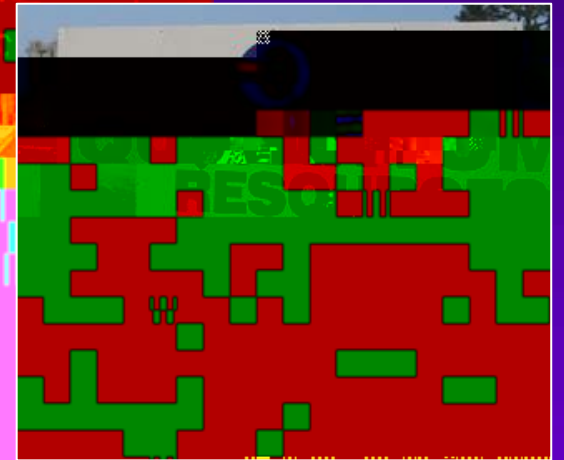
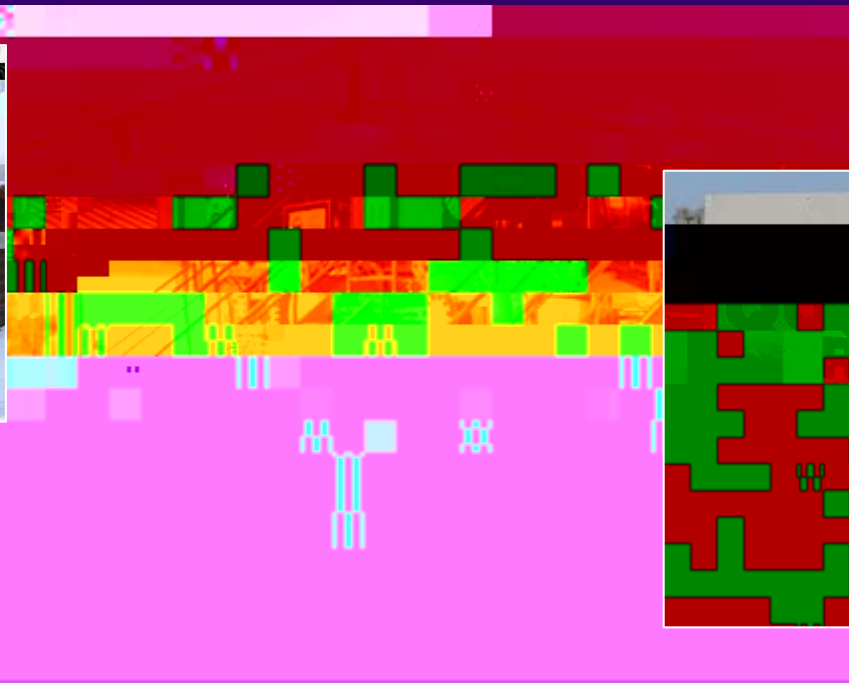


From Alaska to Florida

Finding the Heat for Community Development



Alaska

**Presented by: Bernie Karl, Chena Hot Springs Resort
SMU Geothermal Meeting: Dallas, TX, June 17th, 2008**

Chena Hot Springs



Chena Hot Springs



- **Semi remote site**
- **Electric Power 30¢/kWhr**
- **Load 180kW-380kW**

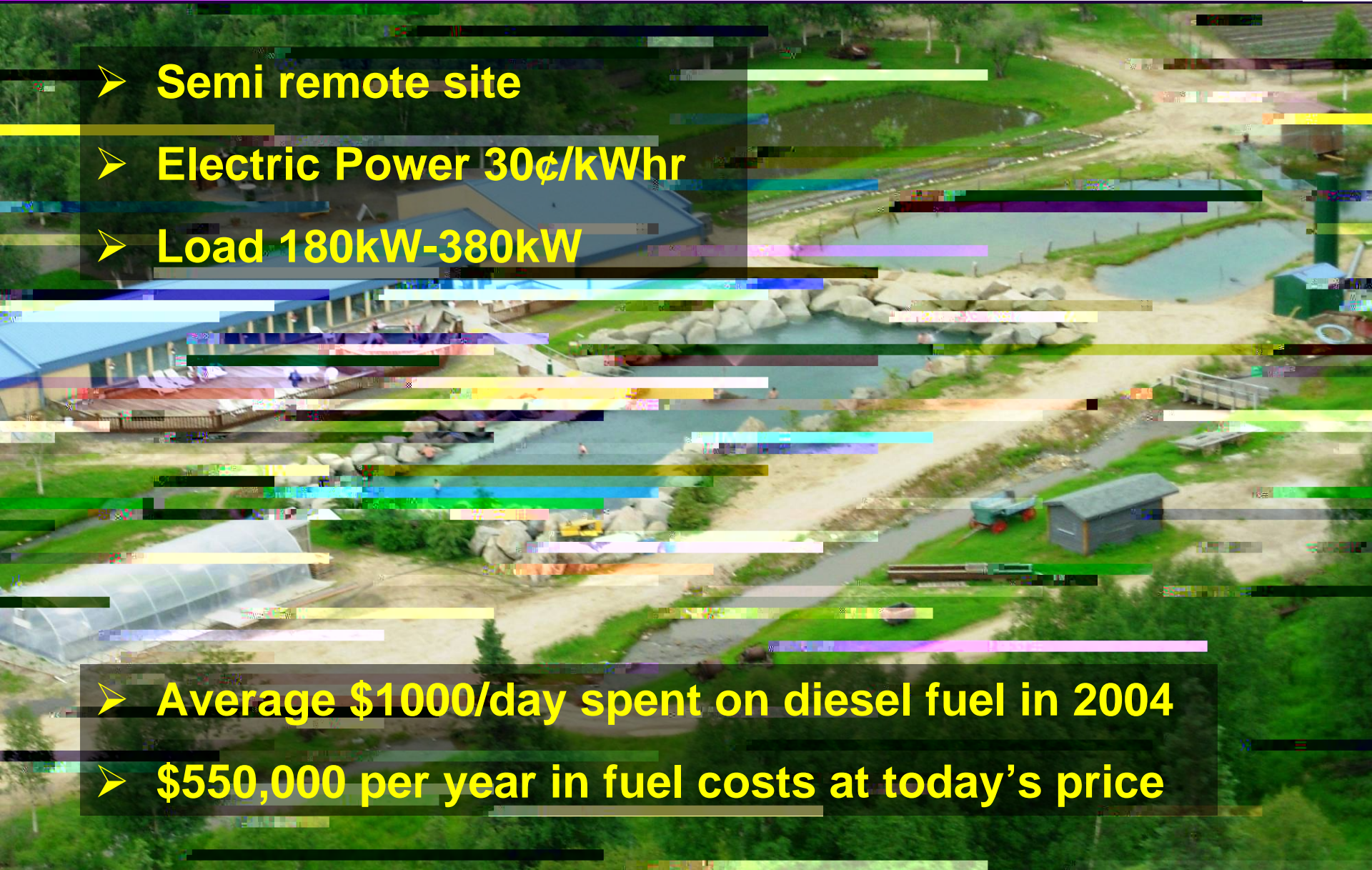


Chena Hot Springs



- **Semi remote site**
- **Electric Power 30¢/kWhr**
- **Load 180kW-380kW**

- **Average \$1000/day spent on diesel fuel in 2004**
- **\$550,000 per year in fuel costs at today's price**





