State Department of Geology and Mineral Industries

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Portland 1, Oregon

Wheeler and Grant Counties

Clinoptilolite occurrences in central Oregon; preliminary investigation.

Introduction: Clinoptilolite is of interest to the Department, as R. E. Brown of the Chemical Effluents Branch of the Hanford Atomic Operation requested that we look for minable occurrences due to the minerals unique property of selectively removing Cesium 137 from atomic waste, Cesium 137 being one of the more lethal waste products generated in atomic fission.

Should sufficient quantities of clinoptilolite be found most of the atomic reactors in this country will require a sustained production of several tons a month according to Brown. There is thus a definite possibility that a mining operation of strategic importance to the atomic industry can be developed provided suitable occurrences of clinoptilolite can be found. In this connection a published description of clinoptilolite occurrences in central Oregon has been noted and is being investigated by the writers. This description, by Dr. R. L. Hay, occurs in an abstract of a talk given at the Pacific Coast Section of the GSA meeting, April 1962. Correspondence with Hay relative to this occurrence led to a field trip on July 18, 1962 with Dr. R. V. Fisher who did the mapping and is making a stratigraphic study of the John Day formation in Central Oregon. The data reported by Fisher and observed on the field trip is summarized in this report.

Location: The occurrences pointed out by Fisher are situated in the NW¼ of S. 36, T. 10 S., R. 25 E., Wheeler County and in the NE¼ of S. 19, T. 10 S., R. 26 E., Grant County. Both occurrences are within a mile of State Highway 19 and are readily accessable.

Geology: Fisher reports the clinoptilolite occurs as a replacement of a vitric tuff in the middle member of the John Day Formation and that X-ray examination has indicated a clinoptilolite content in excess of 95 percent. The samples from which this conclusion was obtained were grab samples but Fisher expressed the belief that the bed from which they were collected is lithologically uniform. Whether subsequent study will confirm this view or not, the bed is nevertheless 20 to 25 feet thick in the Wheeler County occurrence and 15 to 20 feet thick in the Grant County exposure. In both instances this bed occurs as a resistant capping surmounting softer tuffs exposed in low hills adjacent to the John Day River.

The Wheeler County occurrence was viewed from a vantage point at Fossil State Park. It is the largest of the two occurrences, covers an estimated two to three hundred acres of gently sloping plateau land and is the occurrence most advantageously located for a mining operation should subsequent testing at Hanford show the material to be suitable for their requirements. The Grant County occurrence is restricted in its exposure to a narrow bench on the flank of a steep hill side and is therefore less amenable to low-cost open pit mining on any prolonged basis. However, sufficient tonnage for a pilot operation and limited production can be obtained here more readily than from the Wheeler County occurrence.

Clinoptilolite can be identified from other zeolities only by specialized X-ray diffraction techniques. Because of this samples were taken from the upper, middle and lower portions of the Grant County exposure and have been sent to Hanford where facilities exist for identification. Further work on this investigation is being deferred pending receipt of word from R. E. Brown concerning the Hanford laboratory's findings with respect to the identity and suitability of the material as represented by these samples. It is

anticipated that more detailed mapping and sampling will be undertaken should the Hanford testing indicate more work is warranted.

