

A Salt Mine as a Neutrino Telescope

Preliminary work by

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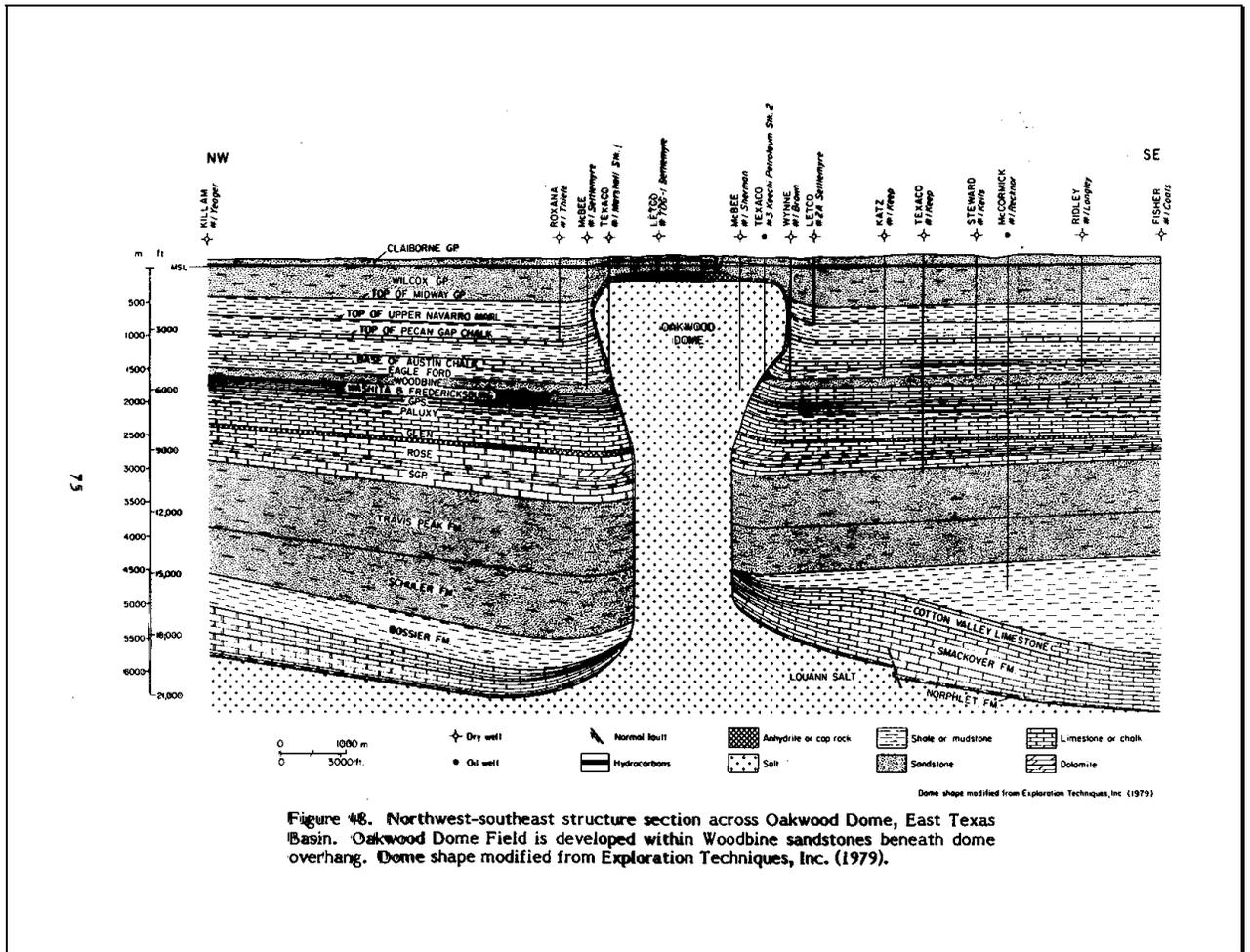


Figure 48. Northwest-southeast structure section across Oakwood Dome, East Texas Basin. Oakwood Dome Field is developed within Woodbine sandstones beneath dome overhang. Dome shape modified from Exploration Techniques, Inc. (1979).

