
 - The emergency event has been ‘detected’ leading to notification of emergency services.
- Alarm Initiated.
 - At this point a call to an emergency service is placed by dialling 9-1-1, or another 10 digit number and is transferred to the PSAP¹¹ by the Public Switched Telephone Network (PSTN).

⁹ This standard to turn out from the fire hall applies only to career units, i.e., ones that have their staffing complement ‘on duty’ at the time call is received.

¹⁰ This model also applies to Police and EMS events however there are no specific defined call management metrics for these.

¹¹ Public Safety Answering Point, another term for a 9-1-1 call centre.

- Transmission.
 - In this step the PSTN makes the routing decisions and 'presents' the emergency call to the 9-1-1 primary call agent(s) at the PSAP.
 - The time for this to occur is indeterminate, though it may be measured by the telephone company; to this point emergency services have yet to be notified of the emergency.
- Alarm Sounds at PSAP.
 - This is the point at which the emergency call first begins to ring at the 9-1-1 call centre.
- Alarm Transferred to CC.¹²
 - The 9-1-1 agent at the PSAP queries the caller to determine which emergency service they require and then transfers them to the call taker for that class of service.
- Alarm Sounds at CC.
 - This is the point at which the emergency call first begins to ring at the communications centre.
 - This is normally the first point at which the communications centre has the ability to begin measuring the elapsed times for call management.
- Answered.
 - This is the time frame which measures the interval between when the emergency call first begins ringing, until the call taker has begun speaking with the caller reporting the emergency.
 - The expectation is that all calls will be 'answered' within 15 second 95% of the time; and within 40 seconds 99% of the time.
 - This measurement equates to the time taken until the phone is 'picked up' by the fire call taker.
- Notification of TC.¹³
 - This is the point at which the call taker begins taking information from the caller reporting the emergency and this period of time ends when the dispatcher has completed the dispatching process.
 - The expectation is that all calls will be processed to the point at which the call has been dispatched, within 60 seconds 90% of the time and within 90 seconds 99% of the time.
 - This measurement equates to the total time taken until fire crews have been alerted and the information transferred to them.
- Alarms Retransmitted to ERF's¹⁴ and Response Units.
 - This marks the completion of the dispatch process and the commencement of the 'turnout phase' for the fire service. This is the interval between when

¹² Communications Centre.

¹³ In this document TC stands for Telecommunicator; in this context it equates to the fire call taker/dispatcher employed by the Port Moody Police Department.

¹⁴ Emergency Response Facility, in this case a Fire Hall.

dispatching has been completed and when the Fire/EMS service leaves the fire hall.

- The expectation is that turnout from the fire hall will occur within 60 seconds.¹⁵
- Response Units Respond
 - This marks the completion of the turnout phase, and the commencement of the travel time which is completed when the unit(s) arrive at scene¹⁶.

In summary, the expectation is that all emergency calls for service will be answered, the caller will be interrogated, the 'call' will be created on paper or in a computer aided dispatch system, and the tones and information will be sent to the responding fire fighters within 60 seconds, 90% of the time.

The time for this measurement begins when the phone first starts to ring in the fire dispatch office, and lasts until the response information has been gathered and transferred to the emergency responders. Where an agency uses a CAD system these times are normally recorded as time stamps and thus can provide the basis for analysis.

The reason for the focus on the time required to create a call and dispatch it, is well founded in the notion that emergency calls being reported to the Fire and EMS services are serious when they occur and have the capacity to significantly deteriorate in a very short space of time. This in turn requires that the initial phases—9-1-1 call taking, call assessment and dispatch—occur in the shortest possible time to insure the earliest possible intervention by emergency services personnel.

A primary mandate of any fire department is to provide for a timely response to fire and medical emergencies, as well as hazardous materials, technical rescue and other public safety interventions. In the vast majority of these, crews respond from a fire hall and travel some distance to the incident. Because these responses must occur within a relatively short time frame to minimize fire damage and save lives, effective call management is crucial. This is because emergency call management is the precursor or 'gating' item for Fire and EMS response to the scene.

The National Fire Protection Association (NFPA) has developed response time objectives for the North American fire service over many years and these provide applicable benchmarks. The NFPA standards are international peer-reviewed standards that address most if not all issues

¹⁵ The timeframe for turnout is described in an associated NFPA Standard 1710 which describes the operation of a Career Fire Department; there is not an equivalent standard for Composite or Volunteer Fire Departments although it can be argued that this should apply to fully staffed first-out vehicles within Composite Departments. Regardless, the call management times in NFPA 1221 apply equally to career and volunteer departments.

¹⁶ The response time expectations for a volunteer fire department such as Sasamat are referred to in NFPA Standard 1720, which is discussed in a subsequent section of this document.

related to the operation of the fire service. NFPA 1710¹⁷ is the standard that describes the organization and management of a career fire department, and defines response time objectives for the turnout of crews from the fire hall, as well as 4 minute and 8 minute expectations for arrival at any emergency incident.

The graph shown in the following figure is taken directly from the and demonstrates the expected fire propagation curve, which indicates the point at which a fire spreads beyond the room of origin. This is normally at or about 8 minutes from the point of ignition.

