

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Geologic Map of the Southeast quarter of the  
Mountain City quadrangle, Elko county, Nevada

by

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This map is preliminary and has not been reviewed for conformity with U. S. Geological Survey editorial standards and stratigraphic nomenclature.

Menlo Park, California

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## DESCRIPTION OF MAP UNITS

- Qc COLLUVIUM, TALUS, AND LANDSLIDE DEPOSITS (QUATERNARY)--Unsorted surficial material ranging in size from boulders through sand and gravel to silt and clay. Development of colluvium is strongly controlled by slope facing direction as the greater amount of vegetation on north-facing slopes favors accumulation. Coarse material at the upper end of mapped bodies forms talus and finer material is washed downslope and becomes colluvium. Poorly resistant formations such as airfall tuffs and non-welded ignimbrites commonly blanketed by colluvium over much of their extent. Landslides common on steeper slopes
- Qal ALLUVIUM (QUATERNARY)--Consists of unconsolidated sand, silt, and gravel along present stream courses. May be 2 m thick above normal stream in summer time; thicker alluvium present in some small valleys where rate of supply exceeds the transporting power of the stream
- Qtg TERRACE GRAVEL (QUATERNARY)--Gravel terrace remnants at levels higher than present flood level
- Qgm GLACIAL MORAINE (QUATERNARY)--Unsorted material including large to very large, angular boulders. Typically forms terminal moraines. Present on southwest side of Merritt Mountain. No striated boulders observed
- Qgo GLACIAL OUTWASH (QUATERNARY)--Present as valley train below morainal deposit. Distinguished from ordinary stream gravel by presence of boulders of a size beyond the carrying capacity of the present stream
- QTs\* UNCONSOLIDATED SEDIMENTARY ROCKS (QUATERNARY AND TERTIARY)--Includes such material as alluvium, colluvium, talus, glacial moraine, glacial outwash
- Tcb TUFFS AND SEDIMENTS OF CALIFORNIA CREEK BASIN (MIOCENE)--White to cream-colored tuff and gravelly tuff, locally contains in petrified wood, including logs up to 1 m in diameter.
- Tcs PHENORHYOLITE OF COLD SPRINGS MOUNTAIN (MIOCENE)--Largely a light gray, massive phenocryst-poor phenorhyolite, making up the mass of three domes in the south west part of the map area; Rough Mountain, Cold Springs Mountain, and an unnamed mountain north of Allegheny Creek aligned with the other two on a north-northwest trending axis. Two additional masses, lying in the southwestern quarter, appear to be related. The unit includes, in Rough Mountain, a considerable thickness of glassy welded tuff. The recognizable minerals in the phenorhyolite include quartz, sanidine, oligoclase ( $An_{19}$ ), hornblende, perrierite (a rare-earth titanium mineral), and sparse biotite and augite

- Tcp COUGAR POINT WELDED TUFF (MIOCENE)--Phenorhyolitic to phenodacitic ignimbrite, purplish gray to dark brown. Present near northeast corner of map area; an outlier of a unit more fully developed in the northeast quarter of the Mountain City quadrangle
- Tcst AIR-FALL TUFF (MIOCENE)--Present at south boundary of map area; similar in composition to phenorhyolite of Cold Springs Mountain but locally with much accidental material of Jarbidge Rhyolite and Seventy Six Basalt, as well as cognate vitrophyre
- Tjr JARBIDGE RHYOLITE (MIOCENE)--Porphyritic rhyolite, light gray to light brownish gray, with cryptocrystalline or glassy groundmass, locally spherulitic. Phenocrysts very abundant, include quartz up to 5 mm in diameter, sanidine phenocrysts somewhat smaller and less numerous, oligoclase similar in size but scarcer. Clinopyroxene recognizable in glassy phases only, and is generally pigeonite. Accessories include zircon, apatite, ilmenite, magnetite; very rarely topaz (which may be secondary) or pale pink garnet. Two K-Ar dates, one from Meadow Creek, in the Rowland quadrangle, of  $16.8 \pm 0.5$  m.y. (Coats, 1964, p. M11), the other from a basal vitrophyre in the Wildhorse quadrangle, of 15.4 m.y. (Evernden and others, 1964, p. 194). Maximum thickness may be 600 m but thicknesses have little meaning because of flow-domal form
- Tdp DANGER POINT TUFF (MIOCENE)--Ranging from andesitic to rhyolitic in composition, largely montmorillonitized, with substantial admixture of boulders picked up by surface flow. Locally, most boulders are derived from the Prospect Mountain Quartzite. Elsewhere, sedimentary admixture is finer, and most is granitic material of local derivation. Locally interbedded with Seventy Six Basalt Tuff
- Tsb SEVENTY SIX BASALT (MIOCENE)--Flows of porphyritic olivine basalt, with conspicuous clear phenocrysts of labradorite, up to 2 cm in size, in a subophitic groundmass with plates of purplish augite including grains of olivine, labradorite, magnetite, ilmenite, and apatite. Local patches of mesostasis made up of biotite and sanidine. Locally interbedded with tuff, Tsbt
- Tsbt SEVENTY SIX BASALT, TUFF UNIT (MIOCENE)--Dull greenish gray, now nontronitic, with plagioclase crystals like those in flows of Seventy Six Basalt. Crystals of plagioclase from the tuff on Rough Mountain gave an age of  $22.9 \pm 3$  m.y. (J. C. von Essen, Menlo Park, Potassium-Argon age report 51, October 15, 1969). Tuffaceous sandstone made up of this basaltic material furnished horse ramins of Barstovian age (C. A. Repenning, oral commun., 1965). Possibly some of the tuff was reworked in Barstovian time; the earlier age given by the K-Ar determination is used here for the age of the volcanic rocks
- Ts\* SEVENTY SIX BASALT WITH TUFF UNIT, UNDIVIDED (MIOCENE)--Shown in cross sections

