FIRE UNDERWRITERS SURVEY

A SERVICE TO INSURERS AND MUNICIPALITIES

c/o CGI Information Systems and Management Consultants

Review of Fire Protective Services For Fire Insurance Grading

Lasqueti Island
BC

Private & Confidential
2008
Draft

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Tables and Figures

1. SCOPE OF OUR ENGAGEMENT

The Powell River Regional District contracted the services of CGI (formerly IAO) to evaluate the Lasqueti Volunteer Fire Department's fire protection programs. The purpose of the assessment is to determine whether the community's current fire insurance grading classifications are representative of the fire protection programs and fire protection resources that are currently in place within the community. A fire insurance grading review is a key part of the assessment process.

The significant findings of the CGI fire protection review were requested to be outlined within a report format. The report will provide an update on Lasqueti Island's fire insurance grading assignments and make recommendations aimed at improving the level of fire protection and improving fire insurance grading classifications of Lasqueti Island.

1.1. Acknowledgement

CGI wishes to thank the Lasqueti Volunteer Fire Department for their valuable assistance in conducting this survey and preparation of this report.

1.2. Distribution of Use

This report, along with the findings and conclusions, contained herein, is intended for the sole use of the Powell River Regional District and the Lasqueti Volunteer Fire Department to assist in the fire protection planning needs of the community.

Judgements about the conclusions drawn, and opinions presented in this report should be made only after considering the report in its entirety. This report is Private and Confidential and is intended for the exclusive use of the Powell River Regional District and the Lasqueti Volunteer Fire Department.

1.3. Reliance and Limitation

We have relied on the general accuracy of information provided by stakeholders without independent verification. However we have reviewed this information for consistency and reasonableness. The accuracy of our conclusions is dependent upon the accuracy and completeness of this underlying data. Therefore any discrepancies discovered in this data by the reader should be reported to us and this report amended accordingly, as warranted.

2. EXECUTIVE SUMMARY

This report outlines the significant findings of a fire protection assessment of Lasqueti Island. The Powell River Regional District requested CGI Municipal Consulting Services to conduct this assessment to evaluate whether Fire Underwriters Survey fire insurance grading classifications need updating due to implementation of a new fire hall on the island. A second objective of the study was to evaluate the fire protection needs of the Lasqueti Volunteer Fire Department and make recommendations in areas that would improve the overall level of fire protection, as well as fire insurance grading classifications.

In order to determine the fire protection needs of the Lasqueti Volunteer Fire Department a fire hazard and life safety assessment was undertaken. The purpose of this review is intended to identify and quantify fire risk and hazard and fire life safety issues.

This assessment of the Lasqueti Volunteer Fire Department found that the fire department has made and continues to make considerable and pro-active improvements to the level of fire protection within the community.

The Lasqueti Volunteer Fire Department is currently graded as a Dwelling Protection Grade 4 for the Northern Fire Hall. One of the primary reasons for this study was to evaluate the possibility of extending this Dwelling Protection Grade to the newly constructed Southern Fire Hall and the area it protects. The study has determined that although several key deficiencies will need to be addressed prior to the recognition of the new fire hall for fire insurance grading purposes. The level of fire protection being provided throughout all areas of Lasqueti Island is generally consistent with a Dwelling Protection Grade 4.

A number of conclusions and recommendations have been drawn as a result of this assessment. This report focuses upon areas of fire department operations where upgrading would improve the level of fire protection service. Recommendations have been made throughout the body of the report.

3. SUMMARY OF RECOMMENDATIONS

The following table summarizes the recommendations made during this assessment. The level of importance in the left column indicates the importance of the recommendation with regard to fire insurance grading and the potential for Lasqueti Island to maintain/improve its fire insurance grading classification. It is important to note that the following recommendations may have different levels of importance when considering them from alternative perspectives such as good engineering practices, economic benefit, life safety, etc.

Table 1.3-1 Summary of Recommendations and Importance Level

4. FIRE UNDERWRITERS SURVEY

Fire Underwriters Survey is a national organization that represents more than 85 percent of the private sector property and casualty insurers in Canada. The Survey provides data to program subscribers regarding public fire protection for fire insurance statistical and underwriting evaluation. It also advises municipalities of deficiencies in their fire defences and recommends improvements to enable them to better deal with fire protection problems.

Fire Underwriters Survey offices maintain data from surveys on fire protection programs throughout all municipalities across Canada. The results of these surveys are used to establish the Public Fire Protection Classification (PFPC) for each community. The PFPC is also used by underwriters to determine the amount of risk they are willing to assume in a given community or section of a community.

The overall intent of the grading systems is to provide a measure of the ability of the protective facilities within a community to prevent and control the major fires that may be expected to occur by evaluating in detail the adequacy, reliability, strength and efficiency of these protective facilities.

4.1. Fire Insurance Grading Classifications

Public Fire Protection Classification

The PFPC is a numerical grading system scaled from 1 to 10. Class 1 is the highest grading possible and Class 10 indicates that little or no fire protection is in place. The PFPC grading system evaluates the ability of a community's fire protection programs to prevent and control major fires that may occur in multifamily residential, commercial, industrial, and institutional buildings and course of construction developments.

Fire Underwriters Survey also assigns a second grading system for community fire protection, referred to as the Dwelling Protection Grade (DPG), which assesses the protection available for small buildings such as single-family dwellings.

Dwelling Protection Grade

The DPG is a numerical grading system scaled from 1 to 5. One (1) is the highest grading possible and five (5) indicates little or no fire protection is provided. This grading reflects the ability of a community to handle fires in small buildings such as single family residences.

4.2. The Public Fire Protection Classification System

The PFPC grading system is a measure of a community's overall programs of fire protection. The DPG grading system only evaluates a fire department's ability to control or extinguish fires in small buildings.

The ability of a community's fire defences are measured against recognized standards of fire protection relative to fire hazard and fire / life safety risk present within the community. The following broad areas of fire protection are reviewed in the survey and have the following weights within the FUS grading system:

Fire department operations	40%
Fire safety control within the community	20%
Fire service communications	10%
Water supplies and distribution system	30%

The above classifications are conveyed to subscribing companies of Fire Underwriters Survey. FUS subscribers represent approximately 85-90% of the fire insurance underwriters in Canada. Subscribers use this information as a basis in their fire insurance underwriting programs to set limits in the amount of risk they are willing to assume within a given or portion of a community, and to set fire insurance rates for commercial properties. Improved fire protection grades may result in increased competition for insurance underwriting companies to place their business within a community. Our analysis indicates that an improved fire protection grade has a positive effect on fire insurance rates.

In addition, FUS classifications are a measure of the fire protection within a community. Many progressive communities use the classification system to assess the performance of their fire protection programs, and to plan the direction of fire protective services for the future of the community.

Improvements that would have a cumulative positive effect in fire insurance grading classifications and fire protection ability are discussed within this report. The intent of identifying areas where improvements can be made is to provide Lasqueti Island direction in their community fire protection planning – if so desired and supported by the community.

4.3. The Dwelling Protection Grading System

Dwelling Protection Grades are based on a 1 to 5 grading system; DPG 5 indicates little or no fire protection is available. Most small and midsize communities that have a gradable emergency water supply are assigned a DPG 3A rating, which the insurance industry has termed fully protected. DPG 3B refers to communities, or portions of communities, that have a recognized fire department but are not protected with a recognized water supply. The insurance industry has termed this 'semi-protected'. Within the Fire Underwriters Survey grading, a grade of 3B indicates that the fire department is equipped, trained, prepared and adequately staffed to provide "Standard Shuttle Service" to a fire event within a reasonable response time (i.e. utilize a pumper, tender and various related equipment to deliver water to a fire site and provide structural fire fighting at the fire event).

The protected assignment refers to DPG 1 to DPG 3A. An unprotected designation refers to DPG 5. DPG 3B and 4 are given the semi-protected designation. The lower the DPG assignment is, the larger the discount given in fire insurance rates. The discounts given for an identical property considered fully-protected over those considered unprotected can be approximately 60%. Where there is sufficient population and sufficient taxation base, the savings generated can more than offset the operating and capital costs of an effective fire service.

A summary of the requirements for fire departments to receive the various protection grades is indicated in Table 4.3-1 FUS Dwelling Protection Grades - Minimum Requirements per Fire Station.

Table 4.3-1 FUS Dwelling Protection Grades - Minimum Requirements per Fire Station

DWELLING	WATER WORKS	FIRE DEPARTMENT	CORRELATION WITH PUBLIC FIRE

PROTECTION GRADE	SYSTEM	EQUIPMENT	FIREFIGHTERS	PROTECTION CLASSIFICATION (P.F.P.C.) See "Note" below
1	Hydrant system capable of delivering 200 IGPM for 2 hours or 400 IGPM for 1 hour in conjunction with consumption at maximum daily rate	Response from within 8 kilometres by road of a standard pumper[1]	Response of 3 on-duty career members plus fire chief or other officer not required on-duty	Water supply and fire department must grade Class 5 or better
2	Same as 1	Same as 1	Response of 1 on-duty career member and 15 volunteer fire fighters fully equipped[2]	Water Supply and Fire Department must grade Class 6 or better
3A	Same as 1	Same as 1	15 volunteer fire fighters fully equipped	Not correlated to Public Fire Protection Classification
3B	Not required	2 units required. Standard pumper plus a mobile water supply (tanker) with a combined water carrying capacity of not less than 1500 Imperial Gallons	15 volunteer fire fighters fully equipped	Not correlated to Public Fire Protection Classification
4	Not required	Standard pumper or 800 Imperial Gallon tankers with booster pump of 200 IGPM capacity	10 volunteer fire fighters fully equipped	Not correlated to Public Fire Protection Classification
5	Unprotected communities or communities not qualifying for Grades 1, 2, 3A, 3B, or 4 above.			

Many insurers have simplified the Dwelling Protection Grading system to a simple three tier system. This is typical for setting insurance premium rates for detached single family residences only.

[1] A "standard" pumper refers to a triple combination pumper that is equipped with a major pump rated at 840 IGPM, a water tank, and hose compartment. Fire apparatus should preferably be purchased new and listed in accordance with Underwriters Laboratories of Canada (ULC) S515 titled "Standard for Automobile Fire Fighting Apparatus." Used or rebuilt fire apparatus must be subjected to ULC or Underwriters service tests.

[2] Fully Equipped means each firefighter having personal protective clothing and equipment as defined in NFPA 1001.
"Personal Protective Clothing" - the full complement of garments fire fighters are normally required to wear while on emergency scene including turnout coat, protective trousers, fire-fighting boots, fire-fighting gloves, a protective hood, and a helmet with eye protection.
"Personal Protective Equipment" - consists of full personal protective clothing, plus a self-contained breathing (SCBA) and a personal alert safety system (PASS) device.
A minimum of 4 SCBA units each with a spare air cylinder are required to be carried on a standard pumper.

Different insurers utilize the Dwelling Protection Grades differently to set their own rates based on the marketplace and their own loss experiences. The three tier system that is typically used by many insurers is shown in Table 4.3-2 FUS Grades Correlation to Commonly used Insurance Terminology and Simplified Grades.

Table 4.3-2 FUS Grades Correlation to Commonly used Insurance Terminology and Simplified Grades

Insurance Bureau of Canada Dwelling Protection Grades. Statistical "5 tier" System:	System Used by Many Insurance Companies Underwriting "3 tier" System:	Insurance Companies refer to this Grade as:
1 2 3A	Table 1	Protected
3B 4	Table 2	Semi - Protected
5	Table 3	Unprotected

The fire insurance industry has minimum requirements that communities must meet in order for their fire protection program to receive recognition. The insurance industry sets benchmarks for:

- Fire Department Organization
- Membership
- Training
- Apparatus Requirements
- Fire Suppression Capability, and
- Alarm Notification

4.4. Measuring Fire Risk in This Review

The strength of fire defence within a community depends largely on the will and financial ability of the community to support this emergency service. Fire Underwriters Survey

and the National Fire Protection Association statistics indicate that the larger the population of a community, the higher the level of fire protection, when measured against the risk of fires within the community. The best scenario for the level of fire protection occurs when expectations of fire suppression and prevention match the community's willingness to pay for this expectation.

Community growth resulting from capital developments increases the level of fire risk; however, the development of fire protective services often falls behind the developments, particularly in communities where growth happens quickly. If the community expectation levels are constant and the fire protective service level is also constant, when the fire risk level increases then the fire protection level relative to the fire risk level decreases and community expectation (for a reasonable level of fire protection) may no longer be met.

Optimum Level of Fire Protection

> *The combination of fire fighting staff and apparatus that delivers a suppression effort commensurate with the fire demand faced, yet representing the most efficient use of resources in a safe and effective manner.*

4.5. Overview of the Assessment Process

There is no one universal model of fire defence that can be applied to all situations or to a community requiring this emergency service. Ideally, the strength of a fire protection program is balanced between the risk of serious fire and the community's fire loss experience. Fire defences should be tailored with these issues in mind. To gauge the needs of the fire service based on experience alone would be to ignore perils that have not yet occurred. Ignoring experience and focusing on risk alone may tend to build-up a fire department force beyond the financial acceptability of the community paying for the service.

FUS measures the ability of a fire department against the risk of fire likely to occur within a community. This measurement is usually not determined by the most significant risk, nor is it based on the average fire risk. Our measurement tends to focus on those structures where there is a considerable risk to fire and life safety, and where total or temporary loss of a particular structure would have a significant impact to a community's tax base and economy. A fire department should be structured and supported to

effectively deal with everyday emergencies while at the same time capable to control and extinguish most fires that may occur.

In the case of Lasqueti Island, the fire protective service was measured in its ability to provide fire protection to the typical risks found in the community. These risks included (but were not limited to): single family residential; commercial buildings, public/institutional buildings; and forest interface areas.

FUS examines the entire program of the community's fire defence in order to assess and grade the overall program. There are some areas within a FUS grading that carry substantial weight, in bold such as:

- Type of, and number of apparatus
- **The condition and age of fire apparatus and fire suppression equipment**
- **The type of apparatus and ancillary equipment for the hazards present**
- Pumping capacity
- **The type of Staffing (i.e. career firefighters vs. volunteers)**
- **The distribution of companies relative to fire risk**
- Response to alarm protocols
- Response times to critical risks
- **The quality of training programs for the fire fighter** including specialized training
- Emergency communication systems
- **Fire prevention and public education programs**
- Building controls (application of Building Codes and related standards; plan review process; effective construction inspection and permit process)
- Fire prevention inspections
- **The availability, adequacy and reliability of emergency water supplies.**
- Automatic fire protection systems
- Management of emergency services

5. PROJECT SCOPE AND METHODOLOGY

5.1. Project Objectives

The scope of this assignment was to conduct an assessment of Lasqueti Island's fire protection program, for two purposes being:

- To evaluate the community's fire protection needs, and
- To evaluate whether the community's fire insurance grading classifications need updating based on the current level of fire protection available to the community.

A supplementary objective was to provide direction to the Lasqueti Volunteer Fire Department as to where improvements to the community's fire protection programs could be made should fire insurance grading classifications remain status quo or be subject to downgrading.

