COAL RESOURCES OF THE DENVER EAST 1/2° x 1° QUADRANGLE, COLORADO

by Karl E. Brand and Wynn Eakins

1980

DEPARTMENT OF NATURAL RESOURCES
COLORADO GEOLOGICAL SURVEY
JOHN W. ROLD, DIRECTOR

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PLATE 1 OF 25
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ACKNOWLEDGMENTS

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This project was carried out in two parts. Part 1 was done by Karl Brand, who researched existing drill hole and outcrop data, planned and implemented the drilling program, and correlated and mapped the coal zones and beds. Part 2 by Wynn Eakins included all resource calculations and compilation of the tables, along with the final editing of the maps and text.

Thanks also to personnel of the Colorado Geological Survey, who have contributed to this project: L. R. Ladwig, Chief, Mineral Fuels Section and principal project investigator for overall guidance and John W. Rold, State Geologist, for insight into geophysical log interpretations and assistance in dealing with other state agencies; Donna Boreck, Carol Tremain, and Bruce Kelso, who assisted with the field work, and Charles Campbell and Jennifer Caine, who assisted in map preparation and with critical review of the text.

John Romero, Colorado Division of Water Resources, provided unpublished file information and helped with Denver Basin stratigraphy and structure. Tom Bretz, Colorado State Land Board, helped in the preparation of required permits.

Many thanks also go to the individuals and companies from private industry who assisted with information for this report. Robert Kirkham, consultant, gave much assistance on depositional environments, basin history, structure and stratigraphy, and also a critical review of the many cross sections. Will Owens, of Willard Owens and Associates and Kevin Jackson, Terry Cox, and Carrie Rodgers, all of Rocky Mountain Energy Company, provided valuable information and comments.

INTRODUCTION

This report and series of maps present the findings of an investigation entitled "Exploratory Coal Drilling and Coring Program in the Denver East 1/2° × 1° Quadrangle". This program is a cooperative investigation conducted by the Colorado Geological Survey and funded by U.S. Geological Survey Grant No. 14-08-0001-G-487, and is part of a nationwide program sponsored by the USGS to assess the quality and quantity of the nation's coal resources, as authorized by the Federal Coal Leasing Amendments Act of October 1975.

The primary goal of the investigation was to evaluate the coal resources in the 1,780 mi² (4,610 km²) Denver East 1/2° × 1° quadrangle. This was accomplished by researching existing data, which included drillers' and geophysical logs from exploration holes, water wells, oil and gas wells drilled by numerous individuals and companies, and other miscellaneous investigations. Sources of these data include the Colorado Division of Water Resources (water well information), the Colorado State Oil and Gas Conservation Commission (oil and gas well logs), the Colorado State Board of Land Commissioners (various log of holes drilled on state properties), and exploration holes drilled by industry. This was followed by a drilling and coring program in areas where additional data were needed. Information obtained from the CGS drilling and coring program is contained in Colorado Geological Survey open-file reports 80-1 and 80-9. All information pertinent to this investigation is used as data for interpretation, with certain proprietary information deleted on the final versions.

The Denver East 1/2° × 1° quadrangle is located between latitude 39°30' and 40°N. and longitude 104° and 105°W. The quadrangle includes much of Adams and Arapahoe Counties, northern Elbert and northeastern Douglas Counties, and part of the City and County of Denver. See Figure 1.

Developmental pressures from the expanding Denver metropolitan area require identification and classification of the coal resources to optimize resource recovery with land use. Our nation's expanding energy demands also require that a detailed knowledge of the coal resources be available for energy planning.

Most of the information obtained from this investigation is presented in map form. This text serves as a general introduction and outline for the maps. For a more detailed discussion on the geography and geology of the area the following are recommended: Kirkham and Ladwig (1979, 1980), Romero (1976), Soister (1972, 1974, 1978a, 1978b), and Soister and Tschudy (1978).

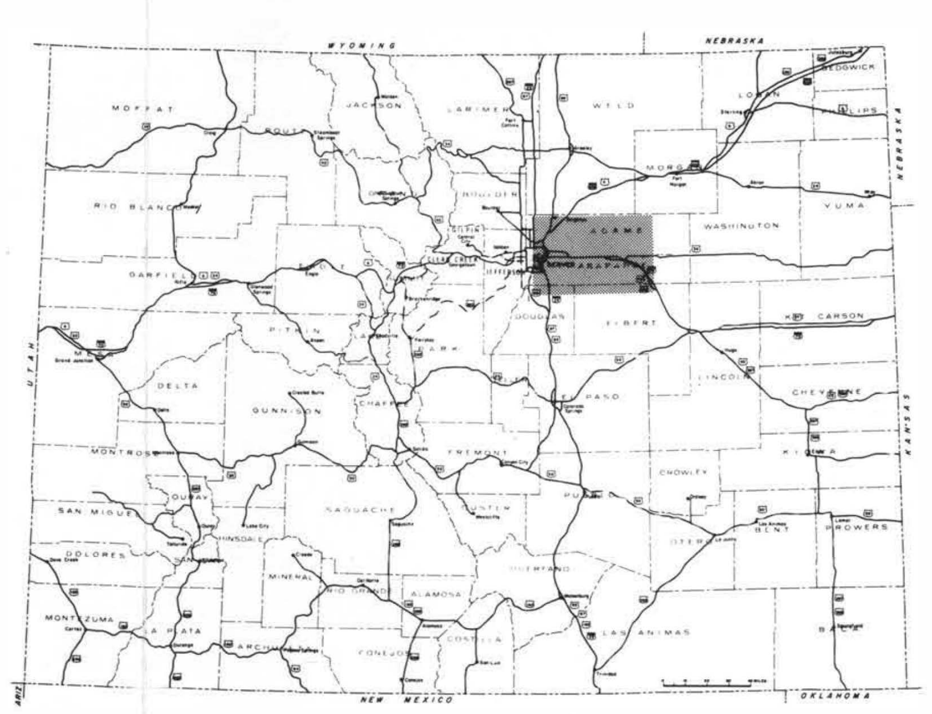

Figure 1 · Index Map of the Denver 1/2° x 1° Quadrangle

The Denver East 1/2° × 1° quadrangle lies within the Great Plains province of the Interior Plains (Fenneman, 1931) and occupies a part of the Denver Basin. A generalized stratigraphic column of the Upper Cretaceous through the Eocene is presented in Figure 2. Only the Denver and Laramie Formations contain appreciable quantities of coal within this quadrangle, although coal and/or lignite has been reported in the Dawson Formation (Kirkham, 1979) and the Fox Hills Sandstone (Kirkham and Ladwig, 1979).

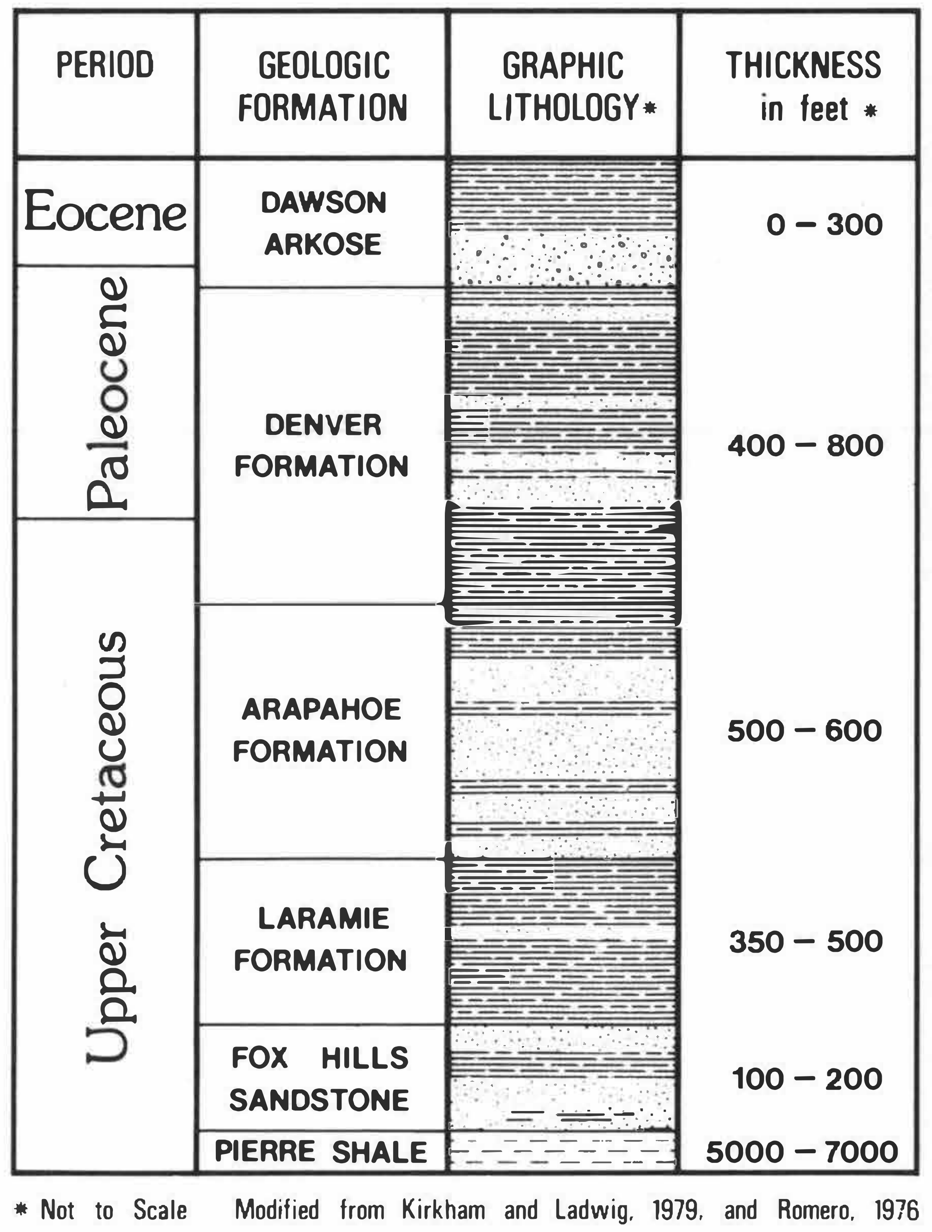

Figure 2 · Generalized Stratigraphy of the Denver Quadrangle

LARAMIE FORMATION COAL ZONE

The Laramie Formation coal zone underlies the entire quadrangle except for the extreme northeastern corner where the coal has been eroded. The Laramie coal zone reaches a maximum depth of about 1,700 ft (518 m) near the structural center of the basin (Kirkham and Ladwig, 1980, p. 51), which is located in the southwestern portion of the quadrangle. Plates 4 and 5 respectively show the top of the Laramie Formation coal zone and the total cumulative coal-bed thickness. The stratigraphy of the Laramie coal zone changes significantly from west to east across the quadrangle, making correlations difficult.

Depth to the Laramie coal zone placed limitations on drilling of certain areas within this quadrangle. Correlation of the coals, in part, were based on those water well and petroleum exploration well logs which were considered to be reliable. Drilling by the Colorado Geological Survey to the Laramie coal zone was concentrated in the Antelope Flats-Deer Trail Areas as shown on Plate 2. These areas have the highest development potential of Laramie coals within the quadrangle, and their relatively thin overburden allowed for a greater drill hole density.

Three separate coal beds are located within the lower portion of the Laramie Formation in the Antelope Flats-Deer Trail area. These are designated the Lower A, the Upper A, and the B beds. Where present, the Lower A bed is usually located immediately above the Laramie Formation-Fox Hills Sandstone contact. The Upper A bed is located 10 to 25 ft (3 to 7.6 m) above the Lower A bed, and it locally splits into as many as three beds. The B bed is located 50 to 100 ft (15 to 30 m) above the Upper A bed and generally marks the top of the Laramie coal zone in the area. Thin coals and carbonaceous lenses are commonly found above the B bed, but are of little economic significance. The general stratigraphy of the Laramie Formation in the Antelope Flats-Deer Trail area is shown in Figure 3.

Three coal samples taken from two holes that penetrated the Laramie Formation were found to have an apparent rank of Lignite A, with as-received heating values ranging from 5,926 to 6,912 Btu/lb, and as-received sulfur contents of 0.3 to 0.5 percent (Brand, 1980). Complete analyses of these samples may be found in CGS open-file report 80-1. Other analyses of Laramie coals are available in CGS open-file report 78-9.

Economic development of Laramie Formation coals will be based on such factors as bed thickness, Btu value, overburden thickness, demand, and environmental considerations. The Antelope Flats-Deer Trail area (see Plate 2) appears to be more suitable for strip and/or underground mining than the remainder of the quadrangle. In this area overburden is less than 250 ft (76 m) thick, normally considered the limit for strip mining, and individual coal bed thicknesses exceed 10 ft (3 m). Factors that may limit mining in this area include the erosion of the B bed by Bijou Creek and the position of the A beds beneath an "alluvial valley floor." Mining of such areas is precluded by Public Law 95-87.

In-situ gasification of Laramie Coal may be possible in areas where individual coal beds exceed 10 ft (3 m) and overburden thicknesses range from 500 to 1,000 ft (152 to 304 m). These limitations were based on work done by Hand (1979) that related drilling costs to coal bed and overburden thickness, and by Kirkham (1979) whose work indicated that subsidence effects may be reduced where 600 ft or more of overburden is present.

Total Laramie coal resources within the Denver East quadrangle are estimated to be 16.6 billion tons.

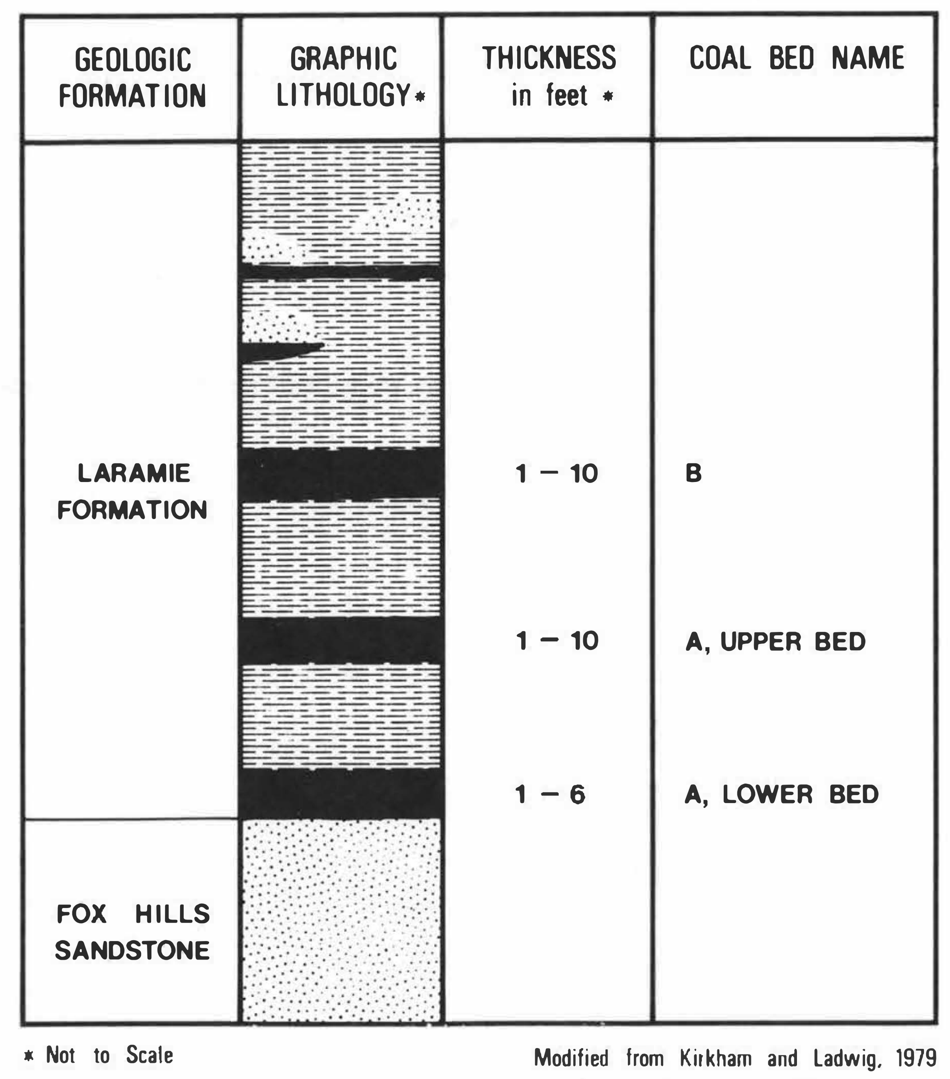

Figure 3 · Generalized Stratigraphy of the Laramie Formation

DENVER FORMATION LIGNITE

Denver Formation lignites occur in the upper 300 to 500 ft (91 to 152 m) of the formation (Kirkham and Ladwig, 1979). The main lignite-bearing area within the Denver East quadrangle is designated the Watkins-Lowry area, as shown on Plate 12. Plates 14 and 15 respectively show the top of the Denver Formation coal zone and the total cumulative coal thickness within the zone. Gun Club Road has been arbitrarily chosen as the western boundary of this area even though there are lignite deposits to the west (Kirkham and Ladwig, 1979). This line was chosen as it is an approximate limit of the Denver metropolitan area urban development.

With the support of additional drill hole data, new correlations of the coals reveal the need for certain changes from those of previous workers. Cross-sectional traverses throughout the Watkins-Lowry area support the assumption that these new correlations are correct even though many hole-to-hole correlations are not immediately evident. Cross sections and structure maps seem to indicate that faulting may be present but only small reverse faults with throws of two or four ft have been observed. Variations in bed elevations are probably due to differences in sedimentation, differential compaction and minor compaction faults.

Changes in the correlations necessitated changes in the bed nomenclature (see Figure 4). Soister (1972) and Kirkham and Ladwig (1979) have designated the lignite beds, in descending order, as the A, B, C, D, and E lignite beds. The B, C, and E beds were named the Lowry, Bennett, and Watkins beds, respectively, by these authors. Work done during this investigation shows that the A and B beds tend to be thin, carbonaceous, and limited in lateral extent. Previous workers may have confused the A and B beds with the C and D beds, respectively. In this report the C and D beds are, respectively, referred to as the Lowry and Bennett beds. The E bed in this report is called the Upper Watkins bed. South of the town of Watkins the Lower Watkins bed splits off from the Upper Watkins bed.

Minor lignite beds occur below the Lower Watkins bed, but due to a lack of data, detailed correlations are difficult (see Plate 22). Correlation between the northern and southern coal areas that were designated by Kirkham and Ladwig (1979), may be possible, but additional drilling is needed to verify this. Much of the Denver lignite lies within 200 ft (60 m) of the surface and is well suited for strip mining (see Plate 13). The cutoff of 200 ft is used in this case because a 250 ft overburden isopach line could not be accurately delineated with available data. In some cases more than one lignite bed could be strip mined during the same operation. In most areas in which the overburden exceeds 200 ft (60 m), in-situ gasification is possible since the lignite beds often exceed 10 ft (3 m). This is especially true in the southern part of the area (see Plate 13). Ideally, overburden should exceed 500 feet to avoid subsidence problems, but on Plate 13 the 200-500 foot range is shown because only the overburden to the top bed is isopached and other beds in this area are deeper than 500 feet.

Typical as-received heat values for Denver Formation lignites range from 4,000 to 7,500 Btu/lb (Kirkham and Ladwig, 1979). Sulfur content varies from 0.2 to 0.5 percent (Kirkham and Ladwig, 1979). Two core samples were taken by the CGS; analyses from these and other lignite samples may be found in CGS open-file reports 78-9, 80-1, and 80-9.

Denver Formation lignites are noted for their many noncoal partings. Most of these are clay and carbonaceous clay, but some are kaolinitic, containing upward of 25 percent alumina (Kirkham and Ladwig, 1979). These alumina-rich partings might be of economic interest dependent upon the future price of aluminum (Kirkham and Ladwig, 1979).

Total Denver Formation lignite resources within the Denver East quadrangle are estimated to be about 12.9 billion tons (See Table III).

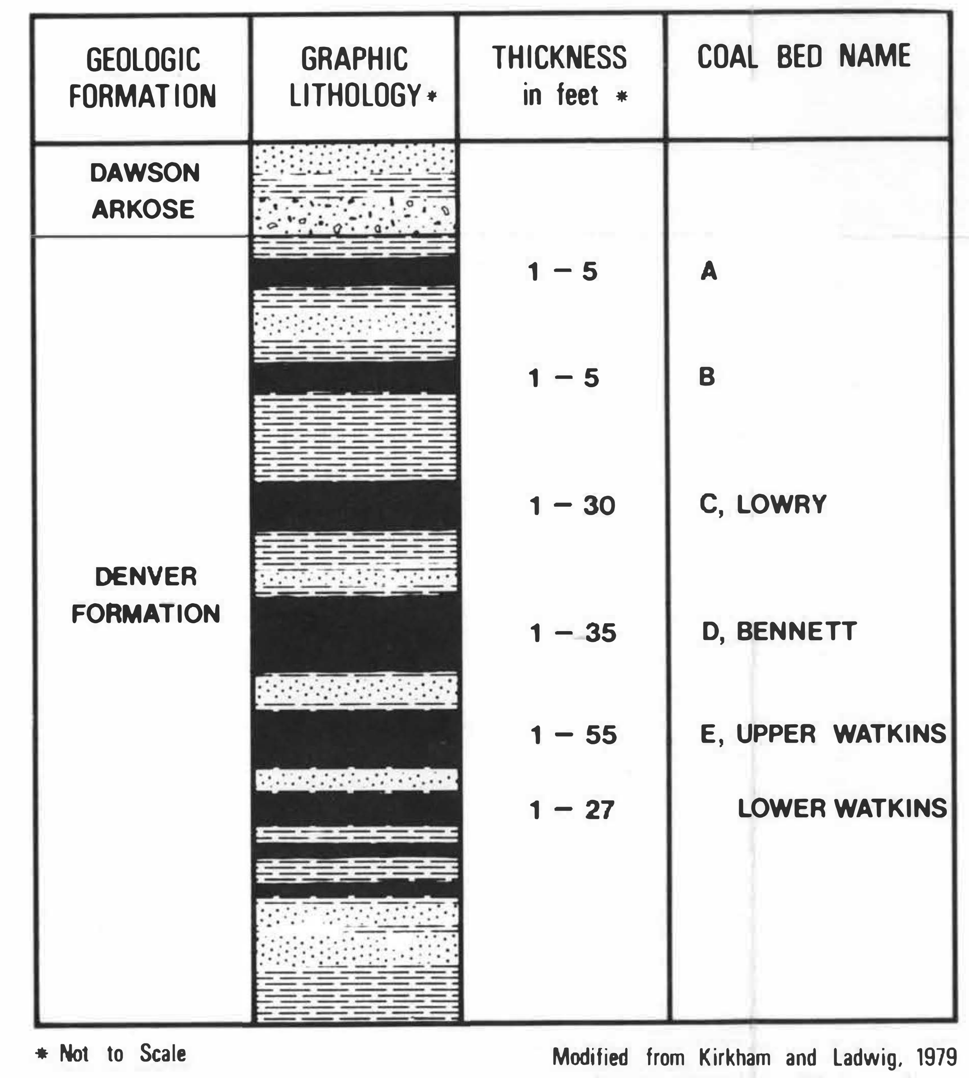

Figure 4 · Generalized Stratigraphy of the Denver Formation

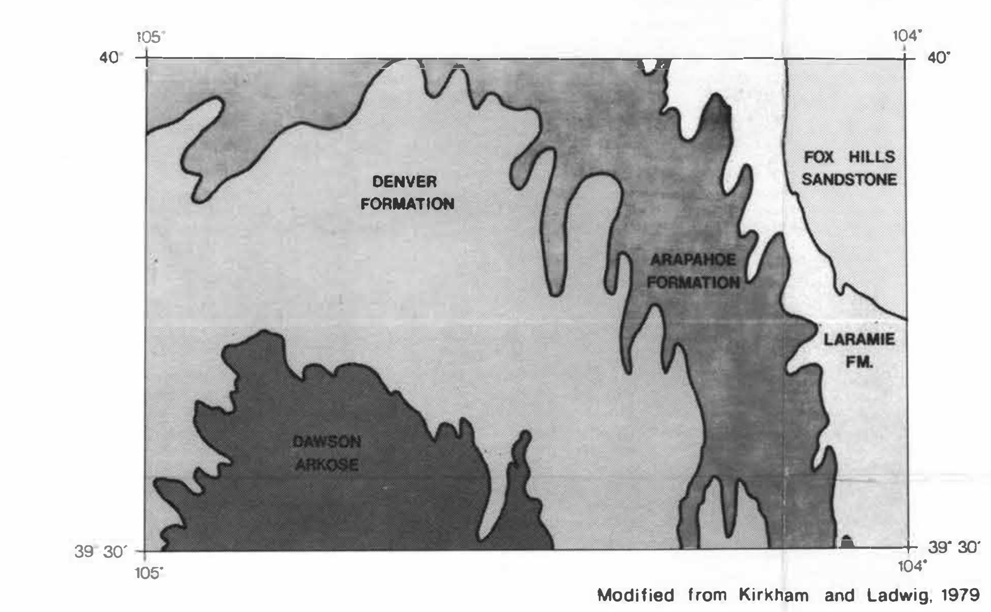

Figure 5 · Bedrock Geology of the Denver 1/2° x 1° Quadrangle

CONCLUSIONS

Coal and lignite resources located within the Denver East quadrangle are greater than previously thought. Future mining within the quadrangle will depend upon many complex and interrelated factors, some of which lie beyond the scope of this report.

