Nebo School District Board of Education

Policy ECG

ENERGY CONSERVATION

It is the intent of the Board of Education that through proper implementation of administrative procedures, a concerted effort be made by each employee of the district to practice as well as teach correct conservation principles.

It will be the policy of the Board of Education that each employee follow diligently all procedures regarding the conservation of energy which are developed and disseminated through the Superintendent's office. Procedures developed for this purpose will be channeled through the principals to all employees at the school level.

Date: 7/80

Nebo School District Board of Education

Administrative Procedure ECG-P

ENERGY AUDIT CHECKLIST

1. Thermostats on heating/cooling units are vulnerable to occupant adjustment.

a. Reset thermostats to correct settings.

b. Install or replace locking screws to prevent tampering.

2. Thermostat settings have been adjusted for change in seasons.

a. Adjust thermostats to 65 degrees F. in heating season and to 78 degrees F. during cooling season.

b. Change the location of thermostats from areas subject to extreme temperature fluctuations, such as next to windows, or over a heating or cooling unit.

3. Unoccupied or little used areas are not heated or cooled unnecessarily.

a. Reduce winter thermostat settings to 55 degrees F. in unoccupied areas.

b. Where possible, turn off heating systems if nothing in space can freeze

c. Use spot heaters/coolers in large spaces with low occupancy.

d. Turn off cooling systems in unoccupied areas, if possible.

e. Disconnect electrical devices, close drapes, and shut off air systems, if nothing in space can freeze.

4. Off-hour activities are scheduled.

a. Reschedule off-hour activities to accommodate partial shutdown of building systems.

b. Reschedule custodial and cleaning activities during working hours whenever possible.

c. Reexamine original assumptions regarding occupancy patterns and building usage. Modify patterns for increased energy efficiency.

5. Building temperatures are adjusted for unoccupied periods.

a. Reduce thermostat settings by a minimum of 10 degrees at nights, for weekends and holidays during heating season.

b. Shut down all air conditioning units at night, on weekends and holidays.

6. Heating/cooling equipment is operating in lobbies, corridors, vestibules, and/or other public areas.

a. Close supply ducts and radiators and/or lower heating set points in the above areas if there is no possibility of freeze-up. Disconnect electrical heating units (or switch off a breaker box).

b. Close air conditioning supply ducts serving the above areas.

7. Heating/cooling equipment is started before occupants arrive and/or is operating during last our of occupancy.

a. Experiment with start-up times and duration of operation to determine satisfactory comfort levels for occupants. Reduce or turn off heating and cooling during the last hour of occupancy, allowing the building to "coast."

8. Use of equipment associated with laundry and custodial services coincides with heavy electrical demand periods.

a. Require that major electrical equipment be used in accordance with guidelines that avoid peak electrical demand periods.

9. Blinds and curtains are used to help insulate the building.

a. Instruct personnel to close interior shading devices to reduce night heat loss in winter and to reduce solar heat gain during the summer.

b. Repair or replace damaged or missing shading devices.

c. Place reminders where appropriate.

10. Records of maintenance for motors and motor driven equipment are available.

a. Using name plate data, prepare an up-to-date list of all motors and pumps used in the facility and list routine maintenance to be performed on each.

b. Check regularly for:

1. Correct motor voltage and amperage

2. Loose connections and worn contacts

3. Unbalanced voltages on 3-phase motors

4. Improper grounding

5. Packing wear

6. Wear and binding on bearings and drive belts

7. Proper sequencing of pumps and motors

11. Control devices are inspected on a regular basis.

a. Routinely check all time clocks and other control equipment for proper operation, correct time and day and for night and proper programming of on-off set points. Protect from unauthorized adjustment.

12. Conditioned air or heated water is discarded.

13. Incandescent lamps are used in offices, workrooms, hallways and gymnasiums.

a. Where possible use a single incandescent lamp of lower wattage rather than two or more smaller lamps of combined higher wattage.

b. Discontinue using extended service lamps except in special cases such as recessed directional lights where short lamp life is a problem.

c. Discontinue using multi-level lamps. The efficiency of single wattage lamp is higher per watt than a multi-level lamp.

14. In fixtures where fluorescent lamps have been removed, the ballasts have been disconnected.

a. Disconnect ballasts which still use significant amounts of energy even though tubes have been removed.