The evaluation is intended to consider both current and future fire protection needs. The tasks and methodology used to conduct the assessment are listed below:

1. Community Risk and Hazard Assessment including
    - Assessment of community profile
    - Profile and quantify hazard and risk
    - Assess planning methods for future growth

2. Fire Department Assessment including Assessments of
    - Fire Department Profile
    - Operations and Administration
    - Apparatus and equipment
    - Distribution of resources
    - Pumping capacity
    - Maintenance programs
    - Staffing and personnel
    - Training programs
    - Pre-Incident Planning Program

3. Fire Safety Control Assessment

4. Emergency Communications Assessment

5. Water Supplies for Fire Protection Assessment
    - Evaluate emergency water supplies capacity and storage
    - Test water supplies at various representative points throughout system
    - Analyze water system for weaknesses and lack of redundancy
    - Compare available water supplies to combined domestic demand and calculated fire flow needs

6. Complete a Fire Insurance Grading Review of the Community

7. Develop a Report that Includes Findings and Recommendations

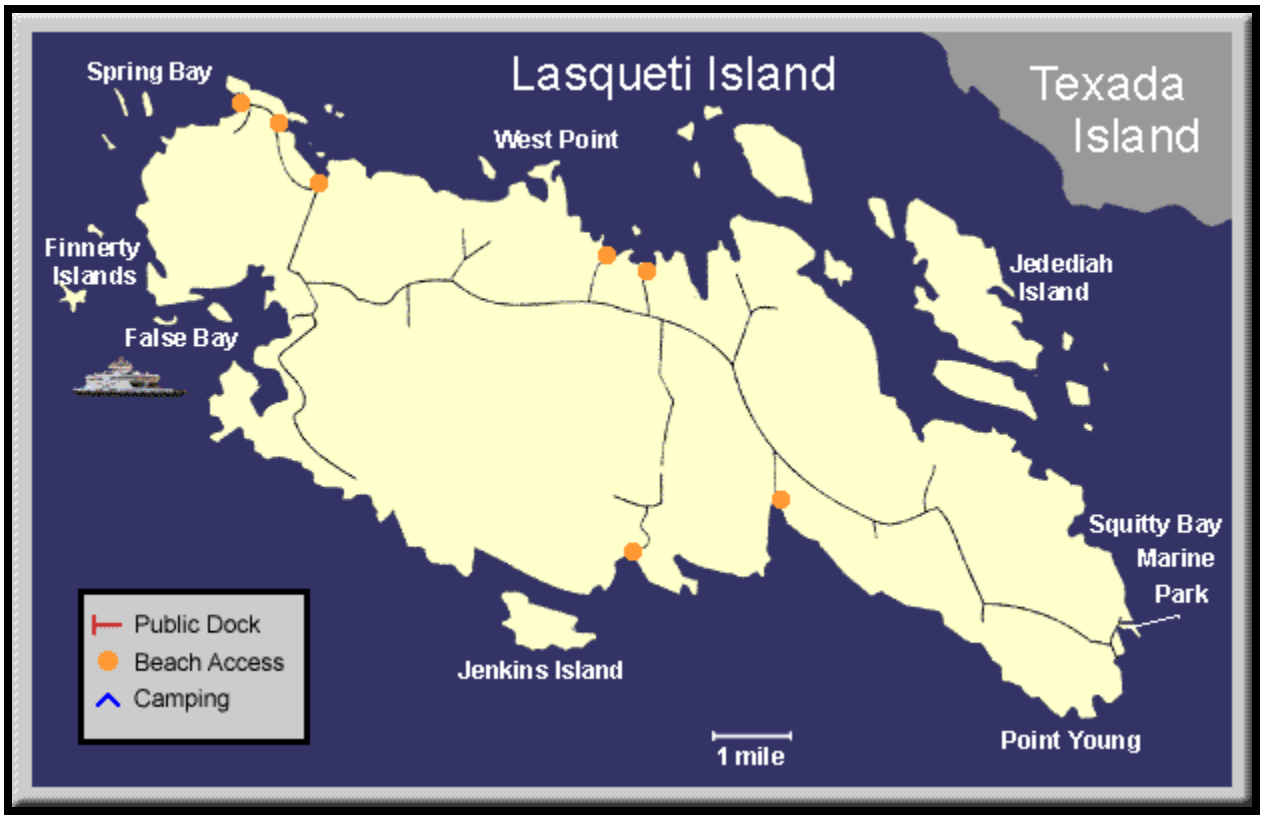
The following key contacts were made and provided information throughout the survey and development of report.

- Ross Thompson, Fire Chief
- Dennis Bergen, Deputy Fire Chief
- Merrick Anderson, Area E Regional Director of Lasqueti Island (Powell River Regional District)

6. LASQUETI ISLAND

6.1. General Description

Lasqueti Island lies southwest of Texada Island, a short distance across the Strait of Georgia from Parksville and Qualicum Beach on Vancouver Island. The size of the island is 6,645 hectares (16,420 acres). The island itself is 19.3 km long and 3.8 km wide. Lasqueti Island has a population of approximately 380.



Lasqueti Island is only accessible by a foot passenger ferry service in Parkville, or by private boat or float plane. No vehicle ferries service the island and the island has no public transportation system

Lasqueti Island is not serviced by B.C. Hydro. Residents live either without electricity or with alternative sources of power. The Island has is very little industry or commercial development.

6.2. Local Governance

Lasqueti Island is part of the Powell River Regional District and is located in Electoral Area E. Services such as waste management, the marine ramp; docks, roads, cemetery, and the volunteer fire department are provided through the Regional District.

The Lasqueti Local Trust Committee is responsible for land use planning and regulating the development for Lasqueti and the surrounding small islands. The Lasqueti Local Trust Committee is a part of the Islands Trust, a federation of independent local governments, which plans land use and regulates development in the trust area.

7. COMMUNITY RISK AND HAZARD ASSESSMENT

7.1. Background

A fire hazard and risk assessment was conducted throughout Lasqueti Island to aid in determining the community's fire protection needs and to assist in assessing the adequacy of the Fire Department. A risk and hazard assessment, along with a response distance review, community growth assessment and assessment of trends of emergency responses, lays the groundwork to determine fire protection needs within a community. This assessment is important in determining organizational structure, personnel requirements, training requirements, fire apparatus and fire equipment needs, response time requirements and adequacy of fire station location.

The "Risk and Hazard Assessment" is an evaluation of the life safety risks, fire loading and risk of fire that is present in a given area.

The risks on Lasqueti Island are spread out across the island. Structures on the island are typically of wood frame construction and one storey in height. There are a small number of structures on the island that are two storeys in height. The island is forested so structures are typically exposed to wildland urban interface fire risk and are typically not exposed to other structures.

7.2. Measuring Fire Risk

Adequate response to a fire emergency is generally measured by the speed of which a responding fire fighting crew(s) can arrive at the fire emergency with the correct type and amount of resources, to have a reasonable degree of opportunity to control or extinguish a fire. Simply put, the response provided by a fire fighting crew should equal the potential severity of the fire or fire emergency. The required response from a fire fighting crew is greater if life safety is a factor in a fire event and the expected response time is shorter.

The potential severity of a fire event is generally associated with the fuel load present and exposures to the fire. Factors such as building construction materials; quality of construction; building renovation history; building size, height and age; occupancy and hazards associated with the occupancy, will all contribute to the potential severity of a

fire. In addition, other buildings sufficiently exposed to a burning building can contribute to the magnitude of a fire and, the resources necessary to be in place to control or extinguish a given fire. Alternatively, building controls and automatic fire protection systems (both active and passive) that limit fire spread will reduce the potential severity of a fire. For building controls to be considered effective, their design, installation and maintenance must also be reviewed as any weak link may result in the system being ineffectual.

Much of the research into fire protection requirements for individual buildings and communities and the corresponding number of "pumper companies" and response times has been conducted by Fire Underwriters Survey and the National Fire Protection Association. Fire Underwriters Survey evaluates adequacy of response by comparing the potential severity of fires that may occur with a rating of the ability of fire crews and their resources responding within a specified time period relative to the fire and life safety risk potential that may be needed.

In a fire and life safety risk analysis, Lasqueti Island is broken up into zones of fire emergency risk and hazard profiles. For this review, the fire protection needs the community were evaluated. A fire and life safety risk analysis provides much of the data that is necessary to comment on the community's fire protection needs including fire apparatus requirements, fire equipment and other areas of a community's fire protection programs.

Table 7.2-1 Fire Underwriters Survey - Table of Effective Response illustrates various sectors commonly found in most communities, and indicates a range of risk ratings that are commonly applied to these sectors. The Table also indicates a range of fire flows that are normally associated with each community sector profile. Additionally, Table 7.2-1 indicates the number of pumper trucks, ladder trucks and associated companies that are expected to be needed to control and suppress fires occurring within representative building zones throughout the community.

The number of fire companies that will be needed is correlated to fire loading within the community's building stock and to life safety risks present. Fire flow requirements are determined by construction characteristics, occupancy, size and exposures to representative buildings throughout the community.

Table 7.2-1 Fire Underwriters Survey - Table of Effective Response

The following Table aids in the determination of Pumper and Ladder Company distribution and total members needed. It is based on availability within specified response travel times in accordance with the fire potential as determined by calculation of required fire flows, but requiring increases in availability for severe life hazard.

RISK RATING	BUILDING DISTRICT EXAMPLES	FIRE FLOW		INITIAL RESPONSE TO ALARMS		1ST DUE	2ND DUE	1ST DUE	TOTAL AVAILABILITY NEEDED			
		L/min X1000	Approx. IGPM Range	Pumper Companies	Ladder Companies	Pumper Company, Minutes	Pumper Company, Minutes	Ladder Company, Minutes	Pumper Co's. No.	Pumper Co's. Min.	Ladder Co's. No.	Ladder Co's. Min.
1 (a)	Very small buildings, widely detached. Scattered	2	400	1	0	7.5	-	*9	1	7.5	*1	9
(b)	development (except where wood roof coverings).	3	600	1	0	6	-	*7.5	1	6	*1	7.5
2	Typical modern, 1 - 2 storey residential subdivision 3 - 6 m 10 - 20 ft. detached).	4-5	800-1000	2	0	4	6	*6	2	6	*1	6
3 (a)	Close 3 - 4 storey residential and row housing, small mercantile and industrial.	6-9 10-13	1200-2000 2200-2800	2 2	1 (if required by Hazards)	3.5 3.5	5 5	*4 *4	2 3	5 6	*1 *1	4 4
3 (b)	Seriously exposed tenements. Institutional. Shopping Centres Fairly large areas and fire loads, exposures.	14-16 17-19	3000-3600 3800-4200	2 2	1 1	3.5 3.5	5 5	4 4	4 5	7 7	1 **1	4 4
4 (a)	Large combustible institutions, commercial buildings, multi-storey and with exposures.	20-23 24-27	4400-5000 5200-6000	2	1	2.5 2.5	4 4	3.5 3.5	6 7	7.5 7.5	2 2	5 5
4 (b)	High fire load warehouses and buildings like 4(a).	28-31 32-35	6200-6800 7000-7600	3	1	2.5 2.5	3.5 3.5	3.5 3.5	8 9	8 8	3 3	7 7
5	Severe hazards in large area buildings usually with major exposures. Large congested frame districts.	36-38 39-42 43-46	7800-8400 8600-9200 9400-10000	3	3	2 2 2	3.5 3.5 3.5	2.5 2.5 2.5	10 12 14	8 9 9	4 5 6	7.5 8 9

Notes to Table of Effective Response

** A ladder company is required here only when exceptional conditions apply, such as 3 storey heights, significant life hazards.*

*** For numerous or large single buildings over three stories use two ladder companies in 5 minutes.*

When unsprinklered buildings over six stories have fire flow requirements less than Group 4, the number of Pumper and Ladder Companies under "Total Availability Needed" should be increased at least to the next group to provide the additional manpower required except where this additional manpower regularly responds in the time allotted, as occurs in some volunteer or composite fire departments.

The table gives travel times for apparatus AFTER dispatch and turn-out. Under very exceptional conditions affecting total response time, these nominal figures should be modified.

7.3. Fire Risk on Lasqueti Island

Lasqueti Island primarily consists of residential occupancies spread out throughout the island on lots of land with varying amounts of hectares. Lasqueti Island has a limited number of commercial occupancies. The commercial occupancies are located in the False Bay area of Lasqueti Island.

The community has been reviewed from the perspective of life safety, fire loading, fire risk and response characteristics.

The community has been reviewed with building risk assessments. Building Risk Assessment was performed at two levels of measure:

1. *Occupancy Risk:* Which is defined as an assessment of the relative risk to life and property resulting in a fire inherent in a specific occupancy or in a generic occupancy class. (Occupancy "Required Fire Flow")

2. *Community:* Which is defined as the overall profile of the community based on the unique mixture of individual occupancy risks, fire flow demand zone risk levels and the level of service provided to mitigate those risk levels. ("Basic Fire Flow")

To develop the required fire flows on Lasqueti Island, the methodology described in Fire Underwriters Survey 1999 *Water Supply for Public Fire Protection* was used. Refer to Appendix A - FUS - Water Supply for Public Fire Protection – 1999.

Required Fire Flow calculations were conducted based on the existing structures on Lasqueti Island. Required Fire Flows were typically between 400-700 IGPM.

Required Fire Flow calculations were also conducted for the commercial structures on Lasqueti Island. Required Fire Flows for the commercial structures were between 700-1100 IGPM.

The Island itself is primarily undeveloped with structures scattered across the island. The Island is forested throughout which creates a considerable potential for wildland urban interface fires. It was unknown if a wildland urban interface study has been conducted for the island

It should also be noted that the required fire flows set by the Fire Underwriters Survey are intended as a benchmark that the community will be measured against. These fire flows are intended to be adequate to fight fires offensively, and to provide property protection (including exposure protection) in addition to life protection.

The required fire flows are utilized with associated risk categories from Table 7.2-1 Fire Underwriters Survey - Table of Effective Response to determine the appropriate level of response from fire departments, including items such as response times and apparatus requirements. These are also used to determine staffing requirements and optimal apparatus and fire station locations based on achieving the level of response indicated in the Table of Effective Response 90% of the time.

The Basic Fire Flow associated with Lasqueti Island is:

700 IGPM

The benchmark requirements of this Basic Fire Flow from Table 7.2-1 Fire Underwriters Survey - Table of Effective Response are as shown in Table 7.3-1 Summary of Benchmark Requirements for Basic Fire Flow. The community is measured against these benchmarks to establish the Public Fire Protection Classification grade.

Table 7.3-1 Summary of Benchmark Requirements for Basic Fire Flow

Basic Fire Flow	1st Due Pumper	2nd Due Pumper	1st Due Ladder	Total Pumper Companies available	Minutes for all to arrive	Total Ladder Companies available	Minutes for all to arrive
700 IGPM	6	-	0	1	6	NA	NA

7.4. Future Fire Risk on Lasqueti Island

The Basic Fire Flow of Lasqueti Island has been set at 700 IGPM. The Basic Fire Flow is not expected to change significantly based on the characteristics of the community in the next 10 years. However, if major developments were to occur on the island that were larger or involved greater fire risk than what is already present on the island then the Basic Fire Flow value may increase.

Lasqueti Island has no major developments planned for the future that would be expected to increase the Basic Fire Flow of the community. Currently, a dedicated BC Ferry is not expected to service the island and residents on the island are not expecting to receive hydro services.

