

Role of The Railroad Commission in Regulating Development of Geothermal Energy in Texas

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GEO THERMAL – TEXAS STYLE!



Introduction

- **Geothermal Resources Act of 1975 – Codified as Chapter 141 of the Natural Resources Code.**
- **RRC rules applicable to oil and gas formally extended to apply to geothermal operations.**
- **Summary of basic requirements.**
- **Useful information maintained by the RRC.**

Background

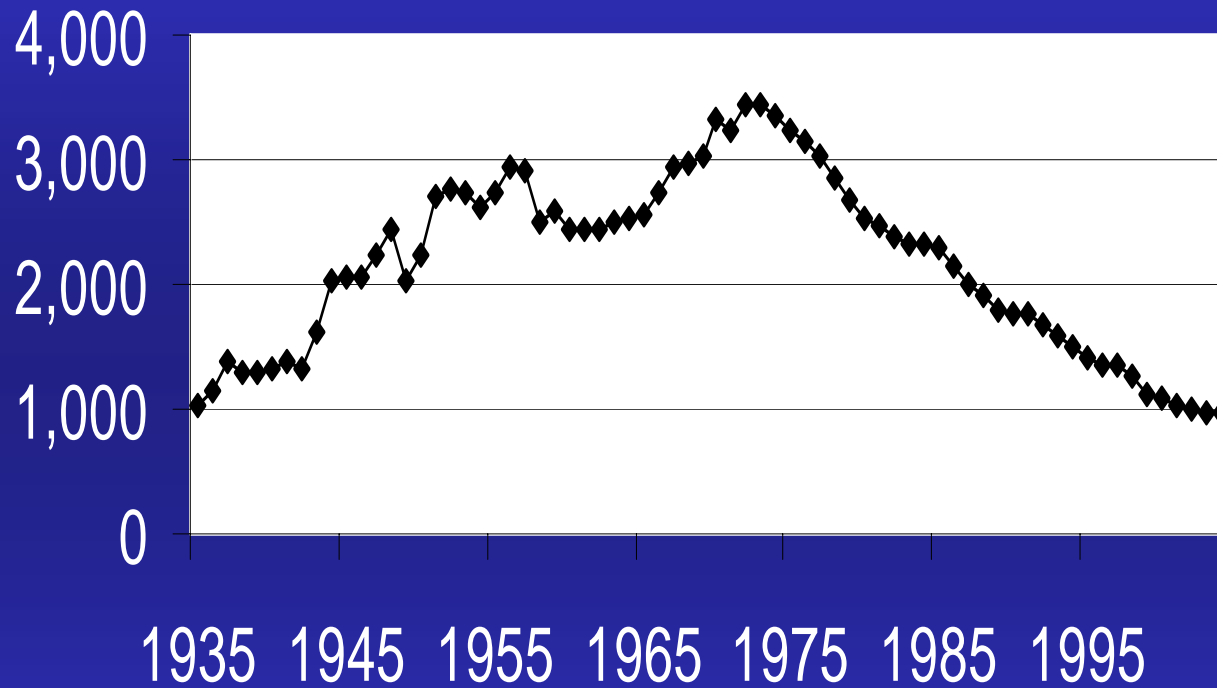
- **RRC curtailed production to meet market demand until 1972.**
- **The first Arab Oil Embargo began in October 1973. Supply plummets and prices skyrocket.**
- **America scrambles to find alternative fuels, including geothermal.**