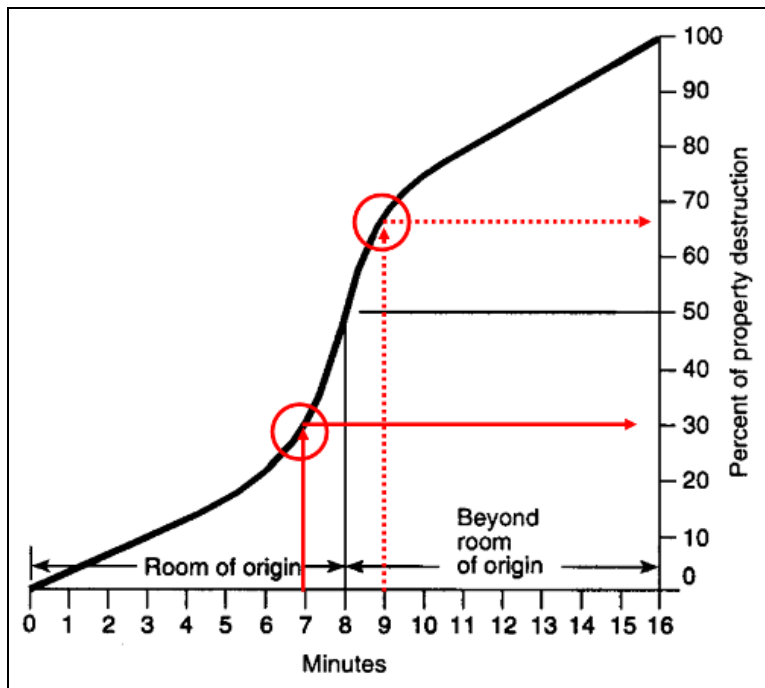


Figure 4: Fire Propagation Curve, Modeled from NFPA 1710

From this graph it can be seen that in the range of time from 7 to 9 minutes after ignition, a fire is expected to rapidly accelerate and the percentage of property destruction (shown on the Y axis) increases from approximately 30% to a little less than 70%. At some point in this short period of time, the assumption is that the fire will spread beyond the room of origin.

The significant point is that each of the steps in the fire department's response sequence, including 9-1-1 call processing, call assessment, dispatch, turnout and travel time should all occur prior to the time when a fire will extend beyond the room of origin, thereby creating a much higher risk to life and property. In this regard, the NFPA notes:

¹⁷ Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments, 2010 edition, effective June 15, 2009.

In Figure A.5.2.2.1, [Figure 3 above] the line represents a rate of fire propagation in an unsprinklered room, which combines temperature rise and time. It roughly corresponds to the percentage of property destruction. At approximately 10 minutes into the fire sequence, the hypothetical room of origin flashes over. Extension outside the room begins at this point.

Consequently, given that the progression of a structure fire to the point of flashover (i.e., the very rapid spreading of the fire due to superheating of room contents and other combustibles) generally occurs in less than 10 minutes, two of the most important elements in limiting fire spread are the quick arrival of sufficient numbers of personnel and equipment to attack and extinguish the fire as close to the point of its origin as possible¹⁸.

The key element going forward is the requirement to manage all parts of the response equation as quickly as possible.

The response requirements for a volunteer fire department like the SFD are described in the NFPA standard 1720. This standard recognizes that volunteer fire departments do not have the option of responding with a full crew from the fire hall, and are required to respond from their homes, place of business or other location. The result is that response times are longer than they would be for a career department as they require additional minutes to arrive at the fire hall prior to donning their turnout equipment and travelling to the scene.

The NFPA standard 1720 proposes a staffing and response time model as shown in Figure 5¹⁹.

Demand Zone ^a	Demographics	Minimum Staff to Respond ^b	Response Time (minutes) ^c	Meets Objective (%)
Urban area	>1000 people/mi ²	15	9	90
Suburban area	500–1000 people/mi ²	10	10	80
Rural area	<500 people/mi ²	6	14	80
Remote area	Travel distance ≥ 8 mi	4	Directly dependent on travel distance	90
Special risks	Determined by AHJ	Determined by AHJ based on risk	Determined by AHJ	90

^a A jurisdiction can have more than one demand zone.
^b Minimum staffing includes members responding from the AHJ's department and automatic aid
^c Response time begins upon completion of the dispatch notification and ends at the time interval shown in the table.

Figure 5: Staffing and Response Model for Volunteer Fire Departments

¹⁸ NFPA 1710, 2010 edition, A.5.2.2.2.1.

¹⁹ NFPA 1720, 2010 edition, 4.3.2, page 7.

From this it can be seen that response time is still a factor, and footnote ^c from Figure 5 outlines that “*Response time begins upon completion of the dispatch notification and ends at the time interval shown in the table*”. For this reason, the ability to complete the dispatch process in the shortest possible time can be understood as it ‘gates’ the ultimate arrival of the fire fighters to any emergency scene regardless of whether they are career or volunteer.

Fire Call Taking and Dispatch

Call taking and dispatch for the SFD is provided by the PMPD from their location on St Johns Street. Their competence as emergency dispatchers is not in question and it is agreed that their primary function is call taking and dispatch for a municipal police department. Dispatchers are hired, trained and managed by the PMPD and have a minimum of one person on duty at all times. Dispatchers are provided training and guidance regarding the basic procedures for determining a response by the SFD and have policies and procedures that have been agreed by the Fire Chief.

Dispatchers use the police CAD system to validate addresses provided by calling parties and where a fire response is warranted for the SFD, they operate the pagers and open the VHF radio system so they can hear any response from fire apparatus while on route or at the scene. If the dispatch facility on St Johns Street becomes untenable, control can be transferred to the New Westminster Police Department where essential functionality can be provided.

The police CAD system is not currently configured to create specific fire department responses and does not create a fire incident report that is transferred to the SFD at the conclusion of a call. The police CAD lacks an interface to the BC Ambulance Service CAD system and so all first responder and MVI²⁰ incidents—the majority of calls for the SFD—are received by telephone from BCAS dispatchers²¹.

At the conclusion of a response by the SFD, the officer in charge phones the PMPD dispatchers and is given basic call information over the telephone. There is no collection of benchmark times that would support an analysis to determine the degree to which the NFPA 1221 standards for fire call taking and dispatch are being met.

