UNITED STATES
DEPARTMENT OF THE INTERIOR
FRED A. SEATON, SECRETARY

DEFENSE MINERALS EXPLORATION ADMINISTRATION

REPORT OF EXAMINATION BY FIELD TEAM
REGION III

DMEA 4331

Big Sioux Uranium and Mineral Company, Inc.

Cedar Canyon and Eleven Claim Groups, and McClure Lease

Fall River County, South Dakota

Uranium

Joint Engineering and Geological Report

by

Donald H. Richter, Geologist
Geological Survey

Carl Selser, Mining Engineer
Bureau of Mines

September 11, 1956

CONTENTS

Page

Introduction and Summary..... 1

Acknowledgments..... 3

Location, Topography, and Climate..... 3

History and Production..... 4

Ownership and Extent..... 4

Present Status..... 6

Exploration and development..... 6

Mining and milling equipment and other facilities..... 6

Geology and Uranium Deposits..... 7

General statement..... 7

Cedar Canyon claim group..... 8

McClure lease and Eleven claim group..... 12

Ore Reserves..... 13

Proposed Exploration and Costs..... 14

Recommendations and Conclusions..... 15

ILLUSTRATIONS

Figure		Follows page
1.	Index map of the Black Hills showing the holdings of the Big Sioux Uranium and Mineral Company, Inc.	3
2.	Geology and Location map, Cedar Canyon claim group, Big Sioux Uranium and Mineral Company, Inc., Fall River County, South Dakota	16

DMEA 4331

BIG SIOUX URANIUM AND MINERAL COMPANY, INC.
CEDAR CANYON AND ELEVEN CLAIM GROUPS, AND McCLURE LEASE
FALL RIVER COUNTY, SOUTH DAKOTA

INTRODUCTION AND SUMMARY

Big Sioux Uranium and Mineral Company, Inc., 1209 South Main Avenue, Sioux Falls, South Dakota, on June 8, 1956, made application to the Defense Minerals Exploration Administration for aid in a two-stage drilling project consisting of 15,400 feet of core and non-core drilling at an estimated cost of $28,660.

The properties were examined on August 14, 1956, by an examining team from the Bureau of Mines and the Geological Survey.

The properties consist of five unpatented mining claims in section 25, 11 unpatented mining claims in section 34 and 320 acres of fee land in the SW 1/4 section 29 and the NW 1/4 section 32; all in T. 8 S., R. 4 E., Black Hills meridian, Fall River County, South Dakota. The properties are from 11 to 16 miles southwest of Hot Springs, South Dakota. The altitude ranges from about 3,300 to 3,600 feet.

The consolidated rocks exposed on the properties are a series of Cretaceous sandstones, siltstones, and mudstones of the Fall River and Lakota formations (Inyan Kara group). Interfingering of the different rock types is common and the lithologic sequence

changes throughout the area. The attitude of the strata is relatively consistent. The strike is generally northeast and the dip ranges from 1° to 4° SE. Uranium mineralization occurs north and west of the properties, but significant amounts of ore have been produced from only two mines, the Gould and Accidental.

In the Cedar Canyon claim group 8.9 tons of ore averaging 0.18 percent U_3O_8 have been mined from a sandstone-siltstone unit in the Fall River formation. Drilling in the vicinity of the deposit has outlined a possible 650-ton ore body. Two other radioactive areas are said to occur on the claim group, but they apparently contain no significant uranium mineralization.

On the Eleven claim group and the McClure lease a few radioactive anomalies are reported but, as in the case of the Cedar Canyon claims, no uranium mineralization has been observed.

Government participation in the applicant's proposed exploration program is not recommended because, (1) there are no known structures or lithologic discontinuities that might serve to localize uranium deposition, (2) no large radioactive anomalies or altered zones indicative of subsurface deposits are present, (3) only one small uranium deposit has been found on the claims, and (4) canyons which form ideal "exploration trenches" through the Inyan Kara rocks fail to disclose significant uranium mineralization.

