Incident Summary #II-1806945-2024 (#55190) (FINAL)

SUPPORTING INFORMATION	Incident Date		December 9, 2024
	Location		Prince George
	Regulated industry sector		Boilers, PV & refrigeration - Boiler and pressure vessel system
	Impact – Injury	Qty injuries	0
		Injury description	N/A
		Injury rating	None
	Impact – Damage	Damage description	Fire damage to vessel resulted in minor shell distortion, damaged insulation, scale formation and instruments destroyed.
		Damage rating	Minor
	Incident rating		Minor
	Incident overview		A fire occurred inside a biofuel filter vessel during its drying cycle.
INVESTIGATION CONCLUSIONS	Site, system and components		A biofuel process converts raw oils such as canola and used cooking oil into renewable crude oil by a series of filtering and polishing methods. The crude slurry made up of the raw oils is filtered in a crude adsorbent filter, which is a vertical stainless steel cylindrical pressure vessel containing a series of adsorbent (leaf) filters. A diatomaceous earth (a naturally occurring, soft, siliceous sedimentary rock) and oil mixture introduced to the slurry circulates in the vessel providing filtration of impurities such as metals and solids which adhere to the leaf filters. The leaf filters are then dried with a stream of heated air. Prior to the start of the drying sequence, operators can set the drying cycle length of time. After a time, the dried cake buildup adhered to the filters is loosened by agitators and dumps into a hopper. The process is continuously monitored by operators. There is a pressure gauge on the top of the vessel but no pressure or temperature sensors on the vessel. There are no cameras or alarms present in the vicinity of the vessel to notify the control room if a fire is present.
	Failure scenario(s)		The diatomaceous earth filter media, laden with trace minerals started to self-heat during a longer than normal drying cycle. An additional filter aid media was introduced to the process and was prone to particulate carryover which created a restriction in the air discharge, contributing to higher temperatures in the vessel. Fire developed as a result of an extended drying cycle of the filter media, leading to oxidation and ignition.

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Facts and evidence	This recently constructed plant made frequent adjustments to operating parameters in an ongoing effort to improve the process. This common practice was not subject to management of change processes. Prior to the incident and in effort to improve filtration of deleterious metals, a silica filter aid material was added which increased drying time and particulate carry over. Maintenance personnel had previously noted a bird screen on the outlet of the vent had oily residue, and that a restriction was present. The method of determining the drying time was changed during the shift prior to the incident; this resulted in approximately a doubling of drying time. Details of the changes to drying times or discussion of anything out of the ordinary were not conveyed to the subsequent shift operators. When the diatomaceous earth is contaminated with trace metals and oils and dries out, the mixture has the potential to heat itself. Smoldering dumped cake was a normal observance in the bin room and was controlled with water spray. Examination of the fire damaged vessel identified: limited vessel shell distortion, damage to gaskets and filter screens, black scale formation, insulation damage and destruction of instruments. The vessel was examined and assessed, minor repairs were made and returned to service.
Causes and contributing factors	It is highly likely that the fire was initiated by an extended drying cycle of the diatomaceous earth filter media, leading to oxidation and ignition that caused a fire and damage to the vessel. The contributing factor was adjustments to operating parameters and filter media without employing management of change review.

