

High Country

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Photo by Tom Bell



Buffalo still roam across Wyoming's Powder River Basin, much as they did when the Sioux bitterly fought the white man for supremacy over this rich area. Strip mining

for coal will destroy thousands of acres of rangelands, possibly including this scene.

Huge Power Complex Planned

by Tom Bell

The Powder River Basin of northeastern Wyoming and southeastern Montana may become the Ruhr Valley of North America. A power industry report documents an ambitious plan to build and operate a concentration of 10,000-megawatt plants in the area around Gillette, Wyoming. Another 10,000-megawatt unit may be located at Lake DeSmet, near Buffalo, Wyoming. (See accompanying map.)

The number of plants will be determined by eventual demands for power. However, it appears that at least five of the big plants are a possibility by the year 2000.

S. M. Swanson of Sioux City, Iowa, chairman of the Coordinating Committee for the power study says the huge mine-mouth plants would be the most efficient way of utilizing the coal and water.

"The minimum-size electric generating complex will produce four million kilowatts (4,000-megawatts) of power," Swanson says.

Wyoming's largest unit, now under construction near Rock Springs, will produce 1,500 megawatts.

The North Central Power Study report, issued in November, 1971, details the studies done by a power study group. It is discussed in more detail in an accompanying article reprinted from *The Billings Gazette*. Although only a limited number of reports were printed, they may be obtained on a first-come basis from the Bureau of Reclamation, Box 2553, Billings, Montana 59103. Vol. I is priced at \$1.50, and Vol. II at \$4.50.

More details on the report and the implications of it will be carried from time to time as analysis and reporting permit.

The significance of the report cannot be overlooked. The social, economic and environmental implications are staggering.

Several basic assumptions can be made and placed in perspective with the report. These are:

1) Demands for electric energy will continue to increase. Even if total consumption of power

were to be curbed drastically in the next few decades, there would still be a net increase in total demand.

2) Those sources of energy most available and most easily exploited will be used first. Wyoming has 23 billion tons of strippable coal and the largest known coal resources of any state - 546 billion tons within 6,000 feet of the surface. Montana has 12.7 billion tons of strippable coal. There is a concentration of easily exploitable coal in the Powder River Basin of both states.

3) Water resources necessary for the development of the vast coal beds seem to be

available. The availability of that water will depend upon immense water diversion and water transportation projects. These will entail large pipelines moving across country, as well as more new storage reservoirs. Water will become so valuable that much presently used agricultural water will be bought and used by industry. The trend has already begun at Lake De Smet near Buffalo, Wyoming.

4) The North Central Power Study considers the use of the resources for power generation only. The low-sulfur coal from this area is (Please turn to page 4)

The Public Lands - Our View

The public lands of the West and Alaska constitute one of the greatest treasures remaining in the public domain. These are the lands left-over after untold thousands of American citizens homesteaded or took the lands under various other disposal acts. They are the lands remaining from public giveaways to railroads, and land grants to the various states.

They are all that are left of the vast heritage which our forefathers claimed and acquired on the North American continent. We are down to the vestiges, and though they may have been the lands least desirable in the settling of this great country, they have now become immensely valuable.

How wisely we manage them from this day on will, in part, determine the quality of life for those who follow us. The record up to now has not been exemplary.

Various laws are in the making which will determine the direction we take in managing and disposing of the public lands. The Public Land Law Review Commission Report is in, and though it seems to raise as many questions as it answers, it does define some minimal guidelines. Special interests which have traditionally had

their way in using and exploiting the public lands will try to continue that tradition. They are going to resist change, and fight any curbs on their power and profit-taking.

If Alaska and the settlement of the Native Land Claims is any bellwether, the public is in for trouble ahead. The vested interests are politically powerful. They know the stakes are high and that they are for keeps.

Many western senators and congressmen answer to a constituency of vested special interests. Unfortunately, a number of them have built up seniority in a system which amplifies their power and prestige. Since their own political fortunes and ambitions are incumbent upon delivering to the power-brokers, they are almost deaf to public pleas, and ruthless in their dealings. Those who are captive to the special interests are almost single-mindedly motivated by economics. They lend their names to environmental matters only when it suits their purpose, or when it may be politically indefensible not to.

Future determinations on grazing fee increases, oil and gas leases, mining, or other

(Continued on page 15.)

Five Billion Watts of Energy!



