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Subject: Selected Hydro Data Plates
Sent Date: 9/13/2010 11:30:42 AM
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From: Burrows, Ronald

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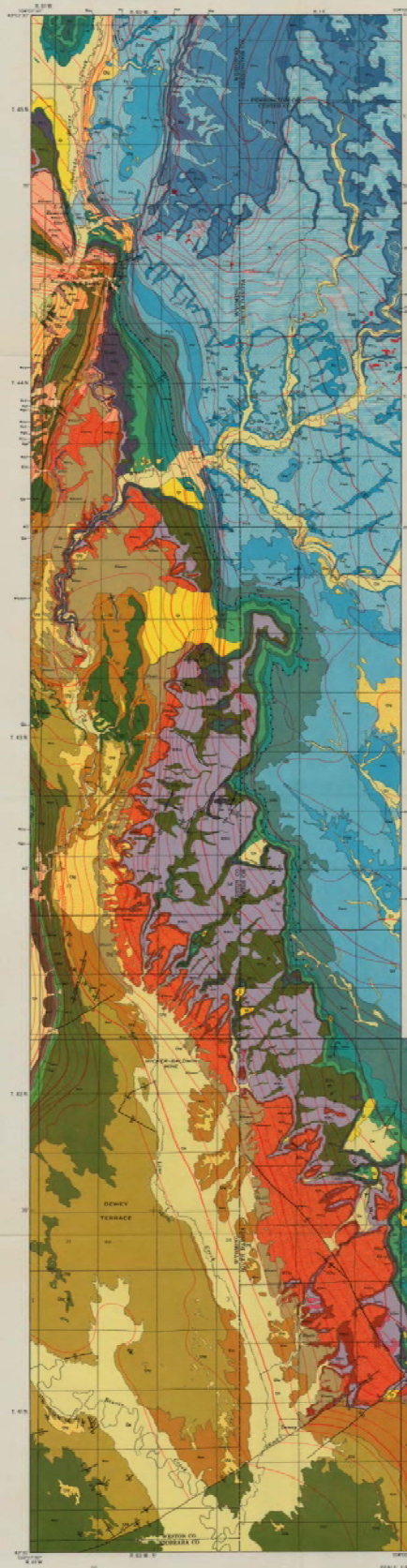
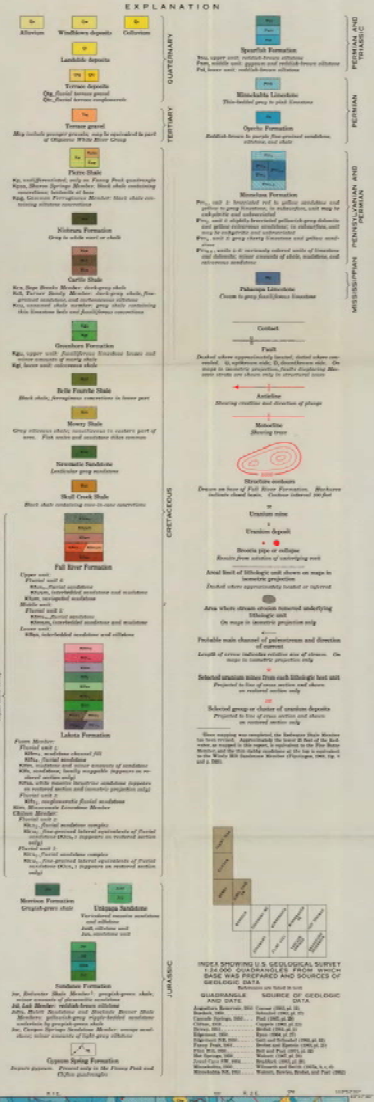
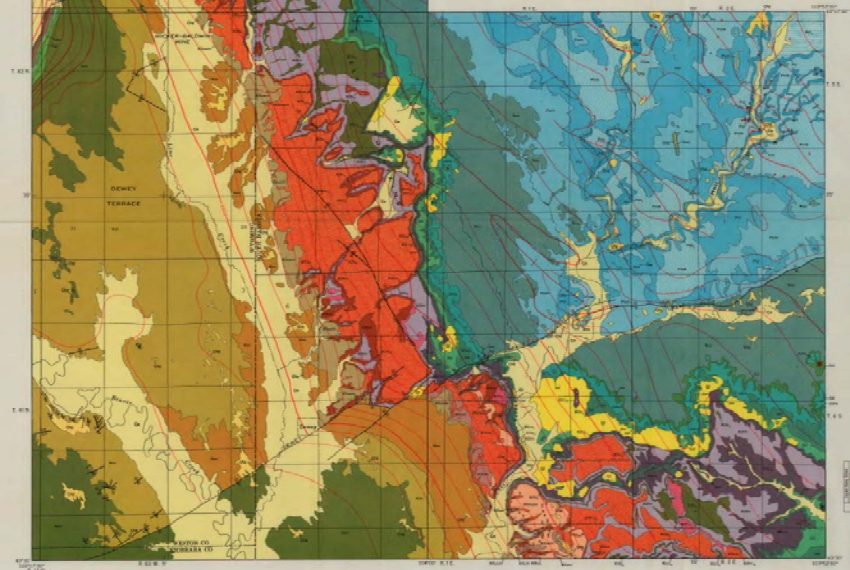
UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