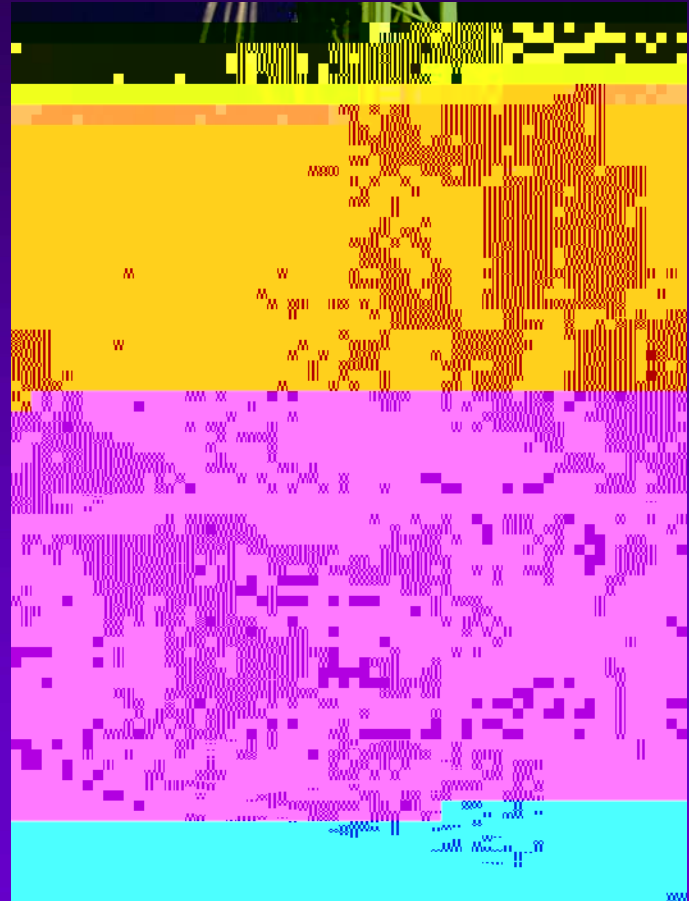
Chena Hot Springs VISION:

To become a self-sustaining community in terms of energy, food, heating and fuel to the greatest possible extent

District Heating



- First geothermal well drilled in March 1998



District Heating

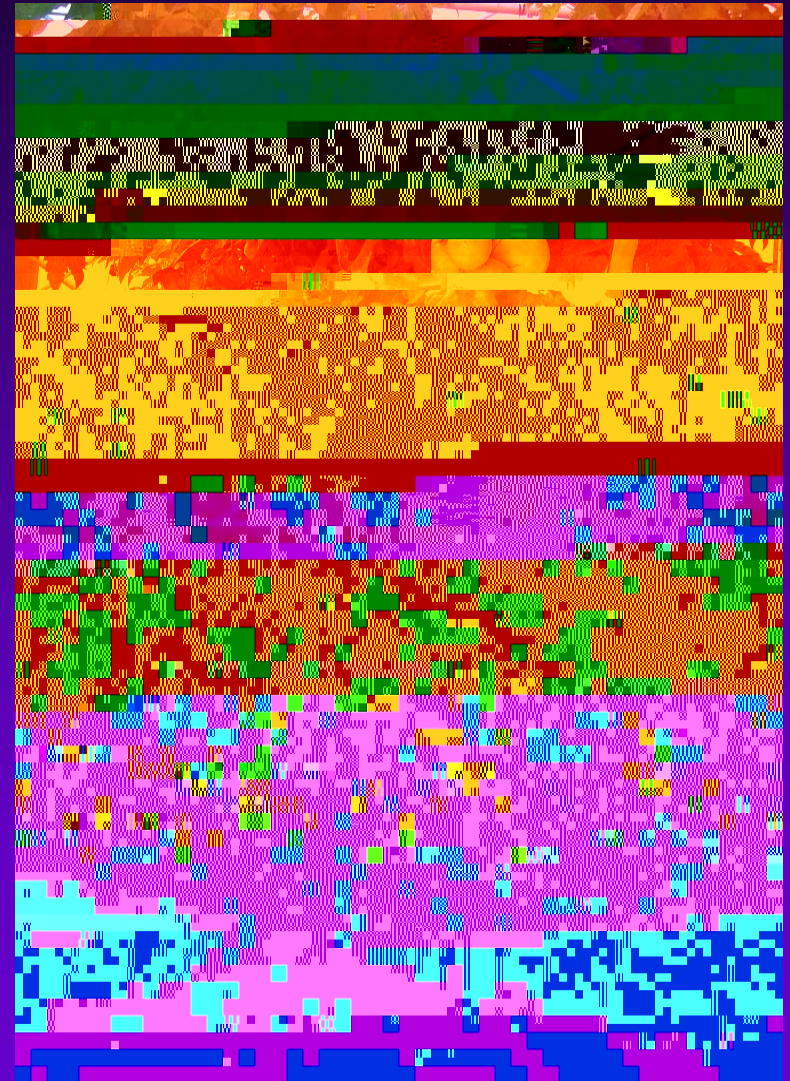


- First geothermal well drilled in March 1998
- All buildings on property are heated geothermally using ~300gpm of 165° F water
- Estimated yearly savings of \$383,000 in heating fuel costs



Moose Lodge, 20,000ft² heated solely with geothermal district heating system

Greenhouse & Gardens

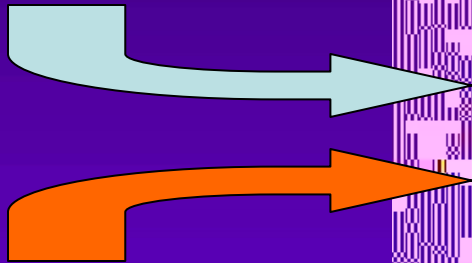


Geothermally Heated Greenhouse
#2 at Chena Hot Springs Resort

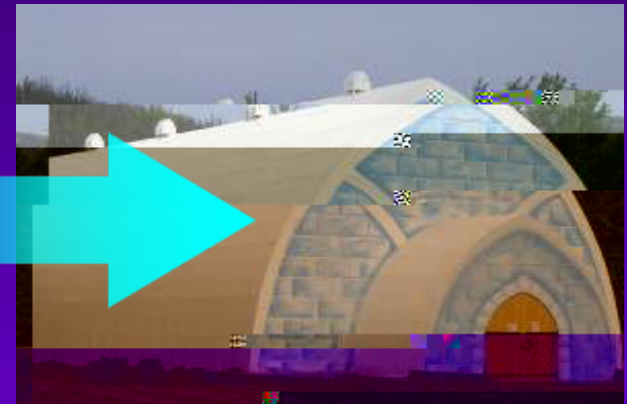
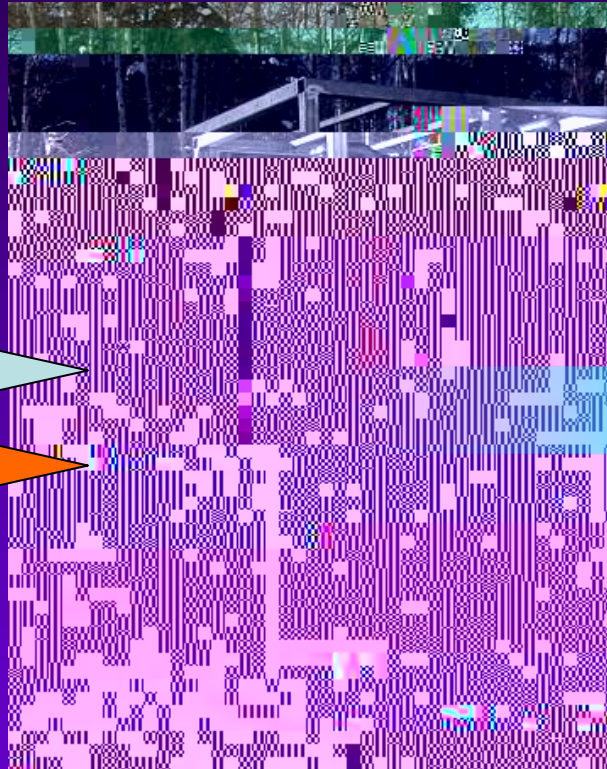
CHENA HOT SPRINGS ABSORPTION CHILLER



