THE GEOLOGICAL SURVEY OF WYOMING
HORACE D. THOMAS, State Geologist

BULLETIN No. 32

UNDERGROUND WATER RESOURCES OF CHUGWATER CREEK, LARAMIE RIVER, AND NORTH LARAMIE RIVER VALLEYS, WYOMING

BY

ACUS R. EDWARDS

UNIVERSITY OF WYOMING
LARAMIE, WYOMING
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STATE OF WYOMING

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UNDERGROUND WATER RESOURCES OF CHUGWATER CREEK, LARAMIE RIVER AND NORTH LARAMIE RIVER VALLEYS, WYOMING *

By Acus R. Edwards

INTRODUCTION

This report treats with the underground water resources of an area of 1,050 square miles in the southern half of Platte County and the extreme northwestern part of Laramie County, southeastern Wyoming. The region is bounded on the west by the Laramie Mountains, on the south by the drainage divide between Chugwater Creek and the Horse Creek-Bear Creek drainage basin, on the east by the Platte County-Goshen County boundary, and on the north by the Tertiary uplands one or two miles north of the Laramie and North Laramie Rivers.

The study of underground water in this region was prompted by (1) an increasing need of ground water for domestic purposes, (2) the possibilities of ground water for irrigation, and (3) the practical value of accumulating and conserving all available data on the underground water resources of the region. Wells are the principal source of domestic water supply, and a succession of dry seasons has created among the residents an interest in the possibility of additional supplies.

Field investigations were conducted during the summer months of 1939 by the writer and Mr. W. Lyle Dockery, under the supervision of Dr. S. H. Knight. Data were secured on 245 wells and springs, the alluvium in the valleys was mapped, and the geologic formations were studied to determine their relations to the underground water supply.

The climate is semiarid. The mean annual precipitation is about 15 inches, the greater part of which falls during the months from May to September. The mean annual temperature is approximately 46.5 degrees, ranging from a mean maximum of 62.8 degrees during the summer to a mean minimum of 29.8 degrees during the winter. The average growing season is 125 days.

The writer wishes to acknowledge the aid of Dr. S. H. Knight, State Geologist*, who sponsored and made possible the preparation of this report, and of Dr. R. H. Beckwith and Dr. H. D. Thomas, in preparing the typescript for publication.

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*Thesis submitted to the Department of Geology and the Committee on Graduate Study at the University of Wyoming, in partial fulfillment of requirements for the degree of Master of Arts.

TOPOGRAPHY AND DRAINAGE

General Statement

The area treated in this report lies in two major physiographic provinces, the Great Plains and the Rocky Mountains. A large part lies in the High Plains, which is a subdivision of the Great Plains Province. The western part lies in the foothills of the Laramie Range, which is a deeply eroded, unsymmetrical, anticlinal mountain range with a north-south axial trend. The Laramie Range is the northern part of the Southern Rocky Mountains.

The region varies in elevation from 7,000 feet on the southwestern border to 4,250 feet on the northeastern border. The lowest point is in the Laramie River Valley a few miles west of the confluence of the Laramie River with the North Platte. Escarpments within the area vary in height from a few feet to as much as 600 feet. The average height is about 200 feet.

Approximately three-fourths of the 1,050 square miles comprising the area lies within the drainage basins of Chugwater Creek and Laramie River. The remaining one-fourth makes up the southeastern part of the area and is drained by eastward flowing streams, which are either ephemeral or intermittent. No perennial streams have their headwaters within the area. Chugwater Creek, Sybille Creek, Laramie River, and North Laramie River are the only major streams which flow across the area.

The Plains Area

The plains area is divided into three parts for the purpose of topographic description. The basis of division is the contrasting degree of dissection characteristic of the parts. Part I (Pl. II) lies east of Chugwater Creek Valley and southeast of Bordeaux, and presents the gently rolling, slightly dissected surface typical of the High Plains. The elevation is approximately 6,800 feet along the southwestern border in sections 30 and 31, T. 19 N., R. 69 W. The surface slopes gently northeastward to an elevation of 5,000 feet on the eastern border. Part II (Pl. III) lies north of Part I and is bounded on the west by the valley of Chugwater Creek and on the north by the valley of the Laramie River. Part II differs from Part I in that the topographic relief is greater and badland areas are more conspicuous. Part III (Pls. II and III) lies west and northwest of Chugwater Creek Valley and is bounded on the west by the foothills of the Laramie Range and on the north by the Wheatland surface. Part III has undergone a greater degree of dissection than the other parts of the plains area. The valleys of several intermittent streams, tributary to Chugwater Creek, have been incised into the Tertiary conglomerates and clays. Where the coarse Arikaree conglomerates cap the escarpments precipitous cliffs ranging in height from 50 to 250 feet have been formed.

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*Resigned, September 1, 1940.

The Wheatland Surface

Lying between the eastern flank of the Laramie Range and the town of Wheatland is an alluvium-covered area of more than 100 square miles which presents a surface of very low relief, except where cut by the valleys of Sybille Creek, Laramie River and North Laramie River. The alluvium-covered surface slopes northeastward from an elevation of approximately 5,000 feet along the southwestern and western margins to 4,500 feet on the northeastern margin.

The Foothills Area

That part of the area which lies within the foothills of the Laramie range presents two distinct types of topography. The southwestern part is characterized by rugged topography cut in the pre-Cambrian complex and in the steeply dipping late Paleozoic and Mesozoic rocks. In the northwestern part the late Paleozoic and Mesozoic rocks are not exposed and the nearly horizontal Tertiary rocks rest upon the pre-Cambrian complex. The topographic relief is low except for granite knobs which have been exhumed and rise above the Tertiary surface.

Chugwater Creek Valley

The various branches of Chugwater Creek head near the western flank of the Laramie Range and in the area treated flow eastward across the pre-Cambrian rocks for a distance of about 8 miles. The South Fork of Chugwater Creek enters the area near the southwestern corner and flows northeastward to the town of Chugwater. North Chugwater Creek joins the South Fork near Diamond. The stream flows northward from the town of Chugwater for a distance of 30 miles to the Laramie River.

That part of Chugwater Creek Valley which lies in this area has its beginning in T. 18 N., R. 70 W., between the eastern flank of the Laramie Range and the westward-facing escarpment of the High Plains. The escarpment on the eastern side of the valley is precipitous throughout most of its length. Southwest of the town of Chugwater the escarpment losses its precipitous character and is broken into a series of benches. The escarpment on the western side of the valley is less continuous, and is characterized by benches which extend back for a distance of 1 or 2 miles from the creek. The valley is about 55 miles long and is narrowest at the town of Chugwater. The escarpments in the vicinity of Chugwater are capped by a coarse conglomerate. The escarpments lose their precipitous character where the conglomerate thins and wedges out between the less resistant sandy clays. This feature is especially noticeable along the western side of the valley a few miles north of the town of Chugwater.

Laramie and North Laramie River Valleys

The Laramie River enters the area 12 miles west of Wheatland and flows north of east across the entire area, a distance of 35 miles. On leaving the Laramie Range the river flows for a distance of 10 miles through a narrow, steep-walled valley, which has an average width of less than half a mile. The Laramie River joins the North Laramie 5 miles north of Wheatland. For a distance of 5 miles above the confluence of these two rivers the floodplain of the Laramie River has an average width of about 1 mile. Below the confluence the valley is less than 1 mile wide. The sides of the valley are characterized by precipitous escarpments and terrace-like steps formed by the more resistant beds of Tertiary rocks. The average height of the valley sides is 100 feet.

The North Laramie River enters the area at the extreme northwest corner and flows eastward for a distance of 15 miles to its confluence with the Laramie River. The valley of the North Laramie River exhibits the same general features as the valley of the Laramie River immediately east of the Laramie Range.

Sybille Creek Valley

Sybille Creek, which heads in the Laramie Range, enters the area in sec. 36, T. 24 N., R. 69 W., and flows northward through a narrow, steep-sided valley for a distance of 7 miles before joining the Laramie River.

STRUCTURE

Lying to the west of this area is the Laramie Range, which is a deeply eroded unsymmetrical anticlinal mountain having a north-south axial trend. The pre-Cambrian crystalline rocks in the nucleus of the range are flanked on the east by late Paleozoic and Mesozoic rocks which dip steeply to the east. These are, in part, unconformably overlain by the almost horizontal sediments of the Tertiary White River group. Field evidence indicates that the upturned and eroded Paleozoic and Mesozoic formations were at one time buried beneath several hundred feet of Tertiary rocks. In the northwestern part of the area the Tertiary rocks and Pleistocene (?) gravel beds rest uncomfortably upon the pre-Cambrian complex. The Paleozoic and Mesozoic rocks are not exposed, and in the absence of subsurface data it is not possible to determine their position beneath the overlying formations. It is possible that the contact between the pre-Cambrian and Paleozoic rocks may lie as much as 10 miles east of the mountain flank. Some evidence is present, notably, isolated exposures of pre-Cambrian crystalline rocks along a southwest-northwest line in sections 21 and 22, T. 25 N., R. 66 W., (Fig. 1), which suggests that the Hartville Uplift is connected with the Laramie Range by a continuous flexure. If this be true, the axis of this flexure would probably pass through the area under discussion.

The eastward dip of the Tertiary rocks away from the flank of the Laramie Range is less than the surface slope. The Tertiary rocks have a dip of less than two degrees throughout most of the area. A few miles east and southeast of Wheatland post-Tertiary faulting has produced a west and northwest dip of five or six degrees.

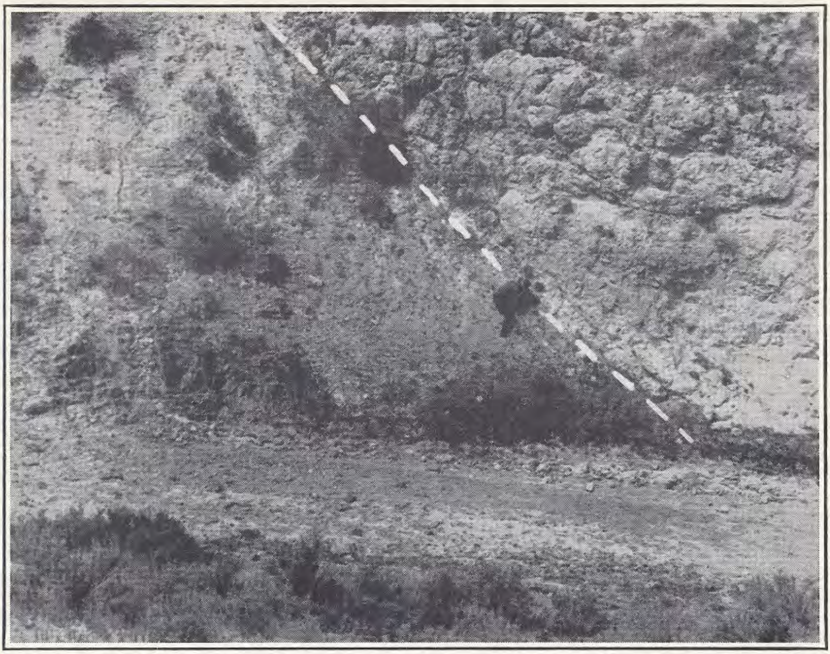

Fig. 1. Contact of pre-Cambrian and nearly horizontal Tertiary rocks in sec. 21, T. 25 N., R. 66 W. Pre-Cambrian rocks at lower left; Tertiary rocks at upper right.

STRATIGRAPHY

On the maps (Pls. II and III) formations older than Tertiary are shown in three groups; pre-Cambrian, Paleozoic and Mesozoic. This grouping is necessary because the areal outcrop of the separate formations is too small to be shown on maps of this scale. All the Chugwater formation is mapped as Mesozoic, although it is recognized as being in part Paleozoic.

Pre-Cambrian Rocks

The pre-Cambrian rocks exposed in this area consist of a complex group of igneous and metamorphic rocks. They have a very low porosity and are of little importance in the occurrence of underground water.