Key Dates

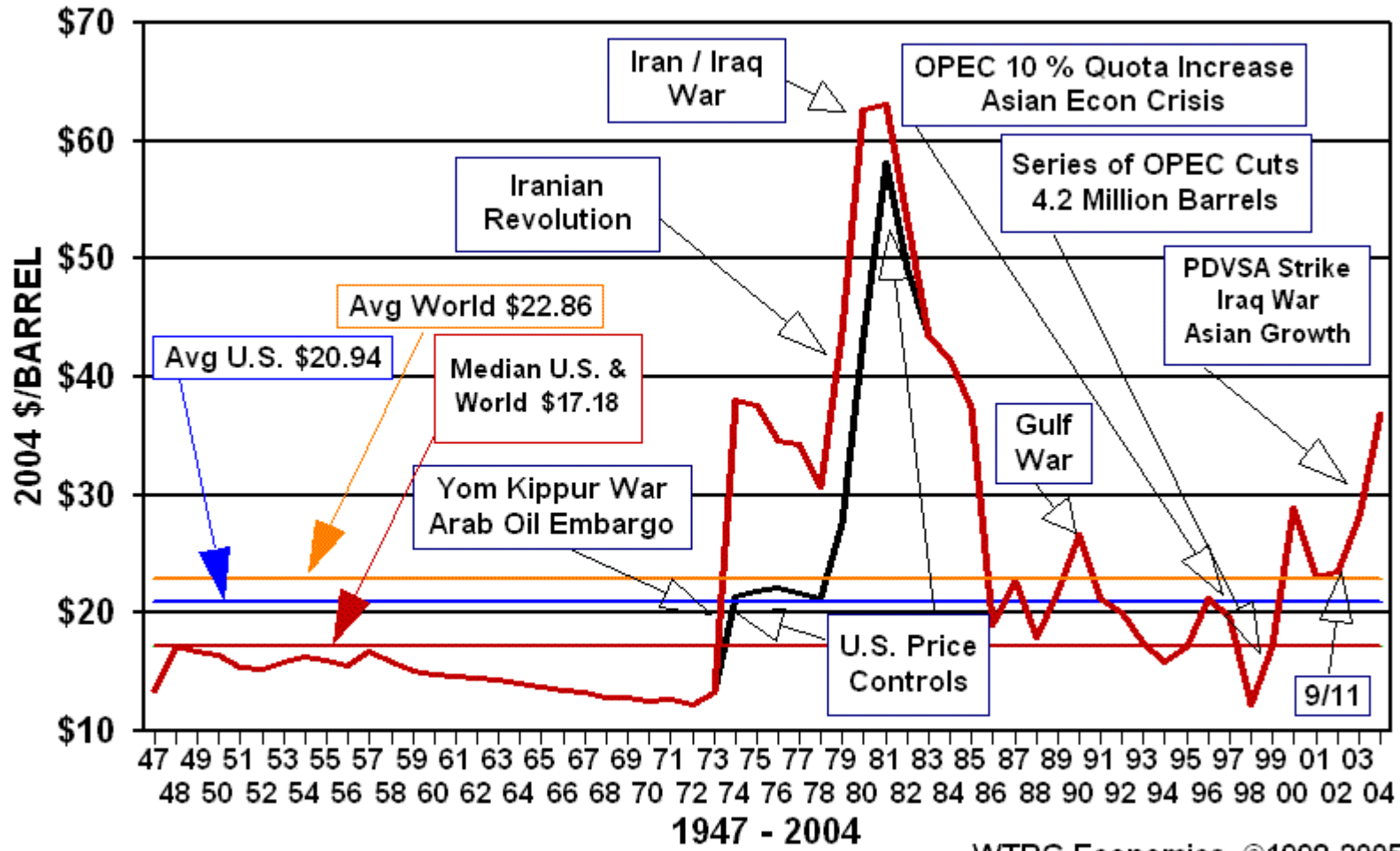
- **1972 – peak US production**
- **1973 – Arab Oil Embargo**
- **1975 – Geothermal Resources Act**
 - RRC Rulemaking
 - State Energy Conservation Office (SECO)
 - GLO and TCEQ
- **1983 – Texas gets primacy over UIC**
- **1989 – 1st and only Texas GT-power plant**
- **Present – renewed emphasis on alternatives**

Texas Crude Oil Production

(mmbbl/day)



Crude Oil Prices 2004 Dollars



— U.S. 1st Purchase Price (Wellhead) — "World Price" *

WTRG Economics ©1998-2005
www.wtrg.com
(479) 293-4081

RRC Regulations

- **Primary directives:**
 - Prevent waste
 - Promote conservation
 - Protect correlative rights
 - Protect environmental health and safety
- **Applicable to oil, gas and geothermal operations.**

RRC Regulations

- **Must have a valid Organization Report (Form P-5) updated annually.**
- **Maintain adequate financial security.**
- **Drilling permits (Form W-1) done online.**
- **Compliance certificate (Form P-4) designates operator of well property.**
- **Production reports.**
- **Injection permits**

Geothermal Injection Wells

- **Underground Injection Control provisions of Safe Drinking Water Act**
- **Oil and Gas waste injected into Class II wells**
- **Injection of geothermal fluids considered Class V for UIC purposes**

Oil & Gas Wells in Texas

- **250,000 \pm active oil and gas wells**
- **141,000 oil wells**
- **71,000 gas wells**
- **31,000 active injection wells**
- **110,000 inactive wells**

7. RRC District

**GEOHERMAL PRODUCTION TEST
COMPLETION OR RECOMP**

1. FIELD NAME (as per RRC Records or Wellnet)

2. OPERATOR

3. ADDRESS

4. If Operator has changed within last 60 Days -- Give former

5a. LOCATION (Section, Block, and Survey)

5b. If Workover -- Give former Field (with Reservoir)

SECTION 1

15. Date	16. Static test Shut-in well head Temp ° F	17. Total Temp ° F
	Prax. Psg. Lbs/Hr	Temp.

INSTRUCTIONS: All production test Forms, with all Railroad Commission not later than 150 days of acceptable Form within the 150 days as specified here more than 150 days after to complete and not shall govern regardless of whether the production test month. Fill in only the front of this Form when report side also.

EACH WITNESS MUST PERSONALLY SIGN.
We, the undersigned, witnessed this test, by observation

Signature: REPRESENTATIVE OF COMPANY MAKING T
List of Other Operators Notified and Date Notified:

An inclination survey has been run in accordance with displacement was _____ feet of a measured

Signature of Authorized Representative
All casing was cemented in accordance with State available upon request.

