THERMALLY HEAT PUMPED DESALINATION

Energy Concepts has fielded a proof-of-principle prototype of a three-effect MED plant with an integrated THP of our design. That field demonstration project was conducted in conjunction with ATSI, the project integrator. The driving heat is a parabolic solar collector providing one million BTU/hour of hot oil at 360^{o}F. Energy Concepts provided an open cycle thermal heat pump that supplies two million BTU/hour to the MED, from inputs of one million BTU/hour from the solar array, and the same amount from reject heat from the MED. Figure 2 is a photo of the THP, and Figure 3 shows it installed in the central valley of California, with the solar collector in the background. That THP uses Alkitrate as the open cycle working fluid. That is a patented absorbent developed by Energy Concepts that is non-corrosive and withstands high temperatures. It is a mixture of alkali metal nitrates. This THP uses the patent-pending absorber geometry we have developed for this application – a horizontal multi-stage absorber with non-adiabatic spray in each stage. Figure 4 is a schematic drawing of the absorber, and Figure 5 is the conceptual flow diagram of the THP.

Figure 2. Prototype Open Cycle Thermal Heat Pump

Figure 3. Prototype THP and MED

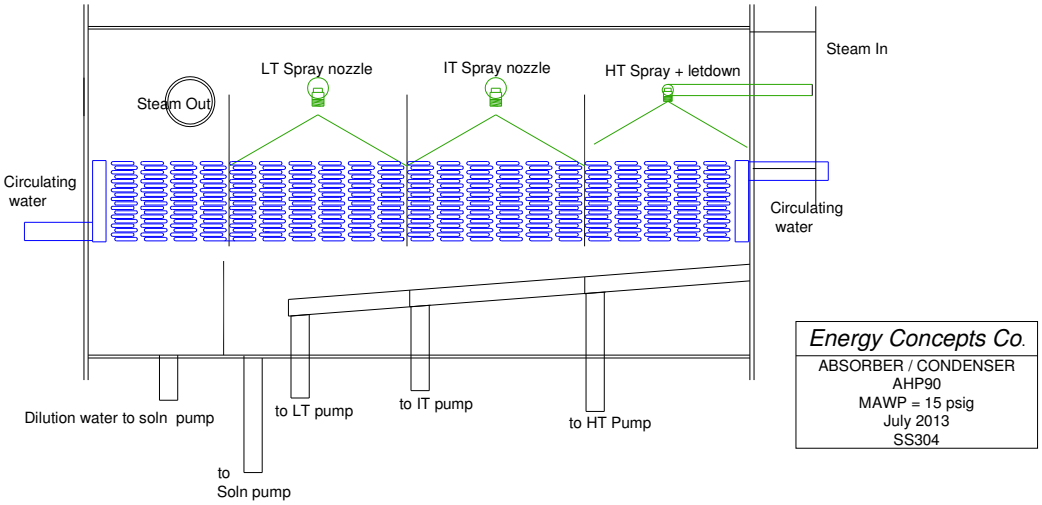

Figure 4. Multi-stage Horizontal Non-adiabatic Spray Absorber

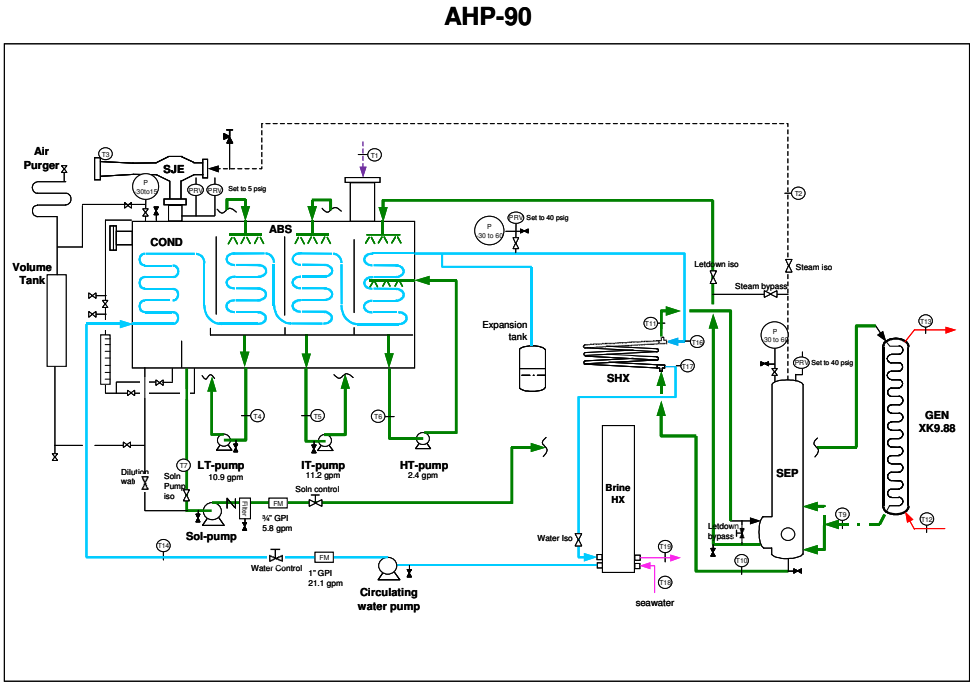

Figure 5. Conceptual Flow Diagram of Open Cycle Thermal Heat Pump Prototype