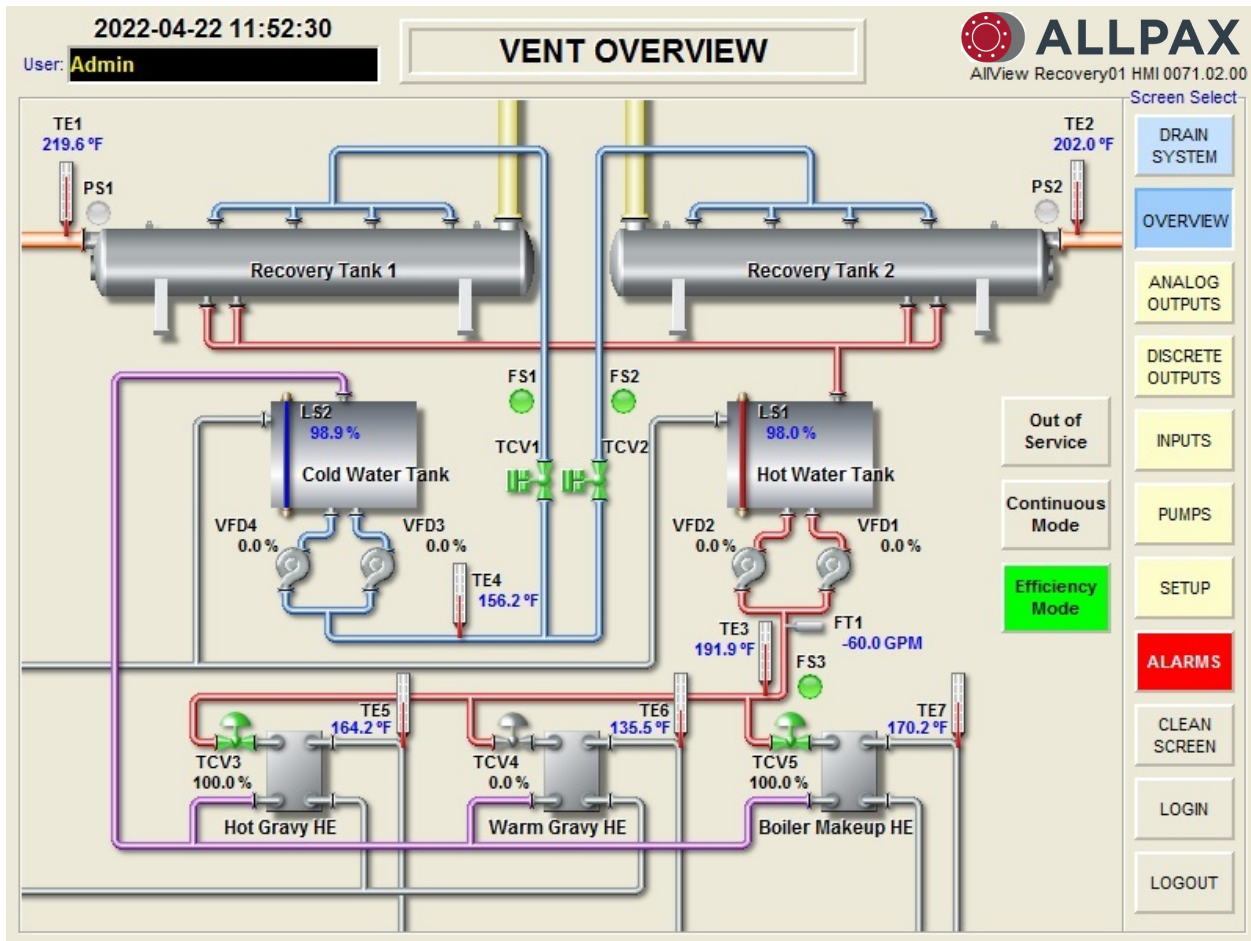


## RETORT ENERGY RECOVERY STEAM HEAT RECAPTURE

Allpax developed technology designed to harness wasted energy on saturated steam retorts by capturing vented steam and creating free hot water for plant operations



### Principles of Operation:

The Vent Steam Recovery Tank (VSRT) is installed in the vent line of one or more saturated steam retorts. Water is pumped into the top of the VSRT while steam is vented from a retort during the come-up vent open phase of the process cycle. The internal spray nozzles create a fine mist of water inside the vessel which provides surface area to condense the vented steam and create hot water.

