Table 1.--Description of geologic units known to underlie parts of the lower Dirty Devil River basin area

Geologic unit: The codes shown by or below unit names (as well as in the columns for Erathem, System, and Series) are used to identify aquifers, formations, or other geologic units listed in table 2, 6-8, 12, and 13. The code consists of three numbers generally ranked according to increasing age and a four-letter mnemonic abbreviation of the unit name. Thus 100VLFL is valley fill of Cenozoic age.
Character of material and hydrologic characteristics: See text for description of data-site numbering systems. Location of data sites are shown in figure 2.
Hydrologic characteristics: Ranges of permeability and salinity are defined on page 8. Interpretations of chemical quality of water are based on analyses in tables 12 and 13 or on known lithologic characteristics of formations. Ranges of permeability are partly based on estimates of hydraulic conductivity as given in table 2.

Erathem	System	Series	Geologic unit	Character of material	Hydrologic characteristics
CENOZOIC (100CNZC)	Quaternary (110QRNR)	Holocene (111HLCN)	Valley fill (100VLFL) / Pediment, terrace, and other deposits (110PTOD): Younger alluvium (111ALVM), dune sand and other windblown deposits (111DUNE), landslide and talus deposits (111LDLD), upper parts of colluvium (111CLVM), and gravel surfaces (110PTOD)	Surficial deposits of clay, silt, sand, gravel, and angular blocks. Along stream valley, young alluvium is often well-sorted, but generally is fine grained and 20 feet or less thick. Dune sand generally is well-sorted veneer 6 to 20 feet thick; principal area of occurrence is in the San Rafael Desert northeast of Hanksville. (See fig. 5.) Landslide and talus deposits are found only in higher areas of Henry Mountains and the western mountain area (see Smith and others, 1963, p. 51). Landslides are chaotic mixtures of soils and other fine-grained debris, blocks of rock and other materials of indeterminate thickness. Talus deposits are accumulations of angular blocks at the bottoms of cliffs and steep slopes. Colluvial deposits in mountain areas are locally mixed with alluvium; the grains are generally smaller than that of landslide deposits and better sorted. Gravel surfaces are the upper parts of terrace deposits and pediments, which are older sediments.	Low to high permeability. In many areas, these deposits are not saturated, but in some stream valleys are part of the deposits that yield water to shallow wells and are less permeable than the underlying older alluvium or valley fill. Dune sand is a good recharge medium but only locally stores water. Landslide deposits, because of poor sorting, have low permeability but locally might yield enough water to supply domestic wells or support springflow. Talus deposits (fig. 24) generally are above the water table but are good recharge media for other underlying formations. Colluvium yields water to springs in the highlands of the Henry Mountains and the western mountains. The upper part of terrace deposits generally is a good recharge medium. Chemical quality of water in most of the younger deposits is variable depending on the sources of debris making up the deposit. Generally, the water is fresh in the mountains and saline in the lower desert areas.
		Pleistocene (112PLSC)	Valley fill (100VLFL) / Pediment, terrace, and other deposits (110PTOD): Older alluvium (112ALVM), colluvium and terrace deposits, glacial outwash (112OTSH), and undivided glacial deposits (112GLCL)	Alluvium consisting mainly of sand, gravel, and some cobbles underlie the Fremont River valley and probably the largest of the tributary valleys; maximum known thickness is about 90 feet at Hanks ville. Colluvium on the east side of Thousand Lake Mountain has a maximum known thickness of 170 feet. Terrace and related deposits consist mainly of sand and gravel; known thickness ranges from 34 feet at the Hanksville airport to 55 feet on the west slopw of the Henry Mountains. Glacial outwash in the Bicknell-Torrey-Grover area (fig. 4) and southeastward along the lower slopes of Boulder Mountain consist mainly of sand and gravel, generally well-bedded and well-rounded; the coarsest of the deposits beneath the lower Fremont River valley may also include outwash. Undivided glacial deposits include till and unsorted, unstratified moraines of several ages (Williams and Hackman, 1971, sheet 1).	Very low to high permeability. Estimated hydraulic conductivity (K) for older alluvium is about 100 ft/d (see table 2). Terrace deposits probably vary widely in permeability depending on source of debris and grain size. Glacial outwash probably has a K similar to that of the older alluvium (table 2). Other glacial deposits probably have very low to high permeability depending on sorting and grain size. Chemical quality of water in deposits of this unit is same as in the above-described units. Water in older alluvium from vicinity of Caineville to Hanksville is variously described as unfit for domestic use, salty, and aklakine (see tables 6 and 10).
