

Background Information:

The house is a 1941 stone center hall. The steam system was originally attached to the Overbrook Central Steam System and an oil boiler was installed when the plant shutdown. The original steam main still runs through the basement.

We purchased the home in February 2017 from an estate sale, so no background information was available on the functioning of the steam system. Due to water damage and mold, we demoed the finished basement and removed the asbestos insulation prior to moving in.

The oil company informed us that the house typically consumed 1200 gallons/year of heating oil. This seemed high to us since the house is only 2700 sqft. We consulted with neighbors who have homes built by the same builders around the same time with the same basic layout of our home. Our bill is unusually high, although others have converted to hot water/forced air and may not be a reliable comparison.

The entire house has convectors recessed into the walls with removeable metal covers.

I have only found vents on the main and return at the end of the line prior to returning to the boiler. Both appear to function but may need to be replaced by large vents, possibly on a tree.

I have not been able to identify any traps in the system. My experience is limited to bulky bucket traps though. I would not be able to identify a trap built-in to the convector. The returns do not heat up during operation, so something is keeping the steam out of the returns.

Problems:

1. 2 radiators do not heat up due to what I believe are frozen shutoff valves. I removed the packing nut and thoroughly covered them in penetrating oil and left a rag wrapped around the stem for hours. They won't budge and any further attempt to turn risks breaking off the stem. The union nut appears to have been set inline with the floor making this difficult to access without cutting up the floor.
2. Center Hall radiator bangs (heavy hammer like banging, suspect water hammer or possibly air?) when steam initially enters the riser and works its way into the convector. It does not bang if the boiler is running frequently. It typically bangs after a period of without the boiler running ie. Afternoon. Turning off the convector did not appear to stop the banging. Issue may be related to riser having to extend 2 stories vertically and approximately 15 ft horizontally. Pitch appears correct for the exposed portions of the riser. Upon removing convector cover, I was able to identify a plug in the upstream side of the convector. I believe there was a vent here at one time since the first-floor convectors that I have inspected do not appear to have this port on them.
3. Radiator in bedroom over garage bangs (loud aggressive hammer like sound). I have not observed a timing for this one since it is intermittent, and we aren't typically in the room.
4. Unusually high energy bills
5. Steam pressure gets to 6psig before cutting out. Thermostat only calls 1cycle/hour. Cut in is at .5 lbs
 - a. Typical behavior is:
 - i. 10 minutes boiler firing before cutting out

- ii. 5 minute pause (to allow pressure drop?)
- iii. 10 minutes of boiler firing, convectors heating up and affected radiators banging if system is cold. System cuts out after the banging of approx. 20-30 seconds
- iv. 5 minute pause (to allow pressure drop?)
- v. 2-10 more minutes of boiler sending steam to the convectors before cutting off from thermostat

Steps taken:

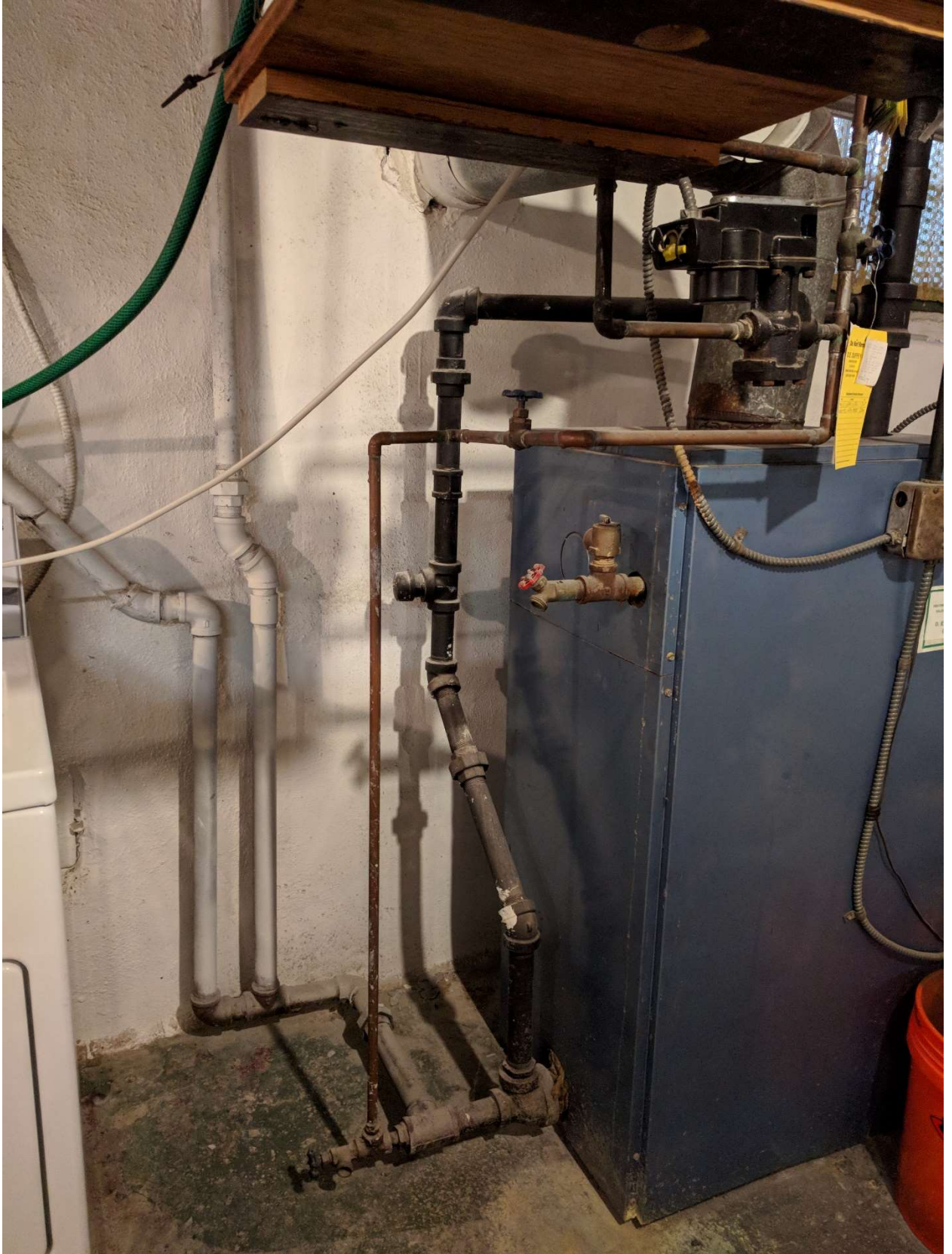
1. 1in fiberglass insulation added to main and risers accessible from basement. This is to replace the asbestos which was professionally removed prior to moving into the home.

