Incident Summary #II-2108298-2026 (#66420) (FINAL)

SUPPORTING INFORMATION	Incident Date		August 10, 2026
	Location		North Vancouver
	Regulated industry sector		Gas - Natural gas system
	Impact – Injury	Qty injuries	6
		Injury description	Six residents were transported to hospital for treatment of carbon monoxide (CO) poisoning. Symptoms reported by multiple people included light-headedness, lethargy, loss of consciousness, headaches, nausea, and vomiting.
		Injury rating	Moderate
	Damage	Damage description	Dangerously high levels of CO were released into occupied indoor spaces of a multi-unit residential apartment building.
		Damage rating	Major
	Incident rating		Major
	Incident overview		CO was released into a multi-unit residential building when the venting system for one of the heating boilers became detached, and the boiler continued to operate. The CO migrated into multiple occupied suites in the 25-unit, three-storey residential apartment building. There were no operating CO detectors or alarms in the building, and the leak was only identified after multiple people reported experiencing illness symptoms aligned with CO exposure. Emergency first responders arrived, identified high levels of CO indoors, evacuated the building, and shut off operation of the gas-fired heating boilers.
INVESTIGATION CONCLUSIONS	Site, system and components		The building is a 25-unit, three-storey residential apartment building that was originally built in 1967. It has a mechanical room located near the center of the building beneath the first floor. The room originally housed a natural gas-fired water-tube boiler for heating and hot water. In 2012, the water-tube boiler was replaced with two IBC model SL 80-399, Category IV*, direct-ignition, condensing, wall-hung boilers certified to the CSA 4.9 Canadian standard. Because the exhaust gases in a Category IV appliance are relatively cool compared to conventional exhaust temperatures, water vapour condenses into liquid inside the vent. These boilers therefore require special corrosion-resistant venting materials and a condensate drain. Category IV boilers are commonly used in modern heating systems because they are very energy efficient, often achieving efficiencies above 90%. ** Category IV gas appliances operate with a positive vent pressure and a vent gas temperature capable of causing condensate production in the vent* **Ignition system** IBC model SL 80-399 boilers use a direct-ignition system that electronically ignites the burner without a standing pilot. When there is a call for heat, the boiler verifies the safety interlocks, starts the combustion fan, purges the combustion chamber, opens the gas valve, and creates a spark to ignite the burner. A flame sensor confirms successful ignition. If ignition fails, the control automatically performs three ignition retries, including a pre-purge before each attempt. If the boiler fails to ignite after three successive attempts, it locks out for one hour and then repeats the three-try sequence without requiring manual intervention or reset.

Incident Summary #II-2108298-2026 (#66420) (FINAL)

Low-water cutoff and high-limit safeties
The low-water cutoff (LWCO) and high-limit switch are safety devices that protect a boiler from damage. The LWCO verifies that there is enough water in the system before allowing the burner to operate. If the water level is too low, it shuts the boiler down to prevent the heat exchanger from overheating. The high-limit switch monitors boiler water temperature and shuts the burner off if the temperature rises above a safe level. These safeties form part of the boiler's safety circuit. If either device detects an unsafe condition, the boiler stops firing and enters a fault or lockout mode until the issue is corrected.

Venting system
The boilers were each installed in a single-pipe venting configuration, meaning flue gases were vented outdoors from each boiler through a single, 4" diameter vent pipe, whereas combustion air was drawn directly from inside the mechanical room. The mechanical room was supplied with combustion and ventilation air openings directly to the outside through louvered and screened openings and ducts. The size of the openings and ducts exceeded the minimum requirements for the combined appliances installed in the room. The polypropylene vent pipes and fittings were matched components from one manufacturer (Centrotherm), which uses gasketed vent joints and retaining rings. The venting system was certified to the CSA S636 venting standard and approved for use with the appliances by the boiler manufacturer. The vent pipes from each boiler were routed horizontally across the mechanical room before being transitioned to a compatible, polypropylene flex pipe that was run up to the rooftop through the original masonry chimney for the building.

Hydronic heating systems
The apartment building's hydronic heating system distributes heat by circulating heated water through a closed piping network. Boilers in the mechanical room heat the water, and circulating pumps move it to radiators, baseboard heaters, fan coil units, or other heating equipment in apartments and common areas. As the water circulates, it transfers heat to the occupied spaces and cools before returning to the mechanical room to be reheated. Thermostats and automated controls regulate water temperature and circulation to maintain indoor comfort.