PROFESSIONAL PAPER 765
PLATE I (NORTH HALF)



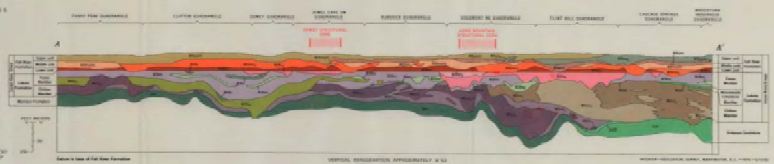
EXPLANATION





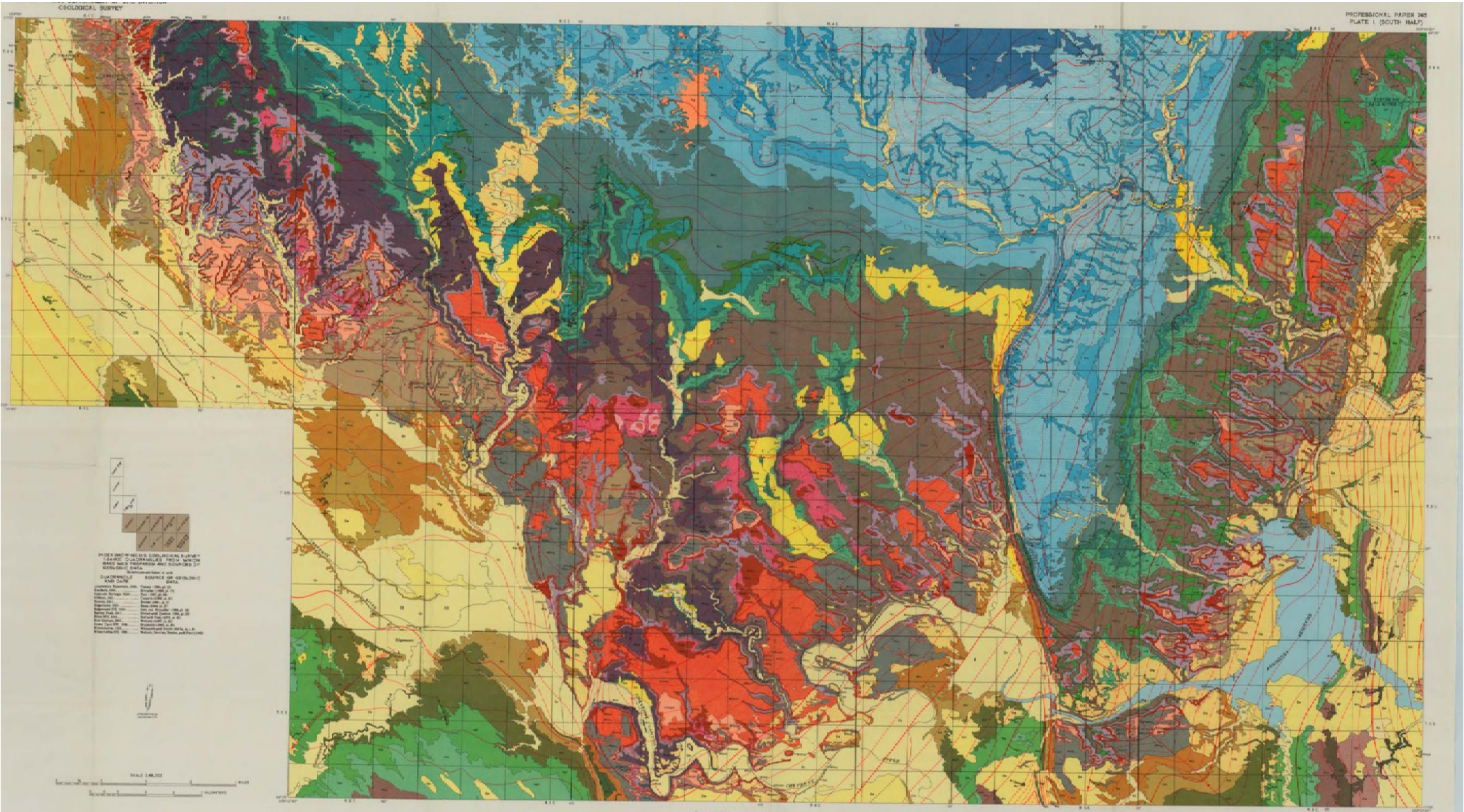
SCALE 1:62,500

MAPS IN ISOMETRIC PROJECTION



RESTORED DIAGRAMMATIC CROSS SECTION

GEOLOGIC AND STRUCTURE MAPS AND RESTORED CROSS SECTION OF PART OF