It is expected that as the community continues to grow, the total fire load (and associated level of fire risk) will increase, however the type of risk within the community is expected to remain primarily residential.

From the perspective of insurers, the level of fire risk is a function of several key factors (each of which are influenced by a number of sub-factors) that include:

i. **Likelihood** of fire event occurring
    a. Influenced by many risk factors
    b. Occupancy type (industrial, commercial, multi-family residential)
    c. WUI - wildland urban interface exposures and Climatic conditions
    d. Presence of combustibles, presence of ignition sources
    e. Quantity of area protected, number of buildings/risks
    f. Population demographic
ii. **Consequence** of fire event occurring
    a. Loss of life
    b. Density of population
    c. Number of persons expected to be affected
    d. Loss of property and property values
    e. Loss of business, employment, tax revenue, economic impacts
iii. **Controls in place to prevent** fire event from occurring
    a. Codes, Bylaws and enforcement measures
    b. Fire Prevention Program
    c. Community and building design
iv. **Controls in place to reduce impact** of fire event that occurs
    a. Quality and availability of fire department
    b. Number of staff and quality of training program
    c. Number of apparatus and quality/reliability of equipment
    d. Availability and reliability of adequate water supplies for fire fighting

When there is an increase in the quantity of values that are being protected by a fire protective service organization, the level of fire protective service typically must increase to meet the increased risk levels. If the level of fire protective service remains a constant during the rise of protected property values, then the rated overall level of risk increases and the fire insurance grade typically reflects this.

8. FIRE DEPARTMENT ASSESSMENT

8.1. Fire Department Profile

The Lasqueti Volunteer Fire Department is an all volunteer fire department. The fire department provides fire suppression services to property owners on the island.

The Lasqueti Volunteer Fire Department is operated by the Powell River Regional District. Funding is provided through taxation of the residents of Lasqueti Island.

8.2. Fire Department Operations and Administration

The Lasqueti Volunteer Fire Department has one Fire Chief, one Deputy Fire Chief and one Assistant Deputy Fire Chief.

Officers:

1. Ross Thompson, Fire Chief
2. Dennis Bergen, Deputy Fire Chief
3. Morgan Runnings, Assistant Deputy Fire Chief

The Lasqueti Volunteer Fire Department has By-laws for establishing and regulating the fire department, and appointment of a Fire Chief and a Deputy Fire Chief.

Administration of the fire department is managed by the Fire Chief and the Powell River Regional District.

Administration is not digitized and the fire department is not provided with office computers to conduct basic administrative tasks. The fire department does not utilize any computer software for administrative tasks or statistical tracking and recording of fire department responses. Records are kept on paper only.

The fire department has standard operating guidelines; however, they are not well developed.

Recommendation 8.2-1 Develop Fire Department Standard Operating Guidelines and Administrative Documents

The fire department should develop and implement Standard Operating Guidelines. Standard Operating Guidelines are important for setting clear guidelines that are to be followed during fire ground operations. Additional documents that should be developed include but, are not limited to;

- Organizational chart,
- Job descriptions for officers,
- Health and safety requirements and regulations (update OH&S as needed),
- Training program and record system, and
- Fire prevention program and record system

Records should be stored digitally and backed up at a remote location.

8.3. Fire Station Suitability

The Lasqueti Volunteer Fire Department operates two fire halls on Lasqueti Island. Fire Hall #1 is referred to as the Northern Fire Hall and Fire Hall #2 is referred to as the Southern Hall.

LASQUETI ISLAND

SEPTEMBER 2005

N

Scale 1: 12,000

500 0 500 1000 Meters

6 Total number of potential lots

63.00 Lot size in acres (BCAA records where ever possible, if not area calculations from mapping.)

375 existing lots (residential and commercial included but excludes crown land and all lesser islands)

142 lots with subdivison potential (greater or equal to 19.76 acres)

938 potential lots

1313 maximum lots

Road dedication, steep slope, park dedication, covenants, lot width to length ratio, etc. have not been factored into these calculations.

Figure 8.3-1 Lasqueti Volunteer Fire Department Fire Hall Locations

The Northern Fire Hall was constructed in 1982 and houses two apparatus. The fire hall is of wood frame construction with a concrete floor and a duroid shingle roof. The hall has a height of 3 m (10 ft) with two bays each measuring 2.4 m (8 ft) in height, 3 m (10 ft) in width, and 9.8 m (32 ft) in length. One apparatus is for the fire department and the other is for first responders for medical emergencies. The fire hall has a small office space on the second floor. The office space houses the department's base radio station and is used for storage.

The Southern Fire Hall was constructed in 2002 and houses two apparatus. The fire hall is of wood frame construction with metal clad siding, concrete floor, and a metal roof. The hall has a height of 4.8 m (15' 10") with two bays each measuring 4.3 m (14 ft) in height, 3.7 m (12 ft) in width, and 12.2 m (40 ft) in length. The hall has sufficient room to conduct vehicle repair, indoor training exercises and meetings (while apparatus are moved outside the hall). There are no offices in this hall.

The Northern Hall was noted to be congested with lack of room for storing equipment, training, administrating, and working on equipment. Additionally, the Northern Hall's roof condition was reported to be in poor condition and in need of repair or replacement.

The fire department plans to expand the Northern Fire Hall by constructing an addition that would house an additional apparatus. Plans for expanding the Northern Hall are in the conceptual stage of planning. The additional bays would house the current apparatus in that hall and a new water tanker. Expansion would provide more space for training and administration.

Recommendation 8.3-1 Expand Fire Station to Provide Space for Administration and Training

To allow the fire department to administer, operate and train effectively, consideration should be given to expanding the Northern Fire Hall. Adequate space for training classroom and fire ground training is extremely important for the effectiveness of the training program. Lack of adequate space for fire department operations, administration and training adversely affects morale of the department and creates unnecessary stress on members.

8.4. Distribution of Resources and Response Times

8.4.1. Distribution of Resources

Resources for fire fighting have been distributed to provide a reasonable level of fire protective services to property owners on Lasqueti Island. The fire department established a second fire hall on the island to provide a reasonable level of service to the southern portion of the island. Apparatus from both fire halls respond on fire alarms. The fire hall locations are shown in Figure 8.3-1. Distance between the two fire halls is approximately 10 km in road travel distance.

For the Southern Fire Hall to be recognized for the Dwelling Protection Grade 4, a standard pumper (triple combination) would be required for that fire hall. In addition to having a minimum of 10 volunteer firefighters fully equipped as outlined in Table 4.3-1.

Recommendation 8.4-1 Acquire a Standard Pumper for the Southern Fire Hall

For fire insurance grading a standard pumper or an 800 Imperial Gallon tanker with a booster pump of 200 IGPM is required at the Southern Fire Hall to meet the requirements for a Dwelling Protection Grade 4.

Acquiring a new or rebuilt apparatus for the Southern Fire Hall is one of the integral requirements for this hall to be recognized. The properties protected by this hall (properties that are beyond 8 km road response from the northern hall) would receive reduced insurance rates as a result of the hall being recognized.

Acquiring a new or rebuilt apparatus is a serious matter that requires careful consideration. There are many factors to consider and fire insurance grading is only one such factor.

8.4.2. Response Times

All firefighters and emergency responders live and work on Lasqueti Island. On rare occasions members may be off the island taking care of personal matters, but for the most part they are on the island. All members of the fire department live within 5 km of the fire hall they are assigned.

Travel distances from the two fire halls are reasonable with the majority of single family dwellings located within 5 km of at least one of the two fire stations.

8.5. Apparatus and Equipment

Fire departments are evaluated for the number of Pumper companies in service relative to the overall fire potential and the area being protected. Pumper companies are required to be adequately staffed in order to receive full credit.

The Lasqueti Volunteer Fire Department apparatus fleet includes:

Table 8.5-1 Apparatus Summary

Fire Hall	Year	Vehicle Type	Pump (IGPM)	Tank Imp. Gallon	Manufacturer	2008 Age	ULC Listed?	Pump Capacity Credit %	Credited Pump Capacity
Northern Hall	2003	Initial Attack Vehicle[3]	420	200	HUB Engine	5	Yes	100%	420
Southern Hall	1980	Initial Attack Vehicle	320	200		28		20%[4]	32
Southern Hall	1963	Pumper	625		Shirley	45	Yes	0	0
					Total Credited Pump Capacity:				452

The maximum acceptable age of apparatus specified in the fire insurance grading index is 20 years. Apparatus is occasionally accepted beyond the age of 20 years for small communities where it may be too financially onerous to acquire newer apparatus. This extension of the usable life of the apparatus is subject to the apparatus and pumps being in good condition (with limited down-time) and being tested regularly. Application for extension of recognized usable life of apparatus for insurance grading purposes should be made in writing to the offices of the Fire Underwriters Survey. Test results should accompany applications for extension.

[3] Normally, the Fire Underwriters Survey does not recognize initial attack vehicles as being equivalent to a triple combination pumper in fire insurance grading. However, in 2003, an equivalency was granted to Lasqueti Island by FUS. Refer to Appendix B Letter entitled Lasqueti Island Fire Truck Certification.
[4] Unlisted Initial Attack Vehicles are credited a maximum 50% of the rated pump capacities for fire insurance grading purposes. Overall credit for pumping capacity is also reduced for reliability factors such as age, testing results and maintenance practices.

Apparatus beyond 30 years in age can not be credited for fire insurance grading purposes due to lack of reliability.

Recommendation 8.5-1 Test and Submit Results of Tests for Older Apparatus and Develop a Replacement Schedule

The Lasqueti Volunteer Fire Department has two apparatus that have surpassed 20 years in age. Some credit has been given for the apparatus; however, apparatus exceeding 20 years in age do not generally receive recognition. If it can be shown through maintenance and test results that the apparatus remains reliable, the accepted age may be extended to 30 years. Apparatus are not recognized beyond 30 years of age due to unreliability factors. To ensure that the Lasqueti Island's fire insurance grades are not adversely affected, an apparatus replacement schedule should be developed, to address the aging apparatus. Refer to Appendix C - Insurance Grading Recognition of Used of Rebuilt Fire Apparatus.

Recommendation 8.5-2 Decommission and Replace Older Apparatus

It is recommended that the Lasqueti Volunteer Fire Department decommission the 1963 pumper and replace it with a newer one. Consideration should also be given to replacing the 1980 initial attack vehicle in the near future.

Until such time as the older apparatus are replaced, these units should be tested annually in accordance with the Fire Underwriters Survey "apparatus service and road tests". Test results should be submitted annually to the Fire Underwriters Survey. Refer to Appendix C - Insurance Grading Recognition of Used of Rebuilt Fire Apparatus.

Recommendation 8.5-3 Acquire a Dedicated Mobile Water Supply Apparatus

To provide a reasonable level of protection to all areas of the Lasqueti Island, it is recommended that a mobile water supply apparatus (tanker) that is designed in accordance with a recognized standard such as ULC S515 or NFPA 1901 (most recent edition) be acquired. Acquiring a mobile water supply apparatus with the minimum tank size as noted in Table 4.3-1 FUS Dwelling Protection Grades - Minimum Requirements per Fire Station would help the fire department meet the requirements for a Dwelling Protection Grade 3B.

8.5.1. Ladder Service

When a community has five buildings of three storeys or greater in height (10 m or 35 ft), a required fire flow greater than 3300 IGPM, the fire department is expected to have one ladder apparatus for response.

Lasqueti Island does not have any buildings that meet the above requirements; therefore, ladder service is not required for the Lasqueti Volunteer Fire Department.

8.5.2. Design, Maintenance and Condition of Apparatus

The Lasqueti Volunteer Fire Department can conduct minor vehicle and pump repairs. Major repairs have to be conducted off the island. Fire department members are responsible for conducting apparatus maintenance. Apparatus pumps are tested annually at draft. Records are kept for all repairs done to the fire department's apparatus.

Fuel for apparatus can be obtained on the island and is available 24 hours a day.

8.5.3. Fire Fighting Ancillary Equipment and Hose

The Lasqueti Volunteer Fire Department has two ground ladders (26' and a 12'). Ground ladders are tested annually by fire department members.

Fire hoses are inspected by fire department members. Hoses are tested, and if deemed faulty, the hose is taken out of service and replaced. Hose testing records are not recorded and hoses are not indexed or marked when tested.

Hose drying is done by hanging hose within the fire halls and by a cable suspended to trees near the Northern Fire Hall.

Table 8.5-2 Fire Fighting Ancillary Equipment: Hose

Fire Hall	Apparatus	Amount of Hose		
		Booster	1 ½"	2 ½"
Northern Fire Hall	LAV		1600’	1000’
Southern Fire Hall	LAV		2000’	
Recommended per Pumper Company		200’	1200’	600’

Recommendation 8.5-4 Develop and Implement Hose Testing Program

To ensure safety of firefighters and residents of Lasqueti Island, the fire department should test its fire hose in accordance with NFPA 1962 (Standard for the Inspection, Care, and Use of Fire Hose, Couplings, and Nozzles and the Service Testing of Fire Hose 2008 Edition) or an equivalent standard. Failure of hose, especially during an emergency situation can result in an increased risk of injury and/or property damage. Testing should be conducted on a regular basis and recorded.

Recommendation 8.5-5 Ensure Ground Ladders are Tested in accordance with NFPA (or Equivalent) Standards

To ensure safety of firefighters and residents of Lasqueti Island, the fire department should test its ground ladders in accordance with NFPA 1932 (Standard on Use, Maintenance, and Service Testing of In-Service Fire Department Ground Ladders 2004 Edition) or an equivalent standard. Failure of ladders, especially during an emergency situation can result in an increased risk of injury and/or property damage. Testing should be conducted on a regular basis and recorded.

8.6. Fire Protective Clothing and Breathing Apparatus

The Lasqueti Volunteer Fire Department possesses nine sets of Personal Protective Clothing (PPC)[5]. The Personal Protective Clothing is stored on the fire apparatus in protective carriers (duffle bags).

[5] Personal Protective Clothing (PPC). The full complement of garments fire fighters are normally required to wear while on emergency scene, including turnout coat, protective trousers, fire-fighting boots, fire-fighting gloves, a protective hood, and a helmet with eye protection.

The Lasqueti Volunteer Fire Department does not possess Personal Protective Equipment (PPE)[6]. The fire department does exterior structural fire fighting only.

Recommendation 8.6-1 Acquire additional Personal Protective Clothing (PPC)

Providing adequate Personal Protective Clothing to fire fighters is important for the safety of the fire fighters as well as the public and properties they protect. The Lasqueti Volunteer Fire Department does not meet the minimum requirements for equipped firefighters. Currently, the fire department has a total of nine sets of Personal Protective Clothing (PPC) available. One of the requirements a fire department must meet to qualify for a Dwelling Protection Grade 4, is to have 10 volunteer firefighters fully equipped as specified in Table 4.3-1 FUS Dwelling Protection Grades - Minimum Requirements per Fire Station.

Notes

For Lasqueti Island to maintain its current Dwelling Protection Grade 4 (for the Northern Fire Hall only) one additional set of Personal Protective Clothing (PPC) should be acquired (for a total of 10 fully equipped volunteer fire fighters on the station roster).