Summer shutdown system
A summer shutdown system, also known as **Warm Weather Shutdown (WWSD)**, is a feature on some modern heating boilers that automatically turns off the space-heating function when the outdoor temperatures rise above a preset level, typically between 15°C and 18°C (55°F to 65°F). The system uses a sensor to continuously monitor outdoor air temperatures and communicates with the boiler's control module. For IBC condensing boilers, the summer shutdown function is integrated into the boiler's controls. When the outdoor temperature rises above the setpoint, the boiler disables all central heating demands because the building no longer requires space heating. If the building has a domestic hot water (DHW) demand through an indirect water heater, the boiler will continue to operate for DHW production even while space heating remains off. When outdoor temperatures fall below the shutdown setpoint, the boiler automatically re-enables the heating system without any operator intervention. This control improves seasonal efficiency, reduces unnecessary boiler cycling, and minimizes fuel consumption during mild weather while maintaining automatic heating availability when required.

Gas combustion
Proper combustion in a gas appliance requires an adequate supply of fuel, sufficient fresh air containing oxygen, a reliable ignition source, and the correct air-to-fuel

Incident Summary #II-2108298-2026 (#66420) (FINAL)

	mixture. The venting system must also remove combustion products efficiently to prevent flue gas recirculation and maintain an adequate supply of fresh combustion air. Flue gases released into indoor spaces can be hazardous. Recirculation of flue gases into the combustion chamber can reduce the amount of oxygen available to the burner, lower flame temperatures, and impair complete combustion of the fuel. Under these conditions, some of the carbon in the fuel forms CO rather than carbon dioxide. As a result, appliances experiencing flue gas recirculation may produce higher-than-normal CO concentrations, creating a CO exposure hazard.
Failure scenario(s)	Two IBC SL 80-399 boilers were installed in the building in 2012 to replace an aged boiler. The IBC boilers provided both hydronic heating and domestic hot water for the residential units in the building. The boilers operated in that configuration until 2023, when two additional boilers were added to supply domestic hot water to the building, and the two IBC boilers were adjusted to provide only hydronic heating and not domestic hot water. A new service contractor took over in 2021 and noted that the IBC boilers experienced frequent ignition failures requiring repeated removal, cleaning, and replacement of ignitors. The contractor had also identified that the boiler venting was leaking condensate and had corroded the retaining clips holding the venting together. In March 2023, the contractor replaced a portion of the venting in the mechanical room with the same type and style of polypropylene venting with gasketed joints and retaining clips. One boiler also had repeated nuisance faults associated with the factory low-water cutoff/high-limit circuit. After multiple attempts to repair the problem, the contractor bypassed the factory low-water cutoff switch and replaced it with an external low-water cutoff mounted on top of the boiler next to the unit's vent system. The boilers were set up to use an external sensor to monitor the outdoor temperature. The contractor programmed the boilers with a summer shutdown temperature of 65°F (18.9°C). When the outdoor temperature exceeded this setpoint, the boilers were intended to stop operating. Investigation of Boiler #2's digital settings showed that it was not sensing the outdoor temperature and therefore was not shutting off as intended. The main circulating pump was wired to operate only with Boiler #1. Because Boiler #1 was shut down during summer shutdown, the pump also remained off. At the time of the incident, the outdoor temperature was above the summer shutdown setpoint, so Boiler #1 and the pump were off while Boiler #2 continued to operate without system circulation. Boiler #2 fired only until the stagnant water inside the boiler reached the operating temperature, then shut off again. This caused short cycling and increased the number of ignition attempts. When the outdoor temperature dropped below the summer setpoint in the evening, the circulating pump started and moved cooler water through the heating system. Boiler #2 then ran for an extended period until the system water reached its 140°F (60°C) supply temperature. On July 29 and 30, fault codes logged in Boiler #2 showed that three failed ignition attempts were followed by 1-hour lockouts. This cycle repeated 25 times without alerts, notifications, or lockouts requiring manual intervention before the boiler began operating. On August 9th, the day before the incident, Boiler #2 experienced similar ignition problems, resulting in ignition failures, 1-hour lockouts, and automatic ignition retries