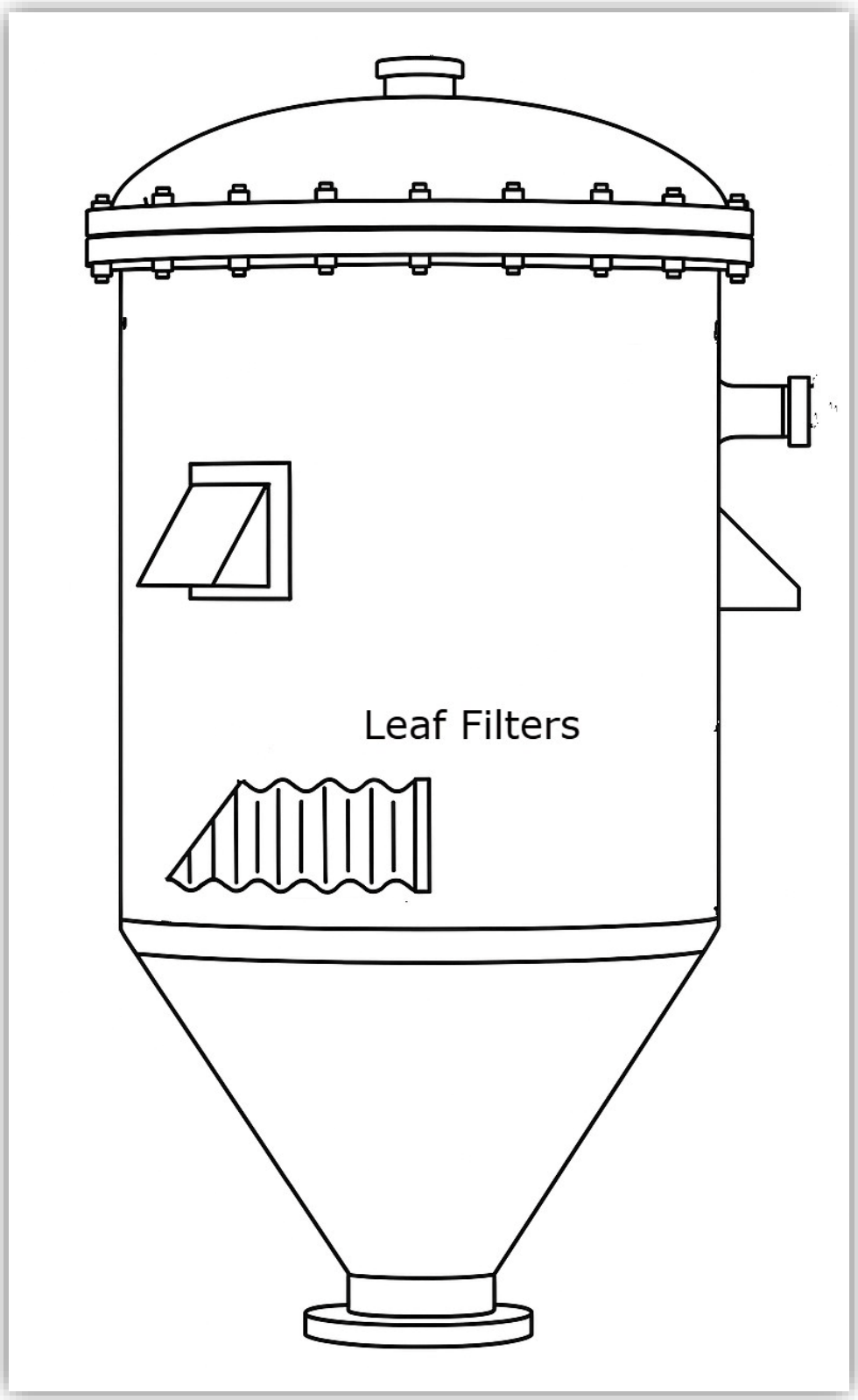

Image 1 - Filter vessel diagram.

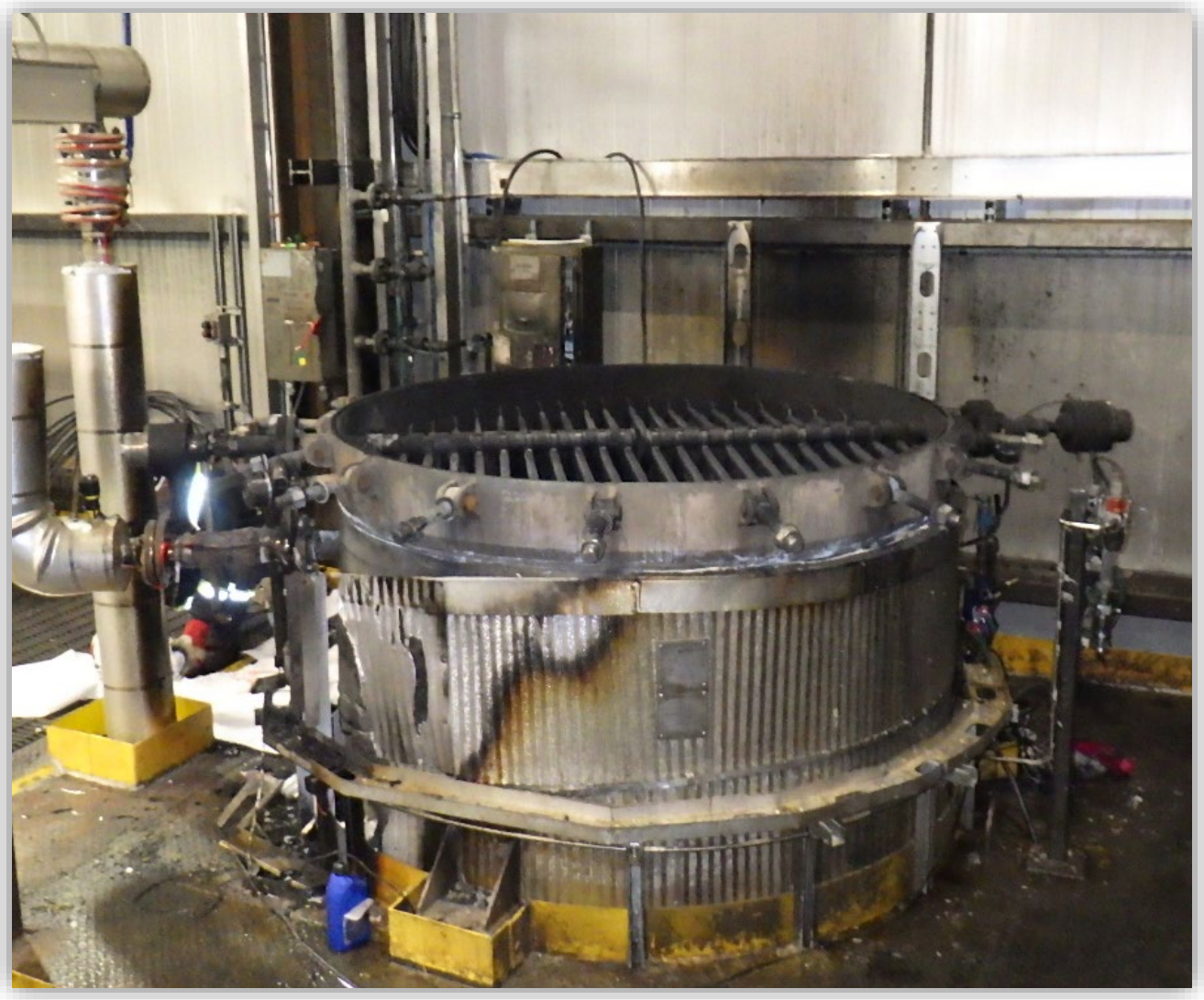

Image 2 - Fire damaged filter vessel with top cover removed.

Image 3 - Damaged leaf filters.