

STRATIGRAPHY AND ECONOMIC
SIGNIFICANCE,
CARRANT CREEK FORMATION,
NORTHWEST UINTA BASIN, UTAH



Utah Geological and Mineralogical Survey

Special Studies 27

UNIVERSITY OF UTAH

James C. Fletcher, President

BOARD OF REGENTS

Donald B. Holbrook	Chairman
Edward W. Clyde	Vice-Chairman
Joseph E. Bernolfo, Jr.	Member
A. Wally Sandack	Member
Richard L. Evans	Member
Marian D. Higginson	Member
Robert H. Hinckley	Member
Clyde L. Miller	Member
Luke G. Pappas	Member
Calvin W. Rawlings	Member
Roy W. Simmons	Member
L. S. Skaggs, Jr.	Member
Glen E. Snow	Member
John Tucker	Member
James C. Fletcher	President, Univ. of Utah, Ex-officio Member
Clyde L. Miller	Secretary of State, Ex-officio Member
Burtis R. Evans	President, Alumni Assoc., Ex-officio Member
George S. Eccles	Treasurer
Parry D. Sorenson	Secretary

UTAH GEOLOGICAL AND MINERALOGICAL SURVEY

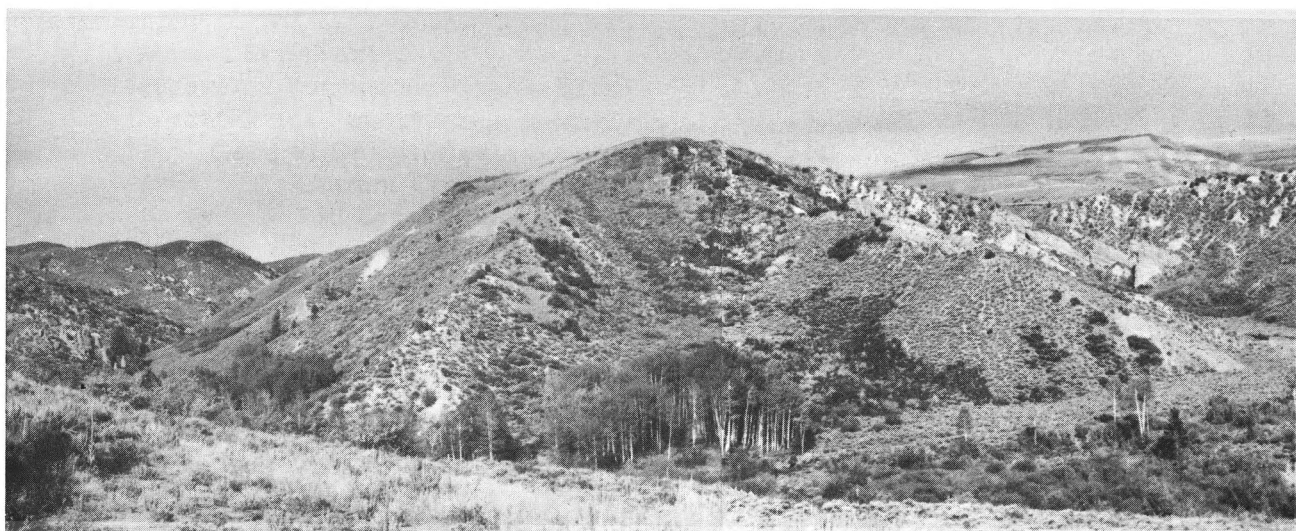
William P. Hewitt, Director

ADVISORY BOARD

John M. Ehrhorn, Chairman	U. S. Smelting, Refining & Mining Co.
Graham S. Campbell	Intermountain Association of Geologists
LaVaun Cox	Utah Petroleum Council
L. W. Folsom	Mountain Fuel Supply Company
John K. Hayes	U. S. Steel Corporation
Lehi F. Hintze	Brigham Young University
Lowell S. Hilpert	U. S. Geological Survey
Ezra C. Knowlton	Utah Sand & Gravel Products Corporation
Kurt O. Linn	Texas Gulf Sulphur Corporation
James D. Moore	The Anaconda Company
W. J. O'Connor, Sr.	Independent Coal and Coke Company
Howard Peterson	Utah State University
Paul S. Rattle	Utah Mining Association
Joe B. Rosenbaum	U. S. Bureau of Mines
Raymond T. Senior	Attorney
William L. Stokes	University of Utah
Alvin J. Thuli, Jr.	Kennecott Copper Corporation
J. Stewart Williams	Utah State University
William P. Hewitt	Director, U.G.M.S., Ex-officio Member
George R. Hill	Dean, College of Mines, Ex-officio Member

STRATIGRAPHY AND ECONOMIC
SIGNIFICANCE,
CARRANT CREEK FORMATION,
NORTHWEST UINTA BASIN, UTAH

by Robert F. Garvin



UTAH GEOLOGICAL AND MINERALOGICAL SURVEY
affiliated with
THE COLLEGE OF MINES AND MINERAL INDUSTRIES
University of Utah, Salt Lake City, Utah



CONTENTS

	Page
Abstract	7
Introduction	7
Previous Work	7
Location and Accessibility	9
Topography and Drainage	9
Climate and Vegetation	9
Glacial Features	9
Landslides	9
Methods of Study	10
Field Methods	10
Rock and Textural Classifications	10
Stratigraphy	10
General Statement	10
Mesaverde Formation	11
Currant Creek Formation	11
General Description	11
Currant Creek Area	14
Red Creek Area	17
Duchesne River-Little Valley Area	18
Sedimentary Textures and Structures	21
Boulder-Cobble Lineation and Imbrication	21
Percussion Marks	21
Frosted Sand Grains	22
Bedding	22
Ripplemarks	23
Rib-and-Furrow Structures	23
Concretions	23
Reworked Fossils	23
Provenance and Origin	24
Sediment Transport and Environment	25
Age and Correlation	26
Summary of Previous Correlations	26
Field Evidence	27
Subsurface Evidence from Well Data	29
Conclusions	31
Uinta (?) Formation	31
Bishop Conglomerate	31
Structure	32
Regional Structure	32
Local Structure	32
Folds	32
Faults	32
Minor Faulting	32
Uinta Basin Fault	33
Fractures	33

	Page
Tectonic History	33
General Statement	33
Tabby Mountain Disturbance	34
Folding of the Uinta Mountain Anticline	34
Economic Geology	34
General Statement	34
Oil-Impregnated Sandstones	35
Petroleum	35
Acknowledgments	36
References	36
Appendix A	
Section 1 of Currant Creek Formation along Red Creek	41
Appendix B	
Section 2 of Currant Creek Formation near Duchesne River in Little Valley	53

ILLUSTRATIONS

Cover: Cobble conglomerate in Red Creek area (see fig. 15).

Frontispiece: Panoramic view along east side of Red Creek (see fig. 8).

Figure 1. Index map of study area illustrating outcrops of Currant Creek Formation (stippled) and location of measured sections	8
2. Lower boundary of the Currant Creek in Red Creek	14
3. Conglomerate outcrops on White Ledge	15
4. Currant Creek outcrop on White Ledge.	16
5. Conglomerate column on White Ledge showing diversity of dip of 40° to 55° south	16
6. Conglomerate columns of the basal Currant Creek in Red Creek area showing cobble alignment and imbrication	16
7. Red Ledge showing upper contact of the Currant Creek with the Uinta (?)	17
8. Panoramic view along the east side of Red Creek	18
9. Oyster-bearing Cretaceous sandstone boulder in the Red Creek section	19
10. View east toward Tabby Mountain showing the flat-topped mountain and the stratigraphy of the area	19
11. Angular unconformities between the Currant Creek and the Uinta (?) Formations and the Uinta (?) and Bishop Formations of Tabby Mountain	19
12. View looking west across Currant Creek and up Racetrack Creek showing stratigraphy and gravel terrace (Qgs)	19
13. Looking west across Red Creek Formation	20

	Page
Figure 14.	21
15.	22
16.	23
17.	23
18.	28
19.	30
Plate 1.	back pocket
2.	back pocket
Table 1.	12
2.	22

STRATIGRAPHY AND ECONOMIC SIGNIFICANCE, CURRANT CREEK FORMATION, NORTHWEST UINTA BASIN, UTAH

by Robert F. Garvin¹

ABSTRACT

The Currant Creek Formation of Late Cretaceous through Eocene age crops out on the southwestern flank of the Uinta Mountains, in the northwest corner of the Uinta Basin, Wasatch and Duchesne Counties, Utah. It unconformably overlies the Mesaverde Formation of Late Cretaceous age and unconformably underlies the Uinta (?) Formation of Late Eocene age. Age and correlation of the unit are based on previous work by Walton (1944 and 1964), Abbott (1957), and Murany (1963 and 1964), field evidence, and subsurface information. The Currant Creek Formation is considered latest Cretaceous through Early Eocene in age. Tentatively, it is correlated with the Bennion Creek, North Horn, Flagstaff, and Colton Formations of the Wasatch Plateau, the Wasatch Formation of the Uinta Basin, and the Knight and Echo Canyon Formations of the Wasatch Plateau.

The Currant Creek Formation consists of interbedded conglomerate, sandstone, siltstone, and shale. The lower part is predominantly sandstone and conglomerate, and the upper part, mainly sandstone, siltstone, and shale. Individual rock units are composed of lithic (petromict) boulder, cobble, pebble, and granule conglomerates, orthoquartzite to sub-graywacke sandstones, siltstones, and sandy-silty-calcareous shales.

The formation thins from about 4,800 feet thick in the Currant Creek region to about 4,000 feet thick in the vicinity of Red Creek, and to 1,500 feet in the Duchesne River-Little Valley areas. From Little Valley eastward, the unit thins rapidly to a feather edge.

The term Uinta Basin fault is proposed for a northeast-southwest trending subsurface fault that roughly follows the trace of the Uinta Basin axis. It is believed to be a north-dipping reverse fault.

In the Currant Creek and Uinta (?) Formations, oil-impregnated sandstones in the Duchesne River-Little Valley area may be of commercial value, and also may serve as a clue to deep oil accumulation in the region.

INTRODUCTION

Previous Work

The entire Currant Creek Formation has not been studied in detail by any single author, but it has been treated briefly in reports encompassing larger areas. Its location, on the southwest flank of the Uinta Mountains, brings it into the realm of many early regional geologic and geographic studies, as well as more recent work.

Among the first to explore the Uinta Mountain region were Fremont, Simpson and Englemann, and Jones. The early geologic work done in the region included that of Powell, King and others, Berkey, Atwood, Emmons, Weeks and Lupton, and Schultz.

1. Development geologist, Phillips Petroleum Company, Denver, Colorado; formerly with the Utah Geological and Mineralogical Survey.

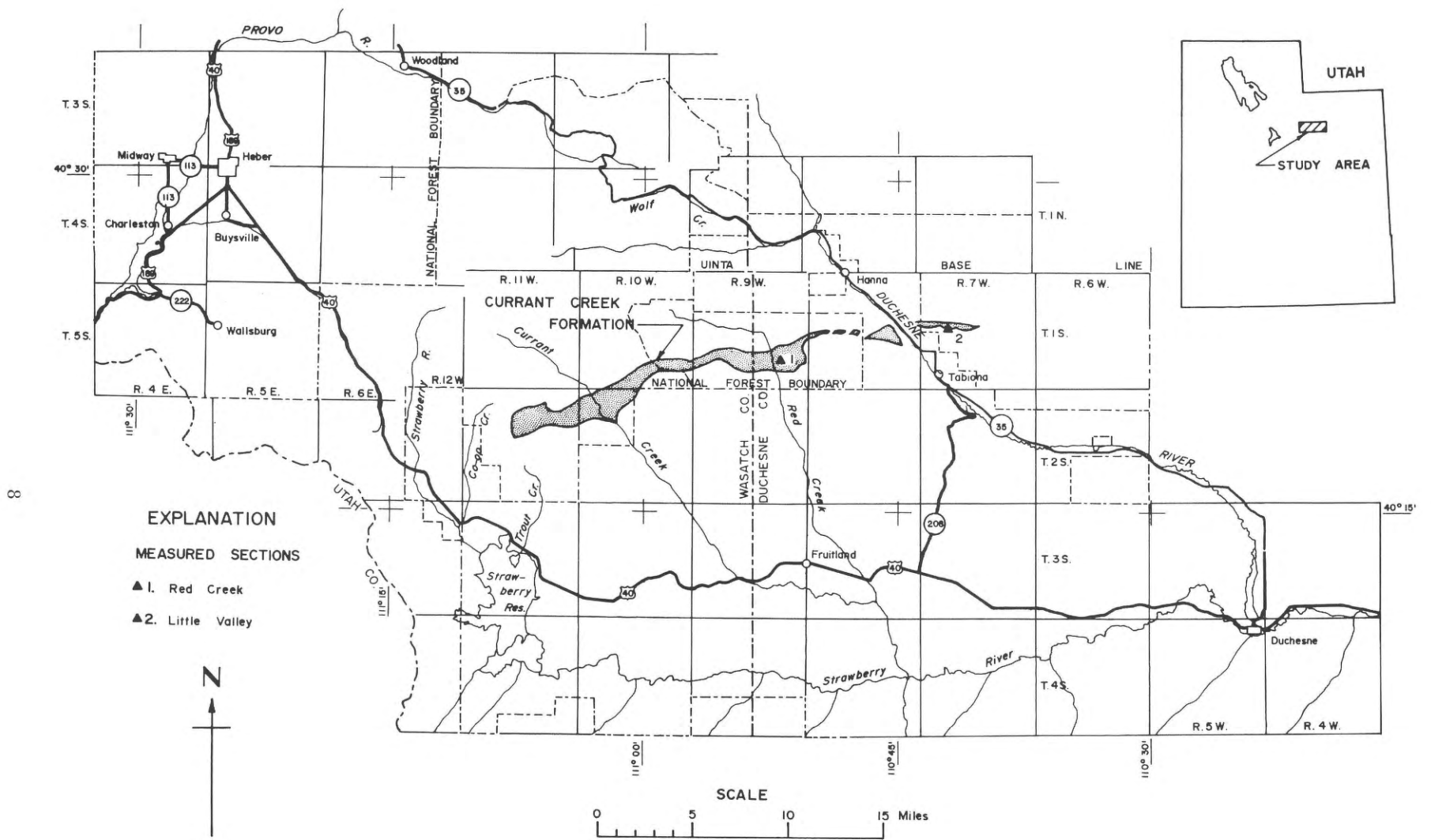


Figure 1. Index map of study area showing outcrops of Currant Creek Formation (stippled) and location of measured sections.

Many papers dealing with the Uinta Mountains and the Uinta Basin have been published since these reports were written. Those related to the Currant Creek Formation were authored by Forrester (1937), Walton (1944), Huddle and McCann (1947), Williams (1950), Huddle, Mapel, and McCann (1951), Bissell (1952 and 1959), Stokes and others (1955), Walton (1957 and 1964), Abbott (1957), Murany (1963 and 1964), and Hale and Van De Graaff (1964).

Location and Accessibility

Regionally, the area dealt with by this paper is located in the Uinta Basin section of the Colorado Plateau physiographic province. It is bounded on the north by the southern flank of the Uinta Mountains, on the east by the north central Uinta Basin, on the south by the west central Uinta Basin, on the west by the Wasatch Mountains, and on the northwest by the junction of the Wasatch and Uinta Mountains. Outcrops of Currant Creek Formation are found in a band, extending for 25 miles along lat. $42^{\circ} 22' N.$, between $110^{\circ} 30'$ to $111^{\circ} 07' W.$, through Tps. 1 and 2 S., Rs. 7, 8, 9, 10 and 11 W., Uinta Special Meridian, Wasatch and Duchesne Counties, Utah (fig. 1).

From U.S. Highway 40, access to the Currant Creek outcrop area is by unimproved roads, along Co-op, Trout, Currant and Red Creeks. The Tabiona area on the east is accessible via State Highways 35 and 208, and by unimproved roads that branch off State Highway 35 (fig. 1 and pl. 1).

Topography and Drainage

The Currant Creek Formation is exposed in the rugged mountainous terrain of the southern Uinta Mountain foothills. Elevations range from less than 7,000 feet in the Duchesne River-Little Valley area to more than 10,000 feet in the Currant Creek area.

The region is deeply dissected by some perennial and numerous intermittent streams that form rectangular drainage patterns. The region's major drainage is through the Duchesne and Strawberry Rivers. Currant and Red Creeks flow southeastward down dip slopes as consequent streams, intersect, and join a subsequent stream, the Strawberry River.

Climate and Vegetation

The climate is semiarid. Because of the high elevations, the area is subject to heavy winter snowfalls and frequent summer thundershowers. Heavy cover of grasses, shrubs, sagebrush, and aspen forests reflects high annual precipitation -- from less than 16 inches to more than 30 inches (Office of the State Engineer and others, 1960).

Glacial Features

Three small cirque basins were created by Pleistocene glaciation on Tabby Mountain in Secs. 20 and 21, T. 1 S., R. 8 W. A large glacial-fluvial fan, truncated by the Duchesne River, extends northeastward from the cirques. Several small alluvial fans have formed along the dissected edge of this fan, and have spread out onto the Duchesne River floodplain. Glacial deposits obscure some outcrops of the Currant Creek Formation.

Landslides

Landslides, a common geomorphic feature of the Currant Creek Formation, cover some outcrops of the formation (three are shown on pl. 1). The largest, adjacent to Currant Creek

in Red Ledge Hollow, Secs. 4, 5, and 8, T. 2 S., R. 10 W., is more than 2 miles long and 1/2-mile wide at its widest dimension. Currant Creek, rerouted around it, has formed a steep, almost inaccessible, gorge. Shroder (1967) prepared a detailed geomorphic study of the slide. Two smaller landslides are in Bear Hole Hollow, Secs. 27, 33 and 34, T. 1 S., R. 10 W.

Methods of Study

Field Methods

Field mapping was done on aerial photographs at a scale of 1:20,000. The results were transferred by inspection to U. S. Geological Survey topographic maps, at a scale of 1:24,000. Because good exposures of the formation were not present, geologic contacts of the Currant Creek Formation many times were drawn on vegetational or erosional forms visible on the aerial photographs.

In the upper Mesaverde Formation, bedding tends to align plants in rows along upturned edges of beds. Poorly defined bedding, in thick conglomerate and sandstone units at the base of the Currant Creek, causes random alignment of plant growth. The influence of bedding control on plant growth also was used to indicate the base of the Currant Creek Formation in areas of poor exposure.

Aerial photo and field mapping on erosional control consisted of drawing contacts between nonresistant and resistant beds. Less resistant beds of the Currant Creek Formation form low areas adjacent to the more resistant beds of the Mesaverde Formation. Examination of photos was supplemented by field mapping.

Most sections of Currant Creek Formation were measured by Jacob's staff. Others were measured by compass, and by the Brunton compass and 100-foot tape method.

Rock and Textural Classifications

Rock and textural classifications used in the field and throughout this report are those proposed by Wentworth (1922), Shepard (1954), and Pettijohn (1957). Size-grade classification was drawn from the grade scale of Wentworth (1922); classification of sand, silt, and clay mixtures from Shepard (1954); and classification of conglomerates and sandstones from Pettijohn (1957).

STRATIGRAPHY

General Statement

A generalized geologic column of the Uinta Basin and Uinta Mountains is presented in Table 1. Particles of the underlying formations are incorporated in the sandstones and conglomerates of the Currant Creek Formation, and the unconformably overlapping sediments form an upper limit on the age span of the formation.

General descriptions of the immediately underlying Mesaverde and the overlying Uinta (?) Formations, as well as the Bishop Conglomerate, are especially valuable to an understanding of the Currant Creek Formation.

Mesaverde Formation

The Mesaverde Formation of Upper Cretaceous age consists of sandstone with some interbedded shale and coal. It extends throughout the mapped area, and topographically is expressed as a hogback ridge. Bissell (1952, p. 611) measured 5,165 feet of Mesaverde in the Currant Creek Basin area; Walton (1944, p. 106-107) about 3,000 feet in the Red Creek area; Huddle and McCann (1947) 1,700 feet west of the Duchesne River, and 550 feet east of the Duchesne River; and Huddle, Mapel, and McCann (1951) about 1,700 feet near Dry Mountain, which lies immediately east of the mapped area. Because of the unconformity between the Mesaverde and the overlying Currant Creek Formation, the formation thins eastward from Currant Creek Basin.

The Mesaverde is mainly sandstone, white and gray to yellowish-brown in color. The sandstones, which are very fine- to coarse-grained, with subangular to rounded quartz grains with calcareous cement, are orthoquartzite to subgraywacke in composition, with some black chert pebbles included. The deposits are massive, and contain small-scale, low-angle cross-bedding. Thin beds of shale and coal are common near the top of the Mesaverde in Currant and Red Creeks.

Throughout the mapped area, the Mesaverde dips steeply southward, from less than 30° to more than 50°. The formation lies disconformably below the Currant Creek Formation with little or no discordance of dip.

In Currant and Red Creek areas, the contact with the Currant Creek is marked by the first occurrence of conglomerates overlying Mesaverde sandstones, and at the change in slope, between the more resistant Mesaverde and the less resistant Currant Creek. In the Duchesne River-Little Valley area, however, the Currant Creek contact is taken at the first appearance of graded bedding up-section from the Mesaverde, and at the change in slope between the Mesaverde and the Currant Creek.

Currant Creek Formation

General Description

The Currant Creek Formation was named by Walton (1944, p. 117) for "the sequence of conglomerates, sandstones, and variegated shales which, in the western part of the Uinta Basin, transects the Mesaverde. . . beds and unconformably underlies the Eocene strata of probable Uinta age."

The Currant Creek unit is a series of interbedded conglomerates and sandstones with some beds of siltstone and shale. The conglomerates¹ are lithic (petromict), with frameworks of boulders, pebbles, granules, and cobbles, which predominate. Generally gray to light-gray, the conglomerates are composed primarily of quartzite from the Pennsylvanian Weber Quartzite, Precambrian Mutual Quartzite, black Paleozoic chert, and minor amounts of limestone. Usually, fragments are rounded, but with decreasing size, become more angular. In the lower part of the Currant Creek, conglomerate predominates. Sandstones are light-gray to light-yellow or yellowish-brown in color. They are poorly to well-sorted; contain subangular to rounded grains, and are loosely to tightly cemented

1. Conglomerates are made up of framework and voids, according to Pettijohn, 1957, p. 245.

Table 1. Generalized stratigraphic section of Uinta Mountains - Uinta Basin area.