ACKNOWLEDGMENTS

The examining team was accompanied by Manes Veeraburus, I.C.A. geologist, Edwin C. Post, U.S.G.S. geologist, and Francis Michaud who represented the applicant.

Memorandums of H. E. Nelson and John R. Crawford were noted.

Mr. Ray Barkeley, geologist for the Atomic Energy Commission in Hot Springs, South Dakota, was consulted at the time of the examination.

LOCATION, TOPOGRAPHY, AND CLIMATE

The property consists of 5 unpatented mining claims in section 25, 11 unpatented mining claims in section 34, and 160 acres of fee land in the SW 1/4 section 29, 160 acres of fee land in the NW 1/4 section 32; all in T. 8 S., R. 4 E., Black Hills meridian, Fall River County, South Dakota. (fig. 1)

The Cedar Canyon claim group can be reached by traveling southwest from Hot Springs over South Dakota Highway 87 a distance of 10.5 miles, thence 1 mile northwest over a poor access road. The McClure lease and Eleven claim groups can be reached by traveling northeast from Edgemont over U. S. Highway 18 a distance of 12 miles, thence southeast over a fair dirt road 5 and 6 miles, respectively.

Altitudes of the properties range from about 3,300 to 3,600 feet.

Labor and supplies can be obtained from Edgemont or Hot Springs, and an ore buying depot is maintained at Edgemont.

