# Geothermal Resources in Sedimentary Basins

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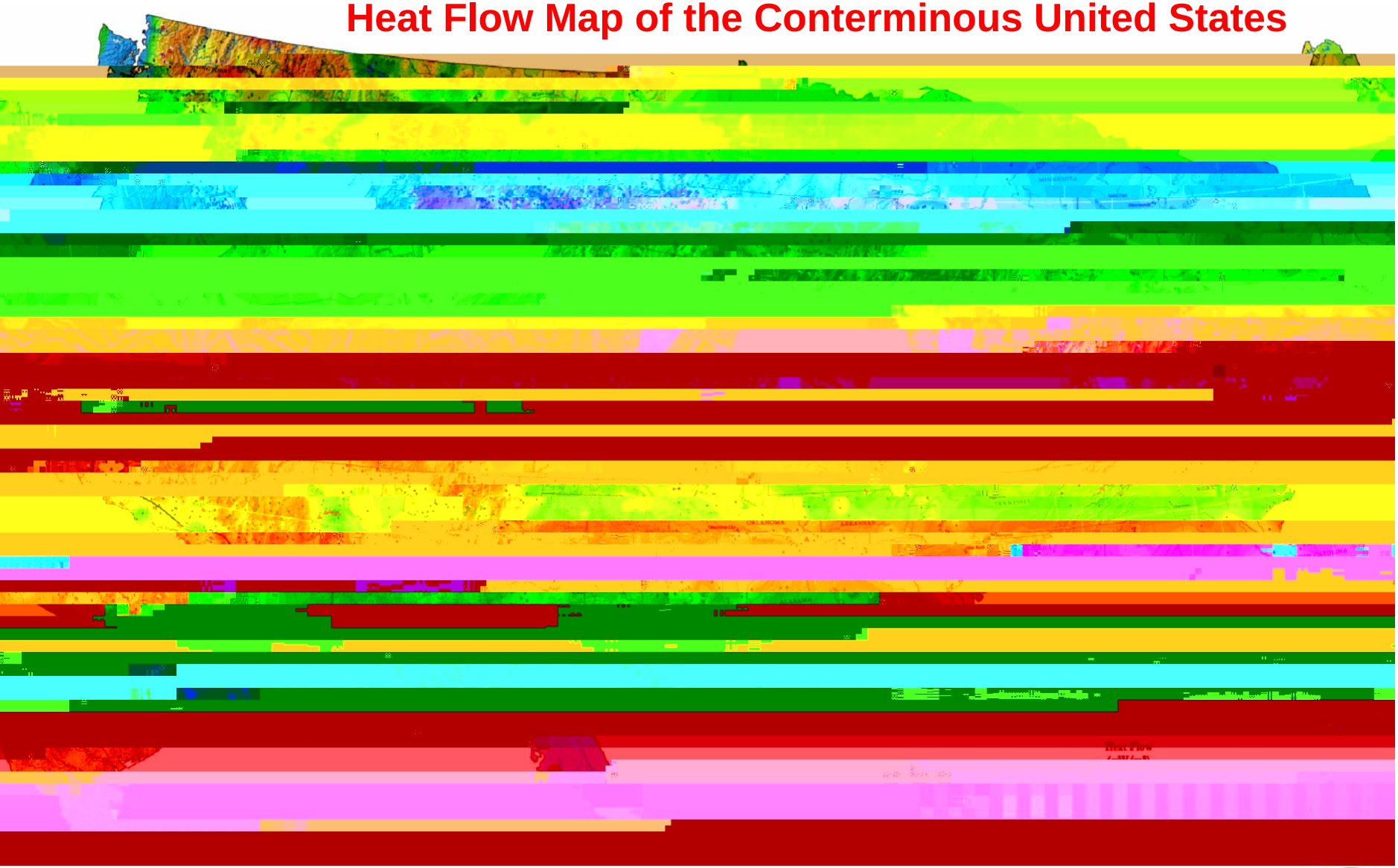
# Heat Flow Map of the Conterminous United States



**Subset of the Geothermal map of North America (Blackwell and Richards, 2004), current geothermal power plants are shown as white stars.**

All data sites for US heat flow map including sites of wells with BHT data in the AAPG data base. BHT symbols are based on depth and temperature. The named wells are the BHT calibration points.


Heat flow and BHT sites

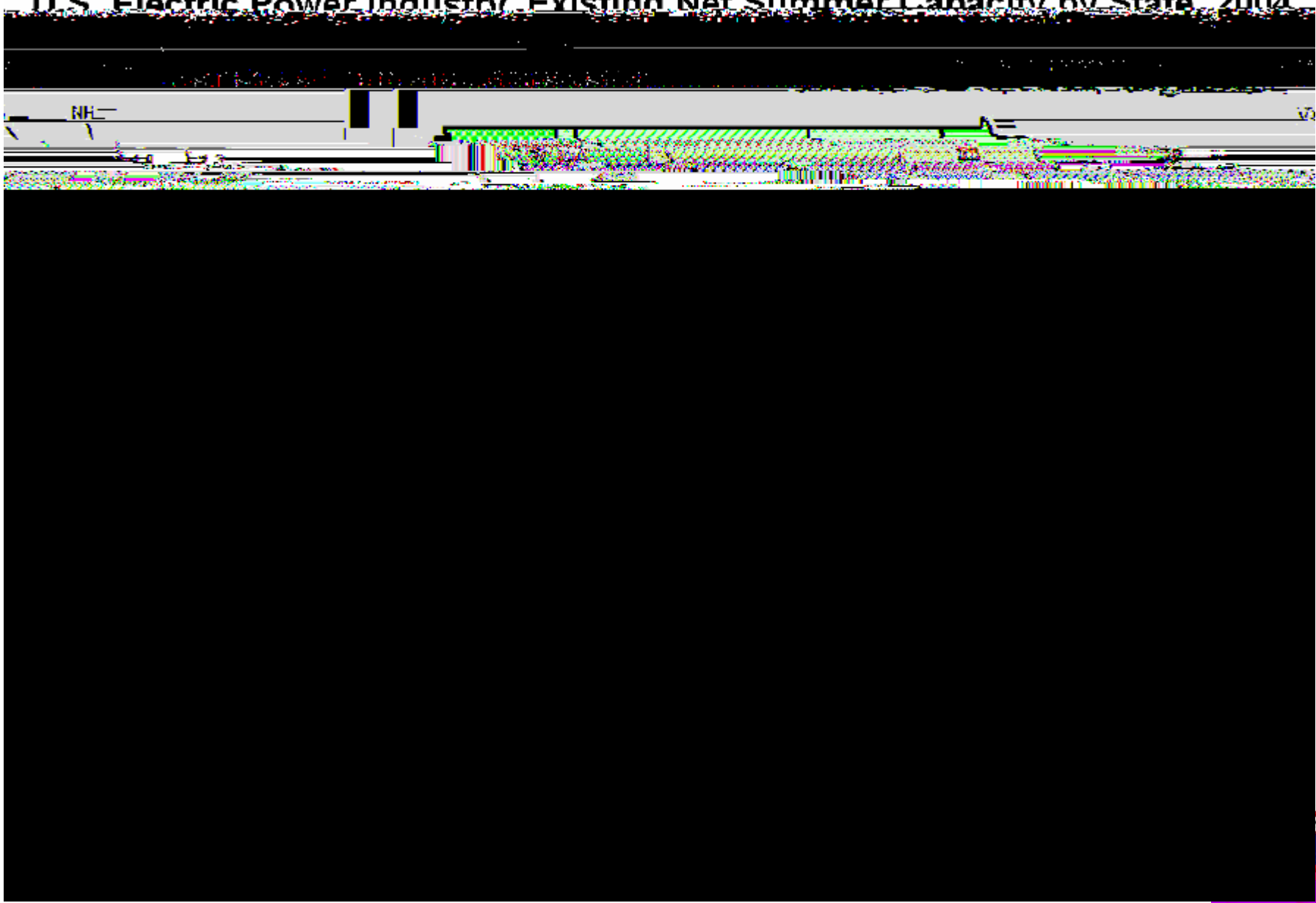
## Scenarios for Development in Sedimentary Basins

