APPENDIX C - RECOMMISSIONING IMPLEMENTATION PLAN

The Recommissioning Implementation Plan (Plan) can be developed by the Recommissioning provider at the end of the recommissioning Investigation Phase. This Plan describes and prioritizes each of the recommissioning findings, identifies a solution, and outlines the owner's acceptance criteria for correct performance. The Plan can be used to develop a scope of work for the contractor(s) responsible for implementing the recommissioning improvements. One Plan can be written that covers all the improvements and repairs or a separate Plan can be developed for each type of improvement. The following presents both a template and a completed sample to assist in developing a *Recommissioning Implementation Plan.* Note that the control improvements are the focus for the sample.

RECOMMISSIONING IMPLEMENTATION PLAN – TEMPLATE

The following outlines a plan for implementing the improvements identified during the recent recommissioning project for [Building Name and Location]. Recommissioning has identified [number] issues as listed below in order of priority:

1. [Name of Issue or Finding]
2. [Name of Issue or Finding]
3. [Name of Issue or Finding]

The following describes each of the issues in detail, proposes a solution, and outlines the acceptance criteria:

1. [Name of Issue]
   Description:
   Proposed Solution
   Acceptance Criteria
2. [Name of Issue]
   Description:
   Proposed Solution
   Acceptance Criteria

3. [Name of Issue]
   Description:
   Proposed Solution
   Acceptance Criteria

RECOMMISSIONING IMPLEMENTATION PLAN – SAMPLE

Recommissioning Implementation Plan for the High Rise Office Building – Control Improvements

The following outlines a plan for implementing the control improvements identified during the recent recommissioning project for the High Rise Office Building located at 1234 Street in Toronto, Ontario, Canada.

Recommissioning has identified five significant issues as listed below in order of priority:

1. Hot water plant control
2. Night low limit control investigation
3. Economizer control modifications
4. Complete programming modifications for warm-up mode
5. Ventilation air preheat control

1. Hot Water Plant Control

Description

At the beginning of recommissioning, the hot water plant was in overflow condition, with a temperature differential between the supply and return of only a few degrees. The hot water plant flow has been reduced by lowering the remote differential pressure setpoint, which resets the differential setpoint across the hot water distribution pumps (P-6, 7, and 8). Now, instead of 3 pumps running at 95% speed, 1 pump runs at 50% speed and still meets the hot water load.

The two small (Aerco) boilers operate almost 100% of the time, along with 1 to 3 of the large boilers. See hot water plant schematic attached. Even with reduced system flow, the two small Aerco boilers only add about 1°C to the supply water temperature. With such a low TD, it is unclear why these boilers even run. Furthermore, the control sequences say that the Aerco boilers are to be enabled first when loads are low, and then used as trim for the large boilers.

Proposed Solution

1. Compare the sequence as programmed to the written sequence. It may be found that the Aerco boilers are not being controlled properly within the entire sequence of the hot water system. Or, it may be that the secondary hot water flow needs to be further reduced (by lowering the differential setpoint across the pump further) to allow the Aercos to significantly influence the hot water supply temperature. Consider turning OFF the Aerco boilers whenever boilers 3, 4, or 5 are commanded ON.

2. Remote DP setpoint has already been reduced and secondary pump speed reduced. Check remote DP setpoint and determine if setpoint value can be reduced further to optimize system operation. Program minimum VFD speed for each secondary pump to be 20 Hz (variable).

Acceptance Criteria

- The problem will be considered fixed once the programming code is clarified and the Aerco boilers are integrated properly into the hot water system sequence.
- The Control Contractor must document the source of the problem and all changes made.
- The Recommissioning provider will trend the hot water plant after any modifications to verify operation as intended.

2. Night Low Limit Control Investigation

Description

Even when the night time outside air temperatures are as high as 10°C, the hot deck air handlers are commanded ON due to the night low limit (NLL) control sequence. The written control sequence says that AHU 5 and 6 will start when "space temperature drops below 15.5°C" and stops when "the space temperature rises to 17°C."

Proposed Solution

- Compare the sequence as programmed to the written sequence. Make sure NLL setpoints are properly implemented.
- Provide a list of zones polled for the NLL control function and note the night time zone temperatures from point histories or trending.
- If one or more zone temperatures are less than 15.5°C, then the night low limit operation would appear to be warranted.
- If no zone temperatures are less than 15.5°C, then NLL should not function.
- The Recommissioning provider will work with the building staff to look for nearby opportunities for infiltration if any zones are identified as driving the night low limit.

Acceptance Criteria

- The problem will be considered fixed once the polled zones are clarified and the NLL sequence is verified to be working properly. The Maintenance Service Contractor and building staff will work to prevent NLL from occurring due to infiltration.
- The Control Contractor must document the source of the problem and any changes made.

3. Economizer Control Modifications

Description

The current economizer sequence utilizes differential enthalpy. Due to difficulties with relative humidity sensor maintenance and accuracy, the economizer is not enabled when it should be, thus requiring additional mechanical cooling.

Proposed Solution

Change the economizer control sequence for AHU 1, AHU 2, AHU 3, and AHU 4 to differential dry bulb.

Acceptance Criteria

- The problem will be considered fixed once the economizer is working to provide free cooling as expected. The Controls Contractor must document all changes made.
- The Recommissioning provider will trend all four air handlers for economizers operation after any modifications to verify that the differential dry bulb control strategy is working properly.

4. Complete control modifications for warm-up mode

Description

The Controls Contractor has been working with the Recommissioning provider to implement a corrected warm-up sequence that prevents warm-up from occurring when there is a cooling load or when the building is occupied. The corrected sequence needs to be replicated on AHU 3 and 4, and the outdoor air fan isolation dampers may need to be programmed to close when warm-up is enabled.

Proposed Solution

Make sure the isolation dampers on the outside air fans close during warm-up. Replicate the corrected programming modifications of the warm-up sequence for AHU 3 and 4.

Acceptance Criteria

- The problem will be considered fixed when the warm up sequence for all AHU works as and when expected. The Controls Contractor must document all changes made.
- The Recommissioning provider will test the control strategy using overrides as well as trend warm-up mode operation to verify implementation.

5. Ventilation air preheat control

Description

The preheat coils on the outside air handlers (AHU 7, 8, 9, and 10) are supposed to open when the outside air temperature is below 2°C and modulate to maintain the cooling AHU discharge air temperature setpoint. On many occasions, the preheat coils have been active even on relatively warm days when there is a call for cooling. The preheat does not control to the discharge air temperature of the cooling AHU, but rather, produces up to 29.5°C discharge temperature. It is not clear how the coil is being controlled.

Upon initial investigation, the Recommissioning provider and the Controls Contractor found that the temperature sensor after the preheat coil may not exist, or at least it is has not been found in the control programming.

Proposed Solution

The Control Contractor with help from the building staff will complete the investigation of the source of the control problem at the preheat coil and correct problems with the sequence on AHU 7, 8, 9, and 10.

Acceptance Criteria

- The problem will be considered fixed when the preheat coils work as expected and not during warm days. The Control Contractor must document the source of the problem and all changes made.
- The Recommissioning provider will trend or functionally test all four outside air handler's preheat operation after any modifications to verify operation as intended.