Period	Epoch or Series	Group or Formation	Member	Lithologic Description	Thickness (feet)	
Quaternary	Holocene	Unnamed		Stream alluvium, slope wash, talus, and landslide debris.	0-150	
	Pleistocene	Unnamed		Glacial-fluvial, pediment and fan gravels.	0-250	
Tertiary	Pliocene					
	Miocene	Bishop Conglomerate		Conglomerate; red to grayish-white; generally loosely consolidated; contains boulders from many older formations.	0-100	
	Oligocene?	Unnamed		Andesite tuff and breccia,	1000-1500	
	Eocene		Uinta Formation		Conglomerate, sandstone, mudstone, siltstone and shale; gray to white; variegated; interbedded; channels.	4500
			Green River Formation	Evacuation and Parachute Creek Members	Shale, oil shale, siltstone, sandstone, and limestone; variegated colors, divided into several members.	1800-2400
				Delta Facies		
				Basal Member		
Wasatch Formation		Conglomerate, sandstone, siltstone, and shale; light-gray to reddish-brown, interbedded, thin- to thick-bedded.	780			
Paleocene	Currant Creek Formation		Conglomerate, sandstone, and siltstone, some shale; light-gray to yellowish-brown; interbedded; conglomerate lower part; sandstone and siltstone upper part.	4000		
Cretaceous	Upper Cretaceous	Mesaverde Formation		Sandstone; light-gray; with some interbedded shale and coal; very fine- to coarse-grained; cross-bedded; massive; marine lower part; mostly nonmarine.	550-4000	
		Mancos Shale	Upper Shale Member	Shale; gray; clayey; calcareous; interbeds of thin sandstone.	1680-2200	
			Frontier Sandstone Member	Sandstone; light-gray to yellowish-brown; fine- to coarse-grained; thin- to thick-bedded; cross-bedded; thickens westward; coal-bearing in upper part.	500-660	
	Lower Cretaceous	Mowry Shale		Shale; gray, siliceous; water-laid volcanic ash; contains fish scales.	85-300	
		Dakota Sandstone		Sandstone; gray; contains interbedded conglomerate; black chert pebbles; fine- to coarse-grained. Thick- to very thick-bedded.	30-40	
		Cedar Mountain Formation	Cedar Mountain Member	Mudstone; green, purple and reddish-brown; calcareous; many nodules.	100-150	
Buckhorn Member	Conglomerate and conglomeratic mudstone with gray, black, and pink chert pebbles.		20-50			

Jurassic	Upper Jurassic	Morrison Formation	Shale, sandstone, siltstone, and conglomerate with some fresh-water limestone; calcareous.	1100-1550	
		Curtis-Stump Formation	Sandstone, shale, and oolitic limestone; greenish-gray.	100-725	
		Entrada-Preuss Sandstone	Sandstone; dark-red; fine-grained; contains minor amounts of shale and mudstone.	700-1585	
	Middle Jurassic	Twin Creek Limestone	Limestone; dark-to light-gray; locally oolitic; fossiliferous; shaly, brittle.	700-950	
	Lower Jurassic	Nugget Sandstone	Sandstone; light-red to white; fine- to medium-grained; grains frosted; high angle cross-bedding.	1100-1240	
Triassic	Upper Triassic	Chinle Formation	Mudstone, siltstone, and shale; interbedded with argillaceous shale; variegated.	250-485	
	Middle Triassic	Shinarump (or Gartra) Formation	Sandstone; gray to white; locally conglomeratic; cross-bedded; massive.	35-125	
		Lower Triassic	Ankareh Shale	Shale and siltstone, variegated.	800-1550
	Thaynes Limestone		Limestone and shale; grayish-brown; interbedded sandstone; fossiliferous.	550-1530	
		Woodside Shale	Siltstone and shale; reddish-brown.	400-1000	
Permian	Guadalupian	Park City Formation	Dolomitic limestone, black phosphatic shale and sandstone; contain nodules of black chert; fossiliferous.	350-450	
Pennsylvanian	Virgilian	Weber Quartzite	Quartzite; gray to light-gray; very fine-grained; calcareous; massive-bedding.	1200-1600	
	Missourian				
	Desmoinesian				
	Atokan	Morgan Formation	Limestone, shale, and sandstone; light-gray to brown; interbedded; limestone contains black chert nodules.	250	
	Morrowan	Round Valley Formation	Limestone; light-gray; contains chert nodules.	500	
	Springeran	Doughnut Formation	Shale; black; calcareous; interbedded with thin beds of limestone and sandstone.	500	
	Chesterian				
Mississippian	Meramecian	Humbug Formation	Limestone breccia, sandstone breccia, and limestone; light-gray to brown.	350-400	
	Osagian	Deseret Limestone	Limestone and dolomitic limestone; light-to dark-gray; abundant black chert in nodules and thin lenses; fossiliferous.	600-650	
		Kinderhookian	Madison Limestone	Limestone; dark-gray; dolomitic in part; abundant black and gray chert; shale partings between beds.	240-500
Cambrian	Albertan	Tintic Quartzite	Quartzite; light-yellow-brown to greenish-gray; fine- to coarse-grained; pebbles and granules along bedding; cross-bedded.	400-500	
Precambrian	Big Cottonwood Series	Uta Mountain Group	Red Pine Shale	Shale; greenish-gray to black; sericitic; micaceous; interbeds of yellowish-brown, arkosic sandstone.	3000
		Mutual Quartzite	Quartzite; reddish-purple; arkosic; shale lenses 200 to 400 feet thick.	4000	
		Undivided	Quartzite, sandstone; white, dark-red and gray; siliceous; interbeds of conglomerate, shale, and argillite; cross-bedded.	5000-8000	

Compiled after Walton (1944), Huddle and McCann (1947), Bissell (1952), Stokes (1955), Abbott (1957), Hansen (1957), Sadlick (1957), Stokes (1957), Walton (1957), Williams (1957), Cohenour (1959), Crittenden (1959), Lochman-Balk (1959), Sadlick (1959), Scott (1959), Bissell (1964), Hale and Van de Graaff (1964), and others (1964).

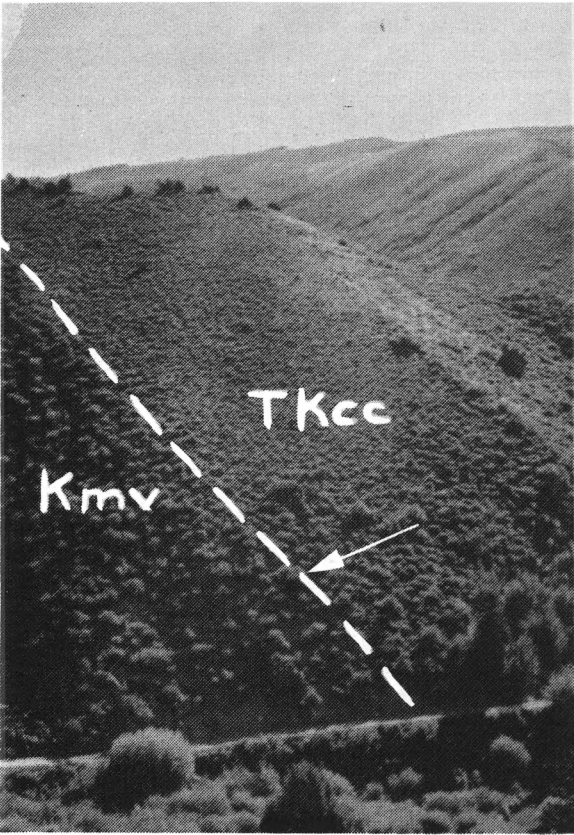


Figure 2. Arrow points to the lower boundary of the Currant Creek in Red Creek. (Note change in vegetation along contact.)

with calcareous cement. They range in composition from subgraywacke near the base of the formation, to orthoquartzite near the top. Beds are lenticular-, blanket-, or wedge-shaped. Most sandstone tongues or wedges pinch out westward. Sandstones predominate in the upper section of the Currant Creek. Siltstones and shales are reddish-brown to variegated in color, calcareous, and poorly exposed. Some bentonite occurs and generally is distinguished by weathered "popcorn" surfaces. Throughout the formation, units are thin- to massive-bedded, and some contain small-scale, low-angle cross-bedding. Detailed descriptions of individual units are given in Appendices A and B.

The base of the formation, in the Red and Currant Creeks region, was drawn at the bottom of a cobble-boulder conglomerate sequence that, in places, forms a fairly resistant ridge. In the Duchesne River-Little Valley area, the formation's base was taken at the first graded sandstone unit above the Mesaverde sandstones, and at the change in slope between the Mesaverde and the less resistant Currant Creek. For this study, the lower contact, which is difficult to decide, was determined, for mapping purposes, by erosional and vegetational differences (fig. 2).

Throughout the study area, the top of the Currant Creek was drawn at the base of a steep, prominent slope, formed by the overlying Uinta (?) Formation. Where it is exposed near the contact, the Uinta (?) characteristically is a red to brownish-red cobble conglomerate, containing a framework of cobbles derived from many previous geologic systems. Nowhere in the mapped area, however, is the actual upper contact exposed.

Erosion of the top of the Currant Creek Formation is responsible for the rapid thinning of the formation east of the Duchesne River.

In the Currant and Red Creek areas, conglomerates of the lower Currant Creek Formation show a rapid decrease in particle size eastward from Red Creek to pebble and granule conglomerates in the Duchesne River-Little Valley area.

Exposures of the formation are found from west to east in the Currant Creek, Red Creek, and Duchesne River-Little Valley areas. These areas of exposure are discussed in turn.

Currant Creek Area

In the Currant Creek area, best exposures of the Currant Creek Formation are on the south side of Bear Hole Hollow on the north-facing slope of White Ledge in Sec. 33, T. 1 S., R. 10 W. There, about 1,000 feet of conglomerates, interbedded with thin sandstone

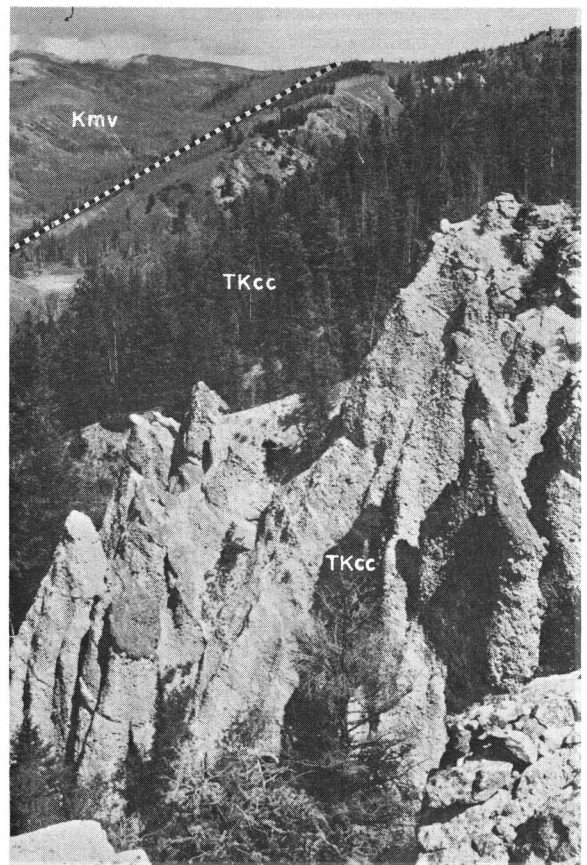
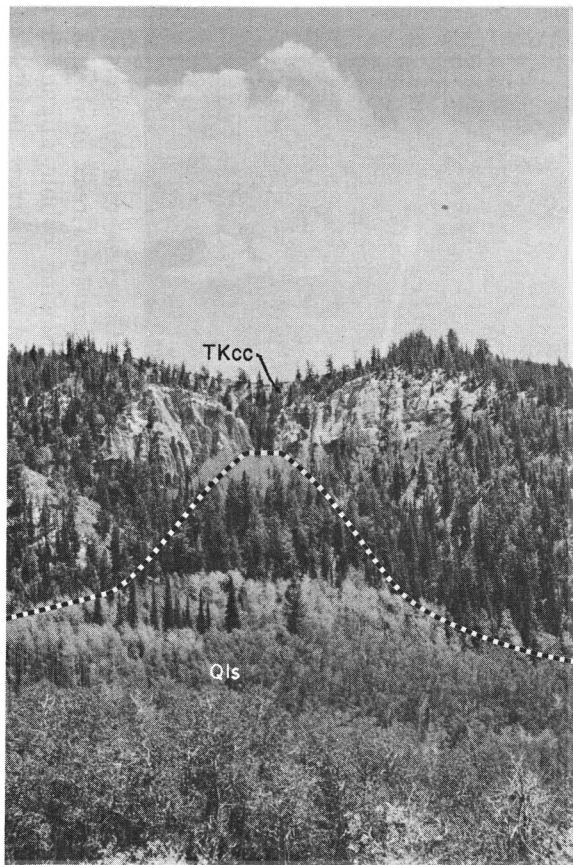


Figure 3. Conglomerate outcrops on White Ledge . Left photo shows landslide (Qls). Right photo illustrates steep south dip.

lenses, are exposed. Figures 3 and 4 illustrate these outcrops. Exposures of the conglomerate grade eastward into thick sandstone channel deposits in the NE $\frac{1}{4}$ of Sec. 33.

For the most part, other outcrops are small and poorly exposed. Conglomerate columns are exposed in the SE $\frac{1}{4}$ Sec. 6 and the NE $\frac{1}{4}$ Sec. 7, T. 2 S., R. 10 W., along the south-facing slope of a long ridge (figs. 5 and 6). A small outcrop of cobble gravel, weathering from the underlying conglomerate beds, is located on the north side of Racetrack Creek near the top of a high ridge, NW $\frac{1}{4}$ Sec. 11, T. 2 S., R. 11 W.

All of the outcrops in the Currant Creek area are conglomerates interbedded with thin channels or tongues of sandstone (fig. 4). The predominantly lithic (petromict) cobble conglomerates consist of a framework of Pennsylvanian Weber Quartzite, Precambrian Mutual Quartzite, and black Paleozoic chert. The beds and particles within them generally are aligned and imbricated northwest. Graded bedding is well-developed in the conglomerate units. Interbedded thin sandstone lenses and beds are less than a few inches to more than 5 feet thick. Poorly developed, small-scale, low-angle cross-bedding is a feature of the sandstones.

In the Currant Creek area, the lower contact of the formation was chosen at the base of the conglomerate beds described above. Where these beds were not exposed, the contact was drawn arbitrarily by erosional and vegetational control. In the western part of the area, the Currant Creek overlies the Mesaverde with angular unconformity and, in Race-

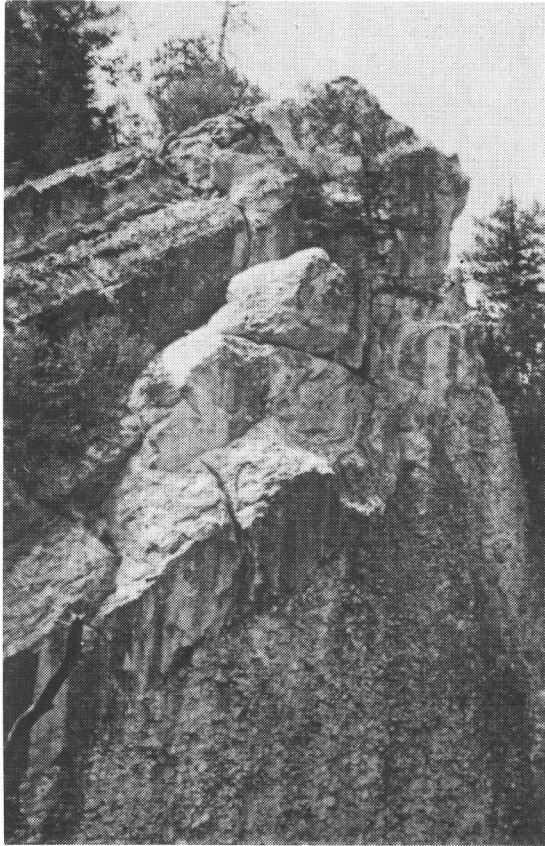


Figure 4. Currant Creek outcrop on White Ledge. (Note channel sandstone that overlies conglomerate unit.)



Figure 5. Conglomerate column on White Ledge showing diversity of dip of 40° to 55° south.

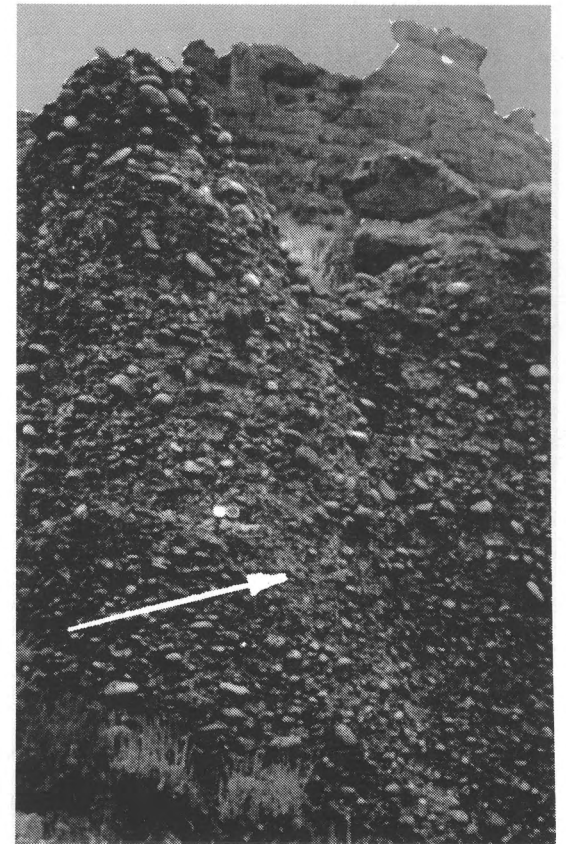


Figure 6. Conglomerate columns of the basal Currant Creek in Red Creek area showing cobble alignment and imbrication. (Arrow points northwest in direction of imbrication.)

track Creek, truncates a syncline formed in the Mesaverde. Eastward, the limbs of the syncline straighten out, and the contact becomes disconformable. Uniformity of dip on either side of the contact, and dense vegetative cover make identification of the basal Currant Creek almost impossible.

The upper boundary was drawn westward, from the base of Red Ledge, along the base of the steep Uinta (?) slope (fig. 7). No rocks are exposed along the contact.

Dips within the Currant Creek range from about 50° south close to the base of the formation, to about 5° south near its top. Figure 5 illustrates the diversity of dips -- ranging between 40° and 55° south -- in a single outcrop.

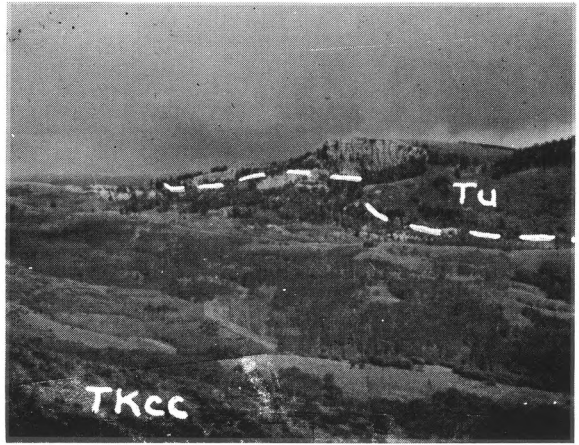


Figure 7. Red Ledge showing upper contact of the Currant Creek with the Uinta (?). (Note steep Uinta (?) slope.)

Because of the scarcity of outcrops in the Currant Creek area, a complete measured section is not possible. Several partial sections were measured, but are not listed in the Appendices, because their stratigraphic position within the Currant Creek is uncertain. Bissell (1952, p. 614) estimated the Currant Creek to be about 4,800 feet thick in this area.

A generalized geologic section (A-A') is shown on Plate 1.

Red Creek Area

Best exposures of the Currant Creek Formation are in Red Creek (pl. 1 and App. A). The formation is well-exposed in Secs. 26, 27, and 35, T. 1 S., R. 9 W. An aggregate thickness of 3,940 feet of the unit was measured along the east side of Red Creek. Conglomerate with interbedded sandstone dominates the lower 2,100 feet. The upper 1,840 feet are predominantly sandstone and siltstone or shale slopes.

The conglomerates are largely lithic (petromict) cobble conglomerates, similar to those described in the Currant Creek area. They are interbedded with tongues, lenses, and tabular beds of sandstone, and finer-grained conglomerates. For the most part, conglomerate beds are gray to light-gray, with frameworks composed mainly of Weber Quartzite cobbles, with some Mutual Quartzite and Paleozoic black chert cobbles and pebbles. The Mutual Quartzite makes up about 5 percent of the framework material, and the black cherts about 10 percent of the framework itself. Beds are very thin- to massive-bedded, and some of the sandstone units exhibit small-scale, low-angle cross-bedding. Alignment of framework particles generally is well-developed, with the particles arranged and imbricated northwest. Sandstones are subgraywacke and orthoquartzite in composition, and are similar in texture to sandstone lenses in the conglomerates of the Currant Creek area. Most of the sandstone units pinch out westward. In some of the conglomerate and sandstone units, graded bedding is well-developed.

Units 35 to 58 of measured section number 1 (App. A) comprise a series of interbedded light-yellowish to yellowish-brown sandstones and conglomerates about 526 feet thick (fig. 8). The conglomerates contain boulders, cobbles, and pebbles. Boulders and some of the cobbles are composed of Cretaceous Frontier Sandstone (fig. 8). A large oyster-

bearing boulder was found resting on top of unit 35 in this section (fig. 9). The dominant yellowish color of the section probably is derived from yellowish-brown sandstones of the Cretaceous Frontier Sandstone and, possibly, from the Cretaceous Mesaverde Formation.

In this area, the base of the Currant Creek was chosen at the base of a cobble conglomerate. The latter has been stained with reddish-brown limonite. Although poorly exposed, the conglomerate is found along the road in Red Creek, and in scattered localities eastward into the SE $\frac{1}{4}$ Sec. 17, T. 1 S., R. 8 W. (fig. 6). The contact between the Mesaverde and the Currant Creek probably is disconformable. It was drawn mainly on topographic expression between the Mesaverde and the less resistant Currant Creek (figs. 2 and 10). Westward, the lower contact is difficult to determine. The basal conglomerate bed extends into the SE $\frac{1}{4}$ Sec. 21, T. 1 S., R. 9 W. Westward, beyond this, contact was inferred, and drawn on topographic and vegetative contrasts to the top of the divide between the Red Creek and Currant Creek drainages.

In the Red Creek area, the top of the formation is obscured and nowhere exposed. The upper contact is presumed to be unconformable and may be slightly angular (up to 5°; figs. 10 and 11). Contact was drawn at the base of a steep slope that is characteristically formed by the overlying Uinta (?) Formation (fig. 13).