Incident Summary #II-2108298-2026 (#66420) (FINAL)

	that generated three successive ignition fault codes. The fault codes occurred at 11:58, 13:00, and 14:01. Boiler #2 began operating again during its fourth ignition attempt sequence. On the night before the incident, delayed ignition during one of the boiler's frequent ignition attempts likely produced enough force to dislodge the vent from the appliance vent connection. The vent wedged against the new external low-water cutoff and remained there, leaving the boiler vent outlet open to the mechanical room. No safety system identified that the vent connector had disconnected from the boiler. When the boiler ignited on subsequent attempts, it continued to operate while expelling flue gases into the mechanical room. During the evening, when the outdoor temperature dropped and the circulating pump started, Boiler #2 ignited and ran for an extended period while heating the system water. During this run time, the disconnected vent allowed flue gases to spill into the mechanical room. Combustion by the boiler and recirculation of flue gases reduced the oxygen available for combustion. The reduced oxygen supply caused incomplete combustion, which significantly increased CO production. Flue gases containing CO then migrated from the mechanical room into occupied spaces through small, unsealed openings and a larger ceiling opening connected to the building floor assembly. There were no operating CO alarms installed in the building, and the boiler continued to run with CO entering the building until several people were exposed and began experiencing illness symptoms. One occupant, whose family members experienced severe symptoms beginning around 6:00 a.m., researched the symptoms online and identified CO exposure as a possible cause. The occupant called 911 around 11:00 a.m. and informed the building manager's family, who were in the neighbouring suite. Emergency responders arrived and, with support from a technician from the responding gas utility, evacuated the building and shut down the boilers. At the time of evacuation, CO levels measured in some areas exceeded the instrument's maximum display reading of 1,500 ppm.
Facts and evidence	**Interview statements** **Property manager's son** • He said a neighbour came to his door and reported that the neighbour's parents were feeling sick. • He told the neighbour to call an ambulance or firefighters and said he would notify his mother, who was the building manager and was out of town. • He did not smell anything unusual, did not hear alarms, and did not hear loud bangs before the incident. • After being told people were sick, he looked toward the balcony and saw that the affected individuals appeared unwell. • He did not feel any symptoms himself. • Firefighters used a beeping device that he understood was checking for CO. • Approximately three ambulances attended, and multiple people were transported to hospital. • The affected individuals included visitors from outside Canada who were visiting their son. • He and his mother were not aware of any recent contractor work, boiler work, heating issues, water issues, or system changes.

Incident Summary #II-2108298-2026 (#66420) (FINAL)

Occupant 1

- Their parents were staying with them from out of town.
- Several family members experienced symptoms consistent with CO exposure, including dizziness, weakness or numbness in the legs, difficulty holding objects, and severe fatigue.
- They had initially suspected high blood pressure in one family member, then became concerned when multiple people, including himself, felt dizzy.
- After searching online, they identified CO poisoning as a possible cause and called 911.
- The fire department attended quickly, detected dangerous gas levels, and evacuated the building.
- Paramedics transported them and their family to hospital by ambulance.
- Hospital blood tests reportedly confirmed CO exposure in them, their mother, father, and brother.
- Their father reportedly had the most serious exposure level and was described as close to a dangerous threshold.
- The family received oxygen treatment for at least six hours and underwent repeated blood testing.
- The family cat was restless during the night and was later given oxygen.
- Other residents were also affected, including an older man taken by stretcher and a child who was vomiting.
- They did not recall hearing any alarms in the building during the incident.

Occupant 2

- They had heard loud banging noises from the mechanical room during the evenings for the three weeks before the incident but did not know what caused the noises.
- They did not hear any alarms in the building immediately before or during the incident.
- Their son was falling down at the time of the incident, and they believe he may have lost consciousness.

Occupant 3

- They heard loud banging noises coming from the mechanical room between midnight and 03:00, approximately every hour.

Boiler contractor

- He had been servicing the Casabella building for about 4–5 years, starting around 2020/2021.
- He confirmed the two original IBC boilers previously served both heating and domestic hot water, but after the Rinnai domestic hot water boilers were installed in December 2023, the IBC boilers were converted to heating only.
- He described the IBC boilers as unreliable, with most problems involving ignition failures, lockouts, and repeated igniter cleaning or replacement.
- He said Boiler #2 had persistent nuisance trips related to the factory low-water cutoff/high-limit circuit, so he installed an auxiliary low-water cutoff and bypassed, or jumpered, the factory arrangement.
- He stated he had not personally seen delayed ignition, banging, or similar events on these IBC boilers.