As noted there are at least four fire dispatch centres in Metro Vancouver, each of which has a dedicated cadre of fire call takers and dispatchers who are specifically trained and managed for this service.

Recommendation: It is recommended that the SFD transition from the PMPD to a dedicated fire dispatch provider and that this be considered a very high priority. The choice of fire dispatch providers should be restricted to those which employ contemporary CAD and RMS system and which also are capable of deploying rip & run printouts and mobile workstations. The contract for service should also include a service level agreement that defines call management times.

²⁰ Motor Vehicle Incident.

²¹ For other fire departments in the Metro Vancouver region, first responder calls are received simultaneously by means on an interface from the BCAS CAD system; notification for the SFD does not occur in this way.

Computer Aided Dispatch (CAD)

The implementation of CAD systems for fire dispatching began in the Metro Vancouver region in 1988 with Vancouver Fire/Rescue. At that time, the system included rip & run sheets along with mobile workstations and an interface to an associated RMS. Over time, the deployment of fire specific CAD systems has continued in the Metro Vancouver area, as well as the major centres in BC including the Okanagan, the Capital Region, Nanaimo, North Island, Kamloops, Prince George, Trail and Fort St John.

The CAD systems in BC are provided by a number of vendors and are configured and operated in a manner that is designed to support the particular requirements of the fire service including the ability to record all benchmark times. The collection of benchmark times allows the authority having jurisdiction to determine the degree to which the dispatch provider and the fire department itself are meeting contemporary standards of service. One or more of the CAD system vendors used for fire dispatching in BC also provide CAD systems for police departments however the security requirements and the configuration to support dispatch and the required peripherals are quite different.

The police CAD used by Port Moody Police is the standard for police departments in BC but it does not support the configuration and peripherals required by a fire department. For example it does not support the use of rip & run sheets for responding fire crews. These are summaries of the response information including the address of the call, cross streets, the type of call, the time the call was received as well as the caller's name and phone number, hazard information, pre-plan details, etc. The CAD systems used by the other four fire dispatch providers all have this capability.

The rip & run is created at the time the fire department is dispatched and appears on a high-speed printer at the fire hall, providing the responding crew with a great deal of information in a highly legible form. This information allows the fire fighters to respond with a much greater amount of information and because it arrives in a printed format, it is not subject to error having been transcribed from what is heard on the pager. At the present time this amount of detail is not currently provided to the SFD crews in any form. They receive the address and limited additional information by voice, only on their pager.

The police CAD also does not currently support the deployment of fire specific mobile workstation units. Similar to rip & run sheets, mobile workstation units are now being implemented in fire departments through the Metro Vancouver region. The mobile workstation units contain the road network and display the location of the call along with cross streets, a recommended route in addition to hazard and pre plan information and the location of fire hydrants. The mobile workstation units also have the ability to query the CAD system for additional incident information in addition to providing updates to the CAD by function keys.

As noted previously, the majority of responses by the SFD are medical first responder calls or responses to MVIs. These calls originate with the BC Ambulance Service and with the exception of Sasamat are transferred simultaneously to fire departments at the time they are created. This

occurs normally by the use of a specific interface that transfers the caller's information including the address and primary diagnoses from the ambulance CAD system to the fire dispatch CAD.

The electronic transfer of this information eliminates error as it does not require the information to be re-transcribed; it is also much faster as it occurs simultaneously with the notification to BCAS. At the present time the police CAD does not have such an interface, nor is one being contemplated. As a result first responder and MVI calls for the SFD are transferred to the Port Moody Police by telephone.

There is no argument that the CAD used by the PMPD is not a tier-one CAD system—it is, however it is a Police CAD system and does not have the ability at the present time to perform as a fire CAD system at an appropriate level.

Recommendation: It is recommended that the SFD transition to a dispatch provider that utilizes a fire-specific CAD system. The CAD should have an associated RMS and should be capable of deploying rip & run sheets as well as mobile workstations. The CAD should also have a full electronic interface with BCAS.

Record Management System (RMS)

For many years fire departments have managed their various assets in multiple, non-linked systems. These included hard copies, spreadsheets, and various databases. The information contained within each of these systems was not integrated and so a great deal of time was spent making corrections or additions to multiple systems.

For example in a fire department there may have been a personnel file maintained in a spreadsheet, with lesson plans developed in a word processing file and with attendance managed in a database. In such a system adding a new fire fighter would mean entering them in multiple different systems and tracking their activities including training records, attendance at fires or exposure to hazardous conditions would be prone to error or omission.

The requirement to manage assets has become a much more serious issue for fire departments, in particular with regard to training records. At least one recent fire in BC that led to a volunteer fire fighter fatality raised serious questions about whether or not the individual had received training appropriate to the risk he faced. In that particular example the fire department was unable to prove satisfactorily that the fire fighter had been trained.

One requirement of the NFPA is that a fire department needs to do more than simply prepare and deliver lessons to fire fighters; it also has to demonstrate that the lesson was provided and acknowledged by the fire fighter. The management of this process is one of the myriad of tasks that fire record management systems were developed for. Figure 6 shows a model of a fire RMS indicating the number of 'modules' of information that a department is required to manage.