Late Paleozoic Rocks

Casper formation.—The Casper formation overlies the pre-Cambrian rocks with angular unconformity, and has a thickness of about 780 feet. The lower 300 feet of the formation is predominantly arkosic and quartzitic sandstone. The upper 480 feet consists of light-gray cross-laminated sandstones and gray massive fossiliferous limestones.

Mesozoic Rocks

Chugwater formation.—According to Jenkins (2:15)* the Chugwater formation is represented by red shales, sandstones, and thin lenses of limestone and gypsum, which have an aggregate thickness of about 700 feet.

Sundance formation.—In this locality the Sundance formation has a thickness of 136 feet. At the base, resting disconformably upon the red shales of the Chugwater formation, is a 40-foot bed of orange to dull-red massive friable cross-laminated unfossiliferous sandstone. The upper part consists of a 96-foot succession of yellow sandstone, soft green shale, hard gray shale, and hard white and gray limestone.

Morrison formation.—The Morrison formation consists of blue and purplish-red variegated shales which have an aggregate thickness of 280 feet. Good exposures are few because the soft shales in most outcrops are covered by talus from the overlying Dakota sandstone.

Dakota group.—The term Dakota group includes a sequence of sandstones and shales which rest disconformably upon the Morrison formation. In this locality the Dakota group consists of five members, (1) a lower dark-gray coarse-grained sandstone, (2) a lower dark shale, (3) a middle buff hard ripple-marked sandstone, (4) an upper dark carbonaceous shale, and (5) an upper massive hard sandstone. The five units have a total thickness of from 250 feet to 375 feet.

Benton group.—The Benton group, as used by Jenkins (2:21), includes from bottom to top, (1) the Thermopolis shale, (2) the siliceous Mowry shale, (3) the black Frontier shale, (4) a thin shaly sandstone equivalent to the Wall Creek sandstone, and (5) a top black sandy shale generally called the Carlile. The so-called Carlile is probably the equivalent of the Sage Breaks shale member of the Niobrara formation of the Black Hills.† The entire succession has a thickness of 1,000 feet.

Niobrara formation.—The Niobrara rests upon the Carlile shale. Only the lower part is exposed and consists of 270 feet of cream-colored calcareous shales and chalky limestones grading upward into dark shales.

Tertiary Rocks

White River group.—As used in this report, the term White River group includes the Chadron, Brule and Arikaree formations. No attempt was made to map these formations as separate units, because the succession exhibits rapid changes in lithology over short distances, exposures are poor in many localities, and the beds are lenticular in character and exhibit numerous local disconformities produced by stream channeling.

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*Numbers in parentheses refer to the list of references on page 25. A number following a colon in parentheses gives the page in the reference cited.

†Horace D. Thomas, personal communication.

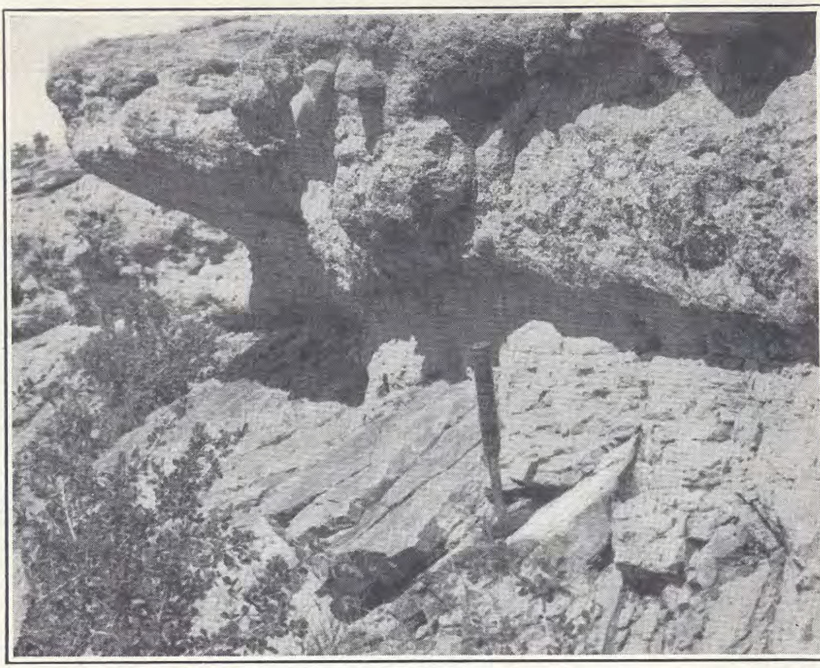

Fig. 2. Contact of steeply dipping Dakota sandstone with overlying horizontal Chadron sandstone and conglomerate, three-fourths of a mile north of Farthing.

Chadron formation.—Observed exposures of the Chadron formation are limited to a few scattered outcrops in the vicinity of Farthing. In these exposures the contact with the overlying Brule is indefinite. A grayish-tan to brown coarse-grained cross-laminated soft porous arkosic sandstone is exposed along the East Fork of Chugwater Creek at Farthing. About three-fourths of a mile northeast of Farthing a conglomeratic phase of the Chadron (Fig. 2) lies with angular unconformity upon Dakota sandstone, which dips steeply eastward. The rock is a brown conglomerate composed chiefly of pebbles derived from the pre-Cambrian complex, with some chert, limestone, sandstone, and quartzite fragments from the Paleozoic and Mesozoic rocks. The pebbles are bound together by a chalcedonic cement. These beds of conglomerate lie at an elevation 75 feet to 100 feet above the arkosic sandstone exposed along the creek. The thickness of the Chadron is variable, due in part to the uneven surface upon which it was deposited. Although no complete section could be accurately measured, the probable maximum thickness is about 100 feet.

Brule formation.—In sections 30 and 31, T. 19 N., R. 69 W., about three-fourths of a mile northeast of Underwood, the Brule lies unconformably upon the Niobrara. The Brule consists chiefly of light-gray to light-tan fine-grained massive sandy claystone, which is com-

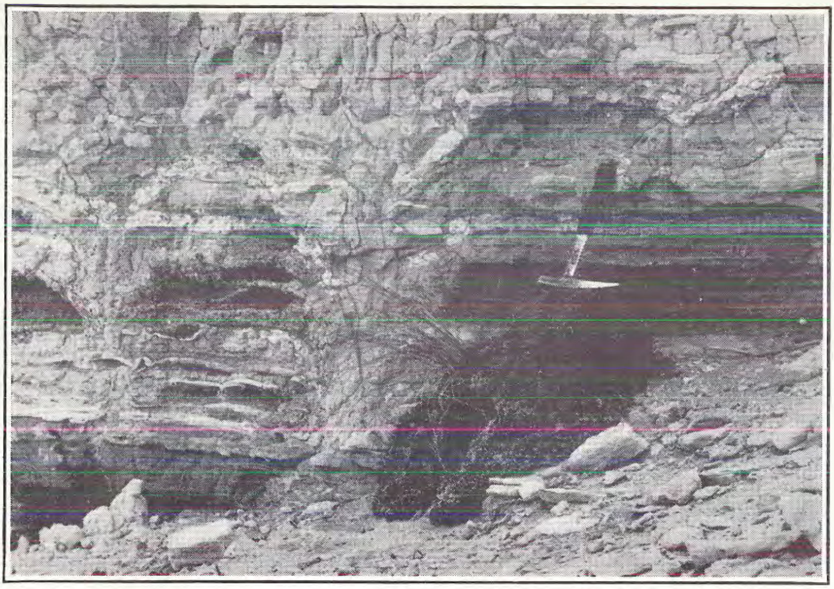

Fig. 3. Fissures in the Brule clay on the west side of Chugwater Creek Valley about ten miles southwest of the town of Chugwater.

posed largely of altered andesitic and dacitic volcanic ash. The beds are of variable thickness, and vary in degree of induration. Numerous claystone concretions, one-half inch to six inches in diameter, occur throughout the formation. Sand grains are scattered through some beds. Lenticular beds of arkosic cross-laminated sandstone, in part conglomeratic, occur between the thicker beds of massive claystone.

A fracture system is present which causes the weathered claystone to break into irregular, blocky fragments. The fragments vary in size from one-eighth inch to three or four inches, and the large fragments readily break into small ones.

Conspicuous vertical fissures (Fig. 3) filled with claystone and sand are a characteristic feature of the Brule. These clastic dikes vary in width from a fraction of an inch to ten inches, and have been traced downward for a distance of 30 feet on vertical rock faces. It is probable that they extend to considerably greater depths.

In general the lithology of the Brule is similar throughout the area. The contact with the older formations is concealed by alluvium except in the southwestern part. In the section measured near Underwood the Brule is 270 feet thick.

Arikaree formation.—In the section measured in the escarpment east of Underwood the contact between the Arikaree and the underlying Brule is placed arbitrarily at the base of the lowest coarse conglomerate. The Arikaree at this place consists of a succession of beds of sandstone and conglomerate. The lower conglomerates of the

Arikaree contain fragments of rocks of pre-Cambrian, Paleozoic and Mesozoic age. The pebbles in these lower conglomerates are more rounded than those in the Brule conglomerates, which suggests that they were probably derived from a more remote source. The upper thick conglomerate which caps the escarpment east of Underwood is composed almost entirely of boulders, cobbles and pebbles of pre-Cambrian anorthosite. The scarcity of Paleozoic and Mesozoic roundstones in the upper anorthosite conglomerate indicates that at the time of deposition, the Paleozoic and Mesozoic hogbacks along the eastern flank of the Laramie Range were, for the most part, buried beneath the lower beds of the Arikaree. Lenticular beds of clay, a few feet thick and 1,000 to 2,000 feet in lateral extent, occur in the upper conglomerate bed. The total thickness of the Arikaree at this place is 320 feet.

Field observations indicate that all the above described conglomerates and sandstones are lenticular, and wedge out laterally within a few miles along the escarpment. Locally, in the vicinity immediately east of Farthing, boulders of pre-Cambrian rocks, having a maximum size of 3 feet by 3 feet by 6 feet, are scattered over the surface. The boulders are distributed along an east-west line for a distance of more than a mile, which suggests that they were dropped in an old stream channel. The boulders occur five miles east of the nearest exposure of pre-Cambrian rocks.

In the stratigraphic section measured one mile north of Chugwater in sec. 20, T. 21 N., R. 66 W., the conglomerate which caps the escarpment is lithologically similar to that which caps the escarpment east of Underwood. Here the conglomerate is 80 feet thick and it is underlain by Brule clay. Near Slater, 10 miles to the north, this conglomerate disappears. The contact between the conglomerate and the Brule clay at Chugwater lies at an elevation of 1,030 feet lower than the contact at Underwood, 25 miles to the southwest. However, the conglomerate bed which overlies the Brule clay at Chugwater does not represent the same bed that overlies the Brule at Underwood. The Arikaree is composed of coalescing alluvial fans which were deposited by streams which flowed eastward from the Laramie Range. As the Arikaree-Brule contact has a northeastward slope of about 41 feet per mile from Underwood to Chugwater, it appears that the conglomeratic alluvial fan which overlies the Brule at Chugwater was deposited prior to the deposition of the conglomerate which overlies the Brule at Underwood.

Northeast of Slater, the Arikaree formation is composed of light-gray massive fine-grained soft sandstone, with lenticular "pipey concretions" of tan to dark-gray fine-grained hard sandstone.

