FACILITY GUIDE

POINT EDWARDS

This manual describes ideas and procedures to help the maintenance team keep the facility running efficiently and cost-effectively over time. The top maintenance and energy efficiency guidelines are listed below, in order of importance:

1.	**Condominium Natural Gas Use**	Section 1 – Fireplace Pilot Lights Appendix A – Information for Homeowners
2.	**Corridor Thermostat Programming**	Section 2 – Corridor HVAC Units Section 2.4 – Thermostat Instructions Section 4.3 – Data Logging in Corridors
3.	**Tracking Natural Gas Use**	Section 3 – Tracking Natural Gas Use Section 4 – On-going Commissioning

SECTION 1. STANDING FIREPLACE PILOT LIGHTS

Every condominium's fireplace was installed with a standing pilot light rather than an electronic pilot light. Each condo also includes HVAC furnaces, heat pumps, baseboard heaters, etc., which are more efficient than the fireplaces; therefore, these other systems should be used as the primary source of heat. Instead, because of the ambience and constant pilot light, homeowners tend to use the fireplaces as the primary source of heat. Facility staff should encourage homeowners to use the more efficient mechanical systems rather than the fireplaces.

Also, the Point Edwards Owners Association (PEOA) pays for the gas used to provide heat energy to each individual fireplace. Therefore, in order to reduce gas usage and expenses, PEOA developed the fireplace pilot light policy described below.

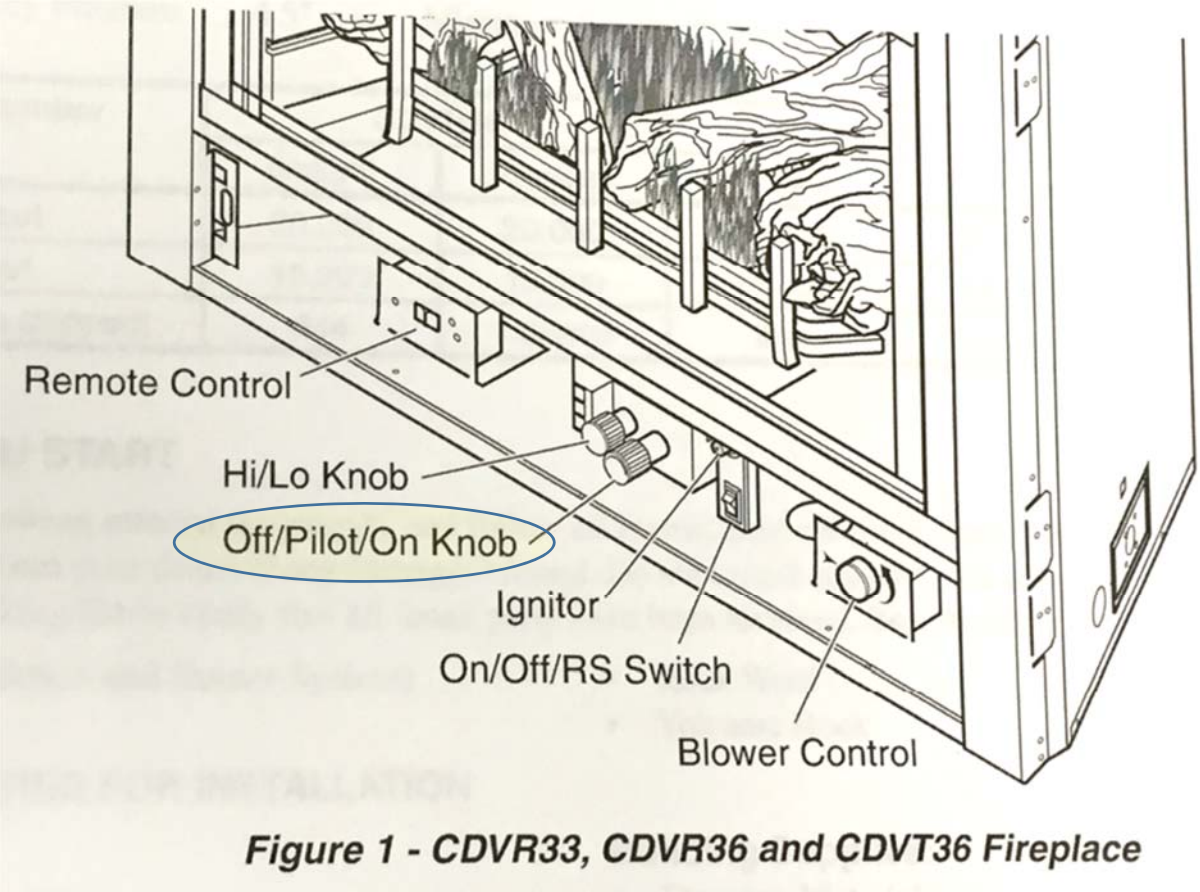
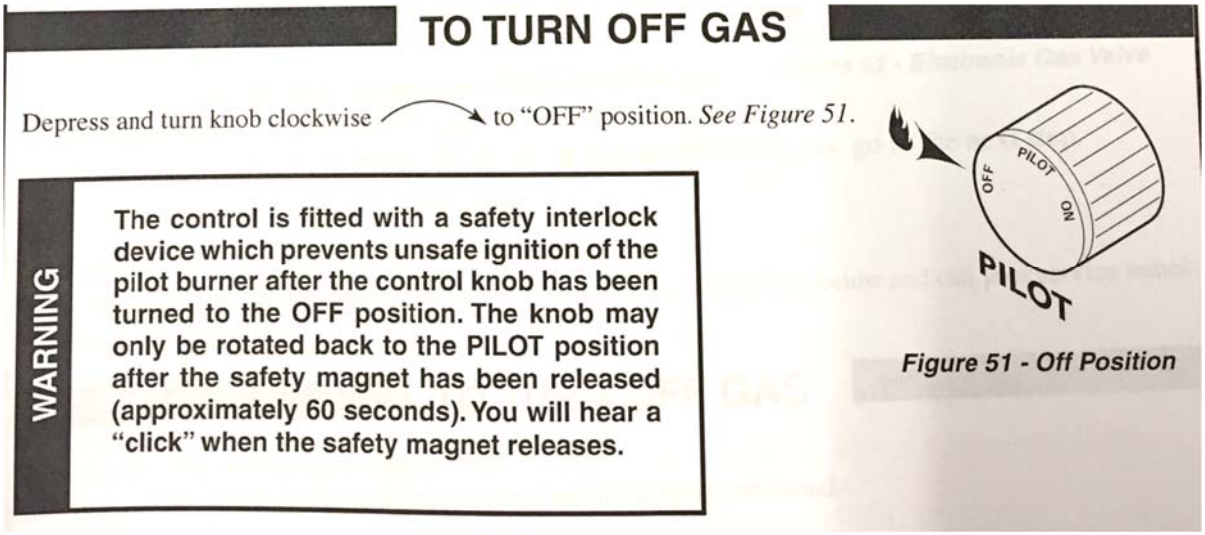