Monument Creek Provides Cooling Water (~40F)



Geothermal Wells Provide Hot Water (~165F)



Approximately 15 tons of Refrigeration Required for Ice Museum (180,000 BTU per hour)



Chena Power Plant

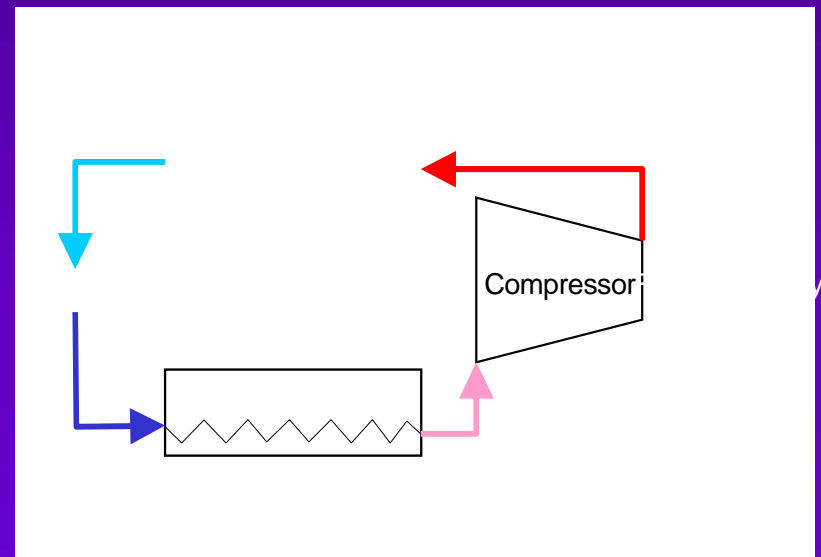


United Technologies Corporation
Department of Energy



Chena Hot Springs/Chena Power
Alaska Energy Authority

UTC PureCycle 225



Chena Power Plant





- **400 kW net; installed in 2006**
- **Uses 900 gpm of 164°F water**
-

Hot Water Supply



Well #7
500gpm, 165F



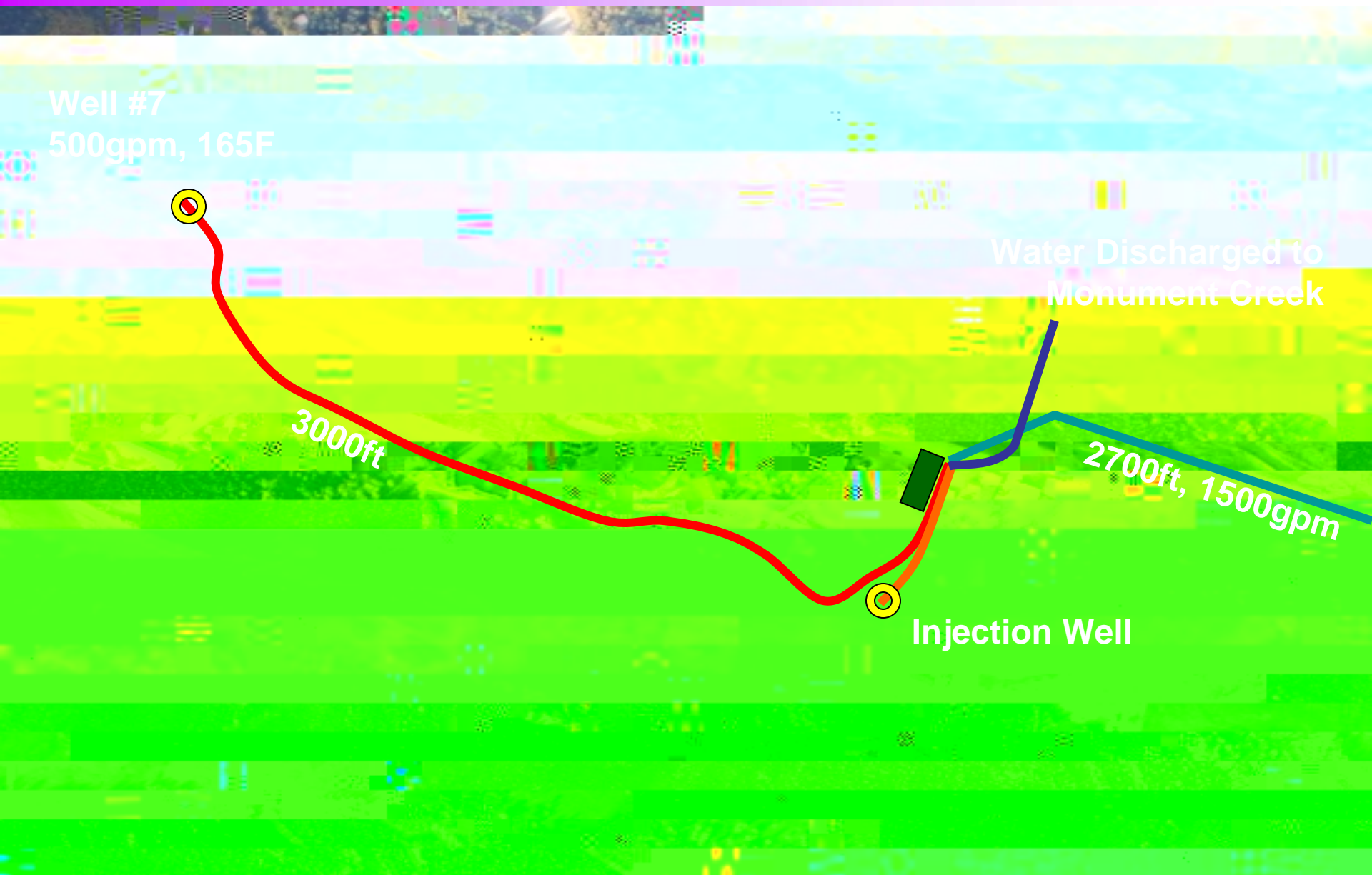
3000ft



Injection Well

Water Discharged to
Monument Creek

2700ft, 1500gpm





Cold Water Supply



Water Discharged to
Monument Creek



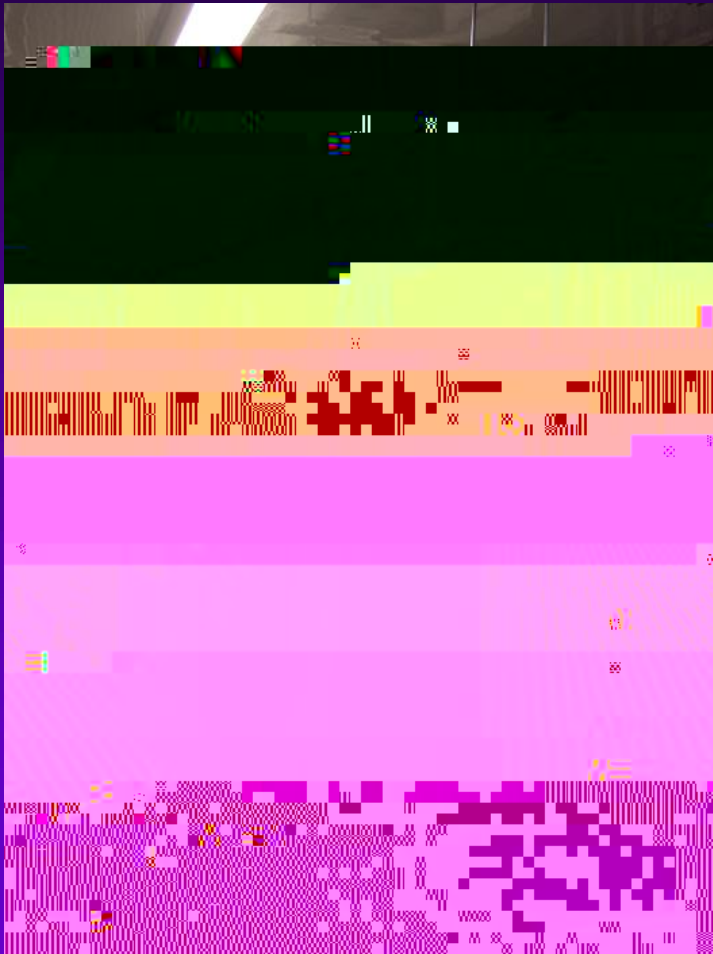
Cold Water Supply



Air Cooled Condenser



Battery and UPS System



UPS System (MGE)