MEASURED SECTIONS OF TERTIARY ROCKS

I. Stratigraphic section measured in sections 30 and 31, T. 19 N., R. 69 W.

Present land surface

Bed No.	Lithology	Feet
26.	Dark-gray medium to coarse conglomerate, with medium and coarse beds. The coarse beds are more resistant to erosion. The conglomerate is composed chiefly of anorthosite boulders, cobbles and pebbles. Differential erosion has produced a honeycomb type of weathering. Within the conglomerate occur lenses of claystone with sporadic pebbles of granite and anorthosite......................	55.0
25.	Light-brown massive very fine-grained soft argillaceous sandstone. The sandstone contains thin indurated layers and weathers cream-colored............................	20.5
24.	Medium-gray medium to coarse conglomerates in beds six to twelve inches thick alternating with light-gray or cream-colored fine- to medium-grained less resistant sandstones. Sandstones predominate........................	42.6
23.	Medium-gray massive coarse friable porous sandstone. The upper portion is conglomeratic and slightly indurated....	10.7
22.	Light-gray massive coarse hard conglomerate which contains anorthosite boulders in the basal part, some of which are 18 inches in diameter. The matrix is quartzitic. A few lenses of gray medium- to coarse-grained sandstone are present	34.6
21.	Light-gray to cream-colored fine-grained to conglomeratic sandstone. The conglomerate beds occur as lenses and become more abundant near the top. The bed forms a slope between the overlying and underlying beds.........	42.6
20.	Gray to tan medium to coarse conglomerate, which contains beds of well-rounded and well-sorted cobbles having a maximum diameter of ten inches........................	19.0
19.	Gray massive coarse cross-bedded conglomerate. Locally lenticular beds of coarse conglomerate are present of lithology similar to the overlying beds.................	32.0
18.	Light- to medium-gray medium to coarse massive conglomerate. The conglomerate is cross-bedded in the lower part. The upper part contains well-stratified beds containing rounded boulders with a maximum diameter of one foot. The bed contains material from pre-Cambrian, Paleozoic and Mesozoic rocks...................	15.6
17.	Gray massive medium-grained soft sandstone interbedded with pink fine to coarse conglomerate. Two beds of sandstone and two of conglomerate form the unit. The cobbles are well-rounded and well-sorted...............	34.5
16.	Interbedded sandstone, conglomerate and clay. All beds are less than one foot thick. Sandstones, light-gray, massive, and medium-grained; conglomerates, poorly sorted with subangular grains from one-sixteenth inch to three-fourths inch in diameter. The top member is a gray, fine-grained clay, somewhat indurated, and has a marked vertical fracture system........................	10.0
15.	Cream-colored hard sandy claystone, which contains numerous claystone concretions. The rock weathers ivory-colored. Fissures present in this unit extend down through beds No. 14, 13, and 12........................	32.0

I. Stratigraphic section measured in sections 30 and 31, T. 19 N., R. 69 W.

(Continued)

Bed No.	Lithology	Feet
14.	Chocolate-brown fine- to coarse-grained soft minutely cross-laminated lenticular argillaceous carbonaceous sandstone. (Locally highly indurated). The sandstone contains scattered concretions up to two inches in diameter. Plant markings (?) are present..............................	0.5
13.	Cream-colored fine-grained thinly and irregularly bedded friable sandstone	0.9
12.	Tan massive fine-grained friable (locally indurated) calcareous sandstone. In places the rock approaches a sandy fresh-water limestone	1.0
11.	Gray fine- to medium-grained argillaceous sandstone, which weathers into small, irregular fragments. The rock is fissured near the top..................................	14.3
10.	Gray massive fine- to medium-grained soft sandstone, which contains some lenses of conglomerate of small areal extent and seldom more than one foot thick, which have a lithology similar to the underlying bed. The upper part of the sandstone contains concretions which are characteristic of the lower beds..................................	3.0
9.	Pink coarse conglomerate, which contains roundstones of sandstone, chert, granite, limestone, clay, and older conglomerate. Size range is from granules to boulders......	5.0
8.	Light-gray extremely fine-grained soft sandstone at the base grading to buff medium-grained hard sandstone at the top. The sandstone is massive throughout, and is broken by small irregular fractures which intersect in such a manner as to result in the removal of small, block-like fragments by weathering..........................	12.0
7.	Cream-colored hard sandy claystone, which contains numerous concretions of the same lithology. The upper part contains fissures about one inch in width filled with material from the overlying bed. Concretions are harder and more abundant in the upper part..................	67.0
6.	Cream-colored sandy claystone similar to the underlying and overlying beds, but is more highly indurated........	7.0
5.	Cream-colored hard sandy claystone which contains numerous concretions of the same lithology..................	66.5
4.	Pink medium to coarse poorly sorted slightly clayey conglomerate	1.5
3.	Yellowish-gray massive fine- to coarse-grained argillaceous sandstone with sporadic grains of quartz, chert and granite. Pyrite is present. The sandstone grades upward into the overlying bed..................................	3.3
2.	Cream-colored claystone which breaks into irregular blocky fragments varying in size from one-sixteenth inch to one-half inch in diameter. Numerous claystone concretions are present in the lower part..........................	51.0
1.	Light-brown friable clay with structure like overlying bed. The thickness is variable..............................	5.5
	Total thickness	587.6

Angular unconformity

Niobrara formation.

II. Stratigraphic section measured two miles south of Horse Creek Station, Wyoming.

Present land surface

Bed No.	Lithology	Feet
10.	Pink to reddish-brown arkosic pebble conglomerate, composed predominantly of transported particles of Sherman granite. A bed of light-gray massive hard sandy claystone five feet thick occurs ten feet above the base of the unit..	37.0
9.	Light-gray massive hard sandy claystone..................	53.0
8.	Lithology similar to Bed No. 10, but is thinner bedded and less resistant to erosion............................	32.0
7.	Lithology similar to Bed No. 9. The sandstone contains some thin lenses of pink arkosic conglomerate..........	21.5
6.	Lithology similar to Bed No. 10. The conglomerate is massive at the base and interbedded with lenticular beds of light-gray hard sandy claystone near the top.........	42.5
5.	Light-gray massive claystone. The claystone contains numerous concretions in the upper half. Indurated beds, each about four feet thick, occur at 117, 144, and 187 feet above the base and form distinct ledges. Large clastic dikes, four inches in width, and more than 20 feet in vertical depth, occur near the top of this unit. A few of the dikes are composed of material from the overlying bed, but usually the material is of the same lithology as the unit in which the dikes occur. The claystone weathers into small, block-like fragments.......................	203.0
4.	Interval covered by alluvium............................	37.0
3.	Drab arkosic conglomerate. A five-foot bed of cross-bedded hard conglomerate which forms a ledge occurs near the top. The conglomerate ledge contains well-rounded granite cobbles	21.0
2.	Interval covered by alluvium............................	42.0
1.	Light-brown cross-bedded friable arkosic conglomerate, made up chiefly of fragments of Sherman granite. The conglomerate contains a few lenticular beds of clay one inch to eight inches thick............................	48.0
	Total thickness	537.0

Base concealed

III. Stratigraphic section measured one mile north of Chugwater, Wyoming, sec. 20, T. 21 N., R. 66 W.

Present land surface

Bed No.	Lithology	Feet
2.	Gray massive cobble conglomerate with lenses of clay having the same lithology as Bed No. 1. The conglomerate is composed chiefly of anorthosite and granite, with smaller amounts of chert, limestone and sandstone. The bed lenses out to the north and south..................	80.0
1.	Tan massive fine-grained soft sandy claystone. The rock weathers into small, irregular, block-like fragments......	187.6
	Total thickness	267.6

Base concealed

IV. Stratigraphic section measured at Bear Mountain, Wyoming, in sec. 34, T. 20 N., R. 62 W.

Present land surface

Bed No.	Lithology	Feet
2.	Gray massive salt-and-pepper fine-grained soft porous sandstone. The sand grains are poorly sorted. The sandstone contains numerous beds of "pipey concretions" composed of dark-gray fine-grained hard sandstone. One three-foot cross-laminated bed occurs 69 feet above the base. Fragmentary and poorly preserved vertebrate remains are present	267.0
1.	Cream-colored to light tan massive fine-grained soft sandy claystone. The color is slightly lighter at the base. The claystone weathers into small, irregular block-like fragments	325.3
	Total thickness	592.3

Base concealed

Quaternary Rocks

Pleistocene (?) gravel.—A bed of coarse gravel, from three to six feet thick composed chiefly of cobbles and pebbles of pre-Cambrian rocks, rests upon the Tertiary formations in parts of the area. These gravel beds are exposed along the terrace sides of the Laramie and North Laramie River Valleys where these streams flow across the Wheatland surface. The gravel beds are covered by a mantle of soil and their lateral extent has not been determined.

Alluvium.—All the valleys are filled to variable depths with alluvium, which is composed predominantly of weathered material derived from the Tertiary rocks, with subordinate amounts of silt, sand, and gravel carried down by streams from the Laramie Range. The alluvium has accumulated in the valleys because the streams have been unable to carry away the weathered material as rapidly as it has been supplied. The streams flow in shallow, meandering channels upon the alluvial fill. Well records indicate that in the smaller valleys the alluvium has a probable maximum thickness of 15 feet, and in the larger creek and river valleys the maximum thickness is probably as much as 30 feet.

PRECIPITATION

All available precipitation data supplied by the United States Weather Bureau stations at Chugwater and Wheatland, Wyoming, follows:

PRECIPITATION AT CHUGWATER, PLATTE COUNTY, WYOMING

Elevation 5,282 feet

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1901	.10	.45	1.25	2.26	2.65	2.35	.92	.73	.65	.57	.05	1.71	13.69
1902	.35	1.03	2.15	1.10	1.43	4.43	.30	.44	2.30	.91	.59	1.75	17.78
1903	.50	1.25	.97	1.86	.57	1.09	2.29	2.47	1.90	.37	.50	.40	14.97
1904	.55	.55	1.08	1.70	5.10	1.67	1.13	....	....	....	....	....	.....
1905	1.62	.60	.56	4.96	2.49	2.01	2.23	.57	1.01	.66	.30	T	17.01
1906	.55	.54	2.65	2.33	2.72	1.99	1.59	1.61	2.15	1.68	2.05	.55	20.32
1907	.55	1.13	.45	.84	3.42	2.34	1.11	.75	1.24	.10	.30	.75	19.98
1908	.30	.04	.20	.50	5.86	2.63	1.12	2.07	.03	1.07	.40	1.00	15.23
1909	1.15	1.80	.80	1.30	1.77	3.70	1.40	.70	.60	.54	.50	1.30	15.56
1910	.30	....	.60	.80	2.36	1.66	.61	.05	1.71	2.20	.39	.60	.....
1911	1.05	.60	.40	.80	.06	1.14	.84	.58	.82	1.49	.60	.50	8.88
1912	2.60	2.60	1.20	1.90	1.28	.94	2.09	2.65	2.37	.50	.70	.63	18.66
1913	.36	1.60	.40	.45	1.05	2.67	2.00	1.50	....	1.57	.00	2.54	.....
1914	.30	.48	.55	3.02	1.79	1.00	.60	1.13	.27	.98	.08	.24	10.44
1915	.45	1.68	1.38	3.88	3.28	2.58	3.50	2.70	5.21	1.94	.60	.80	28.00
1916	.08	.72	....	....	....	T	.41	.41	.31	1.17	.83	.41	.....
1917	.73	.36	.85	2.95	5.14	1.00	T	1.41	.15	.47	.12	1.10	13.38
1918	.33	.51	T	1.40	3.20	1.22	1.27	2.85	3.75	.31	.08	.22	15.14
1919	.00	1.05	1.20	1.70	.20	1.84	1.45	.22	2.30	1.04	1.85	1.56	14.41
1920	.14	.40	.40	7.07	1.63	2.35	.70	2.73	1.00	1.30	.28	.73	18.93
1921	1.08	.16	.52	1.79	2.14	3.81	2.17	.98	.48	.35	.20	1.10	14.78
1922	.35	.40	.50	3.11	3.77	1.35	.90	1.16	.21	.50	1.97	.89	15.11
1923	.00	.61	1.49	2.10	5.26	3.55	2.26	1.17	1.44	3.40	1.00	1.43	23.71
1924	.54	.79	1.88	1.31	2.26	.33	.32	.52	2.23	2.39	.34	.66	13.57
1925	T	.38	.53	2.59	2.83	3.86	3.57	.77	.70	2.88	1.33	2.60	22.04
1926	.51	.49	.65	1.57	3.36	3.25	2.21	1.76	.53	2.19	.60	.60	17.72
1927	.45	.78	2.09	3.02	2.07	3.73	1.85	1.71	.38	1.10	.18	.20	15.51
1928	.23	.79	.41	.22	2.31	3.45	3.23	.28	.04	.97	1.16	.14	13.22
1929	.32	.34	1.08	2.15	2.25	2.30	.33	.88	2.82	1.45	.85	.08	14.85
1930	.65	.38	.34	2.70	3.42	.54	.53	5.69	2.85	2.57	.47	.27	20.41
1931	.05	.90	.98	1.62	1.48	1.43	1.56	1.55	.51	1.26	.46	.31	12.11
1932	.29	.48	.82	1.54	1.03	.71	2.08	1.36	.33	1.00	.16	.86	10.66
1933	.01	.42	1.25	4.56	2.11	.81	1.11	1.97	.46	.05	.25	.13	13.13
1934	.28	.99	.89	1.25	.94	1.63	.89	.90	1.60	T	.38	.50	10.25
1935	.16	.35	.50	3.20	5.42	2.20	1.04	1.48	1.25	.39	.14	.32	16.45
1936	1.36	.61	1.40	1.67	.90	1.61	.46	1.53	2.04	.85	1.02	1.18	14.63
1937	.56	.38	1.54	1.47	2.36	2.44	3.49	1.57	.41	.90	.88	.55	16.55
1938	.28	.08	.88	3.20	2.21	1.81	2.62	.86	2.87	.00	.40	.50	15.81
Mean	.50	.72	.95	2.11	2.49	2.04	1.50	1.39	1.35	1.11	.57	.79	15.79