THE SOUTHERN BLACK HILLS, SOUTH DAKOTA AND WYOMING



GEOLOGIC AND STRUCTURE MAPS AND RESTORED CROSS SECTION OF PART OF THE SOUTHERN BLACK HILLS, SOUTH DAKOTA AND WYOMING

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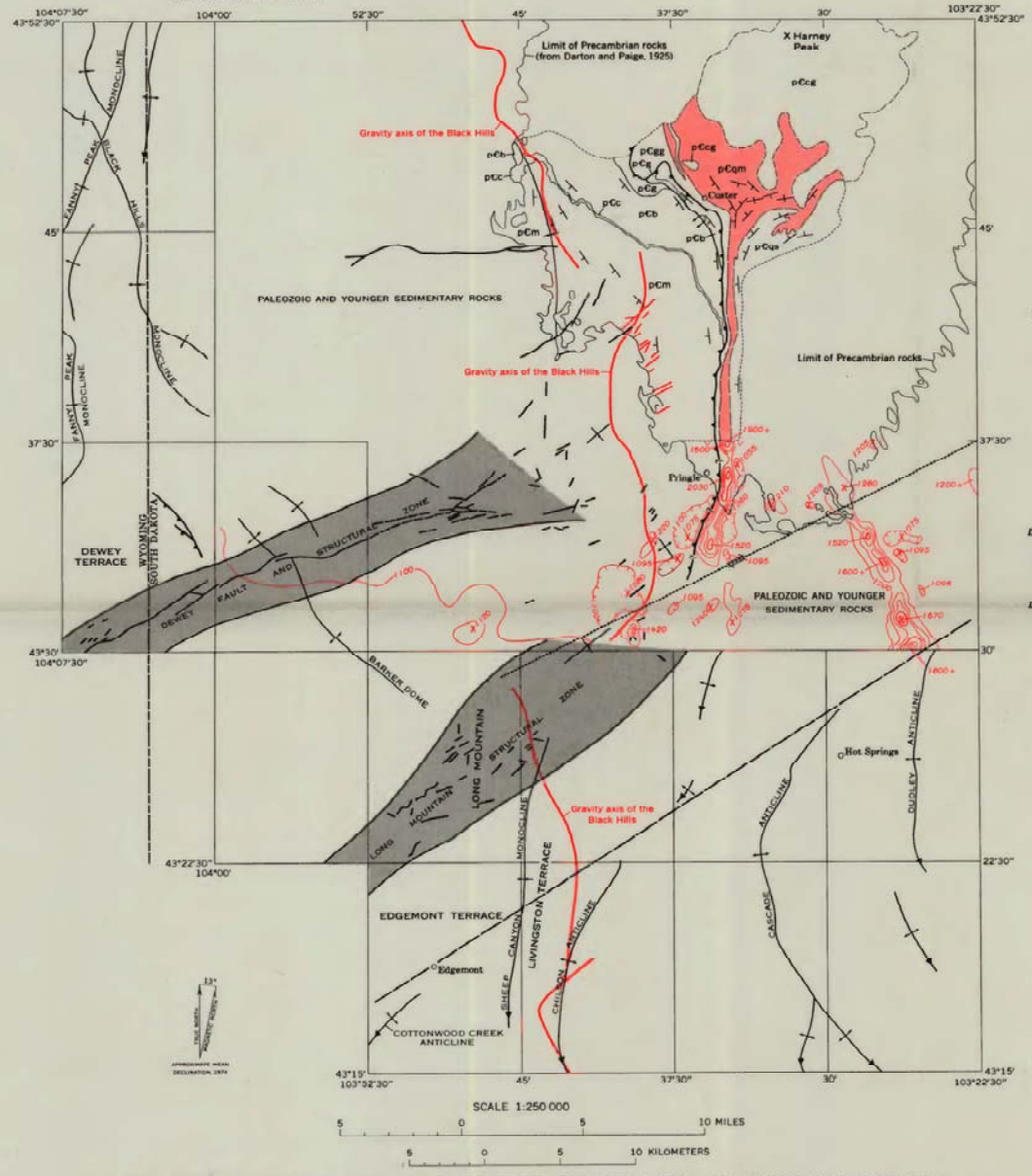
PROFESSIONAL PAPER 763
PLATE 2