Surface and/or underground mining of Laramie Formation coal will be limited to portions of the Antelope Flats-Deer Trail area. In-situ gasification of thick (10 ft or greater) Laramie Formation coals may be possible in areas where the coal cannot be mined by conventional methods, provided that the depth of coal versus coal thickness and other factors are favorable. Most of the Laramie coal is too deep or too thin for economical recovery using present methods.

Exploration during this investigation has expanded the known areal extent of the Denver Formation lignites. Much of this lignite is well suited for strip mining because of relatively thin overburden and thick beds; multiple bed mining is feasible in certain areas. In-situ gasification shows promise as a method for recovering much of the lignite that is unsuitable for conventional mining practices; this is especially true in areas near the Lowry Bombing Range. Mining of the Denver Formation lignites may be limited by the proximity of possible mining areas to the Denver metropolitan area and by the numerous clay partings within them.

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COLORADO GEOLOGICAL SURVEY
JOHN W. ROLD, DIRECTOR

COLORADO GEOLOGICAL SURVEY
RESOURCE SERIES 13

INDEX MAP OF LARAMIE FORMATION DRILL HOLES AND CROSS-SECTIONS, AND OUTLINE OF THE ANTELOPE FLATS-DEER TRAIL STUDY AREA

DEPARTMENT OF NATURAL RESOURCES
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PLATE 3 OF 25

SCALE 1:100 000

1 ½ 0 1 2 3 4 5 MILES

1 .5 0 1 2 3 4 5 KILOMETERS

MAP OF LARAMIE FORMATION COALS SUITABLE FOR STRIPPING AND IN-SITU GASIFICATION

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COLORADO GEOLOGICAL SURVEY
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PLATE 4 OF 25

SCALE 1:100 000

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1 .5 0 1 2 3 4 5 KILOMETERS

TOTAL COAL THICKNESS MAP OF THE LARAMIE FORMATION COAL ZONE

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1 ½ 0 1 2 3 4 5 MILES

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STRUCTURE MAP OF THE LARAMIE FORMATION COAL ZONE

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ISOPACH MAP OF THE UPPER "A" COAL BED, LARAMIE FORMATION, ANTELOPE FLATS-DEER TRAIL AREA

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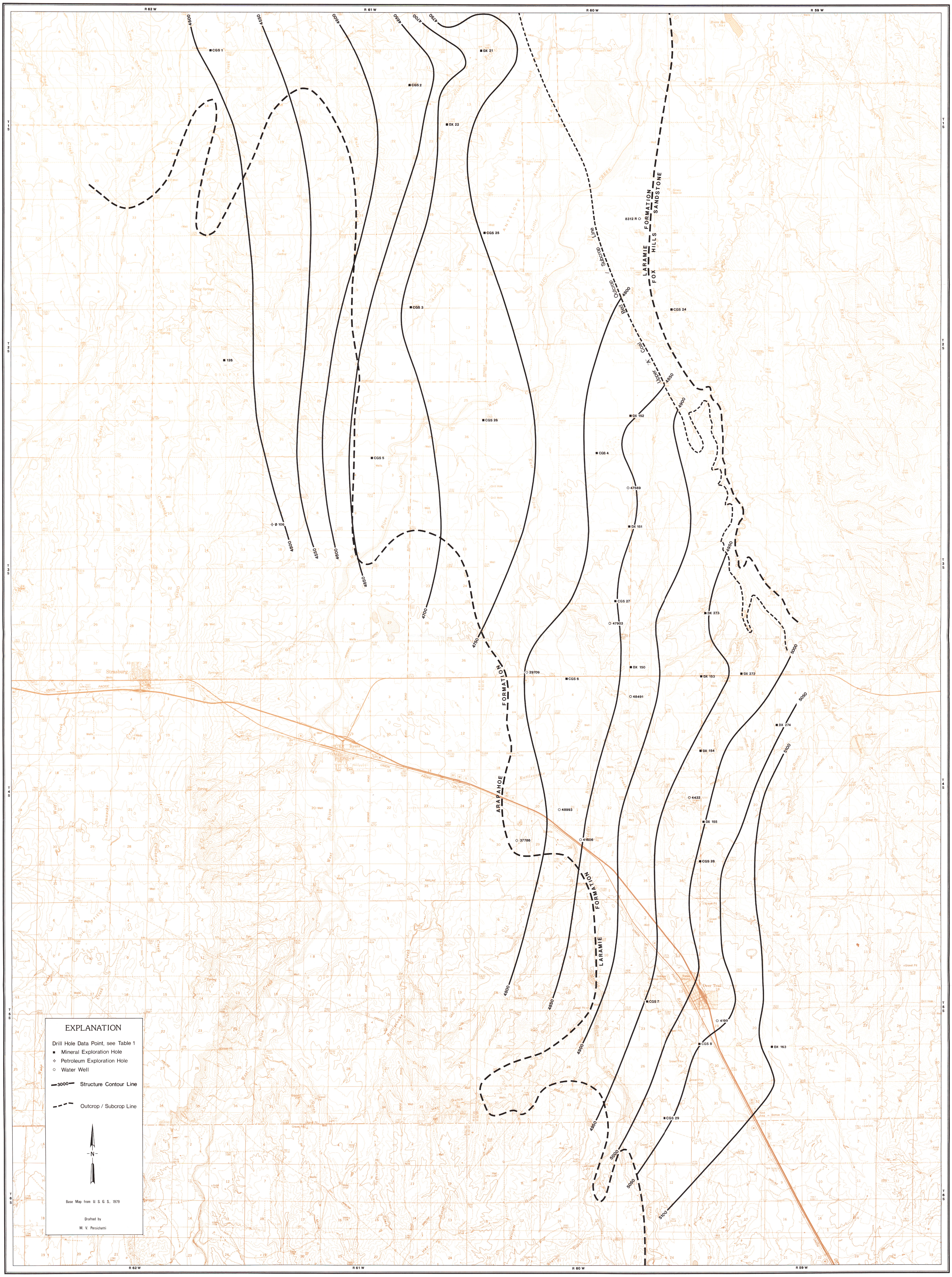

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STRUCTURE MAP OF THE UPPER "A" COAL BED, LARAMIE FORMATION, ANTELOPE FLATS-DEER TRAIL AREA

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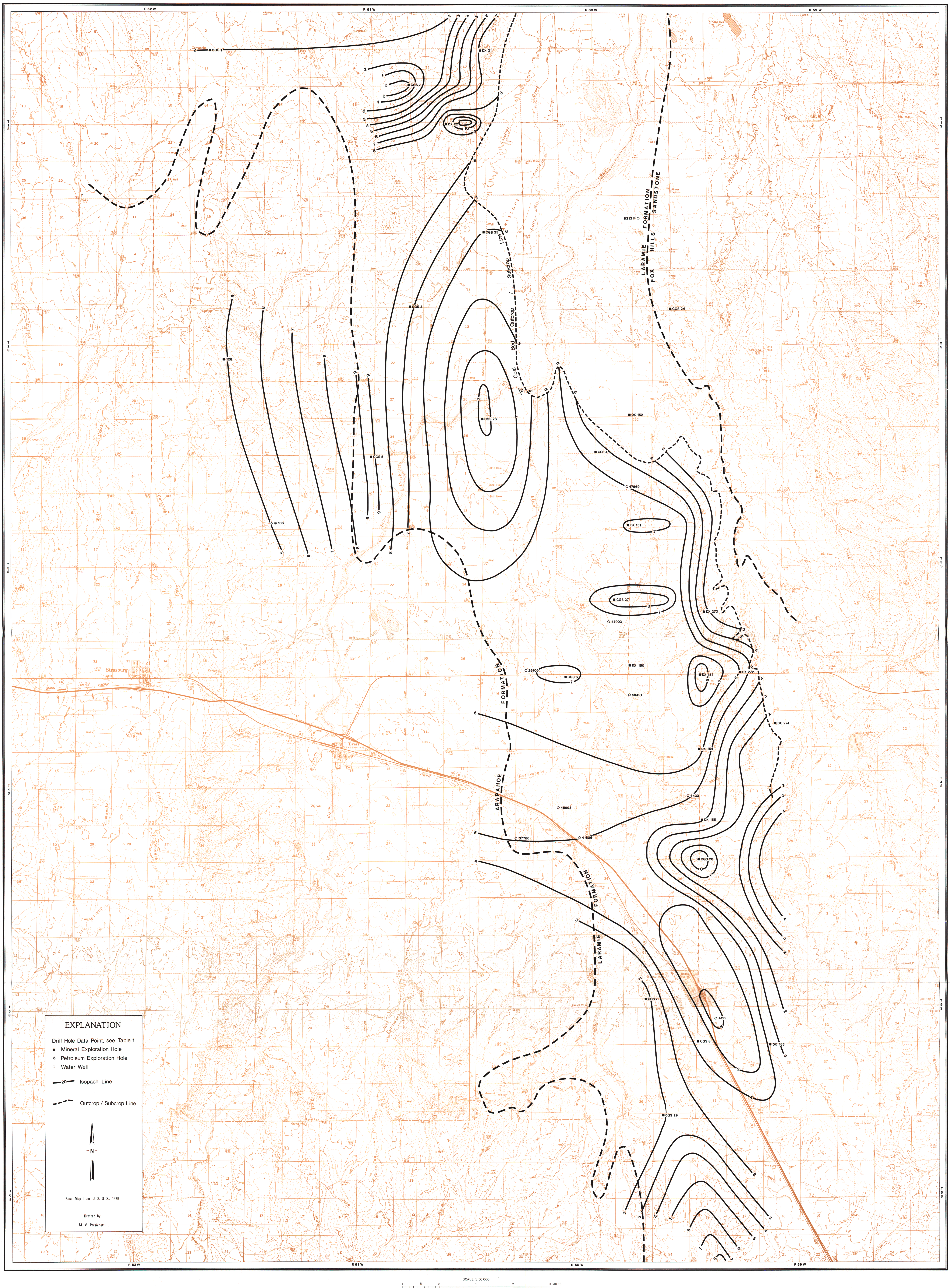
RESOURCE SERIES 13
PLATE 8 OF 25



ISOPACH MAP OF THE "B" COAL BED, LARAMIE FORMATION, ANTELOPE FLATS-DEER TRAIL AREA

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STRUCTURE MAP OF THE "B" COAL BED, LARAMIE FORMATION, ANTELOPE FLATS-DEER TRAIL AREA

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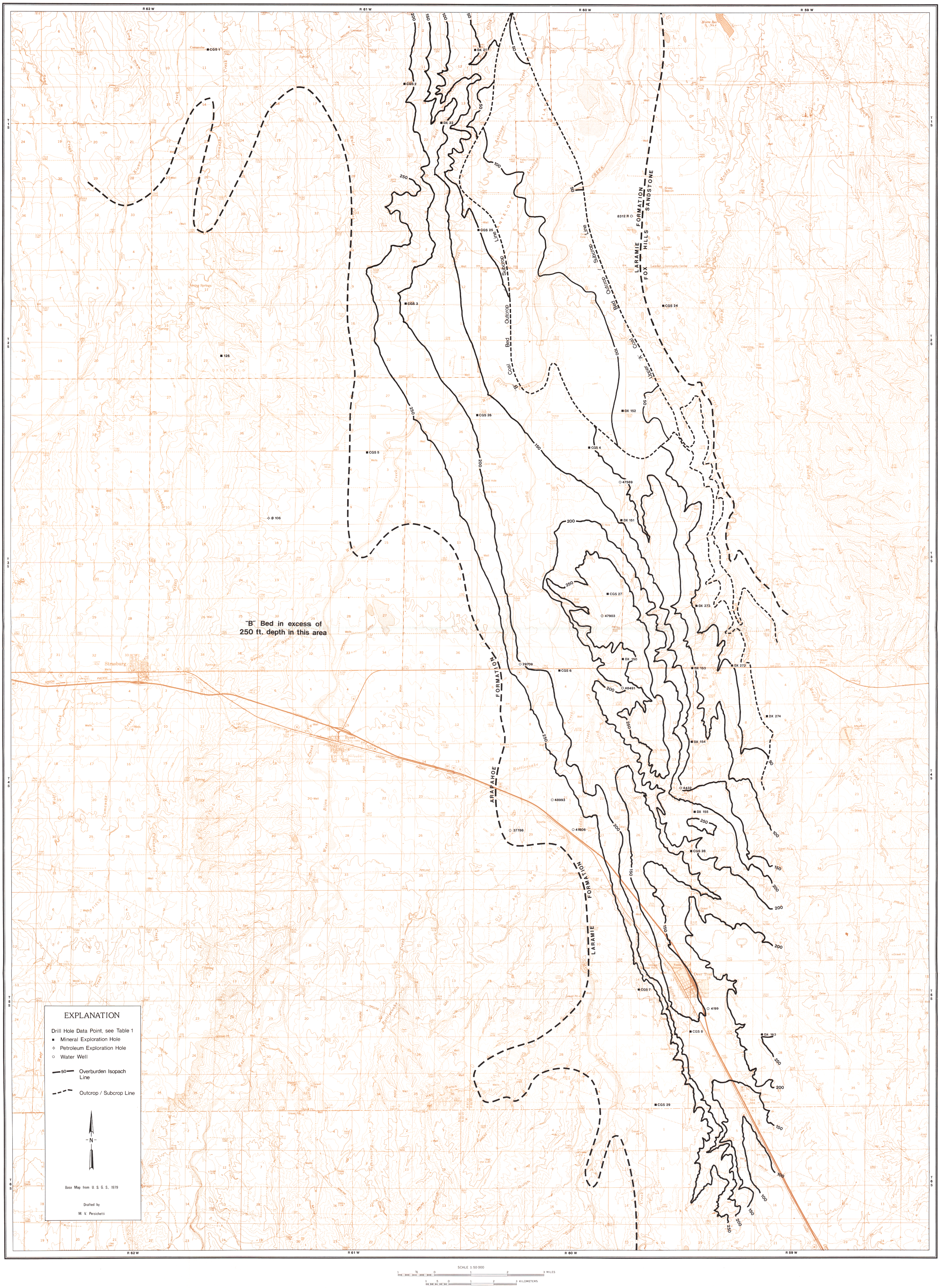
JOHN W. ROLD, DIRECTOR

COLORADO GEOLOGICAL SURVEY
RESOURCE SERIES 13
PLATE 10 OF 25



OVERBURDEN ISOPACH MAP OF THE LARAMIE FORMATION COAL ZONE, ANTELOPE FLATS-DEER TRAIL STUDY AREA

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CROSS-SECTIONS OF THE LARAMIE FORMATION COAL ZONE, ANTELOPE FLATS-DEER TRAIL AREA

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JOHN W. ROLD, DIRECTOR

COLORADO GEOLOGICAL SURVEY
RESOURCE SERIES 13
PLATE 12 OF 25

INDEX MAP OF THE DENVER FORMATION DRILL HOLES AND CROSS-SECTIONS, AND OUTLINE OF THE WATKINS-LOWRY STUDY AREA

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SCALE 1:100 000

1 ½ 0 1 2 3 4 5 MILES

1 .5 0 1 2 3 4 5 KILOMETERS

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COLORADO GEOLOGICAL SURVEY
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by Karl E. Brand and Wynn Eakins

1980

COLORADO GEOLOGICAL SURVEY
RESOURCE SERIES 13
PLATE 14 OF 25

SCALE 1:100 000

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TOTAL COAL THICKNESS MAP OF THE DENVER FORMATION COAL ZONE

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COLORADO GEOLOGICAL SURVEY
RESOURCE SERIES 13
PLATE 15 OF 25

SCALE 1:100 000

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1 .5 0 1 2 3 4 5 KILOMETERS

STRUCTURE MAP OF THE DENVER FORMATION COAL ZONE

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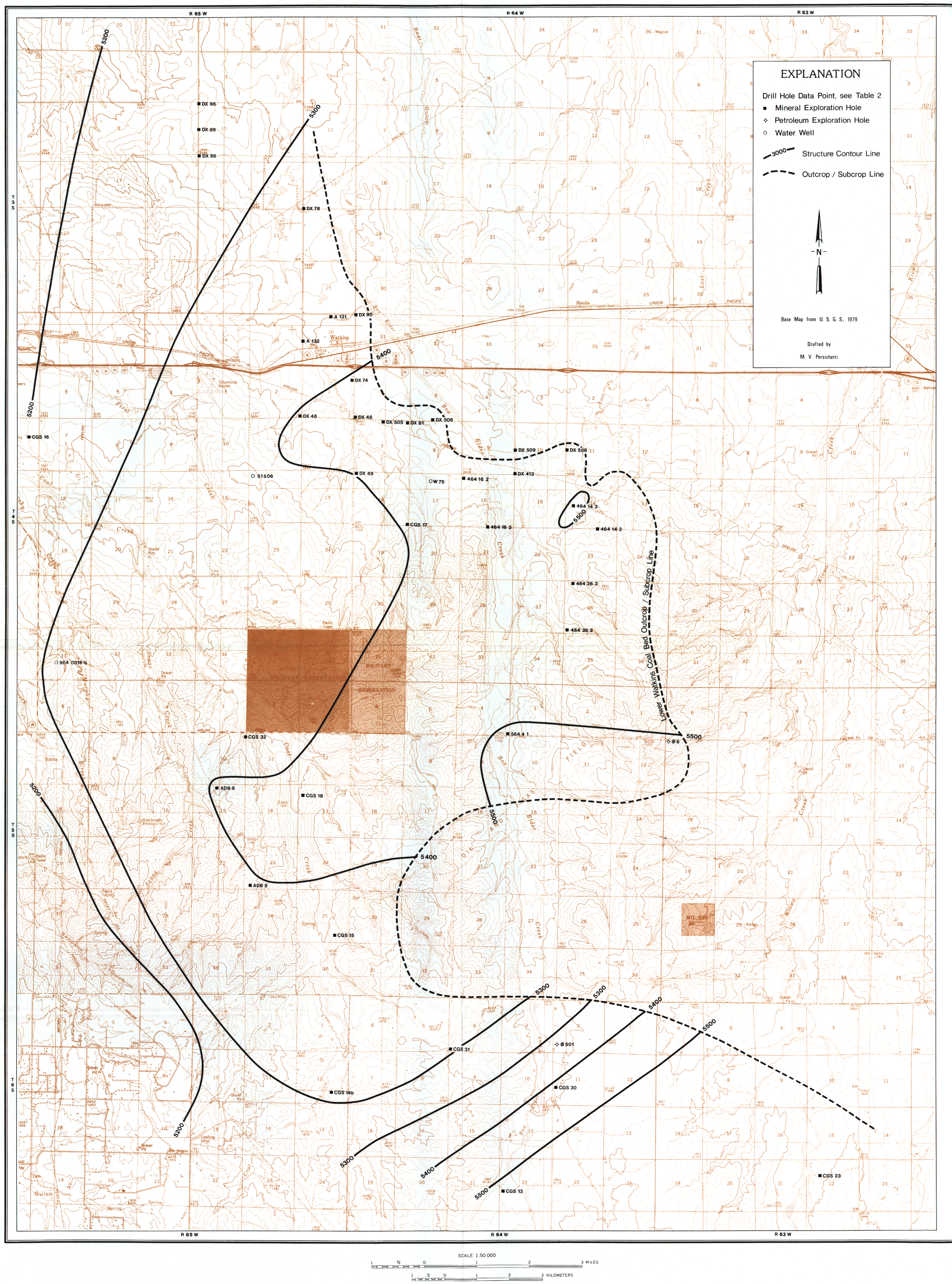
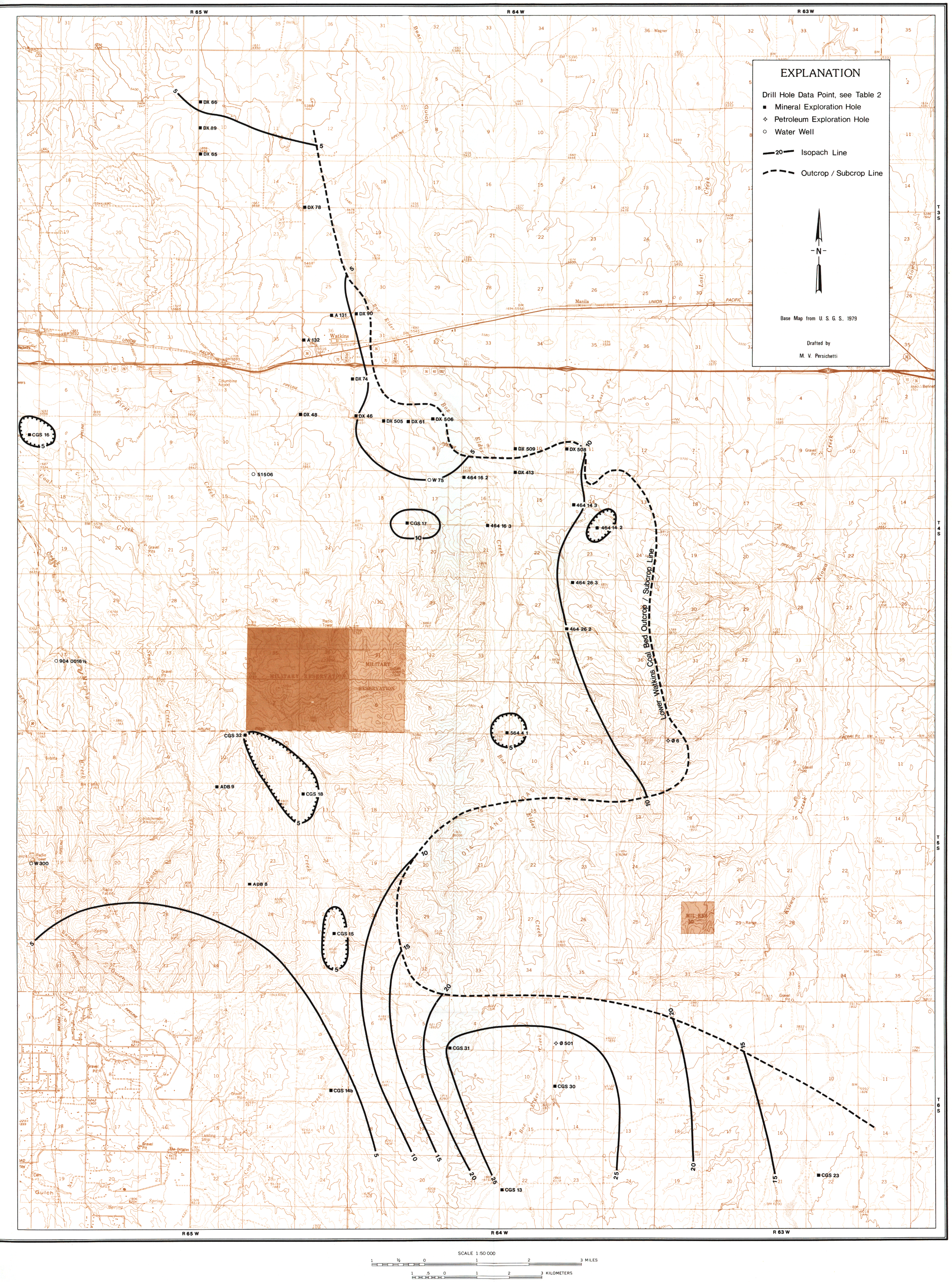