Batteries 3MW Total



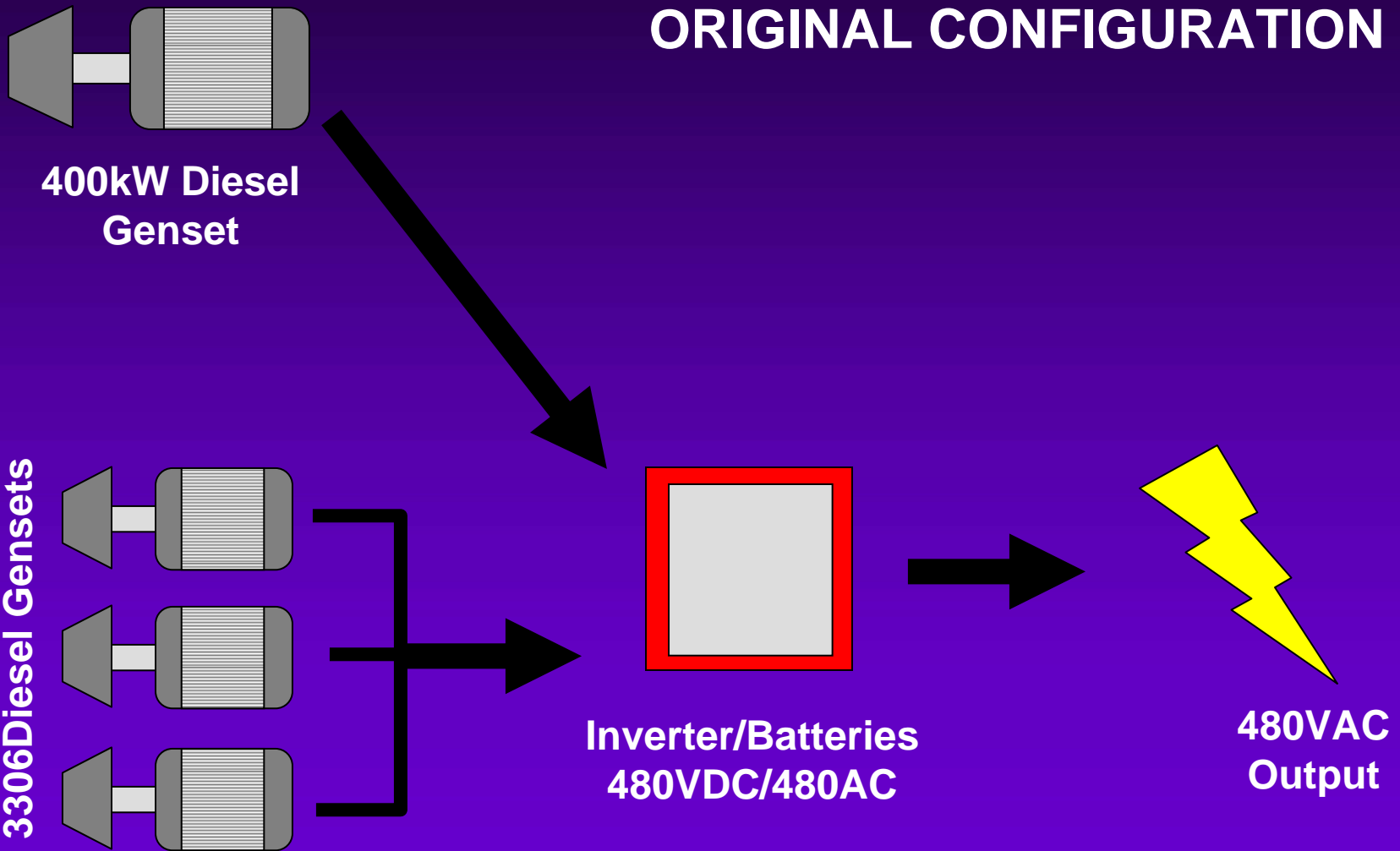
Geothermal Energy is an ideal base load – doesn't depend on sun, wind, rainfall. 99% Availability is common.

