



Electric Power Generation Using Geothermal Fluid Coproducted from Oil and/or Gas Wells

Project Officer: Eric Hass

Total Project Funding: \$724,000

April 22, 2013

PI – Bernie Karl

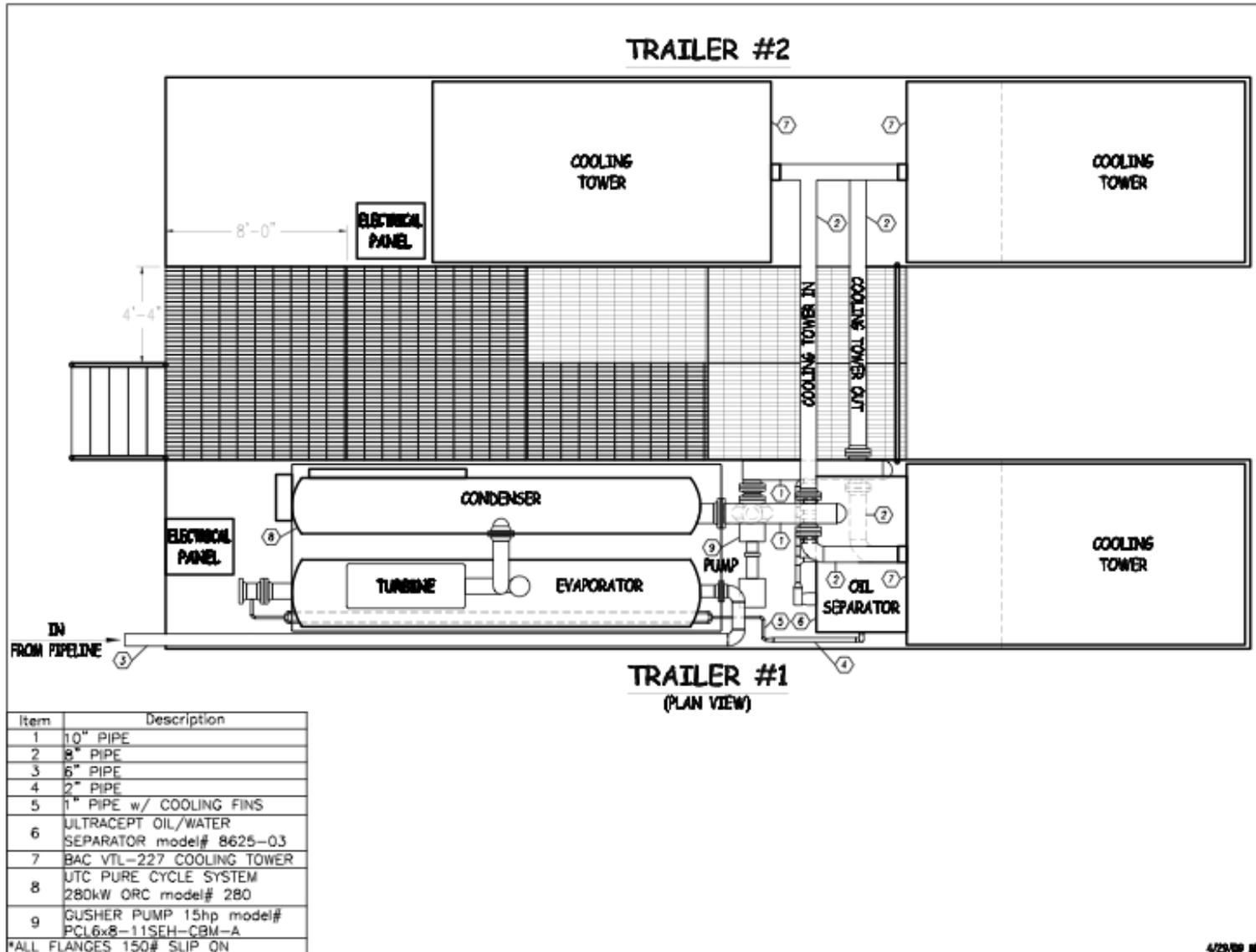
Chena Hot Springs Resort

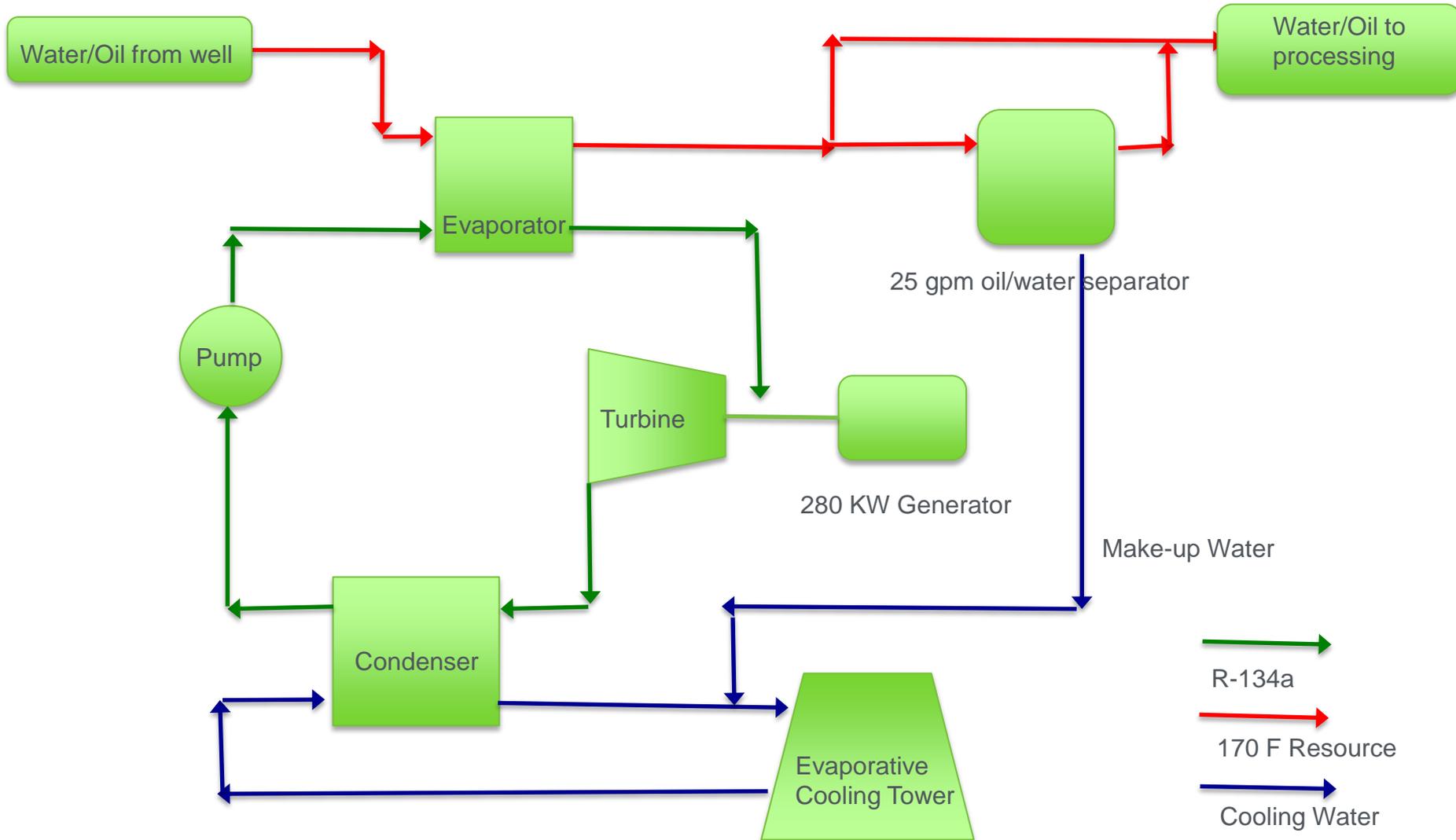
Track 1

Project Objectives

- Design, build, and operate low temperature, mobile, geothermal power plant capable of co-producing off oil/gas wells
- Quick installation and removal of power plant on site
- Portability reduces permitting requirements
- Generate 220 kW of electrical power
- Project originally to operate in Jay, FL at Quantum Resource's oil field
- Increase low temperature and co-generation capacity by 220kW