An internal baffle arrangement is also provided to slow the velocity of the steam and to allow the steam to fill chambers in the top of the VSRT. This forces the steam to flow down to reach the open end of the tank. The clearance below the baffles and above the water line provides adequate flow area to assure no pressure is created in the system if it is ever overwhelmed with steam.

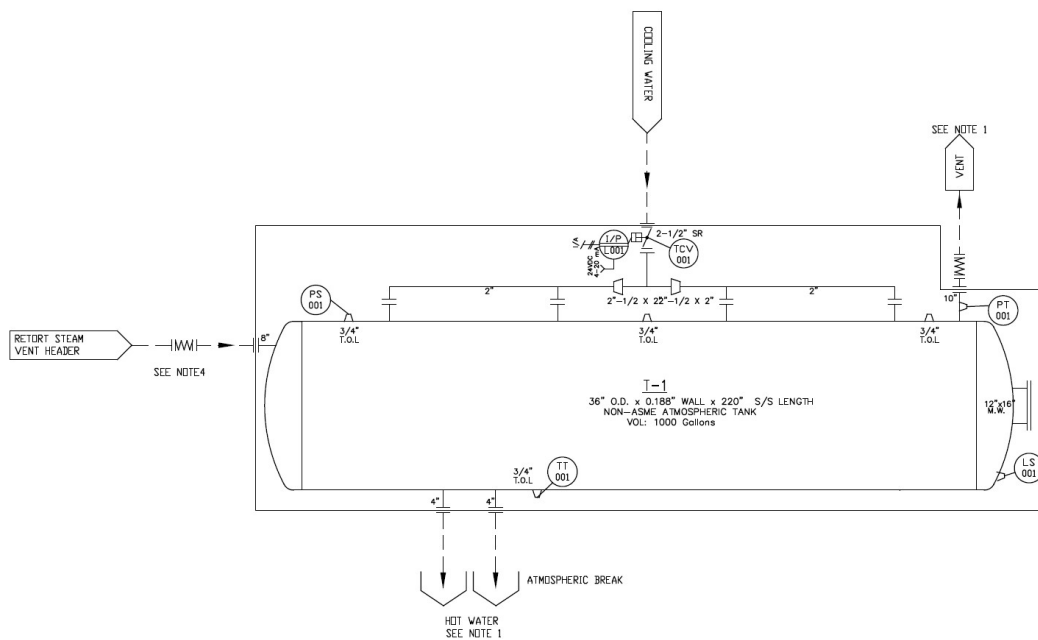
The steam heats the spray water and condenses. The resulting hot water exits the drain in the bottom of the VSRT. The amount of steam exiting the VSRT, and inversely the temperature and quantity of the water leaving the VSRT, can be adjusted by varying the flow rate (TCV-001 valve position).



## CONTROLS OVERVIEW:

When a retort enters the come-up vent open phase of the process cycle, the vented steam from the retort enters the VSRT through the 8" opening at one end, and TCV1 is opened. Small droplets of water are sprayed into the top of the VSRT, and it condenses the steam, thus resulting in hot water which collects at the bottom of the tank. The VSRT is vented through a 10" opening at the other end of the tank and the baffle arrangement and maximum water level in the VSRT is designed to allow a free passageway for the steam to flow, thus assuring compliance with FDA's 21 CFR Part 113. The following critical parameters are monitored and controlled:

1. VSRT Pressure: The pressure in the VSRT is monitored to assure that it is always at or below atmospheric pressure ( $\leq 0$  psi).
2. Level: The water level in the VSRT must remain low to assure that steam has an unimpeded path to flow, and that no back-pressure is created within the retort vent line. The VSRT level is monitored to alarm when it exceeds a point that would begin to restrict the vent line steam flow. Additionally, an overflow drain is provided at the bottom of the tank. This drain has a snorkel inside the tank to allow it to drain any water that is not able to flow down the main drain. This drain should be piped with an atmospheric break to plant drain.
3. Flow Control: The flow rate of the spray water in the tank is controlled by TCV1. More flow rate equals less discharge steam and lower temperature water. Less flow rate equals more discharge steam and higher temperature water.



## FEATURES AND BENEFITS

- VSRT constructed of 304 stainless steel
- Custom designed to meet plant requirements
- PLC controls and graphic HMI screens capture the critical variables
- Allpax Recovery Systems can be remotely monitored via cloud based interface
- Allpax Energy Recovery products facilitate LEED certification initiatives and ISO 50000 Energy Management Systems

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