Relevant Photographs:

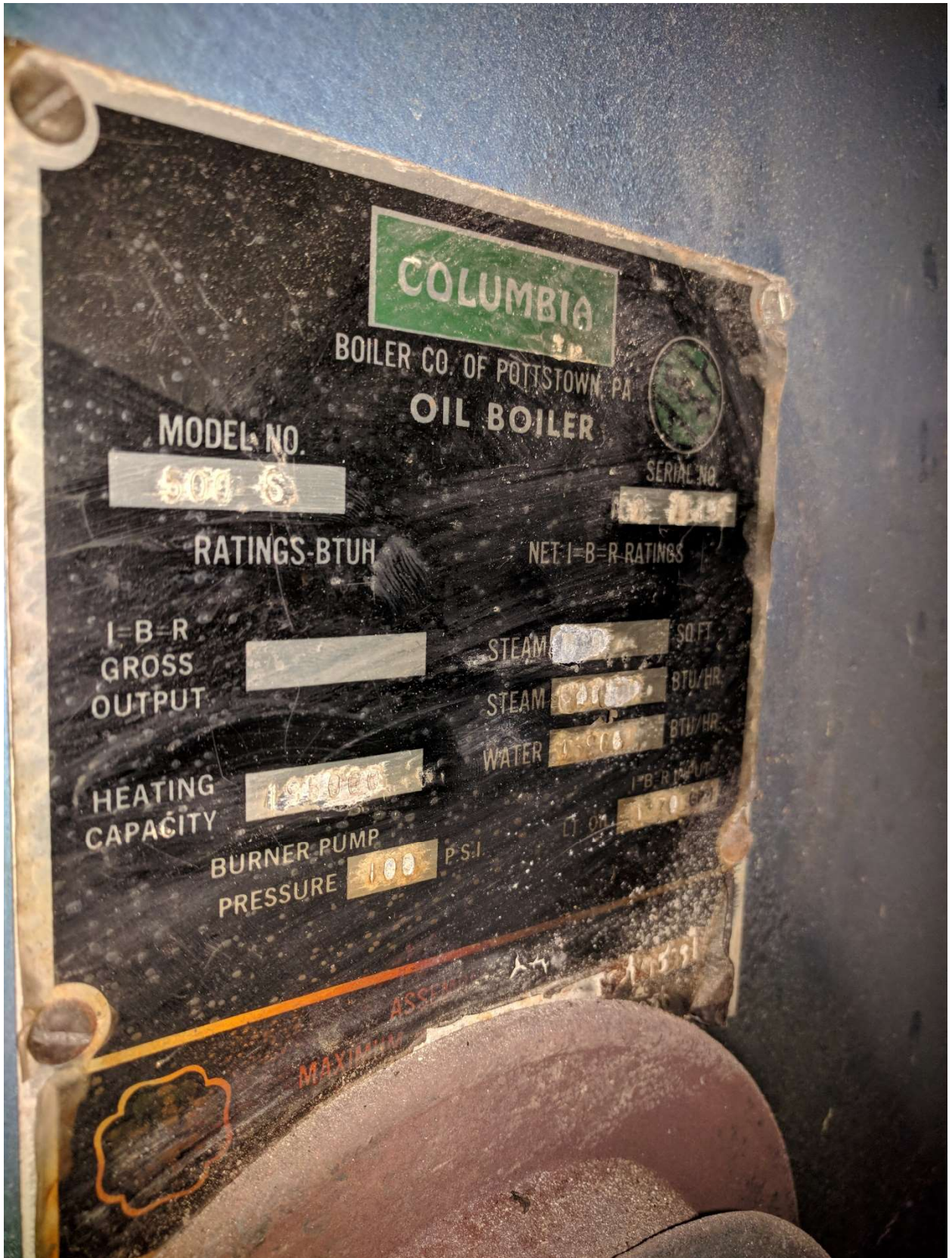
Boiler and near boiler piping:







Boiler information tag



Main/return vents



Center hall convector that bangs and has a plugged port











System Diagram:

