



Havtil

Norwegian Ocean  
Industry Authority

**Cement Bond Logging- Foam Cement**

# Agenda

- Introduction
- Foam Cement
- Foam Cement Literature Review
- Acoustic Logging Of Foam Cement
- Foam Cement In The NCS
- Workshop



# Introduction

- Background:
  - NORSOK “logging of dual barriers”.
  - Foam cement, increasingly used in NCS - particularly in depleted reservoirs.
  - Logging of foam cement is challenging due to the low acoustic impedance.
  - Limited literature available (e.g. SPE) on foam cement evaluation.
  - Limited (unknown) experience with log interpretation of foam cement on NCS among operators/service providers.



# Introduction

- Study
  - Gather information on foam cementing
  - Workshop



# Foam Cement

- Advantages
  - Tailored density
  - Enhanced zonal isolation
  - Improved elasticity and stress tolerances.
  - Efficient mud displacement
- Challenges
  - Foam stability
  - Complex design and execution
  - Handling of foam in cement return at surface
  - Logging and evaluation



# Foam Cement

- Foam cement application
  - Depleted reservoirs
  - Deepwater wells
  - High angle wells
  - Weak or fractured formations

# Acoustic Logging Of Foam Cement

- 2 main categories of logging tools
  - CBL – Cement Bond log
  - Pulse Echo Ultrasonic Imaging tools (e.g. USIT)

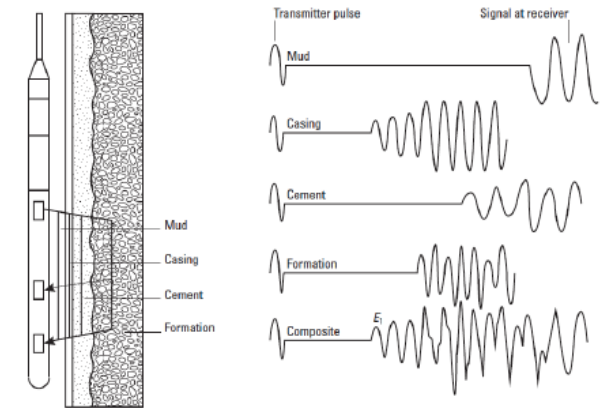


Fig. 4.1 Sonic tool response  
Nelson, E. G. (2006). Well Cementing, Second Edition

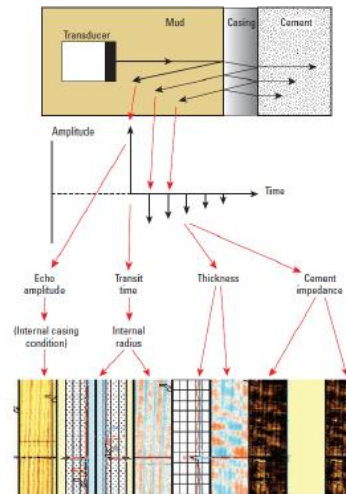
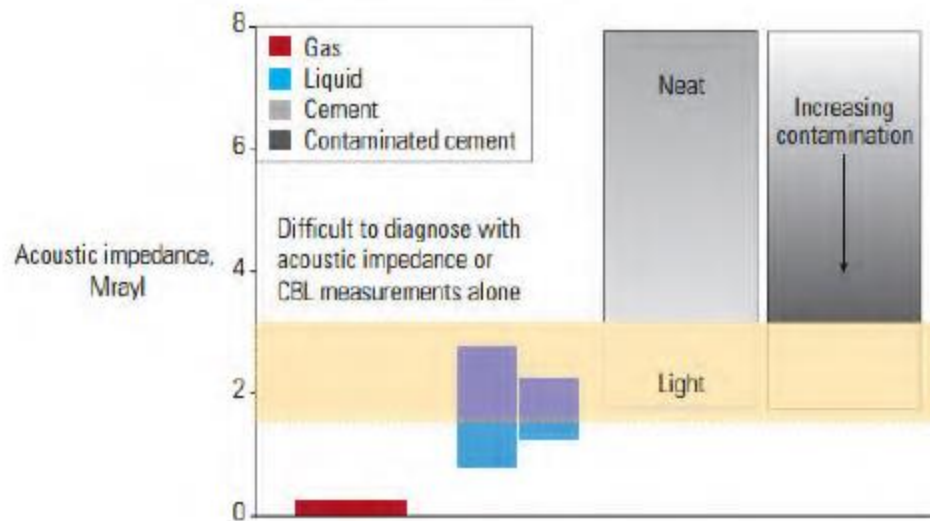
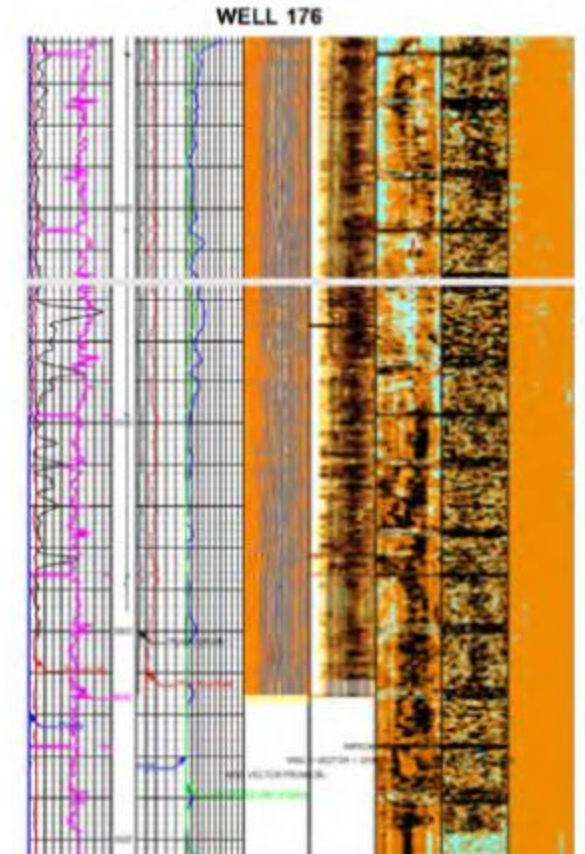


Fig. 4.2 Ultrasonic principles and measurements  
Nelson, E. G. (2006). Well Cementing, Second Edition

$$Z = \rho v$$

# Foam Cement World Wide Literature Review

- 4 SPE papers.
  - SPE 79912 (2003),: Eldfisk field (CoP), 10 wells, 5" liner , 1.83 SG base slurry, foamed to 1.34-1.39 SG
  - SPE 99097(2020): Chichimene field (Ecopetrol, Colombia), 20 wells, 7" liner, 1.98 SG base slurry, foamed to 1.62 SG
  - SPE 55649 (1999), Halliburton
  - SPE 11980, (1984), SLB
- SPE 204040, SLB (2021), 1.94 SG base slurry, foamed to 1.70 SG





# Workshop Summary

- Summarize
  - Foam cement in NCS
  - Timing of logging
  - Evidence of leakage
- Recommendation
  - Simulation, lab testing etc
  - Industry-wide team
  - Training

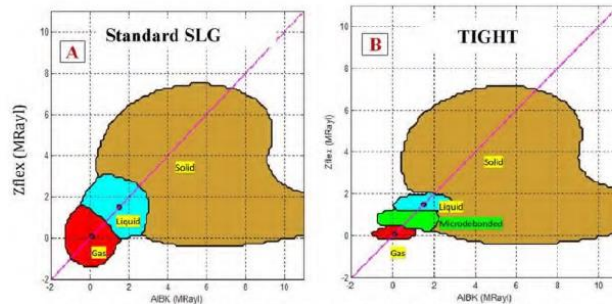


# Other info

Work to be published



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Standard SLG vs TIGHT Model Processing Cross-Plots (SPE-185731-MS).

Dear Amit Govil:

Thank you for acknowledging the acceptance of your Paper **SPE-223648-MS**, "Multi-well Field Examples For Lightweight Cement Evaluation Using Tight Processing From Pulse-echo And Pitch-catch Data." (Control # 25DC-P-216-SPE) for the 2025 SPE/IADC International Drilling Conference and Exhibition to be held 4-6 March 2025 in Stavanger, Norway.

An agreement to present a paper at this SPE conference carries an **OBLIGATION** to participate in the event. If you are unable to present, you must notify your session chair and SPE prior to the conference start date. Please include your SPE paper number in all correspondence.

**Advise your company/organization and co-authors NOW that you have been accepted to begin the approval process for you to prepare, attend and present your paper.**

**The failure of conference authors to have at least one designated individual present the paper at the conference will result in the conference paper being permanently withdrawn from the SPE technical paper archive in OnePetro.**

Details regarding the date and time of your presentation are listed below.

Your Paper Number: SPE-223648-MS

Session: 02 - Cementing & Zonal Isolation I; Tuesday Mar 4 2025 1:30 PM - 3:10 PM Room 3

Author Kit: <https://www.drillingconference.org/call-for-papers/author-kit>

- The Manuscript DRAFT is due to Session Chairpersons by Tuesday, 19 November 11:59 PM Central Time
- SPE's online Paper Management System requires electronic submission of manuscripts and forms by the **Manuscript deadline**: Thursday, 5 December 2024 11:59 PM Central Time.



# Questions





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