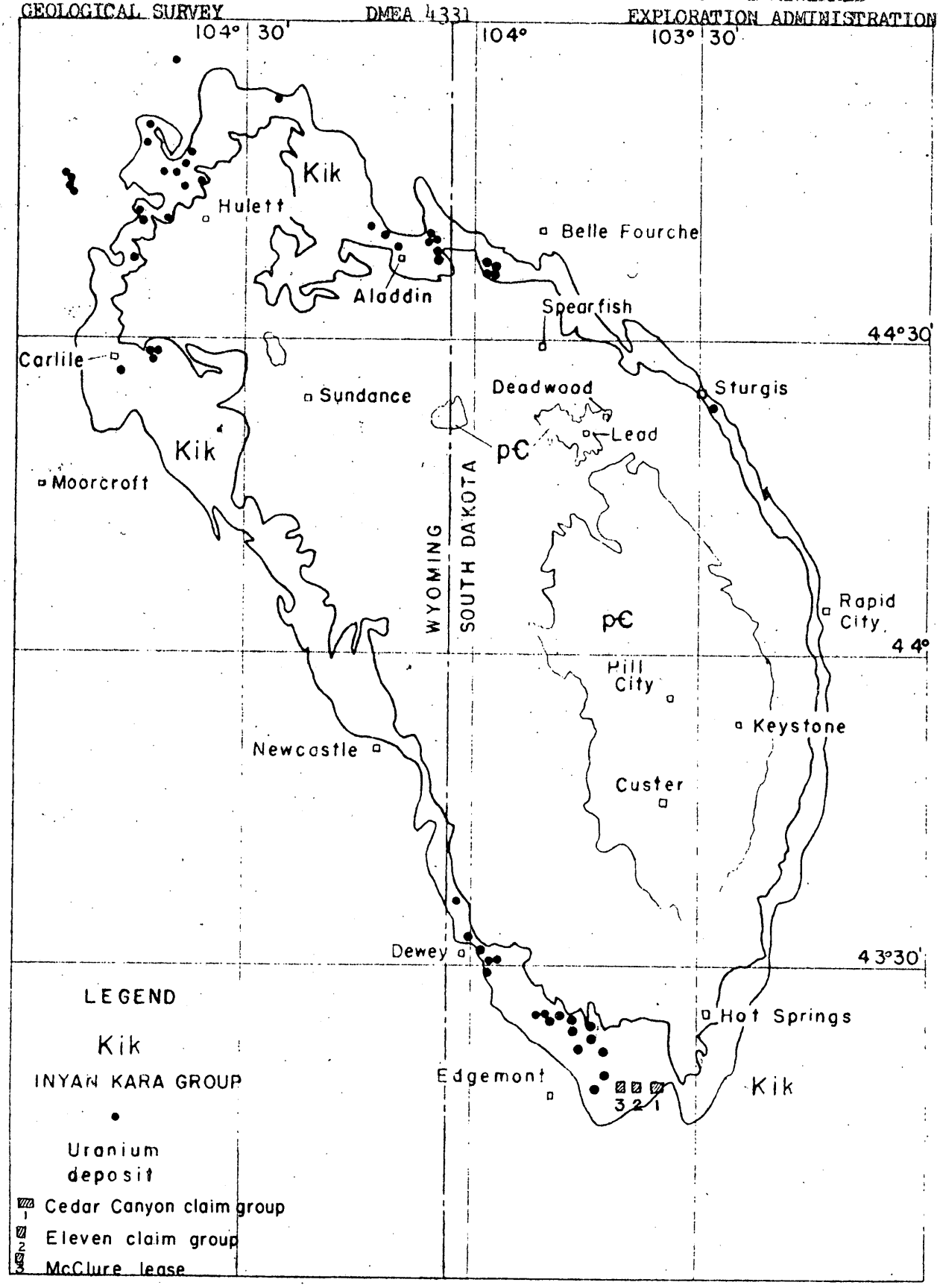


FIGURE 1. INDEX MAP OF THE BLACK HILLS SHOWING THE HOLDINGS OF THE BIG SIOUX URANIUM AND MINERAL COMPANY, INC.

The Burlington railroad passes through Edgemont, and Hot Springs is on the Chicago and Northwestern railroad.

HISTORY AND PRODUCTION

The claims were located late in 1954. Access roads were built on the Cedar Canyon group by Melvin Hanson in 1955, and a small amount of ore was shipped. Discovery pits were bulldozed on the Eleven claim group.

Total production amounts to 8.9 tons averaging 0.18 percent U_3O_8 and 0.34 percent V_2O_5. This production was made from an exposed ore zone on the Canyon claim.

OWNERSHIP AND EXTENT

The SW 1/4 section 29 and the NW 1/4 of section 32, T. 3 S., R. 4 E., Black Hills meridian, are assessed to Abram E. McClure. A United States patent was issued on this land on March 1, 1921, and is recorded in Book 7, page 576, of the records of Fall River County, South Dakota. The mineral rights were leased on October 8, 1954, to Melvin and Jessie Hanson, and Francis and Mary M. Michaud. This lease was transferred to the Big Sioux Uranium and Mineral Company, Inc., on November 1, 1955. The lease transfer is recorded in Book 3[illegible], pages 43[illegible] and 459.

The following claims are recorded in the Office of the Register of Deeds, Fall River County, South Dakota:

Claim	Book	Page	Location Date	Locator
Cedar Canyon group				
Niggar	35	185	9/27/54	Everett and Marie Hill
Niggar Hill	35	185	"	Francis Michaud and Melvin Hanson
Hans	35	188	"	" " " " "
Canyon	35	189	"	" " " " "
Side Hill	35	189	"	Everett and Marie Hill
Eleven claim group				
Flat	35	232	11/18/54	Jessie Hanson
Bull	35	233	"	Mary M. Michaud
Sunday	35	233	11/17/54	Francis Michaud
Sunday No. 1	35	234	11/17/54	Melvin Hanson
Sunday No. 2	35	234	"	Francis Michaud
Hanson	35	235	"	Melvin Hanson
Hanson No. 1	35	235	"	" "
Number Five	35	235	"	Francis Michaud
Number Seven	35	236	"	" "
Jim	35	237	"	Melvin Hanson
Pete	35	237	"	Francis Michaud

The Niggar Hill, Hans, and Canyon claims were transferred by Everett and Marie Hill to Melvin and Jessie Hanson and Francis and Mary M. Michaud who, on November 1, 1955, transferred the claims to the Big Sioux Uranium and Mineral Company, Inc. The transfer carries a 13-1/2 percent royalty on production and is recorded in Book 38, pages 437 and 438.

