

ANALYSIS OF CRACKS IN RESIDENCES NEAR THE HOMESTAKE MINING COMPANY OPEN CUT MINE

David G. McDowall
Chief Mine Engineer, Open Cut Mine
Homestake Mining Company
Lead, South Dakota

Claude R. Ayoub
South Dakota School of Mines and Technology
Rapid City, South Dakota

Charles A. Kliche
Assistant Professor of Mining Engineering
South Dakota School of Mines and Technology
Rapid City, South Dakota

ABSTRACT

Homestake Mining Company's Open Cut Mine is located in Lead, South Dakota, in the northern Black Hills. The mine is within 300 feet of occupied residences on the south end, and within 1200 feet on the north end. Mining began at the north end of the open pit in October, 1983, and blasting related complaints began almost immediately. Noise and ground movement comprised the majority of the structural damage claims. As a result of these complaints, Homestake purchased a recording seismograph and began monitoring nearly every blast. In addition, the company hired a consultant to review Homestake's blasting and monitoring practices. He was also asked to do a single, one-time study of the cracks in six homes. This initial work led to Homestake monitoring all blasts with three seismographs and having South Dakota School of Mines and Technology do a year-long study of crack development and propagation in five homes in Lead.

Three of the houses were located in the immediate vicinity of the Open Cut and were the project "test houses." The other two houses, called "control houses," were located at such a distance from the Open Cut so as to not be affected by blasting. Three phases of monitoring were conducted; the initial investigation consisted of detailed photo logs and crack mapping, the second phase consisted of a quarterly visit to each house to record changes, and the final phase consisted of a follow-up visit to verify the conclusions. This paper presents the events leading up to the study and the results of the year-long investigation.