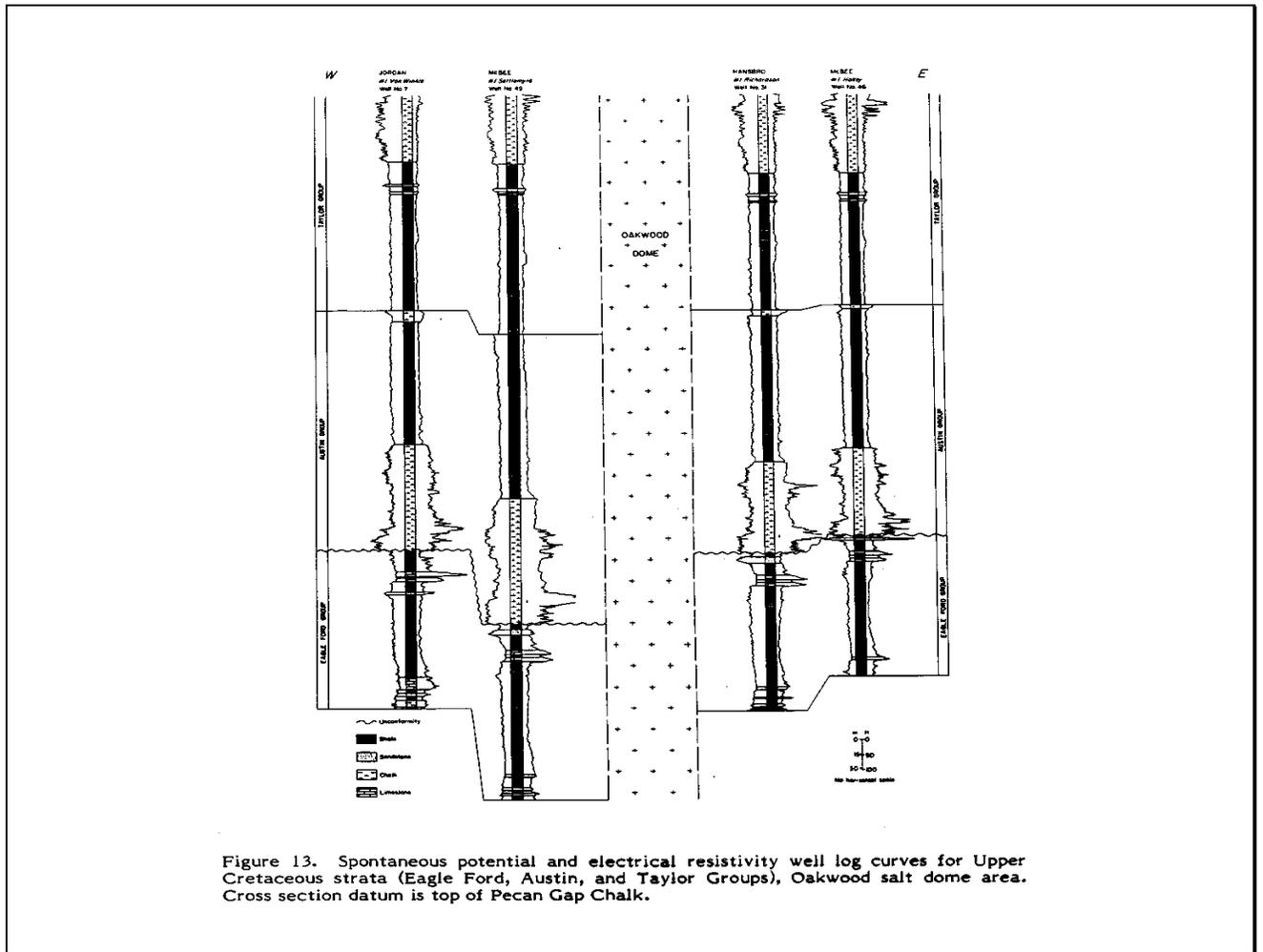


Figure 13. Spontaneous potential and electrical resistivity well log curves for Upper Cretaceous strata (Eagle Ford, Austin, and Taylor Groups), Oakwood salt dome area. Cross section datum is top of Pecan Gap Chalk.