EXPLANATION

Order may not reflect age

PRECAMBRIAN

- pCm — Mayo Formation
- pCc — Crow Formation
- pCb — Bugtown Formation
- pCg — Garnetiferous quartz-mica schist
- pCqs — Quartzite and sillimanite schist
- pCqm — Quartz-mica schist *Containing some beds of gruneritе schist*
- pCgg — Garnetiferous and graphitic schist
- pCcg — Pegmatite and granite
- Northeast-trending dike of layered pegmatite

Contact *Dashed where approximately located or based on reconnaissance mapping; short dashed where indefinite. Dotted line shows limit of mapped area*

Normal fault *Located on structural zone, or northeast of mapped area shown on plate 1*

Possible thrust fault *Queried where inferred. Sawteeth on upper plate*

Fault from photographs

Concealed fault *Showing probable direction of movement. Located by airborne magnetometer survey and by gravity survey*

Lineament

Anticline *Showing crestline and direction of plunge*

Syncline *Showing troughline*

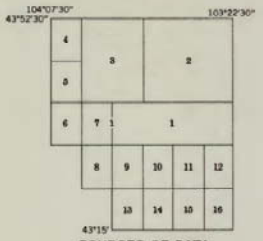
Overturned anticline *Showing direction of dip of limbs*

Monocline *Showing trace and direction of plunge. Dashed where indefinite*

Strike and direction of dip of beds

Magnetic contours *Showing total intensity magnetic field of the earth in gammas relative to arbitrary datum. Hachured to indicate closed areas of lower magnetic intensity. Interval 100 gammas*

Measured maximum or minimum intensity within closed high or closed low *In gammas*