# Coproduced fluids
# Geopressure fluids
# Sedimentary EGS

**These are briefly described, resource base discussed, and examples of development given for each category**

**The resource base for these 3 types of geothermal development is briefly summarized:  HUGE!**

# U.S. Electric Power Industry, Existing Net Summer Capacity by State, 2004



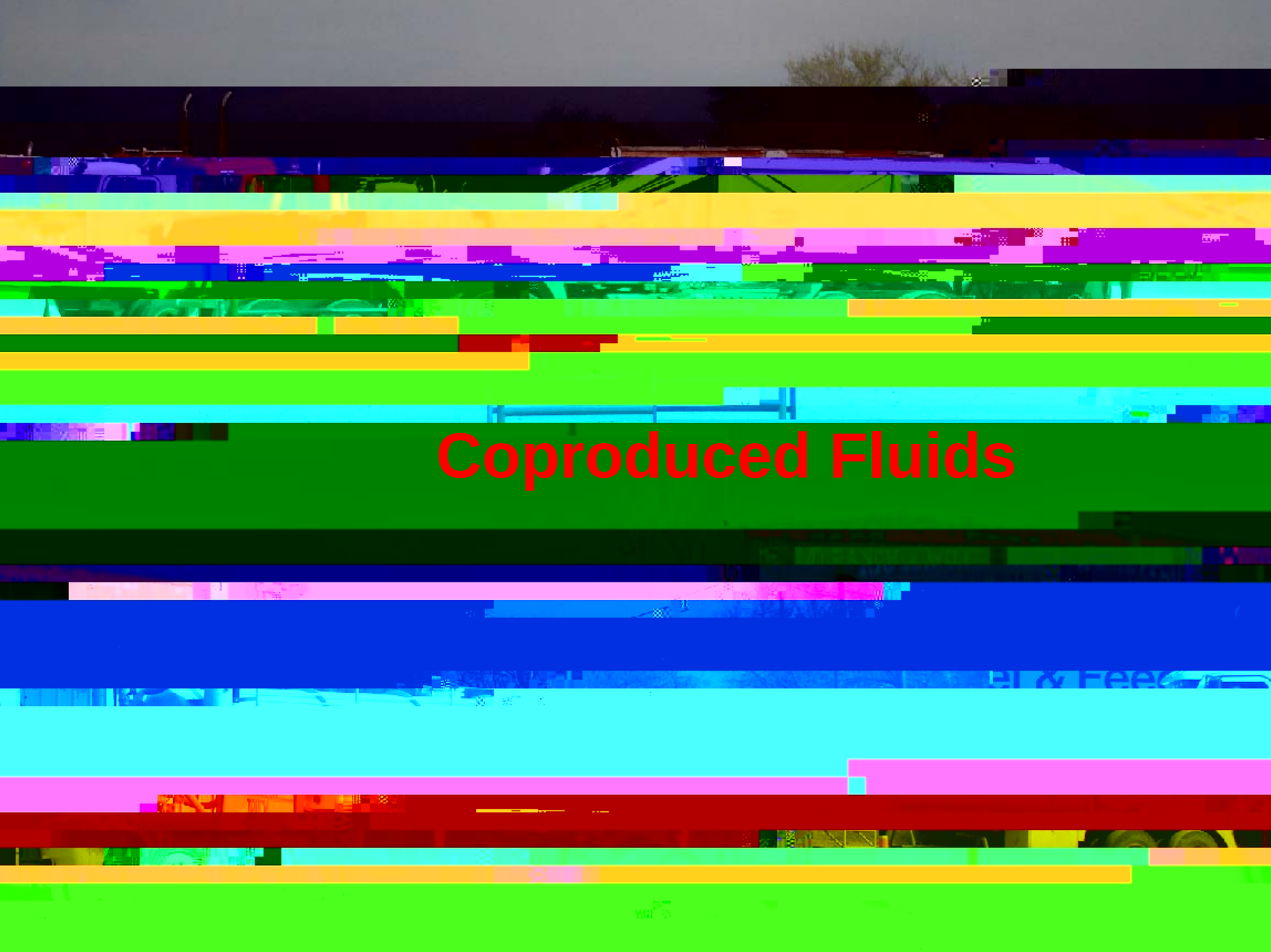
# Geothermal Resource Base Summary, Conterminous US

| Category | Thermal Energy | Methane | Total Energy |
| --- | --- | --- | --- |
| | ExoJoules (10 | | |