Divergence of dips is well-expressed, with dips, along the base of the Currant Creek, being about 48° south and ranging up-section along the base of the Uinta (?) Formation, to about 10° or 12° south. Local variation of dips may be more or less than 10° in a single outcrop.

The section measured is subject to some error, because of the discontinuity of the outcrops and the numerous offsets required. Figure 8 is a panoramic view of most of the section, along the east side of Red Creek.

A generalized geologic section (B-B') is shown on Plate 1.

Duchesne River - Little Valley Area

Currant Creek rocks are best exposed in the easternmost part of the study area, in Secs. 15, 16, 17, and 18, T. 1 S., R. 7 W. Scattered outcrops occur in portions of Secs. 14, 15,

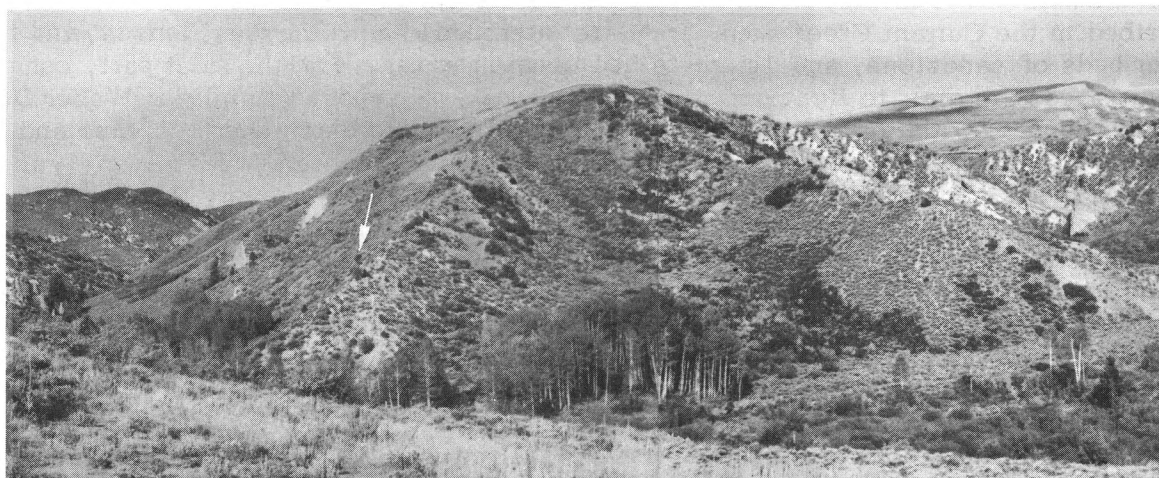


Figure 8. Panoramic view along the east side of Red Creek. Arrow points to yellowish-brown sandstone and conglomerate units.

Figure 9. Oyster-bearing Cretaceous sandstone boulder in the Red Creek section.

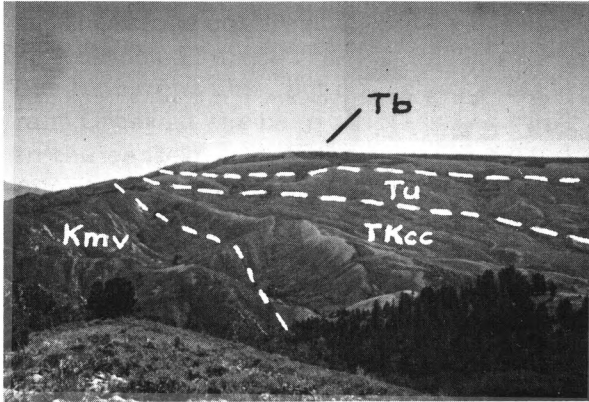
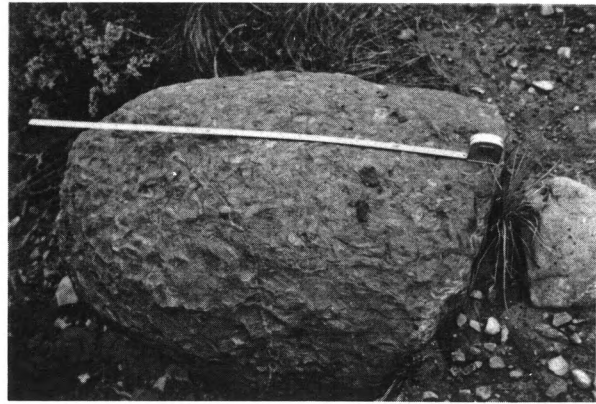


Figure 10. View east toward Tabby Mountain showing the flat-topped mountain and the stratigraphy of the area.

Figure 11. Angular unconformities between the Currant Creek and the Uinta (?) Formations and the Uinta (?) and Bishop Formations of Tabby Mountain.

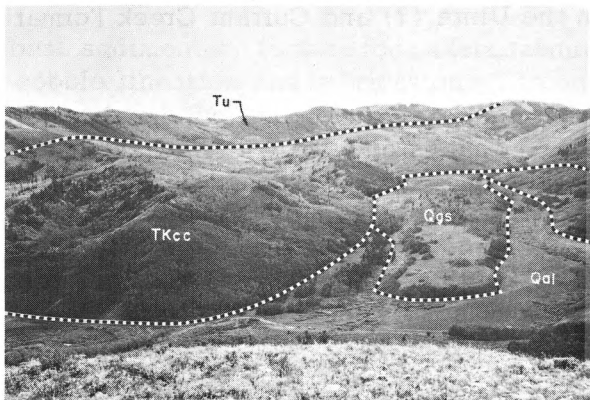
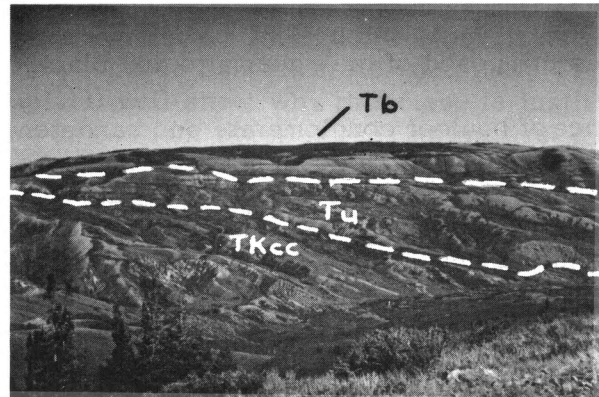


Figure 12. View looking west across Currant Creek and up Racetrack Creek showing stratigraphy and gravel terrace (Qgs).

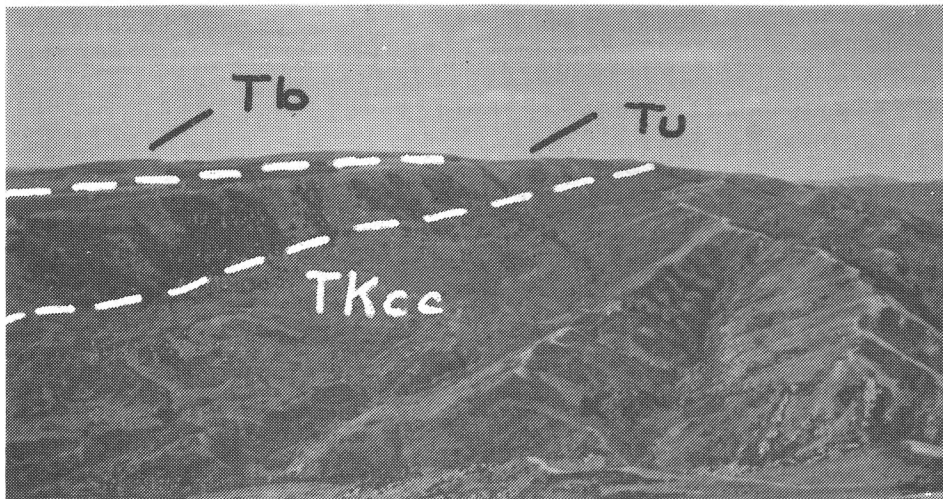


Figure 13. Looking west across Red Creek Formation. (Note steep Uinta slope and stratigraphy of the area.)

16, 17, 20, and 23, T. 1 S., R. 8 W. Huddle and McCann (1947) measured about 3,000 feet of Currant Creek west of the Duchesne River, and the author measured 1,534 feet east of the Duchesne River, Sec. 18, T. 1 S., R. 7 W., in Little Valley (App. B). Because of progressive erosion of upper units beneath the overlying Uinta (?) Formation, the Currant Creek thins rapidly eastward and pinches out in the center of Sec. 15, T. 1 S., R. 7 W.

Outcrops of Currant Creek in this area are interbedded lithic (petromict) pebble and granule conglomerates and subgraywacke to orthoquartzite type sandstones, with some shale and siltstone. Detailed descriptions of the units comprising the formation in this area are presented as measured section number 2 (App. B). The conglomerates are mainly pebble and granule types composed of gray quartzite and black chert.

A sequence of boulder conglomerate and sandstone beds, 337 feet thick, is represented by units 1 to 13 (App. B). The conglomerate beds are light-reddish-gray and contain frameworks of boulders, cobbles, and pebbles. The boulders and cobbles, composed mainly of Cretaceous Frontier Sandstone, contain marine fossils (fig. 14). This sequence is traceable westward into the SE $\frac{1}{4}$ Sec. 13, T. 1 S., R. 8 W., from which point it becomes obscured by alluvium. These same beds may correlate with the yellowish-brown sandstone and conglomerate beds exposed from units 35 to 58, described in the Red Creek area (figs. 8, 14, and pl. 2).

Sandstones are light-gray and are subgraywacke to orthoquartzite in composition. They contain angular to rounded grains, are fine- to coarse-grained, and are cemented with calcareous cement. Oil-impregnated sandstones occur in the Uinta (?) and Currant Creek Formations in this area (see section on oil-impregnated sandstone).

Shale and siltstone units are red to reddish-brown or variegated, calcareous, and deeply weathered. Unit 22 (App. B) is a shale unit, 20 feet thick, that is covered with satin spar gypsum chips. Eastward, this unit disappears under alluvium, but is exposed further eastward, SW $\frac{1}{4}$ Sec. 16, T. 1 S., R. 7 W., where it thickens to more than 100 feet.

Bentonite is expressed by weathered "popcorn" surfaces in the section. Bedding ranges in individual units from very thin- to massive-bedded, and some sandstones exhibit low-angle, small-scale cross-bedding. In the sandstone and conglomerate units, graded bedding is well-developed.

Here, the base of the Currant Creek was decided from the change in slope between the Mesaverde and the less resistant Currant Creek, and from the first appearance of graded bedding up-section from the Mesaverde in sandstones, where resistance was not a determinable factor.

In this area, the top of the Currant Creek is difficult to determine. Huddle, Mapel, and McCann (1951) took the top of the Currant Creek at the base of a prominent conglomerate bed containing limestone cobbles, and below an ostracodal limestone. The writer did not find a fossiliferous limestone unit, but chose the top of the Currant Creek at the base of the conglomerate bed in the eastern part of the area. Exposed in the Little Valley area, this conglomerate unit is a boulder, cobble, and pebble conglomerate about 20 to 30 feet thick. It is traceable eastward to the end of Currant Creek exposures in the center

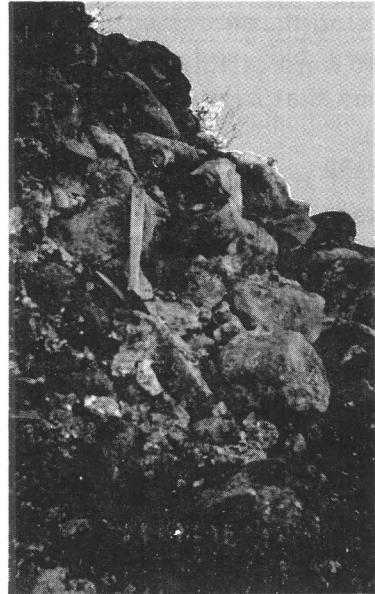


Figure 14. Conglomerate containing fossiliferous Cretaceous boulders and cobbles in the Duchesne River-Little Valley area.

of Sec. 15, T. 1 S., R. 7 W. Conglomerate is composed of fragments of quartzite, chert, and limestone. The bed grades upward from boulders into coarse- and medium-grained sandstones. No alignment of framework fragments was observed.

In Sec. 18, T. 1 S., R. 7 W. and Sec. 13, T. 1 S., R. 8 W., the upper boundary of the Currant Creek has been moved down-section from that proposed by Huddle, Mapel, and McCann (1951), to a position immediately above the youngest conglomerate containing Cretaceous sandstones. A look at the geologic map (pl. 1) will show why this move is justified. By protracting along the trace of the conglomerate bed that overlies the Currant Creek in eastern Little Valley, it will be seen that the intersection of a line protracted with outcrops in western Little Valley occurs where the boundary is now drawn.

Divergence of dips is well-defined here, as in Currant and Red Creeks. Dips decrease from 44° to 22° south from the top of the Mesaverde to the base of the Uinta (?) Formation.

Sedimentary Textures and Structures

Boulder-Cobble Lineation and Imbrication

The best sedimentary texture for paleocurrent direction studies in the Currant Creek is boulder-cobble lineation and imbrication. Throughout the mapped area, the framework of some conglomerate units is lineated and imbricated in a dominant direction (fig. 6). This is more pronounced in the Currant and Red Creek areas. Imbrications and lineations on several outcrops were measured with a Brunton compass and were averaged. In places, these averages are given in measured sections 1 and 2 (Apps. A and B). Framework particles generally are aligned northwest-southeast with imbrications of about 30° northwest. Orientations in the imbricated direction range from less than $N. 20^{\circ} W.$ to more than $N. 70^{\circ} E.$; average orientation is about $N. 64^{\circ} W.$ These orientations indicate a general southeast flowing current with a source area somewhere to the northwest.

Percussion Marks

Large percussion marks are characteristic textures on the quartzites comprising the main framework of some conglomerate beds. Percussion marks, up to 3/10-foot in length, were noted. Most were elliptical in shape (fig. 15). These textures testify to the rapidity of the streams that carried and deposited the sediments of the Currant Creek.

Frosted Sand Grains

Many of the coarser quartz sand grains that make up the sandstones are frosted. These are reworked grains, possibly weathered from the aeolian Navajo Sandstone of Jurassic age.

Bedding

Bedding in the Currant Creek Formation includes planar-bedding, cross-bedding, and graded bedding. Planar beds were classified after McKee and Weir (1953), as modified by Ingram (1954), and presented in Dunbar and Rodgers (1957, p. 97). Planar-bedding ranges from thin to massive. Classification of individual planar units is given in Table 2.

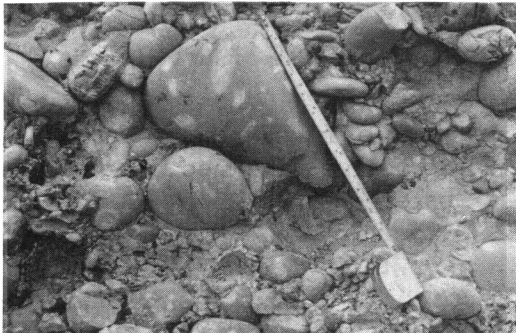


Figure 15. Cobble conglomerate in the Red Creek area showing percussion marks. (Tape extended 2 feet.)

Thickness of strata in some units of the Currant Creek is related to grain size, the coarser the grains, the thicker the unit and the finer the grains, the thinner the unit.

Cross-bedding in the Currant Creek is the festoon or lenticular type, and is poorly defined in most units. The cross beds are of small scale, or fairly thin, and generally inclined at a low-angle, from less than 5° to more than 30°, between the individual beds. Cross-bedding usually strikes about north-west-southeast, with inclinations to the southeast indicating current flow in that direction. On the whole, cross beds were too poorly defined to measure accurate attitudes for paleocurrent studies.

Graded bedding is well-developed in many of the conglomerate and sandstone units (figs. 16 and 17). In conglomerates, units grade up from boulders or cobbles into pebbles, granules, or sand grains. In sandstones, units grade up from coarse to very fine sand grains. These units often appear to be cyclic deposits. In other words, one graded bed is overlain by another, and it, in turn, by another (fig. 16). These graded beds are probably the products of waning currents that sorted particles from cobbles to sand-sized particles.

Table 2. Classification of bedding according to thickness (after McKee and Weir, 1953, as modified by Ingram, 1954, and after Dunbar, 1957, p. 97).

Beds	Massive-Bedded
	— About 5 Feet —
	Very Thick-Bedded
	— About 3 Feet —
	Thick-Bedded
	— About 1 Foot —
	Medium-Bedded
Laminae	— About 4 Inches —
	Thin-Bedded
	— About 1 Inch —
	Very Thin-Bedded
	— About 2/5 Inch —
	Laminated
— About 1/10 Inch —	
	Thinly Laminated

Ripplemarks

Ripplemarks, which are rare, were found in only one locality. Unit 64, measured section 2 (App. B), contains ripplemarks along bedding planes in siltstone. Ripples are asymmetrical current features. Wave lengths range from 2 to 7 inches, but average 2 inches in length.

Rib-and-Furrow Structures

Rib-and-furrow structures are developed on bedding planes in siltstone of unit 64, measured section 2 (App. B). These structures indicate diversified current directions. Average current direction noted was S. 81° E.



Figure 16. Graded beds of cyclic nature in the Red Creek area. Beds grade upward from cobbles into pebbles into cobbles into pebbles. (Tape extended 6 feet.)



Figure 17. Conglomerate in the Red Creek area. (Note graded bedding.)

Concretions

Limonite concretions formed in sandstone and in the early stage of development were found in one outcrop in unit 41 of section 2 (App. B). They are composed of the same material as the host rock. Halos of dark limonite, up to 0.1 inch wide, surround the concretions. These concretions are extremely soft and friable, as is the host rock that contains them. Manganese concretions and plates were noted on the surface of a small slope exposure in unit 69, section 2 (App. B).

Reworked Fossils

Fossils of Cretaceous age were found in and weathering from boulders and cobbles in units 1, 3, 8, 11, 13 of measured section 2 (fig. 14 and App. B). These fossils were identified by the author as being derived from the Frontier Sandstone of Upper Cretaceous age. The faunal assemblage collected follows:

Cephalopods:

Baculites codyensis

Pelecypods:

Camptonectes stygius
Cardium pauperculum
Exogyra columbella ?
Exogyra suborbiculata
Exogyra sp.
Gervillia propleura ?
Inoceramus dimidius ?
Inoceramus fragilis ?
Inoceramus labiatus
Inoceramus undabundus ?
Liopistha (Psilomya) concentrica ?
Maetra emmonsii
Maetra Siouxcensis ?
Maetra sp.
Ostrea malachitensis
Ostrea (Gryphaea ?) patina
Ostrea soleniscus
Ostrea sp.
Trigonarca obliqua

Gastropods:

Campeloma vetula ?
Campeloma? sp.
Fusus (Neptunea ?) venenatus
Gyrodes depressa
Gastropod (unnamed ?)

Vertebrates:

Shark teeth

Identification of the fossils listed follows work done by Meek and Hayden (1876) and Stanton (1893).

Provenance and Origin

Walton (1944, p. 120) proposed a possible source area for the sediments that make up the Currant Creek Formation. He stated:

The lithologic characteristics of the Currant Creek Formation indicate that it was deposited at or near the mouths of streams and rivers flowing out of the mountains to the west.

He proposed (1964, p. 142) the Strawberry Valley thrust sheets might be the source area, rather than orogenic uplift of the Uinta Mountains, because dips are similar on either side of the Mesaverde-Currant Creek boundary. Thickening of isopach contours drawn across the Wasatch-North Horn-Tuscher Formation interval led Murany (1964, p. 149) to suggest that the source area for the Currant Creek and Wasatch Formations lay to the northwest, toward the central Wasatch Mountains.

Current-oriented cobbles and boulders, cross-beds, and rib-and-furrow structures in the Currant Creek all trend northwest, an indication of definite southeast flowing currents. The Geologic Map of Utah, Northeast Quarter (Stokes and Madsen, 1961) shows very little Weber Quartzite exposed in the vicinity of the Strawberry Valley Thrust sheet. Most of the formation's boulder, cobble and pebble material is composed of Weber Quartzite. No Precambrian Mutual Quartzite is exposed in the thrust area either, but Mutual is a common framework material in the Currant Creek.

In the Heber area, a volcanic field mapped as T₁ap (Early Tertiary (?) andesitic pyroclastic rocks) on the state geologic map, trends northwest and is about 6 miles wide and 30 miles long. This field may follow an older stream channel or channels that may have provided fluid transport for the sediments of the Currant Creek. Weber Quartzite is exposed in this vicinity both on the Wasatch and Uinta Mountains, along with some Precambrian Mutual. Logically then, the junction of the Uinta and the Wasatch Mountains would seem to be the source area for the Currant Creek sediments. This argument is supported by the northwesterly thickening of the Wasatch, North Horn, and Tuscher Formations mapped by Murany (1963), and by the northwesterly current-alignment of boulders and cobbles noted with the Currant Creek Formation.

Sediment Transport and Environment

Walton (1944, p. 120) recognized that the Currant Creek was deposited from the west. That Currant Creek sediments are the result of a fluvial environment is evidenced by rounded boulders, cobbles, and pebbles, percussion marks on framework particles, waning current-graded bedding, and the small-scale, low-angle cross-bedding produced by stream deposition.

Streams or rivers providing transport must have been flowing at very high velocities. Percussion marks, as large as 1 inch by 3 inches in size, are common surface textures on framework particles. Then, too, the absence of limestones in the conglomerates of the Currant Creek, indicates an inordinate amount of grinding may have taken place within the streams. Limestone boulders might have been reduced to fine powder, facilitating solution by stream waters. Only the resistant quartzites and chert survived stream abuse and subsequently were deposited with Currant Creek sediments. Cyclic graded bedding suggests successive periods of slow and rapid transport of sediments, corresponding with successive periods of tectonic activity and stability in the source area. These events of unrest and stability may also account for some of the diversity of dips in the Currant Creek deposits.

The Currant Creek Formation probably was deposited near headwaters and along floodplains of streams or rivers, flowing down now-buried stream channels from the Wasatch-Uinta Mountains junction area. Fairly good sorting, particle rounding, boulder-cobble alignment and imbrication, and lenticular channel sandstones indicate a floodplain environment of deposition. General decrease in grain size eastward suggests a loss of energy in the transportation medium, where stream competencies were reduced and streams carried only sand-, silt- and clay-sized particles.

Conglomerate composition (mostly Weber Quartzite, black chert, and Mutual Quartzite) points to a source area composed predominantly of these rocks. The dominant gray to light-gray color of Currant Creek sediments is derived mainly from the gray Weber Quartzite. Red coloration did not appear in the section until the source area was uplifted and weathered deeply enough to expose Precambrian rocks rich in ferric iron. These Precambrian rocks probably provided reddish color for the overlying Uinta (?) Formation.