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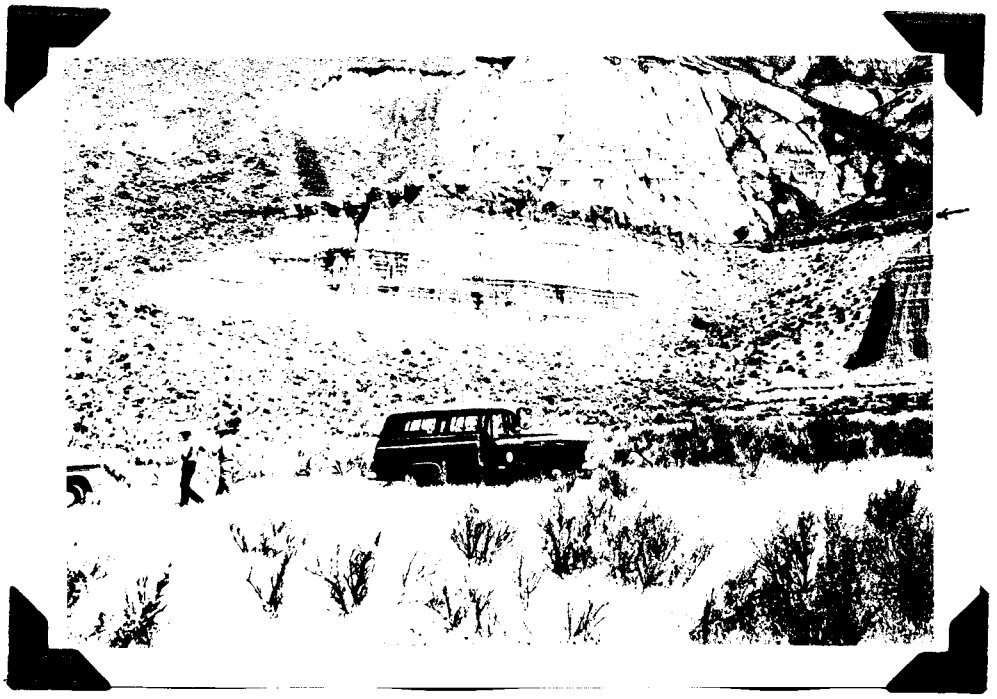
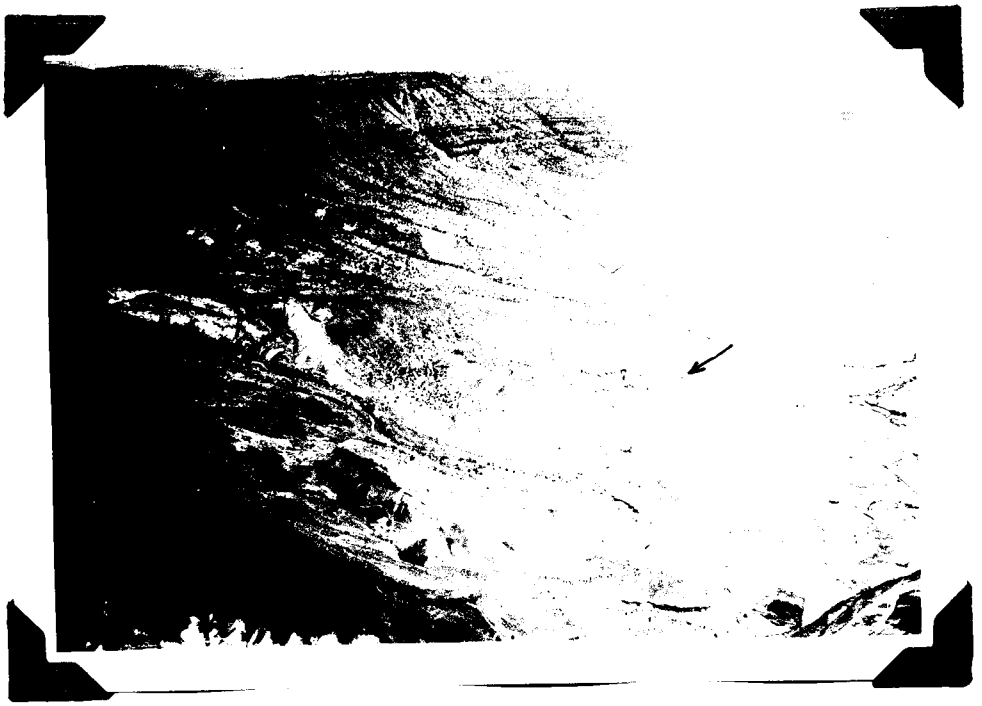
Report by: N. S. Wagner
R. G. Bowen
Date of Exam: July 18, 1962
Date of Report: Aug. 24, 1962

Clinoptilolite tuff, Grant County

Contact between massive clinoptilolite tuff and underlying tuffaceous shale, Grant County



Clinoptilolite bearing tuff, Grant County



Massive tuff bed replaced by clinoptilolite,
Wheeler County.