**Facility:**

**Commissioning Provider: Date:**

DIRECTIONS: Address each item listed or note why it was not tested/investigated. Add other items that were tested/investigated. Note what testing/investigation was done, how these were conducted and results of the testing/investigation. Indicate any operating parameters found. Put in EEI# for improvements to resolve items that are not optimal or explain why no improvements are recommended. Complete full EEI description and information in PSE NC Post Occ EEI Details form. Include other capital improvements that may be cost effective. Expand to fit information or note specific location of information. (Handwritten legible notes are acceptable.)

**SYSTEM TYPE: AHU (ID#\_\_\_\_\_\_\_\_\_\_\_\_\_)**

**EQUIPMENT & SEQUENCES INVESTIGATED** *(be specific)***:**

**Equip ID#s:** *Example: AHU-1*

**Area Serves/occupancy type:** *Example: south side of building, offices Monday-Friday*

**Describe System:** *Example: VAV with HW and CHW coils*

**Sequences:** *Example: On/Off Schedule, Min OA, Economizer, SAT reset*

**FINDINGS, TESTS CONDUCTED and INVESTIGATION RESULTS:**

**Working Optimally?**

**Yes No N/A EEI# \_\_\_\_\_\_\_ Date(s)/time(s)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

[ ]  [ ]  [ ]  **GENERAL SYSTEM CONDITION**: Equipment is generally in good shape and does not exhibit any abnormal noIse or vibration. System is not in need of over-all replacement in the near future. Safety guards are in place. Working on and around equipment can be done safely.

Tests Conducted /Results/Findings:

**Yes No N/A EEI# \_\_\_\_\_\_\_ Date(s)/time(s)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

[ ]  [ ]  [ ]  **SENSOR CALIBRATION & PT-to-PT**: Key controlling sensors are calibrated and in appropriate locations. Points are mapped correctly to the DDC front-end. Key sensors include: supply air and mixed air temperatures (SAT and MAT), duct static pressure, flow meters. Other sensor outputs seem reasonable.

Sensors Checked: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Tests Conducted /Results/Findings:

**Yes No N/A EEI# \_\_\_\_\_\_\_ Date(s)/time(s)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

[ ]  [ ]  [ ]  **OUTSIDE AIR TEMPERARTURE (OAT) SENSOR CALIBRATION & PT-to-PT**: Controlling sensor(s) is calibrated and in appropriate location(s) to get accurate reading of ambient temperature. Point is mapped correctly to the DDC front-end.

Tests Conducted /Results/Findings:

**Yes No N/A EEI#\_\_\_\_\_\_\_ Date(s)/time(s)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

[ ]  [ ]  [ ]  **PT-to-PT OTHER**: Other critical points (fan, damper etc.) are mapped correctly to the DDC front-end and reflect existing system condition. Points Checked: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Tests Conducted /Results/Findings:

**Yes No N/A EEI#\_\_\_\_\_\_\_ Date(s)/time(s)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

[ ]  [ ]  [ ]  **AIR CIRCULATION:** Exhaust air is not mixing with inlet air or affecting outside air sensor. There are no major restrictions of air flow into and out of space which would increase energy use and/or decrease comfort.

Tests Conducted /Results/Findings:

**Yes No N/A EEI#\_\_\_\_\_\_\_ Date(s)/time(s)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

[ ]  [ ]  [ ]  **SCHEDULING:** Operating schedule matches occupancy schedule including holiday scheduling. Equipment shuts down when unoccupied as evidenced by energy internal data or walk-through (night typically).

Schedule: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Tests Conducted /Results/Findings:

**Yes No N/A EEI#\_\_\_\_\_\_\_ Date(s)/time(s)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

[ ]  [ ]  [ ]  **OPTIMUM START/STOP – WARM-UP & COOL DOWN**: System is on as little as possible prior to occupancy to warm or cool down building. Outside air damper: closed for warm-up; open for cooling (when appropriate). System is not being driven by one space keeping system on too long. System start time adjusts based on minimum time required to get spaces to temperature setpoints by occupancy.

Tests Conducted /Results/Findings:

**Yes No N/A EEI#\_\_\_\_\_\_\_ Date(s)/time(s)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

[ ]  [ ]  [ ]  **VENTILATION**: Outside air ventilation is minimum needed – not too much. No OA when space is unoccupied. Required min OA cfm\_\_\_\_\_\_\_\_\_ Found min OA cfm \_\_\_\_\_\_\_\_\_

Tests Conducted /Results/Findings:

**Yes No N/A EEI#\_\_\_\_\_\_\_ Date(s)/time(s)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

[ ]  [ ]  [ ]  **DCV**: Demand control ventilation systems have calibrated sensors (CO2 or occupancy sensors) and operate to lower outside air to minimum allowed ventilation rates in response to occupancy levels. Sensor calibration schedules are in place. There are no additional spaces where DCV is appropriate but not installed.