Age and Correlation

Summary of Previous Correlations

To this date, no one person has studied all of the Currant Creek Formation, but some aspects relative to it have been incorporated in reports covering large areas. These include papers by Lupton (1912), Walton (1944), Huddle and McCann (1947), Williams (1950), Huddle, Mapel and McCann (1951), Bissell (1952), Stokes and others (1955), Walton (1957), Abbott (1957), Murany (1963), Walton (1964), Murany (1964), and Hale and Van De Graaff (1964). Moussa (1966) studied the Price River Formation in the Wasatch Plateau, and his studies are reviewed, also. Lupton (1912, p. 607-608), in his geologic mapping of the Tabby Mountain coal field, included the Currant Creek and a large part of the Uinta (?) Formation in the Wasatch Formation. He estimated the Wasatch to be about 10,000 feet thick in the Tabby Mountain area, and placed the entire section within the Tertiary Period.

Walton (1944, p. 117-120) named the Currant Creek Formation and differentiated between it and the overlying Uinta (?) Formation by its lithologic character and color change -- the Uinta is redder than the Currant Creek. He suggested a possible Late Cretaceous to Early Eocene age for the Currant Creek, and roughly correlated the formation by lithologic characteristics, stratigraphic position, and other general relationships, with the Price River and North Horn Formations of the Wasatch Plateau.

Huddle and McCann (1947) dated columnar sections of the Currant Creek as questionably Late Cretaceous. They correlated the formation with the Price River Formation in the Wasatch Plateau.

Williams (1950, p. 103-104) defined the Wasatch Group as comprising the North Horn, Flagstaff, Colton, Currant Creek, Tuscher, and Wasatch Formations, and so proposed a Late Cretaceous to Eocene age for the Currant Creek Formation.

Bissell (1952, p. 613-614) discussed the Currant Creek in his study of the northeast Strawberry Valley Quadrangle, and agreed with Walton (1944) on the tentative age assignment of Price River-North Horn equivalent for the Currant Creek, thereby indicating a Late Cretaceous-Paleocene age.

Stokes and others (1955, p. 2014) writing of the Cretaceous-Tertiary boundary problem in the northwestern Uinta Basin, weighed the correlations of Walton (1944), and Bissell (1952). Concurring with Walton, they concluded that Currant Creek corresponds to the Price River, North Horn, and Wasatch Formations (1955, p. 2006-2007).

Abbott (1957, p. 103) tentatively correlated the Currant Creek with the Price River, North Horn, and Wasatch Formations in the western Uinta Basin, thereby giving the formation an Upper Cretaceous-Eocene age. He believed the Currant Creek to be gradational with the overlying Uinta (?), therefore making the uppermost part of the Currant Creek Eocene.

Walton (1957, p. 100) matched the Currant Creek to the "conglomerate-variegated shale facies of the North Horn and Price River Formations where they are exposed in the 'Narrows' of Spanish Fork Canyon at the north end of the Wasatch Plateau."

In correlating the Wasatch Formation, Murany (1963, p. 80 and 1964, p. 149-150) favored the idea that the "Price River conglomerates and Currant Creek conglomerates are equi-

valent in age and represent a coarse western facies of the North Horn-Wasatch Formations." Isopach mapping of the Wasatch-North Horn-Tuscher Formations by Murany showed a general thickening of the Wasatch, in the direction of the Currant Creek and central Wasatch Mountains, indicating a possible source area for the Wasatch. According to Murany (1964, p. 149), the stratigraphic position of the Currant Creek Formation therefore, may correspond to the Wasatch and Green River Formations, with the lower conglomerate section of the Currant Creek being a coarse facies of the Wasatch Formation. This would put the Currant Creek in Paleocene-Eocene time.

Walton (1964, p. 139-143) matches the Currant Creek with the Price River and North Horn of the northern Wasatch Plateau, and roughly correlates the lower Currant Creek with the Echo Canyon Conglomerate on the northwest flank of the Uinta Mountains. Williams and Madsen (1959, p. 122-125) placed Echo Canyon in Late Cretaceous time.

Hale's and Van De Graaff's (1964, p. 118-119) diagram of Cretaceous formations in adjoining areas of Utah, Wyoming, and Colorado in part correlates the Currant Creek with the Cretaceous Echo Canyon, the Price River, and the Tuscher Formations, and with the Tertiary Wasatch and the Knight Formations (fig. 18).

Moussa (1966, p. 35) proposed the name Bennion Creek Formation for the conglomerates that comprise the Price River Formation in Spanish Fork Canyon and Bennion Creek in the northern Wasatch Plateau. He placed the Bennion Creek unconformably below the Flagstaff Limestone, transecting beds of the North Horn and overlying unconformably the remainder of the formations of the Price River Group (fig. 18). Bennion Creek's age was presumed to be Late Cretaceous and, possibly, Early Paleocene.

Field Evidence

Field evidence, which may have a bearing on the tentative age and correlation applied to the Currant Creek, includes unconformities, basal conglomerates, stratigraphic position, similarity to the Wasatch and North Horn Formations, and the presence of "frameworks" of Cretaceous Frontier Sandstone boulders and cobbles in some of the conglomerates of the Currant Creek. Except in the Currant Creek area, the unit overlies the Cretaceous Mesaverde Formation unconformably, with no apparent discordance of dip. In the Red Creek and Duchesne River-Little Valley areas, it underlies the Uinta (?) Formation with a slight angular unconformity, thereby placing its age between the Mesaverde (Late Cretaceous) and the Uinta (?) (Eocene).

In the western and central parts of the mapped area, the predominance of conglomerates in the lower part of the Currant Creek points to a change in lithology (from sandstone to conglomerate), and to some tectonic activity in the source region. Folding of the Mesaverde, truncation of the folds, and subsequent deposition of sediments in the Currant Creek area infer a later age than Mesaverde for the formation. In the Duchesne River and Little Valley areas, beds are transitional from Mesaverde to Currant Creek, and can be differentiated lithologically only by their resistance to erosion, and by graded versus planar-bedding.

The Currant Creek's stratigraphic position strongly favors a Late Cretaceous through Early Eocene age. It unconformably overlies the Mesaverde in the study area. In the Wasatch Plateau, the Mesaverde Group is overlain by the Bennion Creek, which, in turn, is overlain by the Flagstaff Formation, with the Bennion Creek being partially equivalent to the North Horn Formation. Spieker (1946, p. 134-135) places the Cretaceous-Tertiary time

boundary somewhere in the North Horn Formation (fig. 18). In the western, central, and eastern Uinta Basin (fig. 15), the Currant Creek is overlain unconformably by the Uinta (?) Formation, which gradationally overlies the Green River Formation of Eocene age. The Green River Formation gradationally overlies the Wasatch Formation of Late Paleocene-Eocene age in the eastern, and central Uinta Basin, and overlies the Colton Tongue of the Wasatch in the western Uinta Basin (fig. 18).

Lithologically, sediments comprising the Wasatch and the North Horn Formations are very much the same as the Currant Creek Formation, except for the presence of fresh water limestones in the Wasatch and North Horn. Fluvial sediments of the Wasatch are "red and green silty shale, lenticular beds of massive cross-bedded sandstone, and occasional thin lenses of fine-grained, gray, dense limestone. There are conglomerates also that have a local distribution which form only a small percent of the formation" (Murany, 1963, p. 66). Goodwin (1961, p. 56) presents a threefold zonation of the Tertiary rocks in the subsurface. Of these, rocks assigned to the Wasatch Formation contain interbedded conglomeratic sandstone, in which the pebbles are less than 50 percent limestone. Pebbles of Mesozoic and Permian lithologies are dominant. In a general way, this description of Wasatch conglomerates fits that of the Currant Creek conglomerates, because the latter are composed principally of Weber Quartzite and black Paleozoic chert. Fluvial sediments of the North Horn contain variegated shale and sandstone, conglomerate, and some fresh water limestone (Spieker, 1946, p. 133). The Currant Creek, which has been described elsewhere in this paper, is composed of fluvial sediments also.

That the Frontier Sandstone was extensively exposed in the source area of the Currant Creek Formation during this stage of deposition is indicated by the conglomerate and sandstone sequence containing yellowish-brown cobbles and boulders with late Cretaceous fossils found in the Little Valley and Red Creek areas. Undoubtedly, the Wasatch and Uintas were in an early uplift stage. During later stages, Paleozoic and Precambrian rocks from the Uintas' core were exposed, and became the dominant material of the conglomerates. It seems likely then that the Cretaceous-Tertiary boundary lies between the base of the Currant Creek and that of the first conglomerate containing Cretaceous particles. It appears to correspond roughly to the Cretaceous-Tertiary boundary referred to by Spieker (1946, p. 135), within the North Horn Formation in the Wasatch Plateau, indicating correlation between the lower part of the Currant Creek and the North Horn Formations.

Subsurface Evidence from Well Data

One well in the area, the Sinclair Oil Company No. 1 Bert L. Coleman in the NE $\frac{1}{4}$ Sec. 13, T. 2 S., R. 10 W., has penetrated the Currant Creek (pl. 2). Only approximate correlations can be drawn from this single log. However, the log character of the Currant Creek is similar to that of the Wasatch in logs from other wells. These logs have fairly low resistivities and fairly straight (slightly inclined toward the positive side of the log), spontaneous potential "shale lines." Only a few wells have penetrated the Wasatch Formation; south of the study area, the deepest penetration into the formation is about 250 feet. The tops of the Currant Creek and Wasatch Formations are picked on the electric logs by a drop in resistivity from more than 50 to less than 20 ohms, or an average decrease over 5 wells of about 26 ohms.

In an attempt to correlate the top of the Currant Creek with the top of the Wasatch, a subsurface structure contour map, drawn on the tops of the Wasatch and the Currant Creek, was prepared. Instead of the hoped for correlation, closely spaced contours indicated a large displacement of approximately 1,000 feet or more. The writer named that displacement the Uinta Basin fault (fig. 19 and section on faults).

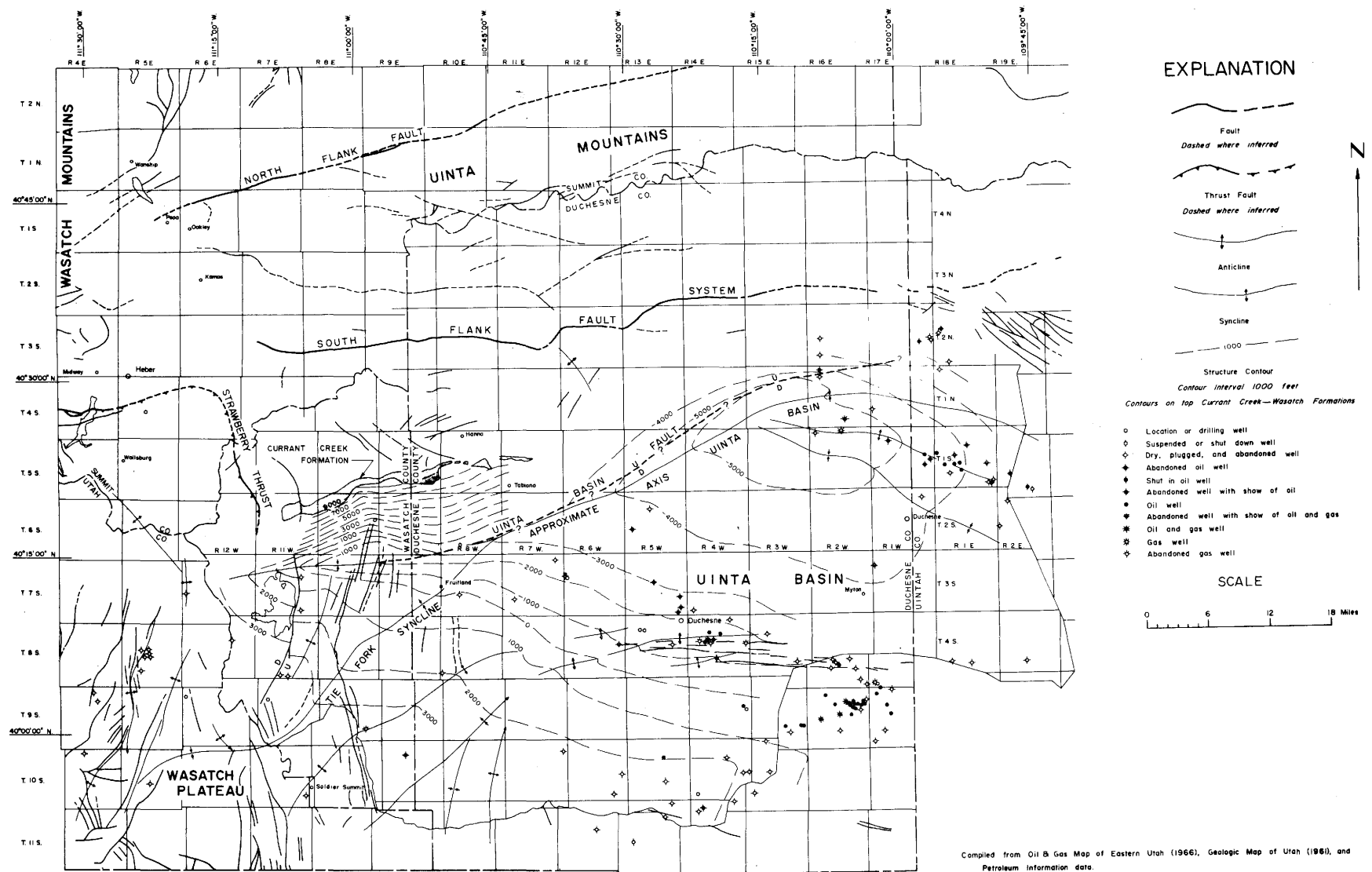


Figure 19. Structural map of the northwestern Uinta Basin and vicinity (by R. F. Garvin, 1967).

Conclusions

From a review of the correlations and age assignments made by various other authors and his own field and subsurface evaluations, this writer correlates the Currant Creek Formation in agreement with Walton (1944 and 1964), Abbott (1957), and Murany (1963 and 1964), and suggests the age of the Currant Creek to be latest Cretaceous through Early Eocene. Correlation of the Currant Creek Formation with formations in adjacent areas is shown in Figure 18.

Isopach mapping by Murany (1963) indicates similar source areas for the Wasatch and the Currant Creek; so the upper Currant Creek may be a coarse northwestern facies of the Wasatch. The lower Currant Creek may be a coarse northern facies of the Bennion Creek and the North Horn Formations. While the Bennion Creek and the North Horn obviously have different source areas, they may be time equivalents of the Currant Creek Formation.

Uinta (?) Formation

The Uinta (?) Formation of Upper Eocene age is a sequence of conglomerate, sandstone, siltstone, and shale. These rocks have not been positively identified by previous authors as belonging to the Uinta Formation and here are questionably referred to as the Uinta. Throughout the mapped area, the Uinta (?) forms a steep slope in its lower part. Bissell (1952, p. 616) measured about 4,500 feet of Uinta (?) in the northeast Strawberry Valley quadrangle, and Walton (1944, p. 122) 5,400 feet of Uinta (?) along the Duchesne River.

The formation is predominantly a conglomerate, interbedded with sandstone in the Currant Creek area. The conglomerate is red to reddish-brown in color, with a framework of cobbles, pebbles, and granules, derived from rocks of many geologic periods, which form a lithic (petromict) conglomerate. Red Ledge, in Red Ledge Hollow, is a good exposure of the Uinta (?) in the Currant Creek area (fig. 7). In this area, the formation is comprised of a series of light-gray to reddish-brown sandstone and siltstones, orthoquartzitic in composition. As in Currant Creek, the formation in Red Creek is more resistant than the underlying Currant Creek, and forms steep slopes (figs. 10 and 11). In the Duchesne River-Little Valley areas, the Uinta (?) is made up of a series of conglomerate, sandstone, siltstone, mudstone, and shale beds, ranging in color from light-gray to grayish-green and red.

The Uinta (?) Formation overlies the Currant Creek unit with a slight angular unconformity of about 5° in the Red Creek area. Elsewhere, it overlies the latter unit disconformably (figs. 10 and 11).

The contact with the Currant Creek is taken at the base of a steep, reddish slope that forms the lower Uinta (?) Formation. Low dips of from less than 5° to more than 20° south are common on lower Uinta (?) outcrops.

Bishop Conglomerate

The Bishop Conglomerate of Miocene (?) age generally is an unconsolidated boulder-cobble conglomerate that covers the tops of many of the highest mountains in the mapped area, and supplies talus gravels to the lower slopes (figs. 10 and 11). The Bishop is red to grayish-white in color, and contains a framework of many rock types. A high percentage of limestone fragments commonly present distinguish this unit from the Currant Creek.

STRUCTURE

Regional Structure

The Uinta Basin is a broad structural depression that parallels the Uinta Mountains, which form its northern border. The Uintas to the north and the Wasatch Mountains to the west have had a strong influence on the structural relationships along the northern Uinta Basin margin. This is particularly true in the vicinity of the Currant Creek Formation, in the northwest corner of the basin, near the juncture of two mountain uplifts. Major regional structural elements are shown in Figure 19.

Local Structure

The Currant Creek Formation's outcrop area is on the northwest limb of the Uinta Basin. Beds dip southward, from more than 50° to less than 10° , toward the basin. The bedding attitude becomes less steeply inclined southward from the area, and is almost horizontal near U.S. Highway 40, about 7 miles south of the outcrop area.

Folds

Some of the folds in the area of Currant Creek outcrops lie within the eastern belt of folding in the northeast Strawberry Valley quadrangle, described and mapped by Bissell (1952, fig. 2). According to Bissell (1952, p. 621), the folds have formed where the prevailing east-west striking strata of the south flank of the Uinta Mountains abruptly swing to a northwest-southeast, and then a north-south strike. The fold associated with this structure is a northeast-plunging syncline in Secs. 31 and 32, T. 1 S., R. 10 W., and in Secs. 1 and 6, T. 2 S., Rs. 10 and 11 W., in Racetrack Creek and Currant Creek (pl. 1).

The writer mapped one anticline (pl. 1), a small nose plunging northwest to southeast, near the town of Hanna, in Secs. 16 and 17, T. 1 S., R. 8 W. Drainage and topographic expression suggest the possible presence of another nose in the vicinity of Secs. 17, 18, 19, and 20, T. 1 S., R. 8 W. (pl. 1). Radial drainage in Sec. 20, T. 1 S., R. 9 W. implies a small dome or nose may be present here.

Faults

Some faulting was observed by surface outcrop studies, or was indicated by subsurface studies of the Currant Creek Formation. These faults are divided into two categories, minor faulting and the Uinta Basin fault.

Minor Faulting

Bissell (1952, p. 624) recognized a high-angle normal fault striking a few degrees west of north in the southeast and northwest quarters of the northeast Strawberry quadrangle. The fault is mapped, in part, in Secs. 1 and 2, T. 2 S., R. 11 W. Its area of exposure is covered with dense vegetation, and no outcrops are visible. For the most part, this fault was mapped on the basis of a northward offset in the Currant Creek outcrop pattern. The fault has downdropped Mesaverde Formation on the west against Jurassic strata on the east, and has truncated part of the syncline described above. The age of faulting is tentatively placed by the author within the Eocene-Oligocene (?) time interval because northward in the Strawberry quadrangle the fault is overlain by Oligocene (?) volcanics and in the mapped area displaces Eocene strata (interpreted from Bissell, 1952, fig. 2).

A smaller fault, with a displacement of about 5 feet and an attitude of N. 16° W., 82° SW., was observed at the head of a narrow gorge in the NW $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 33, T. 1 S., R. 10 W. in Bear Hole Hollow. This minor fault is slickensided, and its sides are coated with limonite and manganese stains.

Uinta Basin Fault

Closely spaced contours on a structure contour map of the top of the Wasatch and Carrant Creek Formations indicate a vertical displacement of 1,000 feet or more (fig. 19). This displacement is interpreted to be a fault that follows the approximate axis of the Uinta Basin striking about N. 80° E. The author proposes the name Uinta Basin fault for this displacement. Subsurface data on structural contours of the Wasatch Formation were obtained from oil well data cards published by Petroleum Information Corporation, Denver, Colorado. Subsurface data for drawing structural contours on the Carrant Creek were derived by extending elevations down dip from surface outcrops, using surface dips and data from one well. Both structural contours and the fault are superimposed on the regional structure map (fig. 19).

On the map (fig. 19), the Uinta Basin fault is extended northeastward through the Starr Flat oil field in Tps. 1 and 2 N., R. 2 W., Uinta Special Meridian, Duchesne County. There a fault of similar strike, but less magnitude (less than 200 to more than 500 feet of displacement), has been mapped by Goodwin (1961, p. 56). The area of greatest displacement may occur along its southwest extension in Tps. 2 and 3 S., Rs. 8 and 9 W. Westward, the fault may lose its definition and die out (fig. 19).

More is mentioned about the Uinta Basin fault in the Age and Correlation and Economic Geology sections of this report.

Fractures

Near-vertical fracturing perpendicular to the strike of the bedding was noted throughout the Carrant Creek Formation. Conjugate fracturing is predominant in the lower conglomerate and sandstone beds. Such fracturing is absent in the sandstone units of the uppermost Carrant Creek, possibly because the lower Carrant Creek is less friable than the upper Carrant Creek. Limonite staining of fractures is a common characteristic.

Fractures are best exposed in a narrow gorge in the NW $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 33, T. 1 S., R. 10 W., where the gorge itself follows a near-vertical fracture. However, these fractures were not of mappable scale (1:24,000).

A N. 65° W. alignment noted on aerial photographs through the south half of Sec. 16, T. 1 S., R. 7 W. appears to be associated with anomalous steep dips and some fracturing in the Carrant Creek. This may be a surficial expression of deep-seated faulting.

TECTONIC HISTORY

General Statement

Detailed accounts of the structural history of the Uinta Mountains and the Uinta Basin have been published by Forrester (1937, p. 648-664), Walton (1944, p. 125-128), Bissell (1952, p. 625-633 and 1959, p. 163-165), Crowley (1957, p. 25-29), and Osmond (1964, p. 47-58).

Locally, Walton's account of tectonic history is the most applicable to the subject of this report. Disturbances, discussed by Walton and recapitulated here, that have a direct bearing in the tectonic structures within the Currant Creek Formation are the Tabby Mountain disturbance and the folding of the Uinta Mountain anticline.