Across this three-mile stretch, a huge open-pit mine will furnish the low-sulfur coal for midwestern steam-generating electric plants. Decker, Montana, can be seen in the distance. The open-pit, which will eventually cover about 10 square miles, will come to within about one-fourth mile of the post office and store at Decker. The county road, shown here, is already largely rebuilt to circumvent the mine development. A railroad spur was built down the Tongue River from Acme, Wyoming, to connect the mine to the Burlington Northern Railroad.

Reprinted from THE BILLINGS GAZETTE, Dec. 26, 1971.

by David T. Earley
Gazette Staff Writer

Production of 50,000 megawatts of electrical energy from mine-mouth thermal generating plants in the Colstrip-Gillette (Wyo.) area is tentatively planned by a group of power suppliers in the north-central United States.

Every year the plants would use 219 million tons or thereabouts of the area's low-sulfur, subbituminous coal. They will be supplemented during peakload hours and seasons by 3,000 megawatts of energy from new hydro-generating plants in Wyoming, at Sheep Mountain on the Shoshone River, above Buffalo Bill Reservoir, and a two-dam installation on Cutler Creek and the Tongue River just south of the Montana line.

Power suppliers in a 14-state region collaborated on the North Central Power Study which was recently concluded with the above predictions, and more.

For practical purposes, the expected con-

sumers of all this electricity have been divided into two groups: East and West, separated by the existing east-west intertie division in the nation's power system.

Eastern customers as far away as St. Louis, Mo., are expected to take 43,000 megawatts of the Colstrip-Gillette production. Westerners are

expected to demand 10,000 megawatts from a trunkline ending at Medicine Bow, Wyo.

If enough utilities decide to join in the project, the 53,000 megawatt capacity would be planned for on or after 1978.

NCPS was begun about a year ago by power suppliers in a 14-state region which includes Montana, Wyoming, Utah, Colorado, Idaho, the Dakotas, Nebraska, Kansas, Iowa, Minnesota and parts of Illinois, Oregon and Wisconsin.

Nineteen investor-owned utilities, six co-ops, two public and 750 municipal power districts are represented on the 36-member NCPS board, along with a federal member.

Locals in the consortium include the latter official, Harold Aldrich, regional chief for the Bureau of Reclamation (and his power specialist, Bill Graham), and men from Montana Power Co., Montana-Dakota Utilities and Basin Electric, the co-op.

They ended the first phase of NCPS on-schedule with two volumes of background data and proposed solutions relating to what is expected to be a gargantuan energy demand by 2000 A.D.

The next phases of NCPS include decision making by the utilities - whether it is in their interest to participate in a giant building program - and then the start of construction.

All of this, of course, will depend upon information included in the study, together with tentative conclusions arrived at by the 13 task forces and a steering committee, manned by industry reps more or less on company time.

(BuRec guaranteed to provide some manpower - e.g. Graham's time in coordinating the study - and to publish the results.)

Study "reasoning" goes as follows:

By 1980, according to a federal power study of 1964, the contiguous "lower" 48 states will be using 494,000 megawatts of electricity at peak hours. NCPS members think the study area, comprising about 34 per cent of the lower 48, will

(Continued on page 5)

Power Complex . . .

already being shipped east in huge amounts. The tonnage is sure to increase.

Natural gas supplies are already short. Coal gasification technology will be perfected and come into extensive use before the decade of the 70's ends.

Depending upon what happens to foreign imports of oil, coal liquification technology will get increasing study. It's impact may come in the 1980's.

5) A combination of national imperatives, low population densities in the affected area, and the ready accessibility of coal and water resources would indicate that development and exploitation are inevitable.