Incident Summary #II-2108298-2026 (#66420) (FINAL)

- He replaced most of the polypropylene venting in April 2023 after identifying leaking joints, flue product leakage concerns, and acidic condensate damage.
- He expressed strong concern about gasketed polypropylene venting systems and said he had seen similar issues in other buildings.
- He stated there had been no further venting repairs or changes after the 2023 replacement, prior to the incident.
- He had not previously seen the vent come off at this boiler location, but he observed after the incident that the right-hand boiler vent connection had been displaced upward.
- He confirmed the only gas-fired appliances in the building were the two IBC boilers and two new separate domestic hot water boilers in the mechanical room.
- He recalled being told that CO levels of about 1,500 ppm were measured in an upstairs hallway.

Site observations

- The vent for Boiler #2 was observed dislocated from the appliance vent connection and wedged beside the external low-water cutoff switch installed above the boiler.
- Both boilers had individual single vents routed outdoors through an old masonry chimney and had been operating for some time with the front covers off.
- Both IBC boilers and both domestic hot water boilers drew their combustion air from the mechanical room.
- A screened and louvered opening communicated directly with the outdoors and had ducting that separated combustion air directed to the floor from ventilation air near the ceiling of the room.
- The horizontal sections of the vent did not have the correct slope when fully engaged in the boiler, and the horizontal hangers did not meet the boiler manufacturer’s requirements.
- Staining on Boiler #2 suggested long-term leaking condensate from the horizontal vent connection above the appliance.
- The retaining ring at the first horizontal connection after the elbow on top of the appliance had corroded completely through and was no longer effectively retaining the connection.
- Both boilers had several old used ignitors stored inside them.
- There were multiple unsealed passages through the mechanical room’s block walls and one large hole in the ceiling communicating directly with the floor joists of the suites above.

Tests and measurements

- The combustion air ducting was measured at 28.5” × 10”, which provided 285 square inches of opening and exceeded the minimum requirement for the appliances in the room.
- Boiler #2 was energized after the incident while the gas remained shut off. The boiler initialized and then attempted to ignite the burner.
- The gas was turned on, the boiler ignited smoothly, and combustion analysis showed CO levels within the expected range for a properly operating appliance.

Incident Summary #II-2108298-2026 (#66420) (FINAL)

- The water temperature rose quickly, and the boiler shut down, indicating that the external circulating pump was not operating.
- The pump was tested and confirmed not to be operating because the outdoor temperature was above the summer setpoint and the pump was being controlled only by Boiler #1.
- When the vent was moved away from the external low-water cutoff, it fell back onto the appliance vent connection.
- Multiple ignition cycles were performed. Several hard light-offs were observed once the boiler had heated up, causing a “whoosh” of pressure at the vent.
- The appliance vent connector clamps were tested and found to be tight around the stainless-steel vent connectors on both boilers.
- Despite the clamps being tight, the vents for both boilers could be pulled out of the vent connectors easily by hand.
- The vents were correctly reinstalled on the appliances, and both clamps were tightened using a special clamp-tightening tool that releases at a predetermined torque value. After tightening, both vent connectors could still be pulled out by hand with a small amount of force.

Documents

- The boiler installation manual states that the ignition module stops after three failed ignition attempts, the boiler enters a 1-hour lockout, and then the control repeats the three-try ignition sequence.
- The boiler installation manual identifies polypropylene venting approved under ULC-S636 as an acceptable vent material.
- The polypropylene venting manual states the following requirements:
    - The venting manual requires retaining clips to be used on vent systems with diameters from 2” to 5”.
    - Horizontal supports must be spaced no more than 1 metre apart.
    - Horizontal vent configurations must slope back toward the appliances by no less than 1° or ¼” per foot when using long sockets, or 3° or 5/8” per foot when using short sockets.
    - Factory-supplied supports are strongly recommended. Where factory supports are not suitable, field-supplied clamshell-style supports with a minimum threaded rod diameter of 5/16 in. (8 mm) are permitted.

Historical weather data

- Online historical weather data showed daytime highs of 23°C in the area at the time of the incident, with overnight temperatures falling to 13°C. The overnight temperature was 5°C below the summer setpoint that controlled Boiler #1 and the main circulating pump.