Cannot respond quickly to load fluctuations

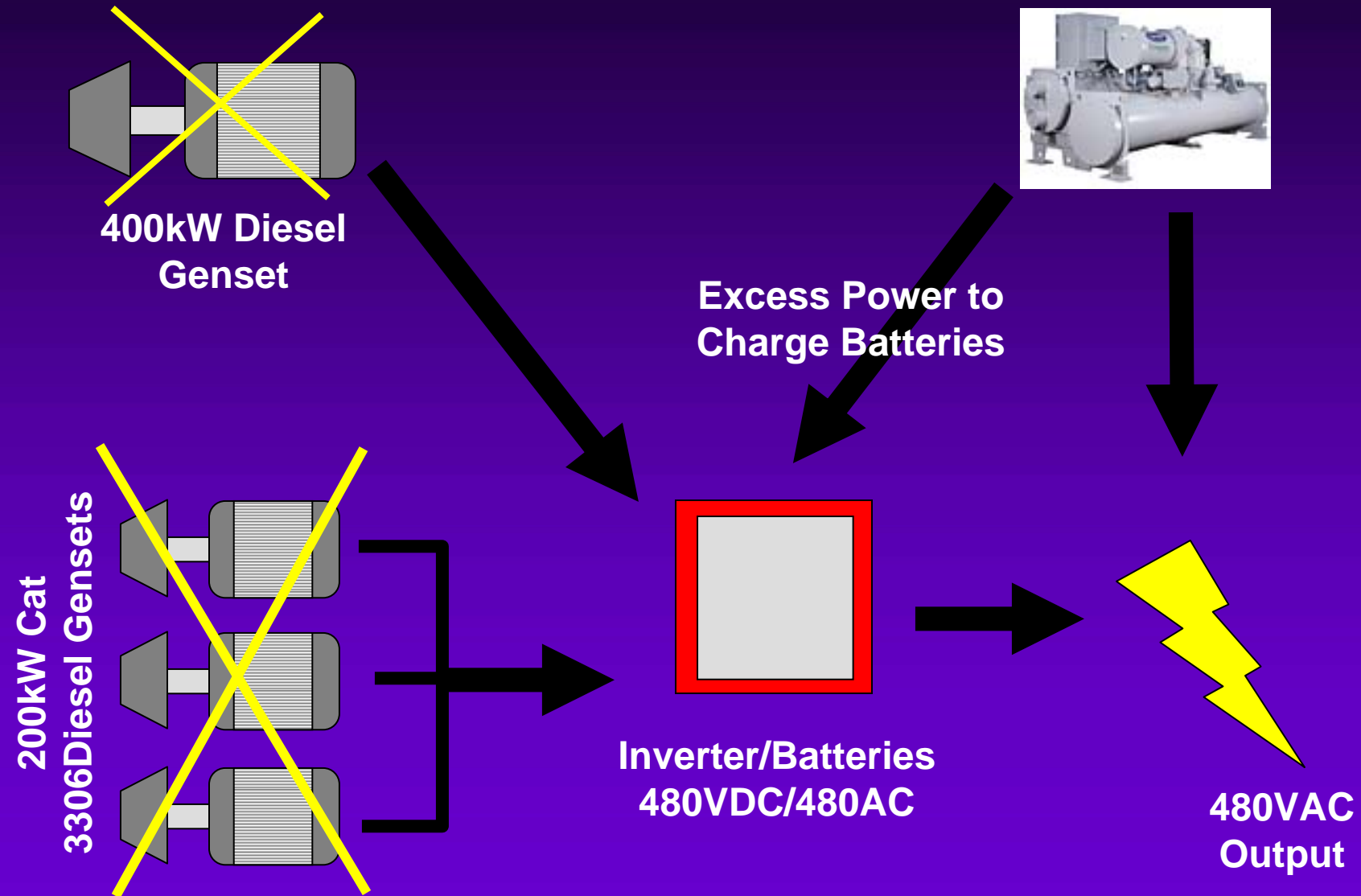
Battery and UPS System



ORIGINAL CONFIGURATION



Battery and UPS System



The bottom line



August 20th 2006 – December 31st 2007

Hours of Operation

Availability

Capacity

Gallons Diesel Offset

\$ Saved

Tons CO₂ Avoided

The bottom line



August 20 th 2006 – December 31 st 2007	
Hours of Operation	10,850
Availability	
Capacity	
Gallons Diesel Offset	
\$ Saved	
Tons CO ₂ Avoided	

The bottom line



August 20th 2006 – December 31st 2007

Hours of Operation

10,850

Availability

95%

Capacity

Gallons Diesel Offset

\$ Saved

Tons CO₂ Avoided

The bottom line



August 20th 2006 – December 31st 2007

Hours of Operation	10,850
Availability	95%
Capacity (Ave output 175kW)	87.5%
Gallons Diesel Offset	148,785
\$ Saved	
Tons CO ₂ Avoided	

The bottom line



August 20th 2006 – December 31st 2007

Hours of Operation	10,850
Availability	95%
Capacity (Ave output 175kW)	87.5%
Gallons Diesel Offset	148,785
\$ Saved	
Tons CO ₂ Avoided	



August 20th 2006 – December 31st 2007

Hours of Operation	10,850
Availability	95%
Capacity (Ave output 175kW)	87.5%
Gallons Diesel Offset	148,785
\$ Saved	\$365,555
Tons CO	Tons CO

The bottom line

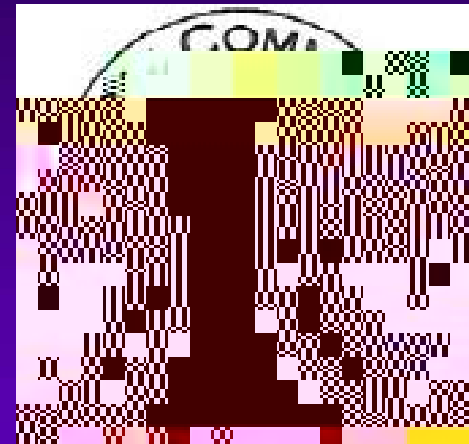


2007 Survey Results:

- 14% of visitors listed the Renewable Energy Projects as the #1 reason for coming to Chena Hot Springs during the summer of 2007
- Average 6.5 people per day participated in the free renewable energy tour (43% Alaskans)
- 11% increase in revenue during the same time period
- Over 600 students have participated in the tours



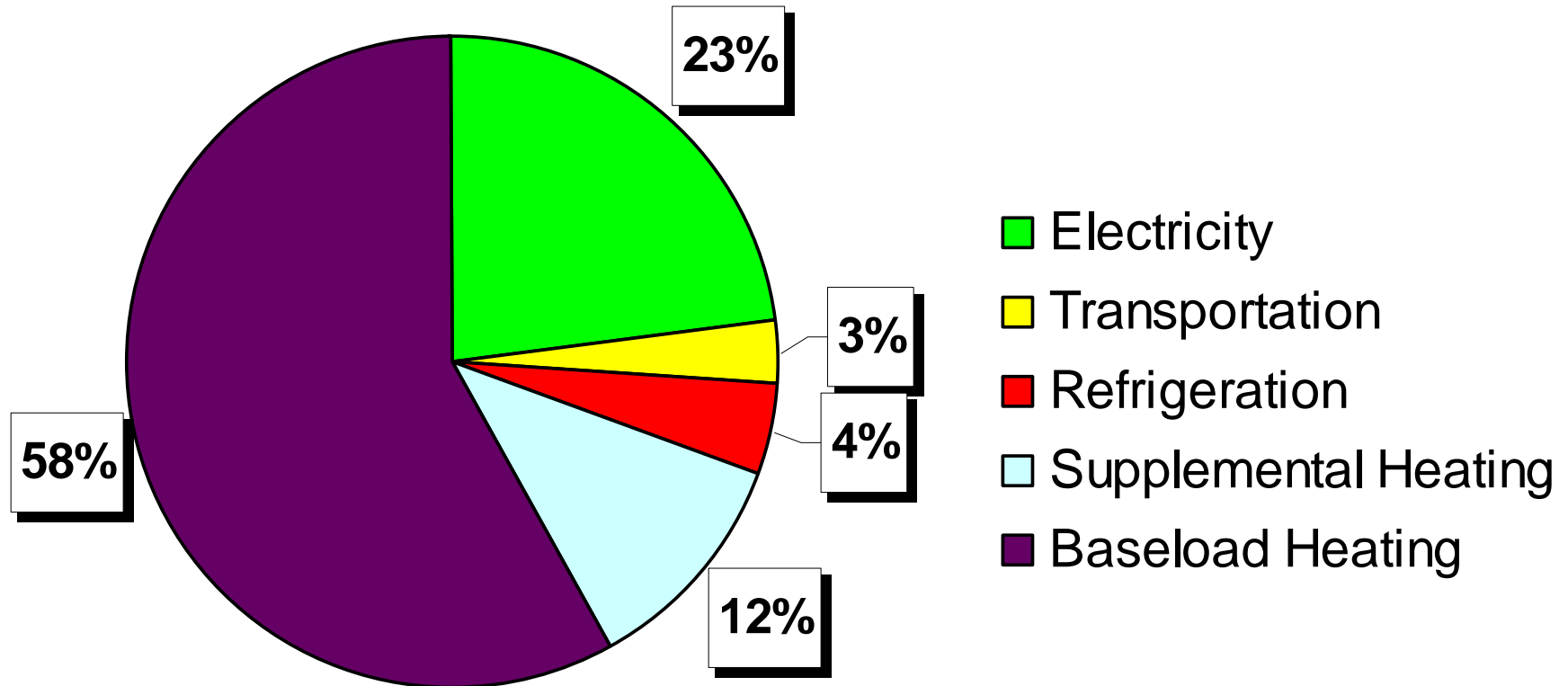
Special thanks to the Department of Energy, the Alaska Energy Authority and the Denali Commission for their continued involvement and assistance.





