```
public void add_heat_constant_p(double j)
{
 double new_h = enthalpy+j;

 //at this point, we have enough internal state to derive the rest
 enthalpy = new_h;
 volume = ThermoMath.v_given_ph(pressure, new_h);
 temperature = ThermoMath.t_given_ph(pressure, new_h);
 entropy = ThermoMath.s_given_vt(volume,temperature);
 internalenergy = ThermoMath.u_given_vt(volume, temperature);

 region = ThermoMath.region_given_pvt(pressure,volume,temperature);
 switch(region)
 {
  case 0: quality = 0;                                  break; //subcooled liquid
  case 1: quality = ThermoMath.x_given_pv(pressure, volume); break; //two-phase region
  case 2: quality = 1;                                  break; //superheated vapor
 }

 scenario:
 - water starts at room temp, 1 atm pressure
 - add thermal insulator
 - add burner
 - as soon as state passes into two-phase region, entropy goes negative?
 - (internalenergy also negative, bc derived from entropy)

 Variables (first column of values is initial state, second column of values is [erroneous] resulting state):
 add_heat_constant_p(849.628080637543)
 pressure       101325              changed to 101325             (delta 0)
 temperature    373.071338963376    changed to 373.124300000481   (delta 0.0529610371048079)
 volume         0.00104339388081545 changed to 0.0015024098312424 (delta 0.000459015950426946)
 internalenergy 418.72549774911     changed to -35856.7948514049  (delta -36275.520349154)
 entropy        1306.31369618511    changed to -92181.2747321785  (delta -93487.5884283636)
 enthalpy       418760.430956022    changed to 419610.059036659   (delta 849.628080637543)
 quality        0                   changed to 0                  (delta 0)
}
```

The unit of internal energy here seems to be kJ/kg, but it should be J/kg as mentioned at the beginning of the code.

results from EES (1st row of values is initial state, 2nd row of values is resulting state)

Sort	1 P_i [Pa]	2 T_i [K]	3 v_i [m3/kg]	4 u_i [J/kg]	5 s_i [J/kg-K]	6 h_i [J/kg]	7 vf_i [m3/kg]	8 vg_i [m3/kg]
[1]	101325	373.071	0.00104340	418729	1306	418834	0.00104344	1.673
[2]	101325	373.124	0.00161808	419671	1309	419834		