

## DEMAND SIDE ENERGY MANAGEMENT AND CONSERVATION PROGRAM Measurement and Verification Program

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### Steam Trap Upgrade Savings Calculation Steps and Parameters:

Direct measurement of savings is not performed for the steam trap replacements because it is not feasible to measure steam leakage from individual failed open traps. The traps that fail internally in an “open” condition, continuously blowing down steam to drain or to the downstream condensate tank for recycling back to the boiler, and they can blow down steam at rates ranging from a slight leak to a very large leak. The leakage rate and the resulting steam savings from replacing the failed-open traps is calculated from the hardware manufacturer’s proprietary software (Spirax Sarco) that uses empirical data and conservative assumptions to yield steam blowdown flow for each given pipe and orifice size. Steam production costs are provided by the University.

1. Pre-retrofit - Measure parameters of all steam traps on Main Campus and Pickle Research Campus
  - a. Size/Diameter
  - b. Connection type
  - c. Orientation
  - d. Application
  - e. Pressure (psig)
  - f. Temperature (°F)
  - g. Failed open or closed
2. Test trap stations using ultrasonic and infrared equipment to determine if trap is failed open, failed closed, out of service or strainer clogged
3. Identify steam and condensate leaks and insulation issues to be repaired
4. Using proprietary software, calculate energy losses due to failed traps (steam lbs/yr) in dollars according to current production cost of steam provided by the University
5. Calculate money/energy saved by replacing failed steam traps
6. Calculate (estimate) savings from repairs to leaks and insulation
7. Deliverables
  - a. Final Steam Trap Report
  - b. Summary savings report included within the Final Steam Trap Report describing savings calculation methodology
  - c. Report requested here meets the Federal Energy Management Program (FEMP) intent for a “Post-Installation Report.”

### Steam Trap Upgrade Savings Summary:

17,305	MMBtu annual savings from steam trap replacement (E&G buildings only)
690	MMBtu annual savings from radiator repairs in MAI and SSW buildings
<u>5,486</u>	MMBtu annual savings from insulation repairs
23,481	MMBtu annual savings for Total Project
6,881,884	Equivalent annual energy savings in kilowatt-hrs