PRECIPITATION AT WHEATLAND, PLATTE COUNTY, WYOMING

Elevation 4,738 feet

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1889	....	....	....	....	3.45	3.37	1.99	.75	.21	.32	....	....	.....
1890	....	1.23	1.02	4.10	1.01	.00	....	....	....	....	....	....	.....
1891	1.30	.70	1.60	1.40	.30	1.30	.50	.50	2.32	....	.60	....	.....
1892	.70	.90	.45	2.35	4.90	1.50	.01	1.00	.00	1.50	.90	.20	14.51
1893	.20	.40	.50	1.40	.90	.10	.55	.27	T	.60	.30	.70	5.92
1894	.50	.30	.46	.00	2.17	.00	....	....	....	....	....	....	.....
1895	....	....	....	....	4.30	3.20	1.46	T	.60	2.00	.80	.70	.....
1896	1.70	.60	1.40	.55	2.73	....	.52	2.19	.40	.12	.85	.00	.....
1897	.30	.15	1.10	.62	.87	1.63	.93	2.60	T	.30	.70	.50	9.70
1898	.80	T	.85	.32	4.32	1.65	2.35	.48	.02	.19	.76	.70	12.44
1899	.60	1.55	2.30	2.10	2.55	2.63	1.28	.49	.68	....	....	....	.....
1900	....	....	....	....	.31	.43	2.12	.33	1.42	.84	.40	.20	.....
1901	.05	1.10	.76	1.27	2.95	2.43	.77	.36	.53	....	....	....	.....
1902	....	1.30	....	....	....	....	....	....	.16	1.06	.71	....	.....
1903	.60	1.30	....	....	....	....	....	....	....	....	....	....	.....
1906	T	.03	3.89	1.20	3.35	2.95	1.41	1.25	2.60	3.10	1.40	.80	21.98
1907	1.34	1.15	2.30	1.80	....	....	2.30	.93	2.35	.00	.40	1.16	.....
1908	.22	T	....	1.20	8.93	2.19	1.03	1.16	.24	2.35	....	....	.....
1911	....	....	....	....	....	1.45	1.14	.43	.39	1.33	.08	.21	.....
1912	.98	1.08	1.25	2.61	1.02	2.03	4.58	2.43	3.76	2.04	.44	.34	22.58
1913	.37	.48	.04	.52	1.92	1.35	1.74	.75	1.44	1.39	.54	.05	14.59
1914	.12	.38	.40	3.43	1.55	T	.12	.24	T	.58	T	.45	7.27
1915	.68	1.45	1.31	1.75	3.27	1.91	2.20	1.79	2.85	1.02	.09	1.08	19.40
1916	.43	.72	.72	.16	2.27	.41	.60	1.54	.13	1.46	.60	.29	9.33
1917	.36	.10	.53	....	....	....	....	....	....	.44	T	.93	.....
1918	.94	.80	.16	2.34	3.34	2.70	2.96	.97	1.19	.39	.61	.81	17.21
1919	.00	.72	....	2.16	.20	1.08	1.11	.81	1.90	1.93	1.79	.89	.....
1920	.14	.97	.74	6.08	2.81	1.05	1.31	.66	1.05	1.31	.17	.78	17.07
1921	1.04	T	....	.52	2.68	2.74	....	....	....	....	....	....	.....
1922	....	....	....	....	....	....	....	....	....	.57	1.22	.90	.....
1923	.01	.27	.83	2.22	4.87	3.84	3.13	.10	1.74	3.86	.23	.55	21.65
1924	.10	.13	.99	1.50	1.47	.01	.44	.42	2.04	1.40	.22	.33	9.05
1925	.17	.02	.80	3.78	2.29	2.90	1.04	.83	.07	1.74	.39	1.41	15.44
1926	.46	.81	.38	.90	2.45	1.97	2.75	1.32	1.30	1.77	.78	.58	15.47
1927	.64	.83	2.16	2.48	1.00	3.27	1.65	2.71	.67	1.37	.13	.14	17.05
1928	.23	.70	.59	.53	1.72	1.90	2.36	....	....	....	....	....	.....
1929	.47	.16	1.51	....	....	1.47	2.16	....	3.39	....	.60	....	.....
1930	....	....	....	....	....	.32	.41	3.79	1.22	2.02	.41	.04	.....
1931	T	.35	.50	1.01	.80	2.43	2.95	2.75	.47	1.45	.37	.42	13.50
1932	.16	.41	.84	1.73	1.24	1.73	.15	.69	.32	.42	.25	.39	8.32
1933	T	.08	.72	5.15	2.48	.69	.64	.87	.28	.00	.05	.26	11.22
1934	.22	1.36	.35	1.45	.85	1.31	.49	.30	1.24	.00	.21	.27	8.05
1935	.05	.32	.18	2.13	7.13	2.65	.42	1.02	1.81	.45	.17	.07	16.40
1936	.22	.97	.49	1.66	.32	1.67	.91	.98	1.84	1.47	.69	.54	11.76
1937	.53	.15	.96	2.10	1.69	1.46	3.04	.59	.95	1.13	.72	.22	13.54
1938	.28	.06	.79	3.42	2.48	2.11	1.81	.96	2.98	.25	.73	.16	16.03
Mean	.44	.60	.94	1.86	2.38	1.75	1.43	1.01	1.14	1.16	.52	.61	13.97

DISTRIBUTION

The precipitation varies widely from year to year. A maximum annual precipitation of 28 inches was recorded at Chugwater in 1915, and a minimum annual precipitation of 5.92 inches at Wheatland in 1893. The maximum precipitation for any one month was 8.93 inches recorded at Wheatland in May, 1908. The minimum recorded precipitation for the month of May was .06 inch at Chugwater in 1911. January is the driest month, with a mean precipitation of .50 inch at Chugwater, and .44 inch at Wheatland. The mean annual precipitation for the 34 years that complete records have been kept at Chugwater is 15.79 inches. The precipitation has been above the mean for 14 of the 34 years, and for the remaining 20 years below the mean. During the 25 years that complete records have been kept at Wheatland, 14 years have been above the mean of 13.97 inches, and 11 years have been below the mean.

The heaviest precipitation occurs during the late spring and early summer months. More than 50 per cent of the annual precipitation occurs during the months from April to July. May is the wettest month, with 18 per cent of the annual precipitation.

The mean annual precipitation at Chugwater is 1.82 inches greater than that recorded at Wheatland. Chugwater has an elevation 544 feet higher than Wheatland, which may account in part for the difference.

DISPOSAL

The precipitation is disposed of by evaporation, transpiration, run-off, and percolation. The part that follows each of these ways is determined by a number of factors including topography, character of the rocks, depth and character of the soil, vegetative cover, depth to the water table, rate of rainfall, rate of melting snow, relative humidity, and winds.

The rate of evaporation is greatest during the summer months and, as precipitation is heaviest during this season, the proportion of disposal through evaporation is large. Frequently, during the late fall, winter, and early spring, a light snow disappears without apparently wetting the surface of the ground.

The quantity of water which plants remove from the soil by transpiration varies with different plants and with the same plant under different conditions. As the maximum precipitation occurs during the period of maximum plant growth, it follows that transpiration plays an important part in the disposal of precipitation.

Sufficient data are not available on which to base an accurate estimate of that part of the precipitation which is disposed of through run-off. The diversion of streams for irrigation largely nullifies the value of stream discharge data in the estimation of the per cent of precipitation which normally leaves the area as run-off.

The per cent of precipitation which penetrates to the water table is difficult of estimation. W. Lyle Dockery (1 : 17) has estimated that the probable ground-water recharge in the part of the Horse Creek basin east of the Laramie Range is three to five per cent of the annual precipitation. As the topography and the geology of this area and the Horse Creek drainage basin are similar, the ground-water recharge is probably comparable.

SURFACE WATER

Most of the surface water used for domestic purposes and for irrigation has its source outside the region. Water of the Laramie River is stored in the Wheatland irrigation reservoirs and furnishes most of the water used for irrigation. Water is diverted from the North Laramie River near the east flank of the Laramie Range and stored in three small reservoirs located on the Wheatland surface between the North Laramie and Laramie Rivers, a few miles west of their confluence. The Wheatland surface is the only area of extensive irrigation, although the floodplains of the various streams are utilized for the growing of forage crops.

Few springs occur in the area. Two springs, 7 and 8*, are on the McDonald Ranch in sec. 1, T. 19 N., R. 69 W., and sec. 31, T. 20 N., R. 68 W. Both springs occur near Chugwater Creek, and it appears that the upper sandstone of the Dakota group is the aquifer. One spring is used for household purposes and the other for stock.

UNDERGROUND WATER

General Relations

A number of factors affect the occurrence, quantity, and availability of underground water. Some of the factors effective in this area are size and slope of catchment area, location and steepness of escarpments, gradient and depth of valleys, type and porosity of soils, and permability and attitude of underlying rock units. In the southeastern part of the area the movement of the ground water is eastward, and in the rest of the area the general movement is toward the valleys, where the ground water joins the streams or their underground flows. The shape of the water table conforms in general to the surface topography, differing in that it has less relief. Where the plains terminate in abrupt escarpments the water table is lowered to a marked degree due to leakage along the escarpment.

Source

The underground water is supplied from two sources, (1) the rain and snow that fall within the area, and (2) the streams that enter and flow across the region. A small flow of water enters the area from the headwaters of Chugwater Creek. The North Laramie River likewise contributes a relatively small quantity of water to the ground-water reservoir. Some of the water which flows past the Wheatland irrigation reservoirs on the Laramie River enters the alluvium of the river valley. Where water is diverted for irrigation a part of it returns as recharge to the ground-water reservoir.

*Well and spring locations are shown on Plates II and III and location by section, township, and range are given on pages 26 to 28.

Occurrence

Paleozoic and Mesozoic formations.—Very little ground water is recovered from rocks of Paleozoic and Mesozoic age, because of their limited areal exposure and their depth below the surface where overlain by Tertiary rocks. Only three wells (Nos. 1, 13a, and 160a) are known to obtain water from rocks older than Tertiary. It is highly probable that should wells be drilled to a depth sufficient to penetrate the sandstones of Paleozoic and Mesozoic formations, water would be encountered. Well No. 160a, which was being drilled for oil, encountered water-bearing sands at several horizons. Water from Mesozoic rocks, except for that from the sandstones of the Dakota group, usually has a high mineral content. This concentration of Epsom and Glauber's salts makes the water unfit for domestic use in many instances.