Tabby Mountain Disturbance

The Tabby Mountain disturbance (Late Cretaceous to Early Paleocene time) is reflected by the disconformity between the Mesaverde and Currant Creek beds. According to Walton (1944, p. 125), formation of the Uinta Basin began with major diastrophism and the uplift and erosion of Cretaceous rocks in the vicinity of Tabby Mountain. Some uplift may have taken place in the Heber area, and may be represented by the basal conglomerate units of the Currant Creek. Walton (1944, p. 126) notes this orogeny represents the initial phase of the Laramide Revolution in this area. The Bennion Creek Formation in the northern Wasatch Plateau may have been deposited during this same diastrophic event.

Folding of the Uinta Mountain Anticline

Deposition of the Currant Creek Formation during Early Paleocene time may represent the first uplift of the western Uinta Mountains into a broad arch. Presence of predominant frameworks of Pennsylvanian Weber Quartzite and Paleozoic black chert in the conglomerate units of the lower Currant Creek suggests a source area of considerable relief. Surface rocks across the extent of Uinta Arch probably are of Upper Paleozoic through Mesozoic origin. Erosion of the arch carried sands from Mesozoic rocks and gravels, from upper Paleozoic rocks, into source streams that flowed southeastward from the Heber area. High-velocity streamflow probably reduced the limestone, leaving black chert residues and water high in CaCO_3 content. The more resistant Weber Quartzite fragments were rounded by the fast-flowing waters to the shapes found in outcrops today. High percentages of CaCO_3 in the streams provided cementing material for the newly deposited sediments.

Divergence of dips within the Currant Creek suggests successive periods of uplift and quiescence in the source area. The South Flank Fault System of the Uintas may have originated during the time of early movement of the Uinta Mountains. The Uinta Basin fault may have originated during the same period. The fault is older than the Uinta Formation, but it displaces rocks of Wasatch age and, therefore, may be Early to Middle Eocene in age.

A long period of erosion followed deposition of the Currant Creek during Green River Lake time (Eocene). During some phases, the lake may have been close to floodplain deposits of the Currant Creek, but erosion has removed any trace of Green River sediments in the vicinity of the Currant Creek Formation.

ECONOMIC GEOLOGY

General Statement

The Currant Creek Formation's economic potential includes oil-impregnated sandstones and petroleum. Coal is an important economic resource of the Mesaverde Formation in this same area.

Oil-Impregnated Sandstones

Bituminous sandstone deposits occur in the Currant Creek and Uinta (?) Formations in Secs. 16 and 17, T. 1 S., R. 7 W. in Duchesne County, about $2\frac{1}{2}$ miles northeast of Tabiona.

Oil-impregnation in sandstones of the Currant Creek occurs near the center of the $SE\frac{1}{4}$ Sec. 16, T. 1 S., R. 7 W. The saturated zone, estimated to be about 100 feet thick, extends from the bottom of a small, steep wash to the upper contact with the Uinta (?) Formation on the north-facing slope of a steep ridge. The sandstone is black, weathering to bluish-gray, and its coarse grains are angular. Some pebbles and granules of gray quartzite and black chert are included in the sandstone.

Saturation in the Uinta (?) Formation is less extensive than that in the Currant Creek. The saturated zone extends along the north-facing slope of a small ridge in the $S\frac{1}{2}SE\frac{1}{4}$ Sec. 17, and in a small outlier in the $SE\frac{1}{4}SW\frac{1}{4}$ Sec. 17. Saturation appears to be confined to a series of beds, with saturation ranging from 15 to 21 feet thick. The sandstone is grayish-black, weathering bluish- to light-gray, is fine- to medium-grained, with sub-angular to subrounded grains of quartz. The beds range from 6 to 18 inches thick, and dip southward about 26° . Bitumen saturation in this area was noted previously by Covington (1963, p. 245 and 1964, p. 239).

Saturation appears to be heaviest in the vicinity of an aerial photo alignment noted through the south half of Sec. 16, T. 1 S., R. 7 W. Anomalous steep dips and fracturing also were noted here. The alignment is traceable southeast to the vicinity of a small spring in the southwest corner of Sec. 15, T. 1 S., R. 7 W. It appears possible that the oil-impregnated sandstones result from oil rising along a prominent zone of fracturing, which may be the surface expression of deep-seated faulting.

Petroleum

The Currant Creek Formation, being a series of conglomerates, sandstones, siltstones, and shales, contains suitable reservoir rocks in which petroleum might accumulate. Permeability and porosity variances between siltstone and sandstone or between sandstone and conglomerate units may form suitable traps. Currant Creek sandstones dip steeply southward and provide porous conduits for hydrocarbons moving northward up dip from the highly organic sediments of the Uinta Basin. This oil and gas may have been trapped by permeability barriers, or may have accumulated in various concealed structural traps.

The Uinta Basin fault (fig. 19) may afford major entrapment for oil and gas migrating northward from the deeper parts of the Uinta Basin. Oil caught in stratigraphic or structural traps prior to faulting may have been further enclosed by faulting.

Geophysical exploration to find deep-seated stratigraphic or structural traps is warranted in this area. Depth to these traps is not excessive in the light of present-day drilling economics. Rocks that may serve as possible reservoirs for oil include Weber Sandstone (or Quartzite), Jurassic sandstones, the Dakota Sandstone, Mesaverde Formation, and sandstone units within the Wasatch-Currant Creek Formations.

No drilling depths nor target areas are proposed, because of a lack of definite subsurface information and the likelihood of wide variations in depth from area to area. However, geophysical exploration in this area should uncover drilling prospects with vast potential. There is a distinct possibility that oil fields, comparable to the Phillips Petroleum

productive Bridger Lake field on the north flank of the Uintas, exist near the South Flank Fault System or the Uinta Basin fault. Oil-impregnated sandstones in Secs. 16 and 17, T. 1 S., R. 7 W. may indicate leakage from petroleum accumulations of this type.

REFERENCES

- Abbott, W.O., 1957, Tertiary of the Uinta Basin, in Guidebook to the geology of Uinta Basin, Utah: Intermtn. Assoc. Petroleum Geologists, 8th Ann. Field Conf., p. 102-109.
- Berkey, C.P., 1904, Mineral resources of the Uinta Mountains: Eng. Mining Jour., v. 77, p. 841.
- Bissell, H.J., 1952, Stratigraphy and structure of northeast Strawberry Valley quadrangle, Utah: Am. Assoc. Petroleum Geologists Bull., v. 36, p. 575-634.
- _____ 1959, North Strawberry Valley sedimentation and tectonics, in Guidebook to the geology of the Wasatch and Uinta Mountains transition area: Intermtn. Assoc. Petroleum Geologists, 10th Ann. Field Conf., p. 159-165.
- _____ 1964, Lithology and petrography of the Weber Formation in Utah and Colorado, in Guidebook to the geology and mineral resources of the Uinta Basin: Intermtn. Assoc. Petroleum Geologists, 13th Ann. Field Conf., p. 67-91.
- Cohenour, R.E., 1959, Precambrian rocks of the Uinta-Wasatch Mountains junction and part of central Utah, in Guidebook to the geology of the Wasatch and Uinta Mountains transition area: Intermtn. Assoc. Petroleum Geologists, 10th Ann. Field Conf., p. 34-39.
- Covington, R.E., 1963, Bituminous sandstone and limestone deposits of Utah, in Oil and gas possibilities of Utah, re-evaluated: Utah Geol. and Mineralog. Survey Bull. 54, p. 225-247.
- _____ 1964, Bituminous sandstones in the Uinta Basin, in Guidebook to the geology and mineral resources of the Uinta Basin: Intermtn. Assoc. Petroleum Geologists, 13th Ann. Field Conf., p. 227-242.
- Crittenden, M.D., Jr., 1959, Mississippian stratigraphy of the central Wasatch and western Uinta Mountains, Utah, in Guidebook to the geology of the Wasatch and Uinta Mountains transition area: Intermtn. Assoc. Petroleum Geologists, 10th Ann. Field Conf., p. 63-74.
- Crowley, A.J., 1957, The tectonic history of the Uinta Basin, in Guidebook to the geology of Uinta Basin, Utah: Intermtn. Assoc. Petroleum Geologists, 8th Ann. Field Conf., p. 25-29.
- Dunbar, C.O., and Rodgers, J., 1957, Principles of stratigraphy: New York, J. Wiley and Sons Inc., p. 97.
- Forrester, J.D., 1937, Structure of the Uinta Mountains: Geol. Soc. America Bull., v. 48, p. 631-666.
- Goodwin, J.C., 1961, Starr Flat field, Duchesne County, in Oil and gas fields of Utah: Intermtn. Assoc. Petroleum Geologists Symposium, p. 56.

- Hale, L.A., and Van De Graaff, F.R., 1964, Cretaceous stratigraphy and facies patterns -- northeastern Utah and adjacent areas, in Guidebook to the geology and mineral resources of the Uinta Basin: Intermtn. Assoc. Petroleum Geologists, 13th Ann. Field Conf., p. 115-138.
- Huddle, J.W., and McCann, F.T., 1947, Geologic map of Duchesne River area, Wasatch and Duchesne Counties, Utah: U.S. Geol. Survey Preliminary Map OM 75.
- Huddle, J.W., Mapel, W.J., and McCann, F.T., 1951, Geology of the Moon Lake area, Duchesne County, Utah: U.S. Geol. Survey Oil and Gas Investigations Map OM 115.
- Ingram, R.L., 1954, Terminology for the thickness of stratification and parting units in sedimentary rocks: Geol. Soc. America Bull., v. 65, p. 937-938.
- Kinney, D.M., 1955, Geology of the Uinta River-Brush Creek area, Duchesne and Uintah Counties, Utah: U.S. Geol. Survey Bull. 1007, p. 126-130.
- Lochman-Balk, Christina, 1959, The Cambrian section in the central and southern Wasatch Mountains, in Guidebook to the geology of the Wasatch and Uinta Mountains transition area: Intermtn. Assoc. Petroleum Geologists, 10th Ann. Field Conf., p. 40-45.
- Lupton, C.T., 1912, The Blacktail (Tabby) Mountain coal field, Wasatch County, Utah: U.S. Geol. Survey Bull. 471, p. 592-628.
- McKee, E.D., and Wier, G.W., 1953, Terminology for stratification and cross-stratification in sedimentary rocks: Geol. Soc. America Bull., v. 64, p. 381-389.
- Meek, F.S., 1876, A report of the invertebrate Cretaceous and Tertiary fossils of the upper Missouri country, in Hayden, F.V., 1876, Report of the U.S. Geol. Survey of the territories, v. 9, p. 1-43.
- Moussa, M.T., 1965, Geology of the Soldier Summit quadrangle, Utah: Unpublished Ph.D. thesis, Univ. of Utah.
- Murany, E.E., 1963, Subsurface stratigraphy of the Wasatch Formation of the Uinta Basin, Utah: Unpublished Ph.D. thesis, Univ. of Utah.
- _____ 1964, Wasatch Formation of the Uinta Basin, in Guidebook to the geology and mineral resources of the Uinta Basin: Intermtn. Assoc. Petroleum Geologists, 13th Ann. Field Conf., p. 145-155.
- Osmond, J.C., 1964, Tectonic history of the Uinta Basin, Utah, in Guidebook to the geology and mineral resources of the Uinta Basin: Intermtn. Assoc. Petroleum Geologists, 13th Ann. Field Conf., p. 47-58.
- Pettijohn, F.J., 1957, Sedimentary rocks: New York, Harper and Bros., 2nd ed., p. 243-339.
- Sadlick, Walter, 1957, Regional relations of Carboniferous rocks of northeastern Utah, in Guidebook to the geology of Uinta Basin, Utah: Intermtn. Assoc. Petroleum Geologists, 8th Ann. Field Conf., p. 56-77.

- _____ 1959, Illustrated sections of strata adjustment to the Mississippian-Pennsylvanian boundary, western Uinta Mountains, *in* Guidebook to the geology of the Wasatch and Uinta Mountains transition area: Intermtn. Assoc. Petroleum Geologists, 10th Ann. Field Conf., p. 75-81.
- Shroder, J.F., 1967, Landslides of Utah: Unpublished Ph.D. thesis, Univ. of Utah.
- Scott, W.F., 1959, Stratigraphy of the Triassic sequence in the Wasatch and Uinta Mountains, *in* Guidebook to the geology of the Wasatch and Uinta Mountains transition area: Intermtn. Assoc. Petroleum Geologists, 10th Ann. Field Conf., p. 101-108.
- Shepard, F.P., 1954, Nomenclature based on sand-silt-clay ratios: Jour. Sed. Petrology, v. 24, p. 151-158.
- Spieker, E.M., 1946, Late Mesozoic and early Cenozoic history of central Utah: U.S. Geol. Survey Prof. Paper 205-D, p. 133-135.
- Stanton, T.W., 1893, The Colorado Formation and its invertebrate fauna: U.S. Geol. Survey Bull. 106, p. 1-45.
- Stokes, W.L., and others, 1955, Correlation of Mesozoic formations of Utah: Am. Assoc. Petroleum Geologists Bull., v. 39, p. 2003-2019.
- _____ 1957, Jurassic system of the southern flank of the Uinta Mountains, *in* Guidebook to the geology of Uinta Basin, Utah: Intermtn. Assoc. Petroleum Geologists, 8th Ann. Field Conf., p. 92-96.
- Stokes, W. L., and Madsen, J. H., Jr., 1961, Geologic map of Utah, northeast quarter: Washington, Williams and Heintz Map Corp.
- Utah State Engineers Office, and others, 1960, Normal annual precipitation, 1931-1960, State of Utah: Map published by Utah State Engineers Office.
- Walton, P.T., 1944, Geology of the Cretaceous of the Uinta Basin, Utah: Geol. Soc. America Bull., v. 55, p. 91-130.
- _____ 1957, Cretaceous stratigraphy of the Uinta Basin, *in* Guidebook to the geology of Uinta Basin, Utah: Intermtn. Assoc. Petroleum Geologists, 8th Ann. Field Conf., p. 97-101.
- _____ 1964, Late Cretaceous and early Paleocene conglomerates along the margin of the Uinta Basin, *in* Guidebook to the geology and mineral resources of the Uinta Basin: Intermtn. Assoc. Petroleum Geologists, 13th Ann. Field Conf., p. 139-143.
- Wentworth, C.K., 1922, A scale of grade and class terms for clastic sediments: Jour. Geology, v. 30, p. 377-392.
- Williams, N.C., 1950, Tertiary stratigraphy of the Uinta Basin, *in* Guidebook to the geology of Uinta Basin, Utah: Intermtn. Assoc. Petroleum Geologists, 5th Ann. Field Conf., p. 101-114.

_____ 1957, Cambrian stratigraphy of the south flank of the Uinta Mountains, in Guidebook to the geology of Uinta Basin, Utah: Intermtn. Assoc. Petroleum Geologists, 8th Ann. Field Conf., p. 53-55.

Williams, N.C., and Madsen, J.H., Jr., 1959, Late Cretaceous stratigraphy of the Coalville area, Utah, in Guidebook to the geology of the Wasatch and Uinta Mountains transition area: Intermtn. Assoc. Petroleum Geologists, 10th Ann. Field Conf., p. 122-125.

Appendix A

Section 1 of Currant Creek Formation along Red Creek in Secs. 26 and 35,
T. 1 S., R. 9 W., Uinta Special Meridian, Duchesne County, Utah.

Tertiary

Uinta Formation

Sandstones and siltstones interbedded. Sandstones: light-gray, weather light-gray; fine- to medium-grained, subrounded to rounded grains; calcareous cement, thick-bedded (1 to 2 feet); composed of 98 percent quartz and 2 percent chert. Siltstones: reddish-brown, weather reddish-brown; clayey; calcareous cement; thick- to very thick-bedded (1 to 5 feet); weather to small pinnacles; contain bentonite weathering to "popcorn" surface.

Unconformity.

Tertiary-Cretaceous

Feet

Currant Creek Formation

1. Slope; reddish sandy soil; contains chips and blocks of Uinta Formation talus; contact with Uinta obscure	43
2. Slope; reddish clayey soil; covered with Bishop Conglomerate talus. Downslope is outcrop of sandstone; light-gray; fine- to medium-grained; subangular to subrounded grains; fairly sorted; calcareous cement; friable	12
3. Slope; reddish clayey-sandy soil; Bishop Conglomerate talus	155
4. Alluvium	34
5. Slope; yellowish-brown to light-gray sandy soil	79
6. Sandstone and siltstone; variegated; sandstone, fine-grained; subrounded grains; well-sorted; calcareous cement; friable; medium-bedded; interbedded with siltstone	5
7. Slope; light-yellowish-brown clayey-sandy soil	41
8. Sandstone; light-gray, weathers light-gray; fine- to medium-grained; angular to subrounded grains; light calcareous cement; friable; some grains frosted; medium-bedded (8 to 12 inches); composed of 94 percent quartz, 6 percent quartzite and other rock fragments, and a trace of glauconite. Large Cretaceous sandstone boulder as talus on outcrop	14
9. Slope; yellowish-gray to light-reddish-brown sandy soil covered with Bishop and Uinta talus	385
10. Sandstone; light-reddish-brown, weathers reddish-gray; very fine- to coarse-grained; subangular to subrounded grains; poorly sorted;	

	Feet
calcareous cement; somewhat friable; some grains frosted; medium-bedded (6 to 12 inches); composed of 92 percent quartz and chert and 8 percent quartzite and other rock fragments	21
11. Sandstone; light-gray, weathers gray; fine- to medium-grained; subangular to subrounded grains; poorly sorted; calcareous cement; somewhat friable; medium-bedded (6 inches); beds poorly exposed; composed of 90 percent quartz and chert and 10 percent quartzite and other rock fragments	15
12. Slope; red clayey-sandy soil	70
13. Alluvium	20
14. Slope; red clayey-sandy soil	50
15. Alluvium	198
16. Slope; red clayey-sandy soil	20
17. Sandstone; light-yellowish-gray, weathers light-gray; fine-grained; subangular to subrounded grains; well-sorted; light calcareous cement; friable; medium-bedded (4 to 12 inches); interbeds of very thin-bedded (0.4 to 1 inch) sandstone; low-angle cross-bedding prominent; composed of 99 percent quartz and 1 percent chert.	20
18. Slope; reddish clayey-sandy soil	93
19. Alluvium; approximately 240 feet from base of unit is a small hill protruding into alluvium; possibly sandstone	290
20. Conglomerate; light-reddish-gray, weathers reddish-brown; framework of cobbles and pebbles, pebbles predominant; angular to subangular particles; fairly sorted. Voids with sandstone matrix; medium- to coarse-grained, angular grains; poorly sorted; calcareous cement; composed of 90 percent quartz and 10 percent quartzite and other rock fragments	25
21. Sandstone; light-gray, weathers light-gray; fine- to coarse-grained; subangular to subrounded grains; poorly sorted; calcareous cement; some grains frosted; medium-bedded (4 to 8 inches); low-angle cross-bedding prominent; composed of 90 percent quartz, 8 percent quartzite and other rock fragments, and 2 percent pink chert. . .	4
22. Slope; sandy soil	40
23. Alluvium	115
24. Sandstone; light-gray, weathers light-gray; fine- to coarse-grained; angular to subrounded grains; poorly sorted; calcareous cement;	

	Feet
massive-bedded; grades upward into medium-grained sandstone; composed of 85 percent quartz and chert and 15 percent quartzite and other rock fragments	10
25. Slope; sandy soil covered with Bishop and Currant Creek talus . .	10
26. Sandstone; yellowish-white, weathers yellowish-gray; very fine- to medium-grained; subangular to subrounded grains; poorly sorted; calcareous cement; friable; some grains frosted; massive-bedded; low-angle cross-bedding; pebbly in places; composed of 93 percent quartz, 6 percent quartzite and other rock fragments, and 1 percent chert	3
27. Conglomerate; light-reddish-gray, weathers dark-reddish-gray; framework of cobbles, pebbles, and granules; cobbles subangular to rounded; other particles subangular; graded bedding; cobbles lower 13½ feet, pebbles and granules upper 2½ feet; particles composed of 60 percent Weber Quartzite, 35 percent Cretaceous sandstone, 4 percent limestone of unknown age, and 1 percent red chert; disoriented. Voids with sandstone matrix; fine- to coarse-grained; subangular grains; poorly sorted; calcareous cement	16
28. Slope; red sandy soil	40
29. Conglomerate; light-gray, weathers light-yellowish-gray; framework of pebbles, granules, and some clay gill material; cobbles average 2 by 3 inches in size, pebbles and granules of all sizes; subangular to subrounded particles; poorly sorted; graded bedding; grades upward into pebble conglomerate. Voids with sandstone matrix; medium- to coarse-grained; subangular to subrounded grains; poorly sorted; calcareous cement	9
30. Conglomerate; light-gray, weathers light-gray; framework of pebbles grading upward into cobbles; subrounded to rounded particles; fairly sorted; graded bedding; particles composed of 60 percent Weber Quartzite, 33 percent Cretaceous sandstone, 7 percent Mississippian-Pennsylvanian black chert, and a trace of Paleozoic limestone. Voids with sandstone matrix; same as unit 29	4
31. Sandstone; light-greenish-yellow, weathers light-gray; fine- to medium-grained; subrounded to rounded grains; poorly sorted; calcareous cement; limonite staining along bedding planes; some grains frosted; massive-bedded; unit thins rapidly eastward; gradational with overlying beds; composed of 85 percent quartz and chert and 15 percent quartzite and other rock fragments	6
32. Sandstone; light-gray, weathers gray; fine- to medium-grained; subrounded grains; poorly sorted; calcareous cement; somewhat friable; some grains frosted; very thin-bedded (0.4 to 0.5 inches) becoming thinner near top of unit; coarser grained near top of unit and coarser grained along strike, grades westward into very coarse-grained	