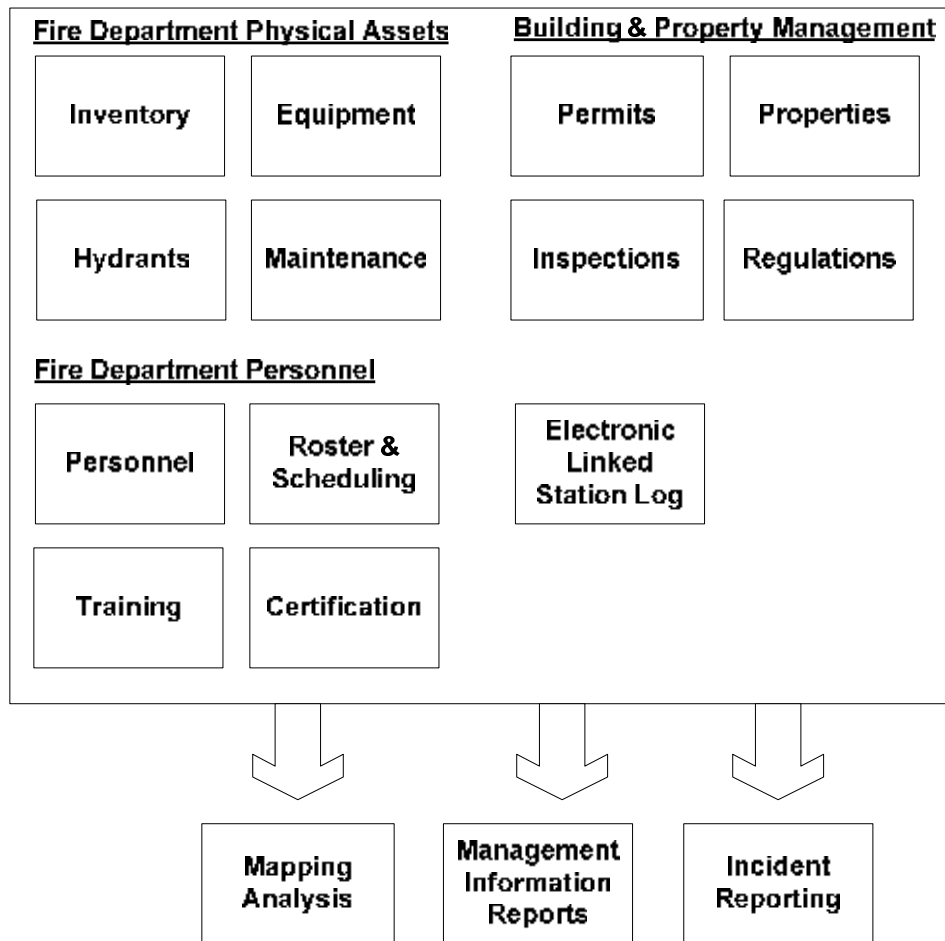


Figure 6: Fire RMS Modules and Outputs

There are currently a number of vendors of fire record systems which are deployed in the BC fire service. In Metro Vancouver one vendor has been successful in being chosen for all current users and has multiple implementations. In some cases these are stand-alone installations where the fire department has developed its own configuration of the system to meet their perceived requirements.

In a number of other cases, the configuration is agreed between two or more fire departments and is offered on a hosted basis. There are several advantages to this approach including a reduced cost of ownership and implementation. This approach is usually quicker to implement, and for smaller fire departments offers the opportunity to participate with a well developed system without having to commit scarce resources to manage system setup.

Record management systems should also be tightly interfaced with the dispatch CAD system as shown in Figure 7.

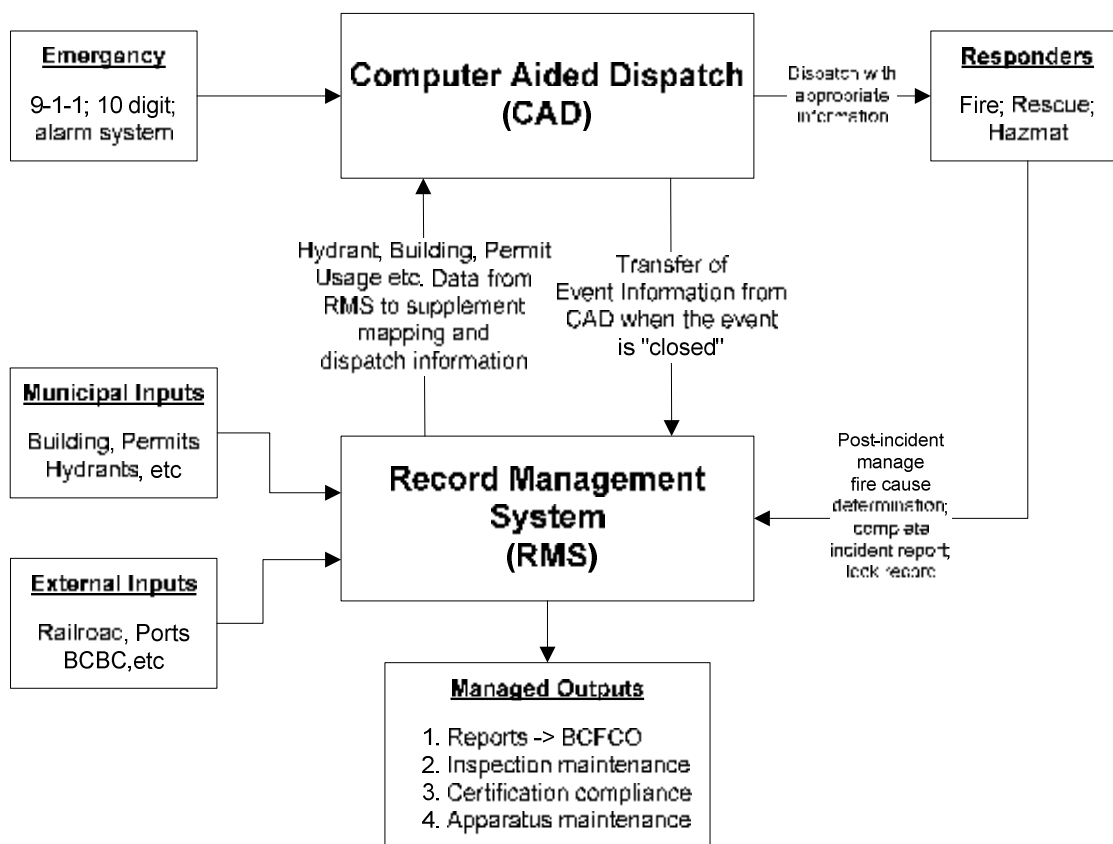


Figure 7: RMS Relationship to CAD

The two-way relationship between CAD and RMS provides for information such as hazards, pre-plans, locations of shut-offs and other property related data to be managed in the RMS by fire crews and inspectors, but available to be accessed by CAD at the time a call is dispatched. This allows for the most effective use of information to guide the selection of apparatus; it allows for this information to be provided to responding fire crews on the rip & run sheet, on the mobile workstation, etc.