**The EGS resource base for Texas alone (at temperature above 150°C (300°F) and depths less than 7 km (23,000 ft)) is 255,000 EJ, or $4.1 \times 10^8$ MWsecs-20yrs.**

**If a recovery factor of 1% is used there is still $4.1 \times 10^6$ MWsec for 20 years available (the present installed electrical power capacity in Texas of $0.1 \times 10^6$ MWe).**

**The US Geological Survey has estimated the resource in the geopressured city in Texas of 0.1x10**


Coproduced Fluids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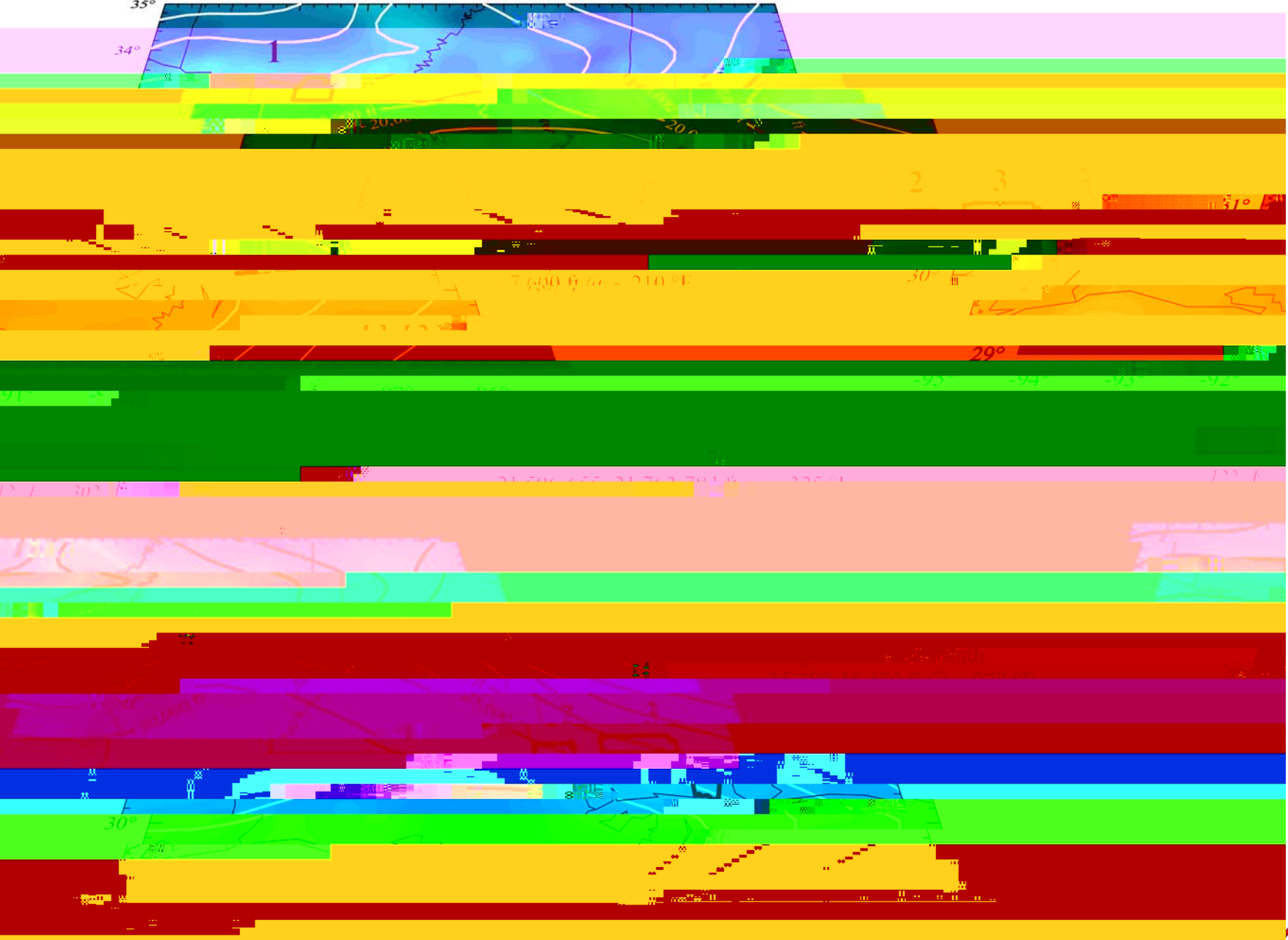