Chadron formation.—None of the wells listed are known to draw their supply of water from the Chadron formation. The porous nature of the sandstones, however, indicates that where these rocks lie below the water table, they would yield water.

Brule formation.—The Brule formation is composed of dense, compact, indurated clay and interbedded lenses of sand and gravel. These lenses are restricted, so far as is known, to an area lying within five to ten miles of the mountain front. The clay is too fine-grained and dense to allow the rapid transmission of water. The clay beds are extensively fractured and fissured, however, to an unknown depth below the surface. In the valley of Lodgepole Creek, Laramie County, wells which encounter fractures in the Brule clay yield large amounts of water. The Brule formation is known to be the source of ground water of a few wells listed in this report. It is not known whether the water is recovered from sandstone lenses or from fractures in the impervious clay.

Arikaree formation.—The porous sandstones and conglomerates of the Arikaree formation are the source of supply for most of the wells in this region. In the area between the town of Chugwater and the Platte County-Goshen County boundary it is believed that most of the wells have their source in the lower beds of the Arikaree. Some of the deeper wells may reach the contact zone between the Arikaree and the underlying Brule. Northeast of Bordeaux it appears that practically all the ground water recovered is from the Arikaree formation. In some instances the deeper wells drilled to a depth of from 200 feet to 400 feet may have passed through the Arikaree into the underlying Brule. The source of water in these wells appears to have been in the Arikaree as little or no additional water was encountered in the lower parts of the wells for which data were available.

Valley-fill alluvium.—The alluvium along the valley floors is an important source of ground water. The alluvium yields water freely, and the water is, for the most part, of good quality. Wells sunk into the alluvial material are less than 50 feet deep.

Quality of Water

Tables of well data at the end of this report show that several of the wells yield hard water. Little positive correlation seems to exist between the quality of hardness and any particular aquifer. Local conditions within the producing beds appear to be the controlling factors.

Depth to Water Table

The accompanying map (Pl. I) shows the position of the water table in those areas where sufficient data make possible its determination. No attempt is made to show the position of the water table where well data are not available. Where an unclassified area is adjacent to those classified, similar underground-water conditions probably exist.

The shape of the water table conforms in general to the surface topography, but has less relief. The water table usually occurs at greater depth beneath the surface of the upland areas, and approaches or reaches the surface in the valleys. In areas where irrigation is extensively practiced the water table fluctuates in response to the recharge from irrigation. In the southwestern part of T. 25 N., R. 68 W., and in the northwestern part of T. 24 N., R. 68 W., the depth to the water table is affected to a marked degree by irrigation. Wells drilled prior to irrigation encountered water at 90 feet. At the present time one well (No. 192) in NE¼ sec. 32, T. 25 N., R. 68 W., is 12 feet deep, and during the irrigation season the water level is four feet below the surface. The water table has been raised beneath an area of approximately 1,800 acres. Conditions comparable to those described above are also present farther south in T. 24 N., R. 68 W.*

The position of the water table in the alluvium on the valley floors shows seasonal variations of from three to four feet.

Artesian Conditions

The only flowing well (No. 133) is located in sec. 19, T. 24 N., R. 69 W., in the Laramie River Valley near the east flank of the Laramie Range. The structural and stratigraphic conditions suggest that the source of the artesian flow is the contact zone between the Tertiary rocks and the underlying pre-Cambrian complex. The pre-Cambrian rocks crop out at a higher elevation about three miles west of the well. It appears that surface water seeps into the ground along the contact between the Tertiary and pre-Cambrian rocks and percolates downwards along the sloping pervious contact zone. The overlying impervious Tertiary clay serves as a confining bed. The flow rises less than three feet above the surface and is carried by a one-half inch pipe.

Deep wells drilled into the Paleozoic and Mesozoic rocks in localities where the surface is a few hundred feet lower than the outcrop of these older rocks might encounter water under sufficient hydrostatic pressure to produce flowing wells. These conditions are limited chiefly to the valleys. The probability of obtaining flowing wells from Tertiary rocks is remote.

*Oral communication from Mr. F. A. Beard, July, 1939.

Ground-water Recharge from Streams and Irrigation

Water is added to the zone of saturation by influent seepage from streams and influent seepage from irrigation. The streams are in part effluent and in part influent, that is, along parts of their courses they receive water from the zone of saturation, and in other parts they contribute water to the zone of saturation. Where influent seepage occurs along the stream channels, the writer believes that the zone of saturation is in contact with the bottom of the stream bed.

Water diverted from streams for irrigation is in part returned to the zone of saturation by influent seepage. Influent seepage is especially active in the area of extensive irrigation in the region around Wheatland, where much of the soil is probably underlain by coarse gravel beds. This return of irrigation water to the zone of saturation raises the water table over large areas. A part of the ground-water recharge returns to the streams by effluent seepage.

Irrigation Supplies

Successful irrigation wells depend upon the depth to water table, quantity of water available, and the distance between the well and the irrigated land.

Only one well (No. 138) is used for irrigation. This well is located in sec. 29, T. 24 N., R. 67 W., near Chugwater Creek. The well is four feet in diameter, twelve feet deep, and obtains its supply of water from the alluvium. Power for a centrifugal pump is supplied by a farm tractor.

All available data indicate that shallow wells of sufficient capacity for irrigation will be found only in certain parts of the area covered by alluvium.

Municipal Supplies

Chugwater and Wheatland obtain their municipal water supplies from wells. Chugwater obtains its municipal water supply from one well (No. 49) located in sec. 30, T. 21 N., R. 66 W., which has a depth of 80 feet and a capacity of 400 gallons per minute. The Brule formation appears to be the aquifer. Wheatland obtains its muncipal water supply from three wells located in sec. 13, T. 24 N., R. 68 W. Well No. 135 is 550 feet deep and has a capacity of 500 gallons per minute. Wells No. 136 and 137 are 450 feet deep and are used only in an emergency. The geological position of the source beds of the water of these wells is not known. The aquifers may be in the Arikaree or in older beds.

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DATA FOR WELLS SHOWN ON PLATE II
(Wells No. 1-109 inclusive)

No.	Location	Owner	Method of Lift	Elev. (ft.)	Depth (ft.)	Diam.	Water Level	Aquifer	Topo. Loc.	Use	Remarks
1	NW 32-18-70	Lewis & Bell Cattle Co.	Wind	6480	80	6″	?	Trc	Valley	Stock	
2	SW 9-18-70	C. T. Farthing	do	6410	30	52″	26′	Qal	do	House	No water in nearby well 160 feet deep.
3	NW 2-18-70	J. A. Whiting	do	6275	22	6″	12′	do	do	Stock	Near creek.
4	NE 35-19-70	J. C. Underwood	do	6575	225	do	?	Twr	Terrace	do	
5	SW 25-19-70	J. C. Underwood		6310	100	do	?	do	do		Not in use.
6	NE 25-19-70	J. C. Underwood	do	6245	40	48″	?	?	Valley	General	Formerly drilled to 350 feet in blue shale.
7	NE 1-19-69	Hugh McDonald		5975							Spring.
8	SW 31-20-68	Hugh McDonald		5910							Spring.
9	NW 34-20-68	Ned Foss	do	5840	143	6″	?	Twr	do	do	
10	C 23-20-68	Mary G. Burdette	do	?	100	do	?	do	Plains		Not in use.
11	NE 25-20-68	Ned Foss	do	?	100	do	?	do	do		Not in use.
12	SW 9-20-67	Swan Land & Cattle Co.	do	5470	20	?	?	Qal	Valley	General	
13	NE 5-20-67	M. Larsen	do	5500	80	6″	?	Twr	do	do	
13a	SE 30-21-68	Diamond Ranch		6250	510	8¼″	?	Cc	?		Drilled for oil; water at 372 feet and 374 feet.
14	SE 34-21-67	Harvey Kuhns	do	5425	90	6″	65′	Twr	Valley	do	
15	SE 30-21-67	Martin Matthew	do	?	40	do	20′	do	do		Not in use.
16	NE 29-21-67	Martin Matthew	do	5600	160	do	?	do	Plains	Stock	
17	NE 27-21-67	Martin Matthew	do	5700	296	do	185′	do	do	General	Crs. cong. 180 feet.
18	10-20-67	I. O. Miller	do	5475	150	do	75′	do	do	do	
19	2-20-67	Joe Casper	do	5400	162	do	112′	do	do	do	Never pumps dry.
20	11-20-67	Wm. E. Hersh	do	5450	140	do	?	do	do	do	Never pumps dry.
21	12-20-67	Wm. E. Hersh	do	5480	50	do	?	do	do	do	Pumps continuously.
22	SW 19-20-66	E. J. Bliss	do	5650	150	do	110′	do	do	Stock	
23	W½ 28-20-66	Donald Welty	do	5590	180	do	140′	do	do	do	
24	E½ 18-20-66	R. J. Harvey	Wind	5590	130	6″	?	Twr	Plains	General	
25	E½ 18-20-66	R. J. Harvey	do	5590	163	do	?	do	do	do	
26	NW 8-20-66	Stella Bostwick	do	5550	200	do	?	do	do	Stock	
27	NE 8-20-66	Homer Moxley	do	5510	120	do	?	do	do	do	
28	6-20-66	A. Bastian		5380	40	48″	?	?	Valley		Not in use.
29	NW 15-20-66	Emma Welty	do	5470	135	6″	?	Twr	Plains	do	Never pumps dry.
30	SE 3-20-66	Sadie A. Kewr	do	5440	120	do	80′	do	do	General	Never pumps dry.
31	NE 3-20-66	Mary A. Welty	do	5450	99	do	64′	do	do	do	Never pumps dry.
32	NW 1-20-66	Fred Steinaker	do	5390	70	do	36′	do	do	do	Never pumps dry.
33	SW 1-20-66	Lester Baker	do	5400	100	do	?	do	do	do	Never pumps dry.
34	E½ 11-20-66	A. W. Bittinger	do	5400	80	do	?	do	do	do	
35	N½ 30-20-65	C. C. Miller	do	5380	120	do	?	do	do	do	Never pumps dry, 90 feet to water.

DATA FOR WELLS SHOWN ON PLATE II—(Continued)
(Wells No. 1-109 inclusive)