Once crews have been dispatched to the incident, the CAD tracks all actions by them including benchmark times for going on route from the fire hall, arrival at the incident, the time that fire loss was stopped, etc. This information is then transferred to a blank incident in the RMS which forms the basis of the fire department's historical record of the call. It also provides the basis for a fire investigation report as well as the required report to be filed with the Office of the Fire Commissioner.

At the present time the SFD does not have an electronic RMS and one is not currently available from the system utilized by the PMPD. The requirement for an RMS has also been identified by members of the department in the strategic planning process as being a high priority.

Recommendation: It is recommended that the SFD procure a fire RMS as a high priority. The RMS chosen should be complete with an interface to the dispatch CAD system and have a full complement of modules. It would be preferable for the SFD to participate with a shared RMS using a hosted-provider solution.

Radio System

At the present time, a majority of emergency services in Metro Vancouver have transitioned to the regional 800 Mhz system operated by E-Comm. The agencies using the regional system include all police departments (Municipal and RCMP), the BC Ambulance Service along with Vancouver, North Vancouver City, Richmond, Delta, Surrey, White Rock, New Westminister, Port Moody and Coquitlam Fire/Rescue Departments.

The radio system utilized by the Sasamat Fire Department is a legacy VHF system that has lacks interoperability with other fire departments, the police and the BC Ambulance Service. The radio hardware, such as the portable and mobiles radios, is not the issue; it is industry standard equipment. The more serious concern is that the radio system also lacks sufficient coverage throughout the SFD response area which limits to some degree their ability to communicate between responding units and from an emergency scene to the base station.

The coverage of the existing system was compared with the regional radio system²² in a series of side-by-side tests conducted by members of the SFD under the direction of the Deputy Fire Chief. The two radio systems were 'tested' at locations throughout the SFD response area and included those that were area ones the department regularly responds to.

Current System

The current system lacked complete coverage, or had very poor coverage at approximately 50% of the locations tested. The Deputy Chief confirms that this is consistent with their experience in regular use of the system.

The present system often lacks the ability to communicate from the incident commander using a portable radio to incoming units from either Belcarra or Anmore, depending on the location of the call²³. Also the coverage at the north end of Buntzen Lake as an example does not allow the units at the scene to communicate with the dispatcher. This requires that one of the fire fighters that has answered the page must stay at the Anmore fire hall to relay information from the scene to dispatch instead of responding with the crew. The need to leave one fire fighter behind further reduces what is often a less than full response, and further limits the crew actions at the scene.

The degree of interoperability with other emergency services is essentially nil with the current system. The list of other agencies that can be contacted on the SFD system is shown in Appendix 2 and this list does not include any other fire or police departments or the BCAS.

²² E-Comm provided a number of portable radios to SFD to conduct the tests in 2009.

²³ This situation requires the incident commander to move from a command post, to locate one of the fire trucks and attempt to contact the incoming units using the mobile radio which has been coverage.

Regional System

The regional system was tested throughout the SFD coverage area and into Indian Arm and there were no identified coverage gaps, nor were there any system failures. It was noted that the portable radios on the regional system are somewhat heavier but this is not considered to be an issue.

There are a number of reasons why the regional radio system provides better coverage including that it broadcasts from multiple sites. For the purposes of providing coverage to the SFD response area, these include towers in North Vancouver, Burnaby and Port Coquitlam. The radio system is programmed to operate using the required number of towers to support emergency operations and these are shown in the following coverage plots. In each of these plots the legend indicates the road network and other key geographical features as well as the degree to which system coverage was noted in drive tests.

