Process Improvements to Piping Systems at an Ethanol Biorefinery

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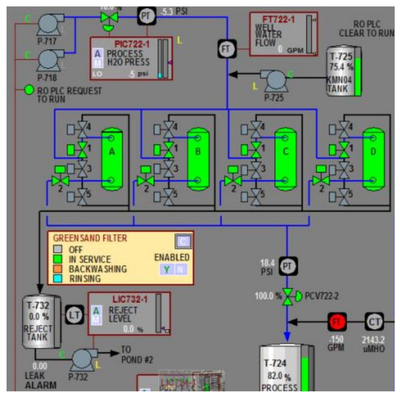
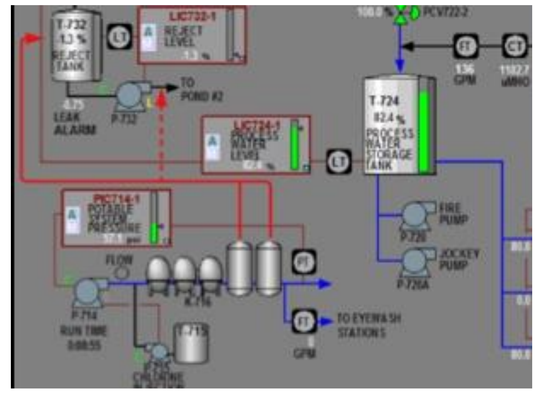
Objective 1

Design a piping system that bypasses the reject tank and pump in the water treatment area from the reject side of greensand filters in place.



Objective 2

Design piping systems for the potable water system of the facility by taking the place of old tank and pump and replacing them with new criteria.



Design 1 Results

- Total backpressure to reject pond is 1.5 psi
- Total energy savings was roughly 200$/year
- With cost of piping and labor and mobilization an ROI of 19% was calculated
- Valves and other sensors in place to maintain overall safety

Parameters

- Total flow rate: 525 gpm
- One bottle reject flow rate: 158 gpm
- 4 inch sch 10
- 304 stainless steel
- Total discharge piping: 778 ft
- Discharge fittings:
  - 5 90 elbows
  - 2 butterfly valves
  - 1 4-6 inch expansion

Pumps

- 2 well pumps:
  - 75 and 60 hP rating
- Reject pump
  - 7.5 hP rating
  - 580 operational hours per year
- Potable water pump:

Design 2 Results

- Currently in progress to see if this will be feasible in terms of cost
- What design will cause the least amount of pressure
- How small can we make the storage tank for this application
- Leak alarm with sensors and transmitters will be installed accordingly for safety purposes
- Pump must be selected for proper power from pressure

Overall Conclusions

Final decision is to bypass the reject tank and pump completely
Potable tank sizing:
Potable pump sizing:

PID for tank placed here

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