Incident Summary #II-990977-2020 (#16844) (FINAL)

SUPPORTING INFORMATION	Incident Date		March 10, 2020
	Location		Peace River Region
	Regulated industry sector		Boilers, PV & refrigeration - Refrigeration system
	Impact – Injury	Qty injuries	0
		Injury description	None
		Injury rating	None
	Impact – Damage	Damage description	Extensive damage to multiple buildings and equipment.
		Damage rating	Major
	Incident rating		Major
	Incident overview		A gas plant facility fire detection alarm on this date was acknowledged by an on call operator at approximately 04:50 am. Fire destroyed this plant facility comprised of a compressor, inlet separator, treater and other processing equipment.
INVESTIGATION CONCLUSIONS	Site, system and components		A pressure vessel known as a “treater” lost containment of process fluids called emulsion. The emulsion is a mixture of fluids such as both natural occurring and drilling well waste water, together with oil and/or condensate (depending on the geological formation by-products) along with natural occurring gas found in the geophysical formation extracted from a drilling well. This emulsion is transported from the well via pipeline to plant facilities such as this to initially separate the oil, condensate, waste water and gas before further transportation again by pipelines to larger processing plants where end products for consumer consumption are made, such as propane, gasoline and diesel. As part of the separation process; to break down the emulsion, the emulsion is heated in the treater, which is a horizontal separator containing a fire tube in where natural gas is burned to provide heat. The treater fire-tube is in contact with the emulsion and once the emulsion is heated, gravity then separates the emulsion into useable products for further processing. The fire tube (heating element) is sealed in place to the treater using an appropriate gasket that is rated for temperatures and substances in which it can be subject to.

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Failure scenario(s)	• Owner provided investigation documents indicate that an operator had increased operating pressure on the treater by approximately 55 kPa (7.97 psig) the day before. Although within the treater's operating pressure specifications, the pressure increase may be a contributing factor to the fire-tube gasket leaking product (emulsion oil containing flammable products) onto the hot burner assembly. • Owner's documented investigation revealed that the Fire-tube inside the treater was not fully supported which may have contributed into the gasket not sealing correctly. • Owner's investigation documents show that cyclic loading of the burner may have contributed to the treater gasket failure by temperature and pressure loading and unloading (turning the heater on and off as a normal part of the process of heating the treater; similar to turning up the heat in a home to maintain a constant warm temperature. This turning off and on (cyclic loading) of the treater firetube burner likely attributing to the gasket not sealing properly. • The investigation report provided by the Owner describes a plausible failure scenario describing the loss of emulsion through the fire-tube gasket as the flammable fuel which spread to the other facility equipment. • The Treater hot burner assembly may have provided an ignition point for the flammable emulsion vapors to start the fire.
Facts and evidence	• Owner's report describes that the firetube was not supported properly inside the treater, contributing to the firetube gasket miss-alignment and gasket failure; allowing the emulsion to leak out onto the ground and which vapours likely ignited from the burner assembly. • Owner's report includes photographic evidence of the treater flange and gasket misalignment. • Extensive Heat Damage near burner end of treater support legs may be further indication of the fire's heat concentration where the treater fire likely started nearby at the burner assembly. • Photos taken by attending Boiler Safety Officer of complete loss of plant facility.
Causes and contributing factors	• It is plausible that the increased operating pressure on the treater fire-tube gasket, which seal was likely already compromised by the improperly supported fire-tube, contributed to the gasket failure. It is plausible that the fire tube gasket failure allowing the flammable emulsion fluid vapours to come in contact with the hot treater burner

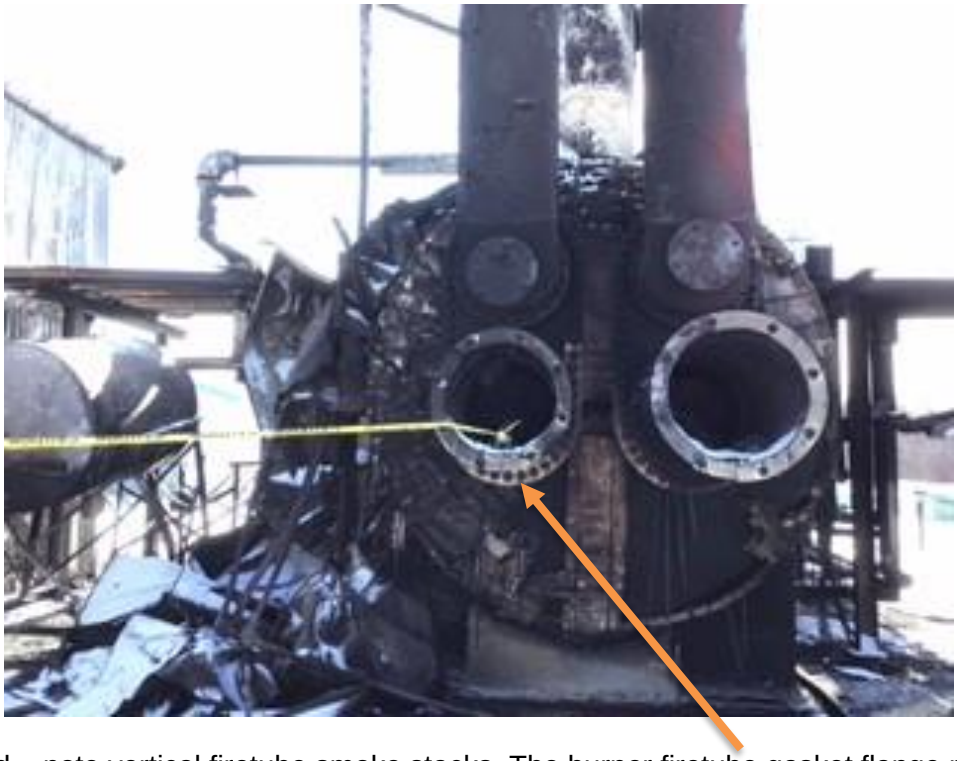
assembly, likely resulting in the fire which spread to this plant's other equipment nearby, destroying this facility's equipment.

Looking from South East End of facility

Looking From North East End of Facility

Looking from North West End of Facility

Treater is Middle Unit



Treater Burner End – note vertical firetube smoke stacks. The burner firetube gasket flange may have been source of emulsion leakage, of which, emulsion vapours likely were ignited by the burner assembly.

Bottom of Treater Burner End – Orange arrow shows side of flange gasket affected.

Treater Burner End skid and Support Brace

Note: Extensive Heat Damage likely in focal area of fire ignition.

Orange arrow points to flange gasket – firetube gasket on other side of burner assembly may be source of emulsion leakage.