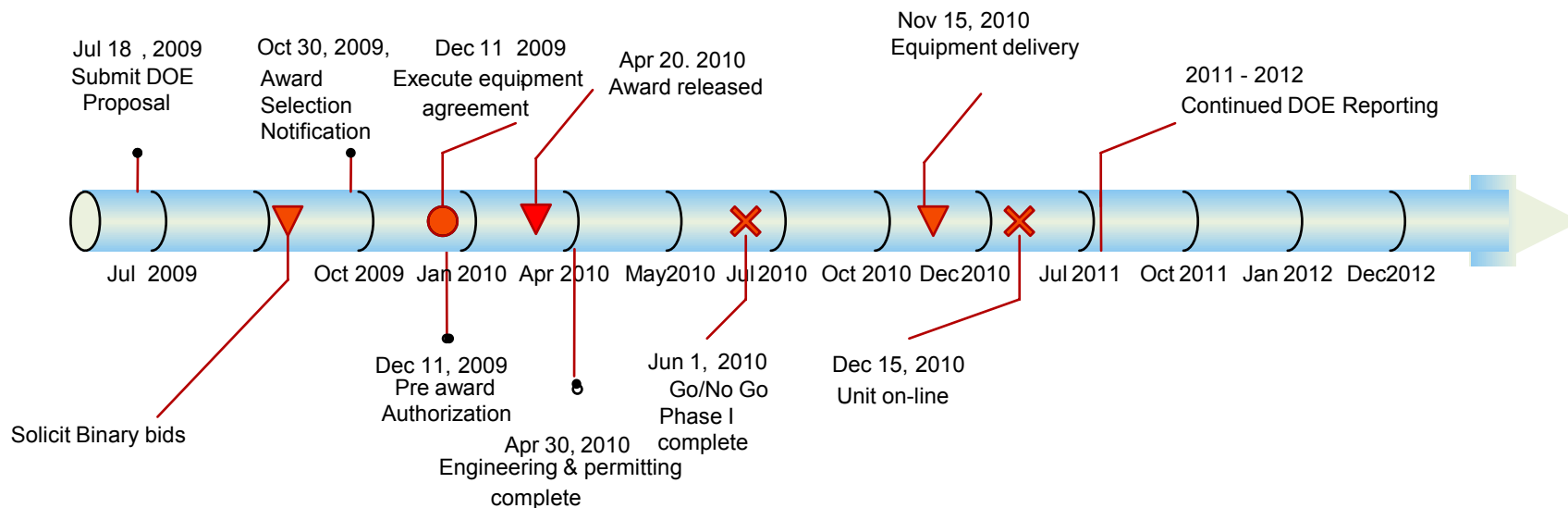




## Beowawe Binary Bottoming Cycle

May 19, 2010

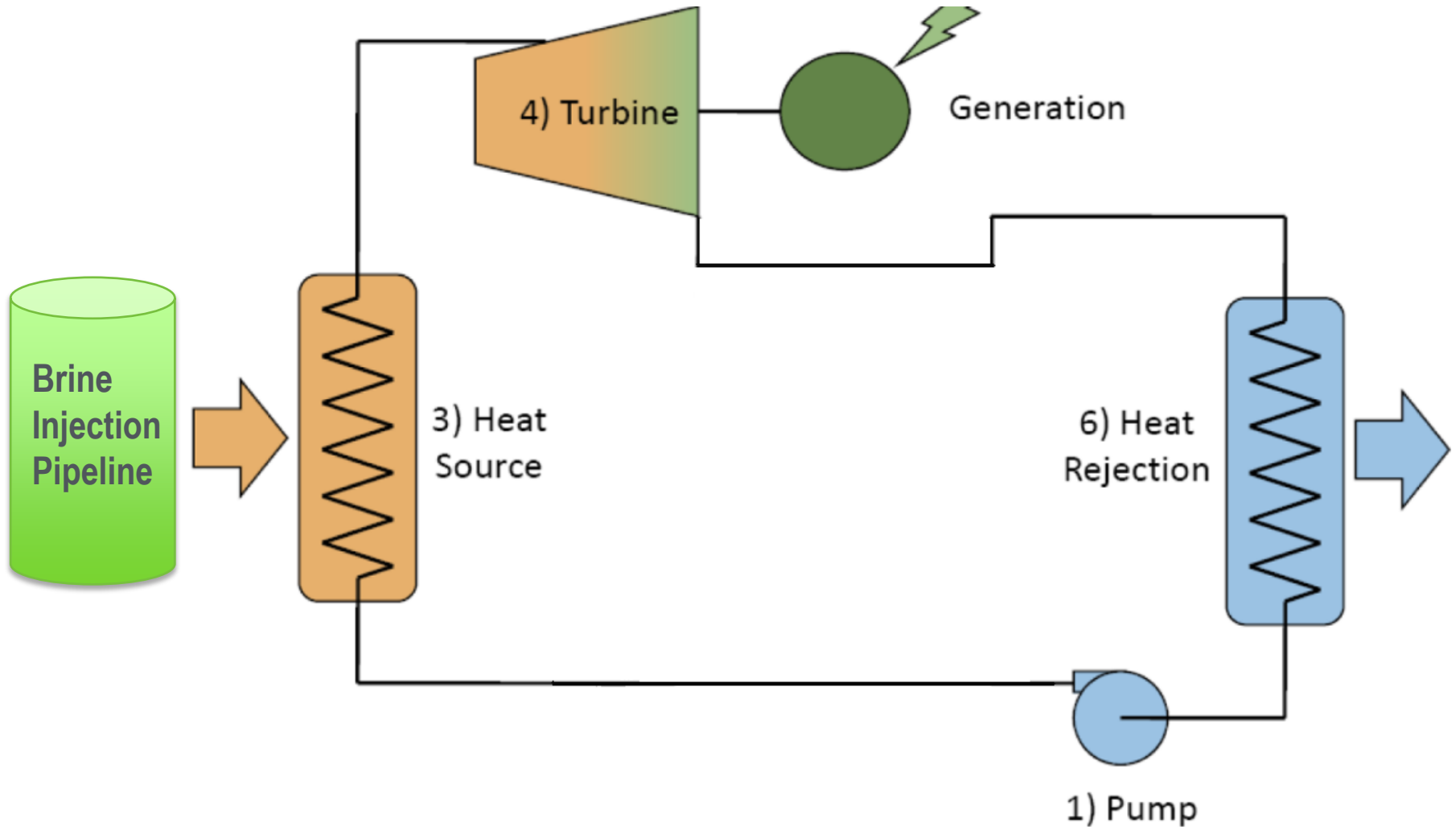
Principal Investigator Dale McDonald  
**Presenter Name Dale McDonald**  
**Organization Beowawe Power**