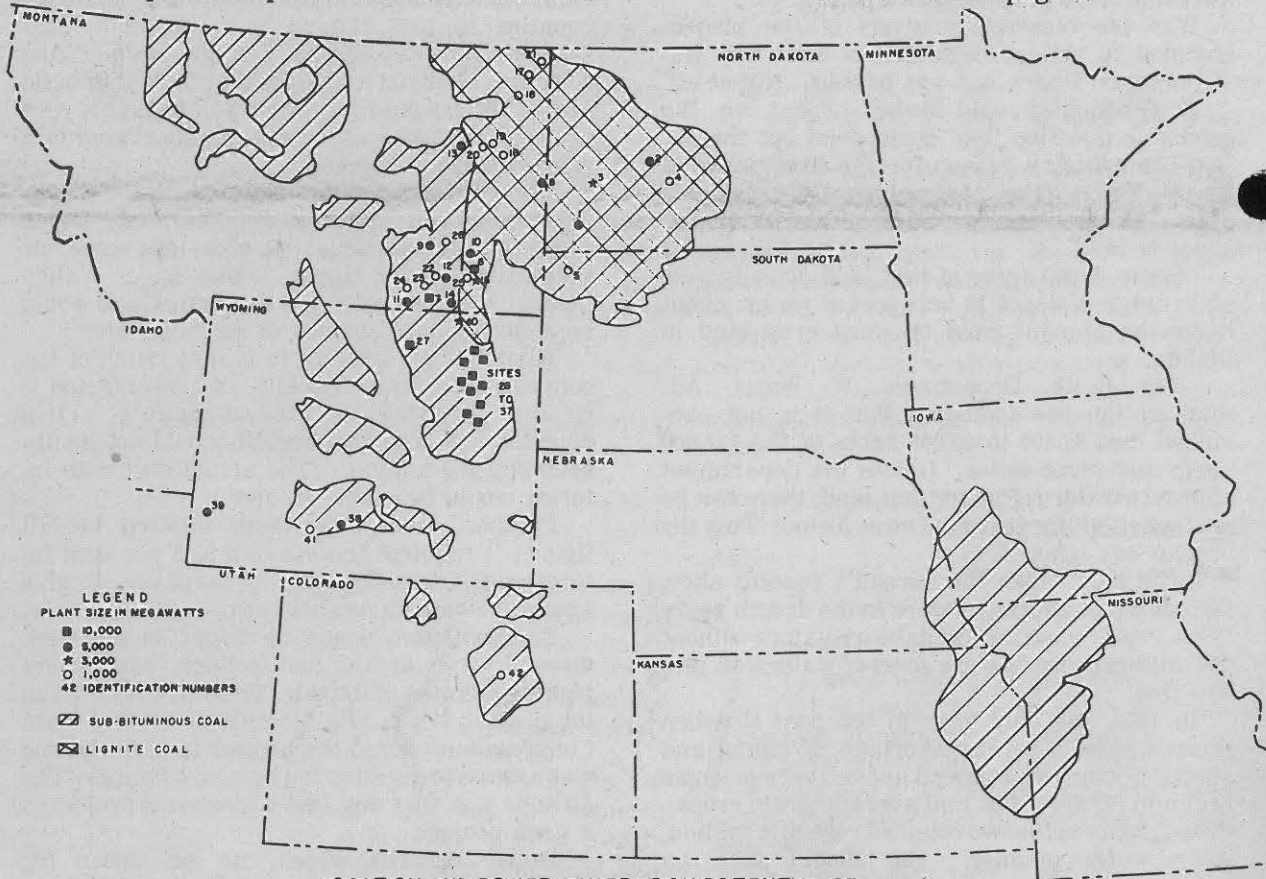
6) Thousands of square miles of land will be disturbed by strip mining, railroad and highway complexes, transmission lines, industrial sites, and appurtenant activities. Strip mining must be strictly regulated if widespread damage to the land is to be avoided. Land use planning is a must.

7) Air pollution technology must be greatly perfected and applied to the gigantic coal-burning plants if intolerable air pollution is not to ensue.