	Tertiary and Quaternary		Igneous rocks: Basalt flows and minor intrusives	Small exposures on Thousand Lake Mountain and Boulder Mountain; include cinder cones around necks of diabase	Unknown; however, cinder cones and basalt probably are a good recharge medium. Probably not saturated.
	Tertiary (120TRTR)	Eocene(?) to Miocene(?)	Igneous rocks: Intrusive and extrusive rocks	Diorite porphyry in stocks, laccoliths, bysmaliths, and sills in Henry Mountains (Hunt, 1953). Syenite and diabase sills and diabase dikes (fig. 14) in area from southwestern San Rafael Swell to northern Waterpocket Fold (Gilluly, 1929, p. 120; Smith and others, 1963, p. 37-40) and a dike north of Big Flat Top (fig. 15). Undivided extrusive rocks are mainly basaltic andesite on Thousand Lake and Boulder Mountains (Smith and others, 1963, p. 40-42; Rowley and others, 1975).	Very low to very high permeability. Intrusive rocks in Henry Mountains inhibit recharge and movement of ground water in the intruded sedimentary rocks; conversely, surface exposures enhance runoff directly to streams. Rock is sufficiently rigid that local open fractures may yield water to wells. Such water as may be obtained from the porphyry should be fresh. Dikes and sills near the San Rafael Swell where unjointed probably have very low permeability, and their intrusion has locally lowered permeability of the country rock by baking. Hydrologic properties of the extrusive igneous rocks in the area are unknown; however, those rocks probably are a good recharge medium. Locally they may transmit water in large quantities. Spring (D-29-3)14bcb-S1 (tables 7 and 12) in the upper Fremont River valley supplies several cubic feet per second of freshwater to irrigators and supports the flow of the Fremont River.
MESOZOIC (200MSZC)	Cretaceous (210CRSC)	Upper Cretaceous	Mesaverde Formation or Group (221MVRD)	Pale-yellow thick-bedded sandstone and thin interbedded dark-gray shale west of the Henry Mountains. More than 300 feet thick.	Low(?) permeability. Yields an estimated 10 gal/min of slightly saline water to spring (D-33-8)2ccd-S1 (table 7). Formation might produce more water to wells that penetrate fully saturated sections, but water probably would be saline.
			Mancos Shale, Total thickness 3,200 to 4,900 feet; thickens from east to west: Masuk Member (211MSUK)	Dark-gray to black carbonaceous and sandy shale interbedded with pale-yellow sandstone and shaly sandstone. 600 to 800 feet thick. Full thickness present only in remnants west of Henry Mountains and northwest of study area.	Very low permeability. Shale inhibits drainage of water from overlying unconsolidated rocks. Unleached debris from this member, where present in alluvium, contributes to salinity of the ground water in the alluvium.
			Mancos Shale, Total thickness 3,200 to 4,900 feet; thickens from east to west: Emery Sandstone Member (211EMRY)	Pale-yellow thin- to thick-bedded lenticular sandstone and minor interbedded carbonaceous shale and impure coal. Thickens westward from 250 to 800 feet; 200 to 300 feet thick in Henry Mountain area.	Very low permeability. Yields small quantities of slightly saline water to spings such as (D-31-8) 27dab-S1 (tables 7 and 12). May be fully saturated in Henry Mountain structural basin, but water from wells is expected to be more saline than the spring water and yields probably would be low as at well (D-31-9)32ddd-1 (table 6).
			Mancos Shale, Total thickness 3,200 to 4,900 feet; thickens from east to west: Blue Gate Member (211BLGT)	Dark-gray to black carbonaceous marine shale with minor thin pale-yellow sandstone beds. 1,400 to 2,000 feet thick. In areas around Factory Butte (fig. 22) and the North and South Caineville Mesas, member has characteristic badlands topography that is almost devoid of vegetation.	Very low permeability. Debris from this member, where present in alluvium, contributes to salinity of ground water in the alluvium.