Incident Summary #II-2108298-2026 (#66420) (FINAL)

Causes and contributing factors	The incident was caused by the boiler vent dislocating during a delayed ignition while the boiler continued to operate. Contributing factors to the incident include: • The incorrect summer shutdown setpoint setup allowed Boiler #2 to operate without the main circulating pump. This caused short cycling and increased the number of ignition attempts, likely increasing the frequency and severity of delayed ignitions. • The boiler automatically resetting after ignition faults without requiring manual intervention, allowed the ignition issue to repeat multiple times without being identified. • The boiler vent connection did not sufficiently secure the vent when the clamp was tightened, allowing the vent to disconnect during delayed ignition. • The external low-water cutoff installed on top of the boiler allowed the vent to wedge against it after a delayed ignition displaced the vent from the connector. • The boiler continued to operate after the vent became disconnected, allowing flue gases containing CO to spill into the mechanical room. • The boilers drew all combustion air from the mechanical room and were operating with their covers off. This allowed flue gases to recirculate back into the boilers, causing incomplete combustion and significantly increasing CO production. • Unsealed passages in the mechanical room walls and a ceiling opening allowed CO to migrate into occupied indoor spaces. • The absence of installed CO detectors allowed CO exposure to continue for a prolonged period and increase in severity before being identified through occupant illness symptoms.

Image 1 – 25-unit, three-storey residential apartment building.

Image 2 – Mechanical room door with passive air intake opening, screen, and louvers on the right side.

Image 3 – Two heating boilers in the mechanical room, with the disconnected vent on Boiler #2 shown at right.