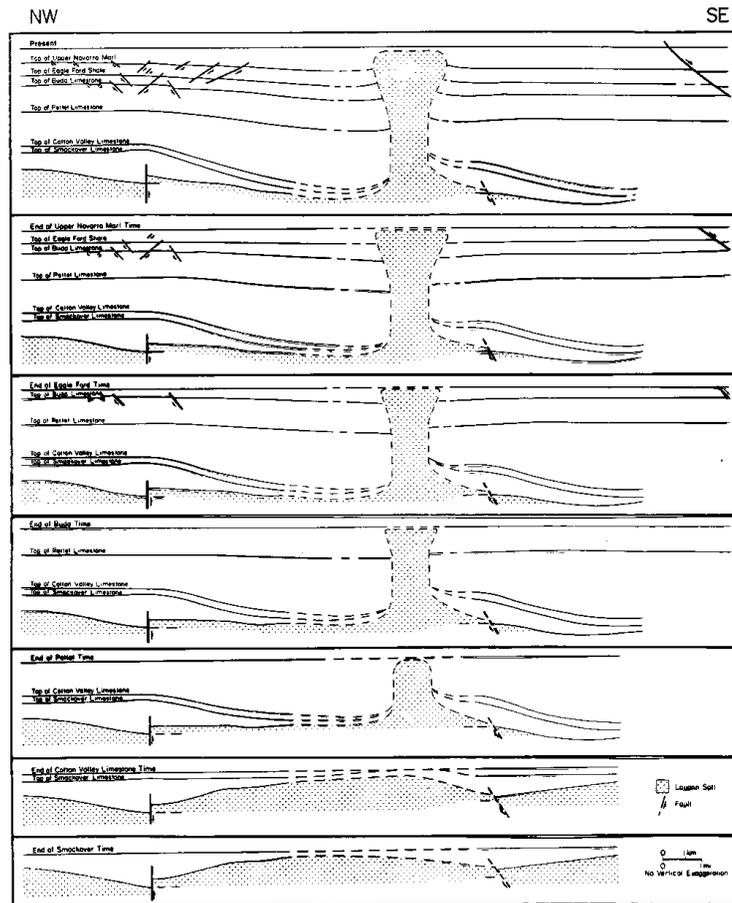
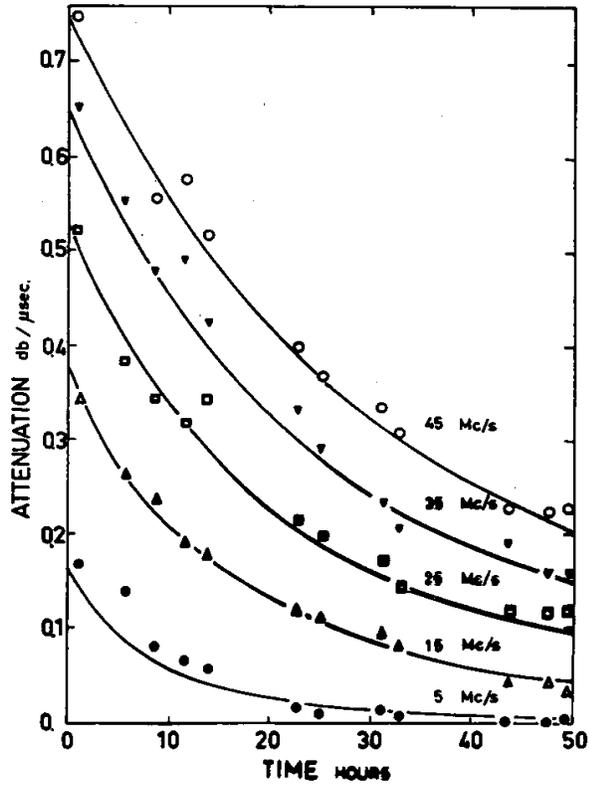