Tests Conducted /Results/Findings:

**Yes No N/A EEI#\_\_\_\_\_\_\_ Date(s)/time(s)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

[ ]  [ ]  [ ]  **SPACE TEMPERATURES**: Space temperatures and setpoints are as efficient as possible – day, night setback, unoccupied, standby. Setpoints have proper deadband to prevent simultaneous heating and cooling. Night/unoccupied and stand-by temperatures are set back. There are no comfort complaints from occupants.

Temperature Setpoints:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Tests Conducted /Results/Findings:

**Yes No N/A EEI#\_\_\_\_\_\_\_ Date(s)/time(s)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

[ ]  [ ]  [ ]  **NIGHT MODE & SETBACK:** AHU systems shut down completely with dampers closed and heating and cooling off when building is unoccupied. For VAV, VAV box dampers close, fans turn off and heat is off. Night walkthrough and early morning walkthrough reveal nothing on unless needed. For night heating, AHU does not come on for spaces with fan powered VAV boxes, only the affected zone fan-powered VAV boxes come on with the primary air damper closed. For heating in zones served by VAV boxes without fans, AHU comes but only in that zone along with the minimum number of boxes to prevent duct over-pressurization. For night cooling economizer is used, no mechanical cooling. AHU is on with only those zones needing cooling along with the minimum number of boxes to prevent duct over-pressurization.

Tests Conducted /Results/Findings:

**Yes No N/A EEI#\_\_\_\_\_\_\_ Date(s)/time(s)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

[ ]  [ ]  [ ]  **ROOM THERMOSTATS**: Room thermostats are in appropriate locations and not influenced by non-room temperature heating or cooling elements (example: stat is right above a light) or blocked.

Tests Conducted /Results/Findings:

**Yes No N/A EEI#\_\_\_\_\_\_\_ Date(s)/time(s)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

[ ]  [ ]  [ ]  **PROGRAMMABLE THERMOSTATS**: Non-DDC thermostats are connected and programmed to match the occupancy schedule. Heating and cooling setpoints and deadband are appropriate.

Heating and cooling setpoints: \_\_\_\_­­­­­­­­­­­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Schedule: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Tests Conducted /Results/Findings:

**Yes No N/A EEI#\_\_\_\_\_\_\_ Date(s)/time(s)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

[ ]  [ ]  [ ]  **SUPPLY AIR TEMP**: Supply air temperature (SAT) setpoint and measured temperature is appropriate for heating and cooling modes. Supply air temperature is resetting based on load and through a 10-15 °F range. One zone is not driving the whole system.

Reset SAT Setpoints and controlling parameter: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Tests Conducted /Results/Findings:

**Yes No N/A EEI#\_\_\_\_\_\_\_ Date(s)/time(s)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

[ ]  [ ]  [ ]  **DUCT STATIC**: For VAV systems, duct static pressure set point and actual static pressure is as low as possible. Duct static pressure is resetting based on load and through a 1-1.5” WC range. VAV box CFMs are met with some box dampers at 90% or higher in heating and cooling mode. One zone is not driving the whole system.

Duct Static Setpoints and controlling parameter: \_\_\_\_\_\_\_­­­­­­­­­­­­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Tests Conducted /Results/Findings:

**Yes No N/A EEI#\_\_\_\_\_\_\_ Date(s)/time(s)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

[ ]  [ ]  [ ]  **FREE COOLING/ECONOMIZER:** Economizer is operating to provide free cooling. Outside air (OA) dampers fully open and close. Mechanical cooling is locked out when OA can provide 100% cooling. Economizer remains on with mechanical cooling until outside air temperature is too high to provide cooling (integrated economizer). Economizer lockout setpoint/parameter: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Tests Conducted /Results/Findings:

**Yes No N/A EEI#\_\_\_\_\_\_\_ Date(s)/time(s)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

[ ]  [ ]  [ ]  **HW and CW VALVES:** Valves are not leaking by and are opening and closing as needed to meet load.

Tests Conducted /Results/Findings:

**Yes No N/A EEI#\_\_\_\_\_\_\_ Date(s)/time(s)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

[ ]  [ ]  [ ]  **DX COOLING STAGING**: Compressors stage (load and unload) efficiently to match actual load and control to appropriate setpoint without excessive cycling.