A. STRUCTURE MAP OF THE LOWER WATKINS COAL BED, DENVER FORMATION, WATKINS-LOWRY AREA



B. ISOPACH MAP OF THE LOWER WATKINS COAL BED, DENVER FORMATION, WATKINS-LOWRY AREA

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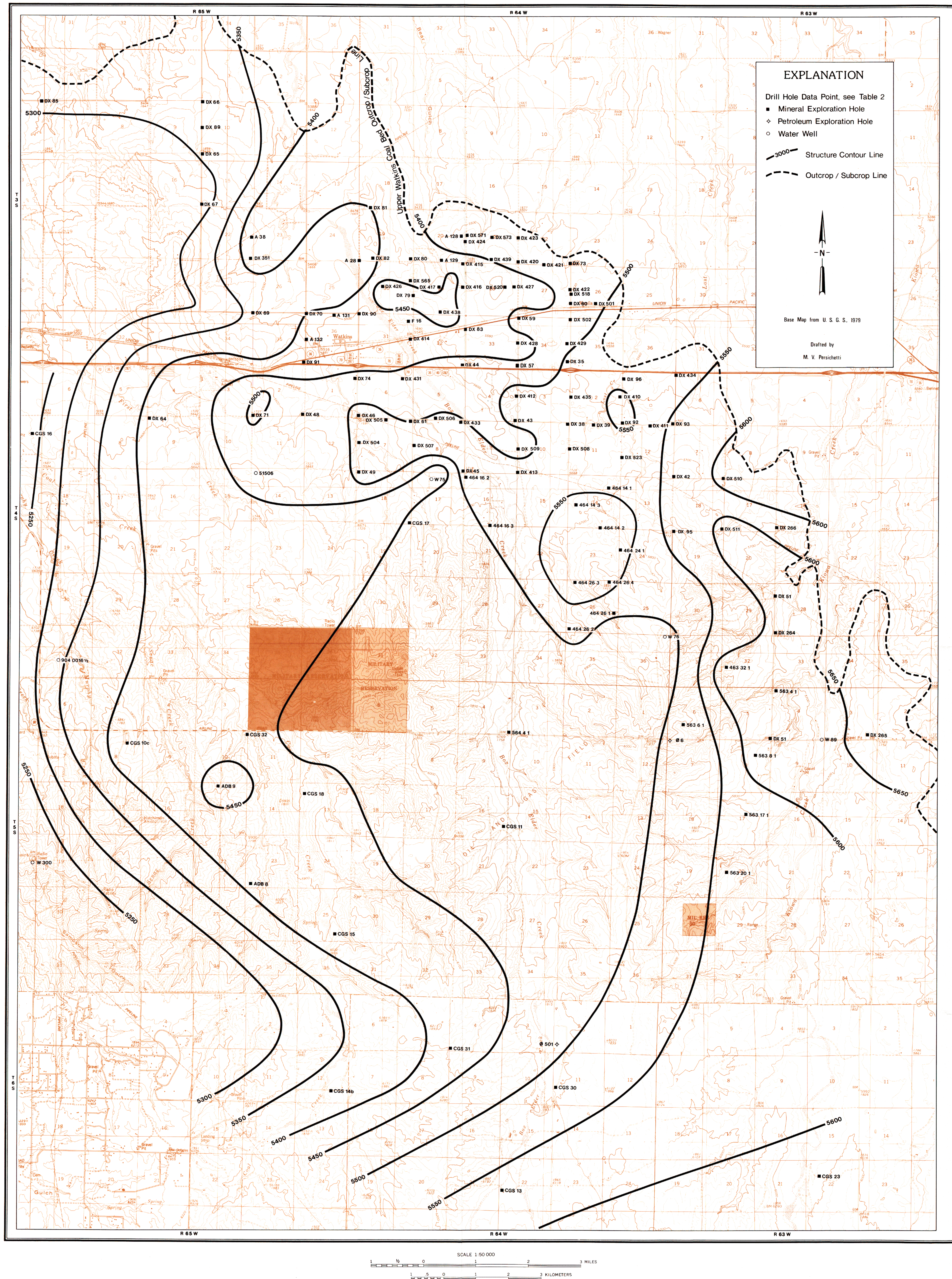
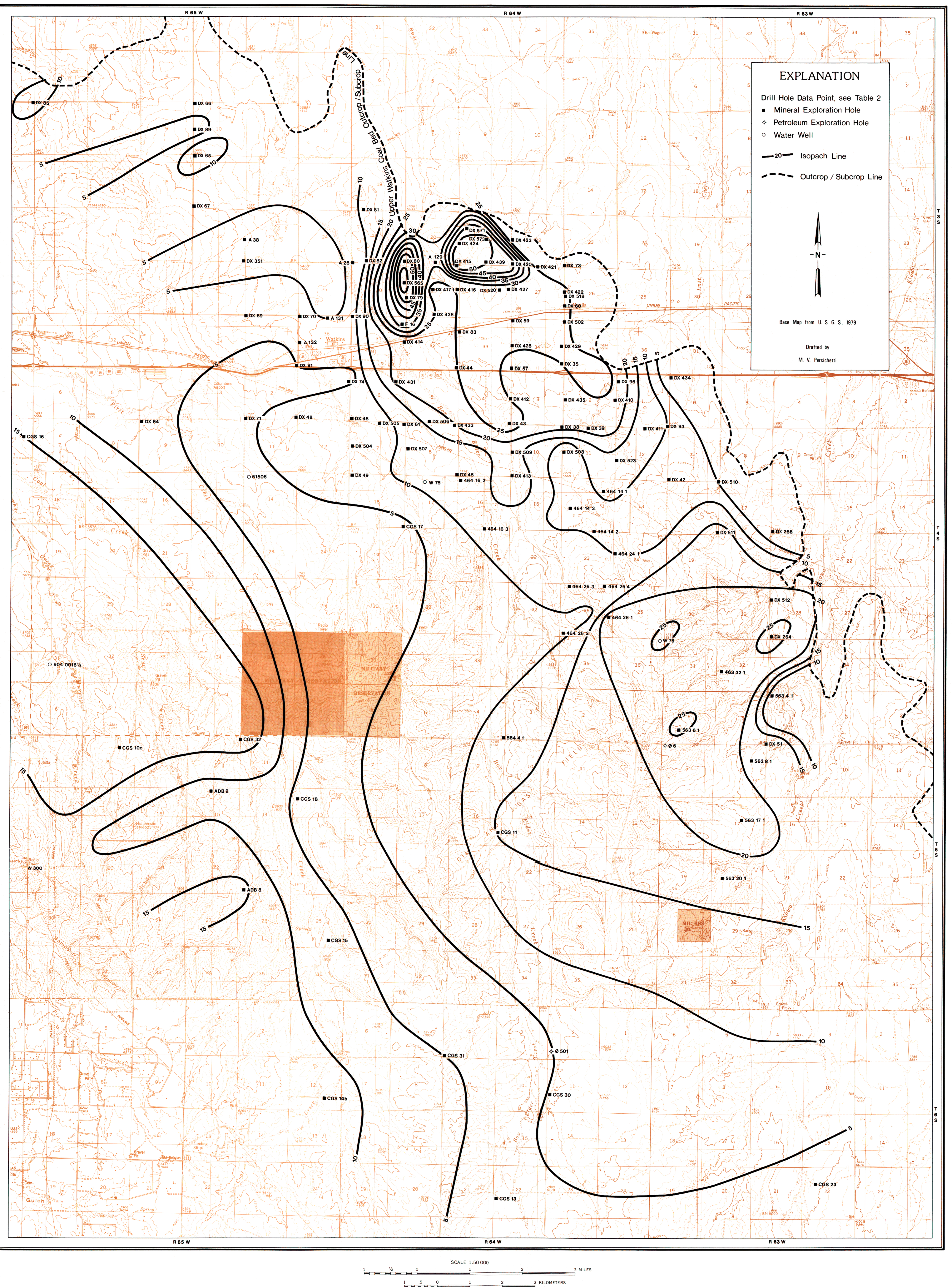


A. STRUCTURE MAP OF THE UPPER WATKINS COAL BED, DENVER FORMATION, WATKINS-LOWRY AREA



B. ISOPACH MAP OF THE UPPER WATKINS COAL BED, DENVER FORMATION, WATKINS-LOWRY AREA

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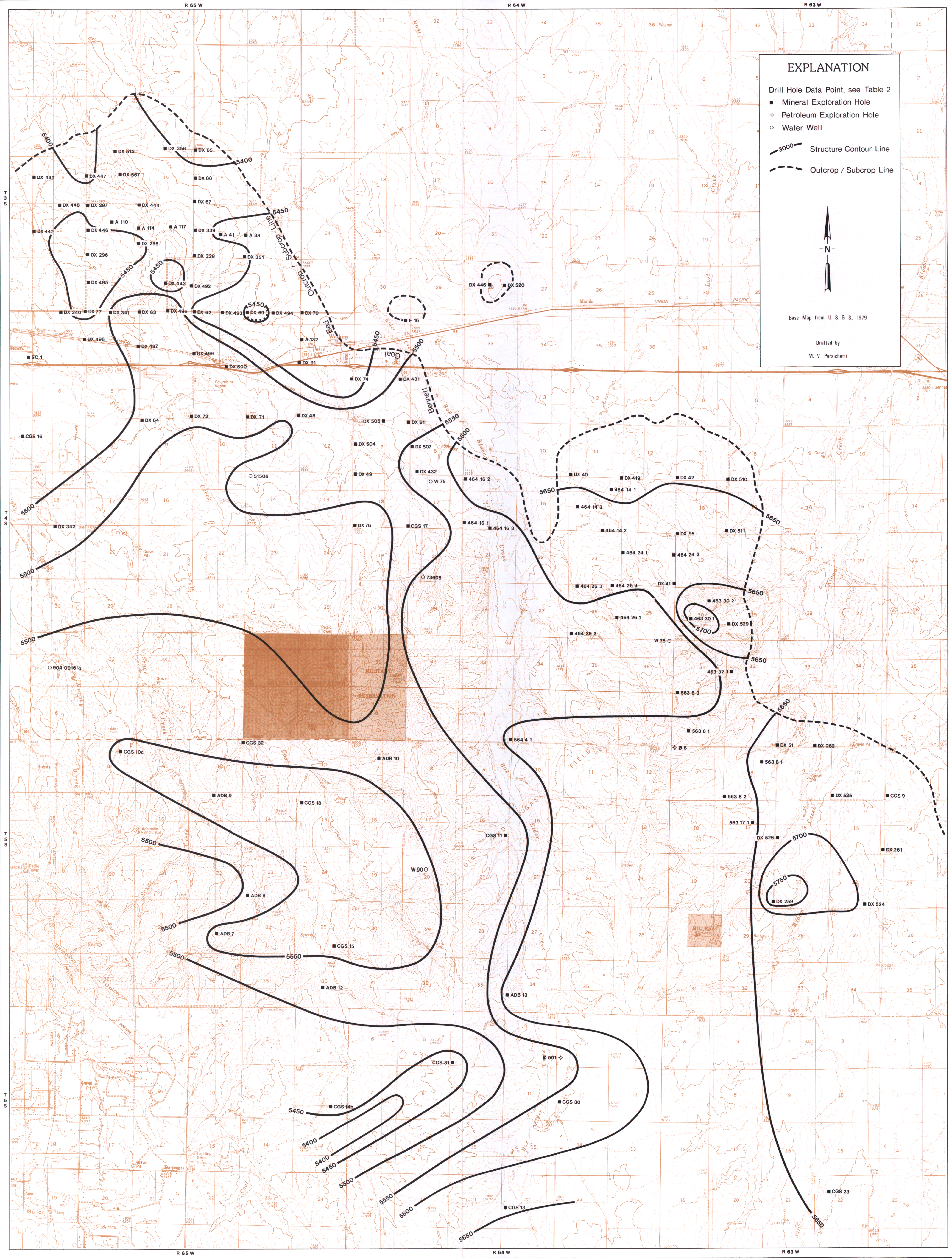
by Karl E. Brand and Wynn Eakins

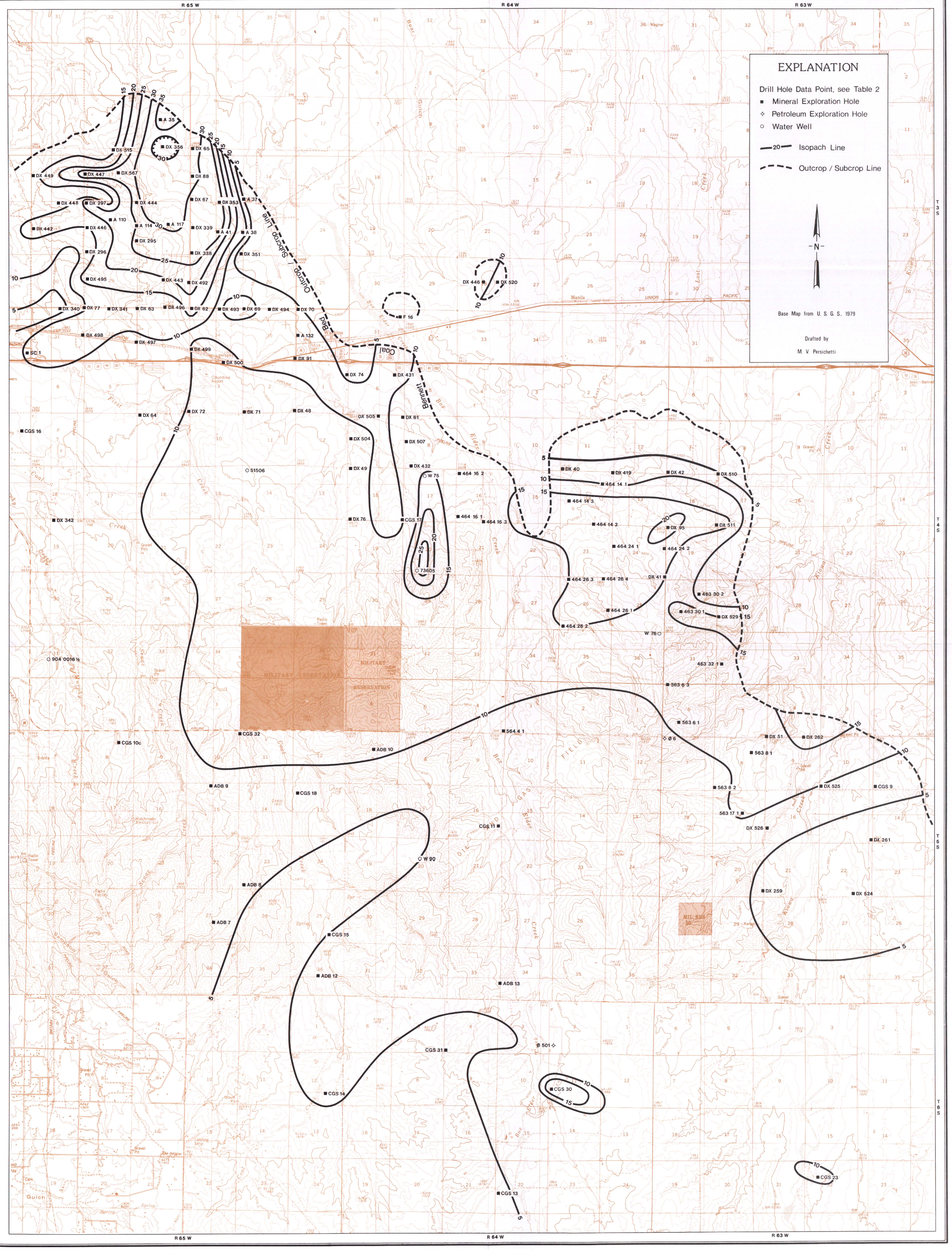
1980

COLORADO GEOLOGICAL SURVEY
RESOURCE SERIES 13
PLATE 18 OF 25



SCALE 1:50 000

A. STRUCTURE MAP OF THE BENNETT COAL BED, DENVER FORMATION, WATKINS-LOWRY AREA



SCALE 1:50 000

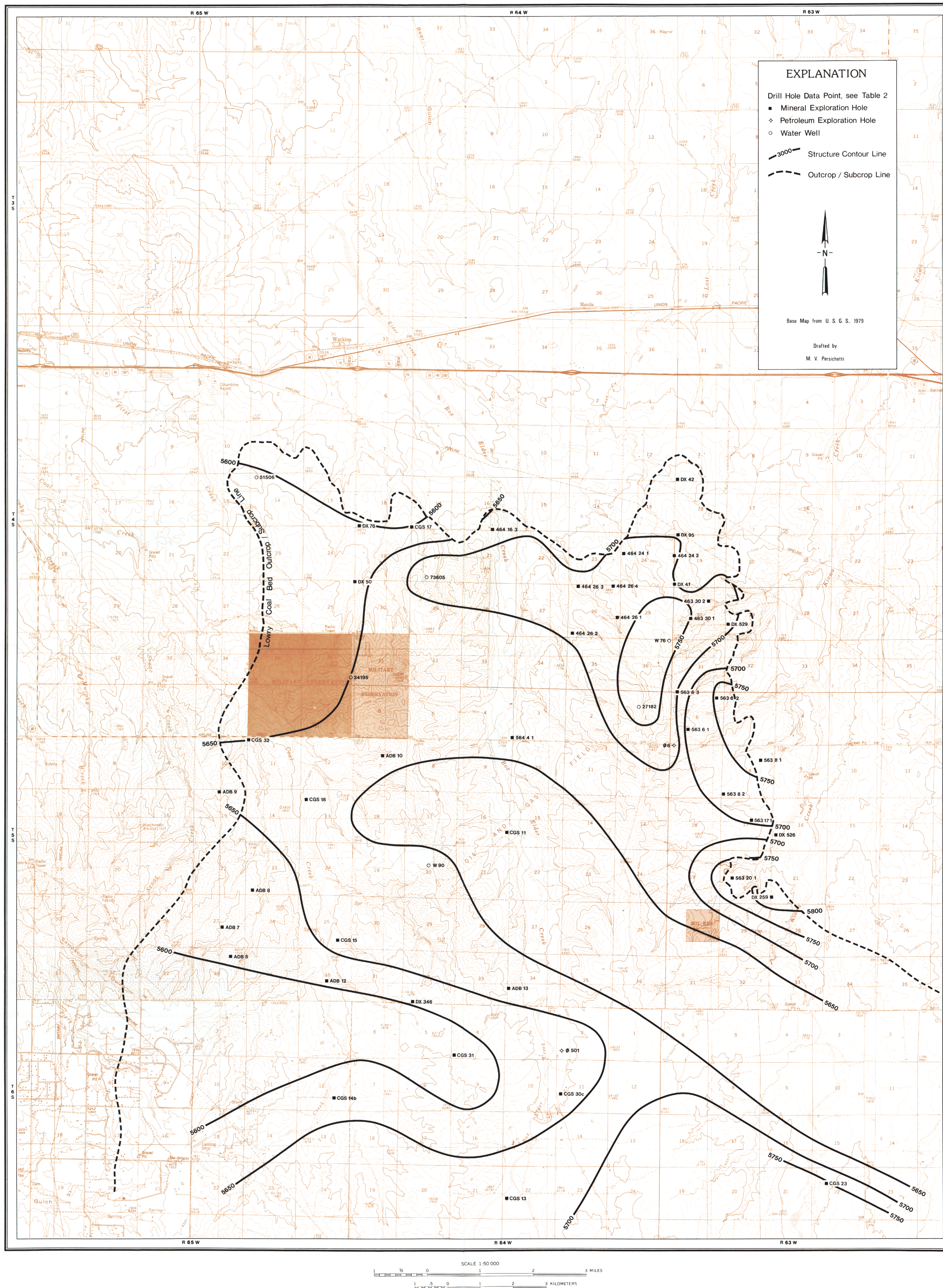
B. ISOPACH MAP OF THE BENNETT COAL BED, DENVER FORMATION, WATKINS-LOWRY AREA

DEPARTMENT OF NATURAL RESOURCES
COLORADO GEOLOGICAL SURVEY
JOHN W. ROLD, DIRECTOR

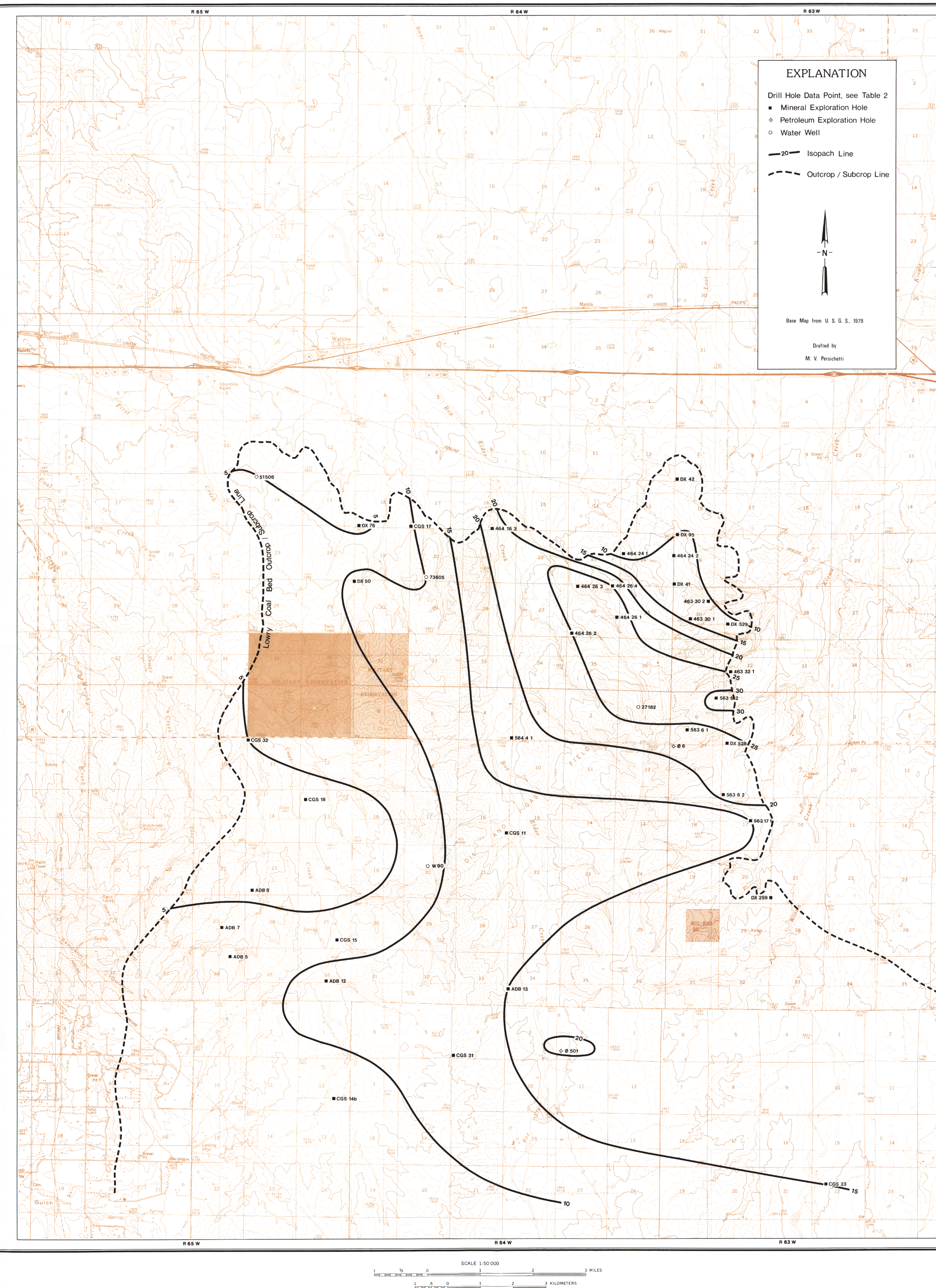
COAL RESOURCES OF THE DENVER EAST ½° x 1° QUADRANGLE, COLORADO