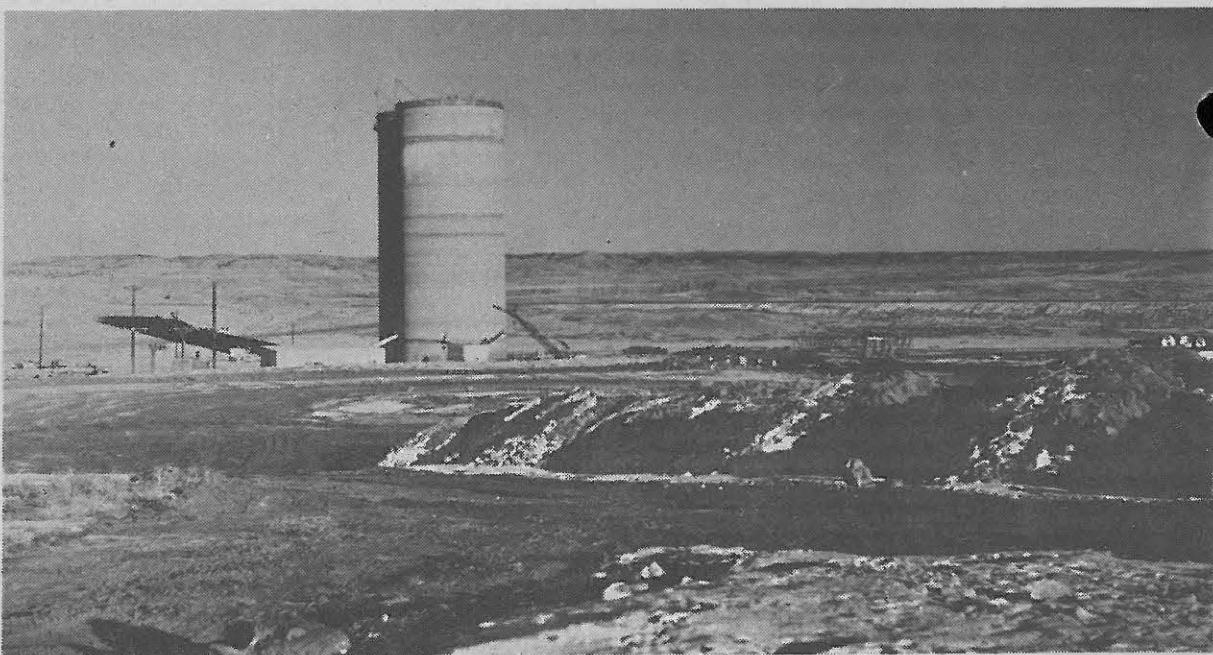
8) The residents of Montana and Wyoming must be willing to accept great change. Long-range projections indicate the possibility of a population around one million within the general area of Casper, Wyoming, to Miles City, Montana.

9) The environment of the Powder River Basin is changing rapidly and will change even more rapidly and dramatically in the next decade. The effects will be felt far beyond the immediate area.

10) The Powder River Basin of Montana and Wyoming is only part of a larger, evolving situation based upon the demands for energy. North and South Dakota, Northeastern Montana, southern Wyoming, Utah, Colorado, and the Four Corners area are all a part of a much larger picture.



LOCATION AND POWER GENERATION POTENTIAL OF STRIPPABLE COAL DEPOSITS IN NORTH CENTRAL POWER STUDY AREA
Figure II E-1.1



Coal for mine-mouth steam generation is only one of the uses to be made of the vast deposits in Montana and Wyoming. This huge two-silo facility is being built at Decker, Montana, for storage of coal before being shipped to mid-western markets. Each silo will hold enough coal to fill 100 railroad cars of 1,000 tons each.

Mine Mouth Plants Seen

house about 10 per cent of the population by 1980, and use about 50,000 megawatts of electricity.

But by 2000 demand is expected to increase to a peak load of 181,000 megawatts in the region - and NCPS members anticipate that they will supply about 53,000 megawatts of this.

With this as a starting point, NCPS committees began studying the possibilities. They considered availability of coal and water here and there from Colorado to North Dakota, probable cost of plant construction, of this size and that, and the cost of transmission lines into the Midwest from a variety of plant sites.

The findings, like the expected energy demands, are gargantuan.

Forty-two potential mine-mouth sites were identified by the NCPS group: 4 in North Dakota, 1 in South Dakota, 21 in Montana, 15 in Wyoming and 1 in Colorado. The site of the capacities ranged from 1,000 to 10,000 megawatts.

Of the 10,000 megawatt capacity sites, 11 are in Wyoming and 2 in Montana, mainly because that's where the coal is.

The subbituminous coal of Wyoming and

Montana tapers off to the lower-grade lignite in North Dakota. A mine-mouth plant in the latter state was not considered economical.

Production costs would outweigh the slightly lower cost for transmission lines, the study concludes, though a Dakota plant might be more feasible later on.

A 53,000 megawatt generation complex, then, in the Colstrip-Gillette oval with, maybe, 765 kilovolt transmission lines into the Midwest. Total cost; maybe \$14.5 billion.

In the matter of thermal-generating plants, the economics are so: from \$124-158 million for a 1,000-megawatt capacity at 1970 prices - and \$158-\$200 million at prices anticipated in 1975.

Supposed capital cost of the whole, 53,000-megawatt complex is about \$8.6 billion.

Add construction costs for the hydro-plants at Cutler Park-Rockwood (\$244 million at 1970 prices) and Sheep Mountain (\$217 million).

The 14 765-kilovolt transmission lines would be spaced out in four corridors. Lines to the East system are estimated to cost about \$5.9 billion at 1975 prices and the West system lines about \$388

million.

Per-mile cost of the 765-kilovolt line is expected to be about \$230,000 at 1970 prices and \$293,000 in 1975.

