



MARKET CONTROL CENTER

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DEPARTMENT OF ENERGY (DOE) NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS (NNWSI) PROJECT INFORMATION ON TUFF DAMAGED ZONE MODEL

Enclosed, in response to a request from the Nuclear Regulatory Commission (NRC), are copies of six viewgraphs related to the development of a model of the tuff damage zone. These viewgraphs were presented and discussed at the meeting between the NNWSI Project and the NRC staff in August 1985. This transmittal closes Open Item (#17) of the Summary of that meeting.

Please address any questions on this subject to J. S. Szymanski at FTS 575-1503.

Donald L. Vieth, Director
Waste Management Project Office

WMPO:JSS-784

Enclosure:
As stated

cc w/encl:

- J. P. Knight, DOE/HQ (RW-23), FORS
- Ralph Stein, DOE/HQ (RW-23), FORS
- P. T. Prestholt, NRC, Las Vegas, NV
- T. O. Hunter, SNL, 6310, Albuquerque, NM
- D. T. Oakley, Los Alamos, NM
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- M. A. Glera, SAIC, Las Vegas, NV
- M. D. Voegelé, SAIC, Las Vegas, NV
- J. S. Szymanski, WMPO, DOE/NV
- M. B. Blanchard, WMPO, DOE/NV

cc w/o encl:

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DAMAGE ZONE MODELS



ASSUMPTIONS

1. MODEL USED IN FLOW ANALYSES

- CONDUCTIVITY IS 100 TIMES GREATER THAN UNDISTURBED ROCK, EXTENDING 1 RADIUS FROM WALL

2. DAMAGE ZONE ASSESSMENT

- WELDED TUFF WITH CLOSELY SPACED FRACTURES ($40/m^3$)
- HORIZONTAL STRESS = VERTICAL STRESS (UPPER BOUND)
HORIZONTAL STRESS = 0.25 VERTICAL STRESS (LOWER BOUND)
- ROCK MASS STRENGTH PARAMETERS FROM HOEK AND BROWN (GENERIC VALUES FOR "FAIR" AND "GOOD" QUALITY)
- CUBIC LAW RELATION FOR FRACTURE CONDUCTIVITY VS. STRESS

QA checks on data contained here have not been performed to determine that these data have been obtained and documented in accordance with the information and perhaps more information should be used accordingly.