by Karl E. Brand and Wynn Eakins

1980



A. STRUCTURE MAP OF THE LOWRY COAL BED, DENVER FORMATION, WATKINS-LOWRY AREA



B. ISOPACH MAP OF THE LOWRY COAL BED, DENVER FORMATION, WATKINS-LOWRY AREA

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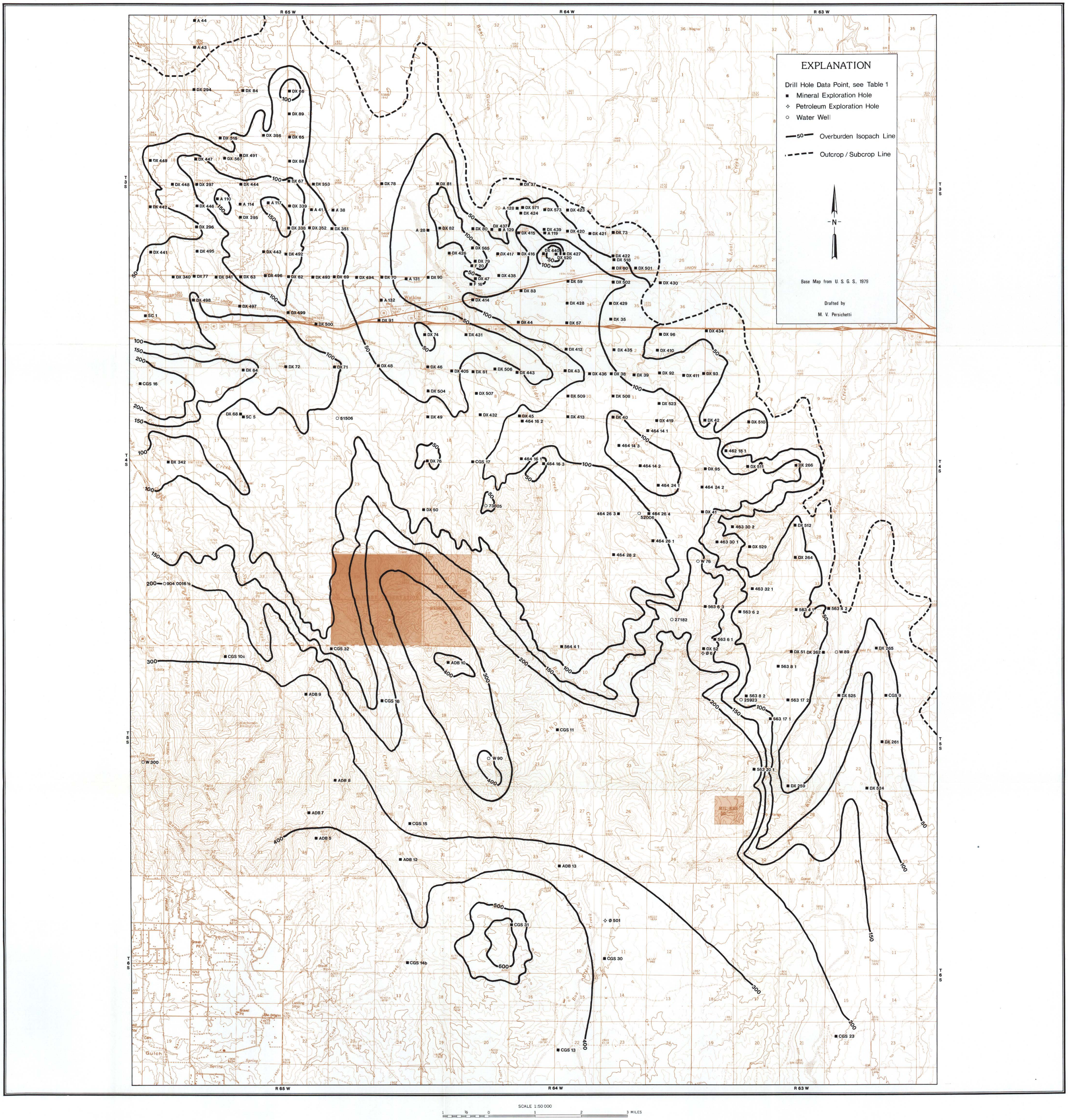
1980

COLORADO GEOLOGICAL SURVEY
RESOURCE SERIES 13
PLATE 20 OF 25



OVERBURDEN ISOPACH MAP OF THE DENVER FORMATION COAL ZONE, WATKINS-LOWRY STUDY AREA

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COLORADO GEOLOGICAL SURVEY
JOHN W. ROLD, DIRECTOR

COAL RESOURCES OF THE DENVER EAST ½° x 1° QUADRANGLE, COLORADO

by Karl E. Brand and Wynn Eakins

1980

CROSS-SECTIONS OF THE DENVER FORMATION COAL ZONE, WATKINS-LOWRY AREA

COAL RESOURCES OF THE DENVER EAST ½° x 1° QUADRANGLE, COLORADO

by Karl E. Brand and Wynn Eakins

1980

CROSS-SECTIONS OF THE DENVER FORMATION COAL ZONE, WATKINS-LOWRY AREA

DEPARTMENT OF NATURAL RESOURCES
COLORADO GEOLOGICAL SURVEY
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COAL RESOURCES OF THE DENVER EAST ½° x 1° QUADRANGLE, COLORADO

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Table I Drill Hole Points of the Laramie Formation Coal Zone

CORRELATED LARAMIE COALS

Hole #	Location	Elevation	Total Depth (ft)	Depth to 1st Seam	"B" BED Depth	"B" BED Elevation	"B" BED Thickness	"A" BED Depth	"A" BED Elevation	"A" BED Thickness	Total Laramie Coal (undifferentiated) Elevation of Top Coal	Total Laramie Coal (undifferentiated) Total Thickness
CGS 1	T1S-R62W-SWSE2	4925	500	326	326	4599	2.0	407	4518	2.0	4599	8.5
CGS 2	T1S-R61W-SESE10	5011	355	287	—	—	—	287	4724	2.5	4724	6
CGS 3	T2S-R61W-NWNW14	4942	320	191	191	4751	7	232	4710	3	4752	17
CGS 4	T2S-R60W-NENE34	4975	200	109	109	4866	5.5	148	4827	3	4866	14
CGS 5	T3S-R61W-NENE4	5027	390	306	306	4721	9	352	4675	10	4721	19
CGS 6	T4S-R60W-NENW4	5046	331	187	187	4859	7	217	4829	2.5	4859	16
CGS 7	T5S-R60W-SWSE14	5297	420	306	306	4993	1.5	346	4953	2.5	5085	8
CGS 8	T5S-R60W-SESE24	5205	260	131	131	5074	3.5	155	5050	3	5074	11
CGS 24	T2S-R60W-SWSW12	4892	240	no coal	—	—	—	—	—	—	—	—
CGS 25	T1S-R61W-SESE36	4893	250	103	103	4790	6	174	4719	4	4790	10
CGS 26	T2S-R61W-NENE36	4968	380	244	—	—	—	244	4724	3	4724	13.5
CGS 27	T3S-R60W-SWSW22	5154	380	280	280	4874	8	312	4842	2.5	4865	12.5
CGS 28	T4S-R60W-NENE36	5215	280	243	—	—	—	243	4972	2	5013	3.5
CGS 29	T5S-R59W-SWSW36	5414	400	329	329	5085	4	374	5040	5	5085	9
DX 21	T1S-R61W-NENE12	4867	200	61	61	4806	7	117	4750	3	4806	7
DX 22	T1S-R61W-NENW24	4906	144	109	109	4797	11		NDE		4797	11
DX 151	T3S-R60W-SESE10	5027	267	147	147	4880	7.5	179	4848	4	4880	11.5
DX 152	T2S-R60W-SESE27	4934	164	87	—	—	—	87	4847	3	4847	14
DX 153	T4S-R59W-NWNW6	5082	164	125	125	4957	8		NDE		4981	9.5
DX 154	T4S-R59W-NWNW18	5151	164	134	134	5018	6.5		NDE		5014	6.5
DX 156	T4S-R59W-NENE28	5205	164	102	102	5103	6				5103	6
DX 272	T3S-R59W-SWSW32	5041	144	51	51	4989	6	79	4962	0.5	4989	6.5
DX 273	T3S-R60W-SENE25	5012	110	46	46	4966	3.5	69	4943	1	4966	4.5
DX 274	T4S-R59W-SWNW9	5108	134	92	—	—	—	92	5016	1.5	5016	1.5
4199	T5S-R59W-SENW19	5225	320	140	140	5079	6	186	5039	2	5085	8
4259	T3S-R62W-SWSW27	5350	1291	921	921	4429	10				4429	14
4432	T4S-R60W-SWNE24	5180	362	157	157	5028	5	191	4989	4	5067	18
15292F	T4S-R60W-SWNW33	5245	568	355	355	4890	5				4890	23
15482	T5S-R60W-NWSE28	5295	415		—	4945	—				4945	12
23248	T6S-R60W-NENE5	5350	508	286	286	5064	1				5064	11
29709	T3S-R60W-SWSW32	5095	438	268	268	4827	6	296	4799	4	4827	13
37786	T5S-R60W-SENE30	5225	660	222	425	4800	5	500	4720	6	5003	12.5
41606	T4S-R60W-NW 27	5185	560	278	—	—	—	327	4828	2	4907	20
47569	T3S-R60W-SESE3	4990	415	108	108	4882	6	152	4838	7	4882	13
47903	T3S-R60W-NESW27	5160	465	305	305	4855	6	338	4822	7	4949	18
48491	T4S-R60W-NWSW2	5120	380	171	203	4917	6				4949	10
48993	T4S-R60W-NWSW21	5160	515	268	306	4854	5	333	4827	4	4892	16
0106	T3S-R61W-SWSW7	5093	7055	570	2532	4523	5	2566	4489	11	4523	22
0126	T2S-R62W-SWNE23	5150	7210	586	2657	4553	5	2740	4470	7	4564	9

UNCORRELATED LARAMIE COALS

W 1	T2S-R67W- 5	5150	1250	954	2′@954,6′@980,3.5′@1038	4196	11.5
W 2	T1S-R66W-SESE34	5175	1317	840	4′@840,4′@1136,2′@1163	4335	10
W 3	T1S-R67W-NWNW16	5140	1117	730	4′@730,5′@766,2′@775	4390	11
W 5	T1S-R68W-NWNE1	5072	875	452	1′@452,5′@504,2′@525,4′@536,1′@569,1′@587,6′@589	4620	20
W 22	T3S-R64W-SWNE32	5580	1752	1590	3′@1590,5′@1596,6′@1611	4005	14
W 57	T3S-R67W-SWNE6	5138	1373	960	4′@960,2′@1226,2′@1236,4′@1242	4178	12
W 58	T3S-R68W-SESW34	5270	1610	1204	2′@1204,1′@1230,4′@1306	4066	7
W 76	T4S-R64W-NENE36	5870	1954	1635	14′@1635,7′@1713,6′@1730	4235	27
W 79	T4S-R66W-SESE3	5500	2210	1620	10′@1620	3980	10
W 84	T4S-R67W-SENE25	5610	2323	1737	2′@1737,2′?@1903	3880	10
W 91	T5S-R65W-SENW5	5812	2101	1862	4′@1862,4′@1872,6′1911	3873	14
W 92	T5S-R66W-C 6	5710	2186	1796	1′@1796,1′@1812,2′@1846,2′@1864,2′@1896,2′@1900, 2′@1903,5′@1945,4′@1953	3914	25
W 93	T5S-R66W-SWSE6	5723	2182	1836	1′@1836,1′@1849,4′@1909,8′@1955	3887	14
W 94	T5S-R67W-SENW5	5550	2092	1588	2′@1588,2′@1633,1′@1671,2′@1719,2′@1733,1′@1768, 1′@1780,1′@1797,2′@1803,1′@1806	3962	15
W 95	T5S-R67W-NENW8	5600	1995	1657	1′@1657,1′@1670,1′@1682,1′@1701,1′@1710,2′@1754, 3′@1782,1′@1786	3943	11
W 96	T2S-R67W-SWSW1	5620	1493	1236	3′@1236,1?@1268,2′@1275,5′@1278,6′@1308	4384	17
W 100	T5S-R67W-SWSE35	5805	2485	2023	2′@2023,3′@2093,6′@2099	3782	11
W 101	T5S-R68W-SENW12	5420	1867	1503	2′@1503,2′@1525,2′@1586	3917	6
W 151	T1S-R66W-SWSW3	5135	1131	820	6′@820,8′@930,7′@954	4315	21
W 300	T5S-R66W-SE 24	6090	2380	1950	4′@2180,5′@2205	4140	9
W 301	T2S-R63W-SENE35	5310	1240	957	5′@957,7′@1009,2′@1030	4353	14
214	T4S-R61W-NENE6	5205	712	201		5004	31
1388	T1S-R68W-NENW12	5070	875	504	4′@504,4′@536,2′@570	4516	10
3087	T1S-R67W-SWSW4	5220	1054	670	3′?@670,1′@678,4′@694,5′@704,2′@715	4793	12
3297	T1S-R67W-NWSE1	4965	1040	646	4′@646,9′?@718,16′@793	4550	20
4923	T3S-R61W-NWNW23	5085	566	309		4776	25
5212	T5S-R61W-NWSE12	5430	775	585	10′@585	4845	10
9920	T4S-R61W-NENE15	5225	672	485		4740	16
13593	T1S-R68W-NWSE1	5090	950	408	3′@408,5′@431,2′@451,3′@536,6′@572,3′@581	4682	22
14472	T1S-R68W-NWNW2	5145	995	450	3′@450,15′@560	4695	18
31091	T5S-R61W-NWNW14	5340	734	505	14′ between 505 & 622	4835	14
42239	T3S-R61W-NESW28	5125	625	365		4760	20
53700	T3S-R61W-SWSW34	5155	638			4758	25
89192	T1S-R68W-NWNW36	5250	1043	775	1′@775,2′@783,2′@806,1′@819,2′@829,7′@870	4475	15
902-0028	T1S-R66W-SWSW34	5120	1247	496	4′@496	3873	4
902-0036	T1S-R67W-SWNE10	5040	1048	645	6′@645,3′@718,4′@727	4395	13
902-0056	T1S-R68W-NESE22	5150	956	626	3′@626,3′@688	4524	14
903-0046	T3S-R66W-NWSW9	5310	1520	50	4.5′?@50,5′@270′,1′?@301,4′?@370,4′?@380	3871	10
903-0048	T3S-R66W-SESW9	5308	1700	1421	6′?@1421,1′?@1462,2′?@1491,3′?@1497	3887	12
903-0079	T4S-R68W-NWNW36	5365	1830	1363	1′@1363,2′@1398,4′@1482,1′@1514	3990	8
903-0103	T3S-R68W- 12					3984	8
01	T4S-R63W-SWSW4	5559	7825	1245	4′@1245,3′@1423,2′@1430	4314	9
02	T4S-R63W-SESE10	5585	7788	1284	2′?@1024,3′@1284,2′@1298,3′@1307,5′@1315	4301	13
03	T4S-R63W-NENE26	5580	7790	1275	3′@1275,3′?@1285,2′@1315,3′@1321	4305	11
04	T4S-R63W-SWSW29	5719	8047	1529	2′@1529,2′@1534,3′@1549	4190	7
05	T5S-R63W-NENW6	5860	8232	1581	4′?@1581,3′@1677,4′@1694	4279	11
06	T5S-R63W-NWNW7	5878	8288	1668	4′?@1668,3′@1699,4′@1705,3′@1721	4210	14
07	T5S-R63W-NENE12	5685	—	1198	2′?@1198,2′?@1205,2′@1247,1′?@1250,2′@1291	4487	12
08	T2S-R67W-SENE20	5103	8608	997	6′@997,8′@1070	4106	14
09	T3S-R65W-SENW12	5397	8220	1492	6′@1492	3905	6
010	T6S-R63W-SESW12	5830	7772	1405	6′@1405,4′@1430	4425	10
015	T5S-R63W-NENW25	5923	8626	1838	4′@1838,4′?@1923	4085	8
019	T6S-R67W-SESE13	5945	9397	1988	5′@1988,3′@2143,4′@2167,5′@2233	3957	17
023	T2S-R66W-SENW26	5315	8520	1386	4′@1386	3929	4
024	T2S-R65W-NESW25	5299	8200	1305	3′@1305,5′@1353,3′@1384	3994	11
025	T3S-R63W-NESE21	5440	7963	4238	10′@1202	4238	10
026	T3S-R64W-CSE4	5414	8210	4040	6′@1374,4′@1404,3′@1442	4040	13
027	T2S-R64W-CNE9	5365	8089	4144	3′@1221,4′@1264,3′@1303	4144	10
028	T2S-R64W-NENW3	5294	8000	4171	4′@1123,5′@1150,2′@1232,2′@1257	4171	13
029	T2S-R62W-NWNW26	5144	7238	602		4542	9
030	T2S-R62W-SENE29	5206	7400	754	5′@1418,5′@1440	4452	18
032	T6S-R63W-NENE10	5941	8040	4351	6′@1590,10′@1603	4351	16
033	T6S-R63W-NESE10	5860	7950	4383	2′@1477,3′@1493,6′@1506,3′@1535	4383	14
034	T6S-R63W-NWSW13	5863	7810	4445	4′@1448,5′@1440	4445	9
0100	T2S-R65W-SWNE17	5360	8420	1429	5′@1429,5′@1460	3931	10
0101	T2S-R65W-SWNE21	5401	8400	1436	6′@1436,6′@1468,3′@1491	3965	15
0102	T2S-R65W-NE 9	5279	8225	1304	4′@1304,3′@1333,4′@1358	3975	11
0103	T2S-R65W-SWSW3	5439	8234	1263	4′@1263,3′@1297	4176	7
0104	T2S-R65W-SW 21	5400	8422	1486	3′@1486,4′@1505	3914	7
0108	T4S-R61W-SESW15	5493	7486	1048	4′@1048,4′@1124	4445	8
0110	T1S-R66W-SWSW35	5166	8350	1138	6′?@1138	4028	6
0111	T6S-R63W-NWNW13	5865	7844	1432	9′@1432,3′@1452	4433	12
0112	T6S-R63W-NESW2	5872		1525	18′@1525,4′@1552	4347	22
0113	T3S-R62W-NENE19	5324	7500	937	6′@937,9′@975,4′@1002	4387	19
0114	T4S-R62W-SESW21	5493	7486	1047	5′@1047,4′@1120	4446	9
0115	T6S-R62W-NWSE12	5601	7220	959	5′@959,3′@977	4642	8
0117	T5S-R63W-NESW34	5790?	7523	1200	3′@1200,2′@1204,3′@1217,4′@1226,5′@1240	4590	17
0118	T6S-R63W-NESW16	5874	7848	1480	5′@1480,3′@1489,1.5′@1493,2′@1499	4394	11.5
0120	T5S-R61W-SWSE24	5474	6837	646		4828	16
0121	T1S-R65W-SWNE5	5063	8065	948	4′@948,3′@957,4′@1006	4115	11
0123	T1S-R64W-SWSE3	5282	8104	1129	3′@1129,5′@1263	4153	8
0124	T1S-R64W-NESW29	5176	8005	970	6′@970,6′@1013,4′@1037	4206	16
0125	T1S-R64W-SWSE28	5232	8000	1025	2′@1025,10′@1055	4210	12
0126	T2S-R62W-SENE23	5150	7208	588	3′@588,7′@690	4562	13
0127	T5S-R62W-SWSW30	5762	7660	1209	5′@1209,5′@1220	4553	20
0128	T5S-R62W-SWSW34	5757	7555	1205	5′@1205	4553	5
0131	T3S-R62W-NWSW17	5308	7500	912	6′@912,9′?	4386	18
0133	T6S-R62W-NESW4	5758	7520	1176	3′@1176,5′@1182,5′@1195,5′@1204	4593	23
0501	T6S-R64W-SWSW2	5962	8310	1776	3′@1776,5′@1805	4198	8
0510	T6S-R61W-SESE8					4828	11

Sources of Data

CGS	Colorado Geological Survey
DX	Public Service Company of Colorado
Permit # (4199, etc.)	Colorado Department of Water Resources
0	Colorado Oil and Gas Conservation Commission
902-0028, etc.	John Romero, Colorado Department of Water Resources

