Fire following earthquake in the Vancouver region

Executive summary
With a population of about 2.5 million, the Vancouver region is the most populous metropolitan area in western Canada, and the third most in the country, comprising more than 7% of the nation’s population. About a quarter of the study area’s population is within the City of Vancouver itself, which is the eighth largest city in Canada, a major cultural centre with leading universities, major rail hub and port.

**Specific initial steps to reduce the risk of fire following earthquake would include:**

1. **Enhanced post-earthquake firefighting water supply:** Much has been done in the Lower Mainland to improve the ability to fight fires after earthquakes, but more can be done. The fire service in the Lower Mainland is modern, advanced, well-equipped and of a high caliber in its organization, methods and tactics. Earthquake risk in the region is understood and appears to be a focus for fire departments. The city of Vancouver is bordered on many sides by water, as was San Francisco in 1906 – indeed, San Francisco had direct access to the largest body of water on earth yet burned for three days due to lack of firefighting water. As a result, San Francisco and Vancouver have both built specialized high-pressure dedicated fire protection systems (DFPS), for which they are to be commended. In addition to the DFPS, Vancouver has built a defence in depth, with fireboats, hose tenders and hose reels, as well as training citizen volunteer Neighbourhood Emergency Assistance Teams (N.E.A.T.s). However, departments in the region need to improve their access to firefighting water following an earthquake, when water mains are likely to fail. **Recommendation:** We recommend development of an integrated regional Portable Water Supply System (PWSS) of hose tenders/hose reels, with compatible fittings, that can be used to access alternative water supply sources (such as bays, lakes, rivers) and relay water to the fireground. Such a regional system would also benefit from a number of specialized pumps, like Vancouver’s HydroSubs®, distributed among the various larger departments in the Lower Mainland. Note that a PWSS has wider applicability than just earthquake – it can be used for wildfires, dewatering flooded areas and other emergency needs.

2. **Secondary water supply for high-rise buildings:** High-rise buildings are particularly vulnerable to fires at all times and fire departments depend to a great extent on sprinkler systems. However, sprinklers depend on the underground water distribution system for supply and, if that system fails in an earthquake, sprinklers may be left without water and fires can grow unimpeded. Building codes in the United States have required high-rise buildings in high seismic zones to have a secondary water supply, typically a 60,000-litre tank located in the basement or mechanical room near the backup fire pump. **Recommendation:** Both the Vancouver Building Code and the Provincial Building Code should include a provision for high-rise building secondary water supply in high seismicity areas.
Seismic natural gas shutoff valves:
This report has not assessed the seismic vulnerability of gas distribution in general or major energy facilities in the Vancouver area, some of which are in the highly liquefiable Fraser River Delta. **Recommendation:** Several actions have been de rigueur in other earthquake-threatened regions and should be considered in the Lower Mainland: (a) a review of the overall seismic vulnerability and reliability of major energy facilities; (b) a review of the gas distribution operator’s ability to control and isolate its transmission and distribution networks in the event of a major earthquake, and consideration by the gas distribution operator of incorporating an automatic gas shutoff device in gas meters. Following the 1995 Kobe earthquake, Japan replaced every gas meter in the country with meters incorporating an automatic gas shutoff device, so the technology is well-established and the cost quite nominal if meters are being replaced for other reasons. The opportunity afforded by the B.C. operator’s current plan to replace these meters for more efficient operation permits inclusion of the seismic shutoff device at a very modest marginal cost.
Vancouver Fire Rescue Services new Large Diameter Hose reel system – each trailer-mounted motorized reel carries 6000 ft. of 6” hose.

Photo: Scawthorn, 2019