SOURCES OF DATA

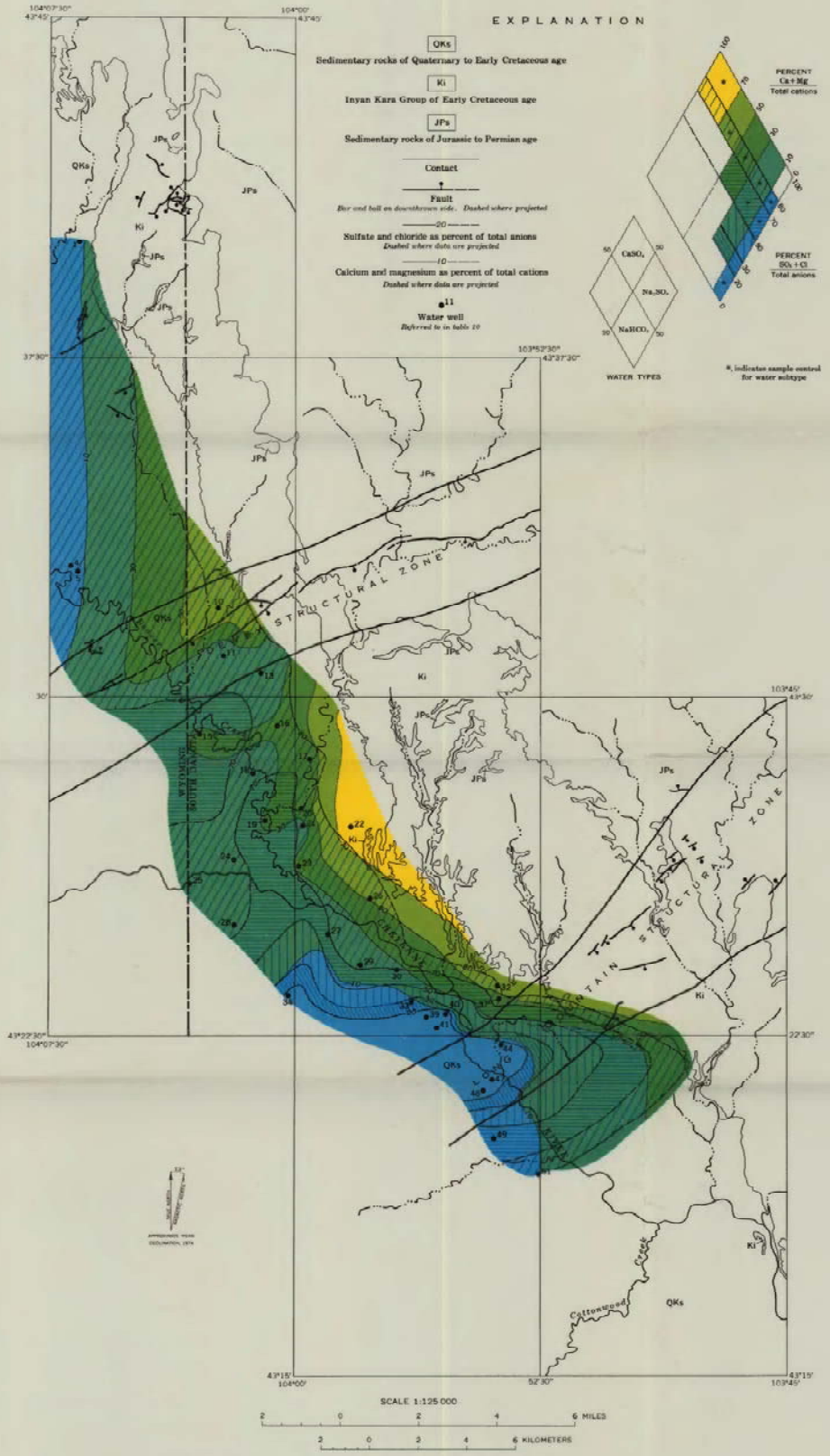
References are listed in text

1. Meuschke, Johnson, and Kirby (1963) [aeromagnetic data]
2. Redden (1963, pl. 21 and fig. 75)
3. Darton and Paige (1925)
4. Brobst and Epstein (1963, pl. 25)
5. Cuppels (1963, pl. 23)
6. Brobst (1961, pl. 5)
7. Braddock (1963, pl. 20)
8. Schnabel (1963, pl. 17)
9. Gott and Schnabel (1963, pl. 12)
10. V. R. Wilmarth, U.S. Geol. Survey (unpub. data)
11. Wolcott, Bowles, Brobst, and Post (1962)
12. Wolcott (1967, pl. 28)
13. Ryan (1964, pl. 27)
14. Bell and Post (1971, pl. 32)
15. Post (1967, pl. 25)
16. Connor (1963, pl. 11)

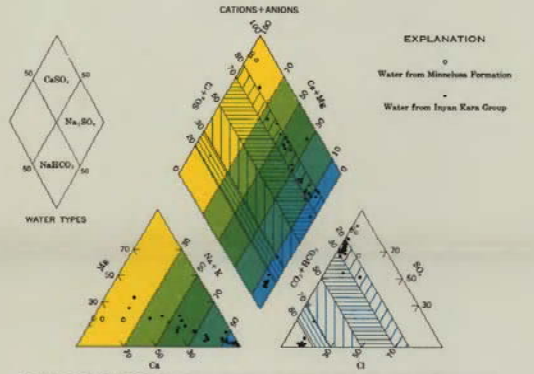
Gravity data by R. A. Black, U.S. Geol. Survey (unpub. data)

MAP OF PART OF THE SOUTHERN BLACK HILLS, SOUTH DAKOTA AND WYOMING, SHOWING MESOZOIC AND CENOZOIC DEFORMATION ALONG PRECAMBRIAN STRUCTURES