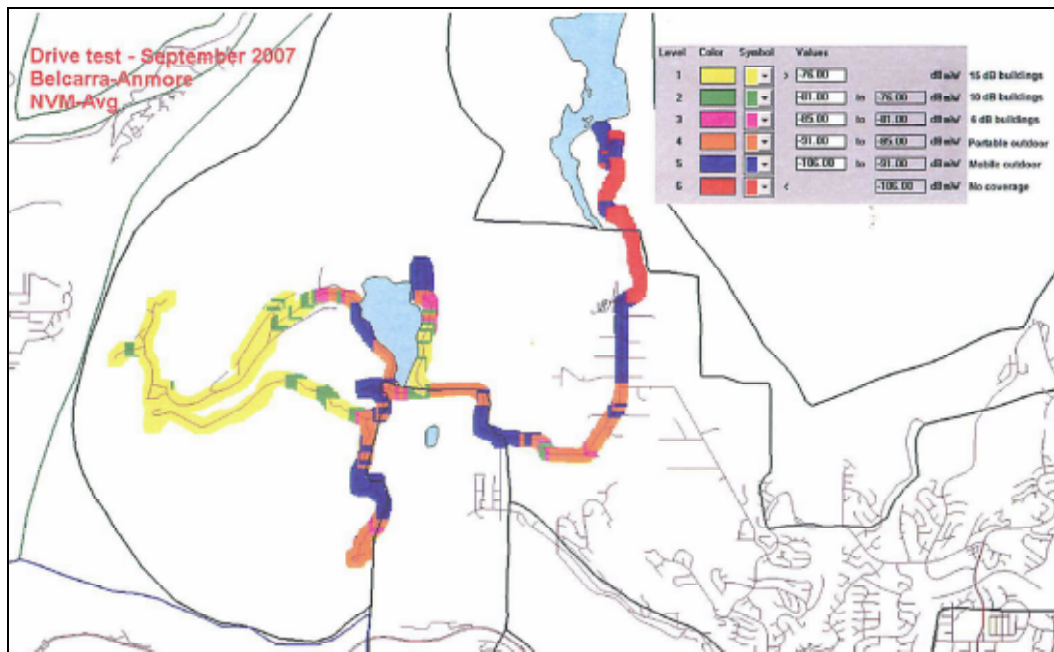


Figure 8: Regional Radio System Coverage: North Vancouver Tower

Figure 8 illustrates the coverage from the North Vancouver tower, and this is optimal in the Belcarra area with good coverage as well on the east side of Buntzen lake and in much of the Anmore area.

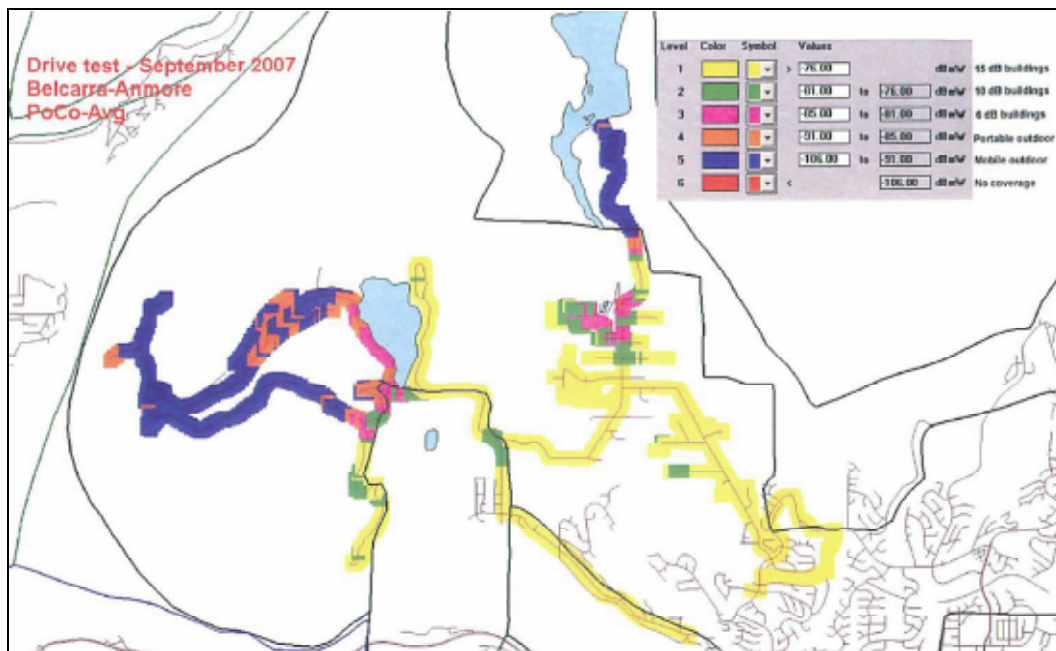


Figure 9: Regional Radio System Coverage: Port Coquitlam Tower

Figure 9 illustrates the degree of coverage from the Port Coquitlam tower which is optimized for Anmore, the west side of Buntzen Lake and provides a more limited coverage in Belcarra.

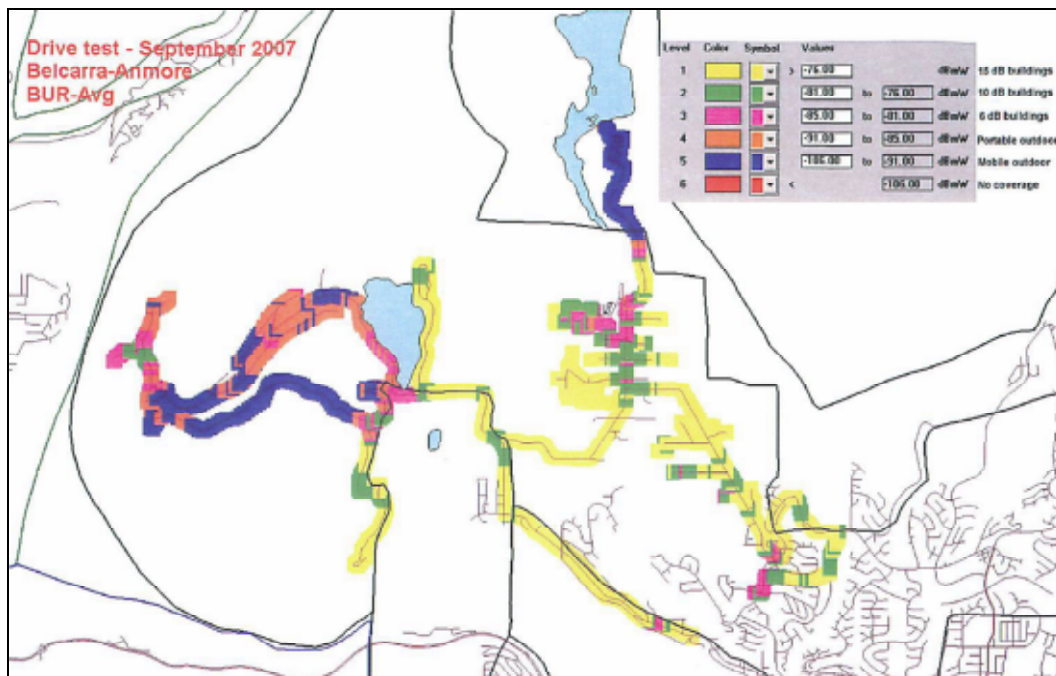


Figure 10: Regional Radio System Coverage: Burnaby Mountain Tower

Finally, Figure 10 illustrates coverage from the Burnaby tower which is also optimal for Anmore, but which provides additional coverage to much of Belcarra.