No.	Location		Owner	Method of Lift	Elev. (ft.)	Depth (ft.)	Diam.	Water Level	Aquifer	Topo. Loc.	Use	Remarks
36	W½	29-20-65	C. C. Miller	do	5375	120	do	?	do	do	do	90 feet to water.
37		32-20-65	Harry Lundberg	do	?	115	do	?	do	do	do	90 feet to water.
38		29-20-65	State Land	Wind	?	115	6″	?	Twr	Plains	General	
39	S½	20-20-65	Wright Nickerson	do	5325	115	do	?	do	do	do	
40	S½	6-20-65	E. F. Lutzke	do	5390	125	do	?	do	do	do	
41	E½	6-20-65	E. F. Lutzke	do	5400	110	do	?	do	do	do	
42	SE	4-20-65	Roy Arnold	do	5390	128	do	?	do	do	do	
43	NE	14-21-67	W. A. Latham	do	5450	50	do	25′	do	Basin	do	All wells in basin near 50 feet in depth.
44	NW	13-21-67	W. A. Latham	do	5375	50	do	25′	do	do	do	
45	SW	13-21-67	E. M. Hedges	do	5375	50	do	25′	do	do	do	
46	SE	18-21-66	H. M. Milburn	do	5450	180	do	?	do	Valley	do	Pumps dry.
47	NE	7-21-66	Swan Land & Cattle Co.	do	5125	18	2″	?	Qal	do	do	Driven well.
48*	SW	30-21-66	R. L. Staats	Hand	5350	80	6″	?	Twr	Valley	House	Four-inch casing.
49		30-21-66	Town of Chugwater	Motor	5315	80	10″	?	do	do	Town	
50	SE	31-21-66	A. Bastian	Wind	5390	175	6″	120′	do	do	General	
51	SW	33-21-66	A. Bastian	do	5510	100	do	?	do	Plains	do	
52	NW	33-21-66	Mrs. Sadie Cone	do	5500	260	do	170′	do	do	do	
53	SE	34-21-66	A. E. Smeesby	do	5440	130	do	?	do	do	do	Water at 90 feet.
54	SW	25-21-66	Roscoe Bostwick	do	5400	140	do	?	do	do	do	
55	S½	31-21-65	State Land	do	5375	150	do	?	do	do		Not in use.
56	SW	32-21-65	George Shiels	do	5390	150	do	115′	do	do	do	
57	SE	32-21-65	F. E. Bostwick	do	5400	155	do	120′	do	do	do	
58		29-21-65	Arthur Clark	do	5390	170	do	?	do	do	do	Hard water.
59	E½	29-21-65	Curtis Templin	do	5375	190	do	?	do	do	do	Pumps dry.
60	SE	14-21-66	Henry Hellbaum	do	5400	168	do	100′	do	do	do	
61	NW	14-21-66	Herman Hellbaum	do	5400	160	do	140′	do	do	do	Never pumps dry.
62	NE	15-21-66	Herman Hellbaum	do	5400	185	do	150′	do	do	Stock	
63	SE	17-21-65	Herman Hellbaum	do	5360	140	do	?	do	do	General	
64	SW	16-21-65	State Land	do	?	154	do	114′	do	do	Stock	
65	NE	7-21-65	Herman Schnacker	do	5370	129	do	?	do	do	General	
66	N½	8-21-65	Herman Schnacker	do	5290	70	do	?	do	do	Stock	
67	E½	4-21-65	F. G. Karlson	do	5250	90	do	65′	do	do	General	
68	W½	4-21-65	Herb Havely	do	5300	100	do	?	do	do	Stock	
69	S½	5-21-65	Herman Schnacker	do	5335	185	do	?	do	do	do	
70	E½	6-21-65	R. D. Burhans	do	5385	200	do	?	do	do	General	
71		2-21-66	State Land	do	?	180	do	?	do	do		Not in use.

*Taken as typical of wells in Chugwater.

DATA FOR WELLS SHOWN ON PLATE II—(Continued)
(Wells No. 1-109 inclusive)

No.	Location	Owner	Method of Lift	Elev. (ft.)	Depth (ft.)	Diam.	Water Level	Aquifer	Topo. Loc.	Use	Remarks
72	NW 2-21-66	A. J. Eastwood	do	5400	138	do	88′	do	do	do	Never pumps dry.
73	NE 3-21-66	Fred Marke	do	5400	135	do	?	do	do	do	Never pumps dry, 120 feet of casing.
74	NW 14-22-67	R. H. Baker	Wind	5125	80	6″	?	Twr	Plains	General	Never pumps dry.
75	NE 18-22-66	Swan Land & Cattle Co.	Hand	5100	80	do	?	do	Valley	do	Very good water.
76	NE 19-22-66	W. T. McCarty	Motor	5120	14	42″	10′	Qal	do	do	Abundant supply.
77	17-22-66	W. T. McCarty	Hand	5160	128	6″	100′	Twr	do	do	Soft water.
78	29-22-66	Jim Rogers	Wind	5280	200	do	170′	do	Plains	do	Never pumps dry.
79	28-22-66	E. A. Haney	do	5400	280	do	?	do	do	do	Poor well.
80	NE 28-22-66	Henry George	do	5400	367	do	90′	do	do	do	Only water at 90 feet.
81	W½ 36-22-66	Herb Havely	do	5315	270	do	?	do	do	do	
82	W½ 22-22-66	E. A. Haney	do	5350	240	do	?	do	do	do	Poor well.
83	W½ 15-22-66	Chas. E. Nash	do	5180	192	do	137′	do	do	do	Four barrels capacity.
84	SW 10-22-66	Belle D. Lyons	do	5235	135	do	?	do	do	do	Never pumps dry.
85	NE 4-22-66	Floyd Goering	do	5300	315	do	?	do	do	do	Never pumps dry.
86	W½ 11-22-66	Bruce McElvain	do	5275	265	do	?	do	do	do	
87	S½ 23-22-66	Mrs. Maude Williams	do	5250	100	do	?	do	do	do	Pumps dry.
88	SE 27-22-66	E. A. Haney	do	5280	175	do	?	do	do	do	
89	35-22-66	E. A. Haney	do	5315	125	do	?	do	do	?	
90	SE 13-22-26	Jim Enix	do	5200	200	do	?	do	do	do	Poor well, pumps sand.
91	NE 24-22-66	J. H. Rowles	do	5200	75	do	?	do	do	do	
92	SE 24-22-66	W. E. Hitt	Motor	5230	150	do	?	do	do	do	Used infrequently.
93	NE 25-22-66	W. E. Hitt	Wind	5220	109	do	?	do	do	do	Never pumps dry, water at 80 feet and 100 feet.
94	N½ 31-22-65	John Fry	do	5290	118	do	50′	do	do	do	Never pumps dry.
95	SW 32-22-65	John Fry	Motor	5350	200	do	?	do	do	Stock	
96	S½ 29-22-65	George D. Rhoades	Wind	5275	164	do	100′	do	do	General	Never pumps dry.
97	S½ 28-22-65	R. Seigel	do	5240	105	do	?	do	do	do	Never pumps dry.
98	W½ 20-22-65	Morris Hitt	do	5240	160	do	?	do	do	do	
99	NW 21-22-65	B. W. Ashenhurst	Wind	5235	190	6″	?	Twr	Plains	General	Will pump dry.
100	SE 17-22-65	B. W. Ashenhurst	do	5255	135	do	?	do	do	Stock	Never pumps dry.
101	N½ 19-22-65	Hall & Rowles	do	5240	160	do	?	do	do	General	
102	N½ 19-22-65	J. H. Rowles	do	5240	287	do	?	do	do	do	Will pump dry.
103	SW 18-22-65	Mrs. B. Bartles	Hand	5250	130	do	?	do	do	do	
104	E½ 18-22-65	Elva Mers	Wind	5240	190	do	?	do	do	do	Never pumps dry.
105	S½ 8-22-65	Gertrude Crandall	do	5260	270	do	?	do	do	do	
106	E½ 7-22-65	Earl Harvey	do	5240	150	do	?	do	do	?	Never pumps dry.
107	W½ 7-22-65	C. F. Goertz	do	5240	140	do	?	do	do	Stock	
108	SE 6-22-65	J. R. Prickett	do	5240	268	do	?	do	do	General	Never pumps dry, water at 120 feet.
109	W½ 6-22-65	L. F. Wilson	do	5240	198	do	?	do	do	do	Never pumps dry.

DATA FOR WELLS SHOWN ON PLATE III
(Wells No. 110-243 inclusive)

No.	Location	Owner	Method of Lift	Elev. (ft.)	Depth (ft.)	Diam.	Water Level	Aquifer	Topo. Loc.	Use	Remarks
110	SE 14-23-68	Sophie M. Bolte	Wind	5074	45	6″	?	Twr	Plains	General	Goes dry.
111	S½ 28-23-67	E. Ritter	do	5060	60	do	?	do	do	do	
112	NW 34-23-67	Fred Fiel	do	5100	180	do	?	do	do	do	Will pump dry, affected by irrigation.
113	NE 34-23-67	State Farm Loan Board	do	5040	180	do	?	do	do	Stock	Not very good well.
114	E½ 27-23-67	H. A. Sater	do	5000	85	do	68′	do	do	General	Never goes dry.
115	SW 22-23-67	J. S. Kinnamon	do	5000	89	do	59′	do	do	do	Water at 60 feet.
116	NE 21-23-67	Morris Thomas	Hand	4860	33	do	?	do	Valley	do	
117	SW 35-23-67	Cecil L. Hofman	Wind	5050	90	do	70′	do	Plains	do	Water at 60 feet, good well.
118	SE 35-23-67	W. McLean	do	5040	127	do	60′	do	do	do	Good well.
119	NE 36-23-67	Carey Brothers Co.	do	4890	30	42″	?	Qal	Valley	do	
120	SE 36-23-67	Swan Land & Cattle Co.	Hand	4900	24	6″	16′	do	do	do	
121	NW 32-23-66	Harry Ashenhurst	Wind	5150	210	do	?	Twr	Plains	do	Pumps about 1,000 gallons per day.
122	SE 29-23-66	Harry Ashenhurst	do	5120	290	do	?	do	do		Not in use.
123	NW 33-23-66	C. F. Goertz	do	5250	220	do	160′	do	do	do	Will pump dry.
124	S½ 27-23-66	L. H. Mickaelis	do	5300	180	do	?	do	do	do	
125	NW 35-23-66	Floyd Goering	do	5320	200	do	110′	do	do	Stock	
126	NE 20-23-66	Harry Ashenhurst	do	5150	375	do	?	do	do	do	Poor well.
127	SW 17-23-66	C. C. Houston	do	5140	200	do	100′	do	do	General	
128	SW 16-23-66	Mrs. N. B. Manning	do	5120	275	do	?	do	do	do	
129	SW 4-23-66	Wendell Hobson	do	5150	302	do	120′	do	do	do	Never pumps dry, water at 130 feet.
130	SW 3-23-66	Wendell Hobson	do	5100	110	do	64′	do	do	do	
131	NE 2-23-66	C. A. Foster	do	5050	167	do	67′	do	do	do	
132	W½ 1-23-66	Ralph Carey	do	5115	92	do	?	do	do	do	
133	SE 19-24-69	Frank Wedemeyer	do	4820	184	do	?	?	Valley	do	One-half inch artesian flow; black sand at bottom.
134	SE 10-24-69	Ed Wedemeyer	Motor	4710	80	6″	20′	Twr	Valley	General	Never goes dry.
135	13-24-68	Town of Wheatland	do	4750	550	?	?	?	do	Town	Gravel at bottom, 500 gallons per minute capacity.
136	13-24-68	Town of Wheatland	do	4750	450	?	?	?	do	do	Used only in emergency.
137	13-24-68	Town of Wheatland	do	4750	450	?	?	?	do	do	Used only in emergency.
138	SE 29-24-67	Swan Land & Cattle Co.	do	4645	12	60″	6′	Qal	do	Irrig.	
139	SE 28-24-67	A. J. Roath	Hand	4680	45	6″	?	Twr	do	Stock	
140	E½ 28-24-67	A. J. Roath	Wind	4690	35	42″	10′	Qal	do	General	Never pumps dry.
141	NE 29-24-67	Swan Land & Cattle Co.	Hand	4640	20	do	8′	do	do	do	
142	NE 29-24-67	Swan Land & Cattle Co.	do	4640	8	do	?	do	do	do	
143	NW 20-24-67	Goodrich Estate	Wind	4760	300	6″	?	Twr	Terrace	do	Never pumps dry.
144	NE 18-24-67	Mrs. E. M. Short		4800	280	do	?	do	do		Not in use, quick sand at 70 feet.
145	NW 17-24-67	Ben Mitchell	Motor	4755	360	do	120′	do	do	do	Quick sand in well.
146	SW 8-24-67	Clifford Flora	do	4760	310	do	150′	do	do	do	Some quick sand.

