

## Incident Summary (Reference # 4824) (Final)

SUPPORTING INFORMATION	Incident Date	January 10, 2018	
	Location	North Eastern BC	
	Regulated industry sector	Boilers, PV & Refrigeration	
	Impact	Qty injuries	None
		Injury description	None
		Injury rating	None
	Damage	Damage description	Fire ignited the external wall adjacent to boiler 1 and made its way through to the building exterior. Boiler #1 was extensively damaged in the fire. The fire also damaged the mechanical room ceiling and walls. Please see photos enclosed.
		Damage rating	Major
Incident rating	Major		
Incident overview	Flames ignited in the basement boiler room of an eleven unit residential apartment building.		
INVESTIGATION CONCLUSIONS	Site, system and components	<p>This boiler was located in the basement mechanical room in an eleven unit apartment building.</p> <p>The boiler combustion chamber is to hold the heat and flame of combustion inside the boiler.</p> <p>This wall mounted boiler heats a glycol mixture by the combustion chamber. The heated glycol circulates throughout the building via a piping system to bring heat to each apartment residence.</p> <p>In the event of that glycol stops circulating the flow switch is designed to shut down the burner to prevent overheating the boiler.</p> <p>The hi-temperature shut down safety control is designed to shut down the boiler in the event that the temperature of the boiler reaches a predetermined shut down point to prevent the boiler from overheating. In this case, the maximum allowable working temperature identified on the boiler nameplate is 210 degrees F (98.8 degrees C).</p> <p>The burner management system monitors the boilers' temperature set points and is used to determine which boiler will operate in order to alternate service time between the two boilers known as lead/lag time.</p>	
	Failure scenario(s)	<ul style="list-style-type: none"> <li>- the flow switch may have failed to function,</li> <li>- the hi-temperature shut off control may have failed to shut the burner down,</li> <li>- the burner management system may have failed,</li> <li>- the design of the boiler may have contributed to this event.</li> </ul>	

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<p>Facts and evidence</p>	<ul style="list-style-type: none"> <li>- Contractor providing regular maintenance for the property management company when asked, stated that he does not check the flow switch during contracted maintenance schedules.</li> <li>- Contractor tested the flow switch post incident in the witness of the Gas and Boiler Safety Officers attending. The test equipment used by the contractor indicated that the flow switch did not show continuity.</li> <li>- Contractor removed the flow switch and disassembled it. The paddle which is pushed by the flow of glycol to complete the electric circuit to allow the flow switch to operate moved freely.</li> <li>- The contractor checked the high temperature shut down devices on both boiler 1 and boiler 2 and found that boiler 1 had no continuity, while boiler 2 had continuity.</li> <li>- Monthly maintenance records reviewed, do not note testing of the flow switch, nor the hi-temperature shut down controls.</li> <li>- Flame escaped the combustion chamber via the back side of the boiler adjacent to the building wall,</li> <li>- Second boiler, (adjacent to the first) shows an area of interest in same area as measured when compared with boiler #1 where flame escaped the combustion chamber,</li> <li>- The burner management system was not tested due to the fact that the building electrical panel had been locked out to disconnect the electricity from the building.</li> <li>- The boiler nameplate does not have a decimal 1 located in the Canadian Registration Number to indicate that this design has been accepted in British Columbia.</li> </ul>
<p>Causes and contributing factors</p>	<ul style="list-style-type: none"> <li>- The flow switch may have been a contributing factor,</li> <li>- The hi-temperature shut down safety switch may have contributing factor,</li> <li>- The lack of continuity in boiler #1 Hi-temperature shut down control may indicate that it may not function in an over-temperature situation.</li> <li>- The lack of the safety control function testing during routine maintenance may have been a contributing factor.</li> <li>- Design of this system may have contributed in this event. See photos attached.</li> </ul>

Photos or diagrams (if necessary)

Please see next page for photos.



**Boiler room door closed – notice soot above door frame**



**Photo above shows boiler room ceiling damaged by fire**



**Boiler overview - Boiler #1 on left**



Below - boiler #1 removed (post fire new plywood put in place outside to keep cold out)



Photo below - damage to exterior wall, behind where boiler #1 was removed



Photo below - wall across from boilers



Below-exterior wall damage (insulation placed post fire to keep cold out)





**Boiler #1 on left (prior to removal by contractor)**





Above – Boiler #1 exhaust fan housing and melted vent



Room upper right corner near boiler #2, low water cut off (green), and above it the flow switch (red)





Above -flow switch held by contractor / below - flow switch cover removed by contractor.  
(wiring in photo above is the low water cut off with cover removed)



Low water cut-out cover (removed by contractor)





**Above & below- hole observed in what appears to be the combustion area in rear side of boiler #1**





Rear of boiler #2 - area of interest in same approximate location as boiler #1  
(boiler #2 removed from wall by contractor)