Tests Conducted /Results/Findings:

**Yes No N/A EEI#\_\_\_\_\_\_\_ Date(s)/time(s)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

[ ]  [ ]  [ ]  **STRIP HEATING STAGING**: Heating elements are staging efficiently with appropriated deadband. Heaters are not stuck on.

Tests Conducted /Results/Findings:

**Yes No N/A EEI#\_\_\_\_\_\_\_ Date(s)/time(s)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

[ ]  [ ]  [ ]  **DX HEATING (HEAT PUMP)**: Compressors stage (load and unload) efficiently to match actual load and control to appropriate setpoint without excessive cycling. Strip heating stages to minimize use. Strip heat is locked out when DX can handle heating (typically when OAT is 40 or lower). Outside air is a minimum.

Strip Heat Lockout Setpoint/parameter: \_\_\_\_\_\_\_\_\_\_\_\_\_

Tests Conducted /Results/Findings:

**Yes No N/A EEI#\_\_\_\_\_\_\_ Date(s)/time(s)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

[ ]  [ ]  [ ]  **DELTA T**: Temperature difference across heat exchangers/coils is near design or appropriate; indicating good coil heat transfer (and refrigerant charge). Appropriate delta T:\_\_\_\_\_\_\_\_

Tests Conducted /Results/Findings:

**Yes No N/A EEI#\_\_\_\_\_\_\_ Date(s)/time(s)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

[ ]  [ ]  [ ]  **DUCT WORK**: AHU cabinet and major duct work is not leaking air. Exterior ducts are insulated. Vibration boots are not torn or leaking air.

Tests Conducted /Results/Findings:

**Yes No N/A EEI#\_\_\_\_\_\_\_**

[ ]  [ ]  [ ]  **OVERRIDES**: Controls, setpoints and equipment that can be easily overridden or circumvented are in normal/automatic operating mode. Examples – minimum outside air, fan speed, temperature setpoints, VAV box cfm.

Tests Conducted /Results/Findings:

**Yes No N/A EEI#\_\_\_\_\_\_\_ Date(s)/time(s)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

[ ]  [ ]  [ ]  **VAV FANS**: Fans are ramping up and down efficiently and at minimum efficient levels.

Tests Conducted /Results/Findings:

**Yes No N/A EEI#\_\_\_\_\_\_\_ Date(s)/time(s)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

[ ]  [ ]  [ ]  **CLEANINESS**: Filters are clean and coils are clean and efficient.

Tests Conducted /Results/Findings:

**Yes No N/A EEI#\_\_\_\_\_\_\_ Date(s)/time(s)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

[ ]  [ ]  [ ]  **LOOP TUNING**: Loops are adequately tuned to prevent equipment breakdown and poor control.

Tests Conducted /Results/Findings:

**Yes No N/A EEI#\_\_\_\_\_\_\_ Date(s)/time(s)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

[ ]  [ ]  [ ]  **BUILDING PRESSURE**: Building/space pressure is controlled adequately to maintain intended pressure differential. Building should typically be neutral at night and positive at 0.05” WC during day.

Tests Conducted /Results/Findings:

**Yes No EEI#\_\_\_\_\_\_\_ Date(s)/time(s)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

[ ]  [ ]  ***OTHER****: Describe other things tested/investigated.*

Tests Conducted /Results/Findings:

**Yes No EEI#\_\_\_\_\_\_\_ Date(s)/time(s)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

[ ]  [ ]  ***OTHER:*** *Describe other things tested/investigated*

Tests Conducted /Results/Findings:

**CAPITAL EE IMPROVEMENTS**

**EEI# \_\_\_\_**  *Brief Description of Capital Improvement*

Notes/Comments:

**EEI# \_\_\_\_** *Brief Description of Capital Improvement*

Notes/Comments:

**TRAINING**

**Yes No Date(s)/time(s)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

[ ]  [ ]  **Staff (occupants and O&M) fully understands how the system works.**

[ ]  [ ]  **Staff (occupants and O&M) fully understands how to run the systems efficiently.**

Specific Staff evaluated:

Comments:

**Specific Training needs of staff (occupants and O&M):**

**Ideas for Facility Guide/Operational Aides:** What needs to be added (for example: sensors or specific trends, explanation on DDC graphic, or signage), provided (for example: table of which VAV boxes are served by AHU) or done (for example: putting extra filter check in maintenance schedule) to help the operators keep the systems operating efficiently over time?