TABLE II Drill Hole Data Points of the Denver Formation Coal Zone

Hole #	Location	Elevation (ft)	Total Depth (ft)	Depth to 1st Seam (ft)	LOWRY Depth (ft)	LOWRY Elevation of Top of Seam (ft)	LOWRY Seam Thickness (ft)	BENNETT Depth (ft)	BENNETT Elevation of Top of Seam (ft)	BENNETT Seam Thickness (ft)	UPPER WATKINS Depth (ft)	UPPER WATKINS Elevation of Top of Seam (ft)	UPPER WATKINS Seam Thickness (ft)	LOWER WATKINS Depth (ft)	LOWER WATKINS Elevation of Top of Seam (ft)	LOWER WATKINS Seam Thickness (ft)
CGS 9	T5S,R63W-SWSW 11	5758	420	89	—	—	—	89	5669	8	—	—	—	—	—	—
CGS 10c	T5S,R65W-NWNE 8	5857	620	290	—	—	—	290	5567	7	435	5422	19		—	—
CGS 11	T5S,R64W-SESE 16	5867	560	259	259	5608	12	334	5533	8	497	5370	15	—	—	—
CGS 13	T6S,R64W-NWSW 15	6057	690	424	—	—	—	424	5633	2.5	467	5590	3	534	5523	26
CGS 14b	T6S,R65W-SWSE 12	6085	800	457	457	5628	9	622	5463	6	708	5377	12	778	5307	2
CGS 15	T5S,R64W-SWSE 25	5937	600	276	276	5661	8	383	5554	5	512	5425	6	5405	5324	2
CGS 16	T4S,R66W-SENE 12	5543	400	264	—	—	—	—	—	—	264	5279	15	336	5207	3.5
CGS 17	T4S,R64W-SESE 18	5692	320	92	92	5600	10	190	5502	10	238	5454	4	290	5402	10
CGS 18	T5S,R65W-SWNW 13	5826	640	160	160	5666	2	231	5595	7	300	5526	2	401	5425	2
CGS 19	T2S,R65W-SWSE 20	5290	300	126	2.5′ @ 125.5 (uncorrelated)											
CGS 21	T2S,R65W-NWNW 36	5343	280	146	2.5′ @ 145.5 (uncorrelated)											
CGS 22	T3S,R66W-SWSW 36	5324	380	208	—	—	—	—	—	—	—	—	—	208	5116	5
CGS 23	T6S,R63W-SENW 22	5985	495	224	224	5761	15	324	5661	13	376	5609	4	428	5557	12
CGS 30	T6S,R63W-SWSW 11	5993	720	347	347	5646	15	424	5569	16	471	5522	5.5	591	5402	29
CGS 31	T6S,R64W-SWSW 4	6187	900	602	602	5585	12	742	5445	2	780	5407	5	860	5327	26
CGS 32	T4S,R65W-NENE 10	5755	580	115	115	5640	5	222	5533	12	314	5441	17	436	5319	5
DX 35	T3S,R64W-SWSW 35	5585	164	81	—	—	—	—	—	—	81	5504	25	—	—	—
DX 37	T3S,R65W-SWSW 16	5462	246	90	—	—	—	—	—	—	—	—	—	90	5370	1.5
DX 38	T3S,R64W-NWNW 11	5628	164	108	—	—	—	—	—	—	108	5521	23	—	—	—
DX 39	T4S,R64W-SESW 2	5615	143	83	—	—	—	—	—	—	83	5532	24.5	—	—	—
DX 40	T4S,R64W-SWSW 11	5668	143	95	—	—	—	95	5573	7	—	—	—	—	—	—
DX 41	T4S,R64W-SESE 24	5830	205	143	143	5687	12	—	—	—	—	—	—	—	—	—
DX 42	T4S,R63W-SWSW 7	5721	246	42	42	5679	9	69.5	5652	8.5	160	5564	9	—	—	—
DX 43	T4S,R64W-SWSW 3	5616	164	86	—	—	—	—	—	—	86	5530	27.5	119	5497	2
DX 44	T3S,R64W-SESE 32	5605	185	132	—	—	—	—	—	—	132	5473	25	—	—	—
DX 45	T4S,R64W-NWNW 16	5638	144	112	—	—	—	—	—	—	112	5525	11	—	—	—
DX 46	T4S,R64W-SWSW 6	5548	185	35	—	—	—	—	—	—	35	5512	9	100	5448	5.5
DX 47	T3S,R64W-NWNW 32	5589	102	47	3′ of coal @ 47′, 5′ of coal at 55′ (uncorrelated)											
DX 48	T4S,R65W-NENE 11	5567	246	50	—	—	—	50	5517	14	79.5	5487	9.5	151	5416	8
DX 49	T4S,R64W-NWNW 18	5618	185	81	—	—	—	81	5537	13	105	5512	9	134	5400	6
DX 50	T4S,R65W-NENE 25	5735	185	95	95	5640	11	160	5575	7	—	—	—	—	—	—
DX 51	T5S,R63W-NENE 8	5759	205	86	—	—	—	86	5673	12	141	5618	17	—	—	—
DX 52	T5S,R63W-SWSW 6	5900	226	—	no coal											
DX 57	T3S,R64W-SWSW 34	5583	185	123	—	—	—	—	—	—	123	5460	23	171	5412	2
DX 59	T3S,R64W-NWNW 34	5572	185	108	—	—	—	—	—	—	108	5464	26.5	166	5406	1.5
DX 60	T3S,R64W-SWSW 26	5550	143	88	—	—	—	—	—	—	88	5462	26	—	—	—
DX 61	T4S,R64W-NENE 7	5604	185	65	—	—	—	65	5539	13	104	5500	11	134	5470	4
DX 62	T3S,R65W-NWNW 34	5576	185	118	—	—	—	118	5458	17	160	5416	1	—	—	—
DX 63	T3S,R65W-NENE 32	5623	185	104	—	—	—	104	5519	12	—	—	—	—	—	—
DX 64	T4S,R65W-NWNW 9	5587	190	58	—	—	—	58	5529	9	165	5422	6	—	—	—
DX 65	T3S,R65W-NWNW 15	5466	267	72	—	—	—	72	5394	33	153	5313	10	194	5272	8.5
DX 66	T3S,R65W-NWNW 10	5450	266	113	—	—	—	—	—	—	113	5338	7.5	165	5285	2
DX 67	T3S,R65W-SWSW 15	5528	246	101	—	—	—	101	5425	29	234	5292	9.5	—	—	—
DX 69	T3S,R65W-NWNW 35	5504	185	62	—	—	—	62	5443	12	142	5364	9.5	—	—	—
DX 70	T3S,R65W-NWNW 36	5496	164	39	—	—	—	39	5457	5	94	5204	6.5	—	—	—
DX 71	T4S,R65W-SWSW 2	5666	205	123	—	—	—	123	5543	11	166	5500	3	176	5490	5.5
DX 72	T4S,R65W-SESE 4	5642	205	137	—	—	—	137	5510	10.5	—	—	—	—	—	—
DX 73	T3S,R64W-SWSW 23	5500	139	38	—	—	—	—	—	—	38	5462	3.5	—	—	—
DX 74	T4S,R65W-NE 1	5537	165	72	—	—	—	—	—	—	72	5465	4.5	135	5402	6
DX 76	T4S,R64W-SWSW 18	5668	205	35	35	5605	4	170	5498	12	—	—	—	—	—	—
DX 77	T3S,R65W-NENE 31	5547	164	95	—	—	—	95	5452	10	—	—	—	—	—	—
DX 78	T3S,R65W-SWSW 13	5444	205	154	—	—	—	—	—	—	154	5290	8.5	179	5265	2
DX 79	T3S,R64W-NWSW 29	5557	185	104	—	—	—	—	—	—	104	5452	51	246	5311	1.5
DX 80	T3S,R64W-SWSW 19	5503	143	59	—	—	—	—	—	—	59	5444	51	—	—	—
DX 81	T3S,R64W-SWSW 18	5497	125	97	—	—	—	—	—	—	97	5400	13	—	—	—
DX 82	T3S,R64W-SESW 19	5496	185	103	—	—	—	—	—	—	103	5393	10	138	5358	2
DX 83	T3S,R64W-SWNW 33	5553	250	108	—	—	—	—	—	—	108	5445	26.5	152	5401	1.5
DX 85	T3S,R66W-SESE 1	5388	144	65	—	—	—	—	—	—	65	5323	10	113	5275	1.5
DX 86	T3S,R66W-SESE 11	5430	164	106	—	—	—	—	—	—	106	5324	20.5	—	—	—
DX 87	T3S,R66W-SESE 23	5433	143	48	0.5′ @ 47.5, 1′ @ 52 (uncorrelated)											
DX 88	T3S,R65W-W ¼ 15	5483	143	65	—	—	—	65	5417	32	124	5359	2	—	—	—
DX 89	T3S,R65W-W ¼ 10	5428	156	93	—	—	—	—	—	—	93	5335	4	137	5289	8.5
DX 90	T3S,R64W-NWNW 31	5501	143	87	—	—	—	—	—	—	87	5414	9	104	5397	1
DX 91	T3S,R65W-SWSW 36	5540	143	45	—	—	—	45	5495	8	108	5432	5	—	—	—
DX 92	T4S,R64W-SWSW 1	5631	165	77	—	—	—	—	—	—	77	5554	21	—	—	—
DX 93	T4S,R64W-SESE 1	5650	143	85	—	—	—	—	—	—	85	5565	10	—	—	—
DX 94	T4S,R63W-NWNW 9	5557	143	60	1.5′ 59.5 (uncorrelated)											
DX 95	T4S,R63W-NWNW 19	5813	267	122	122	5691	10	170	5643	20	230	5583	10	—	—	—
DX 96	T4S,R64W-NWNW 1	5568	123	26	—	—	—	—	—	—	26	5542	24.5	—	—	—
DX 259	T5S,R63W-SESE 20	5880	153	46	46	5834	3	113	5767	3	—	—	—	—	—	—
DX 261	T5S,R63W-SESE 15	5751	143	74	—	—	—	74	5677	3.5	—	—	—	—	—	—
DX 262	T5S,R63W-NWNE 9	5715	120	45	—	—	—	45	5670	17	—	—	—	—	—	—
DX 264	T4S,R63W-SWSW 28	5691	141	84	—	—	—	—	—	—	84	5606	25	—	—	—
DX 265	T5S,R63W-SESE 3	5767	123	87	—	—	—	—	—	—	87	5680	7.5	—	—	—
DX 266	T4S,R63W-SWSW 16	5703	140	132	—	—	—	—	—	—	132	5571	4	—	—	—
DX 280	T3S,R66W-NWNW 22	5376	162	84	2′ @ 83.5, 1′ @ 86.5, 2.5′ @ 88.5, 1.5′ @ 91.5 (uncorrelated)											
DX 281	T3S,R66W-NENW 15	5360	164	67	20.5′ @ 67 (7′ of ptgs), 1′ @ 142, 1′ @ 152.5 (uncorrelated)											
DX 282	T3S,R66W-SESE 4	5346	144	55	10.0′ @ 55 (uncorrelated)											
DX 283	T2S,R66W-SWSW 34	5304	144	74	.5′ @ 74, 1′ @ 76, 1′ @ 132, 1′ @ 134 (uncorrelated)											
DX 284	T2S,R66W-NWNW 34	5305	143	—	no coal											
DX 285	T2S,R66W-SWSW 15	5248	143	56	3′ @ 56, 2′ @ 60, 1′ @ 90.5 (uncorrelated)											
DX 286	T2S,R66W-SESE 21	5250	144	67	6′ @ 67, 1′ @ 110 (uncorrelated)											
DX 287	T2S,R66W-NWNW 15	5222	144	75	2′ @ 75, 1′ @ 80, 1.5′ @ 97 (uncorrelated)											
DX 288	T2S,R66W-SWSW 24	5347	164	68	1.5′ @ 68, 1′ @ 70, .5′ @ 71.5, .5′ @ 72.5, 2′ @ 108, 1′ @ 127 (uncorrelated)											
DX 289	T3S,R66W-SESE 8	5332	144	99	3.5′ @ 98.5, 1′ @ 102.5 (uncorrelated)											
DX 291	T3S,R66W-SESE 10	5416	165	107	1′ @ 106.5, 3′ @ 108, 1′ @ 113, 3.5′ @ 114.5, 2′ @ 119, 3′ @ 122 (uncorrelated)											
DX 292	T3S,R66W-NWNW 1	5350	144	105	20′ lignite and clay @ 105′											
DX 293	T3S,R66W-SWSW 1	5482	175	143	1′ @ 142.5, 2.5′ @ 146, 1′ @ 150, 1.5′ @ 153, 1′ @ 155, 1′ @ 157, 2′ @ 159, 2.5′ @ 162 (uncorrelated)											
DX 295	T3W,R65W-SESE 20	5603	205	146	—	—	—	146	5457	26	—	—	—	—	—	—
DX 296	T3S,R65W-SWSW 20	5507	102	41	—	—	—	41	5465	11	—	—	—	—	—	—
DX 297	T3S,R65W-NWNW 20	5544	164	104	—	—	—	104	5440	20.5	140	5404	4.5	—	—	—
DX 338	T3S,R65W-SWSW 22	5578	205	150	—	—	—	150	5430	28	—	—	—	—	—	—
DX 339	T3S,R65W-NWSW 22	5566	205	131	—	—	—	131	5435	27	—	—	—	—	—	—
DX 340	T3S,R65W-NENW 31	5510	102	63	—	—	—	63	5447	2.5	—	—	—	—	—	—
DX 341	T3S,R65W-NENW 32	5577	162	76	—	—	—	76	5501	12	—	—	—	—	—	—
DX 342	T4S,R65W-NENW 19	5614	123	77	—	—	—	77	5538	6.5	—	—	—	—	—	—
DX 351	T3S,R65W-SESE 22	5479	124	30	—	—	—	30	5449	2.5	85	5410	2.5	—	—	—
DX 352	T3S,R65W-SESW 22	5525	123	65	—	—	—	—	—	—	65	5460	28.5	—	—	—
DX 353	T3S,R65W-NWNE 22	5495	102	47	—	—	—	47	5448	28	—	—	—	—	—	—
DX 356	T3S,R65W-SESW 9	5473	102	50	—	—	—	50	5423	27	—	—	—	—	—	—
DX 364	T1S,R65W-SWNW 16	5187	144	—	no coal											
DX 365	T1S,R64W-SWSW 18	5175	123	—	no coal											
DX 366	T1S,R64W-SWSW 15	5256	123	—	no coal											
DX 367	T1S,R63W-NWNW 19	5091	144	—	no coal											
DX 368	T2S,R64W-NWNW 1	5255	144	—	no coal											
DX 369	T2S,R64W-NENE 16	5340	123	84	.5 @ 84′, 1′ @ 110.5 (uncorrelated)											
DX 370	T2S,R64W-SESW 18	5305	123	—	no coal											
DX 371	T2S,R64W-NENE 29	5411	144	40	.5′ @ 39.5, (uncorrelated)											
DX 372	T2S,R64W-SESE 33	5404	144	46	1′ @ 46, .5′ @ 56, 1′ @ 57.5, .5′ @ 60, 2.5 @ 111.5 (uncorrelated)											
DX 373	T2S,R64W-SESE 36	5375	123	83	1′ @ 83, .5′ @ 85.5, 1′ @ 105, 1′ @ 107.5, 1′ @ 111 (uncorrelated)											
DX 374	T2S,R64W-NENE 1	5350	144	105	0.5′ @ 68.5											
DX 375	T2S,R63W-NWNW 15	5205	102	—	no coal											
DX 376	T3S,R63W-NENE 4	5332	123	—	no coal											
DX 377	T3S,R63W-NENE 21	5429	144	104	1′ @ 104 (uncorrelated)											
DX 381	T1S,R63W-SWSW 15	5060	144	—	no coal											
DX 392	T3S,R64W-NESE 13	5469	144	17	2.0′ @17, 2.0′ @ 70 (uncorrelated)											
DX 393	T4S,R63W-NWNW 14	5578	144	49	.5′ @ 48.5, 1′ @ 82, .5′ @ 102, .5 @ 103, 1′ @ 105 (uncorrelated)											
DX 410	T4S,R64W-NESE 2	5587	102	33	—	—	—	—	—	—	33	5554	24	—	—	—
DX 411	T4S,R64W-SWSE 12	5627	144	93	—	—	—	—	—	—	93	5534	11	—	—	—
DX 412	T4S,R64W-SENE 4	5621	164	106	—	—	—	—	—	—	106	5519	25	—	—	—
DX 413	T4S,R64W-SWSW 10	5619	165	113	—	—	—	—	—	—	113	5505	18	—	—	—
DX 414	T3S,R64W-SENE 31	5535	165	106	—	—	—	—	—	—	106	5428	23	—	—	—
DX 415	T3S,R64W-NENE 29	5559	185	112	—	—	—	—	—	—	112	5447	52.5	—	—	—
DX 416	T3S,R64W-NESE 29	5535	164	98	—	—	—	—	—	—	98	5432	26.5	—	—	—
DX 417	T3S,R64W-C 29	5511	103	64	—	—	—	—	—	—	64	5447	24	—	—	—
DX 419	T4S,R64W-NENE 14	5690	164	105	—	—	—	105	5585	8.5	—	—	—	—	—	—
DX 420	T3S,R64W-SWSW 22	5555	144	84	—	—	—	—	—	—	84	5460	46	—	—	—
DX 421	T3S,R64W-SWSE 27	5525	103	38	—	—	—	—	—	—	38	5487	22.5	—	—	—
DX 422	T3S,R64W-SWNW 26	5519	102	43	—	—	—	—	—	—	43	5462	26.5	—	—	—
DX 423	T3S,R64W-NWSW 22	5519	82	32	—	—	—	—	—	—	32	5487	21	—	—	—
DX 424	T3S,R64W-NWSW 21	5533	164	91	—	—	—	—	—	—	91	5461	51.5	—	—	—
DX 426	T3S,R64W-C 30	5545	144	84	—	—	—	—	—	—	84	5461	27.5	—	—	—
DX 427	T3S,R64W-NESE 28	5568	185	130	—	—	—	—	—	—	130	5438	28.5	—	—	—
DX 428	T3S,R64W-SWNW 34	5584	184	147	—	—	—	—	—	—	147	5437	26	—	—	—
DX 429	T3S,R64W-SENE 34	5553	144	72	—	—	—	—	—	—	72	5498	26	—	—	—
DX 431	T4S,R64W-NENE 6	5546	175	35	—	—	—	34	5512	8.5	94	5452	21	—	—	—
DX 432	T4S,R64W-SWSW 8	5651	144	63	—	—	—	63	5587	12	—	—	—	—	—	—
DX 433	T4S,R64W-NENE 8	5590	164	81	—	—	—	—	—	—	81	5509	19.5	—	—	—
DX 434	T4S,R63W-NWNW 6	5585	144	40	—	—	—	—	—	—	40	5546	2	—	—	—
DX 435	T4S,R64W-NWSW 2	5608	144	78	—	—	—	—	—	—	78	5538	22.5	—	—	—
DX 436	T4S,R64W-SESW 10	5620	164	106	26′ @ 106 (uncorrelated)											
DX 438	T3S,R64W-SESW 29	5548	144	771	—	—	—	—	—	—	77	5470	25	—	—	—
DX 439	T3S,R64W-SESW 21	5579	225	106	—	—	—	—	—	—	106	5471	25	22.5	—	—
DX 440	T3S,R64WC 28	5630	185	52	—	—	—	52	5551	13	—	—	—	—	—	—
DX 442	T3S,R65W-SWNW 19	5478	123	41	—	—	—	41	5437	17.5	—	—	—	—	—	—
DX 443	T3S,R65W-C 28	5627	205	137	—	—	—	—	—	—	137	5490	19	—	—	—
DX 444	T3S,R65W-NENE 20	5538	185	103	—	—	—	—	—	—	103	5425	29	—	—	—
DX 446	T3S,R65W-SWNW 20	5547	145	97	—	—	—	97	5450	15	—	—	—	—	—	—
DX 447	T3S,R65W-NWSW 17	5505	155	106	—	—	—	106	5399	27	—	—	—	—	—	—
DX 448	T3S,R65W-SENE 19	5513	103	66	—	—	—	66	5447	14	—	—	—	—	—	—
DX 449	T3S,R65W-SWNW 18	5482	136	55	—	—	—	55	5427	12.5	—	—	—	—	—	—
DX 492	T3S,R65W-SWNW 28	5557	185	137	—	—	—	137	5418	30	—	—	—	—	—	—
DX 493	T3S,R65W-SESW 34	5536	123	63	—	—	—	63	5471	9.5	—	—	—	—	—	—
DX 494	T3S,R65W-C 35	5492	103	45	—	—	—	45	5488	8.5	—	—	—	—	—	—
DX 495	T3S,R65W-SESW 33	5664	135	88	—	—	—	88	5465	16	—	—	—	—	—	—