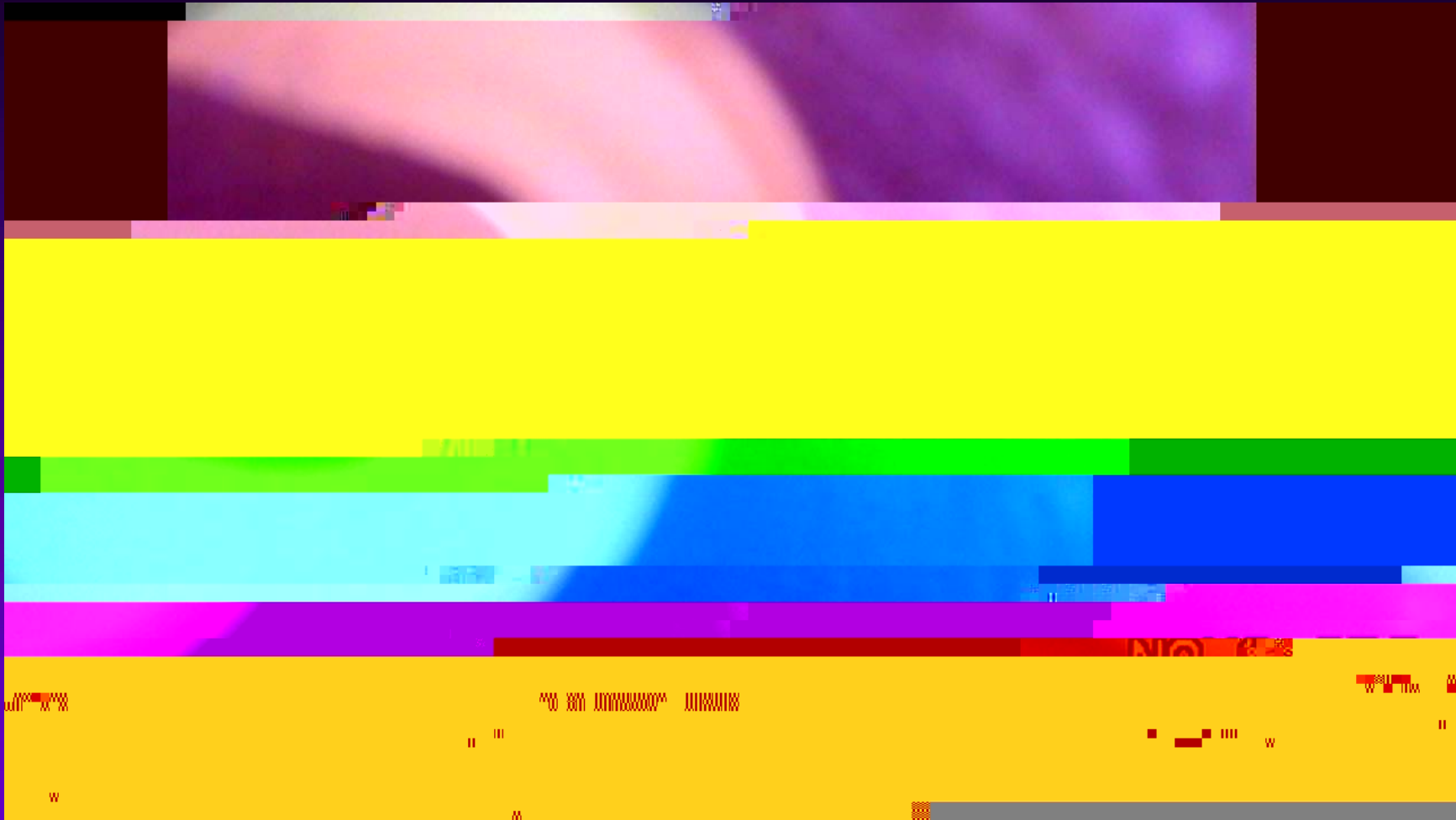


Energy Use at Chena Hot Springs (total 850 kW_{eq})



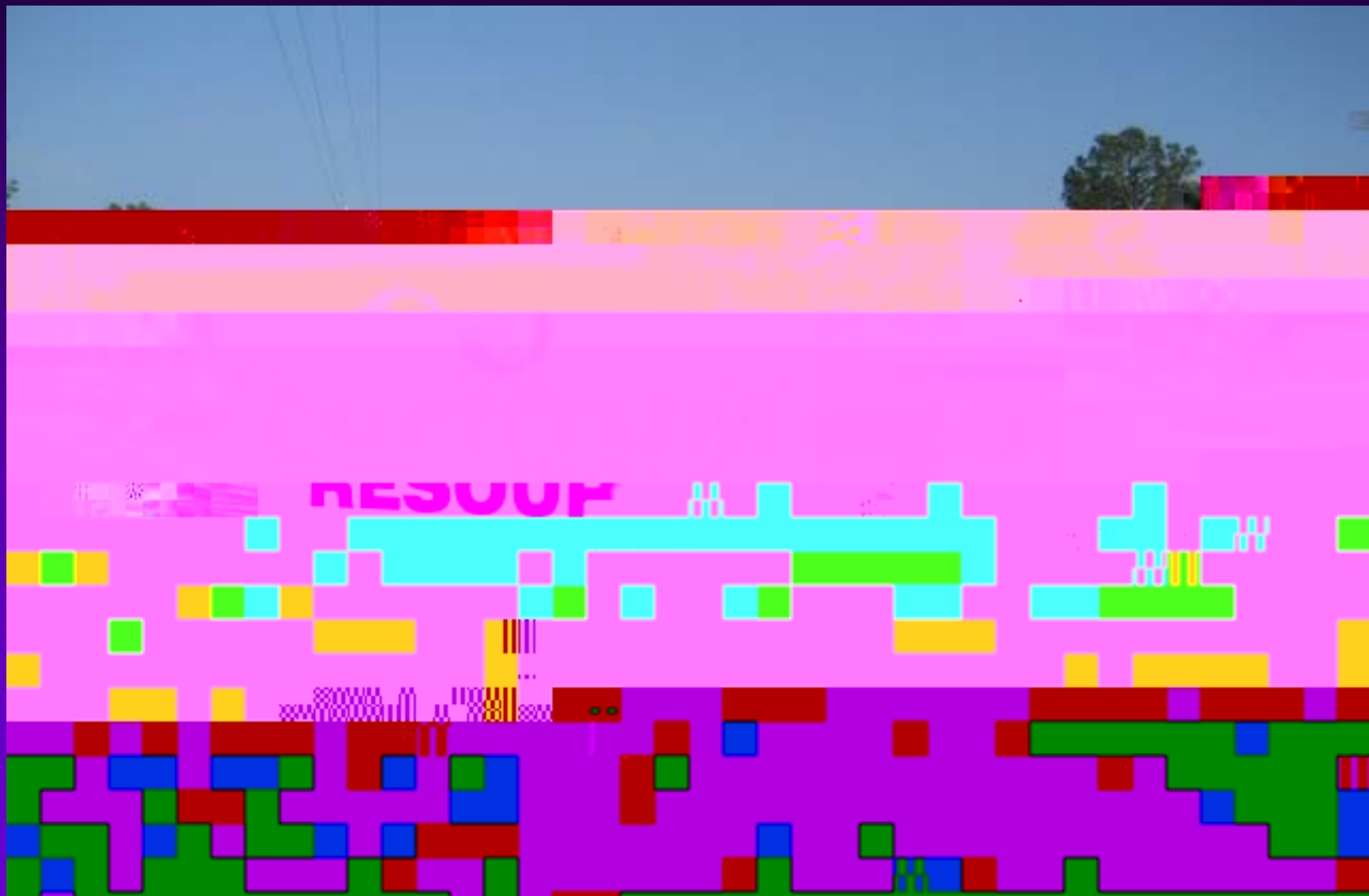


- **Uses 10kW of excess power from power plant**
- **50 gallons of water per day**
- **Generates 6kg of hydrogen**
- **Mixed into propane stream (15%/85% mix)**
- **Cash outlay \$10,000**
- **Total equipment cost \$250,000**
- **Projected savings \$5,000 - \$10,000 per year**