For the Southern Fire Hall to be recognized for fire insurance grading, the fire hall will need to have a minimum of 10 volunteer firefighters fully equipped (minimum of 10 additional sets of PPC) on its roster for a Dwelling Protection Grade 4, in addition to having a recognized pumper as outlined in Recommendation 8.4-1.

Recommendation 8.6-2 Acquire Personal Protective Equipment (PPE)

Providing adequate of Personal Protective Equipment to fire fighters is important for the safety of the fire fighters as well as the public and properties they protect. The Lasqueti Volunteer Fire Department is deficient with respect to the number of sets of Personal Protective Equipment (PPE) available. A minimum of four sets of Personal Protective Equipment (PPE) are required per standard pumper to qualify for the Dwelling Protection Grade 4. The minimum requirements that a fire department must meet to qualify for a

[6] Personal Protective Equipment (PPE). Consists of full personal protective clothing, plus a self-contained breathing apparatus (SCBA) and a personal alert safety system (PASS) device.

Dwelling Protection Grade 4 are specified in Table 4.3-1 FUS Dwelling Protection Grades - Minimum Requirements per Fire Station.

Notes

To maintain Lasqueti Island's current Dwelling Protection Grade 4 (for the Northern Fire Hall only), the Lasqueti Volunteer Fire Department needs to acquire a minimum of four complete sets of Personal Protective Equipment (PPE), including self-contained breathing apparatus (SCBA) and a personal alert safety system (PASS) device, plus a spare air cylinder for each SCBA.

For the Southern Fire Hall to be recognized for a Dwelling Protection Grade 4, a minimum of four sets of Personal Protective Equipment (PPE) each with a spare air cylinder are required per standard pumper. Table 4.3-1 specifies the minimum requirements for a fire hall to be recognized. A standard pumper is required at the Southern Fire Hall as stated in Recommendation 8.4-1.

8.7. Pre-Incident Planning

The Lasqueti Volunteer Fire Department develops pre-incident plans and pre-planning includes

- visits to properties on the island to establish where structures are located,
- determining the condition of access ways for apparatus, and
- determining if other means of access are required to get to a property quickly and effectively.

This program is considered to be reasonable for the level of fire risk within the community.

8.8. Mutual Aid or Automatic Aid Agreements

The Lasqueti Volunteer Fire Department has no mutual or automatic aid agreements with neighbouring communities. Notably, the island is not readily accessible and any assistance would need to come by boat.

8.9. Available Fire Force

The Lasqueti Volunteer Fire Department is 100% volunteer. Fire department personnel include 27 members. Eleven of those members are fire fighters and the other sixteen are first responders. Only the eleven fire fighters are considered with respect to the fire insurance grading.

Within the fire insurance grading system, for a Dwelling Protection Grade 4, a minimum of 10 volunteer firefighters (fully equipped) are required per fire station. The Lasqueti Volunteer Fire Department has 11 firefighters on its roster. Out of those 11 only nine are currently credited because the fire department has only nine sets of Personal Protective Clothing (PPC), therefore can only provide nine fully equipped fire fighters.

Recommendation 8.9-1 Improve Available Fire Force to meet Minimum Requirements

In order for the Lasqueti Island to have the Southern Fire Hall recognized as a Dwelling Protection Grade 4, the fire department's available fire force needs to be increased. Consideration will need to be given to the equipment needs of additional fire fighters that are added to the roster. Consideration should be given to equipping and training the first responders as fire fighters (if they are physically capable and interested).

Notes

In order to maintain the current Dwelling Protection Grade of 4 for the Northern Station only, the Lasqueti Volunteer Fire Department requires:

- one additional set of Personal Protective Clothing[5] (for a total of 10 sets of PPC) as stated in Recommendation 8.6-1, and
- four sets of Personal Protective Equipment[6] (PPE) (SCBA and PASS alarms) as stated in Recommendation 8.6-2.
- Additionally, the full roster of firefighters (11 fire fighters) should be attached to the Northern Hall (currently a recognized DPG 4 area).

Alternately, if it would be of greater benefit to property owners, the 2003 apparatus and all fire fighters could be re-located to the Southern hall, however it is important to state that with the current assets and roster strength, it is not possible to have two recognized fire halls. If the resources are spread between the two halls, neither hall would be recognized and the entire area would become a Dwelling Protection Grade 5 (unprotected) area with respect to the fire insurance grading. This would have an adverse effect on the property insurance rates throughout the area.

For the Southern Fire Hall to be recognized for a Dwelling Protection Grade 4, a roster of 10 fully equipped volunteers (PPC[5] only) is required at the Southern Fire Hall.

For both halls to be recognized, the Lasqueti Volunteer Fire Department would require:

1. a total roster with a minimum of 20 volunteer firefighters being fully equipped with Personal Protective Clothing (See Recommendation 8.6-1).
2. a minimum of 10 responding fire fighters for each fire station,
3. a minimum of one recognized triple combination pumper (See Recommendation 8.4-1) in addition to the Initial Attack Vehicle (currently credited as an equivalent pumper), and
4. a minimum of 4 sets of Personal Protective Equipment per credited pumper, including the equivalent pumper (See Recommendation 8.6-2).

8.10. Training & Qualifications

8.10.1. Training Provided

The Lasqueti Volunteer Fire Department trains on the first and third Mondays of each month for two to three hours. Training on the first Monday usually involves fire pump use, nozzle practise, hose relays, and practising at drafting sites on the island. Training on the third Monday is not mandatory, but firefighters may participate in conducting maintenance on apparatus and equipment if required and go over any questions they have.

Training is done in house and the fire department follows NFPA 1001 and Wildland Fire Fighting S215. The primary resource material utilized by the fire department is Essentials of Fire Fighting, 4th Edition.

The fire department has no probation period for new members. New members are assigned a “mentor.” The mentor works with the new member at training sessions and during fire incidents.

The Lasqueti Volunteer Fire Department has an in house apparatus driver training program. Members of the fire department must possess a valid driver's licence to drive apparatus. Experienced drivers on the fire department train members who are willing to learn. Training usually involves driving the apparatus to and from training locations.

The fire department training program is similar to other communities with similar characteristics. Consideration should be given to improving the training program in the following areas:

- Training frequency (2 hrs per week is recommended)
- Incorporation of Live Fire training (all firefighters should periodically attend live fire training).

8.10.2. Record Keeping

The Lasqueti Volunteer Fire Department does not keep detailed records for training on each of its members.

See Recommendation 8.10-1 Develop Training Curriculum and Use a Database to Monitor Progress.

8.10.3. Training Facilities

The Lasqueti Volunteer Fire Department has no facilities specific for training on the Island. Training is conducted on Lasqueti Island utilizing the various draft sites throughout the island and what space is available near the fire halls. Occasionally members of the fire department attend a fire training centre or college.

Recommendation 8.10-1 Develop Training Curriculum and Use a Database to Monitor Progress

To improve the quality of the training program, a detailed curriculum should be developed. The curriculum should include qualitative and quantitative goals and benchmarks that each fire fighter and officer can work towards. Two standards that would aid in developing an optimal curriculum would be NFPA 1001 *Standard for Fire Fighter Professional Qualifications* and NFPA 1021 *Standard for Fire Officer Professional Qualifications*. NFPA 1001 identifies the minimum job performance requirements (JPRs) for career and volunteer fire fighters whose duties are primarily

structural in nature. NFPA 1021 identifies the performance requirements necessary to perform the duties of a fire officer and specifically identifies four levels of progression.

An effective training program is vital to increase efficiency in firefighting efforts and to help reduce loss of life and property damage from a fire.

A database for record keeping should be developed to monitor, track and progress toward goals. Additionally, adequate space should be provided for training as outlined in Recommendation 8.3-1.

9. FIRE SAFETY CONTROL

Fire Safety Control including Building and Fire Code effectiveness has become an increasingly heavily weighted portion of the fire insurance grading system. This is a result of statistical data showing that communities employing effective programs in these areas have significantly reduced fire related losses.

Lasqueti Island and the Lasqueti Volunteer Fire Department have been reviewed in the effectiveness of its practices with regard to Fire Safety Control.

9.1. Codes and Bylaws: Construction Control, Plan Review, Building Inspection and Permit Process

The Islands Trust is the governing body that plans land use and regulates development in the trust area of Lasqueti Island. The Islands Trust does not have the responsibility of building inspection.

The provincial building code is not enforced by the Islands Trust or the Powell River Regional District on Lasqueti Island. With no building code being enforced it is difficult to assess to what degree the buildings on Lasqueti Island are constructed to a reasonable construction standard.

Recommendation 9.1-1 Develop and Implement Controls for Construction and Building Code Compliance

To ensure that buildings are built to a reasonable construction standard and for code compliance for safety of residents, Lasqueti Island should consider incorporation to be able to implement a planning department that will handle the review and inspection of new buildings to ensure occupant and building safety. Alternatively, request the Regional District to provide building code services in the form of plan review and inspections during the course of construction that follow the British Columbia Building Code.

9.2. Code Enforcement, Inspections and Local Assistants to the Fire Commissioner

The Lasqueti Volunteer Fire Department has no members of the department dedicated to conduct regular fire inspections on Lasqueti Island. Inspections are conducted at the request of property owners.

Recommendation 9.2-1 Further Development of the Fire Prevention Inspection Program

To improve the level of fire prevention and reduce the overall fire risk in the community, a Fire Prevention Inspection Program should be further developed. The fire department should request that the Regional District provide fire prevention inspections to commercial occupancies on Lasqueti Island.

9.3. Public Education Program

The Lasqueti Volunteer Fire Department provides some public education services to the residents of Lasqueti Island. An annual Firefighter Picnic is held on the first weekend of August. A booth is set up to provide fire safety information to the residents during the picnic.

The fire department distributes and installs smoke alarms throughout the community. Information about smoke alarms and home escape plans are provided to residents through various forms of announcement such as newspapers, flyers, pamphlets, advertisements, public signs, and fire hall tours.

Recommendation 9.3-1 Develop and Implement Public Education Programs

To improve the level of fire consciousness throughout the community and to reduce the risk of fires, a formal public education program should be developed. A public education program can also be an excellent public relations tool and can be used to improve fire fighter recruitment within the community as well.

The Public Education Program should include promotion and development of various elements such as:

- Smoke Alarm Installation Program
- Hold Regular Fire Department Open Houses

- Host School Classroom Visits in the Fire Department
- Host Regular Community-Wide Fire Drills

The Program should also include promotion of Educational Programs/Materials such as the following (but not limited to):

- Fire Prevention Canada
- Fire Safety Information - (including PSAs)
- Home Fire Escape Plan Worksheet (PDF 207 kB)
- Learn Not to Burn® (LNTB®)
- Older & Wiser
- Kitchen Care Fire Safety Program
- "Use Candles with Care"
- The Arson Prevention Program for Children (TAPP-C)
- Risk Watch™
- Fire Safety Teacher Awards
- FNESS

9.4. Driveway and Lane Design and Access

To effectively combat structure fires, fire departments must be able to quickly access key parts of buildings. The time that it takes to arrive at a structure fire is one of the most critical elements in the chain of fire protection. When roads and access lanes are not designed specifically to accommodate fire apparatus, there may be delays in access to the building and the initiation of attack on the fire. This can result in increased risk to life safety and increased risk of property losses.

Roads on Lasqueti Island are all gravel (no pavement). The main road throughout Lasqueti Island is maintained by Emcon. Access lanes to single family dwellings are not designed to any specific standard. Access lane maintenance is at the discretion of the property owner.

Access lane design can pose a challenge to the fire department because they are not designed for fire department apparatus. Response times to single family dwellings may be excessive because access ways

- may be overgrown with brush,
- may not be wide enough for fire department apparatus to manoeuvre effectively, and/or
- may not be adequately designed to carry the weight of fire department apparatus.

Recommendation 9.4-1 Improve Driveway and Lane Design for Firefighting Access

To ensure good engineering practices are followed, Lasqueti Island should encourage the Regional District to adopt and use NFPA 1141, *Standard for Fire Protection Infrastructure for Land Development in Suburban and Rural Areas*, recent edition or a similar standard or guideline to improve driveway and access lane design and construction on the island. The fire department should work in conjunction with the Regional District in ensuring suitable design for access for fire fighting purposes.

Ensuring the adequacy of road and access lane design will help to reduce the response times to fire emergency events. Additionally, adequate road and access lane design will help ensure the safety of all persons and vehicles using them.

10. EMERGENCY COMMUNICATIONS

10.1. System Description

The Lasqueti Volunteer Fire Department has a single fire/emergency response number for residents to call. One communication line is utilized and there are four personnel assigned to dispatch on weekly shifts. Dispatching is done using a pager and telephone system. If the pager system fails a telephone tree (list of names and contact numbers) is utilized for contacting members of the fire department.

A siren is mounted on the Northern Fire Hall to notify fire department members and residents.

When a fire emergency is called in, the number where the call originates is displayed on the department's pagers followed by the pager code of 555 for a fire or a motor vehicle accident. The on-duty dispatcher then calls the number on the pager to collect the information about the emergency from the individual who called in the emergency. During this time, firefighters and emergency response personnel page into the pager system with the appropriate telephone number at their current location and wait by that telephone to receive information from the dispatcher. Once the necessary information is collected about the emergency, the dispatcher calls each firefighter and emergency response personnel and relays the information about the fire incident. The dispatcher coordinates which personnel should go directly to the fire scene and which personnel should pick up apparatus on the way to the fire scene.

The emergency communication system is considered unreliable for notification and dispatch because a minimal level of redundancy is built in. In the event that pagers and telephone systems fail, the only means to notify the firefighters would be the siren, located at the Northern Fire Hall. Having a poor emergency communication system may result in increased risk of property losses.

To improve the emergency communication systems of Lasqueti Island to an optimal level, electricity would be required consistently.

Recommendation 10.1-1 Change to Emergency Communication Centre based system

To improve the reliability of the emergency communications systems, Lasqueti Island should consider changing the current the emergency communications systems to a system based around an emergency communications centre designed in accordance with NFPA 1221. Alternatively, consideration should be given to contracting this service to a nearby communications centre.

Recommendation 10.1-2 Implement 9-1-1 Emergency Call System

To improve the ability and reliability for citizens to contact the fire department as quickly as possible and to reduce response times, Lasqueti Island should implement a 9-1-1 call service.

Recommendation 10.1-3 Train Dispatchers to NFPA 1061 Standard

To improve the reliability and effectiveness of the dispatchers on Lasqueti Island, all dispatchers should be required to be trained in accordance with NFPA 1061, *Standard for Professional Qualifications for Public Safety Telecommunicator*, recent edition as appropriate for their position.

10.2. Radio Communication

The Lasqueti Volunteer Fire Department utilizes radios for fire ground operations. Base radio stations are provided at each of the fire halls. Stand-by power is provided to each of the fire halls. The Northern Fire Hall is able to connect to a generator at the False Bay School a short distance down the road.

A portable repeater is located outside of the Southern Fire Hall. The portable repeater is housed in a covered, three-sided structure that is adjacent to the fire hall. Power to the repeater is provided by batteries located outside of the structure. An alternative power source is utilized to keep the batteries charged for the repeater. A solar panel is set up adjacent to the structure with a device to enable the panel to move when the direction of the sun moves. A generator is available to power the repeater if required.