Signature of Contractor or Authorized Representative
CERTIFICATE:
I declare under penalties prescribed in Article 6536c or under my supervision and direction and that date

REPRESENTATIVE OF COMPANY

FORM GT-2

CORRECTED REPORT

RAILROAD COMMISSION OF TEXAS
OIL AND GAS DIVISION

PRODUCER'S MONTHLY REPORT OF GEOTHERMAL WELLS

Month _____, 19____

Page Number: _____

RAILROAD COMMISSION DISTRICT

RAILROAD COMMISSION DISTRICT

10. Minerals produced (lb./hr.)	11. Minerals produced (lb./hr.)
Water	Gas-MCP
Other	Other
12. Flow rate (gal/hr.)	13. Flow rate (gal/hr.)
Temp. (°F)	Temp. (°F)
14. Dry steam produced (lbs. x 10 ³)	15. Wet steam produced (lbs. x 10 ³)
16. Well Number	17. Well Number
18. Well Number	19. Well Number

MONTHLY GEOTHERMAL GATHERER'S REPORT

Gatherer Name _____
Address _____

RAILROAD COMMISSION DISTRICT
FIELD
OPERATOR
LEASE

Residual Water	Acre Feet	Gallons
Type and Weight of Minerals Extracted		Disposition of Minerals

* State type of product: Dry Steam, Geothermal Water, Low-Temp. Thermal Water, etc.
† Total Volume in Gallons for Low-Temp. Thermal Wells Only

APPLICATION TO INJECT FLUID INTO A RESERVOIR PRODUCTIVE OF GEOTHERMAL RESOURCES

1. Field Name (as per current permit schedule - including reservoir, if applicable.)

2. RRC District

3. Operator

4. County

5. Lease Number(s) and RRC Lease Number(s)

6. Reservoir Discovery Date

7. Have any injection permits been granted previously to any operator in this reservoir? Yes No
If answer to this question is "NO", ALL OPERATORS IN THE RESERVOIR MUST BE NOTIFIED of this application, and copies of notification attached hereto.

8. Check the Appropriate Block(s):
 New Project or Expansion of Previous Authority to Add Either: New Lease(s) or Additional Well(s) on Same Lease(s)
Previous Authority Dated _____ by Administrative Action or Hearing, Special Order No. _____

RESERVOIR AND FLUID DATA ON ENTIRE RESERVOIR

9. Name of Reservoir

10. Estimated Productive Area of Entire Reservoir (acres)

11. Composition (sand, limestone, dolomite, etc.)

12. Type of Structure (Include cross-section and structural maps)

13. Original Bottom Hole Pressure (psig)

14. Current Bottom Hole Pressure (psig)

15. Was Hydrocarbon Gas Present Originally?

16. Original Average Reservoir Temperature

RESERVOIR AND FLUID DATA

17. Number of Productive Acres in Lease(s) within Project Area

18. Average Depth to Top of Pay (ft.)

19. Average Effective Pay Thickness (ft.)

20. Average Horizontal Permeability (mds.)

21. Range of Horizontal Permeability (mds.)

22. Average Porosity (%)

PRODUCTION HISTORY OF RESERVOIR

23. Date First Well Completed on Lease(s)

24. Stage of Primary Depletion of Project Area

25. Current Number of Producing Wells on Each Lease in Project Area

26. Current Mass Production (lbs. x 10⁶)

27. SUBMIT ATTACHED SHEETS GIVING THE TOTAL MASS PRODUCTION BY YEARS SINCE DISCOVERY & TOTALS. FOR THE LAST 3 YEARS, GIVE THESE FIGURES BY MONTHS.

INJECTION DATA

28. Type of Injection Fluid (Check the appropriate block(s)):
 Salt Water, Brackish Water, Fresh Water, OTHER (Specify)

28. Source of Injected Fluid(s) (formation(s) and depths) in ft.)

29. Injection Pattern and Spacing

30. Total Number of Injection Wells to be Approved in this Application

31. Estimated Maximum Daily Rate of Injection per Well (bbls./day/well)

32. Total Estimated Maximum Daily Rate of Injection for All Wells in this Application (bbls./day)

33. Maximum Injection Pressure to be Used (psig)

34. LIST COMPLETE INJECTION WELL DATA ON REVERSE SIDE OF THIS SHEET
(APPLICANTS MUST COMPLY WITH THE INSTRUCTIONS ON REVERSE SIDE HEREOF.) (OVER)

DATA ON PROPOSED PROJECT AREA

RRC - Geothermal Forms

Information Resources

Central Records

- **Hearing records**
- **Geologic maps**
- **Reservoir studies**

Web Site

- **“Interactive Data”**
- **“Information Resources”**

Information Resources

- www.rrc.state.tx.us
- GIS map viewer
- Gas well completion reports (Form G-1)
- Annual well status reports (Forms G-10, W-10, and H-10)

Other Texas State Agencies

- **General land office – manages State-owned natural resources.**
- **TCEQ – has established requirements heat pump/sink wells.**
- **SECO – part of Comptrollers Office promotes energy efficiency and alternative energy sources.**



HOOK 'EM HORNS!

Thank you!

Questions?