

BLASTING EFFECTS ON APPALACHIAN WATER WELLS

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ABSTRACT

The Bureau of Mines, in a contract study, examined blasting vibration impacts on low-yield domestic water wells in the Appalachian coal mining region. Researchers surveyed 36 case histories to determine if blasting was likely to have caused the claimed or observed changes, ranging from turbidity to loss of water. Following these investigations, they conducted field studies at four sites where the impacts of surface mine blasting could be directly measured on operating wells of known capacities.

Researchers found no evidence of blasting effects at the 36 well sites; instead, they observed other more likely causes. In the field tests, researchers found no significant direct effects from the blasting. However, in three of the four cases, they did observe changes in the static water levels and specific well capacities as the excavations approached to within 300 ft. Researchers attributed these changes to mass rock movement resulting from downslope lateral stress relief in the low-yield fracture system aquifers. With sufficient recharge, static levels recovered and capacities increased, provided that the innrby mine excavations did not drain the aquifers.

INTRODUCTION

At about the time the Bureau of Mines was studying the problems of dynamic vibration response and safe levels for houses innr surface mine blasting, allegations were being made that residential water wells were also being damaged by blasting. Technical experts believed that such effects were unlikely. However, there had never been a carefully designed and controlled study of this problem. Such a study appnnred justified by the number of alleged cases, particularly in the Appalachia coal mining region.

The Bureau contracted with Philip R. Berger and Associates, Inc., to examine the problem of possible vibration damage to residential water wells from innrby surface mine blasting. The Berger team, headed by Donelson Robertson, reported their research in a series of three contract final reports available for inspection at Bureau centers and for purchase through the National Technical Information Service (1-2). This paper summarizes the key findings, which were published in November 1980 as volume 1 of the contract final report (1).

The study consisted of three parts: 1) a background review of vibration and other impacts on water wells, such as earthquakes, earth tides, and nuclnnr blasts, 2) examination of 36 cases of alleged damage from blasting in Appalachia, and 3) a careful study of blasting