	Feet
sandstone and granule conglomerate; interbeds of cobble conglomerate; cobbles angular to rounded; fairly sorted; low-angle cross-bedding; cobbles composed of rocks from Precambrian to Tertiary lithologies	10
33. Conglomerate; light-gray, weathers light-gray; framework of cobbles, pebbles, and granules; cobbles and pebbles predominant; cobbles average 2 by 3 inches in size, pebbles and granules of all sizes; angular to subangular particles; poorly sorted; thick-bedded; unit pinches out westward into cobble conglomerate	2
34. Slope; reddish clayey-sandy soil; contains bentonite weathering to "popcorn" surface	190
35. Conglomerate; yellowish-brown, weathers yellowish-brown; framework of boulders and cobbles, mostly cobbles; boulders 1.5 to 2.5 feet in diameter, cobbles average 3 by 8 inches in size; subrounded to rounded particles; fairly sorted; particles elliptical in shape; boulders composed of Cretaceous sandstone; cobbles composed of mostly Weber Quartzite with some Mutual Quartzite and Mississippian-Pennsylvanian black chert. Voids with sandstone matrix; calcareous cement; friable	70
36. Slope; yellow to red clayey-sandy soil	258
37. Sandstone; light-yellowish-brown, weathers light-yellowish-brown; fine-grained; subrounded grains; well-sorted; calcareous cement; very friable; light-yellow limonite staining of grains; massive-bedded; composed of 98 percent quartz and chert and 2 percent quartzite and other rock fragments	26
38. Conglomerate; yellowish-brown, weathers light-yellowish-brown; framework mostly cobbles with some pebbles; massive-bedded; same as unit 40	20
39. Sandstone; light-yellowish-brown, weathers light-yellowish-brown; fine- to medium-grained; subrounded to rounded grains; fairly sorted; trace of calcareous cement; friable; grains frosted; light-yellow limonite stain on grains; spotty red limonite in places; massive-bedded; contains thin lenses of pebble conglomerate; composed of 95 percent quartz and chert and 5 percent quartzite and other rock fragments	13
40. Conglomerate; yellowish-brown, weathers yellowish-brown; framework of cobbles interbedded with pebbles; cobbles subrounded to rounded, pebbles more subangular; fairly sorted; particles oriented northwest-southeast; grades upward into pebbly sandstone; sandstone tongues penetrate outcrop and thin westward. Voids with sandstone matrix; fine- to medium-grained, subrounded grains; fairly sorted; trace of calcareous cement; friable; streaky limonite staining, some staining dark-brown to black	15

	Feet
41. Sandstone; yellowish-brown, weathers yellowish-brown; fine- to medium-grained; subangular grains; fairly sorted; calcareous cement; friable; grains frosted; yellow limonite staining on grains; massive-bedded	16
42. Conglomerate; yellowish-brown, weathers light-yellowish-brown; contains interbedded pebble and cobble conglomerate; same as unit 40	12
43. Sandstone, light-yellowish-brown, weathers light-yellowish-brown; very fine- to medium-grained; subangular grains; poorly sorted; trace of calcareous cement; friable; some grains frosted; light-yellow limonite staining of grains; thick-bedded; unit thickens rapidly eastward; composed of 96 percent quartz, 3 percent quartzite and other rock fragments, and 2 percent chert	2
44. Conglomerate; yellowish-brown, weathers light-yellowish-brown; framework of cobbles and pebbles, mostly pebbles; cobbles near top and base of unit; sharp upper and lower contacts	9
45. Sandstone; same as unit 43; thickens eastward, pinches out a few feet westward	1
46. Conglomerate; light-yellowish-brown, weathers yellowish-brown; framework of cobbles and pebbles, mostly pebbles, angular to subrounded particles; fairly sorted; particles elliptical in shape; oriented northwest-southeast; composed of mostly Weber Quartzite, with some Mississippian-Pennsylvanian black chert. Voids with sandstone matrix; same lithology as unit 47	7
47. Sandstone; light-yellowish-brown, weathers yellowish-brown; fine-grained, subangular grains; well-sorted; light calcareous cement; friable; grains frosted; yellow limonite staining on grains; limonite staining along bedding planes; medium-bedded; composed of 97 percent quartz, 2 percent chert, and 1 percent quartzite and other rock fragments.	2
48. Conglomerate; yellowish-brown, weathers yellowish-brown; framework of cobbles and pebbles, mostly pebbles; cobbles predominate in center of unit; particles range from 1 to 3 inches in diameter; subangular to subrounded particles; fairly sorted; thick-bedded. Voids with sandstone matrix; same lithology as unit 47	3
49. Conglomerate and sandstone; yellowish-brown, weathers yellowish-brown; framework of pebbles at base of unit, upper half of unit is graded from cobbles, 2.5 inches in diameter, to coarse sand; heavy limonite staining throughout	2
50. Sandstone; light-yellowish-brown, weathers light-yellowish-brown; fine- to medium-grained; subangular to subrounded grains;	

	Feet
fairly sorted; spotty calcareous cement; friable; yellow limonite staining on grains; thick-bedded	1
51. Conglomerate; light-yellowish-brown, weathers yellowish-brown; framework of cobbles and pebbles; disoriented; particles composed of Weber Quartzite and Mississippian-Pennsylvanian black chert. Voids with sandstone matrix; same lithology as unit 52	0.5
52. Sandstone; light-yellowish-brown, weathers light-yellowish-brown; fine- to medium-grained; subangular to subrounded grains; fairly sorted; spotty calcareous cement; friable; yellow limonite staining on grains; thick-bedded	3
53. Conglomerate; light-yellowish-brown, weathers yellowish-brown; framework of cobbles and pebbles; same lithology as unit 55. . .	2
54. Sandstone; light-yellowish-brown, weathers light-yellowish-brown; massive-bedded; same lithology as unit 52	6
55. Conglomerate; light-yellowish-brown, weathers light-yellowish-brown; framework of boulders, cobbles, and pebbles; mostly cobbles and pebbles; boulders range from 1.5 by 2 feet to 2 by 3 feet in size, one boulder 4 by 6 feet in size; cobbles range from 8 by 10 inches to 2 by 2 inches and average 3 by 5 inches in size; pebbles of all sizes; subrounded to rounded particles; fairly sorted; percussion marks on most particles; framework material composed of mostly Weber Quartzite with some Mutual Quartzite, Mississippian-Pennsylvanian black chert, and Cretaceous sandstone, most boulders are Cretaceous sandstone. Voids with sandstone matrix; same lithology as unit 56.	9
56. Sandstone; light-yellowish-brown, weathers light-yellowish-brown; fine-grained; subangular to subrounded grains; well-sorted; calcareous cement; friable; yellow limonite staining on grains; massive-bedded; low-angle cross-bedding; unit becomes pebbly near top of outcrop; unconformable with overlying conglomerate, red limonite staining along contact; composed of 98 percent quartz, 1 percent chert, and 1 percent rock fragments	31
57. Conglomerate; light-reddish-yellow, weathers yellowish-brown; framework of cobbles and pebbles, mostly cobbles; cobbles subrounded to rounded, pebbles subangular to rounded; fairly sorted; contains thin lenses of granule and pebble conglomerate, scattered clay galls; general disorientation of material; particles composed of mostly Weber Quartzite with some Mutual Quartzite and Mississippian-Pennsylvanian black chert, and a trace of green quartzite, Twin Creek Limestone (oolitic), and Shinarump Member of the Chinle Formation; most particles fractured, red limonite staining along fractures. Voids with sandstone matrix	12.5
58. Sandstone; light-yellow, weathers yellow; fine- to medium-grained; subrounded to rounded grains; fairly sorted; trace calcareous	

	Feet
cement; friable; yellow limonite staining on grains; very thick-bedded; composed of 94 percent quartz, 5 percent black and pink chert, and 1 percent rock fragments	5
59. Slope; sandy soil covered with cobble gravel	146
60. Alluvium	57
61. Sandstone; light-gray, weathers dark light-gray; fine- to medium-grained; subangular to subrounded grains; fairly sorted; calcareous cement; some grains frosted; yellow limonite staining in streaks, chlorite staining of some grains; medium-bedded (6 to 12 inches); composed of 85 percent quartz, 14 percent pink and black chert, and 1 percent rock fragments	35
62. Sandstone; reddish-brown, weathers red; very fine- to medium-grained; angular to rounded grains; poorly sorted; calcareous cement; some grains frosted; red limonite staining on grains and matrix; massive-bedded; composed of 80 percent quartz, 10 percent quartzite and other rock fragments, 8 percent black and red chert, 1 percent muscovite, and 1 percent dark altered mafic minerals.	37
63. Slope; dark-reddish-brown sandy soil; contains loose blocks of sandstone, light-yellowish-brown, weathers light-yellowish-brown; very fine- to medium-grained; subangular to rounded grains; poorly sorted; calcareous cement; limonite staining of grains and cement; composed of 75 percent quartz, 20 percent quartzite and other rock fragments, and 5 percent black and pink chert	114
64. Sandstone; light-yellowish-brown, weathers light-reddish-brown; fine- to medium-grained; subangular to subrounded grains; poorly sorted; calcareous cement; medium-bedded (4 to 6 inches); composed of 75 percent quartz and 25 percent quartzite and other rock fragments	1
65. Sandstone and pebble conglomerate; light-yellowish-gray, weathers yellowish-gray; pebbles and granules at base of unit; subangular to subrounded particles; conglomerate grades upward into pebbly sandstone; graded bedding	21
66. Slope; sandy soil covered with sandstone talus	42
67. Sandstone; yellowish-brown, weathers light-yellowish-brown; fine- to medium-grained; subangular to subrounded grains; fairly sorted; calcareous cement; limonite staining throughout; thin- to medium-bedded (2 to 6 inches); poorly exposed; composed of 75 percent quartz, 15 percent quartzite and other rock fragments, 9 percent pink and black chert, and 1 percent muscovite and chlorite . . .	18
68. Sandstone; light-yellowish-brown, weathers yellowish-gray; fine- to medium-grained; subangular to subrounded grains; fairly sorted;	

<p>calcareous cement; some grains frosted; spotty limonite staining; thick-bedded; grains become more coarse near base of unit; cobble sandstone at base of unit; composed of 85 percent quartz, 10 percent quartzite and other rock fragments, and 5 percent pink and black chert</p>	8
<p>69. Slope; sandy soil covered with cobble and pebble gravel</p>	30
<p>70. Sandstone; light-yellowish-gray, weathers light-yellowish-gray; medium-grained, subangular grains; well-sorted; calcareous cement; friable; grains frosted; some limonite staining in patches; very thick-bedded; composed of 90 percent quartz, 8 percent quartzite and other rock fragments, 1 percent chert, and 1 percent mica-ceous rock fragments</p>	4
<p>71. Conglomerate; light-yellowish-gray, weathers light-yellowish-gray; framework of cobbles and pebbles, mostly cobbles; cobbles average 3 by 5 inches in size, pebbles of all sizes; cobbles subrounded to rounded, pebbles subangular to subrounded; cobbles composed of Weber Quartzite with some Mutual Quartzite; pebbles composed of mostly Mississippian-Pennsylvanian black chert and quartzite as above; particles oriented northwest-southeast. Voids with sandstone matrix; same lithology as unit 70</p>	37
<p>72. Sandstone; light-gray, weathers light-gray; very fine- to medium-grained; subangular to subrounded grains; poorly sorted; calcareous cement; friable; massive-bedded; beds grade laterally eastward into cobble-pebble conglomerate displaying graded bedding from cobbles into sandstone. Sandstone bed pinches out westward; composed of 70 percent quartz (abundant vein quartz), 20 percent quartzite and other rock fragments, and 10 percent chert</p>	2
<p>73. Conglomerate; light-reddish-brown, weathers yellowish-brown; framework of cobbles and pebbles, mostly cobbles; cobbles average 3 by 5 inches in size; subrounded to rounded particles; cobbles composed of mostly Weber Quartzite with some Mutual Quartzite, pebbles composed of Mississippian-Pennsylvanian black chert and quartzite as above. Voids with sandstone matrix; same lithology as unit 72.</p>	23
<p>74. Slope; sandy soil; adjacent wash contains 1-foot thick sandstone outcrop at base of slope. Sandstone; light-reddish-brown, weathers yellowish-brown; very fine- to medium-grained; subangular to subrounded grains; poorly sorted; calcareous cement; somewhat friable; spotty limonite staining; very thin-bedded (0.5 inch); composed of 75 percent quartz, 20 percent quartzite and other rock fragments, and 5 percent chert</p>	41
<p>75. Sandstone; light-reddish-brown, weathers yellowish-brown; fine- to medium-grained; subangular to subrounded grains; fairly sorted; calcareous cement; friable; limonite staining of grains; thin-bedded (3 inches); composed of 90 percent quartz, 8 percent quartzite</p>	

	Feet
and other rock fragments, and 2 percent chert, with a trace of muscovite	2
76. Conglomerate; light-reddish-brown, weathers light-reddish-brown; framework of boulders, cobbles, and pebbles, mostly cobbles; boulders average 12 inches in diameter, cobbles average 6 inches in diameter, pebbles of all sizes; boulders subrounded; graded bedding pronounced near base of unit; larger particles aligned northwest-southeast; percussion marks, 2 inches in diameter, abundant; particles composed mostly of Weber Quartzite with some Mutual Quartzite and Mississippian-Pennsylvanian black chert, and a trace of vein quartz. Voids with sandstone matrix; same lithology as unit 78	35
77. Slope; sandy soil covered with cobble gravel	50
78. Sandstone; light-yellowish-gray, weathers light-yellowish-brown; very fine- to medium-grained, mostly very fine-grained; subangular grains; fairly sorted; calcareous cement; limonite staining of grains and cement; thin-bedded (2 to 4 inches); composed of 65 percent quartz (10 percent of this is vein quartz), 25 percent quartzite and other rock fragments, and 10 percent chert with a trace of muscovite	1
79. Sandstone; same lithology as unit 81	3
80. Conglomerate; light-yellowish-gray, weathers light-yellowish-brown; framework of cobbles and pebbles, mostly cobbles; cobbles composed of Weber Quartzite with some Mutual Quartzite, pebbles composed of mostly Mississippian-Pennsylvanian black chert with some Cretaceous sandstone; percussion marks, very large (1 to 2 inches). Voids with sandstone matrix; same lithology as unit 81.	8
81. Sandstone; light-yellowish-brown, weathers light-yellowish-brown; very fine- to fine-grained; subangular to subrounded grains; fairly sorted; calcareous cement; thin-bedded (0.2 inches); unit thins rapidly eastward and thickens to about 15 feet westward where it is covered by talus; composed of 50 percent quartz (10 percent of this is vein quartz), 40 percent quartzite and other rock fragments, and 10 percent chert	7
82. Conglomerate; light-yellowish-brown, weathers light-yellowish-brown; framework of boulders, cobbles, and pebbles, mostly cobbles; cobbles average 6 by 8 inches in size; particles oriented about N.85° W. and imbricated from 20° to 30° west; boulders and cobbles are Weber Quartzite, smaller cobbles and pebbles are Weber Quartzite and Mississippian-Pennsylvanian black chert; interbedded sandstone tongues from 1 to 2 feet thick pinch out westward. Voids with sandstone matrix; same lithology as unit 83.	32
83. Sandstone; light-gray, weathers light-yellowish-gray; very coarse-grained; angular to subangular grains; well-sorted; calcareous	

	Feet
cement; yellow limonite staining; very thick-bedded; in sharp contact with underlying beds; composed of 50 percent vein and clear quartz and 50 percent quartzite and other rock fragments . . .	4
84. Sandstone; reddish-brown, weathers light-reddish-brown; fine- to medium-grained; subangular grains; poorly sorted; calcareous cement; friable; light-yellow limonite staining on grains, dark-brown limonite staining on cement; massive - bedded; low-angle cross-bedding; tongues of pebble and granule conglomerate pinch out eastward; graded bedding pronounced in conglomerate tongues; composed of 65 percent quartz and chert, 35 percent quartzite and other rock fragments, and a trace of muscovite.	13
85. Conglomerate; light-yellowish - gray, weathers yellowish - brown; same lithology as unit 88	8
86. Slope; sandy soil covered with cobble gravel	47
87. Sandstone; light-reddish-brown, weathers yellowish-brown; fine- to medium - grained; angular to subangular grains; poorly sorted; calcareous cement; some grains frosted; limonite staining throughout; composed of 65 percent quartz, 20 percent black chert, and 15 percent quartzite and other rock fragments	2
88. Conglomerate; light-yellowish-gray, weathers yellowish-brown; framework of cobbles and pebbles, mostly cobbles; particles sub-rounded to rounded; particles oriented about N. 80° W. and imbricated about 30° west; thin lenses of pebble conglomerate characteristic; 8 feet up from base of unit is thin lens of sandstone 1.5 feet thick. Voids with sandstone matrix; fine- to coarse-grained; angular grains; poorly sorted; calcareous cement; composed of 50 percent quartz, 35 percent quartzite and other rock fragments, and 15 percent chert. Lithic (petromict) cobble conglomerate. Sandstone lens; yellowish - gray, weathers yellowish - gray; fine- to medium-grained; angular to subangular grains; poorly sorted; trace calcareous cement; friable; yellowish- to reddish-yellow limonite staining on grains; composed of 65 percent quartz, 25 percent quartzite and other rock fragments, and 10 percent black chert. .	32
89. Slope; sandy soil covered with cobble gravel	33
90. Siltstone; light-reddish-brown, weathers light-reddish-brown; calcareous; dense; medium-bedded; nodular weathering surface; composed of 50-60 percent quartz siltstone, 30-40 percent very fine-grained sandstone, and 10 percent black chert.	2
91. Slope; sandy soil; covered with pebble gravel lower 48 feet . . .	148
92. Sandstone; light-reddish-brown, weathers yellowish-gray; medium- to coarse-grained; angular to subangular grains; fairly sorted; light calcareous cement; friable; light - yellow to brownish-yellow	

limonite staining on grains; medium-bedded (8 inches); beds grade upward into pebble conglomerate; composed of 70 percent clear and vein quartz, 20 percent quartzite and other rock fragments, and 10 percent black chert.	1
93. Conglomerate; light-yellowish-brown to gray, weathers light-yellowish-brown to gray; framework of pebbles, 1.5 to 2 inches in diameter; subangular to subrounded pebbles; fairly sorted; composed of Mississippian-Pennsylvanian black chert and Weber Quartzite; outcrop poorly exposed. Voids with sandstone matrix; medium-grained; subangular to subrounded grains; poorly sorted; calcareous cement	12
94. Slope; sandy soil covered with thin sandstone plates	35
95. Sandstone; yellowish-brown, weathers yellowish-brown; very fine-grained; subrounded to rounded grains; fairly sorted; calcareous cement; friable; reddish-brown limonite staining throughout; thin-bedded (1.5 inches); beds poorly exposed; composed of 60 percent clear and vein quartz, 30 percent quartzite and other rock fragments, and 10 percent chert	31
96. Slope; sandy soil covered with cobble gravel; contains scattered conglomerate columns. Conglomerate; light-yellowish-gray, weathers light-yellowish-gray; framework of cobbles, pebbles, and granules, mostly cobbles; cobbles subrounded to rounded, pebbles subangular to rounded, granules angular to subangular; particles aligned approximately N. 55° W. Voids with sandstone matrix; medium- to coarse-grained; subangular to subrounded grains; poorly sorted; calcareous cement; limonite staining along current bedding; massive-bedded; current beds 0.1 to 0.2 inches thick. Sandstone tongue 1 foot thick penetrates column, thins rapidly eastward . .	35
97. Slope, sandy soil covered with cobble gravel	87
98. Sandstone; light-gray, weathers light-yellowish-gray; medium- to coarse-grained; angular to subangular grains; fairly sorted; light calcareous cement; friable; light-yellow limonite staining on some grains; very thin-bedded (0.3 inch); poorly defined low-angle cross-bedding; composed of 50 percent clear and vein quartz, 30 percent quartzite rock fragments, 10 percent dark rock fragments, and 10 percent black chert.	6
99. Conglomerate; light-yellowish-brown, weathers light-yellowish-brown; framework of boulders, cobbles, and pebbles; mostly cobbles; cobbles average 8 by 12 inches in size; particles subrounded to rounded; fairly sorted; oriented approximately N. 53° W.; boulders and cobbles mostly Weber Quartzite with some Mutual Quartzite, pebbles primarily Mississippian-Pennsylvanian black chert. Voids with sandstone matrix; coarse- to very coarse-grained; angular grains; fairly sorted; calcareous cement	20

	Feet
100. Siltstone; reddish-brown; weathers light-reddish-gray; calcareous; dense; dark-reddish-brown limonite staining along bedding planes; laminated (0.1 inch); some dark-reddish-brown limonite concretions; abundant plant debris; composed of 60 percent quartz siltstone and 40 percent sandstone, very fine-grained, composed of clear quartz and dark rock fragments	4
101. Conglomerate; light-reddish-brown; weathers light-reddish-brown; framework of cobbles and pebbles, mostly cobbles; cobbles of Weber Quartzite, pebbles of Weber Quartzite and Mississippian-Pennsylvanian black chert. Voids with sandstone matrix; same lithology as unit 99	7
102. Sandstone; light-yellowish-gray, weathers light-yellowish-gray; coarse-grained; angular grains; fairly sorted; calcareous cement; friable; medium-bedded (6 inches); interbedded with lenses of thin- to medium-bedded (3 to 12 inches) pebble and cobble conglomerate.	7
103. Conglomerate; light-gray to reddish-brown; weathers light-yellowish-gray; framework of cobbles, pebbles, and granules, mostly pebbles; cobbles average 3 by 5 inches in size, pebbles average 1 inch in size, granules of all sizes; subrounded to rounded particles becoming more angular with decreasing size; larger particles elliptical in shape; cobbles and pebbles oriented northwest-southeast, imbricated 30° northwest; graded bedding, becomes finer and more sandy near top of unit; cobbles composed of Weber Quartzite; pebbles composed of Weber and Mutual Quartzite with abundant Mississippian-Pennsylvanian black chert. Voids with sandstone matrix; coarse-grained; angular grains; fairly sorted; light calcareous cement; friable	3
104. Slope; sandy soil covered with cobble and pebble gravel	<u>74</u>
Total Formation	3,940 Feet
Unconformity.	

Cretaceous

Mesaverde Formation

Sandstone; grayish-white, weathers light-reddish-gray; fine- to medium-grained; subangular to subrounded grains; fairly sorted; calcareous cement; dense; some grains frosted; contains scattered small pebbles and granules of quartzite and chert; coal-bearing in places; forms steep ledges; contact with overlying Currant Creek Formation obscure, chosen mainly on weathering resistance; Mesaverde resistant, Currant Creek partly nonresistant.

Appendix B

Section 2 of Currant Creek Formation near Duchesne River in Little Valley
in the E $\frac{1}{2}$ Sec. 18, T. 1 S., R. 7 W., Uinta Special Meridian,
Duchesne County, Utah.

Tertiary

Uinta Formation

Conglomerate, sandstone, siltstone, mudstone, and shale. Conglomerate; light-gray to gray; boulders, cobbles, pebbles, and granules; subangular to rounded particles; composed of lithologies from Precambrian to Cretaceous. Sandstone; light-gray to grayish-red; fine- to coarse-grained; subangular to subrounded grains. Siltstone and mudstone; gray to grayish-green and grayish-red; calcareous. Shale; grayish-green to red; calcareous; sandy; irregular bedding; lenses. Weathers into slopes and ledges; contains interbedded bentonites weathering to "popcorn" surfaces.

Unconformity.