Today Show Video

X



Quantum Resources



PROJECT PARTNERS:

- UTRC
- UTC Power
- Chena Power
- Quantum Resources Management
- Department of Energy

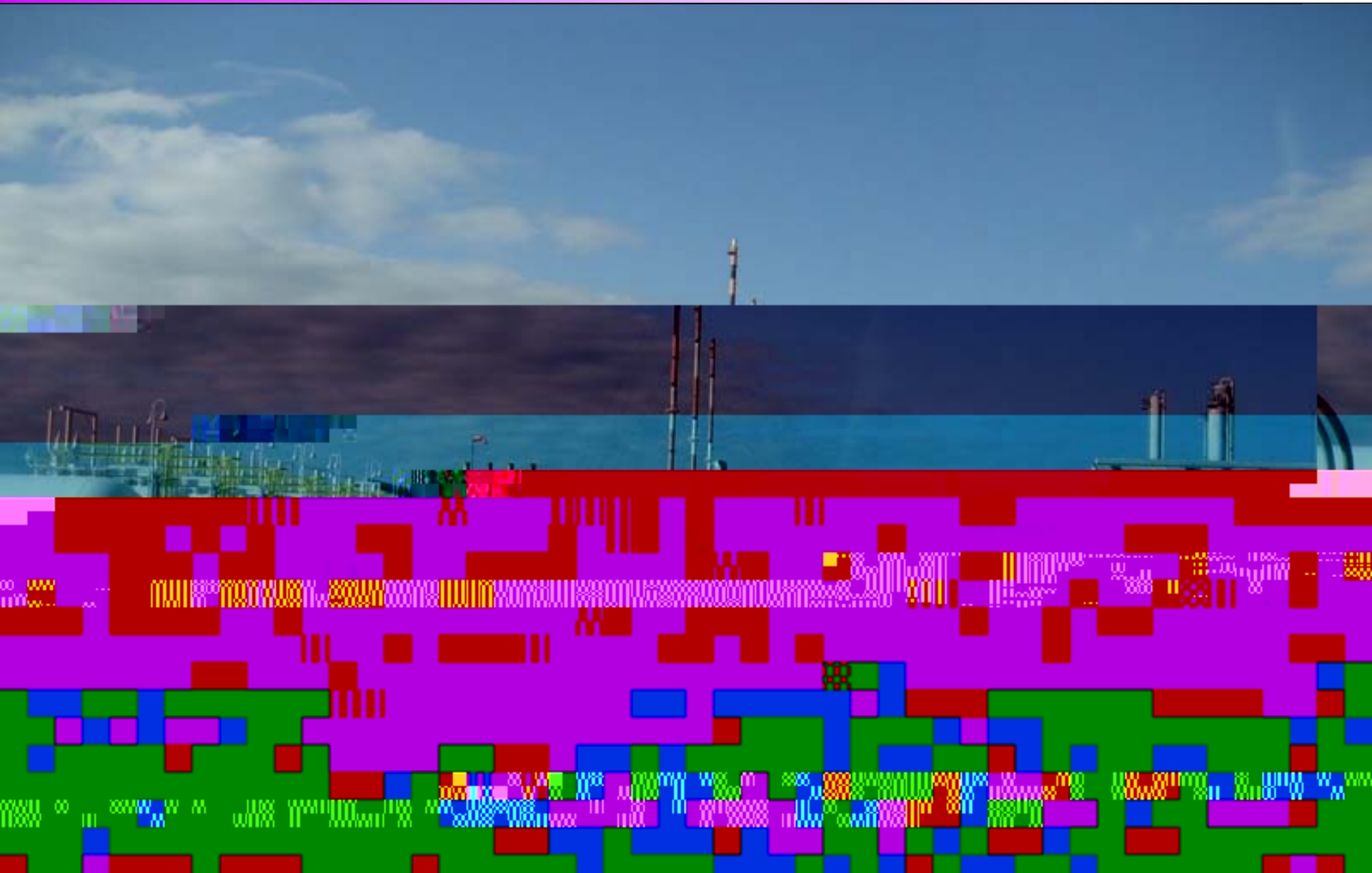
Chena Hot Springs



Jay, Florida



Quantum Resources

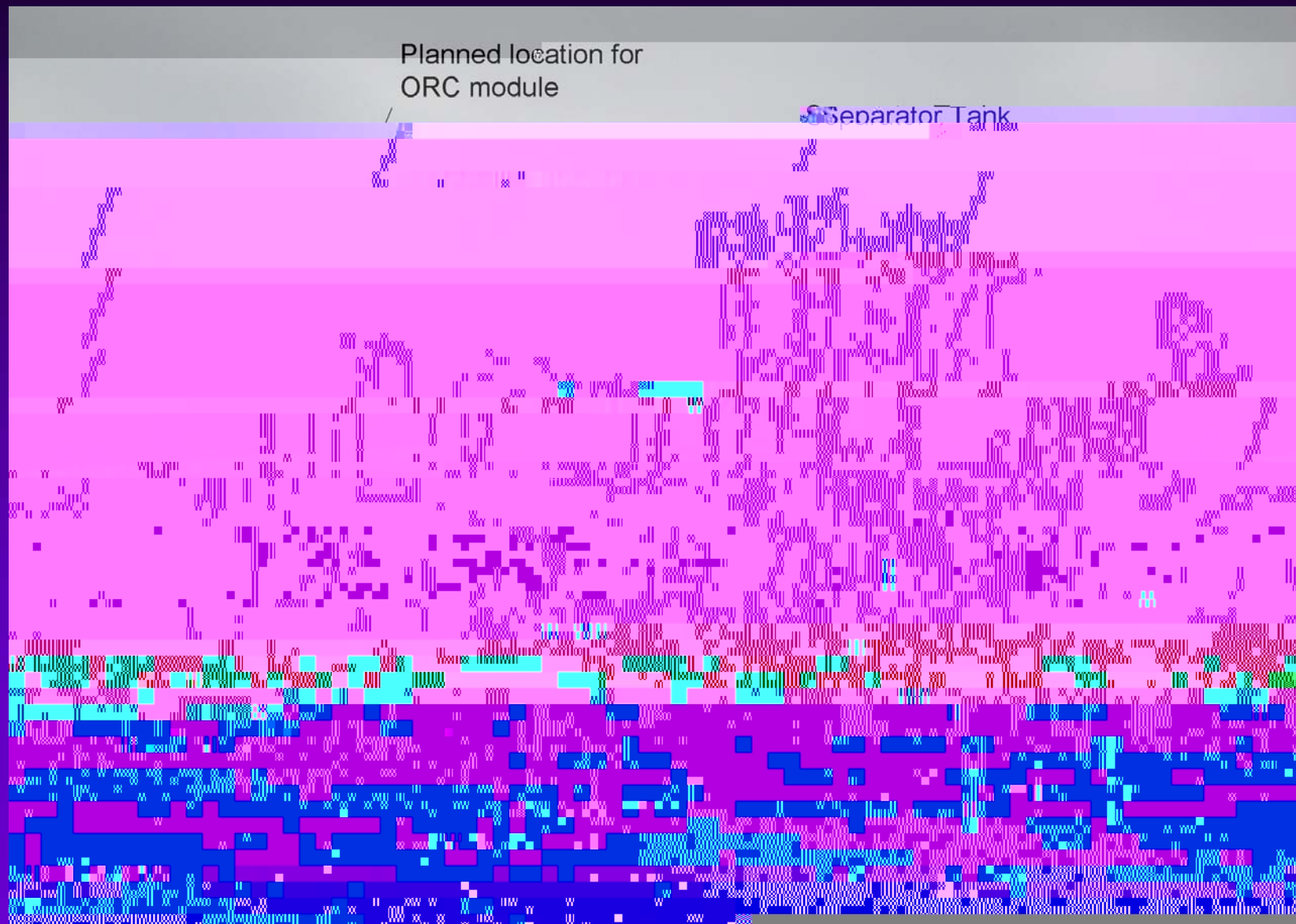


Quantum Resources



- **Owned and operated by Quantum Resources**
- **Field discovered in 1970**
- **Over 400 million barrels of oil have been extracted**
- **20 million barrels estimated remaining**
- **4,500 barrels per day of crude produced**
- **120,000 barrels per day of co-produced water at 200° F**
- **Hot water represents ~95% of fluid stream**