Figure 1. Fireplace instructions showing the controls behind the access panel at the base. The knob used to manually shut off and turn on the pilot light is highlighted.

1.1 Point Edwards Fireplace Pilot Light Procedure

Pilot Light Shut Off – The week prior to June 1st of every year, on-site staff will disseminate information reminding residents that PEOA requires them to shut their pilot light off and that, during the following week, staff can assist them if necessary. During the first week of June, staff will go building to building shutting off pilot lights during the allotted time period referred to in the notices.



TO TURN OFF GAS

Depress and turn knob clockwise to "OFF" position. *See Figure 51.*

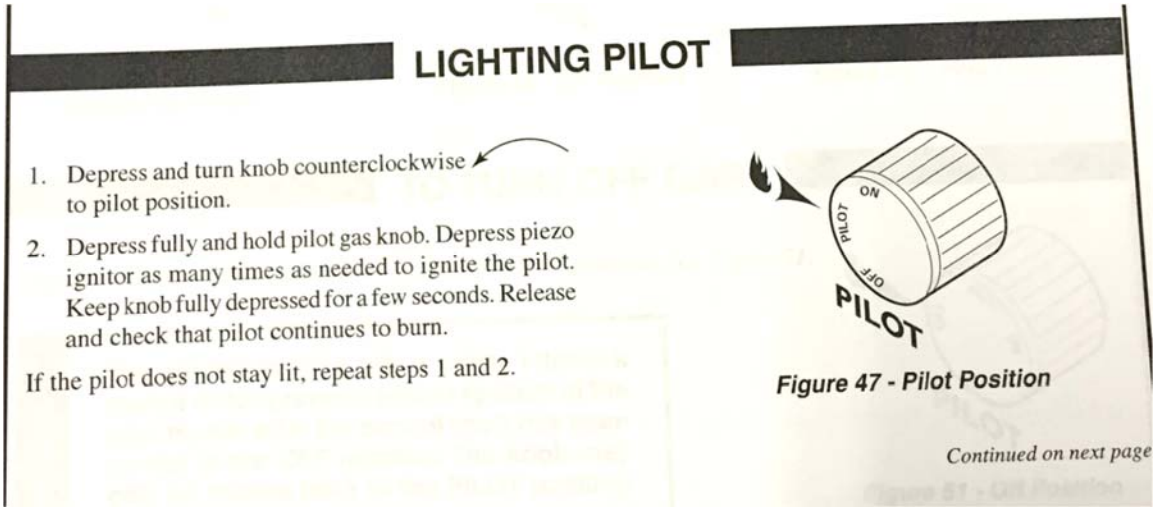
WARNING

The control is fitted with a safety interlock device which prevents unsafe ignition of the pilot burner after the control knob has been turned to the OFF position. The knob may only be rotated back to the PILOT position after the safety magnet has been released (approximately 60 seconds). You will hear a "click" when the safety magnet releases.

Figure 51 - Off Position

Figure 2. Fireplace instructions for shutting off the pilot light.

Pilot Light Turn On – During the early fall months, on-site staff will once again make rounds to each building, turning pilot lights back on for those residents who cannot do so without assistance. This process will coincide with the annual fire systems inspections, so as to reduce inconvenience to residents. At this time, residents can request that their pilot light remain unlit if they please.



LIGHTING PILOT

1. Depress and turn knob counterclockwise to pilot position.
2. Depress fully and hold pilot gas knob. Depress piezo ignitor as many times as needed to ignite the pilot. Keep knob fully depressed for a few seconds. Release and check that pilot continues to burn.

If the pilot does not stay lit, repeat steps 1 and 2.

Figure 47 - Pilot Position

Continued on next page

Figure 3. Fireplace instructions for lighting the pilot light.

SECTION 2. CORRIDOR HVAC UNITS

Each building has one packaged HVAC unit on the roof that provides heating and cooling to the condominium corridors. The sole purpose of these corridor HVAC units is to provide comfort and odor control for the homeowners.

Each unit is controlled by a thermostat located on the 2nd floor inside a locked, tamper-proof cover. Some locations are good (Buildings 51, 61) while other locations are too close to the diffuser (Buildings 31, 41, 45, 71), which may lead to homeowner discomfort and equipment cycling problems. In order of importance, four strategies for maximizing the efficiency of the thermostat (and the HVAC unit) are the following:

- **Unoccupied Mode**: Shut the fan off from 10 pm to 6 am every night
- **Intermittent Fan**: Run the fan at least 10 minutes per hour during the day. During 2015 testing, we found that 20 to 30 minutes was needed to prevent odors in the corridor. The less time the fan runs, the less chance there is that very cold air (winter) or very warm air (summer) blowing on homeowners.
- **Limited Cycles**: Limit the number of heating and cooling cycles to 1 or 2 per hour. This number needs to be balanced with the minutes of fan time. If a building needs more than 30 minutes for odor control, then the cycles should be increased to 3.
- **Increased Deadband**: Allow the temperature to drift over at least 3°F (up to 4°F)

2.1 Program the thermostat to achieve all strategies

Totaline thermostats are capable of achieving all of the bullet points above. As of March 2016, all buildings had Totaline 1800 or 1900 thermostats installed. Section 2.4 provides instructions on how the thermostats should be programmed to operate most efficiently. Note that Carrier and Honeywell thermostats were tried in the buildings but found that they could not achieve all 4 of the goals.

2.2 Resetting Thermostats after a Power Outage

Each thermostat comes with its own set of default programs. For the Point Edwards facility, the default settings are not recommended. After an extended power outage, each thermostat should be reviewed to confirm that they are set correctly. See Section 2.4.

2.3 Balance Air before Adjusting Thermostat

When a complaint comes from a resident, it may be due to air blowing on them as they pass by the corridor diffuser. Before changing the thermostat program, evaluate the airflow. Air blowing up or along the corridor is better than air blowing down towards a person. Blocking a portion of the diffuser to prevent drafts is acceptable, as long at the minimum airflow is maintained. See Appendix B for tools to help measure the airflow, and make sure the minimum amount is provided.

2.4 Instructions for Totaline 1800

To enter the Advanced Setup menu, press MODE and, while holding MODE, press the PROGRAM button. To go forward, press MODE.