15. When burned out fluorescent lamps and/or ballasts have been replaced, more efficient lights have not been installed.

a. When relamping, replace fluorescent tubes with more efficient and lower wattage tubes such as 35-watt instead of 40-watt to achieve a reduction in electrical energy consumption. Whenever possible, replace burned out ballasts with more efficient lower wattage energy conserving ballasts.

b. Consider not replacing burned out bulbs or lamps and disconnecting ballasts in areas where delamping is possible. For example, in four-lamp fixtures allow two lamps to remain disconnecting appropriate ballasts.

16. Lamps and fixtures are clean.

a. Establish a regular inspection and cleaning schedule for lamps and luminaries. Dust build up reduces effectiveness.

b. Replace lens shielding that is yellow or that has become hazy with new acrylic lenses which do not yellow.

17. Exterior lighting is used.

a. Replace exterior 150-watt flood lamps with 75-watt flood lamps to reduce consumption yet maintain adequate illumination.

b. Eliminate outdoor lighting where practical.

18. Lights are on in unoccupied areas.

a. Provide signs instructing occupants to turn off lights when leaving room.

b. Organize task areas to eliminate unnecessary illumination.

19. Natural lighting is optimized.

a. Utilize natural lighting whenever possible.

b. Clean walls or repaint with light reflective non-glossy colors.

20. Two lamps have not been removed from four-lamp fixture where possible.

a. Remove two lamps and disconnect ballasts.

21. Improper alignment and operation of windows and doors allows excessive infiltration.

a. Realign or rehang windows or doors that do not permit proper closure. In extreme cases consider permanent sealing of windows.

b. Make sure that automatic door closing mechanisms are working properly. Adjust for faster return.

c. Replace or repair faulty gaskets in garage or other overhead doors.

22. Ceiling/roof insulation is inadequate or has been water damaged.

a. Before replacing water damaged insulation, repair roof where required.

b. Verify that vapor barrier faces that conditioned space and is intact.

23. Weatherstripping and caulking around windows, doors, conduits, piping, exterior joints, or other areas of infiltration is worn, broken or missing.

a. Use quality weatherstripping and caulking to insure that all areas of infiltration are sealed.

b. Replace broken or cracked windows. (Air leakage is most evident when wind is blowing against the side of the building.)

24. Excessive expanses of glass exist on exterior walls.

a. When replacing windows, replace with thermopanes, utilizing the same casings.

b. Keep curtains and drapes closed in unoccupied spaces.

25. An excessive quantity of outdoor air is used to ventilate the building.

a. Reduce outdoor air quantity to the minimum allowed by codes by adjusting outdoor air dampers during hours of occupancy.

26. Outdoor air intake dampers open when building is unoccupied.

a. Close outdoor air dampers when building is unoccupied. Be sure dampers have proper seals and adjust to insure complete closure.

b. Where codes permit, close outdoor air dampers during first and last hours of occupancy to permit fast warm-up and cool-down.

27. Ventilating systems are utilized for natural cooling capability.

a. Whenever possible, use outside air for cooling rather than using refrigeration. (Use economizer cycle, if available).

28. Exhaust system operation is programmed.

a. Discontinue use of unnecessary exhaust fans.

b. Rewire toilet exhaust fans to operate only when lights are on. (Fans are often wired in reverse. Correct as needed).

c. Schedules should be established so that exhaust fans run only when needed.

d. Consider grouping smoking and other areas with similar exhaust system.

29. Return, outdoor air, and exhaust dampers are sequencing properly.

a. Adjust damper linkage.

b. Be sure damper motors are operating properly.

c. Readjust position indicators to accurately indicate damper positions.

d. Reset linkage or replace dampers if blades do not close tightly.

e. Close all outdoor air intake dampers when equipment is shut off and when building is unoccupied.

30. During heating season, temperature of air flow to space feels too cold.

a. Raise supply temperature to a minimum of 60 degrees in interior zones and 65 degrees in perimeter zones during winter. Be sure to lower the supply temperature to 55 degrees during the cooling season. (Check local codes).

b. Reduce air volume to prevent a draft effect during heating season.

31. Air flow to space feels unusually low or is inconsistent from one space to another.

a. Utilize duct work access openings to check for any obstructions such as loose hanging insulation (in lined ducts), loose turning vanes, and accessories, and closed volume and fire dampers.

b. Inspect all room air outlets and inlets (diffusers, registers, and grills). They should be kept clean and free of all dirt and obstructions. Clean and remove obstructions as necessary.

c. Clean or replace dirty or ineffective filters on a regular basis.

d. Post signs instructing occupants not to place objects where they will obstruct air flow. ,

e. Consider rebalancing system.