DATA FOR WELLS SHOWN ON PLATE III—(Continued)
(Wells No. 110-243 inclusive)

No.	Location		Owner	Method of Lift	Elev. (ft.)	Depth (ft.)	Diam.	Water Level	Aquifer	Topo. Loc.	Use	Remarks
147	S½	8-24-67	A. H. Cheshire	Wind	4740	379	6″	225′	Twr.	Terrace	General	Eighteen feet gravel at bottom.
148	W½	9-24-67	State Bank of Wheatland	do	4675	133	do	?	do	do	do	Very hard water.
149		14-24-67	John K. Phifer	do	?	200	do	?	do	do		Not in use.
150	NW	15-24-67	Mrs. Nora Maglemery	Hand	4560	20	42″	?	Qal	Valley	do	
151	SW	3-24-67	John K. Phifer	do	4540	30	do	5′	do	do	do	
152	SW	4-24-67	Lettie Mae Moon	Wind	4660	300	6″	?	Twr	Terrace	do	
153	NE	5-24-67	Mrs. M. Geringer	Hand	4650	25	42″	19′	do	do	do	
154	NW	4-24-67	Mrs. M. Geringer	Wind	4650	200	6″	60′	do	do	do	
155	NW	3-24-67	B. O. Franzen	Motor	4640	35	42″	?	do	do	do	
156	SW	31-24-66	A. B. Combs	Wind	4950	85	6″	?	do	Plains	do	Never pumps dry.
157		29-24-66	Howard Hurst	do	5090	210	do	?	do	do	do	Water at 100 feet and 160 feet.
158		29-24-66	Howard Hurst	Wind	5040	98	6″	35′	Twr	Plains	Stock	Water at 90 feet.
159	SE	21-24-66	N. B. Campbell	do	5035	210	do	135′	do	do	General	
160	E½	21-24-66	Albert Weber	do	5125	210	do	?	do	do	do	
160a	SW	17-24-66	Dividend Oil and Refineries Inc.		4950	3814				do		Water at 88, 292, 320, 741, 745, 2,455, and 3,410 feet.
161	SW	25-24-66	C. C. Sharer	do	5160	218	do	206′	do	do	do	Never pumps dry.
162	NE	26-24-66	Homer Curtis	do	5150	285	do	?	do	do	do	
163		30-24-65	John J. Weber	do	5230	315	do	300′	do	do	do	
164	N½	19-24-65	Page Reed	do	5300	400	do	?	do	do	do	Water at 360 feet.
165	SE	15-24-66	Finis Tucker	do	5160	210	do	?	do	do	do	
166	NE	14-24-66	Edna Searles	do	5120	210	do	?	do	do	do	
167	S½	12-24-66	O. Throckmorton	do	5100	245	do	?	do	do	do	
168	E½	11-24-66	E. N. Romig	do	5035	190	do	?	do	do	do	Never pumps dry.
169	N½	12-24-66	Lee Marr	do	5060	289	do	269′	do	do	do	
170	S½	1-24-66	F. Sears Estate	do	5120	290	do	?	do	do	do	
171		7-24-65	Roger Romig	do	5150	390	do	?	do	do	do	
172	S½	6-24-65	Charles Romig	do	5155	385	do	?	do	do	do	Never pumps dry.
173	SE	6-24-65	J. W. Weber	do	5100	330	do	280′	do	do	do	
174	NW	34-25-69	Julius Galligar	Hand	4690	12	42″	?	Qal	Valley	do	Often nearly dry.
175	SE	2-25-70	C. A. Soward	Wind	4860	16	do	?	do	do	do	
176	S½	3-25-70	J. M. Nylander	Hand	?	8	do	4′	do	do	do	
177	SW	6-25-69	Hugh Patton	do	4850	14	do	10′	do	do	do	
178	SE	6-25-69	Mrs. M. Wilson	do	4820	14	do	12′	do	do	do	
179	SW	2-25-69	George Mitchell, Sr.	do	4720	12	do	9′	do	do	do	
180	SW	6-25-68	George Mitchell, Jr.	Hand	4660	15	42″	12′	Qal	Valley	House	
181	SE	4-25-68	F. S. Mitchell	do	4590	8	do	5′	do	do	do	
182	NE	10-25-68	Lon Heaton	do	4550	20	do	9′	do	do	do	Sixteen feet of Qal.
183	W½	23-25-68	Ben Cossman	do	4570	16	do	?	do	do	do	

DATA FOR WELLS SHOWN ON PLATE III—(Continued)
(Wells No. 110-243 inclusive)

No.	Location	Owner	Method of Lift	Elev. (ft.)	Depth (ft.)	Diam.	Water Level	Aquifer	Topo. Loc.	Use	Remarks
184	C 22-25-68	T. M. Mullin	Hand	4585	16	2″	?	Qal	Valley	House	Driven well.
185	21-25-68	R. A. Ferguson	do	4620	17	do	?	do	do	do	Driven well.
186	S½ 30-25-68	A. Armann	do	4650	26	?	?	do	do	do	
187	30-25-68	A. Armann	do	4650	68	6″	?	Twr	do	Stock	
188	NW 31-25-68	Wyoming Development Co.	?	4730	70	do	40′	do	Terrace	House	
189	SW 31-25-68	H. T. Fish	do	4760	50	do	?	do	do	General	
190	SE 31-25-68	H. T. Fish	Wind	?	45	do	?	do	do	Stock	
191	SE 31-25-68	H. T. Fish	Hand	4780	20	42″	?	do	do	General	
192	NE 32-25-68	F. A. Beard	do	4700	12	do	4′	do	do	do	
193	S½ 29-25-68	P. J. Mullin	do	4650	32	48″	12′	do	Valley	House	
194	SW 28-25-68	B. E. Crosby	Wind	4700	90	6″	?	do	Terrace	General	Never pumps dry; affected by irrigation.
195	SW 26-25-68	H. C. Havens	Hand	4650	250	do	100′	do	Plains	do	Never pumps dry.
196	SE 26-25-68	Carey Brothers Co.	do	4650	45	do	?	do	do	do	Rock bottom; three barrels capacity; upper 20 feet dug.
197	SW 25-25-68	H. C. Havens	do	4630	50	do	?	do	do	House	Five to six bucket capacity; formerly 125 feet deep.
198	SE 25-25-68	Wilkinson Brothers	do	4630	20	do	6′	Qal	Valley	do	Sandstone at bottom.
199	E½ 24-25-68	Osgood Johnson	do	4535	15	42″	12′	do	do	do	
200	19-25-67	William Irvine	do	4520	18	do	12′	do	do	do	
201	19-25-67	William Irvine	do	4520	18	do	12′	do	do	Stock	
202	S½ 18-25-67	H. Qualls	do	4520	20	do	12′	do	do	General	
203	S½ 18-25-67	H. Qualls	Hand	4520	20	42″	?	Qal	Valley	House	
204	W½ 18-25-67	C. L. Thompson	do	4550	15	do	12′	do	do	do	
205	NW 18-25-67	Crown Oil Co.	do	4575	18	do	14′	do	do	General	
206	NW 20-25-67	F. H. Oehlman	do	4490	20	do	12′	do	do	do	
207	SE 29-25-67	R. B. Purcell	Wind	4600	82	6″	?	Twr	Terrace	do	Hard water; never pumps dry.
208	S½ 28-25-67	Lester Cobb	do	4600	241	do	?	do	do	do	
209	SE 32-25-67	A. J. Hopkins	do	4650	92	do	?	do	do	do	Not very good well.
210	SW 33-25-67	A. J. Hopkins	Motor	4650	142	do	?	do	do	do	
211	S½ 33-25-67	Henry Wolfe	Hand	4640	40	do	?	do	do	do	Hard water; pumps dry.
212	S½ 33-25-67	S. J. Nelson	do	4640	20	?	?	do	do	do	Hole through bottom of cistern; hard water.
213	S½ 33-25-67	J. Geringer	do	4640	60	do	10′	do	do	do	
214	W½ 34-25-67	Amelia & Alex Adams	do	4640	20	42″	?	do	do	do	
215	N½ 34-25-67	Wyoming Development Co.	Motor	4640	140	6″	?	do	do	do	Never pumps dry.
216	W½ 35-25-67	H. W. Loomis	Hand	4490	16	42″	4′	Qal	Valley	do	
217	NE 26-25-67	H. W. Loomis	do	4500	45	6″	?	do	do	do	
218	S½ 30-25-66	William Shepherd		4410	45	do	25′	Twr	Terrace		Not in use.

DATA FOR WELLS SHOWN ON PLATE III—(Continued)
(Wells No. 110-243 inclusive)

No.	Location		Owner	Method of Lift	Elev. (ft.)	Depth (ft.)	Diam.	Water Level	Aquifer	Topo. Loc.	Use	Remarks
219	SW	30-25-66	William Shepherd	Wind	4400	18	2″	14′	Qal	Valley	General	Driven well.
220	SE	19-25-66	J. E. Criss	?	4390	8	?	?	do	do	do	
221		18-25-66	J. E. Criss	do	?	170	6″	?	Twr	Plains	Stock	
222		20-25-66	J. W. Blake	Hand	4375	20	?	?	Qal	Valley	General	Driven well.
223		15-25-66	Pat Daly	Wind	4350	18	?	?	do	do	do	Driven well.
224	NE	14-25-66	L. A. Lonquest	Hand	4340	17	?	11′	do	do	do	
225	NW	13-25-66	Patrick Brothers	do	4340	18	?	?	do	do	do	Driven well.
226	SE	31-25-65	J. W. Weber	Wind	5000	300	6″	240′	Twr	Plains	Stock	
227	W½	32-25-65	H. E. Kershner Estate	Wind	4960	257	6″	225′	Twr	Plains	General	
228	NE	31-25-65	J. W. Weber	do	4990	300	do	200′	do	do	Stock	
229	NE	30-25-65	Roy Anderson	do	4875	315	do	260′	do	do	General	
230	NE	29-25-65	Elmer Larsen	do	4885	340	do	280′	do	do	do	
231	SW	28-25-65	J. W. Blevins	do	4925	290	do	?	do	do	do	
232	SE	28-25-65	Mrs. H. Jeffers	do	4910	300	do	?	do	do	do	
233	NE	21-25-65	J. E. Monger	do	4800	211	do	203′	do	do	do	Gravel at bottom.
234	SE	17-25-65	Bennie Blevins	do	4700	113	do	?	do	do	do	
235	W½	9-25-65	J. W. Weber	do	4665	240	do	90′	do	do	do	Water at 90 feet.
236	SW	6-25-65	A. Bomgardner	Hand	4330	50	do	?	Qal	Valley	House	
237	SW	6-25-65	A. Bomgardner	Wind	4330	313	do	?	?	do	General	Water at 30 to 35 feet.
238	SE	4-25-65	Mrs. M. Blevins	do	4640	471	do	?	?	Plains		Not in use; bottom in blue shale.
239	SE	4-25-65	Mrs. M Blevins	do	4640	160	do	?	Twr	do		Not in use; capacity four barrels per day.
240		26-26-65	Floyd Glade	Hand	4290	7	42″	?	Qal	Valley	do	
241		25-26-65	G. G. Barnard	do	4270	9	do	?	do	do	do	
242		25-26-65	G. G. Barnard	do	4270	21	do	?	do	do	do	
243	N½	36-26-65	Roy Hendrickson	do	4275	30	do	22′	do	do	do	