The Flat, Sunday, Sunday No. 1, Sunday No. 2, Jim, Bull, Hanson, Hanson No. 1, Peter, Number Five, and Number Seven claims were transferred to the Big Sioux Uranium and Mineral Company, Inc., on November 1, 1955. The transfer calls for a two-percent production royalty and is recorded in Book 38, pages 439 and 440.

The Bigger and Side Hill claims were transferred on November 1, 1955, by Melvin and Jessie Hanson and Francis and Mary M. Michaud to the Big Sioux Uranium and Mineral Company, Inc. The transfer carried a two-percent royalty on production and is recorded in Book 38, pages 435 and 436.

PRESENT STATUS

Exploration and development

Exploration consists of a bulldozer cut on the Canyon claim and 27 drill holes in the vicinity of this cut. A survey for radioactivity has discovered weak anomalies on the McClure lease, the Cedar Canyon group, and the Eleven claim group.

Mining and milling equipment and other facilities

There is no mining or milling equipment on the property. Other facilities consist of a few access roads.

GEOLOGY AND URANIUM DEPOSITS

General statement

The consolidated rocks exposed on the holdings of the Big Sioux Uranium and Mineral Company, Inc., consist of a series of lower Cretaceous sedimentary rocks known as the Inyan Kara group. This group, which forms one of the outer peripheral hogbacks to the Black Hills, is now divided into two formations - the Fall River and the Lakota. The Fall River or uppermost member of the Inyan Kara consists of a series of sandstones, mudstones, and interbedded sandstones and siltstones. The Lakota formation, which now includes the old Fuson formation, is primarily a series of sandstones and mudstones. Interfingering of the different rock types within these formations is common, and the lithologic sequence changes frequently throughout the area. The Inyan Kara overlies the Jurassic Morrison formation in the southwest part of the Black Hills and the equivalent Unkpapa sandstone in the areas described here. Thin deposits of Quaternary terrace gravels and alluvium locally cover the Cretaceous rocks.

Structural deformation throughout the area is a result of the Laramidian Black Hills uplift and the attitude of the strata depends upon their position with respect to the elongate Black Hills dome. In the areas examined in the southern Black Hills, the

regional strike is NE, and the dip ranges from 1° to 4° SE. Although a number of north-trending anticlines and monoclines are superimposed on this regional homocline, none were observed in the areas investigated.

Occurrences of uranium mineralization are common in the Inyan Kara group to the north and west of the examined claims. However, only a very few of these occurrences have had material which warranted mining or exploration and only two - the Gould and Accidental mines - have shipped any significant amounts of ore. The Gould mine, from which over 10,000 tons of carnotite-type ore has been shipped from the Fall River formation, is by far the largest mine in the area, and is the only producer. In the Accidental, now abandoned, a 500-ton ore body was mined from the Lakota formation. Two other properties worthy of mention in the area are the McCloud, in the Lakota formation, and the Livingston, in the Fall River, both of which are now undergoing development.

Cedar Canyon claim group

The Cedar Canyon claim group consists of the Hans, Side Hill, Canyon, Niggar, and Niggar Hill lode mining claims in the SE 1/4 sec. 25, T. 8 S., R. 4 E., Fall River County, South Dakota (figs. 1 and 2).

The rocks of the Inyan Kara group are well exposed on the five claims of the Cedar Canyon claim group; only the lowermost unit

of the Lakota formation is absent. The rock units present, from the top of the Fall River formation downward, are as follows:

Fall River formation

(1) Brown, fine-grained massive sandstone, 25 to 30 feet thick.

(2) Gray, fissile mudstone, with minor siltstone, 15 to 30 feet thick. (Buff, fine-grained micaceous channel sandstone has filled the scours in unit 3. It is as much as 70 feet thick)

(3) Light- to dark-brown thinly interbedded sandstones and carbonaceous siltstones 20 to 110 feet thick. Upper part of this unit usually consists of a 10- to 20-foot thick section of brown sandstone.

Lakota formation

(4) Buff, medium-grained massive sandstone with a grit and conglomerate base, 30 to 50 feet thick.

(5) Brown mudstones, probably equivalent to the old Fuson formation, 10 to 80 feet thick.

(6) Brown, fine-grained massive sandstone, 100 to 200 feet thick.