Table 1. Totaline Thermostat Programming Instructions

Setup # (model 1800)	Adjustment	Notes
3	0:20 or 0:30	changes fan cycle time (# of minutes per hour)
4	6:00 am	time of day when fan starts cycling
5	10:00 pm	time of day when fan stops cycling
6	0:30	# of seconds the fan runs after heating/cooling ends
18	1 or 2	# of times heating or cooling can run each hour
19	3°F or 4°F	# of degrees away from the setting before the thermostat will turn the heating or cooling on
Exit Setup	No “Fan On”	Fan On is NOT displayed. This allows the fan to use the cycling program above.

To exit the advanced setup: Press PROGRAM. Alternately, wait 30 seconds and the thermostat will automatically exit.

Next, Use to MODE button to confirm the programming for

- Daytime temperatures, every day:
  - Cool – 73 or 74
  - Heat – 68 or 69
- Night temperature, each day:
  - Cool – 80
  - Heat – 65
- Day Time 6am to 10pm
- Night Time 10pm to 6am

SECTION 3. TRACKING NATURAL GAS USE

For natural gas tracking, Point Edwards uses Energy Star's Portfolio Manager[1]. PSE automatically uploads natural gas bills for each building (12 gas meters). Portfolio Manager adds all the bills together into a Point Edwards Portfolio and reports the energy use intensity (EUI) for all the buildings combined together. Eric Moss, the Point Edwards Energy Champion, has access to this website.

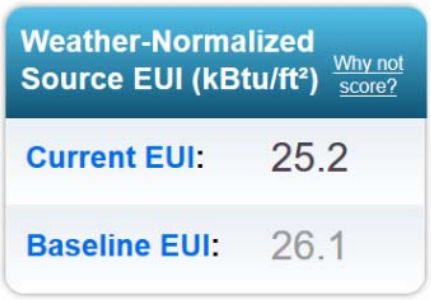


Figure 4. Summary Chart which appears on all screens of Portfolio Manager. This data is "weather-normalized" so it is adjusted from the actual therms in the PSE bills.

An additional feature of the Energy Star website is automatic weather normalizing. To be able to compare energy consumption in prior years to today's consumption, Portfolio Manager modifies the EUI to account for weather. For example, Figure 4 displays the "weather-normalized baseline EUI" as 26.1. However, Figure 5 below shows that the actual number of therms used was 25.2 (see Source EUI in the 2nd column, for the year ending in December 2014).

Portfolio Manager also tracks the energy use against a target. For this project, the target of 15% savings from the Baseline Year (2014) is programmed into Portfolio Manager. If Point Edwards achieves a 15% savings for 1 year after the CBTU project ends, then they will be eligible for an additional grant from PSE. To apply for this additional grant, Point Edwards must complete the PSE CBTU Performance Checks forms (see Section 4 and Appendix C).

Figure 5 shows the Goals tab of Portfolio Manager where the Baseline, Current, and Target EUIs are displayed. Note that the Baseline and Target values will not change. The Current EUI will update approximately once a month. To earn the 1st year Performance Incentive from PSE, the Current Use must equal be at or below the 21.4 EUI in February of 2017.

Metric	Dec 2014	Current (Nov 2015)	Target*
ENERGY STAR score (1-100)	Not Available	Not Available	Not Available
Source EUI (kBtu/ft²)	25.2	22.8	21.4
Site EUI (kBtu/ft²)	24.0	21.7	20.4

Figure 5. Energy Star keeps track of Point Edwards natural gas use and automatically tracks the most current 12 months of use (middle column) against the energy target (right-hand column)

[1] Portfolio Manager is available at: http://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager. Note that neither the common area electricity nor the condominium electricity is entered into Portfolio Manager; therefore, comparisons to the "median score" provided by the software should not be made. Point Edwards uses Snohomish PUD's online tool for tracking monthly electricity use and no information is provided in this document regarding that tool.

SECTION 4. ONGOING COMMISSIONING

This section provides tools for maintenance staff to perform ongoing procedures, maintain efficient operation, and fine-tune the buildings for greater energy efficiency. The sections below provide a recommended frequency for checking each of the energy efficiency items described throughout this document. These tables may be used as a checklist for maintaining and/or improving operational efficiency; they are in the same format as the forms in Appendix C, which need to be filled out to apply for the PSE 1st year performance incentive.

4.1 Maintain Thermostat Programming

Procedure Frequency: ☒Monthly ☒ after power outage of more than 1 day

Procedure to check improvement is still in place: Use the Facility Guide thermostat instructions (Table 1) to confirm that all settings are correct for fan programming, setpoint dead bands, and number of cycles per hour.