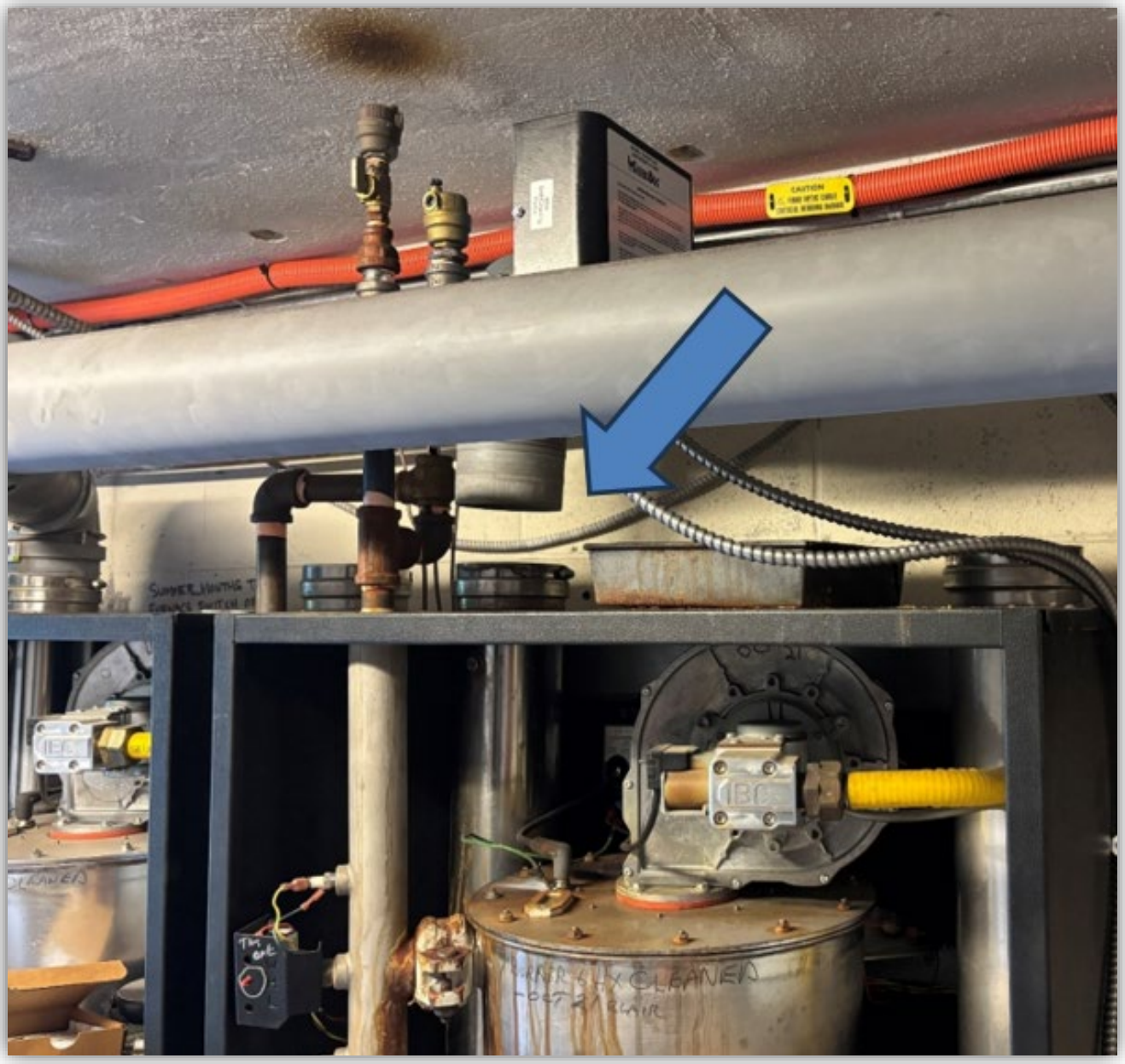

Image 4 – Vent disconnected from the flue outlet on Boiler #2.

Image 5 – Close-up of disconnected vent and corroded retaining ring.

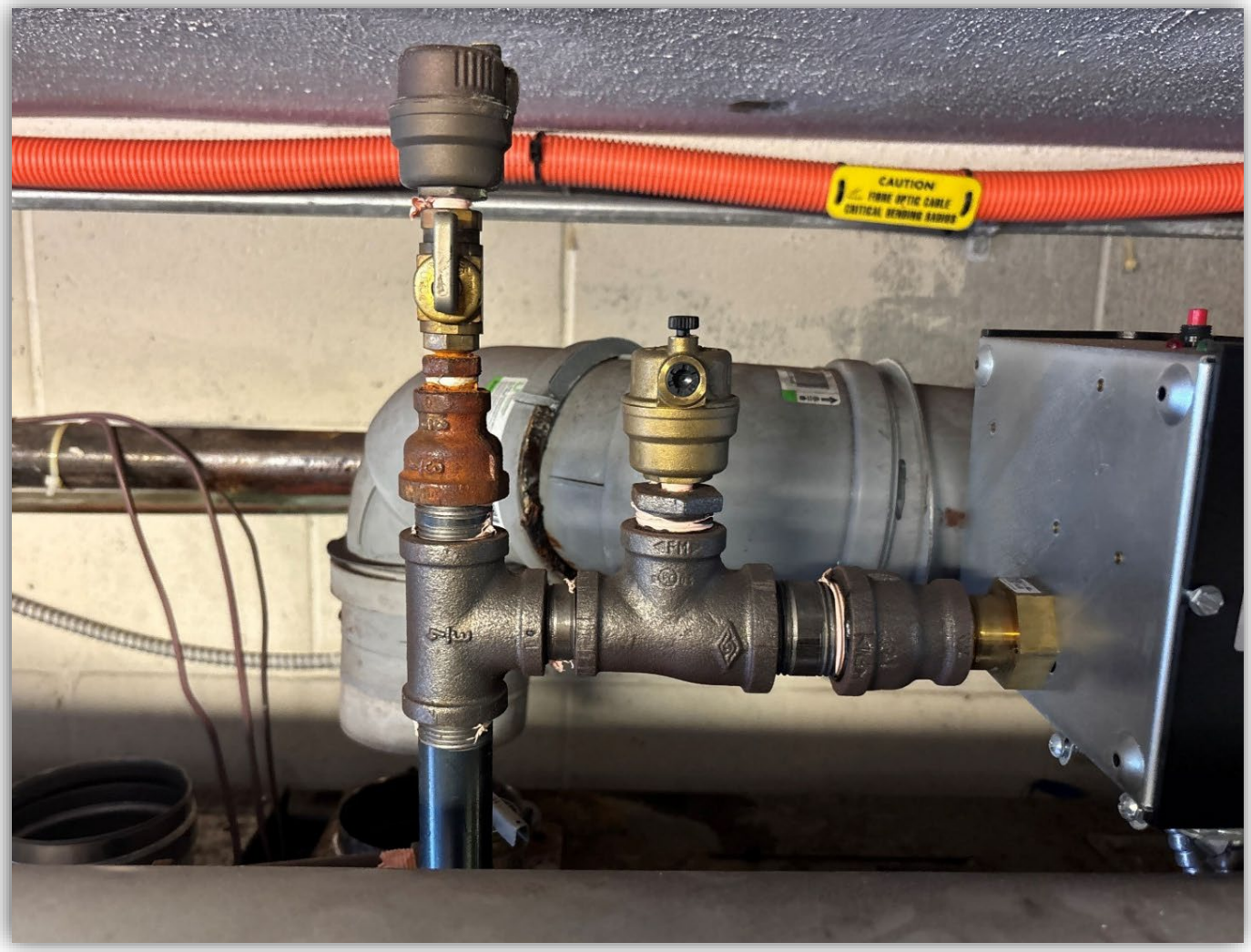

Image 6 – Piping for external low-water cutoff valve.