Recommendation 10.2-1 Develop a Proper Structure for Communication Repeater

To ensure that emergency communication equipment will operate properly at all times, it is recommended that the portable repeater and batteries be housed in a structure that is

reasonably designed for the equipment. The structure should protect the equipment from being damaged by weather and other various factors.

11. WATER SUPPLIES FOR FIRE PROTECTION

Water supplies for fire fighting are a critical component of the community's fire defence systems. If the respective community has water supplies for fire fighting they would be evaluated for adequacy in several areas including but not limited to:

- Fire Flow Delivery – the ability of the water system to deliver the *Required Fire Flows* (from Section 7.3 - Fire Risk on Lasqueti Island).
- Storage Adequacy – quantity of stored water reasonable for expected demands and duration of appropriate flows during expected fire events.
- Distribution System Adequacy – layout and arrangement of piping and pump capabilities, looping/grid design of pipe networks for maximum versatility and minimum losses.
- Hydrant Distribution – appropriate spacing and distribution to minimize hose lays and other delays in setting up an initial attack during structure fires.
- System Design and Installation – the overall design of the system with regard to redundancy, and capability to continuously provide full service to all areas during all foreseeable events (including catastrophic events and/or perils).
- Maintenance of System and Components – system and component maintenance meets recognized standards and improved reliability of system.

This section highlights some of the significant findings of the fire insurance grading emergency water supply review. Areas where improvements can be made have been noted.

11.1. Lasqueti Island Water Supply Information

Lasqueti Island does not have a dedicated water distribution system that has fire hydrants for fire protection services. The Lasqueti Volunteer Fire Department relies on alternative water supplies for fire suppression.

The Lasqueti Volunteer Fire Department drafts from alternative water supplies throughout Lasqueti Island. Alternative water supplies that are utilized include ponds, swamps, and lakes that exist on the island. The fire department's primary drafting source is Pete's Lake. A 76 mm (3 inch) pipe has been installed at Pete's Lake to make drafting more effective.

The Lasqueti Volunteer Fire Department encourages property owners on the island to develop standing bodies of water on their land that are within 300 m (1000 ft) of hose lay to their dwelling for fire suppression use.

There are plans in the future to install a 10,000 Imperial Gallon water tank in the False Bay area that would be available for fire fighting purposes. The water tank would be filled through an existing 76 mm (3 inch) line from Pete's Lake.

11.2. Water Supplies Recommendations

Recommendation 11.2-1 Develop Formal Water Supply Plan for Non-Hydrant Protected Areas

With no water distribution system, the fire department relies on alternative water supplies for fire fighting.

Alternative water supplies for fire fighting should be readily available and easily accessible for emergency apparatus. Alternative water supplies should be designed according to NFPA 1142 *Standard on Water Supplies Suburban and Rural Fire Fighting*, 2007 edition. Chapters 7 and 8 address rural water supplies and dry hydrants. Properly locating, planning, and determining adequate alternate water supplies in rural areas will reduce the number and degree of problems that may occur during the shuttle delivery of water to a fire scene.

Developing an adequate system of alternative water supply delivery, may help enable the Lasqueti Volunteer Fire Department with meeting requirements for Superior Tanker Shuttle Accreditation. Refer to Appendix E for detailed information on the accreditation process.

12. FIRE INSURANCE GRADING CLASSIFICATION POTENTIAL REASSIGNMENT

The results of this assessment indicate that the Lasqueti Island Fire Department does not currently have adequate assets to operate two fire stations with a Dwelling Protection Grade of 4. The Lasqueti Fire Department is marginally short on equipment (PPC and PPE) to operate one fire station.

As a result of this assessment, the following information will be published in the fire insurance grading index for the insurance community to set rates on. The information will apply to Lasqueti Island.

Table 11.2-1 Lasqueti Island Fire Insurance Grading Classifications

SUB DISTRICT(S) and (contract protection areas)	DPG previous	DPG 2008	COMMENTS
Lasqueti Island Northern Fire Hall	4	**4P**[7]	Fire Station Protected Area- detached dwellings within 8 km by road of the Northern Fire Hall
Lasqueti Island Southern Fire Hall	5	**5**	Fire Station Protected Area- detached dwellings within 8 km by road of the Southern Fire Hall
Rest	5	**5**	Unprotected - detached dwellings further than 8 km by road of a Fire Hall

SUB DISTRICT(S) and (contract protection areas)	PFPC previous	PFPC 2008	COMMENTS
Lasqueti Island Northern Fire Hall	10	**9P**	Fire Station Protected - commercial properties within 5 km by road of the Northern Fire Hall
Lasqueti Island Southern Fire Hall	10	**10**	Fire Station Protected - commercial properties within 5 km by road of the Southern Fire Hall
Rest	10	**10**	Unprotected - commercial properties further than 5 km by road of a Fire Hall

The re-assessment of the community has identified a number of weaknesses and areas where improvements are required to maintain fire insurance grading classifications for personal and commercial lines insurance.

[7] "P" Stands for Provisional – a provisional grade is given for a municipality or community where deficiencies in the fire insurance grading have warranted a downgrading. A predetermined amount of time (generally 12 months) is provided to a municipality or community to enable them time to correct major deficiencies to maintain their fire insurance grade.

By addressing the recommendations in this report identified as critical. (Refer to Table 1.3-1 Summary of Recommendations and Importance Level.) Lasqueti Island would be able to maintain its Dwelling Protection Grade 4 and recognize the Southern Fire Hall.

13. PROJECT CONCLUSIONS

The Lasqueti Volunteer Fire Department is currently graded as a Dwelling Protection Grade 4 for the Northern Fire Hall. One of the primary reasons for this study was to evaluate the possibility of extending this Dwelling Protection Grade to the newly constructed Southern Fire Hall and the area it protects. The study has determined that although several key deficiencies will need to be addressed prior to the recognition of the new fire hall for fire insurance grading purposes. The level of fire protection being provided throughout all areas of Lasqueti Island is generally consistent with Dwelling Protection Grade 4.

The recommended approach to provide a minimum reasonable level of protection to residents on the island and a minimum level of safety to fire fighters participating in fire protection activities the following key assets should be acquired:

- 1 additional set of Personal Protective Clothing at Northern Fire Station (allowing there to be 10 credited fully equipped fire fighters responding from this fire station)
- 4 sets of Personal Protective Equipment (SCBA and PASS alarms) for Northern Fire Station
- Roster alignment: 10 firefighters responding to Northern Fire Station
- Roster improvement: add 10 fire fighters to respond to Southern Fire Station
- 10 additional set of Personal Protective Clothing at Southern Fire Station (allowing there to be 10 credited fully equipped fire fighters responding from this fire station)
- 4 sets of Personal Protective Equipment (SCBA and PASS alarms) for Southern Fire Station
- Add 1 recognized triple combination pumper (under 20 years old) at Southern Fire Station (or recognized tanker with adequate pump capacity)

Lasqueti Island Fire Department should consider the recommendations of this report and advise Fire Underwriters Survey of the intended course of action. Fire Insurance grades for the area will be updated accordingly.

Appendix A

WATER SUPPLY
FOR
PUBLIC FIRE PROTECTION

1999

FIRE UNDERWRITERS SURVEY

A SERVICE TO INSURERS AND MUNICIPALITIES

For further information on this document or any matters relating to the Fire Underwriters Survey please contact the appropriate offices of CGI Risk Management Services (formerly the Insurers' Advisory Organization) as follows:

Western Canada	CGI Risk Management Services Fire Underwriters Survey 3999 Henning Drive Burnaby BC V5C 6P9	Local: 604-6841581 Toll Free: 1-800-665-5661 Fax: 604-688-6986
Central Canada	CGI Risk Management Services Fire Underwriters Survey Suite 800, 7015 Macleod Tr. SW Calgary Alberta T2H 2K6	Local: 403-296-1300 Toll Free: 1-800-465-4264 Fax: 403-296-1316
Quebec	CGI Risk Management Services Fire Underwriters Survey 1611 Crémazie Blvd. East Montreal, Quebec H2M 2P2	Local: 514-735-3561 Toll Free: 1-800-263-5361 Fax: 514-844-0777
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Atlantic Canada	CGI Insurance Business Services Fire Underwriters Survey 238 Brownlow Avenue, Suite 300 Park Place Center Dartmouth, Nova Scotia B3B 1Y2	Telephone: 902-423-9287 Toll-Free: 1-800-639-4528 Fax: 902-423-7376

FIRE UNDERWRITERS SURVEY is financed by the Canadian Insurance industry and utilizes technical staff of CGI Risk Management Services (formerly the Insurers' Advisory Organization Inc.) Its purpose is to survey fire protection conditions in Canadian communities and municipalities, providing data and advisory services to fire insurance underwriters and public officials concerned.

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WATER SUPPLY FOR PUBLIC FIRE PROTECTION

PREFACE

This guide summarizes the more significant recommendations of Fire Underwriters Survey with respect to fire protection requirements in municipal water works system design. It reflects the manner in which FUS assesses the water supply aspect of a municipality's fire risk potential during surveys on behalf of the Canadian property insurance industry and represents the accumulated experience of many years of study of actual fires. Water supply is one of a number of components evaluated by FUS in the municipal fire protection system. Recommendations applying to the fire departments and code enforcement are covered in other publications of Fire Underwriters Survey. FUS local offices are prepared to assist municipal officials or their consultants with advice on special problems, as time limits permit, in accordance with the intent of this guide. The minimum size water supply credited by FUS must be capable of delivering not less than 1000 L/min for two hours or 2000 L/min for one hour in addition to any domestic consumption at the maximum daily rate. Static suction supplies to fire department pumpers are recognized as a supplement to the piped system.

In the FUS assessment of a water supply system, the major emphasis is placed upon its ability to deliver **adequate** water to control major fires throughout the municipality on a **reliable** basis via sufficient and suitable **hydrants**. What is ultimately available to the fire department is the critical test in this fire protection evaluation.

Rates of flow for firefighting purposes are expressed in litres per minute as this is the adopted unit for the firefighting field.

In this edition all quantities are specified in S.I. units.

PART I

GENERAL

ADEQUACY AND RELIABILITY. An adequate and reliable water supply for firefighting is an essential part of the fire protection system of a municipality. This is normally a piped system in common with domestic potable water service for the community.

A water supply system is considered to be fully adequate if it can deliver the necessary fire flow at any point in the distribution gridiron for the applicable time period specified in the table “Required Duration of Fire Flow” with the consumption at the maximum daily rate (average rate on maximum say of a normal year). When this delivery is also possible under certain emergency or unusual conditions as herein specified, the system is considered to be reliable. In cities of population in excess of 250,000 (or smaller places with high fire incident and severe hazard conditions) it is usually necessary to consider the possibility of two simultaneous major fires in the area served by the system.

Fire flows are amounts of water necessary to control fires. These are determined as shown in Part II. System design should contemplate meeting the required fire flows existing or probable with the possible exception of gross anomalies where there is no fire threat to the remainder of the community. In these cases, the properties should preferably be modified in hazard to reduce the required flow as part of a coordinated community fire protection system.

The protection of buildings by automatic sprinkler systems is a significant contribution to the fire protection of the community and should be encouraged, not penalized by onerous service charges or metering requirements.

In order to provide reliability, duplication of some or all parts of the system will be necessary, the need for duplication being dependent upon the extent to which the various parts may reasonably be expected to be out of service as a result of maintenance and repair work, an emergency or some unusual condition. The introduction of storage, either as part if the supply works or on the distribution system, may partially or completely offset the need for duplicating various parts of the system, the value of the storage depending upon its amount, location and availability.

STORAGE. In general, storage reduces the requirements of those parts of the system through which supply has already passed. Since storage usually fluctuates, the normal daily minimum maintained is the amount that should be considered as available for fires. Because of the decrease in pressure when water is drawn down in standpipes, only the portion of this normal daily minimum storage that can be delivered at a residual pressure of 150kPa at the point of use is considered as available. As well as the quantity available, the rate of delivery of water to the system from storage for the fire flow period is critical to this consideration.

PRESSURE. The principal requirement to be considered is the ability to deliver water in sufficient quantity to permit fire department pumpers to obtain an adequate supply from hydrants. To overcome friction loss in the hydrant branch, hydrant and suction hose, a minimum residual water pressure of 150 kPa in the street main is required during flow. Under conditions of exceptionally low suction losses, a lower residual may be possible. This includes the use of 100 mm and larger outlets for fire department pumper use and hydrants with large waterways.

Higher sustained pressure is of importance in permitting direct continuous supply to automatic sprinkler systems, to building standpipe and hose systems, and in maintaining a water plan so that no portion of the protection area is without water, such as during a fire at another location. Residual pressures that exceed 500 kPa during large flows are of value as they permit short hose-lines to be operated directly from hydrants without supplementary pumping.

SUPPLY WORKS

NORMAL ADEQUACY OF SUPPLY WORKS. The source of supply, including impounding reservoirs, and each part of the supply works should normally be able to maintain the maximum daily consumption rate plus the maximum required fire flow. Each distribution service within the system should similarly support its own requirements. In large cities where fire frequency may result in simultaneous fires, additional flow must be considered in accordance with the potential. Filters may be considered as capable of operating at a reasonable overload capacity based upon records and experience. In general, overload capacity will not exceed 25 percent, but may be higher in well designed plans operating under favourable conditions.

The absolute minimum supply available under extreme dry weather conditions should not be taken as the measure of the normal ability of the source of supply such as supply from wells. The normal or average capacity of wells during the most favourable nine month period should be considered, or the normal sustained flow of surface supplies to the source.

RELIABILITY OF SOURCE OF SUPPLY. The effect on adequacy must be considered for such factors as frequency, severity and duration of droughts, physical condition of dams and intakes; danger from earthquakes, floods, forest fires, and ice dams or other ice formations; silting-up or shifting of channels; possibility of accidental contamination of watershed or source; absence of watchmen or electronic supervision where needed; and injury by physical means. Where there is a risk of disruption, special precautions or alternate supplies should be arranged.

Where the supply is from wells, some consideration should be given to the absolute minimum capacity of the wells under the most unfavourable conditions; also to the length of time that the supply from the wells would be below the maximum daily consumption rate, and the likelihood of this condition recurring every year or only at infrequent intervals. It should be recognized that some water is generally available from wells and that the most extreme conditions are not as serious as a total interruption of the supply, as would be the case in the breaking of a dam or shifting of a channel. The possibility of clogging, salinity, and the need for periodic cleaning and overhauling must be considered. Dependence upon a single well, even where records are favourable, may be considered a feature of unreliability.

Frequent cleaning of reservoirs and storage tanks may be considered as affecting reliability.

Continuity of, and delay in implementing water supplies obtained from systems or sources not under the control of the municipality or utility should be considered also from these aspects.

GRAVITY SYSTEMS. A gravity system delivering supply from the source to distribution directly without the use of pumps is advantageous from a fire protection point of view because of its inherent reliability, but a pumping system can also be developed to a high degree of reliability.

PUMPING

RELIABILITY OF PUMPING CAPACITY. Pumping capacity, where the system or service is supplied by pumps, should be sufficient, in conjunction with storage when the two most important pumps are out of service, to maintain the maximum daily consumption rate plus the maximum required fire flow at required pressure for the required duration. For smaller municipalities (usually up to about 25,000 population) the relative infrequency of fires is assumed as largely offsetting the probability of a serious fire occurring at times when two pumps are out of service. (The most important pump is normally, but not always, the one of largest capacity, depending upon how vital is its contribution to maintaining flow to the distribution system.)

