Parker County Study

July 25, 2012

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Railroad Commission of Texas

Chairman Barry T. Smitherman
Commissioner David Porter
Commissioner Buddy Garcia
Water Well Complaint

- Water Well producing natural gas
- Complaint filed with RRC Abilene District Office
- Range Resources
- EPA
- RRC Called Hearing
Chronology

• August 6, 2010 – Landowner files complaint of natural gas in domestic water well.

• August 6, 2010 – RRC District office staff inspects the water well, tests for chloride and notices gas smell.
Lipsky Water Well Schematic

Submersible Pump 180 ft

Total Depth 200 ft
Chronology

• August 10, 2010 – RRC District Office staff inspects nearby Range Production Wells (Butler 1-H, Teal 1-H) in near-by Hood County.

• August 11, 2010 – RRC staff meets land owner and other parties (TCEQ, consultant, County Fire Marshall) to collect water samples.
Chronology

• August 13, 2010 – Landowner contacts RRC. Consultant advised him to stay away from well due to gas concentration.

• August 17, 2010 – RRC staff resamples water well to test for dissolved constituents. EPA contacts RRC District Office.
Chronology

• August 19, 2010 – RRC staff contacts water well driller for well construction info. RRC staff contacts contract lab regarding gas sampling procedures.

• August 26, 2010 – RRC staff collects gas samples from water well. Witnessed by consultant and Attorney. Well owner notifies RRC that he will discontinue use of water well.
Chronology

• September 2, 2010 – Range Resources samples bradenhead gas from Butler 1-H.

• September 7, 2010 – RRC staff contact water well driller and discuss occurrence of gas in other water wells in the area.
Chronology

• September 13, 2010 – Landowner notifies RRC that he has moved his family out of the residence and retained legal counsel.

• September 16, 2010 – RRC staff contact Range Production Co. and request additional gas samples from Butler #1-H production tubing and bradenhead for composition and isotope analysis. Also request pressure test of production casing.
Chronology

• September 20, 2010 – Range collects gas samples.

• October 13, 2010 – Landowner contacts RRC District Office to advise that EPA will sample his well in late October to determine source of gas.

• October 15, 2010 – Range pressure tests Butler 1-H well. Held 845 psi.
Surface Casing = 394’  
BUQW = 195’  

- 6-1/8" Hole Drilled to - 9097' KB  
- 4-1/2" - 11.6# N-80, Casing Set @ 9054' KB  
- Cemented Back to 4580' Based on CBL

TOC = 4,580’  

TVD = 5,852’
TOC = 4,580'

Packer = 4,837'

Test Casing to 845 psig (40Min) on 10/15/10
Chronology

• October 21, 2010 – RRC staff in Austin and EPA staff discuss sampling objectives via telephone call.

• October 25, 2010 – RRC District Office requests additional gas samples from Range.
Chronology

• October 26, 2010 – Joint sampling (EPA, Range).
  – Range – production, injection (gas lift), bradenhead from Butler, and production gas from Teal.
  – EPA – water wells, production gas and water (Butler).
Chronology

• November 23, 2010 – EPA emails results to RRC staff. Invites RRC to attend meeting requested with Range on Dec 2.

• December 1, 2010 – RRC staff and EPA staff discuss sampling results. EPA notifies RRC staff that Range has declined meeting invite. EPA intends to issue a “finding of Endangerment”
Chronology

• December 3, 2010 – Range sends letter to RRC outlining plans for additional assessment.

• December 7, 2010 – EPA issues Emergency Administrative Order. Cites, among other things, data showing that gas in water well is thermogenic.
Chronology

• EPA Asserted its authority under Section 1431(a) of SDWA. Three conditions:
  ❑ A contaminant is present or likely to enter a USDW or PWS.
  ❑ The contaminant may present imminent and substantial danger to human health.
  ❑ Appropriate state and local authorities have not acted appropriately to protect human health.
Chronology


• EPA and water well owner did not accept invitation to participate.
Range Resources’ Actions

• Installed gas monitoring meters in residence
• Offered alternative water supply
• Performed Mechanical Integrity Test (MIT) of the Teal Unit #1-H (included spiral segmented cement bond log of production casing)
Range Resources’ Actions

- Performed soil gas survey.
- Sampled domestic water wells within 3,000-foot radius of Butler #1-H well. Water and headspace (gas) samples.
- Collected production gas samples from Teal and Butler wells and bradenhead gas sample from Butler well.
Range Resources’ Actions

• Water samples were analyzed for a variety of dissolved constituents including VOCs, SVOC’s, dissolved gases, metals, and more.

• Gas samples were tested for composition of hydrocarbon and non-hydrocarbon gases, (methane, ethane, ethene, N₂, etc.) and isotopic composition of methane, ethane, propane, CO₂ and N₂.
Range Resources’ Findings

- MIT and cement bond log of Teal #1-H well confirmed no leakage.
- Geochemical fingerprinting showed that gas in water well was thermogenic but could be distinguished from Barnett Shale gas based on nitrogen content.
Stable carbon and hydrogen isotopic composition ranges of methanes from different sources

(Reference: Coleman. 1993; Schoell. 1980)
Figure 6: This plot is similar to Figure 5, but is constrained to samples form Parker and Hood Counties. These data demonstrate that the natural gas in the Lipsky and Purdue water wells is the type of nitrogen-rich gas that occurs only in Pennsylvanian reservoirs in the Fort Worth Basin.
Range Resources’ Findings

• Water well sampling showed no exceedances of human health standards. Small concentrations of dissolved gas present. Head-space gas identified as nitrogen-rich gas associated with shallow source.

• Soil gas survey found trace amounts of gas consistent with natural seepage over petroliferous basin.
Range Resources’ Findings

- 3-dimensional seismic data indicates no evidence of faulting in the area of the water wells.
- Microseismic data available for more than 320 fracture stimulations in Parker County indicated a maximum fracture height of approximately 400 feet.
Range Resources’ Findings

• Provided evidence of occurrence of gas in aquifer prior to the completion of their Butler #1-H and Teal #1-H wells.
Outcome of RRC Hearing

- Based on the Hearings Examiner’s proposal for decision, the Commission found that Range Resources’ natural gas wells (should) be allowed to continue to produce as the wells are not causing or contributing to contamination of any Parker County domestic water wells (March 22, 2011).
Water Well Driller's Log Cross Section in Proximity of Butler #1H Well

Twin Mountains sands

Strawn Formation

Texas Commission on Environmental Quality
Surface Casing Team
John D. Estep, P.G.
December 21, 2010

Location Map
Review of Complaint Investigation Approach

• Inspect and evaluate water well conditions.
• Inspect and evaluate nearby oil and gas operations. Test for well integrity.
• Identify pathways.
  – Physical approach
  – Geochemical approach
• Investigate alternative sources and other occurrences of contamination.
Final thought

• It’s a group effort.
  – Regulatory agencies
  – Oil and gas operators
  – Water well drillers
  – Homeowners
  – Local authorities
Railroad Commission Website

http://www.rrc.state.tx.us
Contact Information

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