No structural features other than a consistent 2° to 5° dip of the strata to the southeast was noted on the claims.

Uranium mineralization was observed only at one locality in the interbedded sandstone-siltstone unit (No. 3) of the Fall River

formation. This locality, known as the Canyon Lode deposit, is at the base of a small side canyon trending N. 70° E. from Cedar Canyon (fig. 2). The deposit occurs in a 2-foot section of manganiferous sandstone and thinly laminated carbonaceous siltstones about 10 feet above the top of the Lakota formation and approximately 80 feet below the channel sandstone. Eight and nine-tenths tons of ore averaging 0.18 percent U_3O_8 and 0.34 percent V_2O_5 have been mined from the deposit. At the time of the examination, the trench from which the ore was taken was completely filled with water and the ore body, which according to the applicant, continued beyond the face of the cut, could not be observed. Samples on the surface at the top of the cut showed minor carnotite-type mineralization and some dull black radioactive material. Highest scintillometer readings around the trench were 0.50 MR/hr above background. Twenty-seven holes have been drilled around the deposit by the applicant; however, on the map accompanying his report, only 14 are shown and the locations of these are in doubt. Figure 2 of this report shows the location of 24 of the drill holes as determined from a plane table survey made by E. V. Post, geologist for the U.S.G.S. in the area. Of the 27 holes drilled, 16 gave indications of a 650-ton ore body 2.2 feet thick and averaging 0.25 percent U_3O_8 (radiometric) in the same horizon as that of the mined body. Unfortunately, however, no chemical analyses were made, nor were the holes probed. All radiometric data was obtained solely by scanning the drill cuttings. During the course of E. V. Post's

investigation in the area, he had six "high grade" outcrop samples chemically analyzed and although one ran 0.00 percent U_3O_8, the remainder contained less than 0.05 percent U_3O_8.

Two other areas along the rim of the canyon in the sandstone-siltstone unit are said to be anomalously radioactive. One of these was examined by the writers and nothing to indicate mineralization was noted in the area. The applicant was in doubt as to the location of the other anomaly and it was not investigated.

There is no evidence to indicate that the channel sandstone (unit No. 2a) has in any way influenced the deposition of ore in the underlying sandstone-siltstone unit. The deposit is at least 80 feet below the contact with the channel sandstone and nowhere else, either on the claims or outside of them, where the channel is present, are there any strong indications of mineralization.

In summary then, it appears that although uranium mineralization is present in the Fall River formation in this area, the deposits are small and probably widely scattered. Certainly Glen Canyon itself, which ideally exposes almost the entire Inyan Kara group over a length of more than 1,600 feet, affords one of the better means of determining the uranium potential in the area. An examination of this exposure has revealed only one small area of uranium mineralization. Furthermore, recommendations for exploration based on the proximity of nearby deposits in

rocks of equivalent age do not appear to be valid. The Gould mine, 7 miles northwest, is the nearest Fall River deposit, and there the geologic environment is apparently very different.

McClure lease and Eleven claim group

These two groups of claims have been included in the applicant's proposed exploration program. The McClure lease group occupies the SW 1/4 sec. 29, and the NW 1/4 sec. 32, T. 8 S., R. 4 E., and the Eleven claim group is in sec. 34, T. 8 S., R. 4 E., Fall River County, South Dakota (fig. 1).

Nearly the full section of Inyan Kara lithology is exposed on these two holdings; however, the unit sequence has altered considerably from that of the Cedar Canyon claim group as described previously. Of considerable interest is the change in the Lakota formation which in these two areas consists of a thick section of interbedded thin mudstones and sandstones. This mudstone-sandstone unit represents a change in the depositional environment between the Craven Canyon sandstone member of the Lakota to the west and the Fall Canyon sandstone member to the east.

Structurally, the areas are very similar to the Cedar Canyon claim group.