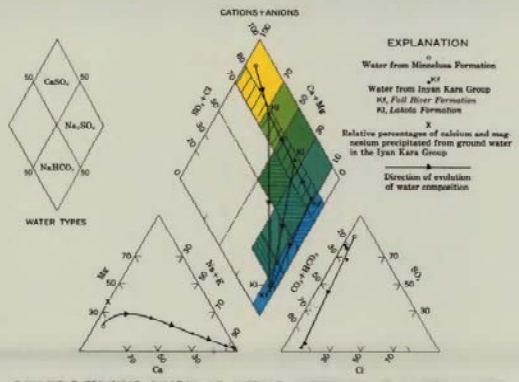
827-764 O - 74 (in pocket)



A. HYDROCHEMICAL MAP SHOWING DIFFERENCES IN GROUND-WATER COMPOSITION IN THE INYAN KARA GROUP



B. MULTIPLE-TRILINEAR DIAGRAM SHOWING CATION AND ANION PERCENTAGES FOR CALCIUM SULFATE, SODIUM SULFATE, AND SODIUM BICARBONATE TYPE GROUND-WATER SAMPLES



C. MULTIPLE-TRILINEAR DIAGRAM OF AVERAGE COMPOSITION OF CALCIUM SULFATE, SODIUM SULFATE, AND SODIUM BICARBONATE TYPE WATERS SHOWING POSTULATED EVOLUTION OF GROUND WATER COMPOSITION IN THE MINNELUSA, LAKOTA, AND FALL RIVER FORMATIONS

HYDROCHEMICAL DIAGRAMS AND MAP SHOWING POSTULATED EVOLUTION OF ARTESIAN CALCIUM SULFATE TYPE GROUND WATER FROM THE MINNELUSA FORMATION AS IT MIGRATES THROUGH THE INYAN KARA GROUP, SOUTHERN BLACK HILLS, SOUTH DAKOTA AND WYOMING

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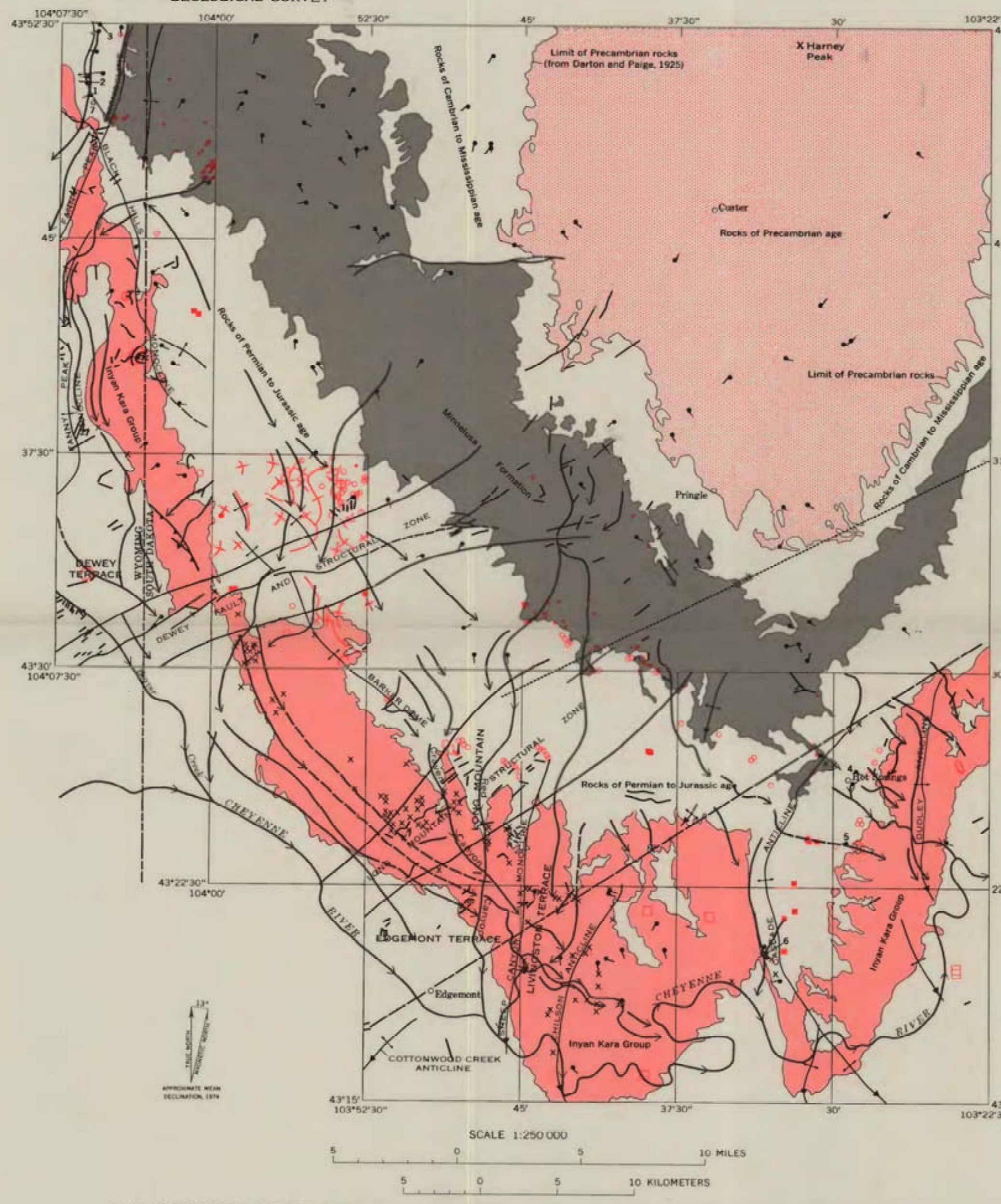
PLATE 4