Tertiary-Cretaceous

Feet

Currant Creek Formation

- | | |
|--|----|
| 0. Alluvium; contains Uinta and Currant Creek talus. Unconformity above obscured by alluvium. | 26 |
| 1. Conglomerate; light-reddish-gray, weathers light-reddish-gray; framework of boulders; boulders average 12 inches in diameter, subrounded to rounded, composed of Cretaceous sandstone. Voids with sandstone matrix; poorly exposed | 22 |
| 2. Slope; sandy soil | 8 |
| 3. Conglomerate; light-reddish-gray, weathers light-reddish-gray; framework of boulders; boulders average 12 inches in diameter, subrounded to rounded, composed of Cretaceous sandstone; outcrop poorly exposed; boulders fossiliferous | 37 |
| 4. Slope; sandy soil | 57 |
| 5. Sandstone; light-yellowish-gray, weathers yellowish-gray; very fine- to fine-grained; subangular to subrounded grains; fairly sorted; calcareous cement; limonite staining in places; thin-bedded; trace of bone debris; composed of 95 percent quartz and 5 percent pink and black chert | 30 |
| 6. Sandstone; light-gray, weathers light-gray; fine-grained; subangular to subrounded grains; well-sorted; calcareous cement; friable; light-yellow limonite staining; very thin- to thin-bedded (0.2 to 0.5 inch); may contain bentonite weathering to "popcorn" surface; contains trace of asphaltic residue; composed of 97 percent quartz, 3 percent chert, and a trace of altered mafic minerals. | 30 |

7. Sandstone; light-gray, weathers light-yellowish-gray; fine-grained; subangular to subrounded grains; well-sorted; light calcareous cement; very friable; reddish-brown to red limonite dikes in fractures; light-yellow limonite staining in places; medium-bedded (5 to 8 inches); may contain bentonite weathering to "popcorn" surface; composed of 96 percent quartz, 3 percent black chert, and 1 percent rock fragments 38
8. Conglomerate; light-yellowish-gray, weathers light-yellowish-brown; framework of boulders, cobbles, and pebbles, mostly boulders and cobbles; boulders average 12 inches in diameter; boulders rounded, cobbles subrounded to rounded, pebbles subangular to subrounded; graded bedding, grades upward into cobbles and pebbles; boulders composed of Cretaceous sandstone as described in unit 13; boulders fossiliferous; cobbles composed of Cretaceous sandstone with some Weber Quartzite, pebbles composed of Mississippian-Pennsylvanian black chert and some quartzite; particles disoriented. Voids with sandstone matrix; fine- to medium-grained; subangular to subrounded grains; fairly sorted; light calcareous cement; friable; composed of 98 percent quartz and 2 percent chert. 15
9. Sandstone; light-gray, weathers dark light-gray; very fine- to fine-grained; subangular to subrounded grains; well-sorted; light calcareous cement; somewhat friable; yellow- to yellowish-brown limonite staining in places; medium-bedded (6 inches); trace of asphaltic residue; composed of 96 percent quartz, 3 percent black chert, and 1 percent rock fragments 13
10. Slope; sandy soil covered with Currant Creek talus 26
11. Conglomerate; light-reddish-gray, weathers light-reddish-gray; framework of boulders, cobbles, and pebbles; mostly cobbles and pebbles; boulders range from 1 to 3 feet in diameter, cobbles range from 6 to 12 inches in diameter, pebbles of all sizes; boulders and cobbles elliptical in shape; larger particles oriented approximately N. 52° E.; boulders and cobbles composed of Cretaceous sandstone as described in unit 13, fossiliferous; pebbles composed of quartzite and black chert 17
12. Slope; yellowish-brown sandy soil covered with large talus boulders from above; one boulder 3 by 5 feet in size 21
13. Conglomerate; light-reddish-gray, weathers light-reddish-gray; framework of boulders, cobbles, and pebbles; mostly pebbles lower 12 feet of unit, cobbles and boulders at top of unit; boulders average 12 inches in diameter; boulders and cobbles subrounded to rounded, pebbles subangular to subrounded; graded bedding; larger particles oriented approximately N. 70° W. and N. 70° E.; boulders composed of Cretaceous sandstone, cobbles composed of Cretace-

- ous sandstone and Weber Quartzite, pebbles composed of Weber Quartzite and Mississippian-Pennsylvanian black chert. Boulders are sandstone; yellowish-brown weathers light-yellowish-brown; fine-grained; subrounded to rounded grains; well-sorted; calcareous cement; dense, light-yellowish-brown limonite staining throughout; fossiliferous, fossils along preserved bedding planes; abundant dendrites; composed of 96 percent quartz, 3 percent dark rock fragments, and 1 percent pink chert. Voids with sandstone matrix; fine-grained; subangular to subrounded grains; well-sorted; calcareous cement; friable; light-yellow limonite staining on grains; composed of 96 percent quartz, 3 percent dark rock fragments, and 1 percent pink chert 27
14. Slope; reddish clayey-sandy soil; contact with overlying conglomerate obscure, chosen where red soil grades into reddish-brown soil covered with talus from above. Sandy shale or sandy siltstone. 16
15. Sandstone; light-gray, weathers light-reddish-gray; fine- to medium-grained; subangular to rounded grains; fairly sorted; calcareous cement; somewhat friable; very thin-bedded (0.2 inch); composed of 98 percent quartz and 2 percent pink and black chert. 2.5
16. Conglomerate; light-gray, weathers light-yellowish-gray; framework of pebbles and granules, mostly pebbles; pebbles average 0.2 to 0.5 inches in diameter, granules of all sizes; pebbles subangular to subrounded, granules angular to subangular; graded bedding, grades upward into sandstone. Voids with sandstone matrix; fine- to medium-grained; subangular to subrounded grains; poorly sorted; calcareous cement; light-yellow to reddish-brown limonite on grains 2.5
17. Conglomerate; light-gray, weathers light-yellowish-gray; same lithology as unit 16; graded bedding; contacts with upper and lower units sharp 2
18. Sandstone; light-gray, weathers dark-gray; medium-grained; subangular to subrounded grains, some rounded grains; light calcareous cement; friable; thick-bedded; low-angle cross-bedding poorly exposed; contains scattered pebbles and granules; composed of 98 percent quartz, 1 percent pink chert, and 1 percent black chert 1.5
19. Conglomerate; light-gray, weathers yellowish-gray; framework of small pebbles and granules, mostly granules; angular to subrounded particles; thick-bedded; grades upward into sandstone. Voids with sandstone matrix; fine- to coarse-grained; subangular to subrounded; poorly sorted; calcareous cement; composed of 97 percent quartz and 3 percent pink and black chert 2.5

20. Sandstone; light-gray, weathers light-gray; fine- to coarse-grained; subangular to subrounded grains; poorly sorted; calcareous cement; friable; very thin-bedded (0.3 inch); grades upward into pebble conglomerate; composed of 96 percent quartz and 4 percent chert 4
21. Slope; sandy-clayey soil, may be silty shale as below. 34
22. Shale; light-reddish-gray, weathers reddish-brown; calcareous; contains much sand and siltstone; fibrous satin spar chips scattered on surface; deeply weathered; contains bentonite weathering to "popcorn" surface 20
23. Slope; light-yellowish- to reddish-gray sandy soil; contains some thin beds of sandstone as described in unit 24; probably sandstone grading upward into siltstone and shale 18
24. Sandstone; light-yellowish-gray, weathers light-reddish-gray; fine- to medium-grained; subangular grains; fairly sorted; calcareous cement; composed of 96 percent quartz and 4 percent chert. Orthoquartzite, grades upward into conglomerate; mostly granules upper 4 feet of unit; pebbles average 0.2 inch, granules of all sizes; subangular to angular particles; particles composed of quartzite and black chert with minor amounts of Cretaceous sandstone; very thin- to medium-bedded (0.3 to 12 inches), mostly medium-bedded (0.5 inch); pebble and granule conglomerate thins rapidly eastward and westward, lenticular. 32
25. Sandstone; light-gray, weathers light-reddish-gray; very fine- to medium-grained; subangular to subrounded grains; poorly sorted; calcareous cement; friable; massive-bedded with low-angle cross-bedding; light limonite staining in places; thin lenses of pebble conglomerate and pebbly sandstone common; unit grades upward into very thin-bedded sandstone; composed of 95 percent quartz, 3 percent pink chert, 2 percent black chert, and a trace of green quartzite. 10
26. Sandstone; light-gray, weathers light-gray; fine- to medium-grained, mostly fine-grained; subrounded to rounded grains; fairly sorted; calcareous cement; friable; many grains frosted; very thin-bedded (0.2 inch); grades upward into massive-bedded sandstone; some limonite staining around dark minerals; composed of 90 percent quartz, 7 percent pink chert, 2 percent black chert, 1 percent quartzite, and a trace of dark mafic minerals 4.5
27. Conglomerate; light-gray, weathers light-gray; framework of very small pebbles and granules; pebbles and granules subangular; thin-bedded (2 inches); grades upward into very thin-bedded sandstone; particles composed of gray quartzite and black chert. Voids with sandstone matrix; fine- to very coarse-grained; subangular to subrounded grains; poorly sorted; cal-

	Feet
careous cement; somewhat friable; some light-yellow to light-reddish-brown limonite staining of grains; composed of 95 percent quartz and 5 percent black chert	3.5
28. Slope; reddish sandy soil	5
29. Sandstone; light-gray, weathers light-gray; very fine- to fine-grained; subrounded to rounded grains; fairly sorted; calcareous cement; friable; some grains frosted; very thin- to laminated-bedding (0.1 inch); some poorly defined cross-bedding; composed of 96 percent quartz, 2 percent pink chert, and 2 percent black chert	7
30. Sandstone; light-gray, weathers light-reddish-gray; fine- to coarse-grained; subangular to subrounded grains; poorly sorted; calcareous cement; friable; thick-bedded; contains much small pebble and granule material composed of angular quartzite; contains 92 percent quartz, 4 percent quartzite and other rock fragments, and 4 percent pink and black chert.	2.5
31. Shale; reddish-brown, weathers light-reddish-brown; calcareous; silty; much very fine- to fine-grained quartz sand; deeply weathered; contains bentonite weathering to "popcorn" surface.	38
32. Sandstone; light-gray, weathers light-gray; fine- to medium-grained; subangular to subrounded grains; fairly sorted; light calcareous cement; friable; thin- to massive-bedded; contains lenses of pebble and granule conglomerate; pebbly; composed of 95 percent quartz, 3 percent pink chert, and 2 percent rock fragments	30
33. Sandstone; mostly slope; obscure outcrop	35
34. Sandstone; light-gray, weathers light-gray; very fine- to medium-grained; subangular grains; poorly sorted; calcareous cement; somewhat friable; massive-bedded; pebbly; pebbles average 0.2 inches in diameter; pebbles angular and composed of quartzite; some granules of quartzite and black chert; composed of 90 percent quartz, 5 percent quartzite rock fragments, and 5 percent pink and black chert	25
35. Conglomerate and pebbly sandstone; light-gray, weathers light-gray; framework of very small pebbles and granules; pebbles and granules predominantly quartzite with some black chert and Cretaceous sandstone; somewhat oriented northwest-southeast, otherwise disarranged; massive-bedded; poorly defined low-angle cross-bedding; calcareous cement; friable	25
36. Slope; sandy soil	75
37. Sandstone; light-gray, weathers light-gray; very fine- to medium-grained; subangular to subrounded grains; fairly sorted;	

	Feet
calcareous cement; friable; thin- to medium-bedded (3 to 6 inches); composed of 95 percent quartz, 3 percent pink and black chert, and 2 percent rock fragments	35
38. Siltstone and silty shale; light-reddish-brown to reddish-gray, weathers light-reddish-gray; slightly calcareous; contains some very fine-grained subangular to subrounded quartz grains; contains bentonite weathering to "popcorn" surface	49
39. Sandstone; light - yellowish - red, weathers yellowish - brown; fine- to medium-grained; subangular to rounded grains; fairly sorted; very light siliceous cement; many grains frosted; yellowish-red limonite staining on grains; fractures across grains; massive-bedded; contains lenses of pebble-granule conglomerate and scattered pebbles and granules in sandstone; composed of 96 percent quartz and 4 percent rock fragments . . .	35
40. Slope; reddish-brown to white sandy soil	55
41. Sandstone; light-gray, weathers dark-gray; fine- to medium-grained; subangular to subrounded grains; poorly sorted; calcareous cement; somewhat friable; thick-bedded (2 feet); concretions, 0.1 to 0.2 inch in diameter, same material as host rock; halos up to 0.1 inch wide of dark limonite stain around concretions, soft, in early stage of development; contains scattered large granules and very small pebbles; composed of 85 percent quartz, 8 percent rock fragments, and 5 percent pink and black chert	30
42. Slope; sandy soil	33
43. Sandstone; light-yellowish-gray, weathers yellowish-gray; same lithology as unit 45	6
44. Conglomerate and pebbly sandstone; light-yellowish-gray, weathers yellowish-gray; framework of small pebbles and granules; pebbles and granules composed of gray quartzite and black and pink chert; very thick-bedded. Voids with sandstone matrix; fine- to coarse-grained; subangular to subrounded grains; poorly sorted; calcareous cement	4
45. Sandstone; light-yellowish-gray, weathers yellowish-gray; fine- to medium-grained; angular to subangular grains; fairly sorted; calcareous cement; light-yellow- to yellowish-red limonite staining of grains; contains pebble conglomerates in channels up to 2 feet thick; channels pinch out rapidly east and west along strike; stringers of pebbles and granules persistent throughout unit; massive-bedded; low-angle cross-bedding poorly defined; sandstone composed of 70 percent quartz, 20 percent quartzite and other rock fragments, 10 percent chert, and a trace of bornite?	103

	Feet
46. Slope; reddish clayey-sandy soil	3.5
47. Sandstone; light-gray, weathers light-gray; very fine- to medium-grained; subrounded to rounded grains; poorly sorted; calcareous cement; dense; massive-bedded; low-angle cross-bedding; rhombic fracturing; some asphaltic residue, fluorescent; composed of 90 percent quartz, 7 percent rock fragments, and 3 percent pink and black chert	10
48. Slope; reddish-brown silty soil	19
49. Sandstone; light-yellowish-gray, weathers yellowish-gray; fine- to medium-grained; subrounded to rounded grains; fairly sorted; calcareous cement; light-yellow limonite staining on grains; rhombic fracturing, fractures filled with light-gray, fine- to medium-grained quartz sandstone; massive-bedded; low-angle cross-bedding; composed of 95 percent quartz, 3 percent chert, 2 percent rock fragments, and a trace of obsidian	25
50. Slope; sandy soil	6.5
51. Sandstone; light-yellowish-brown, weathers yellowish-brown; very fine- to fine-grained; subangular to subrounded grains; poorly sorted; light calcareous cement; friable; medium- to massive-bedded (0.5 to 6 feet); rhombic fracturing, rhombs 6 by 12 inches in size; fractures filled with white calcite; composed of 95 percent quartz, 3 percent chert, and 2 percent rock fragments	17
52. Siltstone; light-gray, weathers reddish-brown; calcareous; contains abundant fine- to medium-grained quartz sand; contains bentonite weathering to "popcorn" surface; reddish-brown oxidized zone lower 7 feet of unit	23
53. Sandstone; light-yellowish-gray, weathers yellowish- and brownish-gray; fine- to medium-grained; subrounded to rounded grains; poorly sorted; calcareous cement; some grains frosted; limonite staining in streaks and spots; thick-bedded (1 foot); slight trace of green copper staining.	5
54. Slope; red clayey-sandy soil; deeply weathered	62
55. Sandstone; light-yellowish-brown, weathers yellowish-brown; medium- to coarse-grained; subangular to angular grains; fairly sorted; calcareous cement; limonite staining throughout; thin- to thick-bedded (1 to 12 inches), grades upward into thick beds; grades upward into pebbly sand and pebble conglomerate upper 2.5 feet of unit; composed of 65 percent quartz and chert and 35 percent quartzite and other rock fragments	7
56. Slope; sandy-clayey soil; covered with talus from above; contains bentonite weathering to "popcorn" surface.	30

- 57. Sandstone; mostly slope with reddish-brown sandy soil and sandstone talus blocks from below; upper 5 feet of unit is same lithology as unit 58; medium- to thick-bedded (6 to 24 inches). 29
- 58. Sandstone; variable gradational lithologies. Lower part of unit is sandstone; light-yellowish-gray, weathers reddish-brown; very fine- to fine-grained; subrounded to rounded grains; poorly sorted; calcareous cement; dense; light-yellow limonite staining on grains; medium-grained (6 inches); composed of 80 percent quartz, 15 percent rock fragments, and 5 percent chert. Grades upward into very fine-grained sandstone; subrounded to rounded grains; well-sorted; calcareous and bentonitic cement; limonite staining throughout; medium-bedded (6 inches); composed of 90 percent quartz and chert and 10 percent rock fragments. Grades upward into coarse-grained sandstone; angular to subangular grains; well-sorted; calcareous cement; medium-bedded (6 inches); composed of 55 percent clear and vein quartz, 40 percent quartzite and other rock fragments, 4 percent pink and black chert, 1 percent green quartzite, and a trace of hematite. Grades upward into medium-grained sandstone of same lithology; some asphaltic residue. Fracturing perpendicular to strike throughout outcrop. 49
- 59. Sandstone; light-yellowish-gray, weathers yellowish-gray to light-gray; medium- to coarse-grained; angular to subangular grains; fairly sorted; calcareous cement; limonite staining throughout; reddish-brown limonite staining in places; massive-bedded; cross-bedding, angles of 30° between cross-beds; stringers and lenses of granule and pebble conglomerate and lenses of reddish-brown, medium-grained sandstone; composed of 50 percent quartz, 45 percent quartzite and other rock fragments, 4 percent pink and black chert, and 1 percent green quartzite. 17
- 60. Siltstone and shale; light-gray, weathers light-reddish-gray, varicolored in places; calcareous; sandy; contains bentonite weathering to "popcorn" surface 19
- 61. Sandstone; light-yellowish-brown, weathers light-yellowish-brown; very fine- to fine-grained; subrounded to rounded grains; fairly sorted; calcareous and bentonitic cement; limonite staining in places; medium-bedded (8 inches); composed of 85 percent quartz and chert and 15 percent quartzite and other rock fragments 1.5
- 62. Sandstone; light-reddish-gray, weathers reddish-brown; fine-grained; angular to subangular grains; fairly sorted; calcareous cement; dense; limonite staining throughout; thick-bedded; grades upward into a 6-inch bed of soft siltstone; composed of 90 percent quartz and 10 percent rock fragments. 1.5

	Feet
63. Siltstone; light-grayish-red, weathers reddish-brown; calcareous; contains 25 percent very fine- to fine-grained quartz sand; very thick-bedded.	5
64. Siltstone; light-reddish-brown, weathers yellowish-brown; calcareous; contains abundant very fine- to fine-grained quartz sand; very thin-bedded (0.3 to 0.4 inch); corrugated weathering surface; current ripple marks, wave lengths range from 2 to 7 inches and average 2 inches; rib-and-furrow structures predominant, indicate diversified current directions; current directions average S. 81° E.; some poorly defined low angle cross-bedding.	2.5
65. Shale; gray, weathers light-gray; calcareous; silty; some limonite staining; weathers into thin plates; contains bentonite weathering to "popcorn" surface; deeply weathered	12
66. Sandstone; light-yellowish-gray, weathers light-yellowish-gray; fine- to medium-grained; angular to subangular grains; fairly sorted; calcareous cement; thin- to thick-bedded (3 to 36 inches); thin beds finer-grained and more uniform in composition; composed of 55 percent quartz, 40 percent quartzite and other rock fragments, and 5 percent chert	15
67. Siltstone; reddish-brown, weathers reddish-brown; calcareous; streaks of yellow limonite staining; forms red soil zone; mostly slope	19
68. Sandstone; light-yellowish-brown, weathers light-yellowish-brown; very fine- to fine-grained; subrounded to rounded grains; poorly sorted; calcareous cement; very thin-bedded (0.4 to 0.5 inch); some poorly defined, low-angle cross-bedding	3
69. Slope; sandy soil; covered with manganese concretions and plates	3.5
70. Sandstone; light-yellowish-gray, weathers yellowish-gray; medium-grained; angular to subangular grains; fairly sorted; calcareous cement; heavy limonite staining throughout; composed of 80 percent quartz, 20 percent quartzite and other rock fragments, and 1 percent vein quartz	3.5
71. Sandstone; light-gray, weathers whitish-gray; medium-grained; angular to subangular grains; fairly sorted; calcareous cement; friable; massive-bedded; grades upward into yellower beds; composed of 85 percent clear and vein quartz and 15 percent rock particles	7
72. Slope; sandy soil covered with talus blocks from above	21
73. Sandstone; light-gray, weathers yellowish-gray; fine-grained; angular to subangular grains; well-sorted; calcareous cement;	

	Feet
medium-bedded (6 to 12 inches); grades downward into graded sandstone sequence	15
74. Sandstone; light-gray, weathers yellowish-gray; fine- to coarse-grained; angular to rounded grains; poorly sorted; calcareous cement; friable. Some rounded, frosted grains. Grades upward into fine- to medium-grained sandstone; subangular to rounded grains; fairly sorted; calcareous cement; friable. Grades upward into fine-grained sandstone; subangular to subrounded grains; well-sorted; calcareous cement. Entire unit dense; graded-bedding; composed of 95 percent quartz, 4 percent chert, and 1 percent rock fragments	<u>20</u>
Total Formation	1,534 Feet
Unconformity.	

Cretaceous

Mesaverde Formation

Sandstone; light-gray to white, weathers yellowish-gray; fine- to medium-grained; subangular to rounded grains; well-sorted; calcareous cement; dense to friable in places; forms resistant ledge; fossiliferous in places; contact with overlying Currant Creek Formation obscure, chosen at the first occurrence of graded sediments in sandstone sequence; small graded unconformity between Currant Creek and Mesaverde Formations; composed of 95 to 97 percent quartz; 2 to 3 percent pink chert, and 1 to 2 percent rock fragments.

Special Studies 27 was prepared for publication by the following:

Editing — Gladys V. Isakson

Typing and Layout — Ann Allen

Illustrations — By author, assisted by Brent R. Jones and Charles H. Nelson

UTAH GEOLOGICAL AND MINERALOGICAL SURVEY

103 Utah Geological Survey Building
University of Utah
Salt Lake City, Utah 84112

THE UTAH GEOLOGICAL AND MINERALOGICAL SURVEY since 1949 has been affiliated with the College of Mines and Mineral Industries at the University of Utah. It operates under a director with the advice and counsel of an Advisory Board appointed by the Board of Regents of the University of Utah from organizations and categories specified by law.

The survey is enjoined to cooperate with all existing agencies to the end that the geological and mineralogical resources of the state may be most advantageously investigated and publicized for the good of the state. The *Utah Code, Annotated, 1953 Replacement Volume 5, Chapter 36, 53-36-2*, describes the Survey's functions.