35°
34°
31°
30°
29°
30°
-93
-94
-93
-92

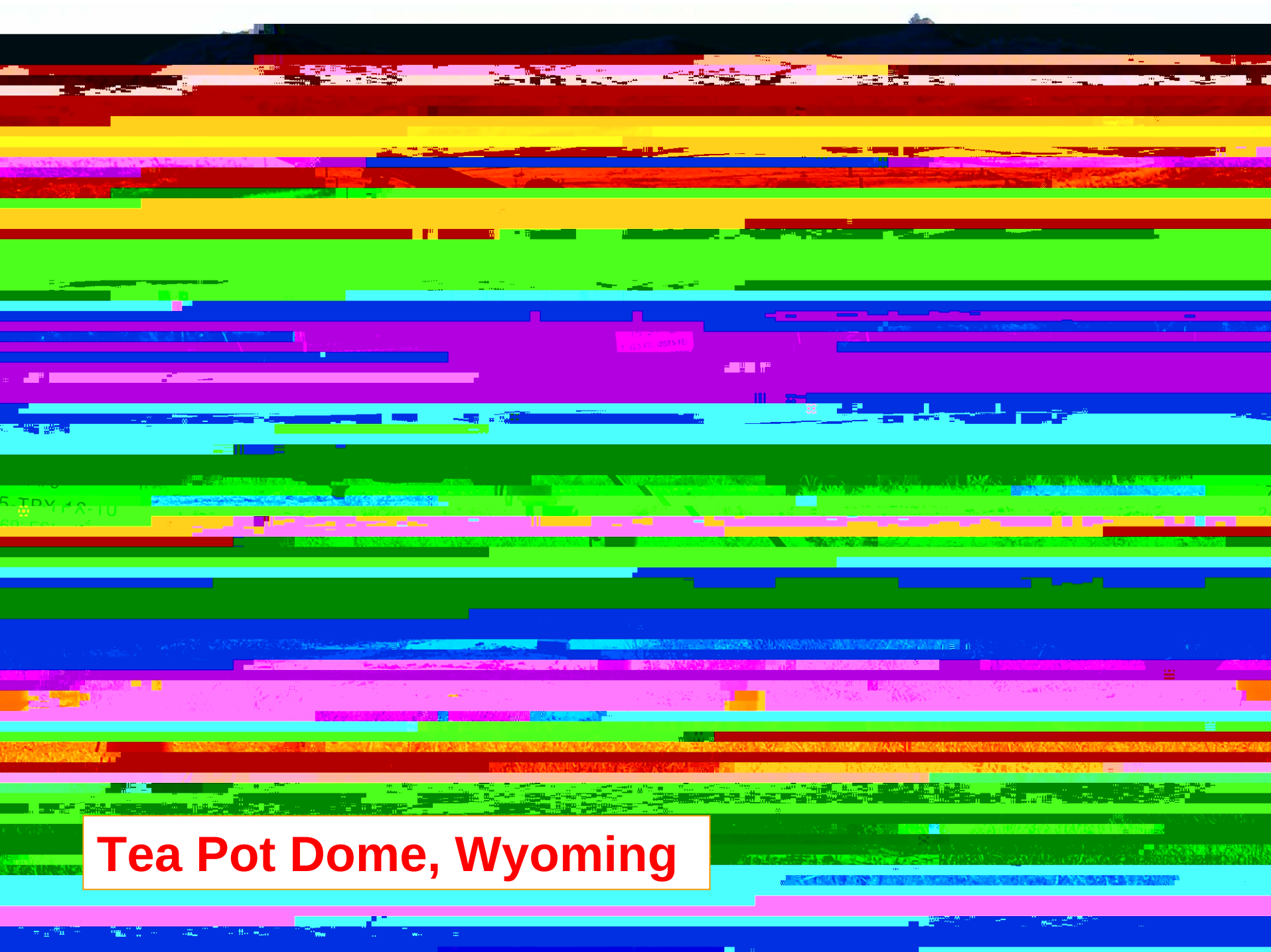
# Table 1. Comparison of cost components for conventional hydrothermal development of a water-flood field.

## *Existing Water-Flood Field Conditions*

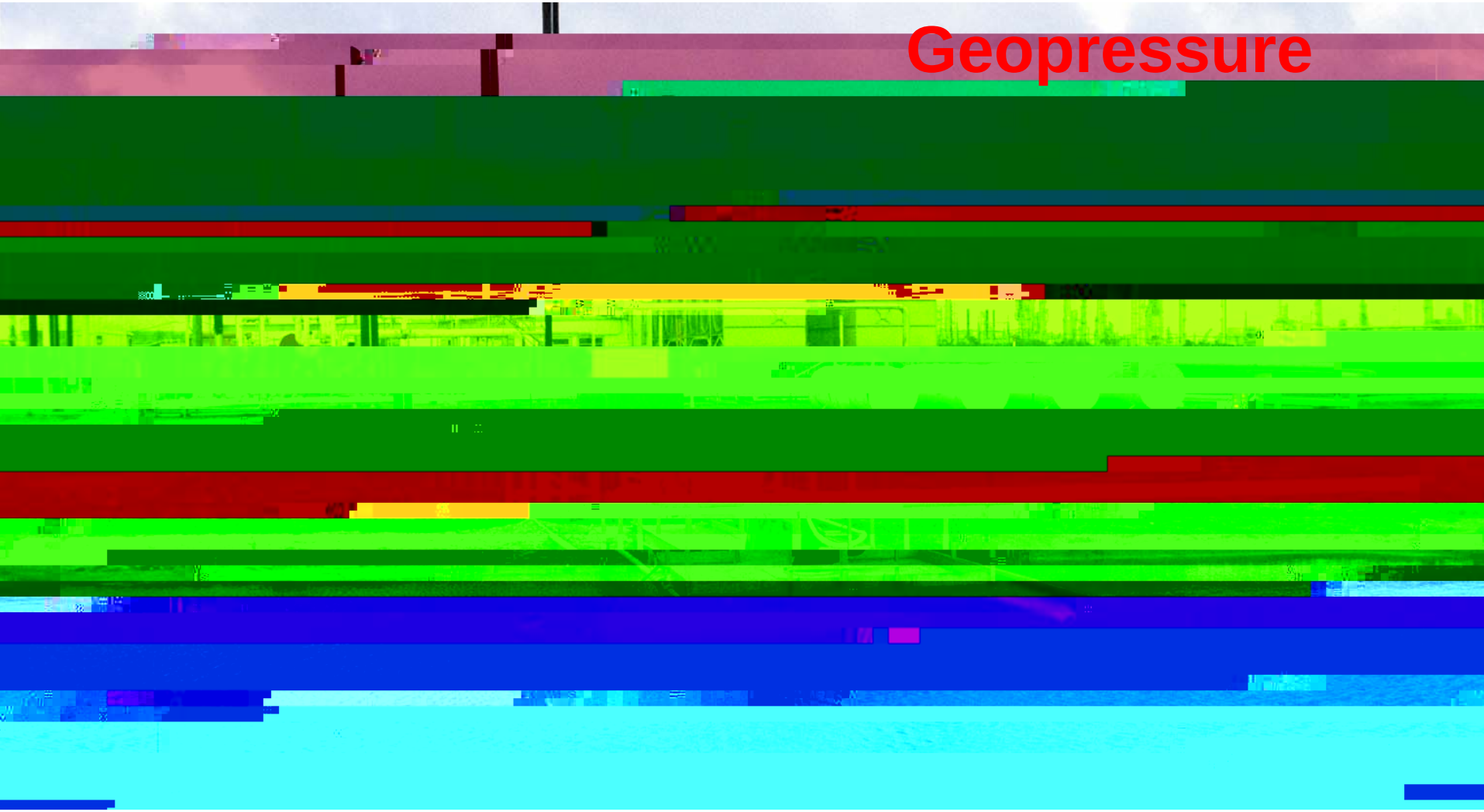
- Many wells with BHT's at over 225 °F at 15,000 ft or less
- Water produced from wells, stripped of hydrocarbons, and reinjected (paid for by disposer!)
- In-place infrastructure of power lines, roads, pipelines
- Possible continued stripping of gas and oil in otherwise non-economic wells

