

Summary of “Evaluation of the Potential for CO₂ and Gas Leakage Along Wellbores” Watson, T.L. and Bachu, S.

Society of Petroleum Engineers Drilling and Completion, March 2009, pp. 115-126
<http://www.spe.org/ejournals/jsp/journalapp.jsp?pageType=Preview&jid=EDC&mid=SPE-106817-PA&pdfChronicleId=09014762801af812>

Presented to San Miguel County Oil and Gas Task Force, 1/03/2012

This study, published in the Society of Petroleum Engineers Drilling and Completion Journal, focused on the leakage characteristics of over 300,000 oil and/or gas wells drilled in Alberta, Canada. Intended to study the viability of using existing wells for long-term CO₂ sequestration, it tracked the integrity of sub-sets of wells through bond logs and measured movement of gas (1) through the annuli of the well bore, and (2) outside the well casing.

Findings and Conclusions

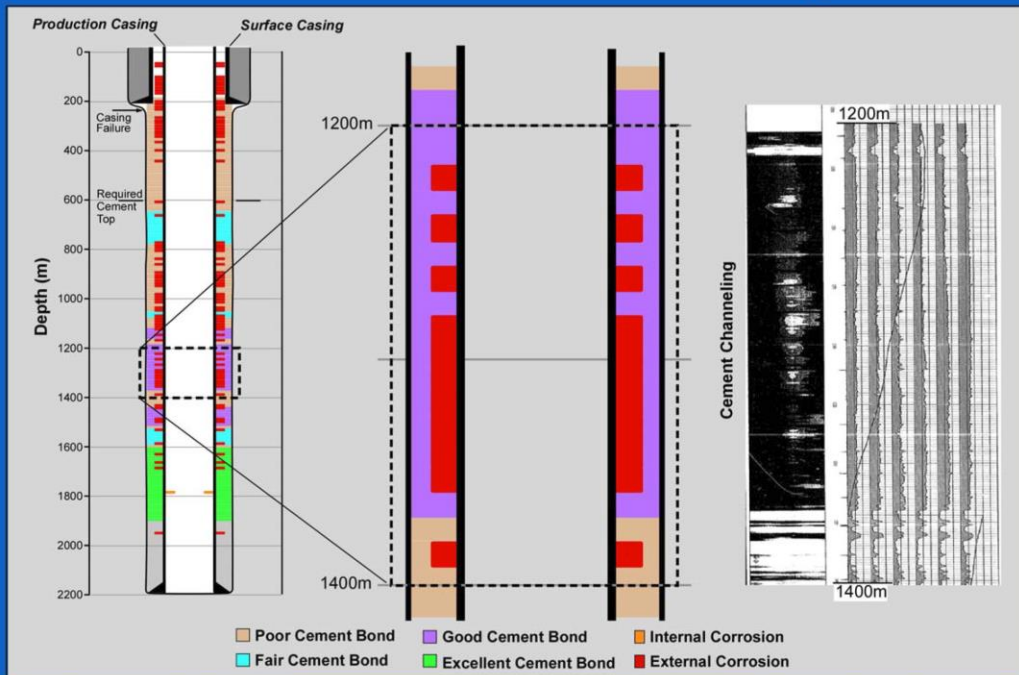
- Approximately 2 – 14% of cased wells had leakage (depending on data aggregation)
- Major factors affecting well leakage:
 - Geographic area of drilling: geologic conditions, location of gas reservoirs
 - Type of well and abandonment: well casing, abandonment plugs and caps
 - Slanted or Crooked Bores = More Wells Leak
 - Oil Prices Up = More Wells Leak:
 - > *“The pressure to do more [drilling] with less [equipment] may have had impacts on primary-cementing-placement practices.”*
 - Stricter Regulations and Testing = Fewer Wells Leak:
 - > *“Enforced regulations are critical”* in controlling wellbore leakage
 - Uncemented Casing/Hole Annulus = More Wells Leak:
 - > Over 30% of well casings had internal or external corrosion
 - > Good quality cementing protects against cement degradation and casing corrosion
 - > Deeper wellbore sections tend to be better sealed
 - Well bore leakage may increase over time
 - In some instances, good well caps may increase pressure and cause leakage elsewhere

Note: Hydraulic fracturing was not included in study analysis

In a presentation of these materials “Factors Affecting or Indicating Potential Wellbore Leakage”, the authors state:

“It is not the CO₂ injection wells that may/will pose a risk, they will be properly constructed and monitored, and, relatively speaking won’t be too many. It is the existing wells that will pose the greater risk!”

Example of Well Log Analysis Showing Corrosion Due to Cement Channeling



Interpretation of Cement Bond Logs in the Same Well in the Zama Field