Figure 21. Growth reconstruction of Oakwood Dome, East Texas. Cross section based on seismic reflection profile. Dashed line indicates where seismic reflections are indistinct or absent. Seismic profile courtesy of Law Engineering Testing Co.



6. The dislocation attenuation in copper, measured as a function of annealing time, for the frequencies 5, 15, 25, 35, and 45 Mc/sec. The measurements are for compressional waves in the [100] direction. The solid curves are theoretical curves from Granato and Granato (1962).

$$1 \text{ db}/\mu\text{sec} = \epsilon (\text{db}/\text{cm}) \times 10^{-6} \text{ cm}/\text{sec}$$

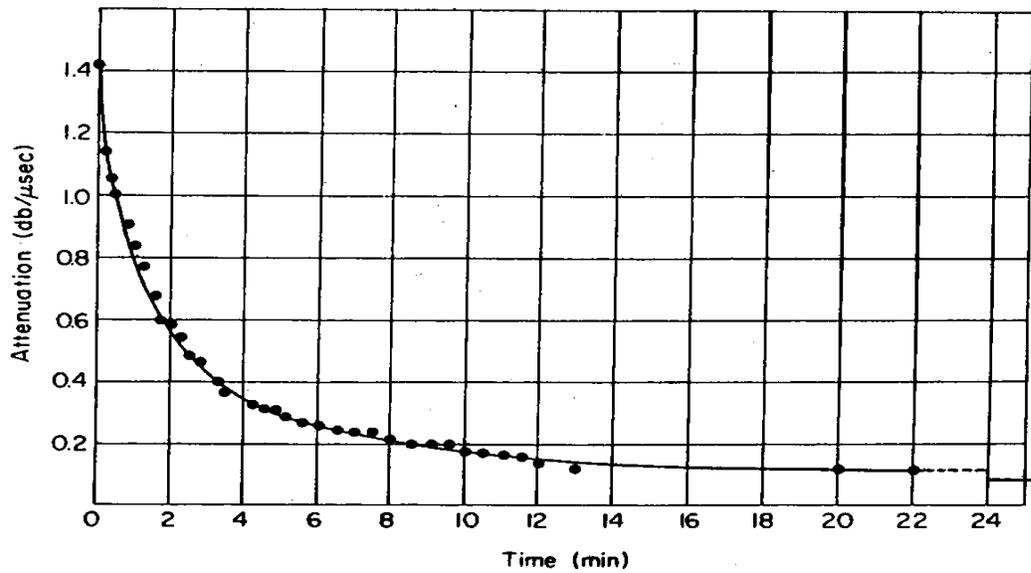
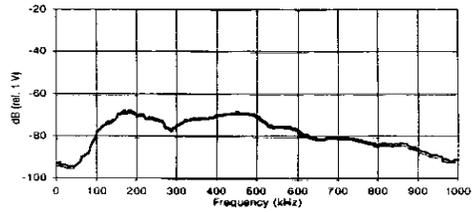
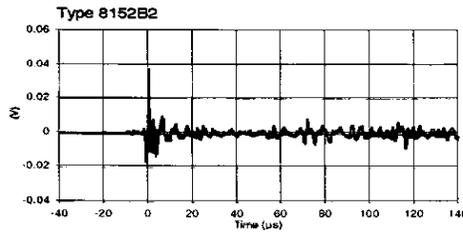
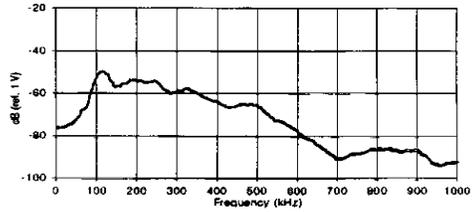
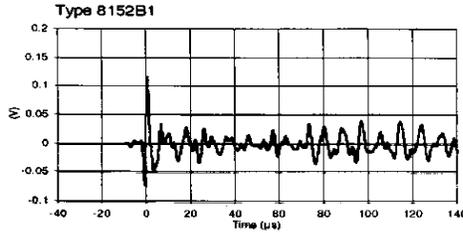
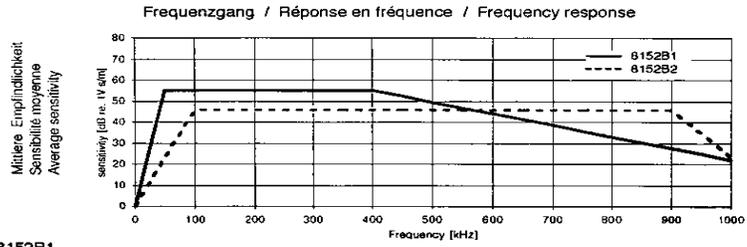


