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POTASH RESOURCES OF WYOMING

by
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This report has not been reviewed for conformity with the editorial standards of the Geological Survey of Wyoming.

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Introduction

Potash is a generic term for a variety of potassium-bearing minerals, rocks and refined products (Adams and Hite, 1983). Ninety-five percent of refined potash is used for fertilizer while the remaining five percent is used in the chemical industry (Searls, 1986).

Potash is produced in the United States from bedded evaporite deposits in New Mexico and Utah and from subsurface brines in Utah and California (Searls, 1986). The production of potash in the United States has been declining in recent years, while the consumption of potash has remained relatively constant. The losses in domestic production have been made up by imports of potash, most of which come from Canada. Imports now account for almost 80 percent of all potash used in the United States (Searls, 1986). Table 1 summarizes potash production, imports and consumption statistics. Potash production has declined from 3.6 million short tons in 1966 (the record year) to 1.4 million short tons in 1985. This has resulted in many mine and mill closures in the United States, particularly within the past five years (U.S. Bureau of Mines, 1986).

Table 1. Production, imports and consumption of potash. Data in short tons (Searls, 1986).

	1981	1982	1983	1984	1985
Production	2,377,000	1,966,000	1,575,000	1,723,000	1,461,000
Imports	5,286,000	4,253,000	4,894,000	5,323,000	5,319,000
Domestic Consumption	6,849,000	5,647,000	6,231,000	6,638,000	6,373,000

The price of potash has also declined over the past several years (Table 2). This is due in part to the presence of large stockpiles of potash in North

America and to overproduction coupled with flat demand for potash fertilizer. From its low point in 1986, demand is expected to increase at a rate of about 1.8 percent through 1990 (Searls, 1986).

Table 2. Potash prices, f.o.b. mine, 1981-1985 (Searls, 1986).

Year	Dollars per short ton
1981	$151
1982	120
1983	110
1984	120
1985	105

The potassium-rich volcanic rocks of the Leucite Hills, Sweetwater County, Wyoming (map, p. 3) have been examined for their potential as sources of potash (Schultz and Cross, 1912; Thoeman, 1932; McCarthy and others, 1944). During and soon after World War I, small amounts of potassium-rich volcanic rocks were mined on Zirkel Mesa and some potassium chloride (KCl) was produced at a plant in Green River by the Liberty Potash Company (Thoeman, 1932). Johnston (1959) and Smithson (1959) state that the estimate of the volume of these rocks by Schultz and Cross (1912), which was based upon inaccurate thicknesses is too high. Schultz and Cross (1912) also assumed a potash (K_2O) concentration of ten percent while Ogden (1979) showed it varies from 6.3 to 12.1 percent. The cost of producing potash from rocks in the Leucite Hills greatly exceeds the price of potash at the present time.

In addition to the Leucite Hills, an area underlain by possible potash-bearing evaporites in east-central Wyoming (map p. 3) may have a potential for deep solution mining of potash. This area is known from a few oil well cores. The potash content of the evaporites and the extent of the potash-bearing evaporites need to be determined.