Then there are operating costs including the price of coal. By 1975 they are expected to total \$976.2 million a year.

The amount of coal used depends upon its heat "content" measured in British Thermal Units per pound. NCPS used 9,400-B.T.U. coal for study purposes, such as that found at Decker with reserves of 1,189 million tons of 9,720 B.T.U. coal and the Adaville deposit near Kemmerer, Wyo. with reserves of 1 billion tons of 10,400 B.T.U. coal.

So how much coal will be used is a difficult question. Power men use a rule-of-thumb, however, of one pound of coal per kilowatt hour.

They say, a 1,000-megawatt plant would burn 4.38 million tons of coal a year. Multiply that by 50 for the 50,000-megawatt capacity.

All of this would provide a peak generating capacity of 53,000 megawatts. To appreciate the size of such a development it might be helpful to study the megawatt.

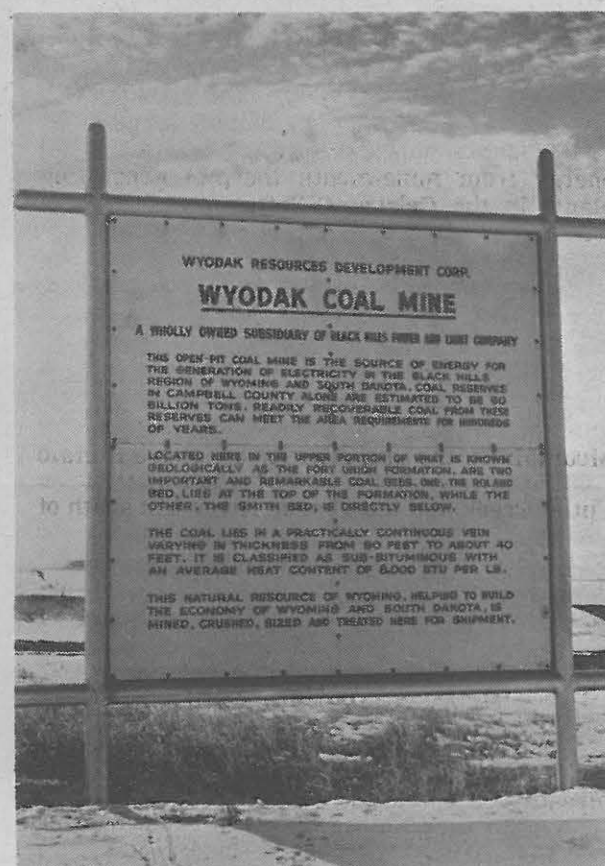
A megawatt is a thousand kilowatts and a kilowatt is a thousand watts. So 53,000 megawatts would light up 530 million 100-watt bulbs.

By comparison, Montana Power Co. figures its peak demand, in the winter, is now about 1,313 megawatts. By 2000 the company expects to sell 3,688 megawatts at peakload times.

Or, there's market value.



The first of many mine-mouth steam-generating electric plants in Wyoming and Montana's Powder River Basin is located six miles east of Gillette, Wyoming. This relatively small plant of 27,600 kilowatts uses air-cooled condensers. Plans have already been announced for an expansion of the plant to a 200,000 kilowatt capacity. That facility is to be in operation by 1976.



MPC charges six cents apiece for the first 20 kilowatts it sells a customer. At such prices, the NCPS output would be worth \$27.8 billion over the year.

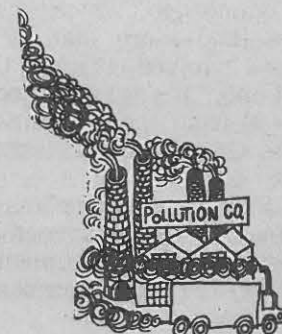
Or look at it this way. Montana's largest generator at present is at Yellowtail Dam and produces 250 megawatts. And the largest transmission line in the state has a capacity of 230 kilovolts - compared with the projected 14,765-kilovolt lines.

Or, finally, consider this. Units of energy are usually expressed in watt-hours, the amount of work a watt can do in an hour. A thousand watt-hours equals a kilowatt-hour. And so on with megawatt-hours.

The annual total of energy predicted to be in demand in the NCPS area by 1980 is so large that use of the term "gigawatt" is necessary. A gigawatt is a thousand megawatts, or a billion watts.

By 1980 area consumers are expected to buy and use 200,000 gigawatt-hours of power a year. And this will increase to 800,000 GWH a year by 2000.