Analysis

On balance, the regional radio system provides multi-site coverage to the SFD response area, and has been in place for more than 10 years. At the present time the RCMP, Port Moody Police, Port Moody Fire, Coquitlam Fire and BC Ambulance already operate in this area on the regional system.

Transition to the regional radio system will address two major areas of concern. First, that the existing system has coverage deficits that are known to cause the SFD to lose coverage at times necessitating workaround procedures that require relocation of an incident commander during some emergencies to provide orders to incoming fire units. The coverage deficits may also require the SFD to assign a responding fire fighter to remain at the fire hall with the base station instead of providing a resource at the emergency scene.

The second benefit that will be achieved with a transition to the regional system will be to allow the SFD to 'talk' with emergency responders from other police and fire departments as well as BC Ambulance units. Radio interoperability between police, fire and ambulance was one of the goals of the regional system and provides for an increase in officer safety, as well as optimizing response to the public.

Interoperable radio systems allow emergency responders to coordinate their response to an emergency while still on route and enhance emergency scene management once a command post has been established.

Recommendation: It is recommended that the SFD transition to the regional radio system hosted by E-Comm to address coverage deficits in their current system as well as to gain full interoperability with other fire and police departments as well as BC Ambulance.

Summary

The Sasamat Fire Department is a progressive, volunteer fire department that has completed a detailed strategic plan in addition to the communications system review. The strategic planning process identified emergency communications in particular the radio system, dispatch, a CAD system and a record management system as high priorities. The communications system review has also been conducted and has identified the same four issues as priorities.

Each of these items is important as they address deficits in the current SFD systems. The changes to the radio system that are recommended will ensure seamless coverage for units operating with portable radios within the existing SFD response area. This will increase fire fighter safety and will allow incident commanders and responders to focus on the fire or rescue that is being managed. In this way, service to the public will also be increased.

Changing dispatch providers to one that utilizes a fire service CAD system that supports rip and run printers, mobile workstations and an interface to the BC Ambulance dispatch will improve service to the public by having SFD units arrive on scene at the earliest possible time, with more complete information regarding the particular emergency. The incident details may include the details regarding the patient's condition in the case of first responder calls, or full details contained in a pre-plan for fire responses to fires and hazardous materials calls. These changes will also improve the ability of the SFD to manage fire fighter safety by providing a higher degree of information as well as placing fire crews at the scene of emergencies earlier than is presently the case.

Finally the implementation of a fire record management system will allow the Chief and his executive to better manage all aspects of the fire department including training and certification of fire fighters, incident reports, fire cause determination, pre-plans, inspections as well as asset management and preventive maintenance.

The recommendations contained in this report are all ones that are currently in place with the neighbouring fire departments and in every case involve proven solutions. The recommendation regarding the radio system only has one option, which is the regional radio system. The recommendations regarding a change of dispatch provider as well as implementation of CAD and a record management system can be obtained from a number of service providers in the Metro Vancouver region.

Recommendations

The following recommendations are proposed for the Sasamat Fire Department. In terms of priorities the first three would normally be simultaneously implemented. The fourth one could be implemented with the first three. Alternately given the small size of the department and the number of members that could be assigned to the various transitions as well as for reasons related to costs, the radio transition could be phased in at a later time.

1. Transition to a fire dispatch provider
2. Implement/utilize a CAD system
3. Implement an RMS system
4. Transition to the regional radio system

Recommendation	Potential Benefits	
	Public	Fire Department
Transition to a fire dispatch provider	<ol style="list-style-type: none"> 1. An earlier response to emergency scenes by SFD 2. Dispatch within the NFPA timeframes 	<ol style="list-style-type: none"> 1. Dispatch within the NFPA timeframe 2. Record of all key benchmarks including loss stopped, etc.
Implement/utilize a CAD system with an interface to the BCAS CAD system	<ol style="list-style-type: none"> 1. Fire fighters will arrive on scene with a higher degree of fire pre-plan and patient information 2. Fire fighters will arrive earlier to first medical responder calls; with more complete information 	<ol style="list-style-type: none"> 1. Implementation of rip & and run sheets with call information at each fire hall 2. Implementation of mobile workstations in fire apparatus including mapping with route recommendation and locations of hydrants 3. Implementation of a proper fire incident report that will support a fire cause determination analysis 4. Response to first medical responder calls earlier, with more complete information
Implement an RMS system	<ol style="list-style-type: none"> 1. RMS will contain modules that manage building pre-plans and inspections where these are required 2. The SFD will be able to ensure that fire fighter training meets contemporary standards to ensure service to the public 	<ol style="list-style-type: none"> 1. Management of all fire department personnel, assets and hazards will be unified in a single system 2. RMS will allow for proper management of all aspects of fire training including drill scheduling as well as documenting training and certification of fire fighters in accordance with accepted standards

Recommendation	Potential Benefits	
	Public	Fire Department
Transition to the regional radio system	<ol style="list-style-type: none"> 1. Fire fighters responding will not need to respond with one less fire fighter (left in the hall to manage the radio) 2. Fire fighters will have full contact with all incoming fire units to manage setup, rescue, fire suppression, etc. 	<ol style="list-style-type: none"> 1. Seamless radio coverage throughout the response area to address current deficits which occur in up to 50% of responses 2. Ability to 'talk' with and manage combined responses with BCAS and other responders within Sasamat

Appendix 1: Consultant Background

Dave Mitchell & Associates Ltd. was established in 2000 and offers consulting services in the provision and operation of emergency communications systems as well as fire and emergency service management including training, hazardous materials response as well as organizational, governance and operational issues.