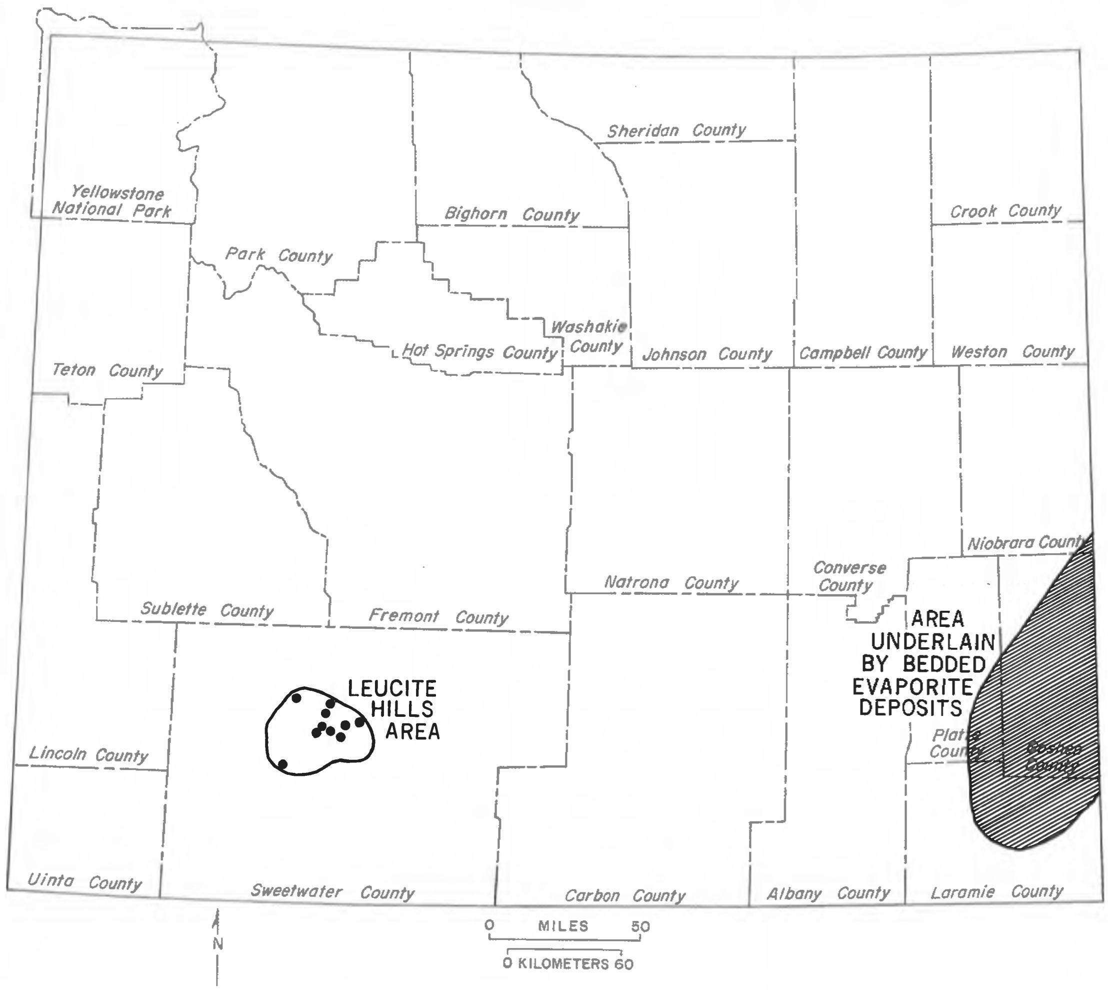

Figure 1. Index map showing potential sources of potash in Wyoming.

Occurrences

Goshen, Laramie, Niobrara and Platte Counties

Evaporites underlie a large area of eastern Wyoming (see map, p. 3). These beds may constitute an important resource of potash; however, there is little known about the potash content of the evaporites. A few oil wells have penetrated the section and some cores have been recovered (J.D. Love, personal communication, 1984). The evaporites are present in Goose Egg and Minnelusa equivalent strata of Wolfcampian, Leonardian and Guadalupian age (Rascoe and Baars, 1972). These rocks occur at depths of about 8,000 feet below the surface.

Sweetwater County

The Leucite Hills are a group of volcanic cones, necks, plugs, lava flows and dikes composed of high-potassium rocks. These volcanic features rest on and intrude Tertiary and Cretaceous sedimentary rocks along the northeastern edge of the Rock Springs uplift (see map, p. 3). The following generalized descriptions cover the larger bodies. For details on these and smaller bodies see Schultz and Cross (1912), Johnston (1959), Smithson (1959) and Ogden (1979).

Black Rock SW1/4 sec. 13, and NW1/4 sec. 24, T.22N., R.101W.

This small butte is capped by a lava flow. This flow is underlain by a friable basal pyroclastic unit, the only basal pyroclastic unit in the entire field.