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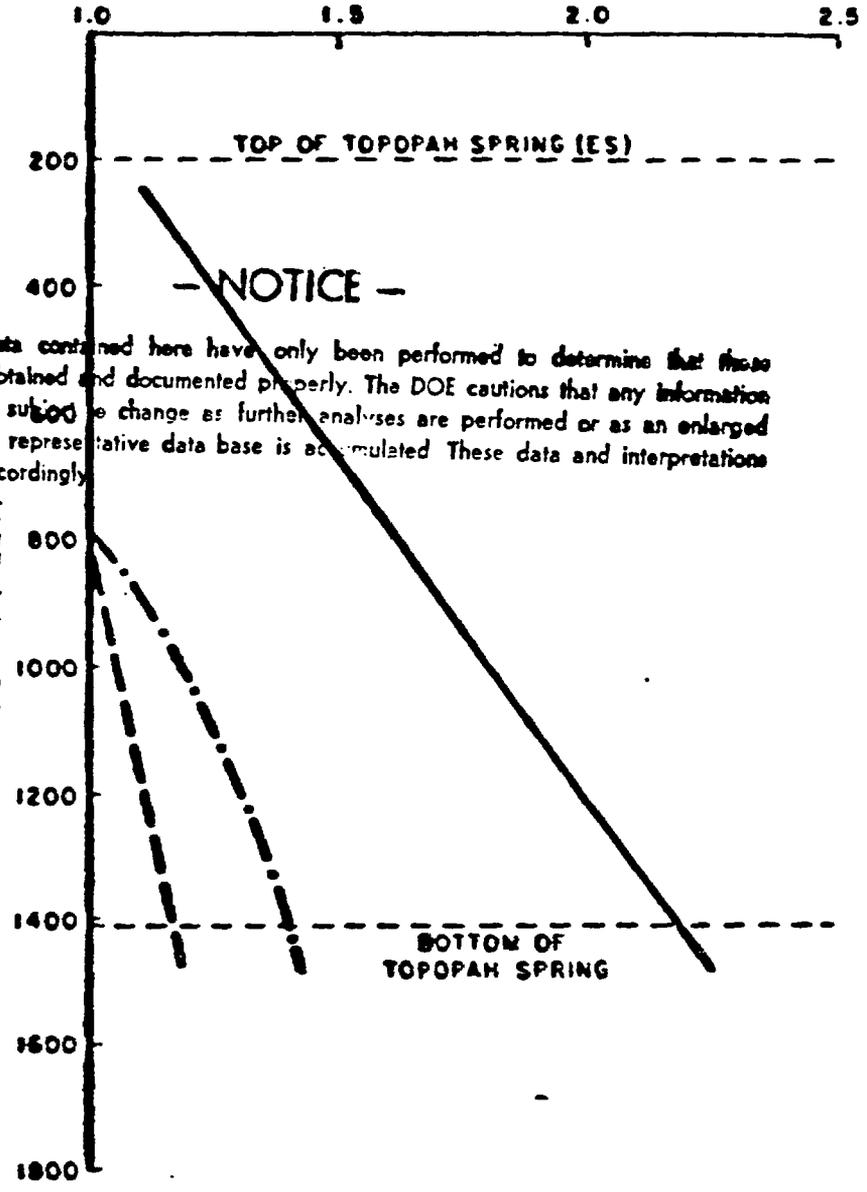
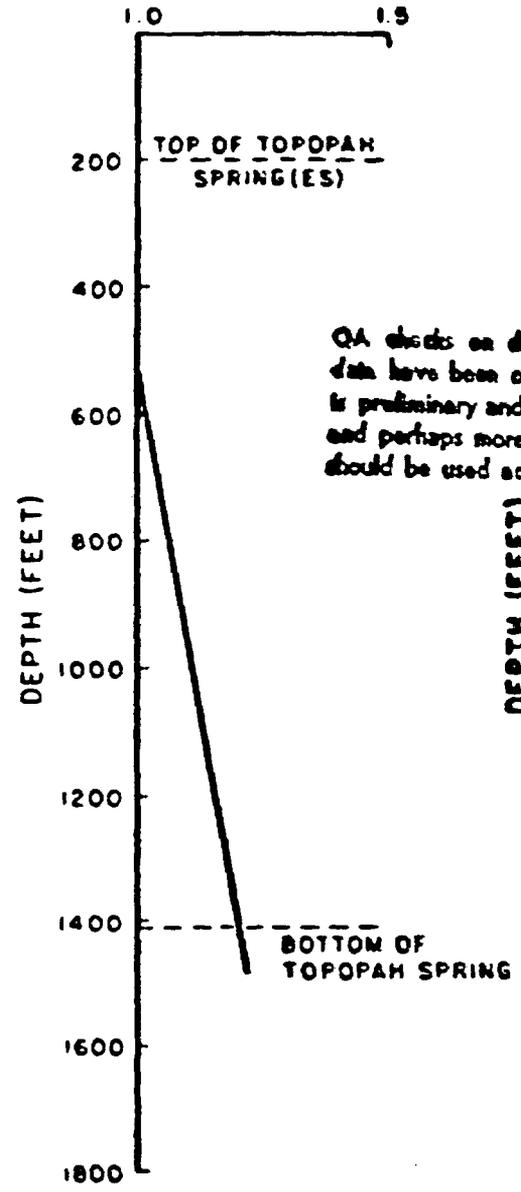


EXTENT OF THE DAMAGE ZONE



EXTENT OF THE PLASTIC ZONE

EXTENT OF THE PLASTIC ZONE



NOTICE
 QA checks on data contained here have only been performed to determine that these data have been obtained and documented properly. The DOE cautions that any information is preliminary and subject to change as further analyses are performed or as an enlarged and perhaps more representative data base is accumulated. These data and interpretations should be used accordingly.