Quantum Resources

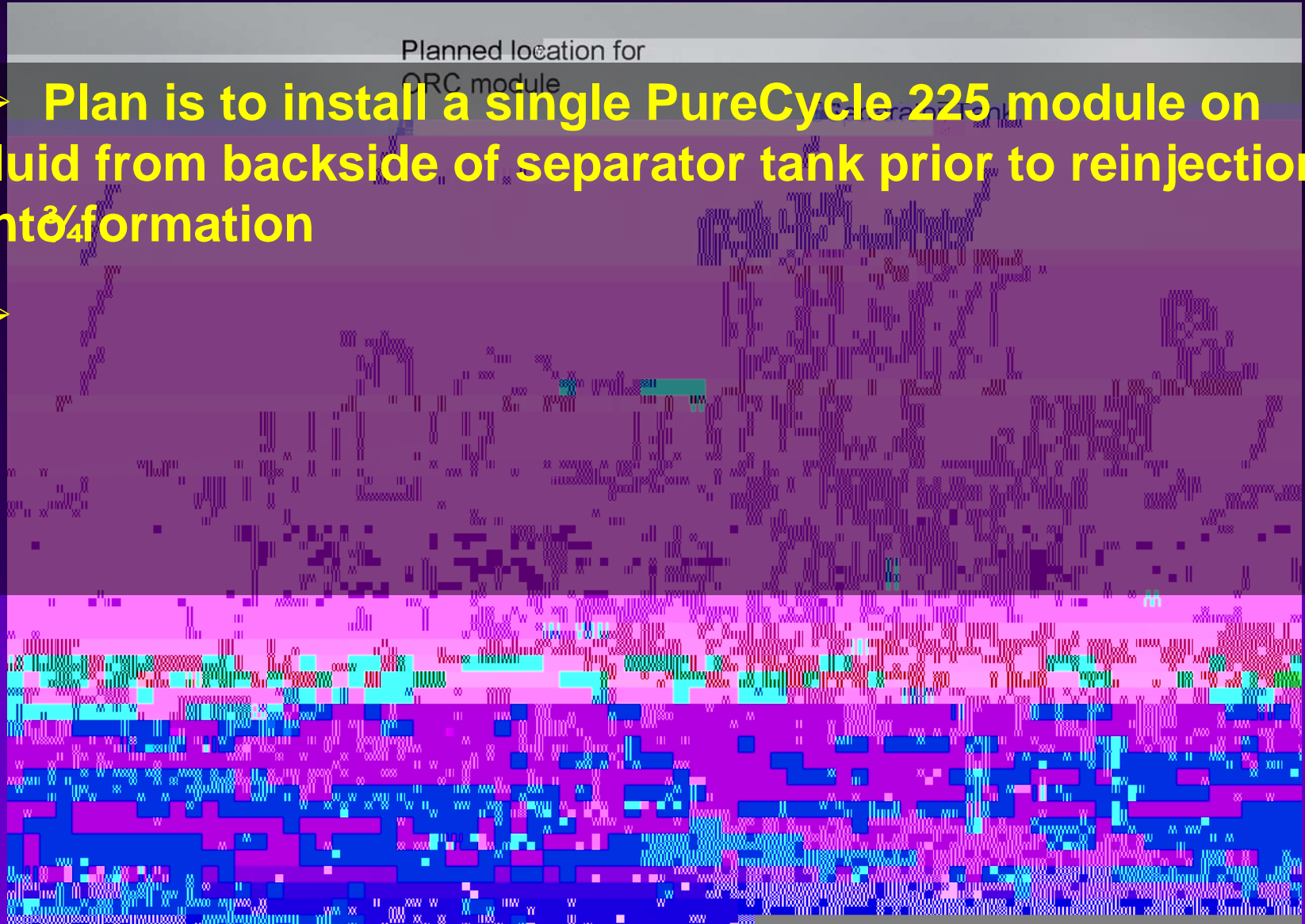


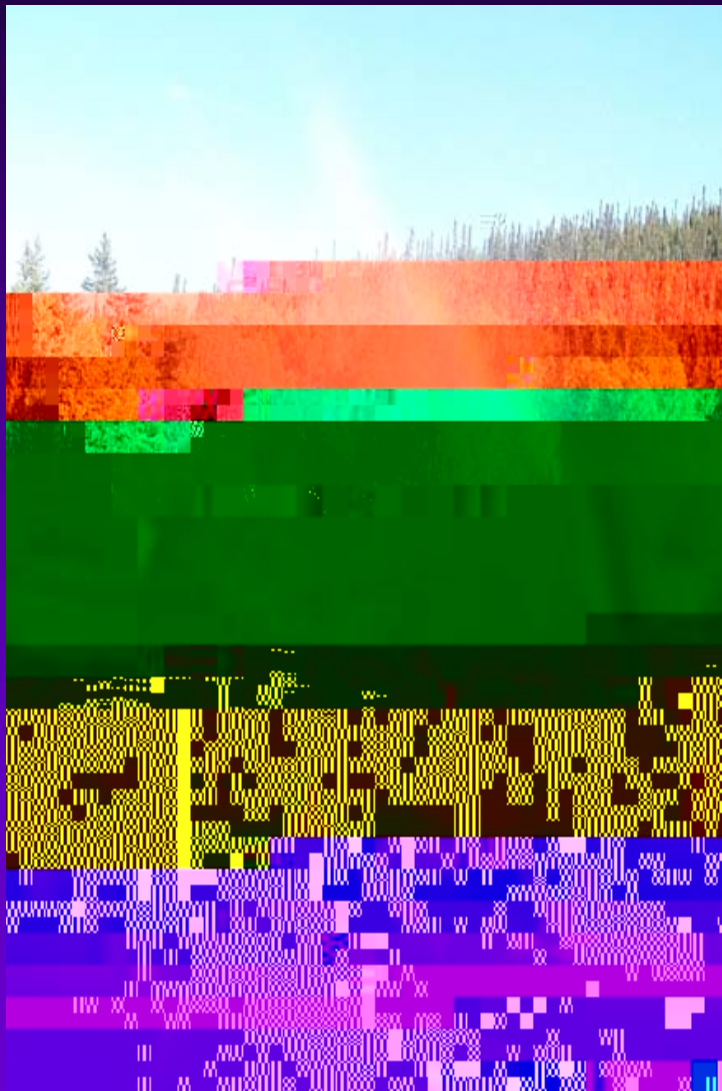
Quantum Resources



Planned location for
ORC module

- Plan is to install a single PureCycle 225 module on fluid from backside of separator tank prior to reinjection into formation





CHENA HOT SPRINGS RESORT

www.chenahotsprings.com

Mile 56 Chena Hot Springs Rd, Fairbanks, AK

(907) 451-8104

Bernie Karl

Proprietor

recycle@polarnet.com

(907) 451-8104