Boars Tusk — SE1/4SW1/4 sec. 16, T.23N., R.104W.

Boars Tusk is an erosional remnant of a volcanic neck. It consists of two spires connected by a dike. Erosion has removed most of the autobreccia encasing the neck.

Cabin Butte — Center S1/2 sec. 6, T.21N., R.102W.

This butte, also known as Osborn Mesa, is capped by a volcanic plug and a lava flow.

Deer Butte — NE1/4 sec. 34, and sec. 35, T.22N., R.103W. and NE1/4 sec. 2, T.21N., R.103W.

Deer Butte is a small elongate mesa also known as Cross Mesa. The butte is a composite volcanic center with a cinder cone, three lava flows and a vent exposed.

Emmons Mesa — SW1/4 sec. 3, S1/2 sec. 4, N1/2 sec. 9 and NW1/4 sec. 10, T.21N., R.102W.

Emmons Mesa is composed of two lava flows, a large cinder cone and a small cinder cone.

Endlich and Hague Hills — SE1/4SE1/4 sec. 7 and SW1/4 sec. 8, T.22N., R.102W. Center W1/2 sec. 17 and sec. 18, T.22N., R.102W., respectively

These hills are covered by talus composed of eroded lava flows. The source of the flows is not known but might be the Hallock, Iddings and/or Weed Buttes volcanic features (see p. 6).

Hallock, Iddings and Weed Buttes — NE1/4NE1/4 sec. 18, T.22N., R.102W.

These small bodies are probably volcanic rocks, possibly apophyses off a single dike.

Hatcher Mesa — Center S1/2 sec. 33, T.22N., R.102W.

This small butte is an erosional remnant of several lava flows. The source of the lava flows is not known.

Mathews Hill — Center sec. 21 - 22 line, T.23N., R.104W.

This feature, mentioned only by Schultz and Cross (1912), might be a volcanic neck.

Middle Table Butte — Center N1/2 sec. 1, T.22N., R.103W.

This small butte is a volcanic plug. It is also known as South Table Mesa and Middle Table Mountain.

North Table Mountain — Center S1/2S1/2 sec. 36, T.23N., R.103W. and Center S1/2S1/2 sec. 1, T.22N., R.103W.

This small mesa is capped by an erosional remnant of a lava flow and is also known as North Table Mesa. The source of the lava flow might have been an adjacent dike or Middle Table Butte.

Pilot Butte — NE1/4 sec. 10 and NW1/4 sec. 11, T.19N., R.106W.

This butte is capped by a lava flow with a partially exposed neck on the west end.

South Table Mountain SW1/4 sec. 6, T.22N., R.102W.

This small butte is also known as Table Mountain. The butte is capped by several lava flows that may have been erupted from the Wortman dike 0.4 mile away (SW1/4,SE1/4,SE1/4, sec. 6).

Spring Butte SE1/4 sec. 19, SW1/4 sec. 20, W1/2 sec. 29 and E1/2 sec. 30, T.22N., R.102W.

This feature is also known as Orenda Mesa. The butte is a compound volcanic feature with four cinder cones, two composite cones, at least six lava flows and three dikes.

Steamboat Mountain SE1/4SE1/4 sec. 8, S1/2 secs. 9 and 10, SW1/4SW1/4 sec. 11, secs. 15 and 16 and NE1/4 sec. 17, T.23N., R.102W.

This is the most complicated feature in the Leucite Hills. It encompasses many lava flows, four lava cones, two sets of concentric pressure ridges (lava rings) and a dike.

Twin Rocks SE1/4SE1/4NW1/4 sec. 7, T.21N., R.103W.

These five spines, also known as Badger Teeth, are mostly autobreccia. They may be an eroded dike or apophyses off a single dike.

Zirkel Mesa Secs. 10, 11, 12, 13, 14, 15, 24, T.21N., R.102W. and secs. 18 and 19, T.21N., R.101W.

This is the most accessible feature in the Leucite Hills. The mesa encompasses four cinder cones, a lava cone, a volcanic plug and at least three lava flows.

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