TABLE II Drill Hole Data Points of the Denver Formation Coal Zone

Hole #	Location	Elevation (ft)	Total Depth (ft)	Depth to 1st Seam (ft)	LOWRY Depth (ft)	LOWRY Elevation of Top of Seam (ft)	LOWRY Seam Thickness (ft)	BENNETT Depth (ft)	BENNETT Elevation of Top of Seam (ft)	BENNETT Seam Thickness (ft)	UPPER WATKINS Depth (ft)	UPPER WATKINS Elevation of Top of Seam (ft)	UPPER WATKINS Seam Thickness (ft)	LOWER WATKINS Depth (ft)	LOWER WATKINS Elevation of Top of Seam (ft)	LOWER WATKINS Seam Thickness (ft)
DX 496	T3S,R65W-SESW 33	5664	205	145	—	—	—	145	5519	14	—	—	—	—	—	—
DX 497	T3S,R65W-NESE 32	5611	103	63	—	—	—	63	5547	9	—	—	—	—	—	—
DX 498	T3S,R65W-NWSW 31	5548	144	108	—	—	—	108	5439	12	—	—	—	—	—	—
DX 499	T3S,R65W-SWSW 34	5630	145	99	—	—	—	99	5531	10	—	—	—	—	—	—
DX 500	T4S,R65W-NENE 3	5588	102	63	—	—	—	63	5525	10.5	—	—	—	—	—	—
DX 501	T3S,R64W-SWSE 26	5542	102	44	—	—	—	—	—	—	44	5498	21	—	—	—
DX 502	T3S,R64W-SWNW 34	5578	165	121	—	—	—	—	—	—	121	5457	26	—	—	—
DX 504	T4S,R64W-NWSW 7	5567	115	35	—	—	—	35	5532	13.5	63	5504	9	—	—	—
DX 505	T4S,R64W-SESW 7	5578	144	53	—	—	—	53	5535	8	68	5510	9	—	—	4
DX 506	T4S,R64W-SESW 5	5588	144	86	—	—	—	—	—	—	86	5502	17.5	172	5416	3
DX 507	T4S,R64W-SWNW 8	5621	144	61	—	—	—	61	5560	13	100	5521	10.5	—	—	—
DX 508	T4S,R64W-SWNW 11	5648	185	126	—	—	—	—	—	—	126	5522	8	154	5494	12.5
DX 509	T4S,R64W-NWSW 10	5620	185	128	—	—	—	—	—	—	128	5492	17	150	5470	6
DX 510	T4S,R63W-NENE 18	5641	165	66	—	—	—	66	5575	5	127	5514	4.5	—	—	—
DX 511	T4S,R63W-SESE 18	5689	144	62	—	—	—	62	5627	16	—	—	—	—	—	—
DX 512	T4S,R63W-SWNW 28	5691	122	68	—	—	—	—	—	—	68	5623	22.5	—	—	—
DX 515	T3S,R65W-SENE 17	5463	82	22	—	—	—	22	5541	15	—	—	—	—	—	—
DX 518	T3S,R64W-SWSW 26	5534	123	72	—	—	—	—	—	—	72	5462	25.5	—	—	—
DX 520	T3S,R64W-SENE 28	5597	215	39	—	—	—	39	5558	9	169	5428	27.5	—	—	—
DX 523	T3S,R64W-SWNW 12	5670	185	147	—	—	—	—	—	—	147	5523	11	—	—	—
DX 524	T5S,R63W-SWSW 22	5823	154	133	—	—	—	133	5690	1.5	—	—	—	—	—	—
DX 525	T5S,R63W-SWSW 10	5709	123	34	—	—	—	34	5675	10	—	—	—	—	—	—
DX 526	T5S,R63W-NWSW 16	5764	123	69	—	—	—	69	5695	7	—	—	—	—	—	—
DX 528	T5S,R63W-SWSW 5	5845	185	88	88	5757	24	—	—	—	—	—	—	—	—	—
DX 529	T4S,R63W-NWSW 29	5755	144	46	46	5709	12	93	5662	15	—	—	—	—	—	—
DX 565	T3S,R64W-SENE 30	5550	179	104	—	—	—	—	—	—	104	5446	52	—	—	—
DX 567	T3S,R65W-SWNE 17	5493	100	57	—	—	—	57	5436	26	—	—	—	—	—	—
DX 571	T3S,R64W-SWNW 21	5540	130	68	—	—	—	—	—	—	68	5477	47	—	—	—
DX 573	T3S,R64W-C 21	5543	150	72	—	—	—	—	—	—	72	5471	51	—	—	—
463-30-1	T4S,R63W-SESW 30	5760	400	73	73	5747	14	96	5724	16	—	—	—	—	—	—
463-30-2	T4S,R63W-NENE 30	5748	400	15	15	5733	10.5	81	5667	9	—	—	—	—	—	—
463-32-1	T4S,R63W-NWSW 32	5755	200	92	—	—	—	92	5663	12	163	5592	24	—	—	—
464-14-1	T4S,R64W-SWNE 14	5688	160	120	—	—	—	120	5568	10	176	5512	11	—	—	—
464-14-2	T4S,R64W-SWSE 14	5730	260	85	—	—	—	85	5645	17	131	5599	10	237	5493	8
464-14-3	T4S,R64W-NWSW 14	5685	200	65	—	—	—	65	5620	18	113	5572	9	180	5505	11
464-16-1	T4S,R64W-SWSW 16	5722	240	150	—	—	—	150	5570	14	—	—	—	—	—	—
464-16-2	T4S,R64W-NWNW 16	5640	220	2?	—	—	25	2?	5638	15	102	5538	11	146	5494	6
464-16-3	T4S2R64W-SWSE 16	5720	320	32	32	5688	22	156	5564	14	202	5518	12	256	5464	6
464-18-1	T4S,R64W-NWSE 18	5705	240	36	12′ @ 36, 14′ @ 78, 11′ @ 125 (uncorrelated)											
464-24-1	T4S,R64W-SWNW 24	5775	240	67	67	5708	9	152	5623	18	228	5547	10	—	—	—
464-24-2	T4S,R64W-SENE 24	5845	260	142	142	5703	11	197	5648	17	—	—	—	—	—	—
464-26-1	T4S,R64W-SESE 26	5800	400	60	60	5740	28	167	5632	16	302	5498	21	—	—	—
464-26-2	T4S,R64W-SWSW 26	5785	400	69	69	5716	25	200	5585	15	262	5523	9	331	5454	10
464-26-3	T4S,R64W-SWSW 26	5754	400	30	30	5715	27	118	5627	15	162	5583	12	267	5478	11
464-26-4	T4S,R64W-NWNE 26	5830	400	101	101	5729	25	211	5619	18	266	5564	11	—	—	—
563-4-1	T5S,R63W-NWNW 4	5745	220	91	—		—	—	—	—	220	5525	?	—	—	—
563-4-2	T5S,R63W-NENE 4	5660	200	—		no coal										
563-6-1	T5S,R63W-SWSW 6	5860	400	149	149	5711	23	257	5603	12	335	5525	25	—	—	—
563-6-2	T5S,R63W-NENE 6	5840	200	67	67	5773	?	—	—	—	—	—	—	—	—	—
563-6-3	T5S,R63W-NWNW 6	5890	300	190	190	5700	25	297	5593	12	—	—	—	—	—	—
563-8-1	T5S,R6 W-SWNE 8	5760	200	77	—	—	—	77	5683	12	135	5625	17	—	—	—
563-8-2	T5S,R63W-SWSW 8	5830	300	95	95	5735	22	—	—	—	—	—	—	—	—	—
563-17-1	T5S,R63W-SWNE 17	5830	320	114	114	5716	15	181	5649	11	257	5573	24	—	—	—
563-17-2	T5S,R63W-NENE 17	5765	300	71	13′ @ 71, 15′ @ 123											
563-20-1	T5S,R63W-SWSW 20	5860	283	283	—	—	—	—	—	—	283	5577	17	—	—	—
564-4-1	T5S,R64W-SESE 4	5770	400	86	86	684	18	161	5609	8	201	5569	12	246	5524	5
W 66	T4S,R63W-NENE 2	5565	600													
W 72	T4S,R63W-CSW 23	5645	548	98	3′ @ 98, 2′ @ 127, 2′ @ 160, 6′ @ 172, 4′ @ 195											
W 75	T4S,R64W-NENW 17	5615	815	41	—	—	—	41	5574	15	177	5438	11	207	5408	5
W 76	T4S,R64W-NENE 36	5870	1954	159	—	—	—	159	5711	13	284	5586	13	373	5497	25
W 81	T4S,R67W-SESW 13	5640	1310	370	6′ @ 370, 4′ @ 393 (uncorrelated)											
W 82	T4S,R67W-SWSE 25	5635	1599	300	2′ @ 300, 2′?′451, 8′? @ 462											
W 85	T4S,R67W-SENE 36	5667	1614	506	5′ @ 506, 4′ @ 519											
W 89	T5S,R63W-NENE 9	5663	294	19	—	—	—	—	—	—	19	5646	11	—	—	—
W 90	T5S,R64W-SENW 20	6080	2202	415	—	—	—	415	5551	5	—	—	—	—	—	—
W 97	T5S,R67W-NENE 17	5650	1435	391	2′ @ 391, 1.5′ @ 419 (uncorrelated)											
W 100	T5S,R67W-SWSE 35	5805	2485	1730	sandy shale with coal layers											
W 103	T6S,R66W-SWSW 8	5850	1750	763	4′ @ 763 (?) (uncorrelated)											
W 104	T6S,R66W-SENE 24	6040	1867	814	—	—	—	—	—	—	814	5226	7	860	5180	3
W 105	T6S,R66W-NWSE 26	6080	1874	700	2′ (?) @ 778, 2′ (?) @ 916, 8′ (?) @ 976, 8′ @ 1087 (uncorrelated)											
W 300	T5S,R66W-SE 24	6090	2380	807	11′ @ 807, 6′ @ 865, 3′ @ 899, 6′ @ 903											
0061	T6S,R67W-NESW 7	5900	1640		—	—	—	—	—	—	—	—	—	—	—	—
2409F	T5S,R63W-NWSE 29	5910	1804	68	5′ @ 68, 11′ @ 85, 6′ @ 112, 8′ @ 130 (uncorrelated)											
3637F	T6S,R68W-SWNE 24	6140	1024	93	1′ @ 80, 7 @ 158 (uncorrelated)											
7723F	T3S,R67W-NENE 1	5265	900													
8285	T3S,R67W-NENE 7	5155	705	120	1′ @ 120 (uncorrelated)											
10186F	T4S,R66W-NESE 6	5430	1298	80	16′ between 80 & 326, 2′ @ 540 (uncorrelated)											
13361	T4S,R66W-SWNW 7	5460	1101	43	24′ between 43 & 337 (uncorrelated)											
14260F	T5S,R66W-NENE 32	5690	1245	90	12′ between 90 & 851 (4′ @ 560, 5′ @ 840) (uncorrelated)											
18830F	T5S,R66W-SESE 35	6125	946		1′ @ 932 (uncorrelated)											
19031F	T4S,R66W-SWNE 19	5610	1200	190	2′ @ 190, 6′ @ 52, 4′ @ 645 (uncorrelated)											
20767	T6S,R66W-SWNE 10	5875	426	183	2′ @ 183 (uncorrelated)											
27182	T5S,R64W-SWNW 1	5960	225	197	197	5763	27	—	—	—	—	—	—	—	—	—
34964	T4S,R66W-SWSW 18	5580	1130	431	9′ @ 431 (uncorrelated)											
36808	T5S,R66W-NESE 20	5790	1208	421	9′ @ 421 (uncorrelated)											
38870	T3S,R63W-NWNW 25	5400	524	47	7′ @ 47(uncorrelated)											
47315	T3S,R63W-NESE 36	5435	325	120	5′ @ 120 (uncorrelated)											
49198	T6S,R66W-NWNE 25	6070	315	109	2′ @ 109, 2′ @ 118 (uncorrelated)											
50376	T4S,R66W-NWNW 15	5545	630	35	10′ @ 35′ (uncorrelated)											
51506	T4S,R65W-NWNW 14	5704	667	84	84	5620	5	166	5538	14	228	5476	3	316	5388	7
52006	T4S,R64W-NWNE 26	5815	547		3′ @ 69, 8′ @ 92, 21 @ 113, 1 @ 155, 15′ @ 211, 17′ @ 273, 5′ @ 336 4 @ 366, 3@ 417 (uncorrelated)											
73605	T4S,R64W-SESW 20	5760	575	35	35	5725	10	185	5575	26	—	—	—	—	—	—
903-0051	T3S,R66W-NWSW 9	5306	1200		no coal											
903-0055	T3S,R66W-SWSW 28	5405	1199	83	1.0′ @ 83, 4.0′ @ 127, 7.0′ @ 166 (uncorrelated)											
903-0071	T3S,R65W-NESE 32	5592	1040		—	—	—	—	—	—	—	—	—	—	—	—
904-0016½	T4S,R65W-NESW 31	5735	902	200	—	—	—	200	5535	6	387	5348	18	400	5335	10
904-0025	T4S,R66W-NWNW 4	5460	561	122	2.0′ @ 121.5, 1′ @ 125, 3′ @ 128, 1′ @ 176, 2′ @ 238, 6′ @ 256, 1′ @ 302, 4′ @ 337, 7′ @ 353 (uncorrelated)											
904-0031	T4S,R66W-SWSW 8	5430	1400	238	5′ @ 238, 7′ @ 248, 4′ @ 324, 2′ @ 472 (uncorrelated)											
905-0048	T3S,R66W-SESW 9	5308	1700	577	1′ ? @ 577, 4′ @ 630, 3′ ? @ 876, 1′ ? @ 902 (uncorrelated)											
905-0053	T6S,R66W-NESE 15	5995	320	264	4′ @ 264 (uncorrelated)											
A 11	T3S,R65W-NWNW 17	5414	120	96	9.5′ @ 96 (uncorrelated)											
A 23	T3S,R64W-SWSW 32	5540	120	79	20.3′ @ 79 (uncorrelated)											
A 25	T3S,R64W-SESE 28	5587	200	43	11.2′ @ 43, 21′ @ 159, 4@ 183 (uncorrelated)											
A 28	T3S,R64W-NWNW 30	5478	200	75	—	—	—	—	—	—	75	5395	6	—	—	—
A 31	T3S,R64W-NWNW 20	5430	80	47	8′ @ 47 (uncorrelated)											
A 32	T3S,R64W-NWSW 20	5456	100	57	15.7′ @ 57 (uncorrelated)											
A 33	T3S,R64W-SWSW 20	5507	140	63	7.1′ @ 63, 37′ @ 75 (uncorrelated)											
A 35	T3S,R65W-SWNE 9	5476	120	70	37′ @ 70 (uncorrelated)											
A 38	T3S,R65W-NESE 22	5486	80	30	—	—	—	30	5456	13	66	5421	2.5	—	—	—
A 41	T3S,R65W-NWSE 22	5525	120	75	—	—	—	75	5451	28	—	—	—	—	—	—
A 43	T2S,R66W-SENE 36	5327	200	146	9′ @ 146, 2′ @ 166											
A 44	T2S,R66W-SESE 36	5345	500	144	7′ @ 144, 6′ @ 171 (other very thin coals, uncorrelated)											
A 101	T3S,R65W-NWNE 26	5648	250	190	21.1′ @ 190, 4.9′ @ 213, 5.3′ @ 239, 1.9 @ 242 (uncorrelated)											
A 102	T3S,R65W-SESE 21	5576	300	31	—	—	—	—	—	—	31	5426	6.5	—	—	—
A 110	T3S,R65W-SENW 20	5574	200	153	—	—	—	153	5421	22	—	—	—	—	—	—
A 114	T3S,R65W-SENE 20	5579	300	136	—	—	—	136	5442	25	—	—	—	—	—	—
A 116	T3S,R65W-NENW 21	5541	200	40	2′ @ 40, 30′ @ 131, 3′ @ 176 (uncorrelated)											
A 117	T3S,R62W-C 21	5599	220	155	—	—	—	155	5444	33.5	—	—	—	—	—	—
A 122	T3S,R64W-NESW 26	5601	260	196	27.5′ @ 196 (uncorrelated)											
A 128	T3S,R64W-NWNW 21	5534	150	57	—	—	—	—	—	—	57	5476	42	—	—	—
A 129	T3S,R64W-SWSE 20	5489	100	42	—	—	—	—	—	—	42	5448	30.5	—	—	—
A 131	T3S,R65W-NWNE 36	5491	180	90	—	—	—	—	—	—	90	5402	5	131	5360	6
A 132	T3S,R65W-NWSW 36	5513	—	33	—	—	—	33	5480	7	—	—	—	143	5370	6
ADB 5	T5S,R65W-NWNE 34	6080	500	465	465	5615	8	—	—	—	—	—	—	—	—	—
ADB 7	T5S,R65W-NESW 27	6000	550	384	384	5616	7	432	5568	7	—	—	—	—	—	—
ADB 8	T5S,R65W-SWSW 23	5965	600	351	351	5614	4	462	5503	6	553	5412	15	574	5391	7
ADB 9	T5S,R65W-NENW 15	5880	1020	326	—	—	—	326	5554	9	418	5462	8	471	5409	7
ADB 10	T5S,R64W-SENW 7	5950	6209	386	—	—	—	386	5564	11	458	5492	8	—	—	—
ADB 12	T5S,R65W-NESW 36	5945	600	324	324	5621	12	411	5534	7	—	—	—	—	—	—
ADB 13	T5S,R64W-SESE 33	5995	600	321	321	5674	15	386	5609	13	—	—	—	—	—	—
06	T5S,R63W-NWNW 7	5878	8288	154	154	5724	22	259	5619	9	336	5542	22	377	5501	13
0501	T6S,R64W-SWSW 2	5962	8310	332	332	5630	20	424	5538	8	464	5498	5	586	5376	27
SC 1	T3S,R66W-SESE 36	5510	200	68	—	—	—	68	5442	11	—	—	—	—	—	—
SC 5	T4S,R65W-NWNW 16	5630	180	88	—	—	—	88	5542	11	—	—	—	—	—	—
F 16	T3S,R64W-NENE 31	5560	160	16	—	—	—	16	5544	9	120	5440	36	—	—	—

Sources of Data

CGS	Colorado Geological Survey
DX	Public Service Company of Colorado
T.-R.-Sec.# A F	CGS Open File Report 78-8
W	
Permit # (0061, etc.)	Colorado Department of Water Resources
0	Colorado Oil and Gas Conservation Commission
902-0028, etc.	John Romero, Colorado Department of Water Resources
ADB SC	Colorado Board of Land Commissioners

