Bibliography of Energy Resources for Idaho

Roy M. Breckenridge, Bill Bonnichsen,
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Idaho Department of Lands
Bureau of Mines and Geology
Moscow, Idaho 83843

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CONTENTS

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by

Roy M. Breckenridge[1], Bill Bonnichsen[1],
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INTRODUCTION

This bibliography contains selected references for the geology-related energy resources of Idaho. It also compliments Idaho Bureau of Mines and Geology Map 3, *Energy Resources of Idaho*, by Breckenridge, Bennett, and Harbour (1980). The emphasis is on fossil fuels and radioactive minerals, and no attempt has been made to list references of hydroelectric power or alternative energy sources such as solar and wind. Citations are grouped into four major categories: coal, geothermal, oil and gas, and uranium, thorium, and rare earths.

Almost all resources with potential application for energy production have attracted recent exploration interest. Yet prospecting for these minerals and fuels is not new; each has been the subject of past exploration and research. Energy resources are a broad topic, and here we present literature that provides a general overview. The reader will find it a useful compilation of both current and past, but not outdated, geologic reports.

COAL

Low-grade coal and carbonaceous material are common in many areas of Idaho, but not much has been commercially mined due to the generally low quality and small size of the deposits. Lignite and carbonaceous material are commonly found in Tertiary sediments throughout the state, but most of the higher grade coal is found in Cretaceous rocks in southeastern Idaho. The Horseshoe Creek District and the Goose Creek District are the only areas regarded as having large tonnages.

Most published information on Idaho coal is in older reports. Almost no new work exists. The U. S. Department of Energy still uses figures presented by Kiilsgaard (1964) for the Demonstrated Reserve Base of Coal for Idaho. No production has been recorded since 1951. The future of coal development in Idaho may well depend on new technology for gasification and in situ development.

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GEOTHERMAL

The geothermal resources of Idaho have been recognized since the early western surveys of the 1800's. Idaho has had a long history of beneficial uses including space heating, fish farming, aquaculture, recreation, and food and industrial processing. Most of the recognized geothermal resources in the state are hydrothermal or hotwater and classed as low to intermediate (80° F to 200° F) in temperature. Geologically, the hydrothermal systems are mostly related to the basalts in the south or to the batholith in the middle of the state. In recent years geothermal resources have been the subject of much research by government as well as industry. The Idaho Department of Water Resources has served as a principal agency in Idaho for geothermal research and development. The following sources provide a broad base of information in both geology and hydrology.

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OIL AND GAS

Petroleum resources in Idaho have been the object of exploration since the early part of the century, but received renewed attention after the energy crisis of the 1970's. Currently most exploration is in two general areas: the Overthrust belt of eastern Idaho and the Tertiary sediments of western Idaho. The recent discoveries of large reserves in the Overthrust belt of Utah and Wyoming have prompted exploration in adjacent areas of Idaho where similar rocks and structures exist. Interest is still high in anticipation of an oil or gas discovery. Minor occurrences of gas in the Tertiary sediments of southwestern Idaho have long been a matter of record. Recent interest in these host rocks has spread exploration to the basalt interbeds at the basin margins all along the western border of Idaho.

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URANIUM, THORIUM, AND RARE EARTHS

Radioactive minerals occur in many parts of Idaho in several types of deposits. The production of uranium and thorium in the state has been minor, although the deposits have been widely studied especially by the federal government. This list contains a large number of reports generated from the National Uranium Resource Evaluation (NURE) program sponsored by the U. S. Department of Energy.

Major occurrences of uranium include the following:

(1) Black sand placer deposits containing radioactive minerals are found in several areas of the state. The first exploitation in the world of black sands for uranium started in Bear Valley in late 1955 (Armstrong, 1964). Approximately 1.1 million pounds of 90 percent niobium-titanium pentoxide was produced from an euxenite concentrate from 1955 to 1959. Euxenite also contains uranium oxide and thorium, rare earths, and titanium residues.

(2) Uranium is found near Stanley in veins and stringers in granitic rocks of the Idaho batholith. Bedded deposits occur in the Idaho basal conglomerate of the Challis Volcanics near Basin Creek (Weiss and others, 1958).

(3) A major low-grade source of uranium exists in the Phosphoria Formation of Permian age that is widely exposed in southeast Idaho. There has been no production from this resource.

(4) A small quantity of uranium is found as uraninite veins in the Sunshine Mine in the Coeur d'Alene mining district in north Idaho.

The main thorium occurrences include the following:

(1) Monazite from black sand placer deposits. Placers in Bear Valley and Long Valley produced this mineral from 1948 until 1955 (Staatz and others, 1980).

(2) A major source of thorium in the United States is found in the Lemhi Pass area astride the Continental Divide in Idaho and Montana. Thorite and monazite are the most abundant minerals in these vein deposits, and reserves are estimated at 70,500 short tons of ThO_2 with a probable potential resource of 133,000 tons (Staatz and others, 1979).

(3) A smaller resource of thorium-bearing veins is located near Hall Mountain not far from the Canadian border.

In addition to these main occurrences of uranium and thorium, numerous other small deposits occur throughout Idaho, as noted on the map, *Energy Resources of Idaho* (Breckenridge, Bennett, and Harbour, 1980).

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