- ~30% Complete
- Budget
  - \$4.4MM total project
  - \$2.0MM DOE award, \$2.4 recipient share
  - \$0 funding FY '09, \$2.0MM FY '10
- Partners - none

- Barriers
  - Access to transmission – none since it's tied in to existing plant
  - Lack of Reliable Resource Information – above-ground nature of project reduces resource risk, but impacts to resource enthalpy unknown
  - Siting, Leasing & Permitting – minimal modifications to existing permits required, private land site negates the need for BLM review

- Use of waste heat from low temperature brine otherwise lost
- Produces additional renewable energy without using additional geothermal resource
- Cost effective
  - additional well drilling is not required
  - existing plant infrastructure and space available
- Improves overall plant efficiency, since additional geothermal resource is not required
- Minimal impacts on existing plant
- Operational testing of scaling potential of lower brine temperatures beneficial to other similar facilities
- Provides operational database of a geothermal bottoming binary plant



- **Solicit Proposals**
  - Supply: specified available brine and ambient conditions
  - BOP Engineering: identified plant tie-in requirements
  - Construction: use defined scope of work with supply and BOP drawings
- **Analysis**
  - Effect on brine scaling potential
  - Generation voltage level
  - Makeup water requirements
  - Permit Impacts
  - Space requirements
- **Phase 1 Go/No-Go – June 2010**
  - Obtain Permits
  - Complete Engineering
  - Prove Economic Feasibility

## •Binary Plant Equipment Supply

- Contract has been executed
- Supplier engineering and material procurement is proceeding on schedule
- Skid construction has begun

## •Permits

- No BLM NEPA review is required, installation is on private land
- Air permit and injection permit modifications have been received
- Building and pressure vessel permits during/post construction
- No County Special Use Permit

## •BOP Engineering

- Complete

## •Construction

- Water well pump building complete
- Mechanical tie-ins scheduled for May outage
- Electrical tie-ins scheduled for October 2010 Outage
- Equipment installation scheduled for November with COD December 2010

- **Project Management Plan**
  - Phase 1 – Feasibility Study, Permitting and BOP Engineering Design
  - Phase 2 – Procurement, Installation, and Commissioning of Equipment
  - Phase 3 – Operation and Maintenance
- **Schedule**
  - Phase 1 – June 2010
  - Phase 2 – Supply Contract awarded Dec 2009, Complete by Dec 2010
  - Phase 3 – Perform O&M, Report Non-Proprietary Data for 2 Years
- **Spending Plan**
  - Phase 1 - \$141,174
  - Phase 2 - \$4,193,206
  - Phase 3 - \$60,000



- Award Construction Contract – June 2010
- Perform Mechanical Plant Tie-ins - May 2010 Outage
- Complete Foundations – August 2010
- Complete All Plant Tie-ins – October 2010 Outage
- Equipment Delivered to Site – November 2010
- Complete Construction, Commission, and Test – December 2010
- Ongoing O&M, DOE Reporting, and Brine Chemistry Monitoring – thru December 2012

- Extraction of Waste Heat From 205F Geothermal Brine
- New Injection Temperature 150F With No Scaling Expected
- 1.8 MW Net Renewable Energy Added With No Additional Geothermal Resource
- Minimal Makeup Water Required
- Minimal Impact on Air Permit