EXPLANATION

Contact

Normal fault

Possible thrust fault
Sawteeth on upthrown side

Fault from photographs

Concealed fault
Showing probable direction of movement. Located by airborne magnetometer survey and by gravity survey

Lineament

Anticline
Showing crestline and direction of plunge

Syncline
Showing troughline

Monocline
Showing trace and direction of plunge. Dashed where indefinite

Breccia pipe or collapse structure in Inyan Kara Group or Morrison Formation

Breccia pipe or collapse structure in Sundance Formation

Breccia pipe or collapse structure in Spearfish Formation, Minnekahta Limestone, or Opeche Formation

Breccia pipe or collapse structure in Minnelusa Formation

Syncline
Possibly formed in part by solution subsidence

Area containing structures of possible solution origin

Topographic depression in Inyan Kara Group or younger rocks

Topographic depression in Sundance Formation

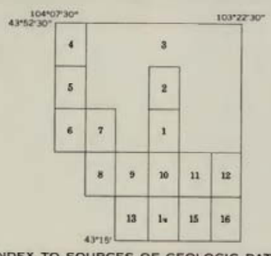
Topographic depression in Spearfish Formation or Minnekahta Limestone

Paleostream of Tertiary and (or) Quaternary age
Dashed where inferred

Uranium deposit
Some undeveloped prospects in pre-Inyan Kara rocks also shown

Spring
Showing locality number in table 9

Water well
Showing locality number in table 11



INDEX TO SOURCES OF GEOLOGIC DATA

References are listed in text. Springs located from U.S. Geological Survey topographic maps. Solution collapse structures not mapped in some areas. Uranium deposits shown on geologic maps referenced below.

1. Bowles and Braddock (1963)
2. Redden (1963, pl. 21)
3. Darton and Paige (1925)
4. Brobst and Epstein (1963, pl. 25)
5. Cuppels (1963, pl. 23)
6. Brobst (1961, pl. 5)
7. Braddock (1963, pl. 20)
8. Schnabel (1963, pl. 17)
9. Gott and Schnabel (1963, pl. 12)
10. V. R. Wilmarth, U.S. Geol. Survey unpub. data
11. Wolcott, Bowles, Brobst, and Post (1962)
12. Wolcott (1967, pl. 28)
13. Ryan (1964, pl. 27)
14. Bell and Post (1971, pl. 32)
15. Post (1967, pl. 29)
6. Connor (1963, pl. 11)

MAP SHOWING MAJOR TECTONIC ELEMENTS, MINOR FAULT AND SOLUTION COLLAPSE STRUCTURES, SPRINGS, PALEOSTREAMS, AND URANIUM DEPOSITS IN THE SOUTHERN BLACK HILLS, SOUTH DAKOTA AND WYOMING

557-784 O - 74 (In pocket)