32. Multiple boilers or heaters fire simultaneously.

a. Adjust controls so that boiler #2 will not fire until boiler #1 can no longer satisfy the demand.

33. Stack temperature appears excessively high (greater than 400 degrees F. plus room temperature).

a. Insure that proper amount of air for combustion is available in furnace room.

b. Examine and clean air intake filters.

c. Perform flue gas analysis on a regular basis to insure proper air to fuel ratio.

d. If furnace is over firing, verify that spuds and nozzles are properly sized. Also check that fuel pressures are not too high.

NOTE: Checks and maintenance of boiler operations should be performed by qualified personnel. If there are none on the staff of the institution, consideration should be given to obtaining assistance from a service contractor.

34. Water in heating system is heated when there is no need.

a. Turn off boiler, pumps or heat source.

35. Space temperatures are higher or lower than thermostat settings.

a. Re-calibrate thermostat.

b. Blow out moisture, oil and dirt from pneumatic lines (for pneumatic systems); clean contacts if electrical control system.

c. Re-calibrate controllers

d. Insure that control valves and dampers are modulated properly.

e. Insure that the generating device is producing heat and that heat distribution to the space is unobstructed.

f. Make sure that air intake volume is not excessive.

36. Heating system's hot water temperature feels excessively hot during periods of mild weather.

a. Experiment with hot water temperature reduction until an acceptable comfort level is reached.

b. Make sure that reset controls work properly.

37. Heating pilot lights are on during cooling season.

a. Turn pilots off. (Enter shut-off and turn-on dates in your log book and post a notice in the boiler/furnace room.)

38. Steam radiators or other steam equipment fail to heat or operate erratically.

a. Check the temperature of the pipe on the downstream side of stream traps. If it is excessively hot, the trap probably is passing steam. This can be caused by dirt in the trap, a valve off the stem, excessive steam pressure, or worn trap parts (especially valves and seats). If the pipe is moderately hot (as hot as a hot water pipe), it probably is passing condensate, which it should do. If it is cold, the trap is not working at all, and should be replaced or repaired. Initiate a steam trap maintenance program.

b. Clean or replace thermostatic control valves on radiators.

c. Check air vent valve. If not operating properly, replace.

d. If thermostatic trap is malfunctioning, clean or replace bellows element.

e. Water pockets may be obstructing steam flow. Correct by repitching or rerouting pipes.

39. Steam condensate and heating water piping insulation is in disrepair or missing.

a. Inspect pipes for broken or missing insulation. Repair or replace as needed.

40. Operation of oil burner is accompanied by excessive smoke and sooting.

a. Inspect burner nozzles for wear, dirt and incorrect spray angles. Clean and adjust as necessary.

b. Verify that oil is flowing freely and that oil pressure is correct.

c. Perform flue gas analysis to set proper air to fuel ratio.

41. Soot and odors are detected in areas where they are not expected.

a. Heat exchanger may have burned out. Replace.

b. Stack draft may be inadequate. Clean and correct as necessary.

c. Perform flue gas analysis to obtain proper air to fuel ratio.

42. Evidence indicated faulty or inefficient boilers or furnaces.

a. Remove scale deposits, accumulation of sediment and boiler compounds on water side surfaces. Examine and treat rear portion of boiler (the area most susceptible to scale formation).

b. Remove soot from tubes.

c. Observe the fire when the unit shuts down. If the fire does not cut off immediately, it could indicate a faulty solenoid valve. Repair or replace as necessary.

d. Inspect all boiler insulation, refractory, brick work and boiler casings for hot spots and air leaks. Repair and seal as necessary.

43. Burner short-cycles.

a. Hot water temperature limit switch may be set too low. Reset as required.

b. Thermostat may be faulty. Replace if necessary.

44. Hot water radiation units fail to operate.

a. Radiators are air-locked. Open air vents and bleed off air until water appears.

b. Bleed off water in pneumatic air lines if necessary. (Pneumatic lines may be frozen). Check for air leaks.

c. Repair faulty valves.

d. Repair or replace faulty thermostats.

e. Hot water pump or booster pump may not be functioning. Repair or replace as necessary.