Uranium mineralization has been localized at the base of the sandstone-mudstone unit of the Lakota in at least two known localities - the Accidental mine and McCloud property - outside

the Big Sioux holdings. These deposits are 1 and 1-1/2 miles, respectively, to the northwest of the McClure lease. No significant mineralization is exposed on either the McClure lease or Eleven claim group; however, each of the properties is reported to contain a surficial or Fall River radioactive anomaly. The locations of these anomalies were unknown to the applicant and consequently were not investigated by the examining team. The Atomic Energy Commission has drilled one hole on the McClure lease. This drill hole, which penetrated to the Jurassic Unkpapa formation, encountered no uranium mineralization nor were any radioactive anomalous zones detected.

Primary basis for the proposed exploration program is again the presence of a similar lithology in which uranium mineralization has been localized nearby. We feel strongly, however, that the size and nature of the deposits found to date do not justify further exploration.

ORE RESERVES

The only known ore reserve is in an area 50 by 100 feet on the Canyon claim. The ore body, about 2.2 feet thick, has been delineated by 16 drill holes and has been estimated by the applicant's geologist to contain 650 tons of inferred ore averaging 0.25 percent U_3O_8. No chemical analyses were made of the ore and apparently the sampling and radiometric assays were not conducted in too satisfactory a manner.

PROPOSED EXPLORATION AND COSTS

The applicant proposes a two-stage drilling project consisting of about 14,800 feet of non-core drilling and 600 feet of core drilling. The applicant's estimated costs follow:

Stage I

Independent contracts

Bulldozing, 5 days at $14/day	$ 1,600.00 (sic)	
3,200 feet of non-core drilling at $1.10/ft.	3,520.00	
4,200 feet of non-core drilling at $1.25/ft.	5,250.00	
200 feet of core drilling at $2.35/ft.	470.00	
100 feet of core drilling at $2.90/ft.	290.00	
Standby, casing, miscl. drilling	1,000.00	
Total individual contracts		$12,210.00

Labor and supervision

Sampling labor, 60 days at $12/day	$ 720.00	
Geological and consulting fees	1,000.00	
Total labor and supervision		$ 1,720.00

Operating material and supplies

None

Operating equipment

None

Rehabilitation and repairs

None

New buildings, improvements, installations

None

Miscellaneous

Analytical work, 100 samples at $3.50 each	$ 350.00	
Postage and handling samples	50.00	
Total miscellaneous		$ 400.00
Total estimated cost for Stage I		$14,330.00
Estimated cost per foot of drilling		$ 1.86
Cost of Stage II (Lumped)		$14,330.00
Total cost of project		$28,660.00
Government participation, 75 percent		$21,495.00

RECOMMENDATIONS AND CONCLUSIONS

Government participation in the uranium exploration program proposed by the Big Sioux Uranium and Mineral Company, Inc., is not recommended because of the following reasons:

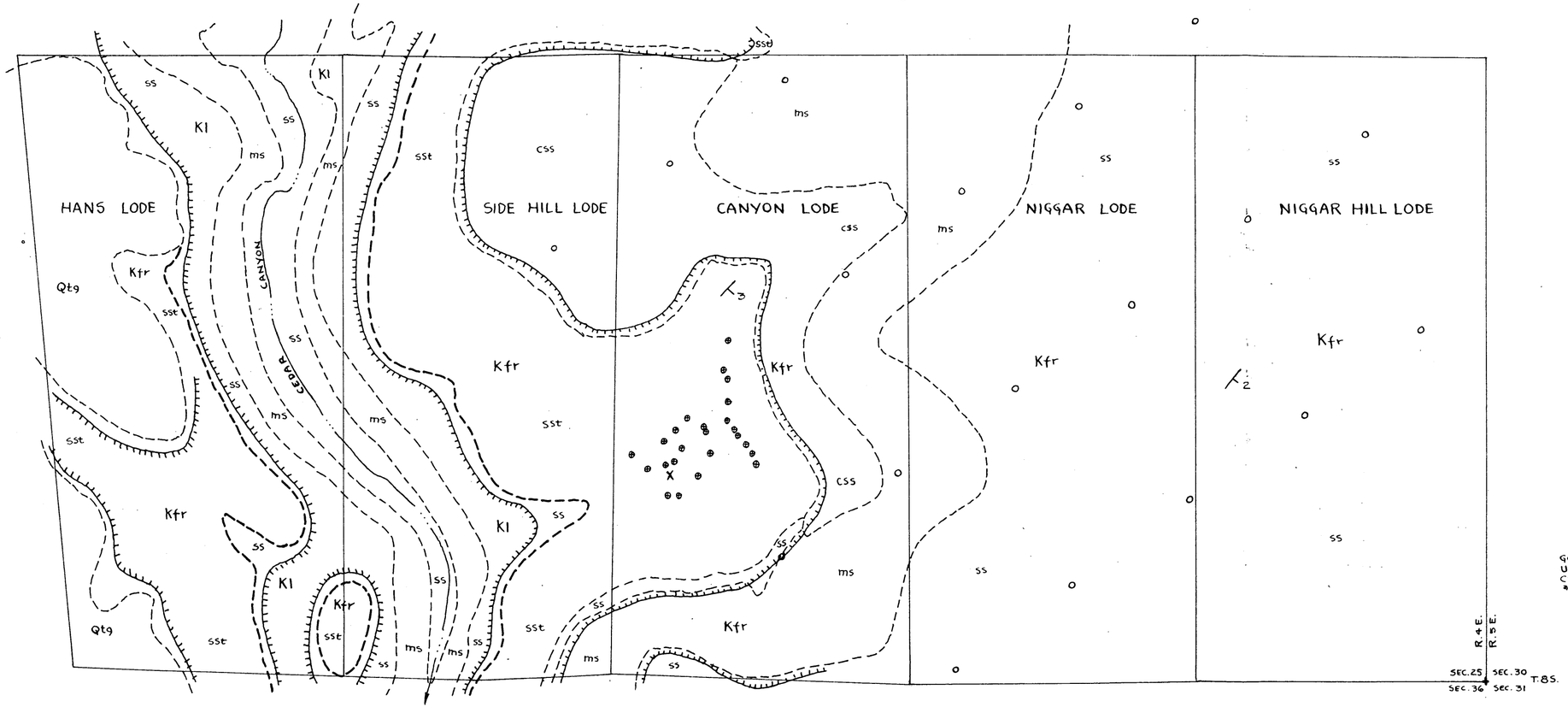
(1) There are no known structures within the proposed exploration areas that might serve to localize or concentrate uranium-bearing solutions.

(2) There appears to be no textural or lithologic discontinuities within the Inyan Kara rocks, other than the facies change in the Lakota formation, that may form a favorable host rock for significant ore deposition.

(3) There are no known large radioactive anomalies, carbonatized or bleached zones, or other features that may indicate a large sub-surface deposit.

(4) Only one small uranium deposit is known to occur on the claims. Larger, but still relatively small deposits, occur to the northwest in a distinctly different geological environment.

(5) Canyons which form ideal "exploration trenches" through the entire Inyan Kara group fail to disclose any significant uranium mineralization.



EXPLANATION

INYAN KARA GROUP — LOWER CRETACEOUS QUAT.

- Qtg — Terrace gravel
- Kfr — Fall River formation (ss, ms, sst, css)
- Kl — Lakota formation incl. Fuson formation (ss, ms)

Rock Types
ss, sandstone
ms, mudstone
sst, sandstone-siltstone
css, channel sandstone

Approximate rock unit contact

Approximate Fall River-Lakota contact.

Strike and dip of bedding

Cliffs

X Canyon lode deposit

⊕ Wagon drill hole

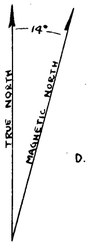
○ Proposed drill hole

SCALE

1 inch = 200 feet

0 200 400 600 feet

SOURCE OF INFORMATION
Geology and topography from E.V. Post, U.S. Geological Survey.
Claim boundaries from Big Sioux Uranium and Mineral Co., Inc.



D. Richter, Aug. 1956

FIGURE 2

GEOLOGY AND LOCATION MAP

Cedar Canyon claim group, Big Sioux Uranium and Mineral Company, Inc.

Fall River County, South Dakota