Image 7 – Disconnected vent pipe wedged against external low-water cutoff valve holding it in place.

Image 8 – Close-up of corroded retaining ring on Boiler #2 vent elbow.

Image 9 – Combustion and ventilation air openings for mechanical room.

Image 10 – Staining and corrosion on combustion chamber from leaking condensate from flue vent on Boiler #2.

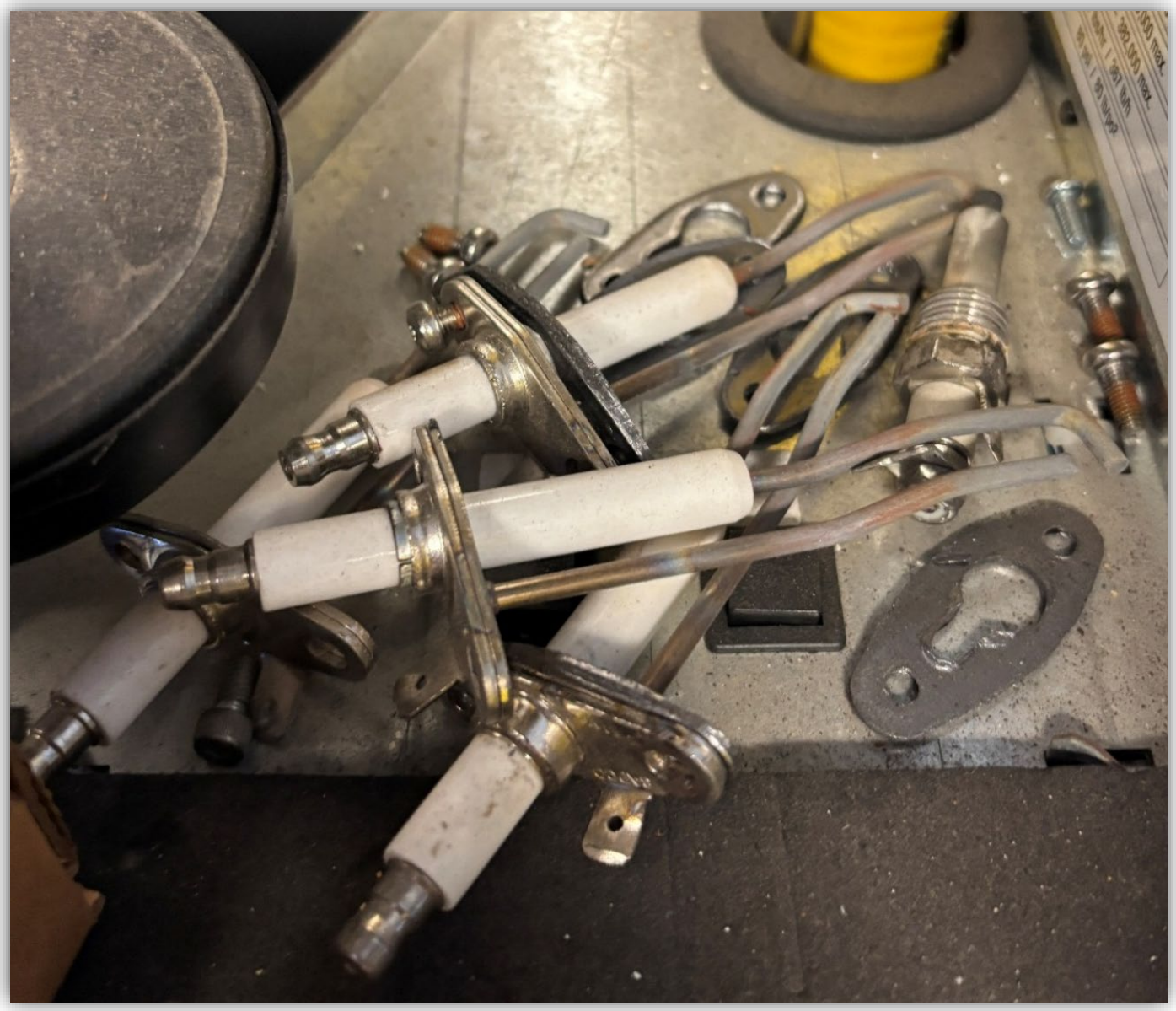

Image 11 – Multiple used ignitors from boiler repairs of ignition issues.