DEPARTMENT OF NATURAL RESOURCES
COLORADO GEOLOGICAL SURVEY
JOHN W. ROLD, DIRECTOR

COAL RESOURCES OF THE DENVER EAST ½° x 1° QUADRANGLE, COLORADO

by Karl E. Brand and Wynn Eakins

1980

TABLE III Coal Resource Estimates

Formation/ Coal bed	Resource category	0-250' overburden*: In beds 2.5-5' thick	0-250': In beds 5-10' thick	0-250': In beds more than 10' thick	0-250': Total of all thickness categories	250'-500' overburden*: In beds 2.5-5' thick	250'-500': In beds 5-10' thick	250'-500': In beds more than 10' thick	250'-500': Total of all thickness categories	500'-1000' overburden: In beds 2.5-5' thick	500'-1000': In beds 5-10' thick	500'-1000': In beds more than 10' thick	500'-1000': Total of all thickness categories	1000'-2000' overburden: In beds 2.5-5' thick	1000'-2000': In beds 5-10' thick	1000'-2000': In beds more than 10' thick	1000'-2000': Total of all thickness categories	More than 2000' overburden: In beds 2.5-5' thick	More than 2000': In beds 5-10' thick	More than 2000': In beds more than 10' thick	More than 2000': Total of all thickness categories	Total of all overburden categories: In beds 2.5-5' thick	Total: In beds 5-10' thick	Total: In beds more than 10' thick	Total: Total of all thickness categories
ADAMS COUNTY																									
T1S R60W																									
LARAMIE FORMATION																									
"B" BED	M		0.8		0.8																		0.8		0.8
	IND		5.9		5.9																		5.9		5.9
	INF		7.7		7.7																		7.7		7.7
	HYP																								
	T		14.4		14.4																		14.4		14.4
UPPER "A" BED	M	0.1			0.1																	0.1			0.1
	IND	2.4			2.4																	2.4			2.4
	INF	27.3	7.8		35.1																	27.3	7.8		35.1
	HYP																								
	T	29.8	7.8		37.6																	29.8	7.8		37.6
LARAMIE FM TOTAL	M	0.1	0.8		0.9																	0.1	0.8		0.9
	IND	2.4	5.9		8.3																	2.4	5.9		8.3
	INF	27.3	15.5		42.8																	27.3	15.5		42.8
	HYP																								
	T	29.8	22.2		52.0																	29.8	22.2		52.0
T1S R61W																									
LARAMIE FORMATION																									
"B" BED	M	2.3	3.4		5.7																	2.3	3.4		5.7
	IND	10.8	17.8	1.5	30.1																	10.8	17.8	1.5	30.1
	INF		34.0		34.0	2.5	28.6		31.1													2.5	62.6		65.1
	HYP																								
	T	13.1	55.2	1.5	69.8	2.5	28.6		31.1													15.6	83.8	1.5	100.9
UPPER "A" BED	M	0.4			0.4																	0.4			0.4
	IND	2.7			2.7	0.4			0.4													3.1			3.1
	INF	7.8			7.8	9.4			9.4	0.3			0.3									17.5			17.5
	HYP																								
	T	10.9			10.9	9.8			9.8	0.3			0.3									21.0			21.0
UNCORRELATED BEDS	M																								
	IND																								
	INF																								
	HYP					7.6	15.6		23.2													7.6	15.6		23.2
	T					7.6	15.6		23.2													7.6	15.6		23.2
LARAMIE FM TOTAL	M	2.7	3.4		6.1																	2.7	3.4		6.1
	IND	13.5	17.8	1.5	32.8	0.4			0.4													13.9	17.8	1.5	33.2
	INF	7.8	34.0		41.8	11.9	28.6		40.5	0.3			0.3									20.0	62.6		82.6
	HYP					7.6	15.6		23.2													7.6	15.6		23.2
	T	24.0	55.2	1.5	80.7	19.9	44.2		64.1	0.3			0.3									44.2	99.4	1.5	145.1
T1S R62W																									
LARAMIE FORMATION																									
"B" BED	M																								
	IND																								
	INF					6.8			6.8													6.8			6.8
	HYP																								
	T					6.8			6.8													6.8			6.8
UPPER "A" BED	M																								
	IND																								
	INF					6.9			6.9	25.0			25.0									31.9			31.9
	HYP																								
	T					6.9			6.9	25.0			25.0									31.9			31.9
UNCORRELATED BEDS	M																								
	IND																								
	INF																								
	HYP					4.5	6.3		10.8	35.0	22.4		57.4									39.5	28.7		68.2
	T					4.5	6.3		10.8	35.0	22.4		57.4									39.5	28.7		68.2
LARAMIE FM TOTAL	M																								
	IND																								
	INF					13.7			13.7	25.0			25.0									38.7			38.7
	HYP					4.5	6.3		10.8	35.0	22.4		57.4									39.5	28.7		68.2
	T					18.2	6.3		24.5	60.0	22.4		82.4									78.2	28.7		106.9
T1S R63W																									
LARAMIE FORMATION																									
UNCORRELATED BEDS	M																								
	IND																								
	INF									4.8			4.8									4.8			4.8
	HYP									140.5	102.4		242.9									140.5	102.4		242.9
	T									145.3	102.4		247.7									145.3	102.4		247.7
T1S R64W																									
LARAMIE FORMATION																									
UNCORRELATED BEDS	M									0.9	2.6		3.5	1.7	2.2		3.9					2.6	4.8		7.4
	IND									4.6	16.3		20.9	12.3	20.1		32.4					16.9	36.4		53.3
	INF									47.7	144.0		191.7	23.1	43.7		66.8					70.8	187.7		258.5
	HYP									24.7	158.2		182.9									24.7	158.2		182.9
	T									77.9	321.1		399.0	37.1	66.0		103.1					115.0	387.1		502.1
T1S R65W																									
LARAMIE FORMATION																									
UNCORRELATED BEDS	M									2.4			2.4									2.4			2.4
	IND									12.6			12.6									12.6			12.6
	INF									60.3	23.9		84.2	169.1	47.4		216.5					229.4	71.3		300.7
	HYP									9.1	20.3		29.4	47.1	12.8		59.9					56.2	33.1		89.3
	T									84.4	44.2		128.6	216.2	60.2		276.4					300.6	104.4		405.0
T1S R66W																									
LARAMIE FORMATION																									
UNCORRELATED BEDS	M										4.6		4.6	0.7			0.7					0.7	4.6		5.3
	IND										37.4		37.4	2.8			2.8					2.8	37.4		40.2
	INF										22.9		22.9	6.7			6.7					6.7	22.9		29.6
	HYP																								
	T										64.9		64.9	10.2			10.2					10.2	64.9		75.1
T1S R67W																									
LARAMIE FORMATION																									
UNCORRELATED BEDS	M									3.5	1.3		4.8									3.5	1.3		4.8
	IND									25.7	10.4		36.1									25.7	10.4		36.1
	INF									164.0	119.7		283.7	9.2	6.9		16.1					173.2	126.6		299.8
	HYP									0.9	0.8		1.7									0.9	0.8		1.7
	T									194.1	132.2		326.3	9.2	6.9		16.1					203.3	139.1		342.4
T1S R68W																									
LARAMIE FORMATION																									
UNCORRELATED BEDS	M									1.3			1.3									1.3			1.3
	IND									10.7			10.7									10.7			10.7
	INF									52.7	3.7		56.4									52.7	3.7		56.4
	HYP																								
	T									64.7	3.7		68.4									64.7	3.7		68.4
T2S R60W																									
LARAMIE FORMATION																									
"B" BED	M	0.3	0.9		1.2																	0.3	0.9		1.2
	IND	4.3	4.1		8.4																	4.3	4.1		8.4
	INF	16.4	22.9		39.3																	16.4	22.9		39.3
	HYP																								
	T	21.0	27.9		48.9																	21.0	27.9		48.9
UPPER "A" BED	M		2.7	1.4	4.1																		2.7	1.4	4.1
	IND	1.0	18.2	8.3	27.5																	1.0	18.2	8.3	27.5
	INF	15.8	138.6	9.9	164.3																	15.8	138.6	9.9	164.3
	HYP	1.4	7.2	0.8	9.4																	1.4	7.2	0.8	9.4
	T	18.2	166.7	20.4	205.3																	18.2	166.7	20.4	205.3
LARAMIE FM TOTAL	M	0.3	3.6	1.4	5.3																	0.3	3.6	1.4	5.3
	IND	5.3	22.3	8.3	35.9																	5.3	22.3	8.3	35.9
	INF	32.2	161.5	9.9	203.6																	32.2	161.5	9.9	203.6
	HYP	1.4	7.2	0.8	9.4																	1.4	7.2	0.8	9.4
	T	39.2	194.6	20.4	254.2																	39.2	194.6	20.4	254.2
T2S R61W																									
LARAMIE FORMATION																									
"B" BED	M	0.4	1.8		2.2		0.8		0.8													0.4	2.6		3.0
	IND	3.1	14.2		17.3		6.8		6.8													3.1	21.0		24.1
	INF	13.3	70.9		84.2		135.7		135.7		27.1		27.1									13.3	233.7		247.0
	HYP																								
	T	16.8	86.9		103.7		143.3		143.3		27.1		27.1									16.8	257.3		274.1
UPPER "A" BED	M	0.5		1.7	2.2	0.1		0.8	0.9													0.6		2.5	3.1
	IND	2.4		3.5	6.3	2.7	6.6	8.0	17.3													5.1	6.6	11.5	23.2
	INF	8.6	23.1		31.7	26.7	72.5	8.7	107.9	10.8	48.8		59.6									46.1	144.4	8.7	199.2
	HYP																								
	T	11.5	23.1	5.2	40.2	29.5	79.1	17.5	126.1	10.8	48.8		59.6									51.8	151.0	22.7	225.5
UNCORRELATED BEDS	M																								
	IND																								
	INF																								
	HYP					6.6	11.1		17.7													6.6	11.1		17.7
	T					6.6	11.1		17.7													6.6	11.1		17.7
LARAMIE FM TOTAL	M	0.9	1.8	1.7	4.4	0.1	0.8	0.8	1.7													1.0	2.6	2.5	6.1
	IND	5.5	14.2	3.5	23.2	2.7	13.4	8.0	24.1													8.2	27.6	11.5	47.3
	INF	21.9	94.0		115.9	26.7	208.2	8.7	243.6	10.8	75.9		86.7									59.4	378.1	8.7	446.2
	HYP					6.6	11.1		17.7													6.6	11.1		17.7
	T	28.3	110.0	5.2	143.5	36.1	233.5	17.5	287.1	10.8	75.9		86.7									75.2	419.4	22.7	517.3
T2S R62W																									
LARAMIE FORMATION																									
"B" BED	M									0.8	0.3		1.1									0.8	0.3		1.1
	IND									4.4	3.7		8.1									4.4	3.7		8.1
	INF					9.1		0.7	9.8	59.5	22.1		81.6									68.6	22.1	0.7	91.4
	HYP																								
	T					9.1		0.7	9.8	64.7	26.1		90.8									73.8	26.1	0.7	100.6
UPPER "A" BED	M										1.5		1.5										1.5		1.5
	IND										11.7		11.7										11.7		11.7
	INF									2.8	139.5		142.3									2.8	139.5		142.3
	HYP																								
	T									2.8	152.7		155.5									2.8	152.7		155.5
UNCORRELATED BEDS	M									2.2			2.2									2.2			2.2
	IND									11.7			11.7									11.7			11.7
	INF									91.0	5.4		96.4									91.0	5.4		96.4
	HYP					2.7	3.7		6.4	53.0	20.2		73.2									55.7	23.9		79.6
	T					2.7	3.7		6.4	157.9	25.6		183.5									160.6	29.3		189.9
LARAMIE FM TOTAL	M									3.0	1.8		4.8									3.0	1.8		4.8
	IND									16.1	15.4		31.5									16.1	15.4		31.5
	INF					9.1		0.7	9.8	153.3	167.0		320.3									162.4	167.0	0.7	330.1
	HYP					2.7	3.7		6.4	53.0	20.2		73.2									55.7	23.9		79.6
	T					11.8	3.7	0.7	16.2	225.4	204.4		429.8									237.2	208.1	0.7	446.0
T2S R63W																									
LARAMIE FORMATION																									
UNCORRELATED BEDS	M									1.1	1.5		2.6									1.1	1.5		2.6
	IND									7.6	10.7		18.3									7.6	10.7		18.3
	INF									64.4	72.1		136.5	11.0	14.1		25.1					75.4	86.2		161.6
	HYP									129.5	80.5		210.0	50.0	30.2		80.2					179.5	110.7		290.2
	T									202.6	164.8		367.4	61.0	44.3		105.3					263.6	209.1		472.7
T2S R64W																									
DENVER FORMATION																									
LOWRY BED	M																								
	IND																								
	INF	3.1			3.1																	3.1			3.1
	HYP																								
	T	3.1			3.1																	3.1			3.1
LARAMIE FORMATION																									
UNCORRELATED BEDS	M													4.1			4.1					4.1			4.1
	IND													35.7			35.7					35.7			35.7
	INF									6.2			6.2	296.6	64.7		361.3					302.8	64.7		367.5
	HYP													37.7	11.7		49.4					37.7	11.7		49.4
	T									6.2			6.2	374.1	76.4		450.5					380.3	76.4		456.7
T2S R65W																									
DENVER FORMATION																									
LOWRY BED	M	1.1			1.1																	1.1			1.1
	IND	9.9			9.9																	9.9			9.9
	INF	42.3			42.3																	42.3			42.3
	HYP																								
	T	53.3			53.3																	53.3			53.3
UNCORRELATED BEDS	M		3.5		3.5																		3.5		3.5
	IND		26.7		26.7																		26.7		26.7
	INF		20.4		20.4																		20.4		20.4
	HYP																								
	T		50.6		50.6																		50.6		50.6
DENVER FM TOTAL	M	1.1	3.5		4.6																	1.1	3.5		4.6
	IND	9.9	26.7		36.6																	9.9	26.7		36.6
	INF	42.3	20.4		62.7																	42.3	20.4		62.7
	HYP																								
	T	53.3	50.6		103.9																	53.3	50.6		103.9
LARAMIE FORMATION																									
UNCORRELATED BEDS	M													8.3	2.6		10.9					8.3	2.6		10.9
	IND													69.6	17.2		86.8					69.6	17.2		86.8
	INF													246.6	49.1		295.7					246.6	49.1		295.7
	HYP																								
	T													324.5	68.9		393.4					324.5	68.9		393.4
T2S R66W																									
DENVER FORMATION																									
LOWER WATKINS BED	M	0.6			0.6																	0.6			0.6
	IND	4.5			4.5																	4.5			4.5
	INF	5.5			5.5																	5.5			5.5
	HYP																								
	T	10.6			10.6																	10.6			10.6
LARAMIE FORMATION																									
UNCORRELATED BEDS	M													1.6	0.3		1.9					1.6	0.3		1.9
	IND													12.9	2.9		15.8					12.9	2.9		15.8
	INF													202.8	51.8		254.6					202.8	51.8		254.6
	HYP													19.8	10.2		30.0					19.8	10.2		30.0
	T													237.1	65.2		302.3					237.1	65.2		302.3
T2S R67W																									
LARAMIE FORMATION																									
UNCORRELATED BEDS	M									0.7	4.4		5.1	1.7	1.3		3.0					2.4	5.7		8.1
	IND									9.1	25.0		34.1	14.2	20.3		34.5					23.3	45.3		68.6
	INF									31.8	129.1		160.9	71.9	178.9		250.8					103.7	308.0		411.7
	HYP													7.9	11.6		19.5					7.9	11.6		19.5
	T									41.6	158.5		200.1	95.7	212.1		307.8					137.3	370.6		507.9
T2S R68W																									
LARAMIE FORMATION																									
UNCORRELATED BEDS	M																								
	IND																								
	INF									51.7	20.4		72.1									51.7	20.4		72.1
	HYP									134.2	24.4		158.6									134.2	24.4		158.6
	T									185.9	44.8		230.7									185.9	44.8		230.7
T3S R59W																									
LARAMIE FORMATION																									
"B" BED	M	0.5	1.1		1.6																	0.5	1.1		1.6
	IND	3.3	5.0		8.3																	3.3	5.0		8.3
	INF	5.9	0.9		6.8																	5.9	0.9		6.8
	HYP																								
	T	9.7	7.0		16.7																	9.7	7.0		16.7
UPPER "A" BED	M																								
	IND	4.1			4.1																	4.1			4.1
	INF																								
	HYP																								
	T	4.1			4.1																	4.1			4.1
LARAMIE FM TOTAL	M	0.5	1.1		1.6																	0.5	1.1		1.6
	IND	7.4	5.0		12.4																	7.4	5.0		12.4
	INF	5.9	0.9		6.8																	5.9	0.9		6.8
	HYP																								
	T	13.8	7.0		20.8																	13.8	7.0		20.8
T3S R60W																									
LARAMIE FORMATION																									
"B" BED	M	0.3	10.3		10.6																	0.3	10.3		10.6
	IND	2.0	59.9		61.9		1.3		1.3													2.0	61.2		63.2
	INF	19.1	136.1		155.2		11.8		11.8													19.1	147.9		167.0
	HYP		6.3		6.3		0.1		0.1														6.4		6.4
	T	21.4	212.6		234.0		13.2		13.2													21.4	225.8		247.2
UPPER "A" BED	M	1.6	2.2		3.8																	1.6	2.2		3.8
	IND	12.8	14.7		27.5																	12.8	14.7		27.5
	INF	46.0	53.4		99.4	15.7	0.5		16.2													61.7	53.9		115.6
	HYP	0.1	3.3		3.4	0.6	6.0		6.6													0.7	9.3		10.0
	T	60.5	73.6		134.1	16.3	6.5		22.8													76.8	80.1		156.9
LARAMIE FM TOTAL	M	1.9	12.5		14.4																	1.9	12.5		14.4
	IND	14.8	74.6		89.4		1.3		1.3													14.8	75.9		90.7
	INF	65.1	189.5		254.6	15.7	12.3		28.0													80.8	201.8		282.6
	HYP	0.1	9.6		9.7	0.6	6.1		6.7													0.7	15.7		16.4
	T	81.9	286.2		368.1	16.3	19.7		36.0													98.2	305.9		404.1
T3S R61W																									
LARAMIE FORMATION																									
"B" BED	M					0.5	1.8		2.3													0.5	1.8		2.3
	IND					1.4	12.2		13.6													1.4	12.2		13.6
	INF	6.4	0.1		6.5	14.8	142.1		156.9		0.1		0.1									21.2	142.3		163.5
	HYP		0.6		0.6	11.3	66.1		77.4													11.3	66.7		78.0
	T	6.4	0.7		7.1	28.0	222.2		250.2		0.1		0.1									34.4	223.0		257.4
UPPER "A" BED	M							1.3	1.3			2.5	2.5											3.8	3.8
	IND						4.6	5.3	9.9		1.5	10.3	11.8										6.1	15.6	21.7
	INF						108.9	22.1	131.0		63.7	4.7	68.4										172.6	26.8	199.4
	HYP						76.8		76.8		38.4		38.4										115.2		115.2
	T						190.3	28.7	219.0		103.6	17.5	121.1										293.9	46.2	340.1
LARAMIE FM TOTAL	M					0.5	1.8	1.3	3.6			2.5	2.5									0.5	1.8	3.8	6.1
	IND					1.4	16.8	5.3	23.5		1.5	10.3	11.8									1.4	18.3	15.6	35.3
	INF	6.4	0.1		6.5	14.8	251.0	22.1	287.9		63.8	4.7	68.5									21.2	314.9	26.8	362.9
	HYP		0.6		0.6	11.3	142.9		154.2		38.4		38.4									11.3	181.9		193.2
	T	6.4	0.7		7.1	28.0	412.5	28.7	469.2		103.7	17.5	121.2									34.4	516.9	46.2	597.5
T3S R62W																									
DENVER FORMATION																									
LOWRY BED	M	0.1			0.1																	0.1			0.1
	IND	3.0			3.0																	3.0			3.0
	INF	28.4	31.3		59.7																	28.4	31.3		59.7
	HYP																								
	T	31.5	31.3		62.8																	31.5	31.3		62.8
LARAMIE FORMATION																									
"B" BED	M																								
	IND					2.3			2.3													2.3			2.3
	INF					26.1	1.1		27.2	25.7	0.3		26.0									51.8	1.4		53.2
	HYP					5.2			5.2													5.2			5.2
	T					33.6	1.1		34.7	25.7	0.3		26.0									59.3	1.4		60.7
UPPER "A" BED	M																								
	IND										0.7	4.4	5.1										0.7	4.4	5.1
	INF										96.1	21.3	117.4										96.1	21.3	117.4
	HYP										16.6		16.6										16.6		16.6
	T										113.4	25.7	139.1										113.4	25.7	139.1
UNCORRELATED BEDS	M										5.5		5.5	0.8	3.3		4.1					0.8	8.8		9.6
	IND										28.2		28.2	5.4	20.5		25.9					5.4	48.7		54.1
	INF									31.2	151.8		183.0	14.8	85.7		100.5					46.0	237.5		283.5
	HYP																								
	T									31.2	185.5		216.7	21.0	109.5		130.5					52.2	295.0		347.2
LARAMIE FM TOTAL	M										5.5		5.5	0.8	3.3		4.1					0.8	8.8		9.6
	IND					2.3			2.3		28.9	4.4	33.3	5.4	20.5		25.9					7.7	49.4		57.1
	INF					26.1	1.1		27.2	56.9	248.2	21.3	326.4	14.8	85.7		100.5					97.8	335.0	4.4	437.2
	HYP					5.2			5.2		16.6		16.6									5.2	16.6	21.3	43.1
	T					33.6	1.1		34.7	56.9	299.2	25.7	381.8	21.0	109.5		130.5					111.5	409.8	25.7	547.0
T3S R63W																									
DENVER FORMATION																									
LOWRY BED	M	1.8	1.5		3.3																	1.8	1.5		3.3
	IND	3.8	12.4		16.2																	3.8	12.2		16.2
	INF	1.2	35.3		36.5																	1.2	35.3		36.5
	HYP																								
	T	6.8	49.2		56.0																	6.8	49.2		56.0
UPPER WATKINS BED	M	0.1			0.1																	0.1			0.1
	IND	1.5			1.5																	1.5			1.5
	INF	0.1			0.1																	0.1			0.1
	HYP																								
	T	1.7			1.7																	1.7			1.7
DENVER FM TOTAL	M	1.9	1.5		3.4																	1.9	1.5		3.4
	IND	5.3	12.4		17.7																	5.3	12.4		17.7
	INF	1.3	35.3		36.6																	1.3	35.3		36.6
	HYP																								
	T	8.5	49.2		57.7																	8.5	49.2		57.7
LARAMIE FORMATION																									
UNCORRELATED BEDS	M																								
	IND									1.2	1.7		2.9									1.2	1.7		2.9
	INF									6.0	8.4		14.4	66.5	100.9		167.4					72.5	109.3		181.8
	HYP													8.8	10.4		19.2					8.8	10.4		19.2
	T									7.2	10.1		17.3	75.3	111.3		186.6					82.5	121.4		203.9
T3S R64W																									
DENVER FORMATION																									
BENNETT BED	M		2.6		2.6																		2.6		2.6
	IND	0.6	2.7	0.1	3.4																	0.6	2.7	0.1	3.4
	INF																								
	HYP																								
	T	0.6	5.3	0.1	6.0																	0.6	5.3	0.1	6.0
UPPER WATKINS BED	M	0.2	2.1	184.9	187.2																	0.2	2.1	184.9	187.2
	IND	0.3	5.3	259.5	265.1																	0.3	5.3	259.5	265.1
	INF		6.5	11.2	17.7																		6.5	11.2	17.7
	HYP																								
	T	0.5	13.9	455.6	470.0																	0.5	13.9	455.6	470.0
LOWER WATKINS BED	M	0.5			0.5																	0.5			0.5
	IND	1.2	0.4		1.6																	1.2	0.4		1.6
	INF																								
	HYP																								
	T	1.7	0.4		2.1																	1.7	0.4		2.1
DENVER FM TOTAL	M	0.7	4.7	184.9	190.3																	0.7	4.7	184.9	190.3
	IND	1.2	8.4	259.6	270.1																	2.1	8.4	259.6	270.1
	INF		6.5	11.2	17.7																		6.5	11.2	17.7
	HYP																								
	T	2.8	19.6	455.7	478.1																	2.8	19.6	455.7	478.1
LARAMIE FORMATION																									
UNCORRELATED BEDS	M													3.3	2.6		5.9					3.3	2.6		5.9
	IND													25.8	20.6		46.4					25.8	20.6		46.4
	INF													198.5	181.9		380.4					198.5	181.9		380.4
	HYP													35.8	23.1		58.9					35.8	23.1		58.9
	T													264.3	228.2		491.6					263.4	228.2		491.6
T3S R65W																									
DENVER FORMATION																									
BENNETT BED	M	2.2	11.8	150.9	164.9																	2.2	11.8	150.9	164.9
	IND	6.5	27.0	178.4	211.9																	6.5	27.0	178.4	211.9
	INF	0.5	0.4	2.9	3.8																	0.5	0.4	2.9	3.8
	HYP																								
	T	9.2	39.2	332.2	380.6																	9.2	39.2	332.2	380.6
UPPER WATKINS BED	M	3.3	7.8	2.3	13.4		1.6		1.6													3.3	9.4	2.3	15.0
	IND	12.7	43.2	4.3	60.2	1.1	7.8		8.9													13.8	51.0	4.3	69.1
	INF	10.7	64.0		74.7	11.9	65.5		77.4													22.6	129.5		152.1
	HYP						0.7		0.7														0.7		0.7
	T	26.7	115.0	6.6	148.3	13.0	75.6		88.6													39.7	190.6	6.6	236.9
LOWER WATKINS BED	M	1.2	7.1		8.3																	1.2	7.1		8.3
	IND	4.3	25.9		30.2		3.8		3.8													4.3	29.7		34.0
	INF	13.6	61.0		74.6		96.6		96.6													13.6	157.6		171.2
	HYP		0.4		0.4		9.7		9.7														10.1		10.1
	T	19.1	94.4		113.5		110.1		110.1													19.1	204.5		223.6
DENVER FM TOTAL	M	6.7	26.7	153.2	186.6		1.6		1.6													6.7	28.3	153.2	188.2
	IND	23.5	96.1	182.7	302.3	1.1	11.6		12.7													24.6	107.7	182.7	315.0
	INF	24.8	125.4	2.9	153.1	11.9	162.1		174.0													36.7	287.5	2.9	327.1
	HYP		0.4		0.4		10.4		10.4														10.8		10.8
	T	55.0	248.6	338.8	642.4	13.0	185.7		198.7													68.0	434.3	338.8	841.1
LARAMIE FORMATION																									
UNCORRELATED BEDS	M														1.3		1.3						1.3		1.3
	IND														10.7		10.7						10.7		10.7
	INF													37.8	93.9		131.7					37.8	93.9		137.1
	HYP													44.2	75.7		119.9					44.2	75.7		119.9
	T													82.0	181.6		263.6					82.0	181.6		263.6
T3S R66W																									
DENVER FORMATION																									
LOWRY BED	M	0.9	2.2	4.0	7.1																	0.9	2.2	4.0	7.1
	IND	6.4	13.7	16.5	36.6																	6.4	13.7	16.5	36.6
	INF	0.6	5.5		6.1																	0.6	5.5		6.1
	HYP	5.2			5.2																	5.2			5.2
	T	13.1	21.4	20.5	55.0																	13.1	21.4	20.5	55.0
BENNETT BED	M	0.1	0.9	4.6	5.6																	0.1	0.9	4.6	5.6
	IND	1.7	4.4	19.9	26.0																	1.7	4.4	19.9	26.0
	INF	1.4	4.1	10.7	16.2																	1.4	4.1	10.7	16.2
	HYP																								
	T	3.2	9.4	35.2	47.8																	3.2	9.4	35.2	47.8
UPPER WATKINS BED	M		1.9	1.5	3.4		0.2		0.2														2.1	1.5	3.6
	IND		4.5	12.3	16.8		3.5		3.5														8.0	12.3	20.3
	INF			2.4	2.4		2.9		2.9														2.9	2.4	5.3
	HYP																								
	T		6.4	16.2	22.6		6.6		6.6														13.0	16.2	29.2
LOWER WATKINS BED	M						0.6		0.6														0.6		0.6
	IND						3.8		3.8														3.8		3.8
	INF						1.4		1.4														1.4		1.4
	HYP																								
	T						5.8		5.8														5.8		5.8
UNCORRELATED BEDS	M	0.8	1.5		2.3	0.2	0.3		0.5													1.0	1.8		2.8
	IND	6.5	11.4		17.9	2.3	4.1		6.4													8.8	15.5		24.3
	INF	7.1	12.4		19.5	1.9	3.4		5.3													9.0	15.8		24.8
	HYP																								
	T	14.4	25.3		39.7	4.4	7.8		12.2													18.0	33.1		51.9
DENVER FM TOTAL	M	1.8	6.5	10.1	18.4	0.2	1.1		1.3													2.0	7.6	10.1	19.7
	IND	14.6	34.0	48.7	97.3	2.3	11.4		13.7													16.9	45.4	48.7	111.0
	INF	9.1	22.0	13.1	44.2	1.9	7.7		9.6													11.0	29.7	13.1	53.8
	HYP	5.2			5.2																	5.2			5.2
	T	30.7	62.5	71.9	165.1	4.4	20.2		24.6													35.1	82.7	71.9	189.7
LARAMIE FORMATION																									
UNCORRELATED BEDS	M													4.5	1.3		5.8					4.5	1.3		5.8
	IND													23.9	6.7		30.6					23.9	6.7		30.6
	INF													119.9	41.9		161.8					119.9	41.9		161.8
	HYP													11.3	20.5		31.8					11.3	20.5		31.8
	T													159.6	70.4		230.0					159.6	70.4		230.0
T3S R67W																									
LARAMIE FORMATION																									
UNCORRELATED BEDS	M									1.7			1.7									1.7			1.7
	IND									6.1			6.1	5.7			5.7					11.8			11.8
	INF									1.1			1.1	100.4	2.6		103.0					101.5	2.6		104.1
	HYP													64.6	10.9		75.5					64.6	10.9		75.5
	T									8.9			8.9	170.7	13.5		184.2					179.6	13.5		193.1
T3S R68W																									
LARAMIE FORMATION																									
UNCORRELATED BEDS	M																								
	IND																								
	INF									34.6			34.6	10.4			10.4					45.0			45.0
	HYP									25.9			25.9	0.4			0.4					26.3			26.3
	T									60.5			60.5	10.8			10.8					71.3			71.3
ADAMS COUNTY TOTALS																									
DENVER FORMATION	M	12.9	42.9	348.2	404.0	0.2	2.7		2.9													13.1	45.6	348.2	406.9
	IND	62.9	177.6	491.0	731.5	3.4	23.0		26.4													66.3	200.6	491.0	757.9
	INF	114.5	240.9	27.2	382.6	13.8	169.8		183.6													128.3	410.7	27.2	566.2
	HYP	100.6	0.4		101.0		10.4		10.4													100.6	10.8		111.4
	T	290.9	461.8	866.4	1619.1	17.4	205.9		223.3													308.3	667.7	866.4	1842.4
LARAMIE FORMATION	M	6.5	23.2	3.1	32.8	0.6	2.6	2.1	5.3	14.6	21.7	2.5	38.8	26.7	14.9		41.6					48.4	62.4	7.7	118.5
	IND	51.9	139.8	13.3	205.0	6.8	31.5	13.3	51.6	93.7	147.3	14.7	255.7	208.3	119.0		327.3					360.7	437.6	41.3	839.6
	INF	195.0	526.8	9.9	731.7	118.0	501.2	31.5	650.7	771.6	1099.1	26.0	1896.7	1585.3	963.5		2548.8					2669.9	3090.6	67.4	5827.9
	HYP	1.5	17.4	0.8	19.7	38.5	185.7		224.2	552.8	484.2		1037.0	327.6	217.1		544.7					920.4	904.4	0.8	1825.6
	T	254.9	707.2	27.1	989.2	163.9	721.0	46.9	931.8	1432.7	1752.3	43.2	3228.2	2147.9	1314.5		3462.4					3999.4	4495.0	117.2	8611.6
ADAMS COUNTY TOTAL	M	19.4	66.1	351.3	436.8	0.8	5.3	2.1	8.2	14.6	21.7	2.5	38.8	26.7	14.9		41.6					61.5	108.0	355.9	525.4
	IND	114.8	317.4	504.3	936.5	10.2	54.5	13.3	78.0	93.7	147.3	14.7	255.7	208.3	119.0		327.3					427.0	638.2	534.3	1597.5
	INF	309.5	767.7	37.1	1114.3	131.8	671.0	31.5	834.3	771.6	1099.1	26.0	1896.7	1585.3	963.5		2548.8					2798.2	3501.3	94.6	6394.1
	HYP	102.1	17.8	0.8	120.7	38.5	196.1		234.6	552.8	484.2		1037.0	327.6	217.1		544.7					1021.0	915.2	0.8	1937.0
	T	545.8	1169.0	893.5	2608.3	181.3	926.9	46.9	1155.1	1432.7	1752.3	43.2	3228.2	2147.9	1314.5		3462.4					4307.7	5162.7	983.6	10454.0
ARAPAHOE CO.																									
T4S R59W																									
LARAMIE FORMATION																									
"B" BED	M	0.6	1.6		2.2																	0.6	1.6		2.2
	IND	6.5	7.4		13.9																	6.5	7.4		13.9
	INF	21.7	3.6		25.3																	21.7	3.6		25.3
	HYP																								
	T	28.8	12.6		41.4																	28.8	12.6		41.4
UPPER "A" BED	M	0.3			0.3																	0.3			0.3
	IND	0.7			0.7																	0.7			0.7
	INF																								
	HYP																								
	T	1.0			1.0																	1.0			1.0
LARAMIE FM TOTAL	M	0.9	1.6		2.5																	0.9	1.6		2.5
	IND	7.2	7.4		14.6																	7.2	7.4		14.6
	INF	21.7	3.6		25.3																	21.7	3.6		25.3
	HYP																								
	T	29.8	12.6		42.4																	29.8	12.6		42.4
T4S R60W																									
LARAMIE FORMATION																									
"B" BED	M	0.6	4.8		5.4	1.0	2.4		3.4													1.6	7.2		8.8
	IND	2.6	30.1		32.7	7.9	15.8		23.7													10.5	45.9		56.4
	INF	18.2	71.4		89.6	20.8	41.4		62.2													39.0	112.8		151.8
	HYP																								
	T	21.4	106.3		127.8	29.7	59.6		89.3													51.1	165.9		217.0
UPPER "A" BED	M	1.7			1.7	0.8	1.2		2.0													2.5	1.2		3.7
	IND	10.6			10.6	6.8	9.1		15.9													17.4	9.1		26.5
	INF	13.3			13.3	19.1	32.2		51.3													32.4	32.2		64.6
	HYP																								
	T	25.6			25.6	26.7	42.5		69.2													52.3	42.5		94.8
LARAMIE FM TOTAL	M	2.3	4.8		7.1	1.8	3.6		5.4													4.1	8.4		12.5
	IND	13.2	30.1		43.3	14.7	24.9		39.6													27.9	55.0		82.9
	INF	31.5	71.4		102.9	39.9	73.6		113.5													71.4	145.0		216.4
	HYP																								
	T	47.0	106.3		153.3	56.4	102.1		158.5													103.4	208.4		311.8
T4S R61W																									
LARAMIE FORMATION																									
"B" BED	M																								
	IND																								
	INF					21.7	34.1		55.8													21.7	34.1		55.8
	HYP					25.1	22.2		47.3													25.1	22.2		47.3
	T					46.8	56.3		103.1													46.8	56.3		103.1
UPPER "A" BED	M																								
	IND																								
	INF					2.9	50.6		53.5													2.9	50.6		53.5
	HYP						39.0		39.0		71.2		71.2										110.2		110.2
	T					2.9	89.6		92.5		71.2		71.2									2.9	160.8		163.7
UNCORRELATED BEDS	M									1.8			1.8									1.8			1.8
	IND									12.0			12.1									12.1			12.1
	INF									84.8	1.4		86.2									84.8	1.4		86.2
	HYP																								
	T									98.7	1.4		100.1									98.7	1.4		100.1
LARAMIE FM TOTAL	M									1.8			1.8									1.8			1.8
	IND									12.1			12.1									12.1			12.1
	INF					24.6	84.7		109.3	84.8	1.4		86.2									109.4	86.1		195.5
	HYP					25.1	61.2		86.3		71.2		71.2									25.1	132.4		157.5
	T					49.7	145.9		195.6	98.7	72.6		171.3									148.4	218.5		366.9
T4S R62W																									
DENVER FORMATION																									
LOWRY BED	M																								
	IND	0.7			0.7																	0.7			0.7
	INF	27.7			27.7																	27.7			27.7
	HYP																								
	T	28.4			28.4																	28.4			28.4
LARAMIE FORMATION																									
UNCORRELATED BEDS	M													2.0			2.0					2.0			2.0
	IND													16.0			16.0					16.0			16.0
	INF									35.6	34.5		70.1	184.6	30.0		214.6					220.2	64.5		284.7
	HYP									14.1	39.4		53.5									14.1	39.4		53.5
	T									49.7	73.9		123.6	202.6	30.0		232.6					252.3	103.9		356.2
T4S R63W																									
DENVER FORMATION																									
LOWRY BED	M		2.4	12.6	15.0																		2.4	12.6	15.0
	IND	1.0	11.3	34.3	46.6																	1.0	11.3	34.3	46.6
	INF	0.7	2.6	7.0	10.3																	0.7	2.6	7.0	10.3
	HYP																								
	T	1.7	16.3	53.9	71.9																	1.7	16.3	53.9	71.9
BENNETT BED	M	0.4	3.0	19.2	22.6			1.2	1.2													0.4	3.0	20.4	23.8
	IND	2.7	9.5	40.4	52.6			9.3	9.3													2.7	9.5	49.7	61.9
	INF		0.7		0.7																		0.7		0.7
	HYP																								
	T	3.1	13.2	59.6	75.9			10.5	10.5													3.1	13.2	70.1	86.4
UPPER WATKINS BED	M	1.4	2.2	19.0	22.6			1.3	1.3													1.4	2.2	20.3	23.9
	IND	8.9	14.4	96.2	119.5		0.1	27.1	27.2													8.9	14.5	123.3	146.7
	INF	3.3	10.0	28.8	42.1		0.4	21.8	22.2													3.3	10.4	50.6	64.3
	HYP																								
	T	13.6	26.6	144.0	184.2		0.5	50.2	50.7													13.6	27.1	194.2	234.9
DENVER FM TOTAL	M	1.8	7.6	50.8	60.2			2.5	2.5													1.8	7.6	53.3	62.7
	IND	12.6	35.2	170.9	218.7		0.1	36.4	36.5													12.6	35.3	207.3	255.2
	INF	4.0	13.3	35.8	53.1		0.4	21.8	22.2													4.0	13.7	57.6	75.3
	HYP																								
	T	18.4	56.1	257.5	332.0		0.5	60.7	61.2													18.4	56.6	318.2	393.2
LARAMIE FORMATION																									
	M													6.6	1.2	1.1	8.9					6.6	1.2	1.1	8.9
	IND													59.7	11.3	12.1	83.1					59.7	11.3	12.1	83.1
	INF													206.6	7.5	8.1	222.2					206.6	7.5	8.1	222.2
	HYP																								
	T													272.9	20.0	21.3	314.2					272.9	20.0	21.3	314.2
T4S R64W																									
DENVER FORMATION																									
LOWRY BED	M	0.4	5.2	31.2	37.8																	0.4	5.2	31.2	37.8
	IND		17.4	146.7	164.1			0.9	0.9														17.4	147.6	165.0
	INF		0.4	130.0	130.4		2.2	18.0	20.2														2.6	148.0	150.6
	HYP																								
	T	0.4	23.0	307.9	331.3		2.2	18.9	21.1													0.4	25.2	326.8	352.4
BENNETT BED	M	0.4	8.8	50.3	59.5			12.1	12.1													0.4	8.8	62.4	71.6
	IND	0.5	22.5	142.1	165.1			56.8	56.8													0.5	22.5	198.9	221.9
	INF			41.5	41.5			75.0	75.0															116.5	116.5
	HYP																								
	T	0.9	31.3	233.9	266.1			143.9	143.9													0.9	31.3	377.8	410.0
UPPER WATKINS BED	M	0.3	11.2	79.7	91.2	0.8	1.4	15.2	17.4													1.1	12.6	94.9	108.6
	IND	1.6	40.7	215.9	258.2	2.3	12.9	55.6	70.8													3.9	53.6	271.5	329.0
	INF	0.4	5.6	10.6	16.6	15.5	39.4	7.0	61.9	0.8	1.5	0.6	2.9									16.7	46.5	18.2	81.4
	HYP																								
	T	2.3	57.5	306.2	366.0	18.6	53.7	77.8	150.1	0.8	1.5	0.6	2.9									21.7	112.7	384.6	519.0
LOWER WATKINS BED	M	3.2	5.3	0.3	8.8	0.7	4.8	6.4	11.9													3.9	10.1	6.7	20.7
	IND	6.6	17.8	3.2	27.6	0.7	35.6	28.6	64.9													7.3	53.4	31.8	92.5
	INF	0.9	6.5	1.2	8.6		68.2	40.6	108.8		3.9		3.9									0.9	78.6	41.8	121.3
	HYP																								
	T	10.7	29.6	4.7	45.0	1.4	108.6	75.6	185.6		3.9		3.9									12.1	142.1	80.3	234.5
DENVER FM TOTAL	M	4.3	30.5	161.5	197.3	1.5	6.2	33.7	41.4													5.8	36.7	195.2	237.7
	IND	8.7	98.4	507.9	614.8	3.0	48.5	141.9	193.4													11.7	146.9	649.8	808.4
	INF	1.3	12.5	183.3	197.1	15.5	109.8	140.6	265.9	0.8	5.4	0.6	6.8									17.6	127.7	324.5	469.8
	HYP																								
	T	14.3	141.4	852.7	1008.4	20.0	164.5	316.2	500.7	0.8	5.4	0.6	6.8									35.1	311.3	1169.5	1515.9
LARAMIE FORMATION																									
UNCORRELATED BEDS	M														1.8	2.0	3.8						1.8	2.0	3.8
	IND													1.6	14.0	14.3	29.9					1.6	14.0	14.3	29.9
	INF													96.7	190.6	140.0	427.3					96.7	190.6	140.0	427.3
	HYP													79.9	148.3	104.0	332.2					79.9	148.3	104.0	332.2
	T													178.2	354.7	260.3	793.2					178.2	354.7	260.3	793.2
T4S R65W																									
DENVER FORMATION																									
LOWRY BED	M	0.8	1.2	1.0	3.0																	0.8	1.2	1.0	3.0
	IND	4.3	10.2	1.3	15.8																	4.3	10.2	1.3	15.8
	INF	3.5	31.1		34.6		6.6		6.6													3.5	37.7		41.2
	HYP																								
	T	8.6	42.5	2.3	53.4		6.6		6.6													8.6	49.1	2.3	60.0
BENNETT BED	M	0.1	5.6	14.0	19.7																	0.1	5.6	14.0	19.7
	IND	0.3	50.0	68.2	118.5																	0.3	50.0	68.2	118.5
	INF		79.8	36.6	116.4																		79.8	36.6	116.4
	HYP																								
	T	0.4	135.4	118.8	254.6																	0.4	135.4	118.8	254.6
UPPER WATKINS BED	M		5.1	1.6	6.7			0.6	0.6														5.1	2.2	7.3
	IND		23.6	10.0	33.6		3.4	3.6	7.0														27.0	13.6	40.6
	INF		7.0	7.4	14.4		107.8	22.9	130.7														114.8	30.3	145.1
	HYP																								
	T		35.7	19.0	54.7		111.2	27.1	138.3														146.9	46.1	193.0
LOWER WATKINS BED	M		2.7		2.7	0.1	3.2		3.3													0.1	5.9		6.0
	IND		10.7		10.7	0.6	22.5		23.1													0.6	33.2		33.8
	INF		1.7		1.7		233.0		233.0		2.2		2.2										236.9		236.9
	HYP																								
	T		15.1		15.1	0.7	258.7		259.4		2.2		2.2									0.7	276.0		276.7
DENVER FM TOTAL	M	0.9	14.6	16.6	32.1	0.1	3.2	0.6	3.9													1.0	17.8	17.2	36.0
	IND	4.6	94.5	79.5	178.6	0.6	25.9	3.6	30.1													5.2	120.4	83.1	208.7
	INF	3.5	119.6	44.0	167.1		347.4	22.9	370.3		2.2		2.2									3.5	469.2	66.9	539.6
	HYP																								
	T	9.0	228.7	140.1	377.8	0.7	376.5	27.1	404.3		2.2		2.2									9.7	607.4	167.2	784.3
LARAMIE FORMATION																									
UNCORRELATED BEDS	M																								
	IND													3.8	2.8		6.6					3.8	2.8		6.6
	INF													100.6	75.5		176.1					100.6	75.5		176.1
	HYP													159.6	119.7		279.3					159.6	119.7		279.3
	T													264.0	198.0		462.0					264.0	198.0		462.0
T4S R66W																									
DENVER FORMATION																									
LOWRY BED	M		3.2		3.2		0.4		0.4														3.6		3.6
	IND		23.7		23.7		2.1		2.1														25.8		25.8
	INF		121.1		121.1		0.7		0.7														121.8		121.8
	HYP		1.6		1.6																		1.6		1.6
	T		149.6		149.6		3.2		3.2														152.8		152.8
BENNETT BED	M	0.6		0.8	1.4																	0.6		0.8	1.4
	IND	3.2	5.2	5.4	13.8																	3.2	5.2	5.4	13.8
	INF	5.3	41.1	8.6	55.0																	5.3	41.1	8.6	55.0
	HYP		2.4		2.4																		2.4		2.4
	T	9.1	48.7	14.8	72.6																	9.1	48.7	14.8	72.6
UPPER WATKINS BED	M						1.2	0.6	1.8														1.2	0.6	1.8
	IND						6.4	23.4	29.8														6.4	23.4	29.8
	INF						10.7	103.4	114.1														10.7	103.4	114.1
	HYP							7.2	7.2															7.2	7.2
	T						18.3	134.6	152.9														18.3	134.6	152.9
LOWER WATKINS BED	M					0.1			0.1													0.1			0.1
	IND					3.8	7.4		11.2													3.8	7.4		11.2
	INF					7.0	299.6		306.6													7.0	299.6		306.6
	HYP						7.2		7.2														7.2		7.2
	T					10.9	314.2		325.1													10.9	314.2		325.1
UNCORRELATED BEDS	M					2.8	3.8		6.6													2.8	3.8		6.6
	IND					38.3	37.8		76.1													38.3	37.8		76.1
	INF					31.2	22.6		53.8													31.2	22.6		53.8
	HYP					1.7			1.7													1.7			1.7
	T					74.0	64.2		138.2													74.0	64.2		138.2
DENVER FM TOTAL	M	0.6	3.2	0.8	4.6	2.9	5.4	0.6	8.9													3.5	8.6	1.4	13.5
	IND	3.2	28.9	5.4	37.5	42.1	53.7	23.4	119.2													45.3	82.6	28.8	156.7
	INF	5.3	162.2	8.6	176.1	38.2	333.6	103.4	475.2													43.5	495.8	112.0	651.3
	HYP		4.0		4.0	1.7	7.2	7.2	16.1													1.7	11.2	7.2	20.1
	T	9.1	198.3	14.8	222.2	84.9	399.9	134.6	619.4													94.0	598.2	149.4	841.6
LARAMIE FORMATION																									
UNCORRELATED BEDS	M																								
	IND													2.3			2.3					2.3			2.3
	INF													53.4	16.5		69.9					53.4	16.5		69.9
	HYP													29.8	15.7		45.5					29.8	15.7		45.5
	T													85.5	32.2		117.7					85.5	32.2		117.7