To be adequate, remaining pumps in conjunction with storage, should be able to provide required fire flows for the specified durations at any time during a period of five days with consumption at the maximum daily rate. Effect of normal minimum capacity of elevated storage located on the distribution system and storage of treated water above low lift pumps should be considered. The rate of flow from such storage must be considered in terms of any limitation of water main capacity. The availability of spare pumps or prime movers that can quickly be installed may be credited, as may pumps of compatible characteristics which may be valved from another service.

POWER SUPPLY FOR PUMPS. Electric power supply to pumps should be so arranged that a failure in any power line or the repair or replacement of a transformer, switch, control unit or other device will not prevent the delivery, in conjunction with elevated storage, of required fire flows for the required durations at any time during a period of two days with consumption at the maximum daily rate.

Power lines should be underground from the station or substation of the power utility to water plants and pumping stations and have no other consumers enroute. The use of the same transmission lines by other consumers introduces unreliability because of the possibility of interruption of power or deterioration of power characteristics.

Overhead power lines are more susceptible to damage and interruption than underground lines and introduce a degree of un-reliability that depends upon their location and construction. In connections with overhead lines, consideration should be given to the number and duration of lightning, wind, sleet, and snow storms in the area; the type of poles or towers and wires; the nature of the country traversed; the effect of earthquakes, forest fires, and floods; the lightning and surge protection provided; the extent to which the system is dependent upon overhead lines; and the ease of, and facilities for, repairs.

The possibility of power systems or network failures affecting large areas should be considered. In-plant auxiliary power or internal combustion driver standby pumping are appropriate solutions to these problems in many cases, particularly in small plants where high pumping capacity is required for fire protection service. When using automatic starting, prime 'movers' for auxiliary power supply and pumping should have controllers listed by Underwriters' Laboratories of Canada to establish their reliability.

FUEL SUPPLY. At least a five day supply of fuel for internal combustion engines or boilers used for regular domestic supply should be provided. Where long hauls, condition of roads, climatic conditions, or other circumstances could cause interruptions of delivery longer than five days, a greater storage should be provided. Gas supply should be from two independent sources or from duplicate gas-producer plants with gas storage sufficient for 24 hours. Unreliability of regular fuel supply may be offset in whole or in part by suitable provisions for the use of an alternate fuel or power supply.

BUILDINGS AND PLANT

BUILDINGS AND STRUCTURES. Pumping stations, treatment plants, control centres and other important structures should be located, constructed, arranged, and protected so that damage by fire, flooding, or other causes will be held to a minimum. They should contain no combustible material in their construction, and, if hazards are created by equipment or materials located within the same structure, the hazardous section should be suitably separated by fire-resistive partitions or fire walls.

Buildings and structures should have no fire exposures. If exposures exist, suitable protection should be provided, Electrical wiring and equipment should be installed in accordance with the Canadian Electrical Code. All internal hazards should be properly safeguarded in accordance with good practice. Private in-plant fire protection should be provided as needed.

MISCELLANEOUS SYSTEM COMPONENTS, PIPING AND EQUIPMENT. Steam piping, boiler-feed lines, fuel-piping (gas or oil lines to boilers as well as gas, oil or gasoline lines to internal-combustion engines), and air lines to wells or control systems should be so arranged that a failure in any line or the repair or replacement of a valve, fuel pump, boiler-feed pump, injector, or other necessary device, will not prevent the delivery, in conjunction with storage, of the required fire flows for the specified duration at any time during a period of two days with consumption at the maximum daily rate.

Plants should be well arranged to provide for effective operation. Among the features to be considered are: ease of making repairs and facilities for this work, danger of flooding because of broken piping; susceptibility to damage by spray; reliability of priming and chlorination equipment; lack of semi-annual inspection of boilers or other pressure vessels; dependence upon common non-sectionalized electric bus bars; poor arrangement of piping; poor condition or lack of regular inspections of important valves; and factors affecting the operation of valves or other devices necessary for fire service such as design, operation, and maintenance of pressure regulating valves, altitude valves, air valves, and other special valves or control devices, provision of power drives, location of controls, and susceptibility to damage.

Reliability of treatment works is likely to be influenced by the removal from service of at least one filter or other treatment unit; the reduction of filter capacity by turbidity, freezing or other conditions of the water; the need for cleaning basins; and the dependability of power for operating valves, wash-water pumps, mixers and other appurtenances.

OPERATIONS. Reliability in operation of the supply system and adequate response to emergency or fire demands are essential. Instrumentation, controls and automatic features should be arranged with this in mind. Failure of an automatic system to maintain normal conditions or to meet unusual demands should result in the sounding of an alarm where remedial action will be taken.

The operating force should be competent, adequate, and continuously available as may be required to maintain both the domestic and fire services.

EMERGENCY SERVICES. Emergency crews, provided with suitable transportation, tools and equipment, should be continuously on duty in the larger systems and be readily available upon call in small systems. Spare pipe and fittings, and construction equipment should be readily available. Alarms for fires in buildings should be received by the utility at a suitable location where someone is always on duty who can take appropriate action as required, such as placing additional equipment in operation, operating emergency or special valves, or adjusting pressures. Receipt of alarms may be by fire alarm circuit, radio, outside alerting device, or telephone, but where special operations are required, the alarm service should be equivalent to that needed for a fire station.

Response of an emergency crew should be made to major fires to assist the fire department in making the most efficient use of the water system and to ensure the best possible service in the event of a water main break or other emergency. The increase of pressures by more than 25 percent for fires is considered to increase the possibility of breaks.

PIPING

RELIABILITY OF SUPPLY MAINS. Supply mains cut off for repair should not drastically reduce the flow available to any district. This includes all pipe lines or conduits on which supply to the distribution system is dependent, including intakes, suction or gravity lines to pumping stations, flow lines from reservoirs, treatment plant piping, force mains, supply and arterial mains, etc. Consideration should be given to the greatest effect that a break, joint separation or other failure could have on the delivery of the maximum daily consumption rate plus required fire flow at required pressure over a three day period. Aqueducts, tunnels or conduits of substantial construction may be considered as less susceptible to failure and equivalent to good mains with a long history of reliability.

INSTALLATION OF PIPE. Mains should be in good condition and properly installed. Pipe should be suitable for the service intended. Asbestos-cement, poly-vinyl chloride (PVC), cast and ductile iron, reinforced concrete and steel pipe manufactured in accordance with appropriate Canadian Standards Association or ANSI/AWWA standards, or any pipes listed by Underwriters' Laboratories of Canada for fire service are considered satisfactory. Normally, pipe rated for a maximum working pressure of 1000 kPa is required, Service records, including the frequency and nature of leaks, breaks, joint separations, other failures and repairs, and general conditions should be considered as indicators of reliability. When mains are cleaned they should be lined.

Mains should be so laid as not to endanger one another, and special construction should be provided to prevent their failure at stream crossings, railroad crossings, bridges, and other points where required by physical conditions; supply mains should be valved at one and one half kilometre intervals and should be equipped with air valves at high points and blow offs at low points. Mains should not be buried extremely deep or be unusually difficult to repair, though depths to ten feet may be required because of frost conditions.

The general arrangement of important valves, of standard or special fittings, and of connections at cross-overs, intersections, and reservoirs, as well as at discharge and suction headers, should be considered with respect to the time required to isolate breaks. The need for check valves on supply or force mains and for other arrangements to prevent flooding of stations or emptying of reservoirs at the time of a break in a main should also be considered, as well as the need for relief valves or surge chambers. Accessibility of suitable material and equipment and ease of making repairs should be considered.

Arterial feeder mains should provide looping throughout the system for mutual support and reliability, preferably not more than 1000 metres between mains. Dependence of a large area on a single main is a weakness. In general the gridiron of minor distributors supplying residential districts should consist of mains at least 150mm in size and arranged so that the lengths on the long sides of blocks between intersecting mains do not exceed 200 metres. Where longer lengths of 150mm pipe are necessary 200mm or larger intersecting mains should be used. Where initial pressures are unusually high, a satisfactory gridiron may be obtained with longer lengths of 150mm pipe between intersecting mains.

Where deadends and a poor gridiron are likely to exist for a considerable period or where the layout of the streets and the topography are not well adapted to the above arrangement, 200mm pipe should be used. Both the ability to meet the required fire flows and reliability of a reasonable supply by alternate routing must be taken into account in this consideration.

VALVES. A sufficient number of valves should be installed so that a break or other failure will not affect more than 400 metres of arterial mains, 150 metres of mains in commercial districts, or 250 metres of mains in residential districts. Valves should be maintained in good operating condition. The recommended inspection frequency is once a year, and more frequently for larger valves and valves for critical applications.

A valve repair that would result in reduction of supply is a liability, but because of the probable infrequency of occurrence, it might be considered as introducing only a moderate degree of unreliability even if it resulted in total interruption. The repair of a valve normally should be accomplished in two days. Valves opening opposite to the majority are undesirable and when they do occur they should be clearly identified.

HYDRANTS

SIZE, TYPE AND INSTALLATION. Hydrants should conform to American Water Works Standard for Dry Barrel Fire Hydrants or Underwriters' Laboratories of Canada listing. Hydrants should have at least two 65mm outlets. Where required fire flows exceed 5000 l/min or pressures are low there should also be a large pumper outlet. The lateral street connection should not be less than 150mm in diameter. Hose threads, operating and cap nuts on outlets should conform to Provincial Standard dimensions. A valve should be provided on lateral connections between hydrants and street mains.

Hydrants that open in a direction opposite to that of the majority are considered unsatisfactory. Flush hydrants are considered undesirable because of delay in getting into operation; this delay is more serious in areas subject to heavy snow storms. Cisterns are considered unsatisfactory as an alternative to pressure hydrants. The number and spacing of hydrants should be as indicated in the table titled "Standard Hydrant Distribution".

INSPECTION AND CONDITION. Hydrants should be inspected at least semi-annually and after use. The inspection should include operation at least once a year. Where freezing temperatures occur, the semi-annual inspections should be made in the spring and fall of each year. Because of the possibility of freezing they should be checked frequently during extended periods of severe cold. Hydrants should be kept in good condition and suitable records of inspections and repairs be maintained. Hydrants should be painted in highly visible colours so that they are conspicuous and be situated with outlets at least twelve inches above the grade. There should be no obstruction that could interfere with their operation. Snow should be cleared promptly after storms and ice and snow accumulations removed as necessary.

HYDRANT DISTRIBUTION. Hydrant locations and spacing should be convenient for fire department use. Hydrants should be located at intersections, in the middle of long blocks and at the end of long dead-end streets. To allow for convenient utilization of water supplies, distribution density of hydrants should be in accordance with the required fire flows indicated in the table titled "Standard Hydrant Distribution" (page 16). The maximum recommended spacing of hydrants in commercial, industrial, institutional and multi-family residential areas is 90 metres; in single family residential areas 180 metres is recommended. In areas where fire apparatus have access (e.g. large properties, private developments, etc.), hydrants should be required by bylaw. The planning of hydrant locations should be a cooperative effort between the water utility and fire department.

RECORDS

PLANS AND RECORDS. Complete, up-to-date plans and records essential for the proper operation and maintenance of the system should be available in a convenient form, suitably indexed and safely filed. These should include plans of the source as well as records of its yield and a reliable estimate of the safe yield; plans of the supply works including dams, intakes, wells, pipelines, treatment plants, pumping stations, storage reservoirs and tanks; and a map of the distribution system showing mains, valves, and hydrants. Plans and maps should be in duplicate and stored at different locations.

Detailed distribution system plans, in a form suitable for field use, should be available for maintenance crews. Records of consumption, pressures, storage levels, pipes, valves, hydrants, and of the operations of the supply works and distribution system, including valve and hydrant inspections and repairs should be maintained.

TABLES

STANDARD HYDRANT DISTRIBUTION	
Fire Flow Required (litres per minute)	Average Area per Hydrant (m^2)
2,000	16,000
4,000	15,000
6,000	14,000
8,000	13,000
10,000	12,000
12,000	11,000
14,000	10,000
16,000	9,500
18,000	9,000
20,000	8,500
22,000	8,000
24,000	7,500
26,000	7,000
28,000	6,500
30,000	6,000
32,000	5,500
34,000	5,250
36,000	5,000
38,000	4,750
40,000	4,500
42,000	4,250
44,000	4,000
46,000	3,750
48,000	3,500

REQUIRED DURATION OF FIRE FLOW	
Fire Flow Required (litres per minute)	Duration (hours)
2,000 or less	1.0
3,000	1.25
4, 000	1.5
5,000	1.75
6,000	2.0
8000	2.0
10,000	2.0
12,000	2.5
14,000	3.0
16,000	3.5
18,000	4.0
20000	4.5
22,000	5.0
24,000	5.5
26,000	6.0
28,000	6.5
30,000	7.0
32000	7.5
34,000	8.0
36,000	8.5
38,000	9.0
40,000 and over	9.5

Interpolate for intermediate figures

Area refers to surface area of blocks and bounding streets. For a street without adjacent streets, a depth of one-half block is used.

A water supply system is considered to be adequate for fire protection when it can supply water as indicated above with consumption at the maximum daily rate. Certain types of emergency supplies may be included where reasonable conditions for their immediate use exist. Storage on the system is credited on the basis of the normal daily minimum maintained insofar as pressure permits its delivery at the rate considered.

PART II

GUIDE FOR DETERMINATION OF REQUIRED FIRE FLOW
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N.B. It should be recognized that this is a "guide" in the true sense of the word, and requires a certain amount of knowledge and experience in fire protection engineering for its effective application. Its primary purpose is for the use of surveyors experienced in this field, but it is made available to municipal officials, consulting engineers and others interested as an aid in estimating fire flow requirements for municipal fire protection.

Required Fire Flow may be described as the amount and rate of water application required in firefighting to confine and control the fires possible in a building or group of buildings which comprise essentially the same fire area by virtue of immediate exposure. This may include as much as a city block.

1. An estimate of the fire flow required for a given area may be determined by the formula:

$$F = 220C\sqrt{A}$$

where

F = the required fire flow in litres per minute.

C = coefficient related to the type of construction.

= 1.5 for wood frame construction (structure essentially all combustible).

= 1.0 for ordinary construction (brick or other masonry walls, combustible floor and interior).

= 0.8 for non-combustible construction (unprotected metal structural components, masonry or metal walls).

= 0.6 for fire-resistive construction (fully protected frame, floors, roof).

Note: For types of construction that do not fall within the categories given, coefficients shall not be greater than 1.5 nor less than 0.6 and may be determined by interpolation between consecutive construction types as listed above. Construction types are defined in the Appendix.

A = The total floor area in square metres (including all storeys, but excluding basements at least 50 percent below grade) in the building being considered.

For fire-resistive buildings, consider the two largest adjoining floors plus 50 percent of each of any floors immediately above them up to eight, when the vertical openings are inadequately protected. If the vertical openings and exterior vertical communications are properly protected (one hour rating), consider only the area of the largest floor plus 25 percent of each of the two immediately adjoining floors.

