Mr. Robert D. Nininger, Acting Assistant Director
Division of Raw Materials
U. S. Atomic Energy Commission
Washington 25, D. C.

Dear Bob:


On March 9, 1955, Mr. Hosted approved our plan to place this report in open file.

Sincerely yours,

W. H. Bradley
Chief Geologist

D. C. DUNCAN
EXPLANATION

Igneous rocks

| Ti |

Intrusive rocks
Chiefly syenite porphyry in plugs, dikes, and sills.

| Tag |

Agglomerate
Aphanitic matrix, containing angular to subangular fragments of surrounding igneous and sedimentary rocks.

Sedimentary rocks

| Qal |

Alluvial deposits of silt, sand, and gravel.

| Qtl |

Talus and landslide

| Qt |

Stream terrace deposits

Unconformity

| Tvr |

White River (?) formation
Light-gray, coarse-grained sandstone at base, overlain by light brownish-gray claystone and siltstone; thickness, 0-150 feet.

Unconformity
Wasatch formation
Drab sandstone and shale, numerous coal beds; thickness, 100+ feet.

<table>
<thead>
<tr>
<th>Tfu</th>
<th>Tfr</th>
<th>Tfl</th>
<th>Tft</th>
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</table>

Fort Union formation
Tfr, Tongue River member; light colored, massive sandstone, containing numerous thick coal beds; thickness, 600-800 feet.

Tfl, Lebo shale member; dark colored shale with some interbedded sandstone; thickness, 200-2000 feet.

Tft, Tullock member; yellowish sandstone and shale; contains several lenticular coal beds; thickness, 250-1500 feet.

Tfu, Tongue River and Lebo shale members, undifferentiated.

Kc

Hell Creek formation
Alternating beds of massive sandstone, dark colored shale, and coal; thickness, 850-1150 feet.

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<thead>
<tr>
<th>Kfc</th>
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Fox Hills sandstone
Kfh, Fox Hills sandstone; brownish sandy shale, siltstone, and sandstone; thickness, 150-250 feet.

Kfc, Colgate member; conspicuous white sandstone; thickness, 35 feet.
Pierre shale

Kpu, Pierre shale, upper unit; dark gray shale and mudstone with calcareous concretions; thickness, 150-250 feet.

Kph, Monument Hill bentonitic member; impure bentonite and siltstone, some limestone and barite concretions; thickness, 150± feet.

Kpm, Pierre shale, middle unit; fissile shale and mudstone with abundant calcareous concretions; light gray in upper part, darker in lower part; thickness, 500-800 feet.

Kps, Mitten black shale member; blue-black shale with a few iron-stained calcareous concretions; thickness, 150-200 feet.

Kpf, Gammon ferruginous member; light gray mudstone and shale with abundant iron-stained concretions and thin beds of siderite; thickness, 800-1000 feet.

Kpg, Groat sandstone bed of Gammon ferruginous member; ferruginous and glauconitic sandstone; present in northern part of the area; thickness, 0-150 feet.

Niobrara formation

Gray chalk marl and calcareous siltstone, weathering light yellow; thickness, 125-200 feet.
Upper Cretaceous

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<tr>
<th></th>
<th>Kcs</th>
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<th>Kcl</th>
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<tbody>
<tr>
<td>Carlile shale</td>
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<tr>
<td>Kcs, Sage Breaks member; gray, non-calcareous mudstone and shale, with many large light-gray calcareous septarian concretions; thickness, 250-325 feet.</td>
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<td>Kct, Turner sandy member; more or less sandy shale and siltstone with iron-stained concretions; thickness, 150-200 feet.</td>
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<tr>
<td>Kcl, Unnamed member; dark gray shale with a few calcareous concretions; thickness, 150-200 feet.</td>
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Greenhorn formation

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<th></th>
<th>Kgm</th>
<th>Kge</th>
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<tbody>
<tr>
<td>Kgm</td>
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<tr>
<td>Kge, concretionary facies; dark-gray shale, containing gray limestone concretions.</td>
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<tr>
<td>Kgl, limestone facies.</td>
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<td>Thickness, 50-350 feet.</td>
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Belle Fourche shale

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<tr>
<td>Black shale with concretions and bentonite beds in upper half and lowermost part; thickness, 350-1000 feet.</td>
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Mowry shale

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<tbody>
<tr>
<td>Dark-gray siliceous shale, weathering to light silvery gray; many thin beds of bentonite; thickness, 125-225 feet.</td>
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Newcastle sandstone

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<tr>
<td>Discontinuous beds of sandy shale, sandstone, lignite, and bentonite; thickness, 0-75 feet.</td>
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</tbody>
</table>
Skull Creek shale
Black fissile shale with a few ferruginous concretions; thickness, 175-275 feet.

Kr, Fall River sandstone; brown, thick-bedded, slabby, iron-stained sandstone, interbedded with dark-colored mudstone in upper part; contains plant remains; thickness, 40-150 feet.

Kfl, Fuson formation and Lakota sandstone, undifferentiated. Fuson formation; predominantly light-colored claystone, shale, and mudstone, containing lenticular gray sandstones, much fossil plant material. Lakota sandstone; massive gray sandstone, locally conglomeratic; contains abundant plant remains. Combined thickness, 100-250 feet.

Ki, Inyan Kara group, undifferentiated.

Unconformity (?)

Morrison formation
Variegated claystone with a few thin discontinuous beds of sandstone and limestone; thickness, 0-250 feet.
Sundance formation
Jsu, Redwater shale and Lak members, undifferentiated; Redwater shale consists of mostly greenish-gray shale with a few thin beds of yellow sandstone and thin platy limestone. Lak member is red to light yellow, friable, calcareous sandstone. Combined thickness, 200-240 feet.

Jsh, Hulett sandstone member; yellow and tan massive, calcareous sandstone; thickness, 70-100 feet.

Jsb, Stockade Beaver shale member; greenish-gray shale with thin beds of calcareous sandstone; thickness, 60-90 feet.

Unconformity

Gypsum Spring formation
Massive gypsum at base, overlain by interbedded gypsiferous red claystone and cherty gray limestone; thickness, 0-125 feet.

Unconformity (?)

Spearfish formation
Red shale, siltstone, and sandstone; beds of massive gypsum in lower part; thickness, 600+ feet.

Minnekahta limestone
Light-gray, tinged with pink or purple, thin-bedded, dense limestone; weathers into slabs; thickness, less than 40 feet.
Contact
(Dashed where approximately located)

Contact of surficial deposits.

Fault
(Dashed where approximately located. U, upthrown side; D, downthrown side.)

Intraformational contact and limit of mapping for members of a formation.