The Colstrip-Gillette complex with its 53,000-megawatt capacity will, theoretically, supply 377,400 GWH of this. Enough to light up the West with 377 billion 1,000-watt bulbs, for an hour.



WATER CONVEYANCE IN THE GILLETTE-COLSTRIP AREA

LEGEND

- POTENTIAL COAL DEVELOPMENTS IN 1,000 MW
- POTENTIAL RESERVOIRS
- MAJOR WATER CONVEYANCE CONDUIT
- - - MINOR WATER CONVEYANCE CONDUIT

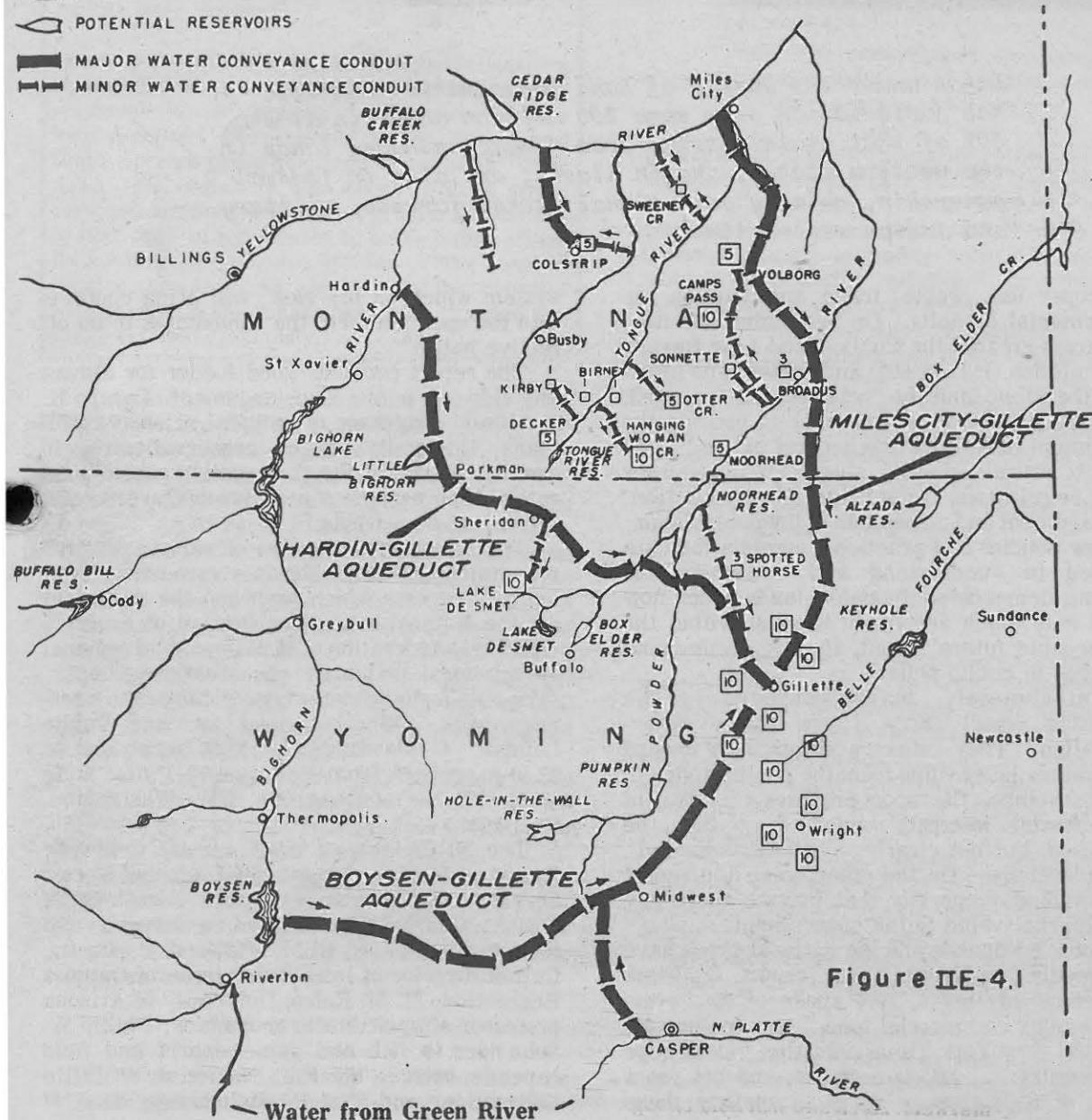


Figure II-E-4.1