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Mr. O. L. Olson  
 Director  
 Basalt Waste Isolation Division  
 U. S. Department of Energy  
 Richland Operations Office  
 P. O. Box 550  
 Richland, WA 99342

Dear Mr. Olson:

Enclosed for your information please find the Nuclear Regulatory Commission (NRC) staff review of document RHO-BW-SA-435P, "Time-Term Analysis of Upper Crustal Structures in the Columbia Basin, Washington." Should you have any questions concerning this review, please contact Paul Hildenbrand of my staff at FTS 427-4672 or Harold Lefevre of the Geotechnical Branch at FTS 427-4532.

Sincerely,

*JS*

John J. Linehan, Acting Branch Chief  
 Repository Projects Branch  
 Division of Waste Management  
 Office of Nuclear Material Safety  
 and Safeguards

Enclosure:  
 NRC Staff Review

WM Record File  
101.22

WM Project 10  
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BWIP DOCUMENT NO. RHO -BW -SA -435P

WMGT DOCUMENT REVIEW SHEET

FILE NUMBER : 3100 GT; 413.2 WM

DOCUMENT : "Time-term Analysis of Upper Crustal Structure in the Columbia Basin, Washington." by A. C. Rohay, D. W. Glover, and S. D. Malone, presented at: Seismological Society of America, Annual Meeting, Austin, Texas, April 14-17, 1985

REVIEWER : M. E. Blackford *MEB*

DATE REVIEW COMPLETED : 4-8-86

DATE APPROVED : N/A

SIGNIFICANCE TO WASTE MANAGEMENT PROGRAM :

The determination of time terms for the network of seismographic stations in eastern Washington is an important step in the development of a reasonable crustal model and set of station corrections which can be used to reduce the uncertainties associated with hypocentral locations of earthquakes in the Pasco Basin. Improvements in the hypocentral locations of earthquakes is important to the waste management program because of the need to identify, as precisely as possible, patterns of seismicity and their relationships to tectonically active structures which may affect the performance of a geologic repository.

BRIEF SUMMARY OF DOCUMENT :

The subject document appears to be an extended outline of material presented at the 1985 Seismological Society meeting and consists of an abstract and a set of detailed figure captions. The purpose of the document is to examine in detail arrival time data from a large scale USGS refraction experiment conducted in the Columbia Basin in 1984, as well as other data from regional quarry blasts, in order to develop a rationale for the observed systematic deviations from the average velocity curves for certain seismic refractors underlying the Columbia Basin.

The authors first analyze residuals associated with a 5.16 km/sec refractor. They find that there is an apparent dependence upon station elevation (0.48 sec/km) and surficial geology. With few exceptions, after making elevation corrections, time-terms for sediment-filled synclinal basins are on the order of 0.1 seconds whereas time-terms for stations located on the anticlinal ridges are approximately zero.

The authors next present evidence from borehole velocity logging to demonstrate that sediments immediately underlying the Columbia River basalts have a significantly lower seismic velocity. They then develop subsets of residual data to determine relative time-terms taking into account the low velocity sediments. The subsets, which include BWIP permanent and temporary networks, and UWGP permanent and temporary networks, all indicate a northeast to southwest trend of increasing time-terms for the basement refractor which has a seismic velocity of about 6.16 km/sec.

Finally the authors, using a simple velocity model, convert the basement time-terms to average depths-to-basement which, of course, reflect the northeast to southwest time-term trend. The depth to basement trends from about 1 to 2 km in the north and east to about 10 km in the central basin. Resolution of basement depth to the south and west is not as well-defined as in the north and east.

PROBLEMS, DEFICIENCIES OR LIMITATIONS OF REPORT :

The subject document's format appears to be an extended outline from which a speaker might make his presentation. As such, there is no formal development of the document's premise which is normally the case with a journal article or other similar report. This is particularly evident in Figure 3 concerning the elevation correction of 0.48 sec/km. Nowhere in the document is there a presentation of data to support this correction and in Figure 3 the evidence seems to support no elevation correction. There is also no development describing the derivation of the time-terms. Presumably the author described the derivation of correction and the time-terms in his presentation but that is of little use here.

Although the observations and conclusions of this document may be well-founded and supported by reliable data, the connection between the data and the conclusions is lacking. Moreover it is not clear whether the text of this document is supposed to represent detailed figure captions of actual premise development. The document is incomplete as it stands.

ACTION TAKEN :

N/A

ACTION RECOMMENDED :

N/A