Notes:
All figures are in millions of tons.
* These overburden categories are 0-200' and 200'-500' for the Denver Formation.

Explanation of Resource Categories:
M Measured coal - within ¼ mile of a data point.
IND Indicated coal - ¼ to ¾ mile from nearest data point
INF Inferred coal - ¾ to 3 miles from nearest data point.
HYP Hypothetical coal - over 3 miles from nearest data point.
T Total of all resource categories.

DEPARTMENT OF NATURAL RESOURCES
COLORADO GEOLOGICAL SURVEY
JOHN W. ROLD, DIRECTOR

COAL RESOURCES OF THE DENVER EAST ½° x 1° QUADRANGLE, COLORADO

by Karl E. Brand and Wynn Eakins

1980

TABLE III Coal Resource Estimates

Column key: each overburden range (0-250′ Overburden*, 250′-500′ Overburden*, 500′-1000′ Overburden, 1000′-2000′ Overburden, More than 2000′ Overburden, Total of all Overburden Categories) is subdivided into: In beds 2.5-5′ thick / In beds 5-10′ thick / In beds more than 10′ thick / Total of all thickness categories.

T4S R67W

DENVER FORMATION

FORMATION/ COAL BED	RESOURCE CATEGORY	0-250′ 2.5-5′	0-250′ 5-10′	0-250′ >10′	0-250′ Total	250′-500′ 2.5-5′	250′-500′ 5-10′	250′-500′ >10′	250′-500′ Total	500′-1000′ 2.5-5′	500′-1000′ 5-10′	500′-1000′ >10′	500′-1000′ Total	1000′-2000′ 2.5-5′	1000′-2000′ 5-10′	1000′-2000′ >10′	1000′-2000′ Total	>2000′ 2.5-5′	>2000′ 5-10′	>2000′ >10′	>2000′ Total	All 2.5-5′	All 5-10′	All >10′	All Total
LOWRY BED	M																								
	IND	0.2			0.2																	0.2			0.2
	INF	0.6			0.6																	0.6			0.6
	HYP																								
	T	0.8			0.8																	0.8			0.8
UNCORRELATED BEDS	M					2.0	2.5		4.5													2.0	2.5		4.5
	IND					6.3	14.1		20.4													6.3	14.1		20.4
	INF					3.0	14.8		17.8													3.0	14.8		17.8
	HYP																								
	T					11.3	31.4		42.7													11.3	31.4		42.7

SUMMARY TOTALS

FORMATION/ COAL BED	RESOURCE CATEGORY	0-250′ 2.5-5′	0-250′ 5-10′	0-250′ >10′	0-250′ Total	250′-500′ 2.5-5′	250′-500′ 5-10′	250′-500′ >10′	250′-500′ Total	500′-1000′ 2.5-5′	500′-1000′ 5-10′	500′-1000′ >10′	500′-1000′ Total	1000′-2000′ 2.5-5′	1000′-2000′ 5-10′	1000′-2000′ >10′	1000′-2000′ Total	>2000′ 2.5-5′	>2000′ 5-10′	>2000′ >10′	>2000′ Total	All 2.5-5′	All 5-10′	All >10′	All Total
ELBERT COUNTY — LARAMIE FORMATION	M						0.2		0.2					15.7	7.7		23.4					15.7	7.9		23.6
	IND					1.7	2.2		3.9					103.1	29.9		133.0					104.8	32.1		136.9
	INF	21.2			21.2	12.0	50.4		62.4	26.1			26.1	541.5	67.3		608.8	19.4			19.4	620.2	117.7		737.9
	HYP	26.1	5.2		31.3	4.5	4.2		8.7					140.0			140.0	126.7			126.7	297.3	9.4		306.7
	T	47.3	5.2		52.5	18.2	57.0		75.2	26.1			26.1	800.3	104.9		905.2	146.1			146.1	1038.0	167.1		1205.1
ELBERT COUNTY TOTAL	M					8.5	4.8	14.5	27.8	3.7	0.8	29.2	33.7	15.7	7.7		23.4					27.9	13.3	43.7	84.9
	IND					11.6	48.3	83.9	143.8	34.2	27.7	199.5	261.4	103.1	29.9		133.0					148.9	105.9	283.4	538.2
	INF	21.2	7.6	28.7	57.5	55.2	431.1	603.1	1189.4	156.2	327.9	707.2	1191.3	547.8	67.3		615.1	19.4			19.4	799.8	833.9	1339.0	2972.7
	HYP	26.1	6.8	8.8	41.7	4.5	34.6	31.9	71.0	0.4	6.5	2.1	9.0	140.0			140.0	126.7			126.7	297.7	47.9	42.8	388.4
	T	47.3	14.4	37.5	99.2	79.8	418.8	733.4	1432.0	194.5	362.9	938.0	1495.4	806.6	104.9		911.5	146.1			146.1	1274.3	1001.0	1708.9	3984.2
DENVER EAST QUAD — DENVER FORMATION	M	24.9	110.6	639.1	774.6	23.7	53.5	108.1	185.3	9.0	6.9	32.1	48.0		1.2		1.2					57.6	172.2	779.3	1009.1
	IND	119.9	489.0	1433.3	2042.2	122.1	426.7	730.8	1279.6	65.6	85.9	244.8	396.3		7.6		7.6					307.6	1009.2	2408.9	3725.7
	INF	180.7	681.5	609.7	1471.9	288.3	2133.9	1760.3	4182.5	308.6	685.2	1062.7	2056.5	10.6	10.6		21.2					788.2	3511.2	3432.7	7732.1
	HYP	100.6	21.5	23.6	145.7	4.9	71.8	63.7	140.4	0.5	118.0	2.1	120.6									106.0	211.3	89.4	406.7
	T	426.1	1302.6	2705.7	4434.4	439.0	2685.9	2662.9	5787.8	383.7	896.0	1341.7	2621.4	10.6	19.4		30.0					1259.4	4903.9	6710.3	12873.6
LARAMIE FORMATION	M	12.3	31.0	3.1	46.4	3.6	6.7	2.1	12.4	16.4	23.9	2.5	42.8	72.1	28.7	3.1	103.9	2.9	1.3		4.2	107.3	91.6	10.8	209.7
	IND	86.5	184.2	13.3	284.0	34.2	59.8	13.3	107.3	105.8	163.3	14.7	283.3	542.9	200.6	26.4	769.9	20.9	7.5		28.4	790.3	615.4	67.7	1473.4
	INF	333.6	626.9	9.9	970.4	272.3	730.9	31.5	1034.7	894.5	1119.2	26.0	2039.7	4222.8	1704.9	161.0	6088.7	221.9	50.5		272.4	5945.1	4232.4	228.4	10405.9
	HYP	27.6	22.6	0.8	51.0	68.1	251.1		319.2	554.0	555.4		1109.4	1625.3	751.2	132.1	2508.6	402.2	79.1		481.3	2677.2	1659.4	132.9	4469.5
	T	460.0	864.7	27.1	1351.8	378.2	1048.5	46.9	1473.6	1570.7	1861.8	43.2	3475.7	6463.1	2685.4	322.6	9471.1	647.9	138.4		786.3	9519.9	6598.8	439.8	16558.5
DENVER EAST TOTAL	M	37.2	141.6	642.2	821.0	27.3	60.2	110.2	197.7	25.4	30.8	34.6	90.8	72.1	29.9	3.1	105.1	2.9	1.3		4.2	164.9	263.8	790.1	1218.8
	IND	206.4	673.2	1446.6	2326.2	156.3	486.5	744.1	1386.9	171.4	249.2	259.5	680.1	542.9	208.2	26.4	777.5	20.9	7.5		28.4	1097.9	1624.6	2476.6	5199.1
	INF	514.3	1308.4	619.6	2442.3	560.6	2864.8	1791.8	5217.2	1203.1	1804.4	1088.7	4096.2	4233.4	1715.5	161.0	6109.9	221.9	50.5		272.4	6733.3	7743.6	3661.1	18138.0
	HYP	128.2	44.1	24.4	196.7	73.0	322.9	63.7	459.6	554.5	673.4	2.1	1230.0	1625.3	751.2	132.1	2508.6	402.2	79.1		481.3	2783.2	1870.7	222.3	4876.2
	T	886.1	2167.3	2732.8	5786.2	817.2	3734.4	2709.8	7261.4	1954.4	2757.8	1384.9	6097.1	6473.7	2704.8	322.6	9501.1	647.9	138.4		786.3	10779.3	11502.7	7150.1	29432.1

Notes:
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IND Indicated coal - ¼ to ¾ mile from nearest data point
INF Inferred coal - ¾ to 3 miles from nearest data point.
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T Total of all resource categories.