Image 12 – Hole in mechanical room ceiling providing a migration path for CO into the building with vent support bracket installed on exposed floor joist.

Image 13 – Main circulating pump for building’s hydronic heating system.

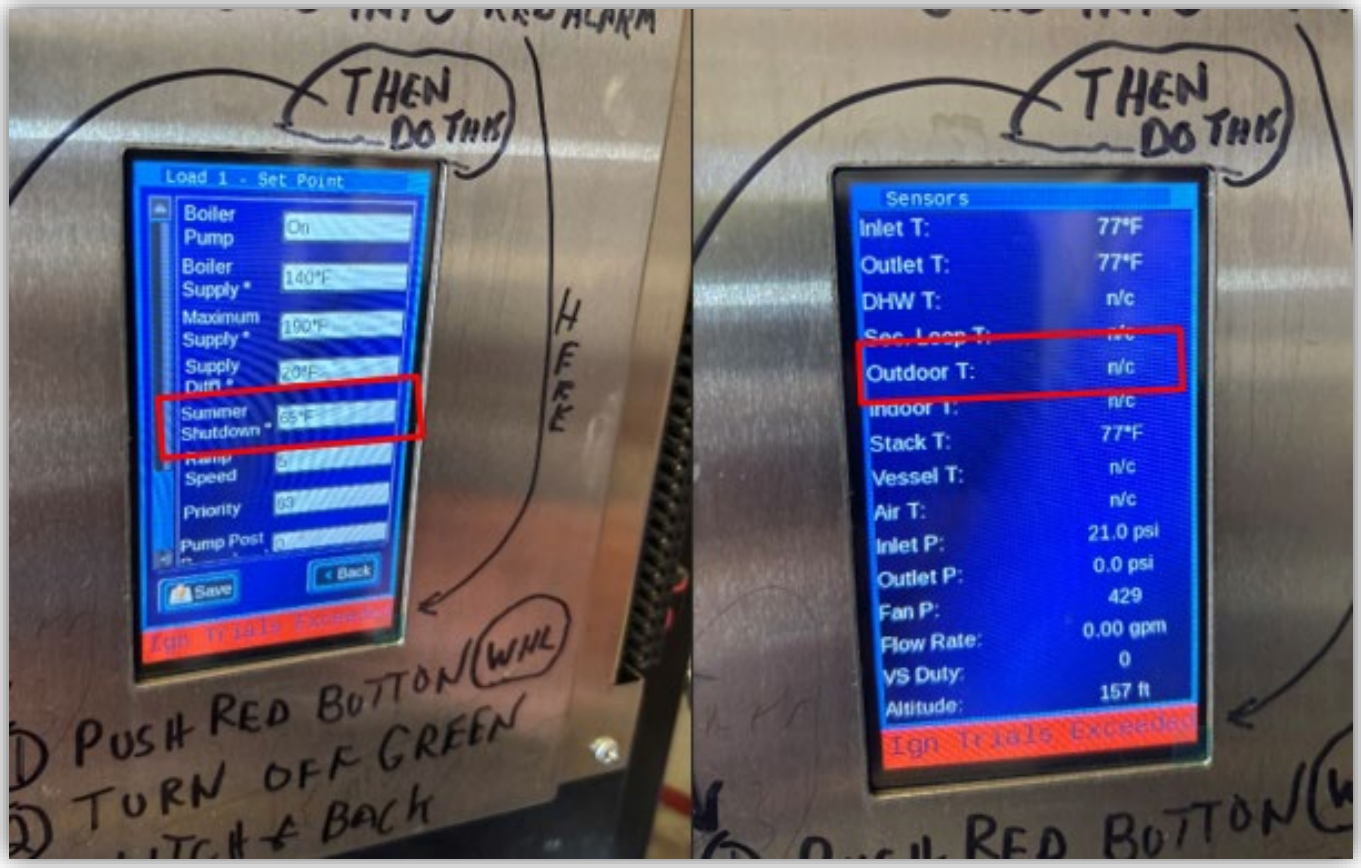

Image 14 – Boiler #2 display showing summer shutdown temperature setting (left) and no reading of the outdoor temperature (right).