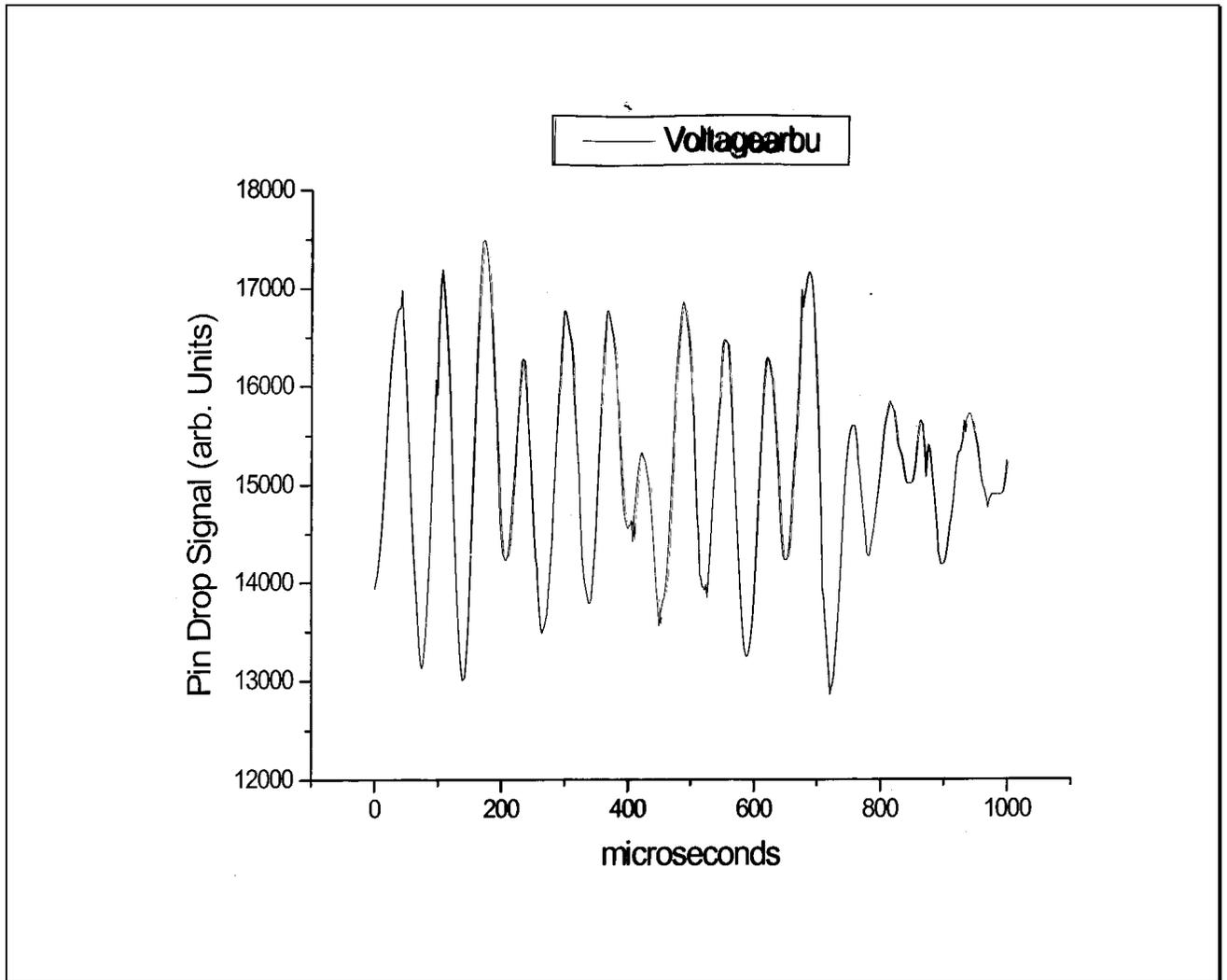
Fig. 3-11. Attenuation as a function of irradiation time for deformed NaCl single crystal (Truell [50]).