## *Direct Costs to Develop a Water-Flood Field*

- Build power station
- Minor surface infrastructure upgrades (i.e., insulating collection pipes)

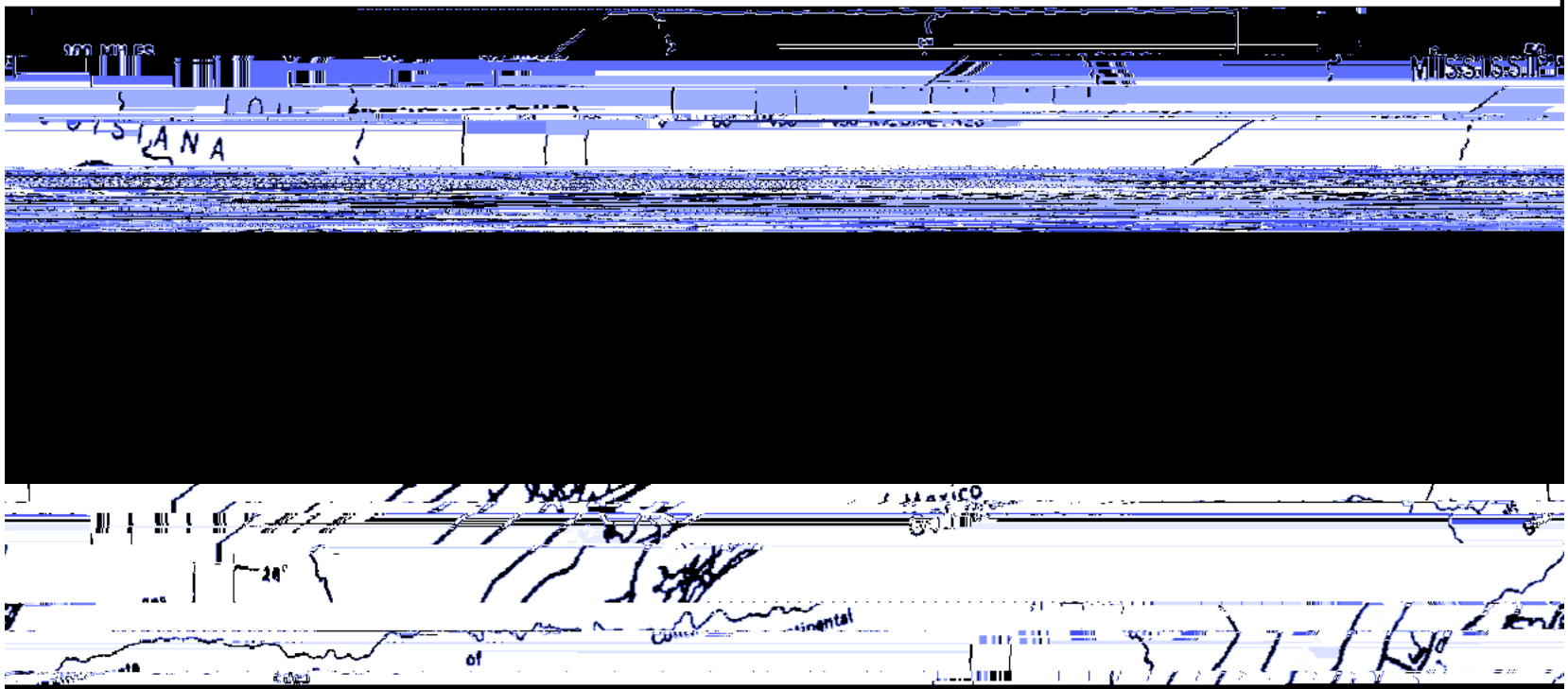

Tea Pot Dome, Wyoming

# Geopressure



- Pleasant Bayou,  Brazoria, Texas 1989-1990

# Circular 725 - Geopressured Geothermal Resource Assessment Papadouplous et al. (1975)



| Category | Thermal Energy $10^{18}$ Joules | Methane $10^{12}$ ft$^3$ | Total Energy $10^{18}$ Joules |
|---|---|---|---|
| **Geopressure** | | | |
| Papadoulopous et al. (1975) | 46,000 | 669 | 71,000 |
| Wallace et al. (1979) | 107,000 | 59 | 170,000 |

# EGS - Sedimentary and Basement

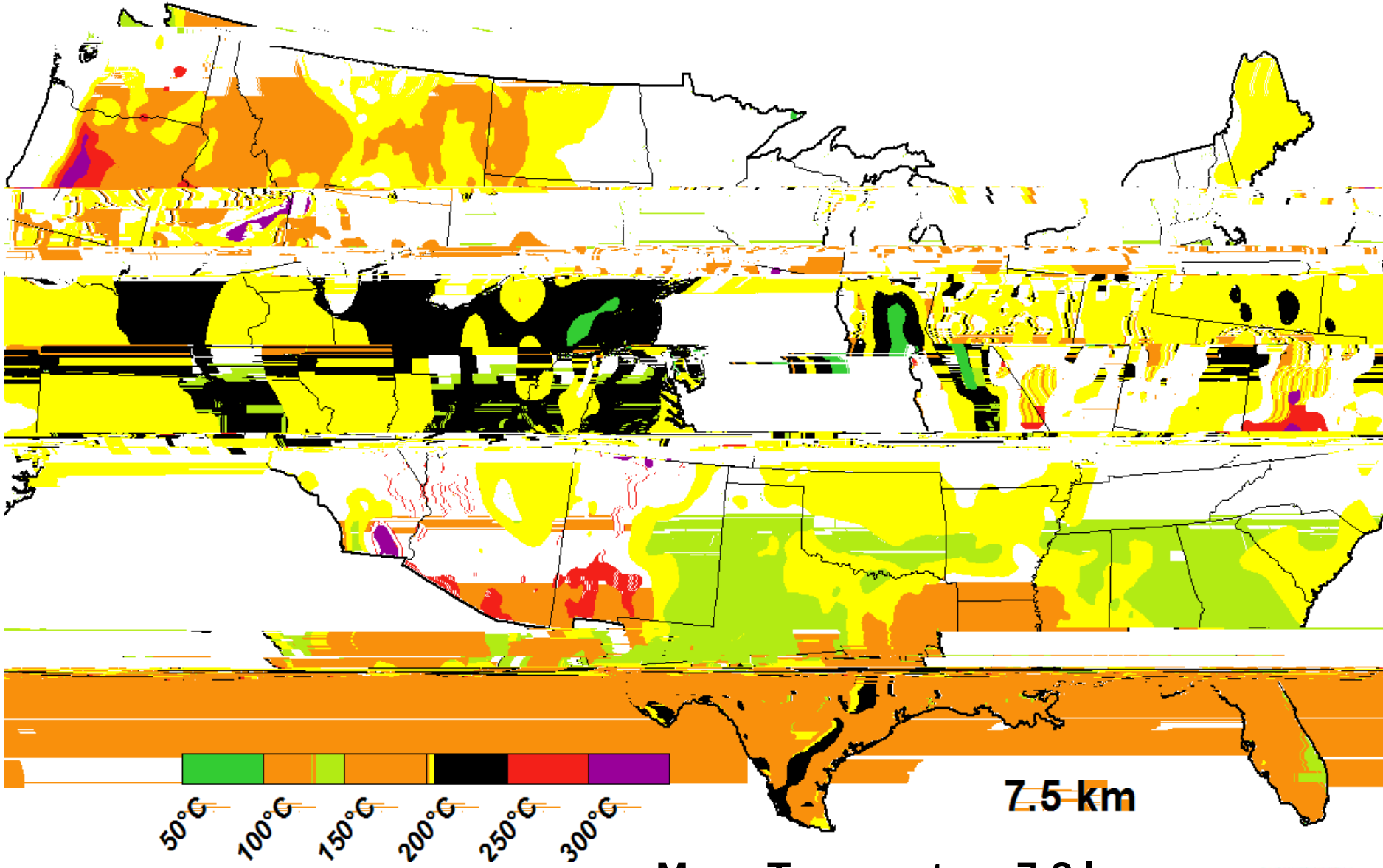
# The EGS System

**Introduction of water into rock of limited permeability (either tight sediment or basement) in a controlled fracture setting so that this water can be withdrawn in other wells for heat extraction.**

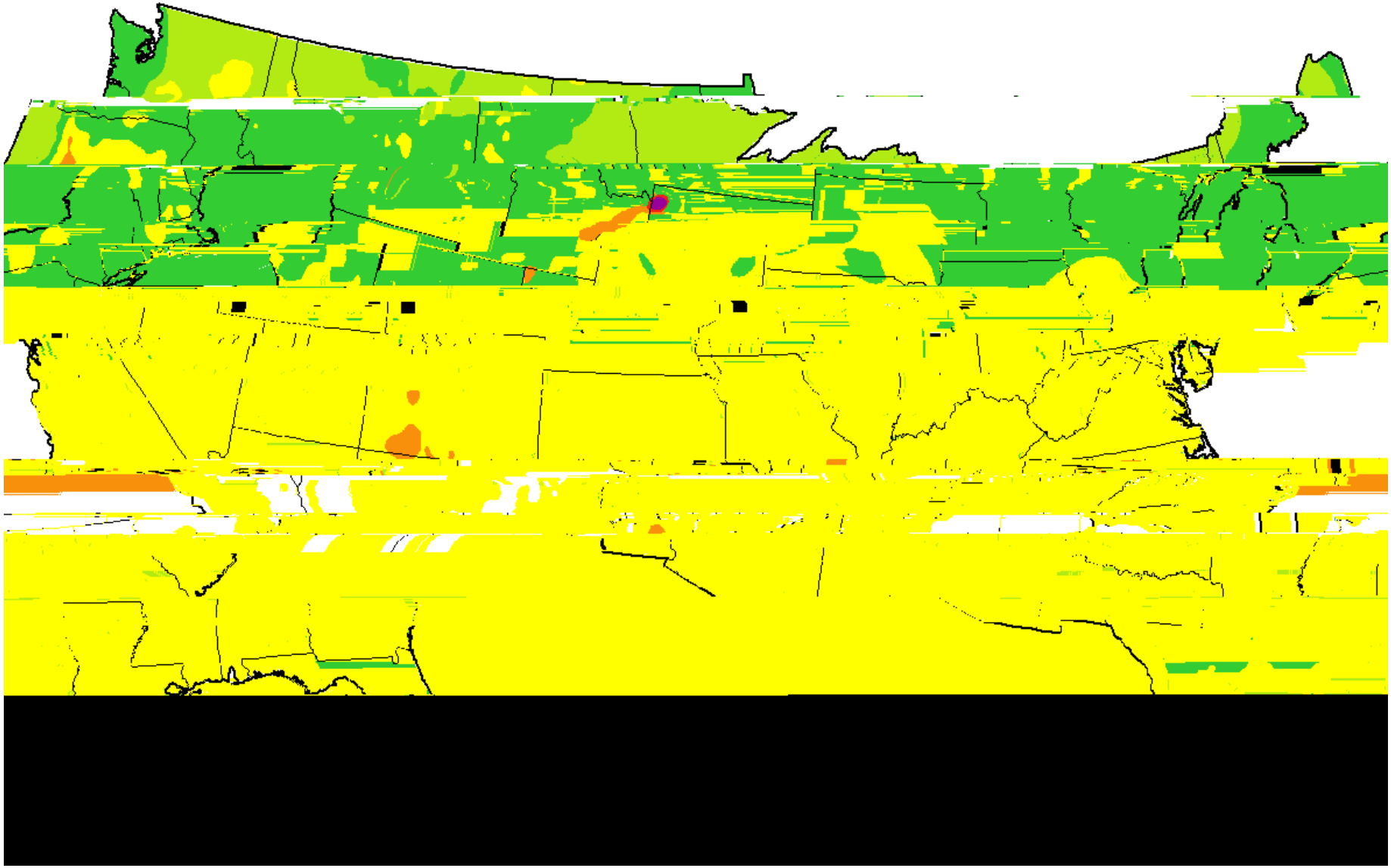
**An area that is very favorable is in east Texas and northern Louisiana where the low permeability tight formations of the Jurassic with temperatures over 350 °F are being exploited as tight gas systems.**