45. Radiators, convectors, baseboards and finned-tube heaters are not providing sufficient heat.

a. Boiler temperature may have dropped. Correct as necessary.

b. Bleed air from units.

c. Establish a systematic cleaning schedule.

d. Remove items obstructing discharge grills.

e. Bleed off water in pneumatic air lines if necessary. (Pneumatic lines may be frozen). Check for air leaks.

f. Repair faulty valves.

g. Repair or replace faulty thermostats.

h. Hot water pump or booster pump may not be functioning. Repair or replace as necessary

46. Space temperature is higher or lower than thermostat setting.

a. Re-calibrate space thermostat.

b. Blow out moisture, oil and dirt from pneumatic lines (for pneumatic control system). Clean contacts on electrical control systems.

c. Re-calibrate controllers.

d. Verify that control valves and dampers modulate properly.

e. Limit excessive outdoor air intake when not operating economizer cycle.

47. Multiple air-conditioning compressors start at the same time.

a. Adjust electric controls to stage compressor operation properly.

48. Insulation on cooling line pipes and ducts appears inadequate.

a. Repair or replace damaged insulation.

49. Air conditioning load trips circuit breaker on extremely warm days.

a. Tighten wire lugs if loose.

b. Replace defective circuit breakers.

c. Clean condenser on air cooled systems.

50. Air of inadequate volume or temperature is being discharged through grills.

a. Defrost evaporator coil if iced. Determine cause of icing.

b. Clean evaporator coil fins and tubes.

c. Clean or replace air filters.

d. Fire damper may be closed. Open and replace fusible link if necessary.

e. Balancing damper may have slipped and closed. Open to correct position and tighten wing nut.

f. If fan is rotating backwards, reverse rotation by reversing electrical contacts.

g. Clean condenser coil and/or water tower nozzles.

51. Refrigeration condensers or coils are dirty, clogged and/or not functioning efficiently.

a. Determine if normal operating temperatures and pressures have been identified and if all gauges are checked frequently to insure design conditions are being met.

b. Increased system pressure may be due to dirty condensers which will decrease system efficiently. High discharge temperatures often are caused by defective or broken compressor valves. Repair or adjust as required.

c. Inspect the liquid line leaving the strainer. If it feels cooler than the liquid line entering the strainer, it is clogged. It is very badly clogged if frost or sweat is visible at the strainer outlet. Clean as required.

d. Clean coils and/or other elements as needed on a scheduled basis. Include dehumidification coils.

52. Chilled water piping, valves and fittings are leaking.

a. Repair joint or piping leaks.

b. Repair or replace valves.

53. Chiller operation is not optimized. (Listen for short-cycling)

a. Raise chilled water supply temperature.

NOTE: This is especially important if system was designed for 75 degree F. space temperature and the space setting has been raised to 78 degrees F. for energy conservation purposes.

b. Remove scale deposits from condensers.

c. Check refrigerant charge.

54. Refrigeration compressor short-cycles.

a. Refrigerant charge is low or refrigerant is leaking. Find and repair leak. Recharge system.

b. Repair electrical control circuit if required.

c. Reset high/low pressure control differential settings if needed/

d. Liquid line solenoid valve may be leaking. Repair or replace.

e. Evaporation coil may be iced up or dirty. Defrost and clean.

f. If frost is detected on the liquid line strainer, it is clogged. Clean strainer.

g. Clean condenser coil.

h. If condenser is a cooling tower, ascertain if spray nozzles are plugged. Make sure water flow is unobstructed. Clean tower of leaves and debris.

i. Remove scale deposits from shell/tubes on water condensers.

j. Repair suction valves in compressor, if needed.

55. Refrigeration compressor runs continually. (Direct expansion systems)

a. Contacts in starter circuits of controls may be fused. Repair and replace as necessary.

b. Bubbles in sight glass indicate low refrigerant charge. Repair leaks and recharge.

c. Refrigerant charge may be too high. Check discharge pressure and purge excess.

d. Compressor valves may be leaking. Overhaul compressor.

e. Liquid line solenoid valve may be stuck open. Repair or replace.

56. Storage tanks, piping and water heaters are utilized inefficiently.

a. Replace damaged or missing insulation.

b. Reduce hot water temperature to 105 degrees F. - 115 degrees F. where allowed by code.

c. Lunch kitchen must have 180 degree F. water for sanitation.

57. Drips or leaks are evident in hot water systems.

a. Repair all leaks including those of the faucets and pumps.

58. Electric water heater has no time restrictions on heating cycle.

a. Utilize "vacation cycle" on water heater when not needed during extended periods. (Note: Complete deactivation could cause leaks)

Date: 9/80