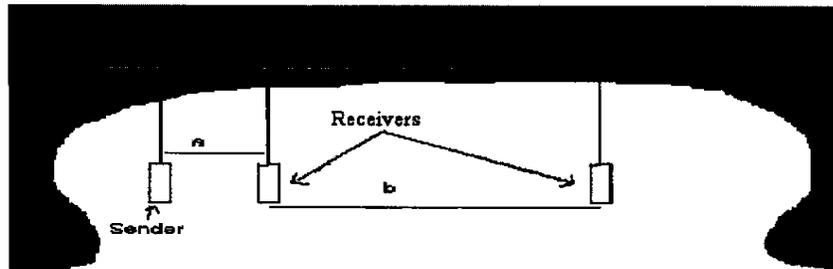
AE-Signal (links) und sein Frequenzspektrum (rechts) beim Brechen einer 0,5 mm, 2H Bleistiftmine auf einer Stahlplatte 262x262x40 mm (Test nach Nielsen und Hsu, ASTM Standard E976-84). Anregungspunkt und AE-Sensor sind, mit 50 mm Abstand, auf der gleichen Fläche.

Signal AE (à gauche) et son spectre de fréquences (à droite) généré lors de la rupture d'une mine de crayon 2H de 0,5 mm sur une plaque en acier 262x262x40 mm (test selon Nielsen et Hsu, ASTM Standard E976-84). Le capteur d'émission acoustique piezotron et point d'excitation sont sur la même surface à une distance de 50 mm.

AE-signal (left) and its frequency spectrum (right) when breaking a 0,5mm, 2H pencil lead on a steel plate 262x262x40 mm. (Test after Nielsen and Hsu, ASTM Standard E976-84). Sensor and point of excitation, are, 50 mm apart, on the same face.



Experimental Setup



- The Sender acts as a point source, which makes the power drop with $\frac{1}{r^2}$.
- Since power is proportional to the amplitude of the sound wave squared, then the wave amplitude drops like $\frac{1}{r}$.
- Scattering and absorption contribute a spatial exponential decay.
- $\psi(r, t) = \frac{A}{r} \exp(-\alpha r) \cos(\omega t - kr + \phi)$
- $\omega \approx 2\pi(50\text{kHz})$, and $\lambda \approx 0.034$ meters.
- Assuming the same coupling coefficient for the two receivers,

$$\alpha = \frac{-\ln(R_a a / R_b b)}{(a + b)}. \text{ Where } R_a \text{ is the signal amplitude at a distance } a, \text{ and } R_b \text{ is the signal amplitude at a distance } b.$$

- $a \approx 10\text{meters}$, and $b \approx 100\text{meters}$.