For one family and two family dwellings not exceeding two storeys in height, see **Note J.**

2. The value obtained in No. 1 may be reduced by as much as 25% for occupancies having a low contents fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard. Those may be classified as to contents as follows:

Non-Combustible	-25%	Free Burning	+15%
Limited Combustible	-15%	Rapid Burning	+25%
Combustible	No Charge		

As guide for determining low or high fire hazard occupancies, see the list in the Appendix. The fire flow determined shall not be less than 2,000 L/min,

3. The value obtained in No.2 above may be reduced by up to 50% for complete automatic sprinkler protection depending upon adequacy of the system. The credit for the system will be a maximum of 30% for an adequately designed system conforming to NFPA 13 and other NFPA sprinkler standards. Additional credit of up to 10% may be granted if the water supply is standard for both the system and fire department hose lines required. The percentage reduction made for an automatic sprinkler system will depend upon the extent to which the system is judged to reduce the possibility of fires spreading within and beyond the fire area. Normally this reduction will not be the maximum allowed without proper system supervision including water flow and control valve alarm service. Additional credit may be given of up to 10% for a fully supervised system.

4. To the value obtained in No. 2 above a percentage should be added for structures exposed within 45 metres by the fire area under consideration. This percentage shall depend upon the height, area, and construction of the building(s) being exposed, the separation, openings in the exposed building(s), the length and height of exposure, the provision of automatic sprinklers and/or outside sprinklers in the building(s) exposed, the occupancy of the exposed building(s), and the effect of hillside locations on the possible spread of fire.

   The charge for any one side generally should not exceed the following limits for the separation:

Separation	Charge	Separation	Charge
0 to 3m	25%	20.1 to 30 m	10%
3.1 to 10m	20%	30.1 to 45m	5%
10.1 to 20m	15%		

   The total percentage shall be the sum of the percentage for all sides, but shall not exceed 75%.

   The fire flow shall not exceed 45,000 L/min nor be less than 2,000 L/min.

Notes to Calculation

Note A: The guide is not expected to necessarily provide an adequate value for lumber yards, petroleum storage, refineries, grain elevators, and large chemical plants, but may indicate a minimum value for these hazards.

Note B: Judgment must be used for business, industrial, and other occupancies not specifically mentioned.

Note C: Consideration should be given to the configuration of the building(s) being considered and accessibility by the fire department.

Note D: Wood frame structures separated by less than 3 metres shall be considered as one fire area.

Note E: Fire Walls: - In determining floor areas, a fire wall that meets or exceeds the requirements of the current edition of the National Building Code of Canada (provided this necessitates a fire resistance rating of 2 or more hours) may be deemed to subdivide the building into more than one area or may, as a party wall, separate the building from an adjoining building.

Normally any unpierced party wall considered to form a boundary when determining floor areas may warrant up to a 10% exposure charge.

Note F: High one storey buildings: When a building is stated as 1=2, or more storeys, the number of storeys to be used in the formula depends upon the use being made of the building. For example, consider a 1=3 storey building. If the building is being used for high piled stock, or for rack storage, the building would probably be considered as 3 storeys and, in addition, an occupancy percentage increase may be warranted.

However, if the building is being used for steel fabrication and the extra height is provided only to facilitate movement of objects by a crane, the building would probably be considered as a one storey building and an occupancy credit percentage may be warranted.

Note G: If a building is exposed within 45 metres, normally some surcharge for exposure will be made.

Note H: Where wood shingle or shake roofs could contribute to spreading fires, add 2,000 L/min to 4,000 L/min in accordance with extent and condition.

Note I: Any non-combustible building is considered to warrant a 0.8 coefficient.

Note J: Dwellings: For groupings of detached one family and small two family dwellings not exceeding 2 stories in height, the following short method may be used. (For other residential buildings, the regular method should be used.)

Exposure distances	Suggested required fire flow	
	Wood Frame	Masonry or Brick
Less than 3m	See Note "D"	6,000 L/min
3 to 10m	4,000 L/min	4,000 L/min
10.1 to 30m	3,000 L/min	3,000 L/min
Over 30m	2,000 L/min	2,000 L/min

If the buildings are contiguous, use a minimum of 8,000 L/min. Also consider Note H.

OUTLINE OF PROCEDURE

A. Determine the type of construction.

B. Determine the ground floor area.

C. Determine the height in storeys.

D. Using the fire flow formula, determine the required fire flow to the nearest 1,000 L/min.

E. Determine the increase or decrease for occupancy and apply to the value obtained in D above. Do not round off the answer.

F. Determine the decrease, if any, for automatic sprinkler protection. Do not round off the value.

G. Determine the total increase for exposures, Do not round off the value.

H. To the answer obtained in E, subtract the value obtained in F and add the value obtained in G.

The final figure is customarily rounded off to the nearest 1,000 L/min.

APPENDIX

TYPES OF CONSTRUCTION

For the specific purpose of using the Guide, the following definitions may be used:

Fire-Resistive Construction - Any structure that is considered fully protected, having at least 3-hour rated structural members and floors. For example, reinforced concrete or protected steel.

Non-combustible Construction - Any structures having all structural members including walls, columns, piers, beams, girders, trusses, floors, and roofs of non-combustible material and not qualifying as fire-resistive construction. For example, unprotected metal buildings.

Ordinary Construction - Any structure having exterior walls of masonry or such non-combustible material, in which the other structural members, including but not limited to columns, floors, roofs, beams, girders, and joists, are wholly or partly of wood or other combustible material.

Wood Frame Construction - Any structure in which the structural members are wholly or partly of wood or other combustible material and the construction does not qualify as ordinary construction.

OCCUPANCIES

Examples of Low Hazard Occupancies:

Apartments
Asylums
Churches
Clubs
Colleges & Universities
Dormitories
Dwellings
Hospitals
Hotels
Institutions
Libraries, except Large Stack Room Areas
Museums
Nursing, Convalescent and Care Homes
Office Buildings
Prisons
Public Buildings
Rooming Houses
Schools
Tenements

Generally, occupancies falling in National Building Code Groups A, B, C and D are of this class.

Examples of High Hazard Occupancies:

- Aircraft Hangars
- Cereal, Feed, Flour and Grist Mills
- Chemical Works - High Hazard
- Cotton Picker and Opening Operations
- Explosives & Pyrotechnics Manufacturing
- Shade Cloth Manufacturing
- Foamed Plastics, Storage or use in Manufacturing
- High Piled Combustibles Storage in excess of 6.5 metres high
- Linseed Oil Mills
- Match Manufacturing
- Oil Refineries
- Paint Shops
- Pyroxylin Plastic Manufacturing & Processing
- Solvent Extracting
- Varnish and Paint Works
- Woodworking with Flammable Finishing
- Linoleum and Oilcloth Manufacturing

Other occupancies involving processing, mixing storage and dispensing flammable and/or combustible liquids. Generally, occupancies falling in National Building Code Group F, Divisions 1 and 2 would be in this class.

For other occupancies, good judgment should be used, and the percentage increase will not necessarily be the same for all buildings that are in the same general category - for example "Colleges and Universities": this could range from a 25% decrease for buildings used only as dormitories to an increase for a chemical laboratory. Even when considering high schools, the decrease should be less if they have extensive shops.

It is expected that in commercial buildings no percentage increase or decrease for occupancy will be applied in most of the fire flow determinations. In general, percentage increase or decrease will not be at the limits of plus or minus 25%.

EXPOSURES

When determining exposures it is necessary to understand that the exposure percentage increase for a fire in a building (x) exposing another building (y) does not necessarily equal the percentage increase when the fire is in building (y) exposing building (x). The Guide gives the maximum possible percentage for exposure at specified distances. However, these maximum possible percentages should not be used for all exposures at those distances. In each case the percentage applied should reflect the actual conditions but should not exceed the percentage listed.

The maximum percentage for the separations listed generally should be used if the exposed building meets all of the following conditions:

a. Same type or a poorer type of construction than the fire building.
b. Same or greater height than the fire building.
c. Contains unprotected exposed openings.
d. Unsprinklered.

CONVERSION FACTORS

Multiply	By	To Obtain
Centimetre	0.3937	Inches
Cubic Foot	0.0283	Cubic Metres
Cubic Metre	35.3145	Cubic Feet
Cubic Metre	219.97	Imperial Gallons
Cubic Metre	1.000	Litres
Foot	0.3048	Metres
Horsepower	0.7457	Kilowatt
Imperial Gallon	4.546	Litres
Inch	2.54	Centimetres
Kilogram	2.2046	Pounds
Kilogram of Water	1	Litres
Kilopascal	0.1450	Pounds per sq. inch
Kilowatt	1.341	Horsepower
Litre	0.21997	Imperial Gallons
Litre of Water	1	Kilograms
Metre	3.281	Feet
Metre of Water	10	Kilopascals
Pound	0.4536	Kilograms
Pound per sq. inch	6.89476	Kilopascals
U.S. Gallons	0.8327	Imperial Gallons
Imperial Gallons	1.201	U.S.Gallons

Appendix B

March 6, 2003

Powell River Regional District
5776 Marine Avenue
Powell River, BC
V8A 2M4

Re: Lasqueti Island Fire Truck Certification

Attention: Francis Ladret, Administrator

Our response to your letter dated March 6, 2003, corresponding in order to the questions listed, is as follows:

1. We will accept the proposed truck as a 1st line truck on Lasqueti Island for a 20 year period provided it is suitably mechanically operational and maintained.

2. We will not require any additional certification testing than we would expect or require for a listed triple combination Pumper.

3. The proposed truck will truck will carry the same weight within a FUS grading as an identical truck with a ULC S515 certification label.

4. The proposed vehicle will not negatively impact Lasqueti's current fire insurance grading. Insurance rate assessment is at the discretion of the insurance industry.

The proceeding statements apply specifically to Lasqueti Island.

I trust this response meets your needs. Congratulations are extended to those involved in improving the response capabilities on Lasqueti Island.

Sincerely,

Robert J. Nelson, CRM
Public Fire Protection Specialist

POWELL RIVER REGIONAL DISTRICT

March 6, 2003

URGENT

Mr. Robert J. Nelson
Surveyor, Pacific Region
Fire Underwriters
Box 39 - Suite 400
840 Howe St.
Vancouver, B.C. V6Z 2M7

Via Fax 604-688-6986
Original Not in Mail
 # pages 1

Dear Mr. Nelson:

Subject: Lasqueti Island Fire Truck Certification

Last year the Regional District tendered a truck for the Lasqueti Island Fire Department. In our tender we stated various criteria that the truck must meet, but did not provide detailed specifications. The criteria included: maximum length; pumping capacity of 625 Igpm; and compliance with ULC Standard S515-M1981.

Hub Fire Engines was the successful tenderer and has built a suitably sized truck with the specified pumping capacity. However, as you are aware from discussions with my assistant, Pat Christie, ULC will not certify the truck to the standard specified. According to Hub, the lighter chassis does not meet that standard's requirement to carry 3,500 pounds of firefighter related weight (firefighters and their gear). Therefore, ULC will only provide a label for a 420 gpm pumping capacity and compliance with ULC Standard S523, Light Attack Vehicle.

Hub has advised that the pump will, in fact, pump to its maximum capacity. They also advised that previously ULC has waived the 3,500 pound requirement for trucks that otherwise met the Class A truck standard and they (Hub) were not aware of any change in the ULC procedures until they applied for a label for this particular truck.

We are annoyed that the truck we purchased will not officially meet the standard we specified and that we were not advised of this earlier. On the other hand, the truck will likely adequately serve Lasqueti's needs. However, before agreeing to this 'lesser label' we want to ensure that a truck to Standard S523 will in no way affect the Department's certification.

Can you please confirm in writing that this light attack truck (ULC Standard S523)

1. Will meet your requirements for a first line truck for 20 years;
2. Will not require testing during that term that would not also be required for a truck to ULC S515-M1981;
3. Will entitle the Department to the same Fire Underwriters certification as a truck to ULC S515-M1981;
4. Will give homeowners in the service area the same savings on their house insurance premiums as a truck to ULC S515-M1981.

There is some urgency on this matter as ULC will require a second pump test if their proposed labelling is not accepted by tomorrow. Accordingly I would appreciate your prompt reply. (e-mail: administration@powellriverrd.bc.ca or fax)

If the above conditions are, in fact, the case, a simple response confirming that my correspondence of today's date is correct would suffice.

Sincerely,

Frances Ladret
Administrator

FL:bkp

Appendix C

Insurance Grading Recognition of Used or Rebuilt Fire Apparatus

The performance ability and overall acceptability of older apparatus has been debated between municipal administrations, the public fire service and many others for years. Fire Underwriters Survey (F.U.S.) has reviewed experiences across Canada and in other countries and has developed a standard for acceptance of apparatus as the apparatus becomes less reliable with age and use.

The public fire service is unique compared to other emergency services in that fire apparatus vehicles are not continuously in use. However, when in use, the apparatus is subject to considerable mechanical stress due to the nature of its function. This stress does not normally manifest itself on the exterior of the equipment. It is effectively masked in most departments by a higher standard of aesthetic care and maintenance. Lack of replacement parts further complicates long term use of apparatus. Truck and pump manufacturers maintain a parts inventory for each model year for a finite time. After that period, obtaining necessary parts may be difficult. This parts shortage is particularly acute with fire apparatus due to the narrow market for these devices.

F.U.S.'s lengthy experience in evaluating fire apparatus indicates that apparatus should be designed to an acceptable standard. The standard that is accepted throughout Canada by Fire Underwriters Survey is the Underwriters' Laboratories of Canada (ULC) Standard S515-04 titled, "Automobile Fire Fighting Apparatus," which was adopted as a National Standard of Canada in September 2004. Fire apparatus should be built by recognized manufacturers.

Fire apparatus should respond to first alarms for the first fifteen years of service. During this period it has reasonably been shown that apparatus effectively responds and performs as designed without failure at least 95% of the time. For the next five years, it should be held in reserve status for use at major fires or used as a temporary replacement for out-of-service first line apparatus. Apparatus should be retired from service at twenty years of age. Present practice indicates the recommended service periods and protocols are usually followed by the first purchaser. However, at the end of that period, the apparatus is either traded in on new apparatus or sold to another fire department. At this juncture, the unit may have one or more faults which preclude effective use for emergency service. These deficiencies include:

a. Inadequate braking system
b. Slow pick-up and acceleration
c. Structurally weakened chassis due to constant load bearing and/or overloading
d. Pump wear

F.U.S. has modified its application of the age requirement for used or rebuilt apparatus. Due to municipal budget constraints within small communities we have continued to recognize apparatus over twenty years of age, provided the truck successfully meets the recommended annual tests and has been deemed to be in excellent condition. The specified service tests are outlined below under the heading "Recommended Service Tests for Used or Modified Fire Apparatus". Testing and apparatus maintenance should only be completed by a technician who is certified to an appropriate level in accordance with NFPA 1071, *Standard for Emergency Vehicle Technician Professional Qualifications*.

Insurance grading recognition may be extended for a limited period of time if we receive documentation verifying that the apparatus has successfully passed the specified tests. If the apparatus does not pass the required tests or experiences long periods of "downtime" we may request the municipal authority to replace the equipment with new or newer apparatus. If replacement does not occur, fire insurance grading recognition may be revoked for the specific apparatus which may adversely affect the Fire Underwriters Survey grades of the community. This can also affect the rates of insurance for property owners throughout the community.