**Example T-D Curves from east Texas and Louisiana**

**Example Cases:** **Cooper Basin,**
**Australia,**
**Gross Schossberg Germany**



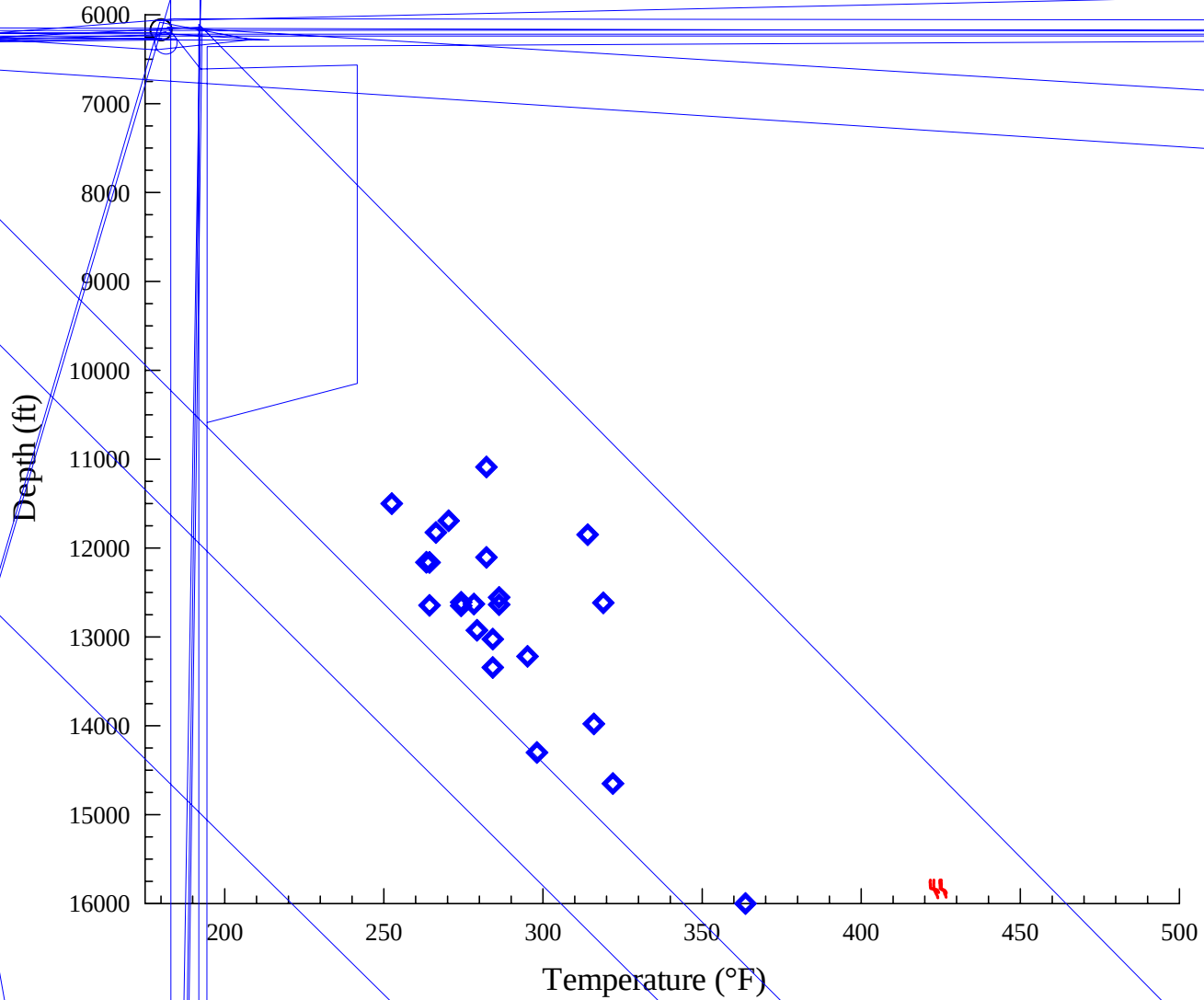

**Mean Temperature 7-8 km**
**21,000 to 24,000 ft**



**Mean Temperature 4-5 km**

**12,000 to 15,000 ft**


2000 to 3000 m
4000 to 5000 m




**Precision temperature log and BHT data for areas in the Texas and Louisiana. All three areas are situated in the high gradients areas paralleling the Gulf Coast. The existence of temperatures in excess of 250 °F by 9,000-12,000 ft suggest favorable conditions for future geothermal development.**


