

SOLUTION MINING RESEARCH INSTITUTE

812 MURIEL STREET
WOODSTOCK, ILLINOIS 60098
815-338-8579

MEETING
PAPER



AUDIO NOISE SERVICE

Donald A. Hayes

Schlumberger Well Services

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INTRODUCTION

The use of "noise" logging in oil and gas wells is well documented. It is the object of this paper to expand the use of the noise log to storage wells and its use in the evaluation of the cement behind the casing. This "behind the casing" evaluation could aid in identifying any potential cement problems (i.e. channels) during a routine pressure test of a storage well. The same principles that apply in oil and gas well evaluation are valid in storage wells.

Noise logging has been around since 1955, when Enright attempted to locate a downhole leak with a listening device. In March, 1973, Dr. R. M. McKinley of Exxon Production Research published a paper in the *Journal of Petroleum Technology*¹. This paper, based on theoretical and empirical concepts, serve as the baseline from which almost all noise log interpretation is currently developed.

The noise in the well that the tool responds to is a function of the acceleration, or turbulence, of a fluid moving across a pressure differential.

$$\text{Noise} = f (\Delta P, Q)$$

By varying the pressure differential or flow rate or both, various types of noise can be generated. The noises can be characterized and categorized into different groups by examining the frequency spectrum of the total signal.

Information from the frequency spectrum concerning fluid flow can be useful with regard to locating and evaluating:

1. Behind casing channels;
2. producing perforations;
3. tubing and/or casing leaks;
4. zones lost circulation while drilling.

The Audio Noise Service employs a tool built by Southwest Industrial Electronics (SIE) based on a tool developed by Exxon Production Research Company (EPRCO). The surface instrumentation, responding to downhole noise, displays four frequency cut curves - 2000 Hz, 1000 Hz, 600 Hz, and 200 Hz. This service requires the tool to be stopped when readings of borehole noise are taken.