Official maps, bulletins, and circulars about Utah's resources are published. (Write to the Utah Geological and Mineralogical Survey for the latest list of publications available).

THE LIBRARY OF SAMPLES FOR GEOLOGIC RESEARCH. A modern library for stratigraphic sections, drill cores, well cuttings, and miscellaneous samples of geologic significance has been established by the Survey at the University of Utah. It was initiated by the Utah Geological and Mineralogical Survey in cooperation with the Departments of Geology of the universities in the state, the Utah Geological Society, and the Intermountain Association of Petroleum Geologists. This library was made possible in 1951 by a grant from the University of Utah Research Fund and by the donation of collections from various oil companies operating in Utah.

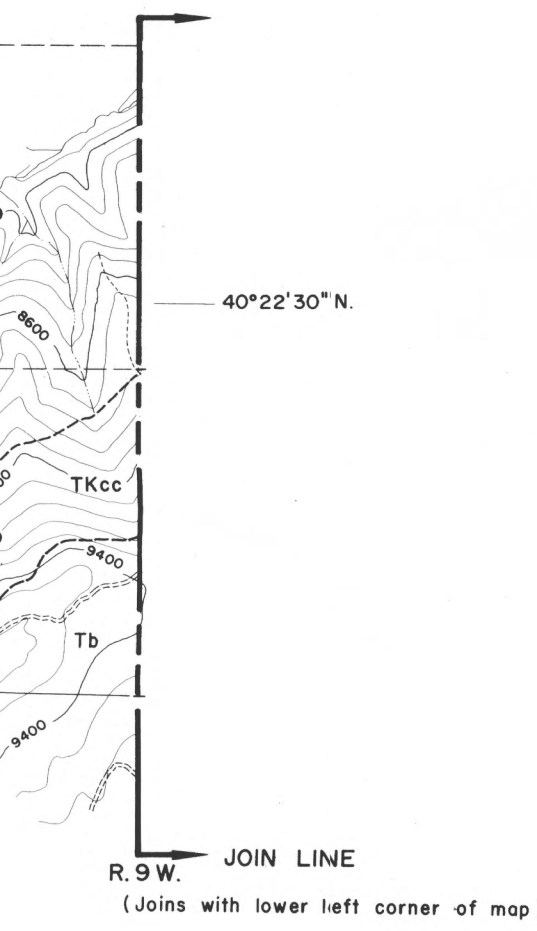
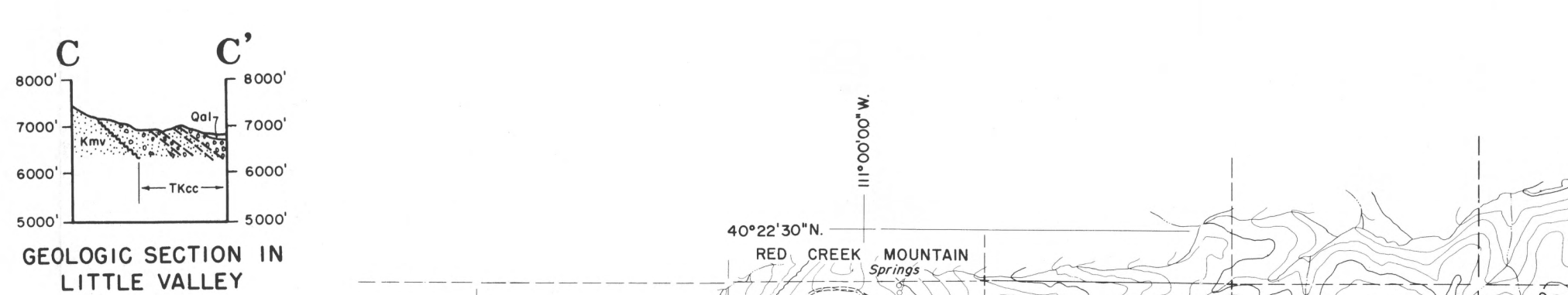
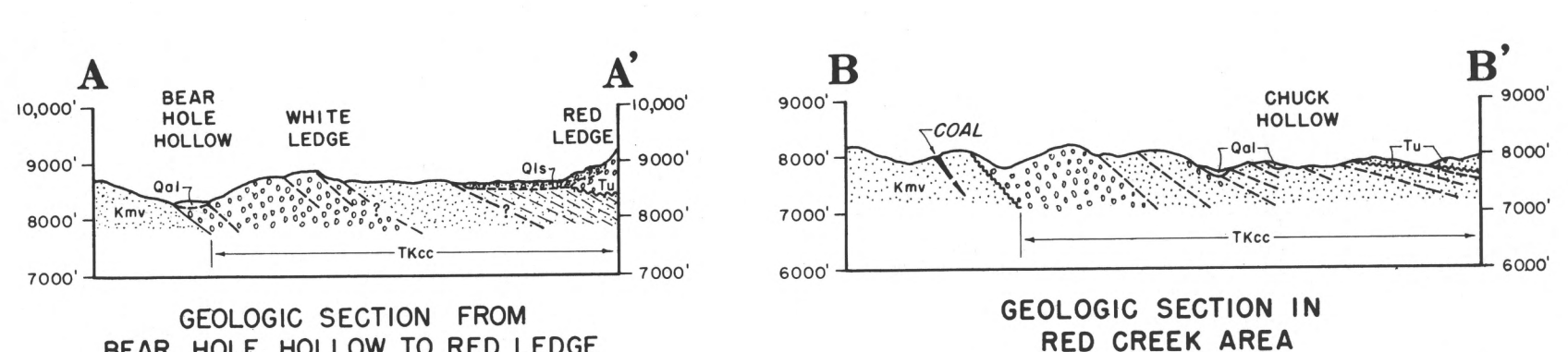
The objective is to collect, catalog, and systematically file geologically significant specimens for library reference, comparison, and research, particularly cuttings from all important wells driven in Utah, and from strategic wells in adjacent states, the formations, faunas, and structures of which have a direct bearing on the possibility of finding oil, gas, salines or other economically or geologically significant deposits in this state. For catalogs, facilities, hours, and service fees, contact the office of the Utah Geological and Mineralogical Survey.

THE SURVEY'S BASIC PHILOSOPHY is that of the U. S. Geological Survey, i.e., our employees shall have no interest in Utah lands. For permanent employees this restriction is lifted after a 2-year absence; for consultants employed on special problems, there is a similar time period which can be modified only after publication of the data or after the data have been acted upon. For consultants, there are no restrictions beyond the field of the problem, except where they are working on a broad area of the state and, here, as for all employees, we rely on their inherent integrity.

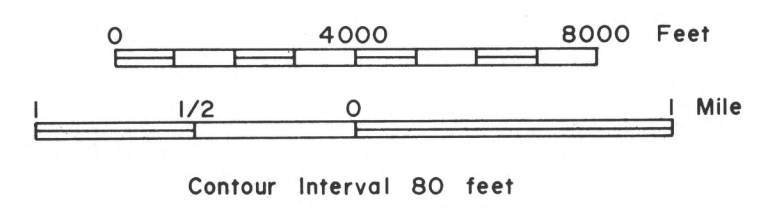
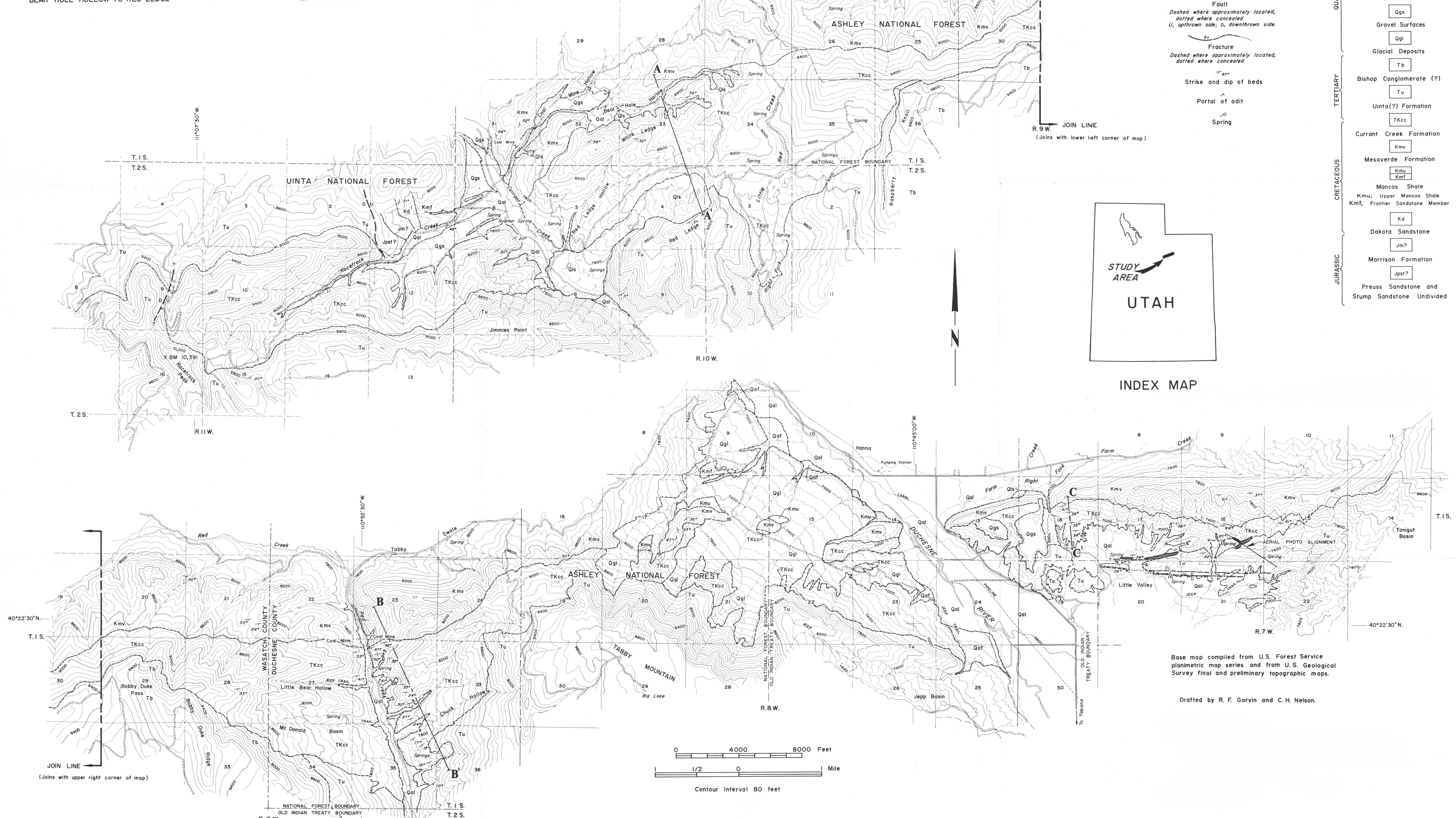
DIRECTORS:

William P. Hewitt, 1961-

Arthur L. Crawford, 1949-1961



SYMBOLS		EXPLANATION	
	Contact		Qal
	Deposit		Alluvium
	Oil-impregnated Sandstone		Alluvial Fan Gravels
	Fault		Landslides
	Fracture		Gravel Surfaces
	Strike and dip of beds		Glacial Deposits
	Portal of adit		Bishop Conglomerate (?)
	Spring		Uinta(?) Formation
			Currant Creek Formation
			Mesaverde Formation
			Mancos Shale
			Upper Mancos Shale
			Frontier Sandstone Member
			Dakota Sandstone
			Morrison Formation
			Preuss Sandstone and Stump Sandstone Undivided



GEOLOGIC MAP OF THE CURRANT CREEK FORMATION, WASATCH AND DUCHESNE COUNTIES, UTAH

BY R. F. GARVIN, 1967

Base map compiled from U.S. Forest Service planimetric map series and from U.S. Geological Survey final and preliminary topographic maps.

Drafted by R. F. Garvin and C. H. Nelson.

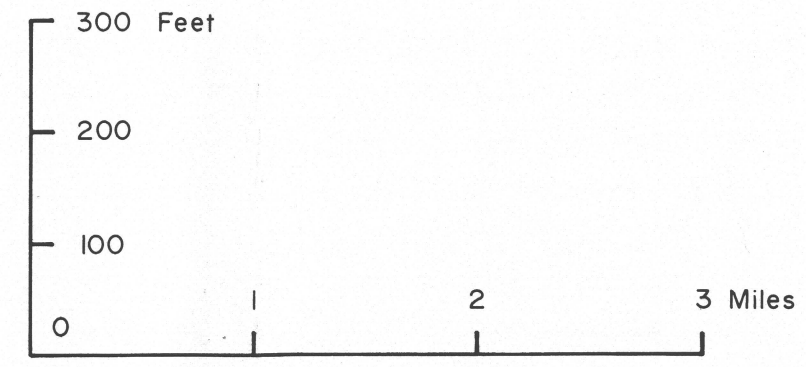
Sinclair Bert L. Coleman No. 1
NE 1/4 Sec. 13, T.2S., R.10W.
Wasatch Co., Utah
Surface El. 8430'

Red Creek Measured Section
Secs. 26 and 35, T.1S., R.9W.
Duchesne Co., Utah

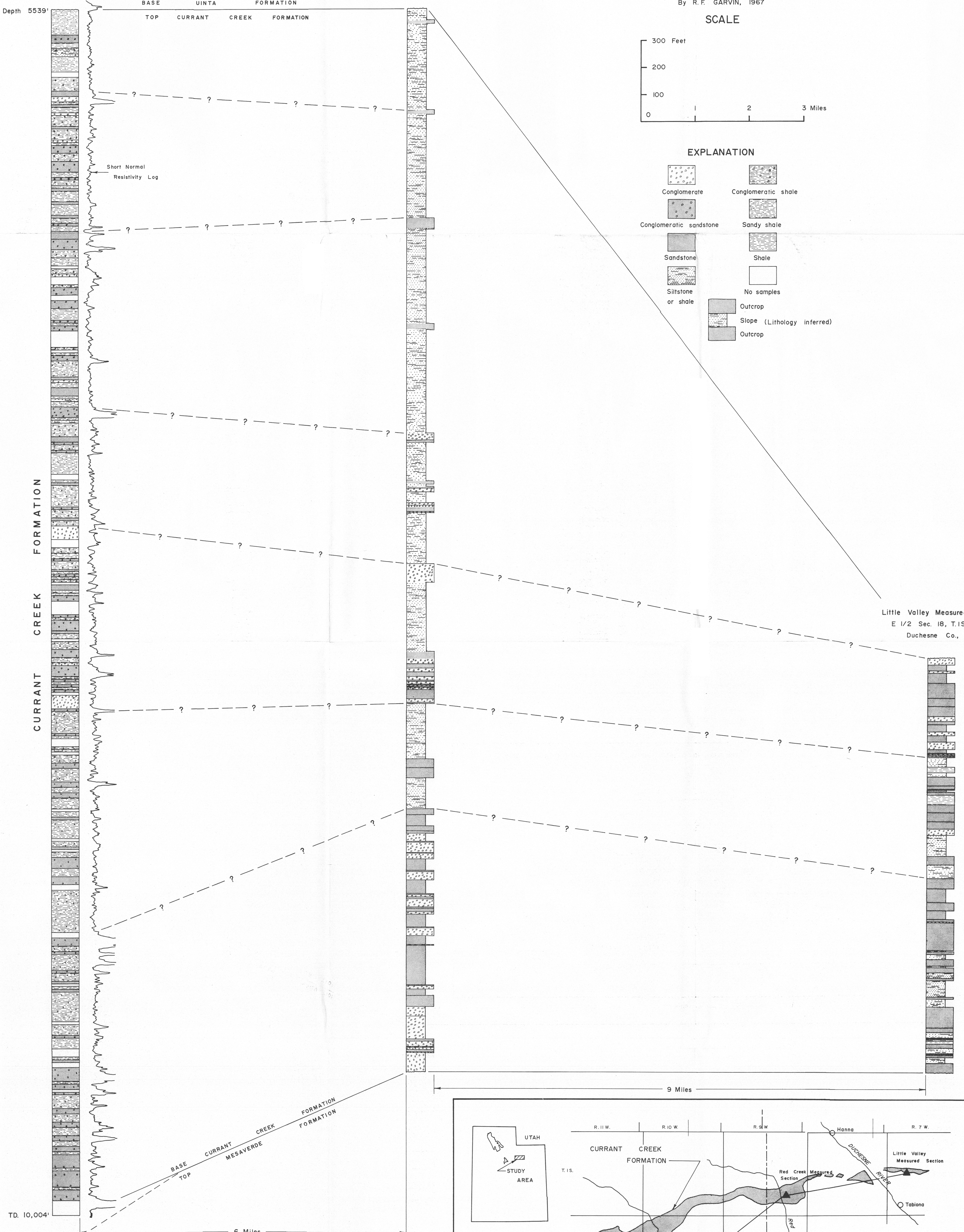
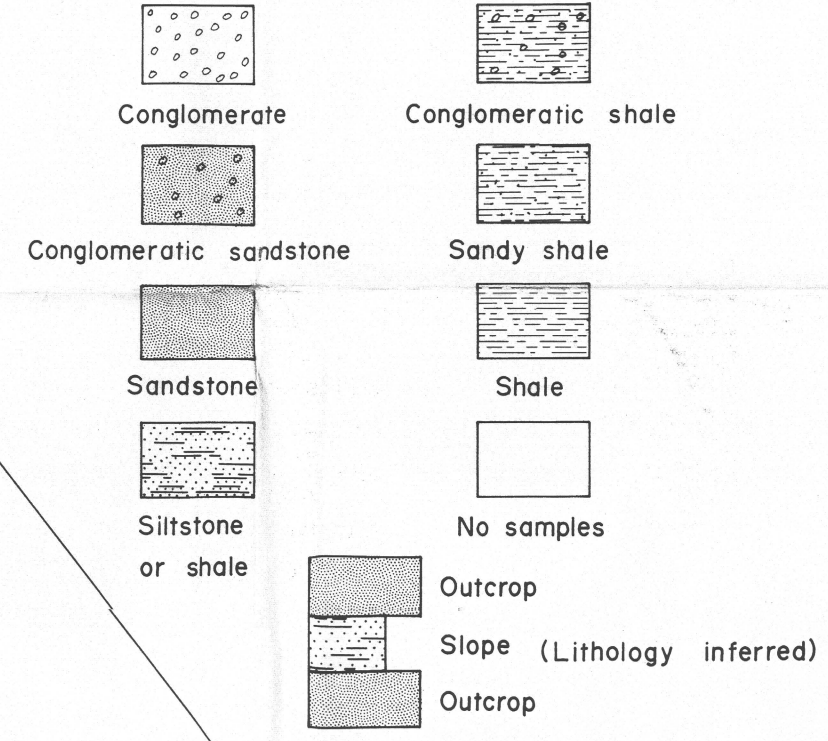
CORRELATION OF MEASURED SECTIONS OF
CURRANT CREEK FORMATION

By R.F. GARVIN, 1967

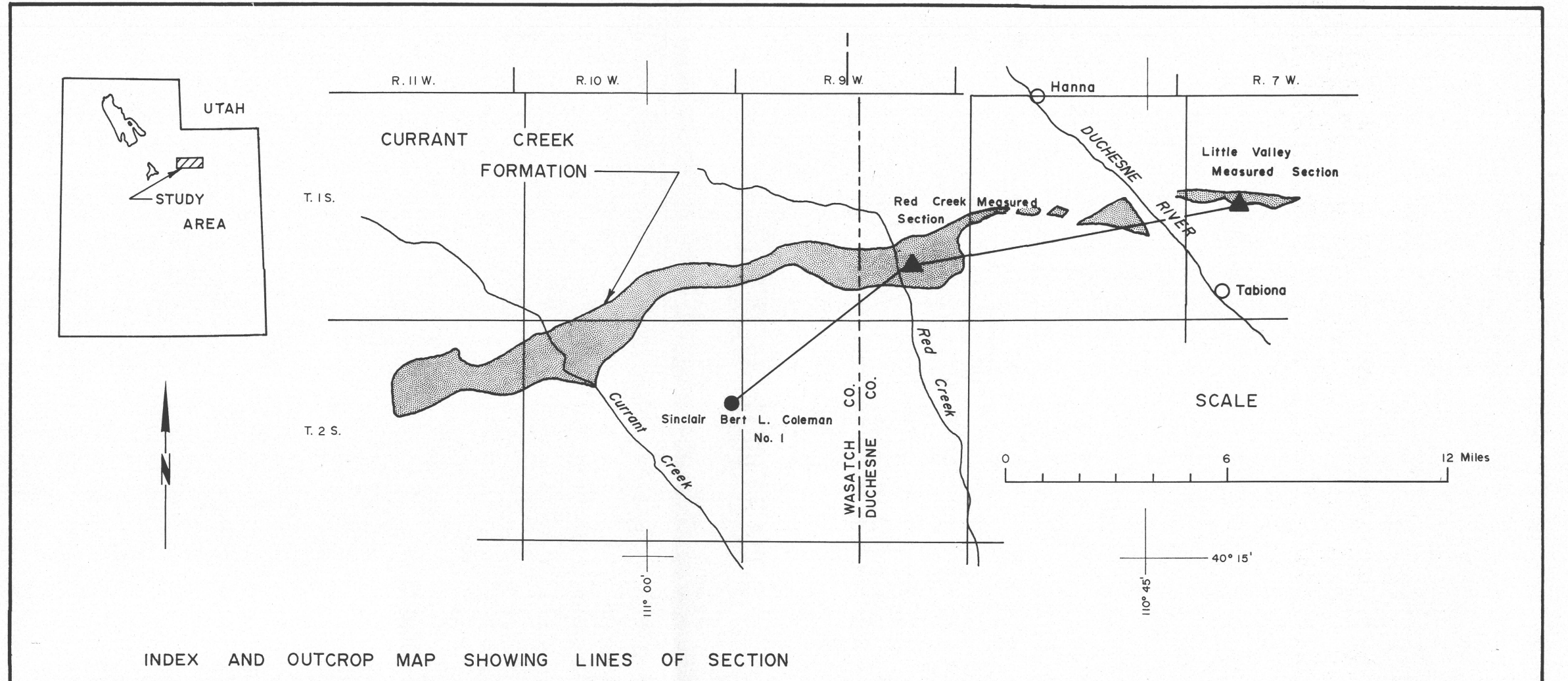
SCALE



EXPLANATION



Little Valley Measured Section
E 1/2 Sec. 18, T.1S., R.7W.
Duchesne Co., Utah



INDEX AND OUTCROP MAP SHOWING LINES OF SECTION