MAP OF A REGION ALONG CHUGWATER CREEK, LARAMIE RIVER, AND NORTH LARAMIE RIVER, WYOMING

SHOWING

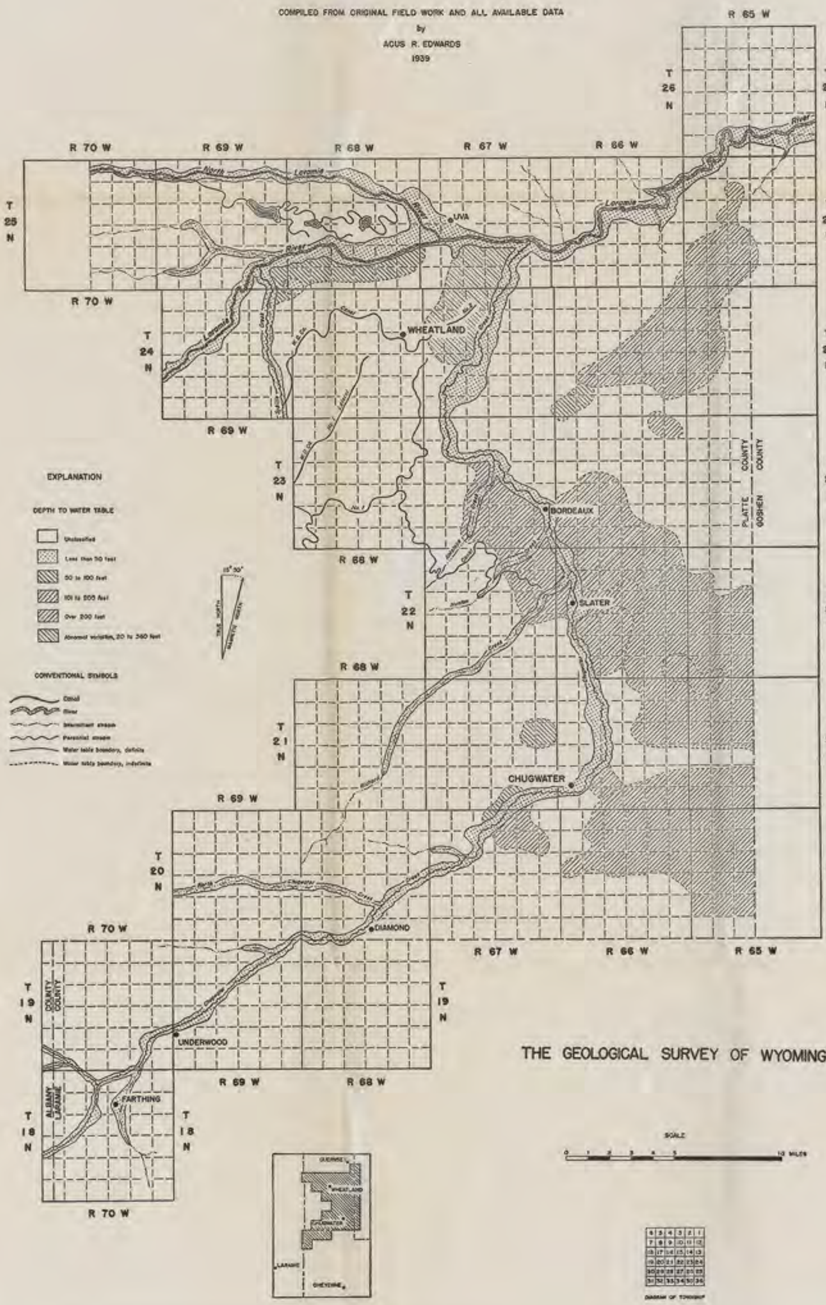
HYDROGRAPHY AND DEPTH TO WATER TABLE

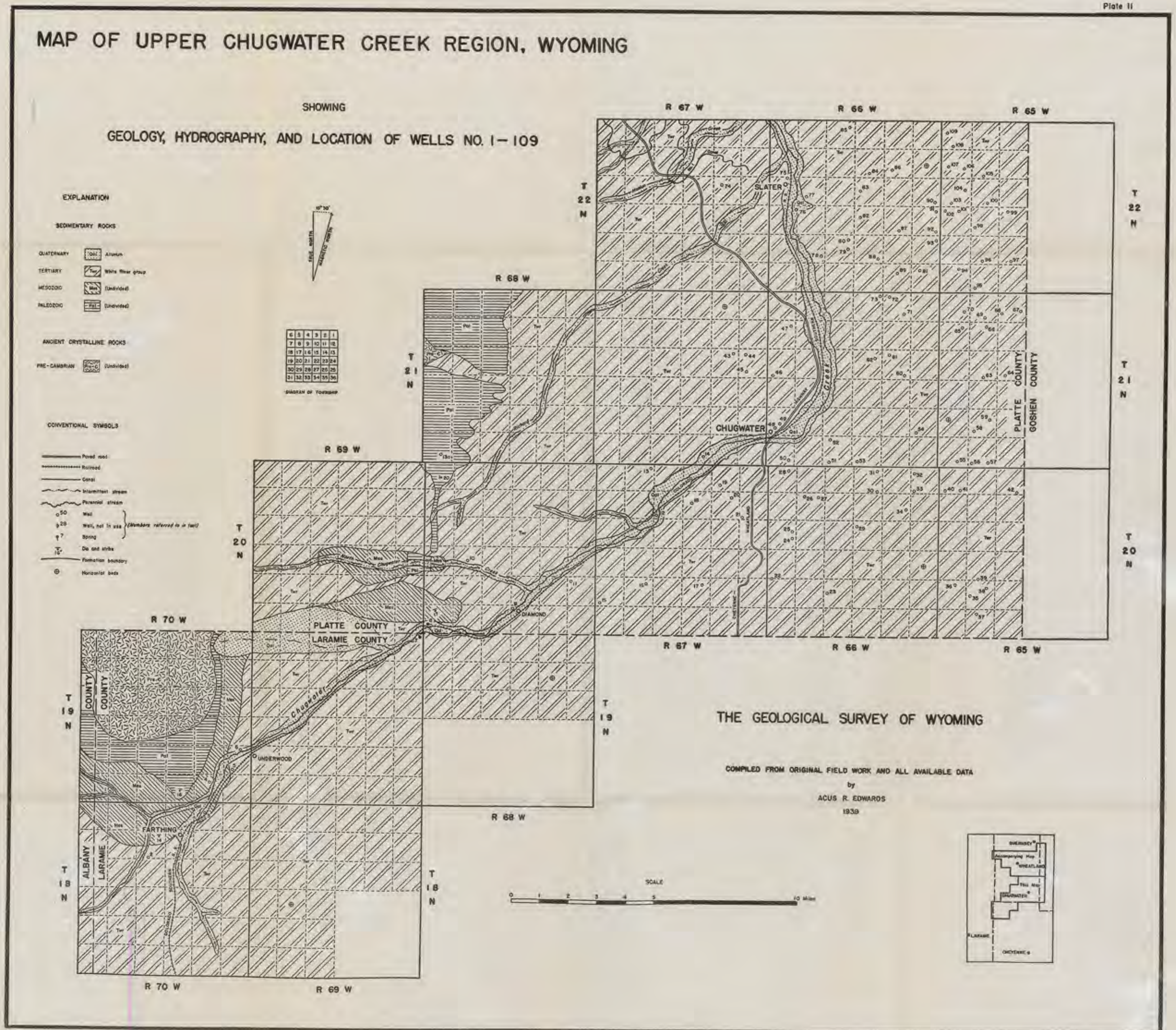
COMPILED FROM ORIGINAL FIELD WORK AND ALL AVAILABLE DATA

by

ACUS R. EDWARDS

1939




MAP OF UPPER CHUGWATER CREEK REGION, WYOMING
SHOWING
GEOLOGY, HYDROGRAPHY, AND LOCATION OF WELLS NO. 1—109
EXPLANATION
SEDIMENTARY ROCKS
QUATERNARY
Alluvium
TERTIARY
White River group
MESOZOIC
(Undivided)
PALEOZOIC
(Undivided)
ANCIENT CRYSTALLINE ROCKS
PRE-CAMBRIAN
(Undivided)
CONVENTIONAL SYMBOLS
Paved road
Railroad
Canal
Intermittent stream
Perennial stream
Well
Well, not in use
(Numbers referred to in text)
Spring
Dip and strike
Formation boundary
Horizontal beds
DIAGRAM OF TOWNSHIP
R 70 W
R 69 W
R 68 W
R 67 W
R 66 W
R 65 W
T 22 N
T 21 N
T 20 N
T 19 N
T 18 N
SLATER
CHUGWATER
DIAMOND
UNDERWOOD
FARTHING
PLATTE COUNTY
LARAMIE COUNTY
GOSHEN COUNTY
ALBANY COUNTY
Chugwater
Creek
THE GEOLOGICAL SURVEY OF WYOMING
COMPILED FROM ORIGINAL FIELD WORK AND ALL AVAILABLE DATA
by
ACUS R. EDWARDS
1939
SCALE
10 Miles
GUERNSEY
Accompanying Map
WHEATLAND
This Map
CHUGWATER
LARAMIE
CHEYENNE

MAP OF THE LOWER REGIONS OF CHUGWATER CREEK, LARAMIE RIVER, AND NORTH LARAMIE RIVER, WYOMING

SHOWING

GEOLOGY, HYDROGRAPHY, AND LOCATION OF WELLS NO. 110-243

COMPILED FROM ORIGINAL FIELD WORK AND ALL AVAILABLE DATA

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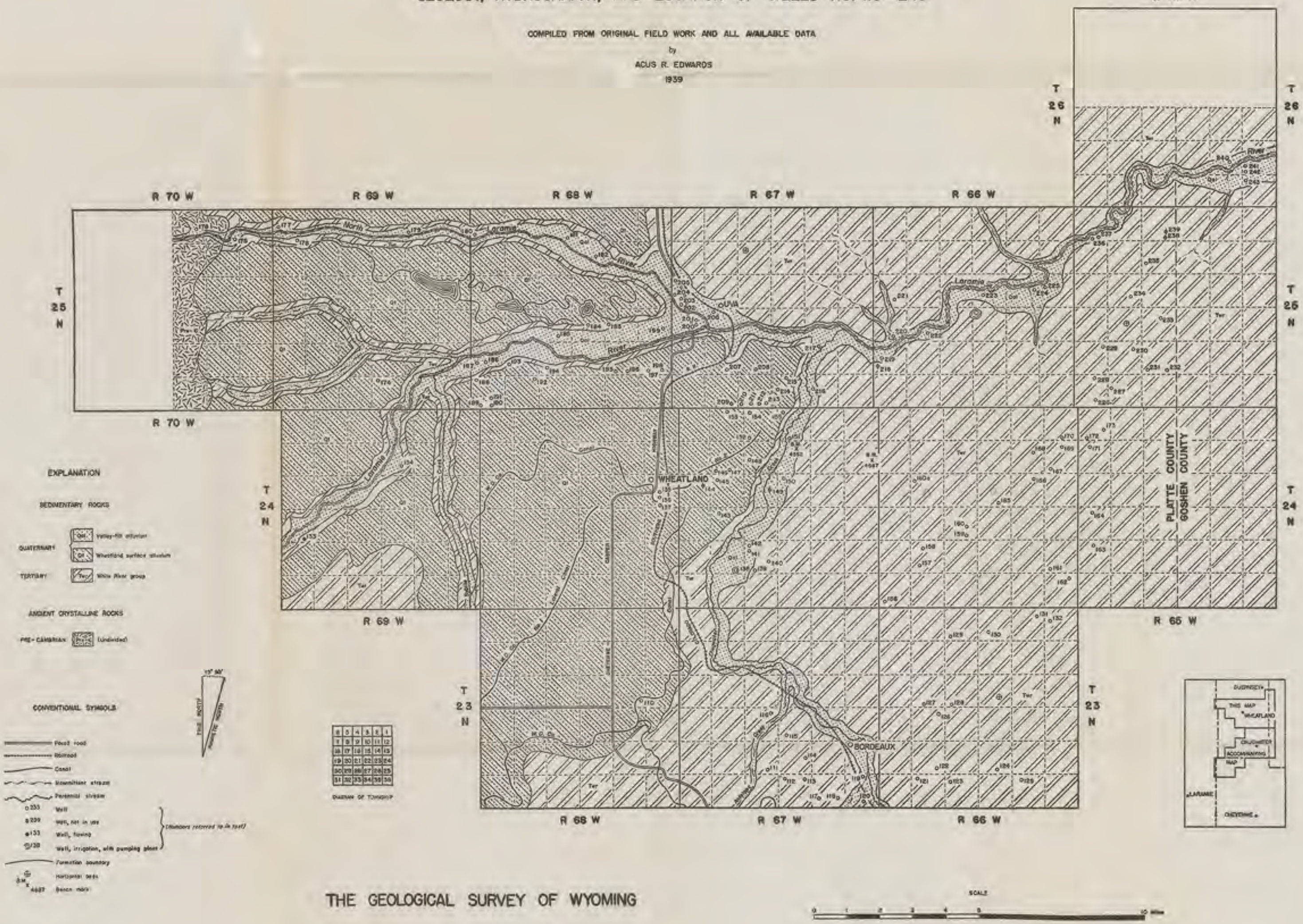
1939



THE GEOLOGICAL SURVEY OF WYOMING