Table 1 Service Schedule for Listed Fire Apparatus

For

Fire Insurance Grading Purposes

Apparatus Age	**Major Cities**	**Medium Sized Cities or Communities Where Risk is Significant**	**Small Communities and Rural Centres**
0 – 15 Years	First Line	First Line	First Line
16 – 20 Years	Reserve	2nd Line	First Line
20 – 25 Years [1]	No Credit in Grading	No Credit in Grading *Reserve [2]*	No Credit in Grading *2nd Line [2]*
26 – 29 Years [1]	No Credit in Grading	No Credit in Grading *Reserve [2]*	No Credit in Grading *Reserve [2]*
30 Years and Older	No Credit in Grading	No Credit in Grading	No Credit in Grading

[1] *All listed fire apparatus 20 years of age and older are required to be service tested by recognized testing agency on an annual basis to be eligible for grading recognition. (NFPA 1071)*

[2] *Exceptions to age status may be considered in a small to medium sized communities and rural centres conditionally, when apparatus condition is acceptable and apparatus successfully passes required testing.*

Table 2 Frequency of Listed Fire Apparatus Acceptance and Service Tests

For

Fire Insurance Grading Purposes

	Frequency of Test					
	@ Time of Purchase New or Used	**Annual Basis**	**@ 15 Years**	**@ 20 Years** ***See Note 4***	**20 to 25 Years (annually)**	**After Extensive Repairs**
Recommended For Fire Insurance Purposes	Acceptance Test if new; Service Test if used & < 20 Years	Service Test	Acceptance Test	Yes	Yes	Acceptance or Service Test depending on extent of repair
Required For Fire Insurance Purposes	Acceptance Test if new; Service Test if used & < 20 Years	No	No	Acceptance Test	Acceptance Test	Acceptance or Service Test depending on extent of repair
Factor in FUS Grading	Yes	Service Test	Yes	Yes	Yes	Yes
Required By Listing Agency	Acceptance Test	No	No	No	N/A	Acceptance Test
Required By NFPA	Acceptance Test	Service Test	No	N/A	N/A	Acceptance Test

Note 1: See: 'Service Tests for Used or Rebuilt Fire Apparatus' for description of applicable tests
Note 2: Acceptance Tests consist of 60 minute capacity and 30 minute pressure tests
Note 3: Service Tests consist of 20 minute capacity test and 10 minute pressure test in addition to other listed tests

Note 4: Apparatus exceeding 20 years of age may not be considered to be eligible for insurance grading purposes regardless of testing. Application must be made in writing to Fire Underwriters Survey for an extension of the grade-able life of the apparatus.

SERVICE TESTS FOR USED OR MODIFIED FIRE APPARATUS

The intent of this document is to ensure that all used or modified fire apparatus, equipped with a pump or used for tanker service, essentially meet the requirements of Underwriters' Laboratories of Canada (ULC) "Standard for Automobile Fire Fighting Apparatus" S515-04 or subsequent (current) editions of the Standard. Full adherence with the following specified tests is recommended when purchasing used apparatus.

1) **Weight Tests**

1.1) Load Balance Test: When fully laden (including a 460kg (1000 lbs) personnel weight, full fuel and water tanks, specified load of hose and miscellaneous equipment), the vehicle shall have a load balance of 22% to 50% of total vehicle mass on the front axle and 50% to 78% of this mass on the rear axle.

Distribution of mass of 33% and 67% respectively on the front and rear axles is preferable for a vehicle having dual rear tires or tandem rear axels.

For a vehicle having tandem rear axels and dual tires on each axle, a loading of between 18% and 25% on the front axle with the balance of mass on the rear axles is permissible.

2) **Road Tests**

2.1) Acceleration Tests:

2.1.1) From a standing start, the apparatus shall attain a true speed of 55 km/h (35 mph) within 25 seconds for Pumpers carrying up to 3,150 litres (700 gallons) of water.

For apparatus carrying in excess of 3,150 litres (700 gallons) or apparatus equipped with aerial ladders or elevating platforms, a true speed of 55 km/h (35 mph) in 30 seconds should be attained.

2.1.2) The vehicle should attain a top speed of at least 80 km/h (50mph).

2.2) Braking Test: The service brakes shall be capable of bringing the fully laden apparatus to a complete stop from an initial speed of 30 km/h (20 mph) in a distance not exceeding 9 metres (30 feet) by actual measurement. The test should be conducted on a dry, hard surfaced road that is free of loose material, oil and grease.

3) **Pump Performance Tests**

3.1) Hydrostatic Test – Recent evidence of hydrostatic testing of the pump for 10 minutes at a minimum pressure of 3,400 kPa (500 psi). APPLICABLE TO NEW OR REBUILT PUMPS ONLY (see 3.3).

3.2) Priming and Suction Capability Tests

3.2.1) Vacuum Test: The pump priming device, with a capped suction at least 6 metres (20 feet) long, shall develop –75 kPa (22 inches of mercury) at altitudes up to 300 metres (1000 feet) and hold the vacuum with a drop of not in excess of 34 kPa (10 inches of mercury) in 10 minutes.

For every 300 metres (1000 feet) of elevation, the required vacuum shall be reduced 3.4 kPa (1 inch mercury).

The primer shall not be used after the 10-minute test period has been started. The test shall be made with discharge outlets uncapped.

3.2.2) Suction Capability Test: The pump (in parallel or series) when dry, shall be capable of taking suction and discharging water with a lift of not more than 3 metres (10 feet) through 6 metres (20 feet) of suction hose of appropriate size, in not more than 30 seconds and not over 45 seconds for 6000 L/min (1320 Igpm) or larger capacity pumps. Where front or rear suction is provided on midship pumps, an additional 10 seconds priming time will be allowed. The test shall be conducted with all discharge caps removed.

3.3 Pump Performance

3.3.1) Capacity Test: Consists of drafting water (preferably with a 10 feet lift) and pumping the rated capacity at 1000 kPa (150 psi) net pump pressure for a continuous period of at least 1 hour.

3.3.2) Pressure Test: Under the same conditions as in 3.3.1 above pumping 50% of the rated capacity at 1700 kPa (250 psi) net pump pressure for at least ½ hour/

For additional information on the above noted tests and test procedures, the following documents provide useful data:

(1) Underwriters Laboratories of Canada (ULC) Standard S515-04 "Standard for Automobile Fire Fighting Apparatus, latest edition.

(2) Fire Underwriters Survey (FUS) publication titled "Fire Stream Tables and Testing Data" latest edition.

(3) International Fire Service Training Association (IFSTA) publication title "Fire Department Pumping Apparatus", latest edition.

(4) National Fire Protection Association (NFPA) 1901 Standard title "Pumper Fire Apparatus", latest edition.

(5) National Fire Protection Association (NFPA 1911 Standard titled "Service Tests of Pumps on Fire Department Apparatus" latest edition.

For further information regarding the acceptability of fire apparatus for insurance grading purposes, please contact:

Michael Currie, AScT.
Public Fire Protection Specialist

Fire Underwriters Survey
CGI Information Systems and Management Consultants
3999 Henning Drive, Suite 101
Burnaby, BC, V5C 6P9

Tel: (604) 684-1581
Direct: 604-609-4125
Toll Free: 1-800-665-5661
Fax: (604) 688-6986

Appendix D

SUPERIOR TANKER SHUTTLE ACCREDITATION

Fire Underwriters Survey will consider a tanker shuttle operation, meeting the criteria listed below, as equivalent to the minimum fire insurance grading requirements for emergency water supplies. Provided a fire service can meet the criterion as surveyed by testing, Fire Underwriters Survey will grant the applicant fire protection area equivalency to 'hydrant protected status', and note the acceptance in Fire Underwriters Survey's Fire Insurance Grading Index. Fire insurance industry subscribers to the Grading Index have typically accepted Superior Tanker Shuttle Accreditation as having met minimum fire insurance grading requirements for emergency water supplies. Superior Tanker Shuttle Accreditation is intended to be applied in rural areas without means of permanent emergency water supply.

1. **Superior Tanker Shuttle accreditation is only valid within a 5 km distance of a fire hall for commercial properties and 8 km for single-family residential properties. Two demonstrations must be provided, one each for single-family districts and commercial districts.**

2. **Within 5 minutes of arrival of the first major piece of apparatus, the department must be producing a minimum of 900 L/min (200 I.g.p.m.), and must maintain this minimum for test duration of 2 hours.**

3. **Automatic aid Tender assistance is acceptable provided the shuttle system is diagrammed in standard operating guidelines for all participating departments.**

4. **The water supply for fire fighting (including the test) must come from a source that is available year round (24 hours per day, 365 days per year). In addition, the supply source must be conveyed through fire hydrant or adequately designed dry hydrant connection. The supply source must be capable of supplying a minimum of 113,000 L (25,000 I. gal.).**

5. **Sufficient apparatus must be available to cover the area in the event of a second fire call.**

6. **The selected test site(s) must be located remote from fire stations and be representative of areas where travel distances to water supply refill points can be excessive. The test site(s) must be agreeable to both the fire department and Fire Underwriters Survey. The test site must be a minimum of five kilometres from all water refill points and within eight km. of a fire station.**

7. **Water from the Pumper at the test site must be supplied to a deluge gun with appropriate smooth bore stacked tips to allow for measurement with a pitot gauge.**

8. **Prior to the test, the FUS representative will evaluate fire apparatus, test equipment, test site, water refill site, automatic aid agreements and test procedures in order to ensure their validity for use within the test.**

For further information regarding Fire Underwriters Survey's Superior Tanker Shuttle Accreditation, please contact:

Mr. Michael Currie, AScT.
Surveyor, Pacific Region

Fire Underwriters Survey
CGI Information Systems and Management Consultants
3999 Henning Drive, Suite 101
Burnaby, BC, V5C 6P9

Tel: (604) 609-4125
Toll Free: 1-800-665-5661
Fax: (604) 688-6986

PUBLIC FIRE PROTECTION SURVEY INFORMATION FOR AREAS WITHOUT WATER MAINS

A. Additional criteria concerning water delivery by fire department apparatus include:

1. When a tanker relay system is used, the volume of the tanker capacities is reduced by 10% for spillage, under filling and incomplete unloading.

2. Travel time of apparatus is calculated from the formula:

T = 0.65 + 1.7D, where T = minutes and D = miles

Slower speeds will be used for underpowered apparatus, or apparatus laying hose lines.

3. The delivery rate of a tanker relay system will be affected by the rate of filling and of dumping of the tankers and the useable volume of the fire-site storage.

4. Credit may be given for apparatus responding from outside the community depending upon communication facilities, handling of alarms, inter-department training, fire ground communications and time of arrival at fires.

B. Please provide us with a scaled map (preferably digital) showing:

1. Boundary of community or area served by Fire Department.

2. All roads that are usable by fire apparatus under all weather conditions (certified by Provincial Department of Highways, or other registered professional engineer).

3. Indicate all bridges that do <u>not</u> have a safe weight capacity sufficient for fire department apparatus. Note: Weight information is available from the Provincial Department of Transportation.

4. The location of fire stations.

5. The location and name of any fire stations housing automatic-aid apparatus.

6. The location and identification of each water supply point (hydrants and/or suction supplies).

7. The total road mileage (county, city and town) within the area served by the fire department. Also, of the total mileage, the mileage that is not paved.

C. Please provide us with a description of each water supply point and;

1. The maximum rate for a hydrant supplied from a water main, or a dry hydrant, using the pumper and hose arrangement scheduled to be used at this hydrant (supported by test results).

Note: The maximum rate if tankers are supplied directly from a hydrant, using the hose arrangement scheduled to be used at this hydrant (supported by test results).

2. For an impounded supply, cistern, tank or other storage facility; the minimum storage available (at not over 15 ft. lift) during a drought with an average 50 year frequency (certified by a registered professional engineer)*. The maximum rate obtainable using the pumper(s) and hose arrangement scheduled to be used at this point (supported by test results).

3. For a supply from a flowing stream, the minimum rate of flow available (at not over 15 ft. lift) during a drought with an average 50 year frequency (certified by a registered professional engineer)*. The maximum rate obtainable using the pumper(s) and hose arrangement scheduled to be used at this point (supported by test results).

4. For each location, the number of pumpers that can operate simultaneously.

5. For each water supply point, the distance to the water supply point from each fire station with responding apparatus.

6. A statement, signed by the owner of any private suction water supply point, authorizing its use by the fire department.

***** May also include a registered hydrologist, registered geologist, soil conservationist, or federal surface water specialist.

D. Provide us with a description of a recent fire or demonstration, more than 1,000 feet from hydrant, where 200 IGPM or more was delivered for more than one hour, giving the following information:

1. Location of fire or test.

2. Date.

3. Number of tankers (if used) dumping simultaneously.

4. Rate of flow delivered.

5. Distance delivered.

6. Time duration.

7. Number of personnel participating with a description of each person's function such as fire fighter, pump operator, tanker operator, etc.

8. The apparatus used with the following information for each:

A. Name.
B. Pump capacity.
C. Tank capacity.
D. Functions

9. The following tankers used, if any, with the following information for each:

A. Total capacity.
B. Usable capacity (total capacity less volume that cannot be pumped out when drafting from the tank).
C. Set-up time.
D. Name of apparatus carrying each folding tank.

10. Description of the overall operation.

E. If different combination of apparatus are used in various sections of the municipality, list the combinations with the data in No. D-7 & D-8 above and show the areas on the map.

F. For each vehicle used to carry water, indicate the actual time to discharge the capacity of the tank and the actual time necessary to fill the tank using the pumpers that normally will be used for filling. If different capacity pumpers will be used for filling, the time shall be obtained for filling with <u>each</u> capacity pumper.

Note: The actual time to be recorded shall be the time necessary for the vehicle to travel 200 feet to the site, manoeuvre into position, fill or dump and travel 200 feet from the site.

G. When the water supply is delivered through a hose line, indicate the time for a pumper to travel 200 feet to a water supply point, connect suction and discharge hoses and commence pumping. If the water supply points are both hydrants and drafting sites, the time shall be obtained for both types of water supply points.

H. When the water supply is delivered through a hose line, indicate the lengths and diameter of the hose line used for the time trial and the time from when the pumper begins to fill the hose line until a solid stream of water is delivered at the other end.

I. Current equipment inventories for all apparatus in service and in reserve in your municipality.

J. When the use of a water supply point at time depends upon creating an opening in ice, the maximum known thickness of ice shall be given. A statement shall be provided explaining the equipment used, apparatus carrying the equipment and the estimated time necessary to provide a drafting site when the ice is at the maximum thickness.

K. The rapid access of a pumper to a drafting source can be aided by the installation of a dry hydrant. This is a piping arrangement similar to a hydrant but designed for drafting. In cold climates, the proper installation of a dry hydrant will eliminate the

necessity of creating an opening in the ice. See the National Fire Protection Standard on Water Supplies for Suburban and Rural Fire Fighting, *NFPA 1142 (2007 Edition or more current), as a guide.

The semi-annual inspection of dry hydrants should include drafting and back flushing.

***** National Fire Protection Association, Batterymarch Park, Quincy, Massachusetts 02269.