The most favorable EGS resources are considered less than 7 km and with temperatures >150°C. There are at least 17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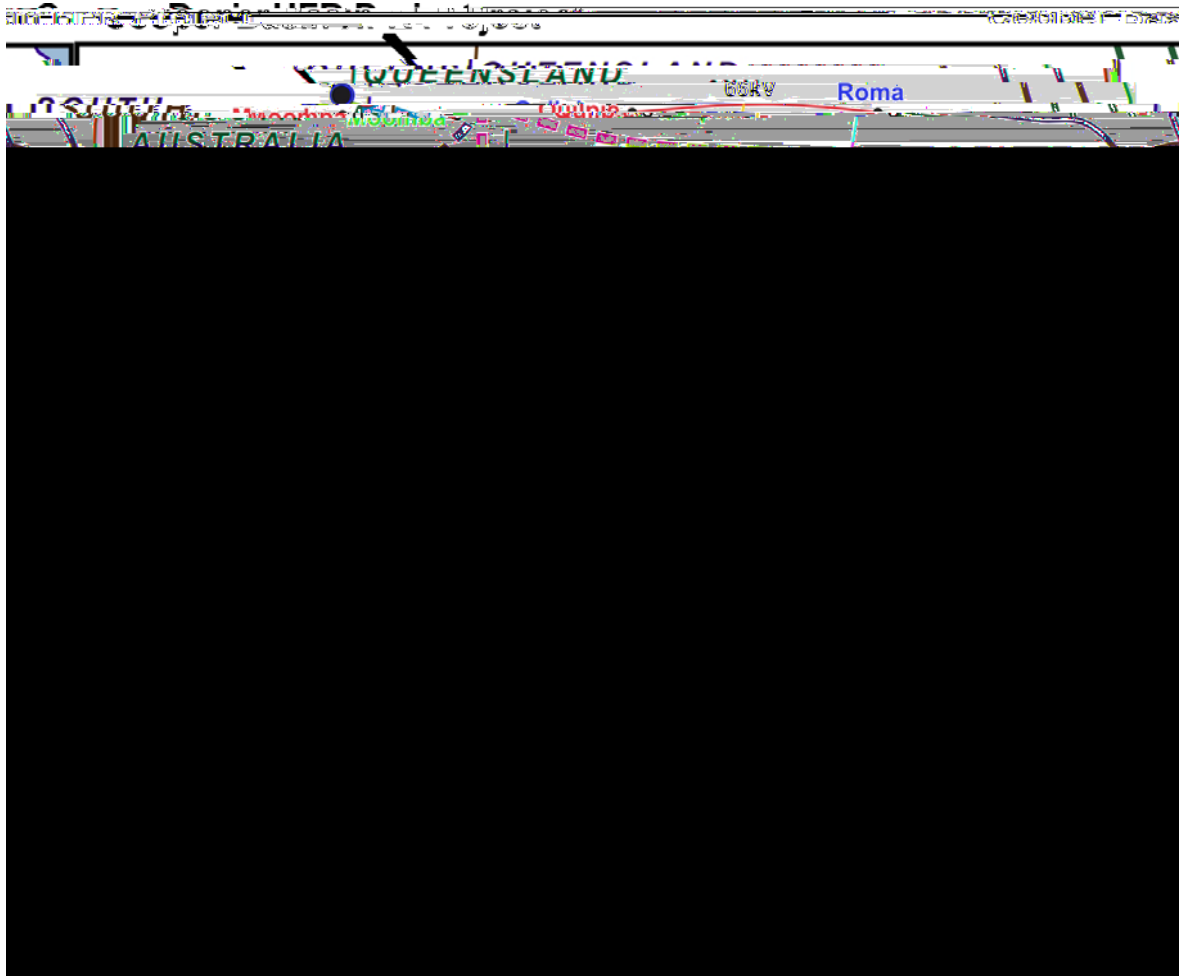
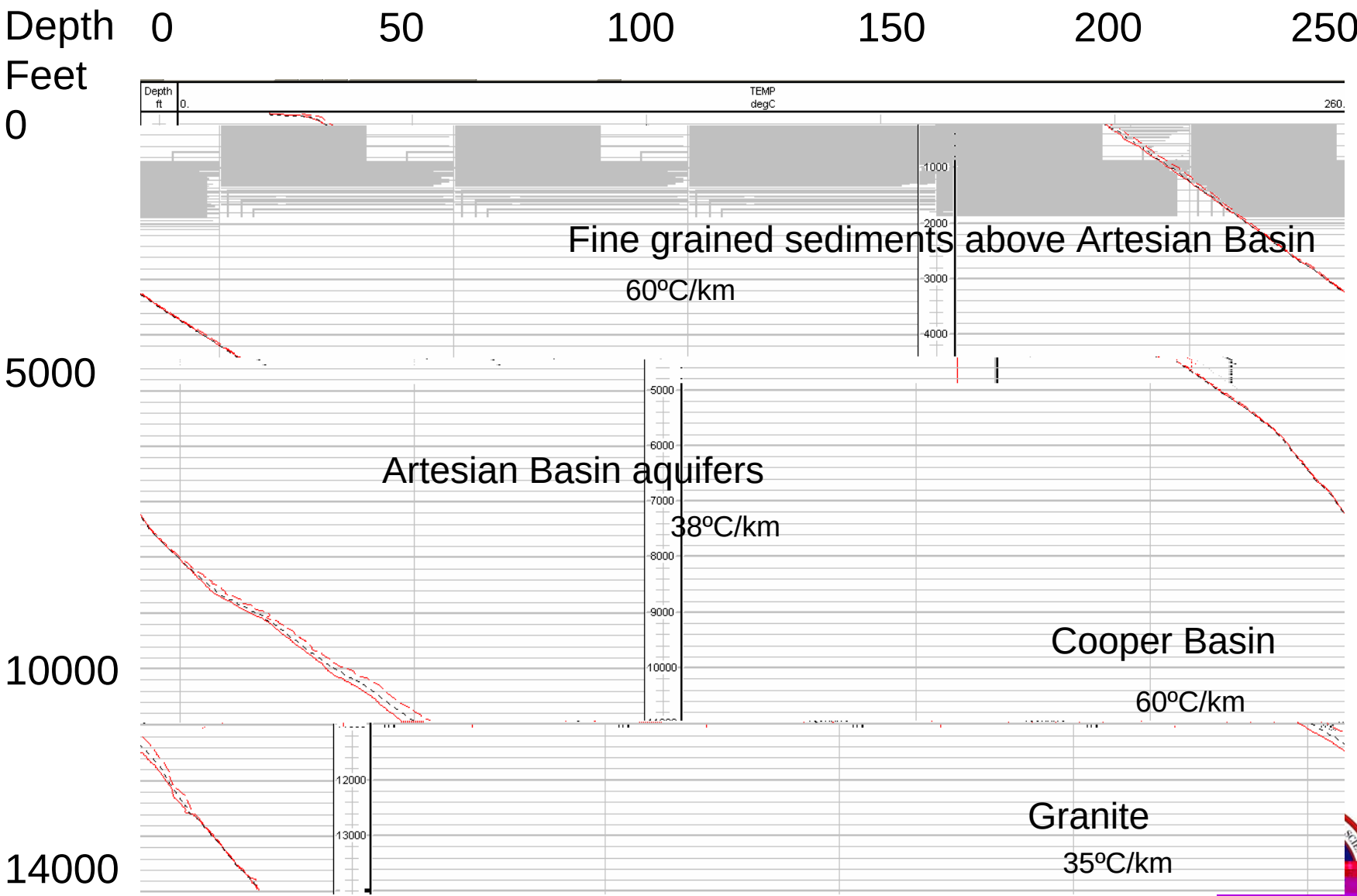
# Closing the NEMMCO Grid into a loop Provides benefits on national scale




Innamincka to:
Leigh Creek
= 380km,

# Temperature (°C) in Habanero-1 Cooper Basin



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