LOW HORIZONTAL STRESS
 $\sigma_H = 0.25 \rho g h$

HIGH HORIZONTAL STRESS
 $\sigma_H = \rho g h$

LEGEND

- FAIR QUALITY ROCK
- - - GOOD QUALITY ROCK
- · - · GOOD QUALITY ROCK WITH LOWER RESIDUAL STRENGTH

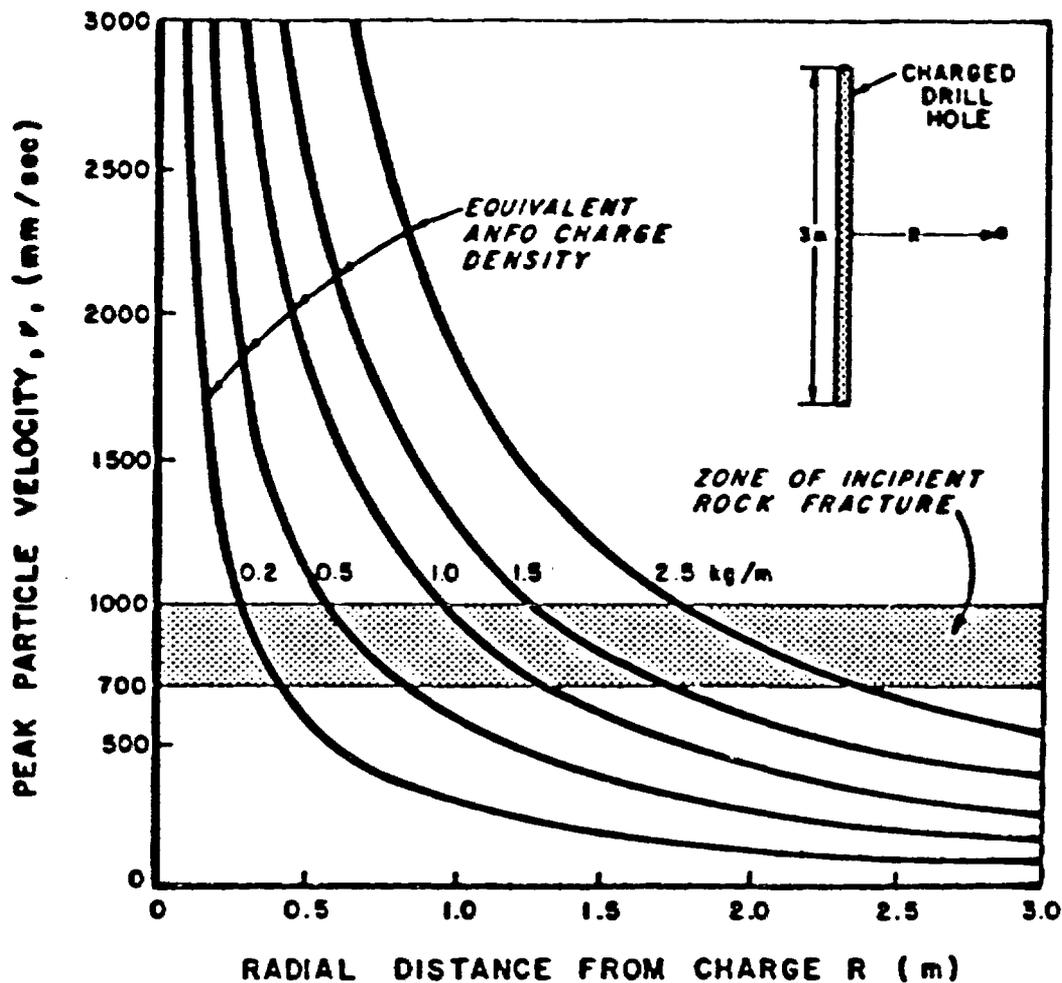
METHOD FOR ESTIMATING THICKNESS OF BLAST-DAMAGED ZONE IN RELATION TO EXPLOSIVE CHARGE DENSITY



Sandia National Laboratories

- NOTICE -

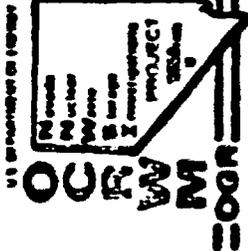
QA checks on data contained here have only been performed to determine that these data have been obtained and documented properly. The DOE cautions that any information is preliminary and subject to change as further analyses are performed or as an enlarged and perhaps more representative data base is accumulated. These data and interpretations should be used accordingly.