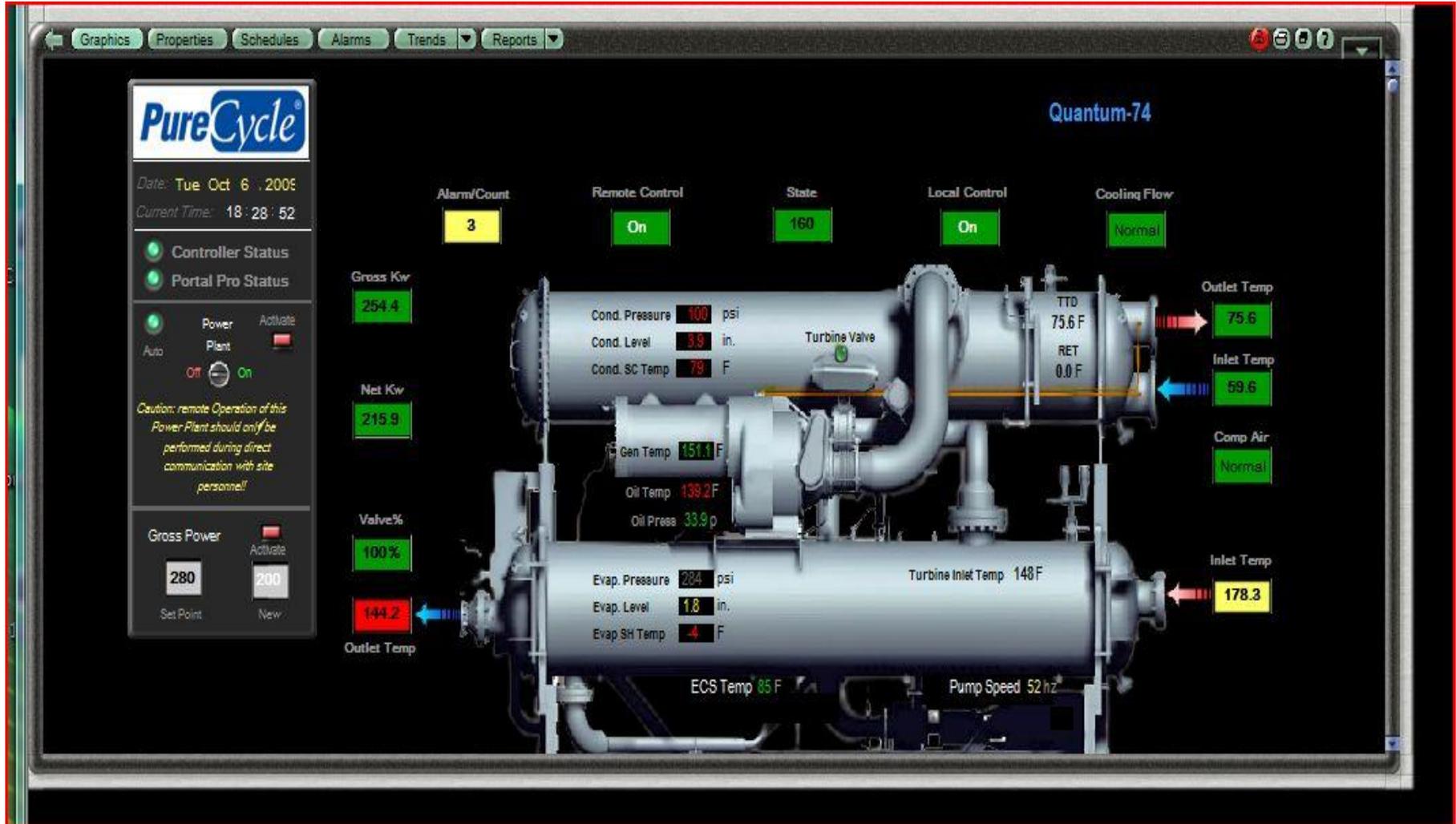
- Use PureCycle ORC manufactured by Pratt & Whitney Power Systems
- Chena Hot Springs Resort has experience in operating PureCycle
- Unit to provide own cooling by means of three evaporative cooling towers
- On board communications via Hughes net or cellular signal for remote operations
- Designed for 24 hour set up and removal
- Designed to self replenish cooling water lost from evaporative cooling





- Describe Accomplishments/Progress to date.
 - Completed building mobile ORC power plant
 - Successfully commissioned plant at Chena Hot Springs
 - Plant operated on 160F geothermal water
 - Tested plant after 65 mile transportation at the Aurora Energy power plant in Fairbanks, AK
 - Operated plant at the Peppermill Resort and Casino in Reno, NV using hotel's boiler water as a heat source
 - Quantum Energy backed out of partnership to host power plant
 - Installed in Utah and has been operating since 11/12
 - Generating 220kW off 600gpm of water at 210°F

Original Planned Milestone/ Technical Accomplishment	Actual Milestone/Technical Accomplishment	Date Completed
Construct mobile power plant	Well completed as planned	8/09
Commission power plant on low temp water source	Power plant successfully produced power on 160F water	8/09
Install power plant on test site	Power plant installed and operating	11/12



- Work with Pratt & Whitney Power Systems to configure power plant to compile operational data
- Operate plant at Utah site until 12-31-14
- Continue to gauge interest of oil/gas companies to produce geothermal power
- Work out long term agreement with operator after grant expires

Milestone	Status & Expected Completion Date
Operate plant for 2 years	On schedule, expected completion 12-31-14
Complete reservoir modeling	To be completed by 5/31/13

- Designed and built mobile geothermal power plant to co-produce off low temperature oil/gas wells
- All encompassing power plant that comes with cooling system
- Power plant successfully operational after 1,000+ transportation
- Power plant is currently generating 220kW in southwest Utah off 210°F water
- Geothermal projects struggle to compete for capital against other oil/gas related projects
- Permitting not required for any location the power plant operated at
- Successfully operated on 4 different utility grids
- Contribute ~220kW to the installed low temperature capacity goal of the GTO

Timeline:

Planned Start Date	Planned End Date	Actual Start Date	Current End Date
7/1/08	4/30/2010	7/1/08	12/31/14

Budget:

Federal Share	Cost Share	Planned Expenses to Date	Actual Expenses to Date	Value of Work Completed to Date	Funding needed to Complete Work
\$723,982	\$1,021,879	\$1,021,879	\$1,021,879	\$1,021,879	\$0

- Chena Hot Springs Resort is the grant recipient
 - Pratt & Whitney Power Systems is a sub-contractor
- Project extended to 12/31/14 and is on schedule to meet end date
- Project delayed due to Quantum Resources backing out and lack of interest from oil/gas industry