Our firm has developed a number of master fire plans and conducted fire services reviews as well as fire hall location studies. We have also undertaken reviews of fire services requirements for various regional districts and municipal governments. In addition, we are participating with an increasing number of organizations as facilitators and consultants developing strategic and operational plans, organizational studies and post-implementation reviews for their emergency services and related dispatch and communications centres.

Dave Mitchell

Dave Mitchell retired as Division Chief, Communications in 1998 from Vancouver Fire & Rescue Services following a career spanning 32 years. During this time he was responsible for managing the emergency call taking and dispatch for the Vancouver and Whistler Fire Departments. In 1997 he managed the transition of dispatch service for the five Fire Departments on the Sunshine Coast from an independent contractor, to Vancouver Fire/Rescue.

In 1998 Mr. Mitchell was hired by E-Comm, Emergency Communications for Southwest BC as its first Director of Operations. In this role he was a member of the founding senior management team, and was responsible for the transition of the Vancouver Police Department dispatch staff as well as the 9-1-1 call takers for Whistler, Metro Vancouver and the Sunshine Coast Regional District to its current location at 3301 East Pender in June 1999. Dispatch services for the RCMP in the Sunshine Coast, Whistler and Pemberton were added in October 1999.

He left E-Comm in June 2000 to work as a consultant, and since that time has worked with provincial, regional and municipal governments on a range of issues including the Hon. Gary Filmon's review of the 2003 Firestorm for which he reviewed all the testimony taken and provided advice and recommendations regarding emergency communications systems and interoperability issues. In addition, along with other members of the firm, he has worked with local and regional governments conducting a series of fire services reviews that considered governance, operations, organization, finance and interoperability including mutual aid. These include studies for the Columbia Shuswap Regional District in 2008/09, the Comox-Strathcona Regional District in 2007 and the Squamish Lillooet Regional District in 2006.

Other areas of work include master fire plans, strategic plans and fire hall location studies for a range of clients including Port Moody, West Vancouver, Saanich, Fort St John, Pitt Meadows, North Vancouver District, North Vancouver City, Burnaby, View Royal and Sidney. The firm also specializes in technology related projects including quality assurance reviews of communications centres as well as procurement and implementation of computer aided

dispatch and record management systems for fire departments such as Whistler, Vancouver, Richmond, Delta, New Westminster, Prince George, Lethbridge, Whitehorse, the Kootenay Boundary Regional District, the Regional District of Fraser-Fort George, and Toronto.

Mr. Mitchell holds a Bachelor of Arts Degree from Simon Fraser University in addition to a diploma from their Executive Management Development Program. He is past Chair of the Board of Directors of the Vancouver General Hospital and University of British Columbia Hospital Foundation and is a member of the National Fire Protection Association (NFPA), the National Emergency Number Association (NENA), the Association of Public-Safety Communications Officials (APCO), the Fire Chiefs' Association of British Columbia (FCABC), the Canadian Association of Management Consultants (CAMC) and is a member of the Public Safety Communications Advisory Committee of Kwantlen College.

Appendix 2: Radio & Pager Frequencies

RADIOS

Select switch	Type	Frequency	Authorization Host
1.	Rx Tx	158.175 MHz	SVFD, Assigned Frequency
2.	Rx Tx	150.305 MHz	SVFD, Tactical 2 Channel Rx & Tx Tone DPL245
3.	Rx Tx	172.095 MHz	Village of Belcarra Public Works & SVFD Tactical 3
[4.	Rx --	169.170 MHz	GVRD Mt. Seymour (Repeater) Rx Tone DPL131.8]
[4.	-- Tx	169.620 MHz	GVRD Mt. Seymour (Repeater) Tx Tone DPL110.9]
5.	Rx Tx	153.830 MHz	POMO Fire, VHF Frequency D223
[6.	Rx --	153.530 MHz	POMO Public Works Rx Tone DPL223,
[6.	Tx --	159.180 MHz	POMO Public Works Tx Tone DPL223,
7.	Rx Tx	155.460 MHz	Fire Commissioner (initial multi agency)
8.	Rx Tx	164.910 MHz	Forestry, Copper
9.	Rx Tx	163.890 MHz	Forestry, Silver
10.	Rx Tx	163.830 MHz	Forestry, Gold
11.	Rx	161.650 MHz	Bowen Marine Weather
12.	Rx Tx	156.800 MHz	Marine call 16
13.	Rx Tx	156.475 MHz	Marine Chat 69
14.	Rx Tx	165.930 MHz	BC Hydro, Buntzen Lake (Simplex)
[15.	Rx --	166.290 MHz	BC Hydro, Buntzen Lake (Repeater)]
[15.	-- Tx	165.210 MHz	BC Hydro, Buntzen Lake (Repeater)]
16.	Rx --	158.175 MHz	SVFD, Pager setting (see pager codes)

Radio Models:

Motorola HT 1000 & HT 750	(portables - program 1 > 16; max. channel potential is 16)
Motorola HT 1250	(portables - program 1 > 16; max. channel potential is 128)
Motorola CDM 1250	(Base Stations for Anmore x1 & Belcarra x1; program 1, 2 & 3 only)
Motorola CDM 1250	(Mobile: Pump 1) x1; program 1 > 16
Motorola Radius M1225	(Mobile: Rescue 5) x2; program 1 > 16
Motorola Max Trac	(Mobile: Tanker 4) x1; program 1 > 16
Motorola CM300	(Mobile: ATV x1, Tanker 2 x1, Pump 3 x1); program 1 > 1