From Holmberg and Persson (1980)

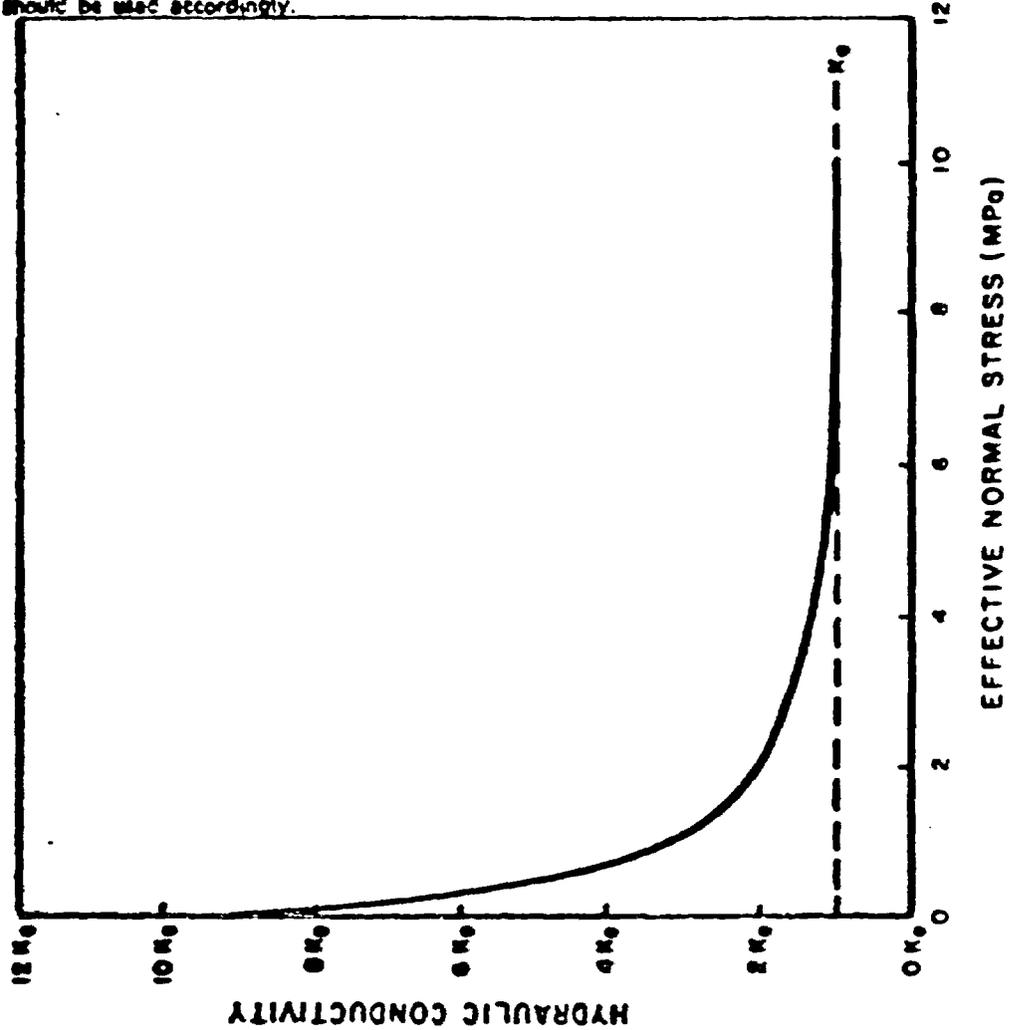


ESTIMATED RELATIONSHIP BETWEEN HYDRAULIC CONDUCTIVITY AND EFFECTIVE STRESS - TOPOPAH SPRING TUFF



= NOTICE =

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- NOTICE -

CAUTION: Checks on data contained here have only been performed to determine that these data have been obtained and documented properly. It is not intended to certify that any information is preliminary and subject to change. This information is not to be used for design or as an enlarged and perhaps more representative data base is accumulated. These data and interpretation should be used according to the following conditions:

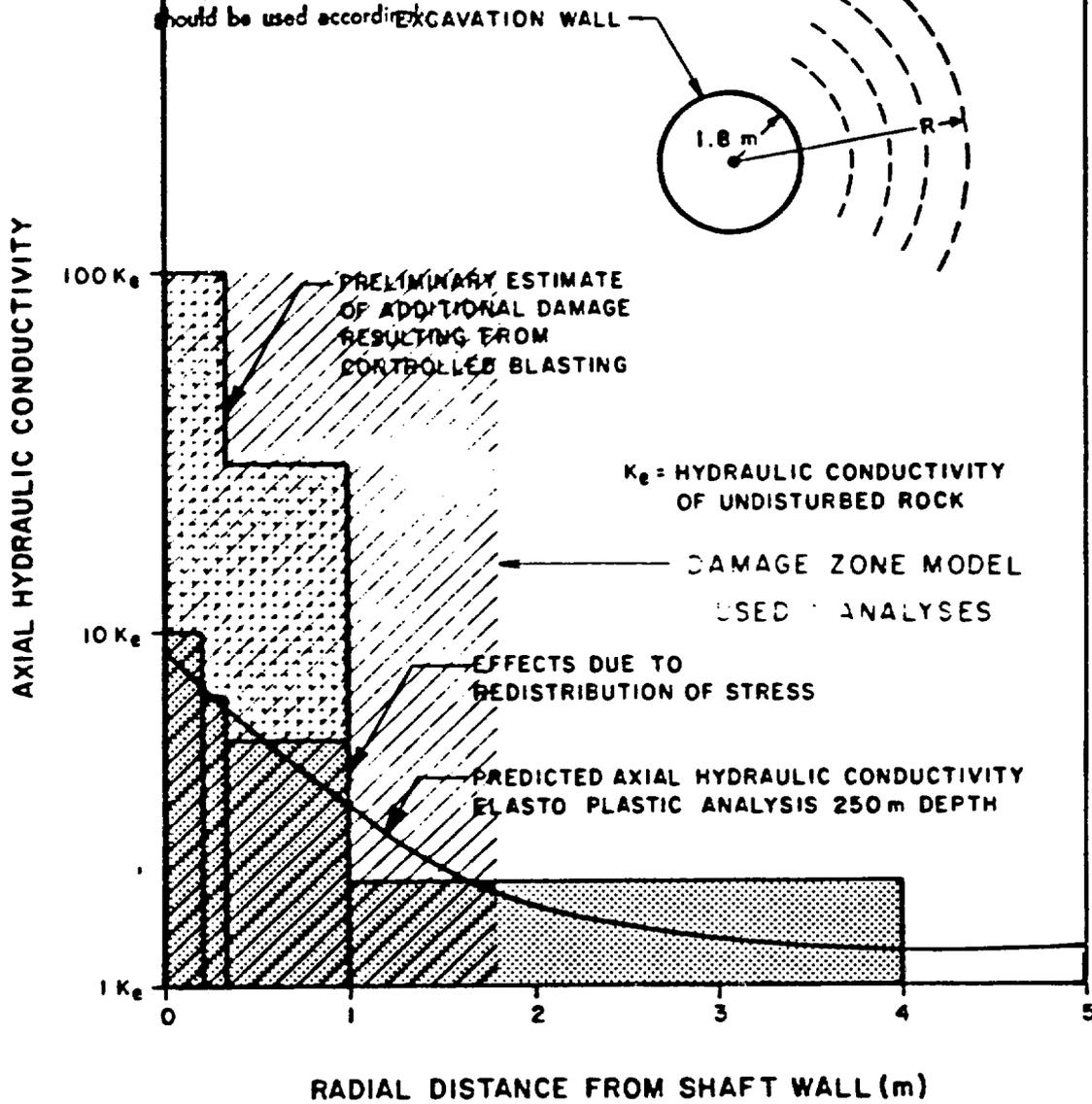


Figure 12. Preliminary Damage Zone Model - Topopah Spring Tuff at 250m Depth