4.2 Fireplace Pilot Light Tracking Form

Procedure Frequency: ☒Bi-Annual ☒ When homeowners report installation of electronic pilot

Procedure to check improvement is still in place:

Follow the Point Edwards fireplace policy (Section 1 of this manual). This policy includes the following:

- Mark any homes which permanently install the electronic pilot light.
- Facility staff helps homeowners shut OFF their pilot lights for the summer in June and turn ON their pilot lights for the winter in September.
- Facility staff helps homeowners shut off their pilot lights and set their thermostats before they travel south for the winter.

Table 2. Sample Form for tracking pilot light work in Building 31. Forms for all 9 buildings are in Appendix C.

Date	Building #	Unit #	Policy Compliance Step
	31		☐ Shut OFF ☐ Turn ON ☐ Electronic Pilot
	31		☐ Shut OFF ☐ Turn ON ☐ Electronic Pilot
	31		☐ Shut OFF ☐ Turn ON ☐ Electronic Pilot
	31		☐ Shut OFF ☐ Turn ON ☐ Electronic Pilot
	31		☐ Shut OFF ☐ Turn ON ☐ Electronic Pilot
	31		☐ Shut OFF ☐ Turn ON ☐ Electronic Pilot
	31		☐ Shut OFF ☐ Turn ON ☐ Electronic Pilot
	31		☐ Shut OFF ☐ Turn ON ☐ Electronic Pilot

4.3 Data logging for Corridor HVAC Units

To check HVAC unit operation, install data loggers. Since these HVAC units operate the same every day of the week, only 24 hours of data is needed. Table 7 provides a data logging strategy and analysis procedure. Additionally, consider the following:

- Program the loggers to collect data every 15 seconds. This should allow the data to clearly show when the units are operating.
- The Smart Buildings Center (http://www.smartbuildingscenter.org/) loans equipment to Puget Sound area businesses, including Point Edwards.

Table 2. Installation locations and analysis guide for testing the operation of corridor HVAC units at Point Edwards.

Logger Location	Reason	Analysis Notes
Inside the supply air diffuser on the 3rd floor	This location is less than 10 feet away from the supply fan so it is a good approximation of the discharge air temperature and, therefore, the heating/cooling cycles.*	• This sensor will record when the unit's heating / cooling cycles begin and end. For greatest thermal comfort and energy efficiency, there should only be 1 or 2 cycles per hour. • In between heating cycles and overnight, the temperature should gradually drift toward the outdoor air temperature.
End of a hallway	This location indicates the general temperature in the corridors.	• Changes in temperatures should be gradual and should not change by more than 2°F per hour. • For thermal comfort, the temperature should stay between 65°F and 75°F during the day (6 am to 10 pm).
Inside HVAC unit thermostat case	This is the signal that the HVAC unit receives. If there are lots of heating and cooling cycles, it must be related to the temperature at the thermostat.	• Changes in temperatures should be gradual. This is critical for thermostats that are too close to the supply diffuser and/or where the programming only allows +/- 1°F
Outdoors near the HVAC unit **		• Compare these readings with the 3rd floor diffuser. If the 3rd floor reaches the outdoor air temperature in less than 3 minutes, then the fans are still operating. The fan should cycle off every hour for at least 30 minutes and should be off all night.

* This may also be accomplished by installing a current transformer inside the HVAC unit casing but the temperature sensor is much easier to install.

** Don't place the temperature sensor inside the HVAC unit. During the CBTU program the data was found to be not useable because the sun warmed up the housing too much.

SECTION 5. TRAINING OPPORTUNITIES

Based on work completed to date, the Point Edwards facility staff may benefit from the weatherization training opportunities and information resources listed below. In general, the facility staff are resourceful and have located training information on their own as the commissioning process has proceeded.

- Energy Star Portfolio Manager training: http://www.energystar.gov/buildings/training
- Smart Buildings Center: http://www.smartbuildingscenter.org/
- Blower Door & Duct Leakage testing:
    - Building Performance Center, Bellingham, WA
      http://www.buildingperformancecenter.org/course-description/
      The Courses offered by the Building Performance Center are constantly updated. The "Building Analyst Auditor" course includes lots of background information as well as training with actual equipment.
    - Journal of Light Construction (JLC)
      http://www.jlconline.com/search
      The JLC has a ton of great information and practical tips for performing maintenance and testing systems including residential duct leakage.
    - Pressure pan testing:
      http://www.greenbuildingadvisor.com/blogs/dept/musings/duct-leakage-testing
      Pressure pan testing is another way to test whether small duct systems are leaking.