- Ttc RHYOLITE OF TELEPHONE CREEK (MIOCENE)--Exposed near the head of Telephone Creek. Interbedded with Seventy Six Basalt and associated tuff, underlies Jarbidge Rhyolite. Thickness not determinable, but at least 100 m. Consists of rhyolite with phenocrysts of quartz, sanidine, oligoclase and brown biotite. Biotite plates very small, about 0.1 mm in diameter. Rock distinguished by bleaching of the otherwise light-gray groundmass, and development of spongy topaz and light-green biotite. Topaz crystals up to 2 mm long, are sherry colored when freshly exposed, but quickly bleached by light. Some secondary fluorite also present
- Tac TUFF AND SEDIMENTARY ROCKS OF ALLEGHENY CREEK (MIOCENE)--Light cream-colored to pale-green tuff, locally biotitic, with small lenses of fine gravel and tuffaceous gravel, containing fossils (the Rizzi Ranch local fauna) of early Miocene age (C. A. Repenning, written commun., 1966). As the Allegheny Creek beds are overlain by Seventy Six Basalt, the early Miocene date on the faunas is consistent with the potassium-argon date for the tuff unit of the Seventy Six Basalt
- Thg TUFF OF HARRIS GULCH (OLIGOCENE?)--Biotite phenorhyolite tuff, with quartz, plagioclase, biotite and sanidine. Present only in a small area at west edge of map area; more extensively developed in southwest quarter of Mountain City quadrangle
- Tba BIEROTH ANDESITE OF BUSHNELL (1967) (OLIGOCENE<sup>?</sup>)--Biotite-hypersthene phenodacite welded tuff, with plentiful phenocrysts of plagioclase, sanidine, brown biotite, nontronite after (?)hypersthene. Shard structure clear, but pectinate recrystallization common. Glassier phases may have olive-green hornblende and may lack sanidine and quartz. Type locality is at Bieroth Spring, near the western edge of the Rowland quadrangle. In map area, rests on volcanic rocks and sediments of Big Springs Creek, overlain by Seventy Six Basalt and Danger Point Tuff, and by younger volcanic rocks. May include as mapped some older volcanic rocks
- Tbs VOLCANIC AND SEDIMENTARY ROCKS OF BIG SPRINGS CREEK (OLIGOCENE)-- Exposed on Pixley Creek, at the uranium mine, where tuffaceous sediments and lignite overlie granodiorite. The sediments have furnished an abundant pollen flora, determined by Estella Leopold (written commun., March 25, 1971) as probably Oligocene. Also exposed on Big Springs Creek, at a uranium pit, where clayey pumiceous tuff dips steeply southeast and rests on granodiorite. This is overlain by a lenticular tuffaceous agglomerate with heterogenous volcanic boulders, and above, by a vitrophyre, fragmental at the base, welded toward the top. The vitrophyre is a typical hypersthene-augite phenodacite welded tuff. At the top of the section, there is a dosemic hornblende-biotite phenodacite vitrophyre, containing andesine, biotite, and hornblende in a typical vitroclastic welded texture

- Tpr\* GRAVEL OF PECK RANCH (EOCENE?)--Shown in cross section only.  
Exposure in southwest quarter of Mountain City quadrangle
- Kg GRANITE (IN THE BROAD SENSE ACCORDING TO STRECKEISEN, 1967)  
(CRETACEOUS)--Includes granodiorite and quartz monzonite of previous usage; includes marginal microcline microperthite aplite, pegmatite, and migmatitic zones adjacent to country rock. Generally contains both biotite and hornblende, locally contains perthitic orthoclase megacrysts
- P Prh RESERVATION HILL FORMATION (PERMIAN ? AND PENNSYLVANIAN ?)--Mostly fine grained dolomitic metasandstone and siltstone; pale gray, weathering white or pale reddish brown, in beds 2 cm to 5 cm thick, interbedded regularly with thinner beds of graphitic phyllite. The dolomitic metasandstone is composed of various combinations of quartz, calcite, tremolite, diopside, and wollastonite, the last locally coarsely prismatic. Also present are metagraywacke, micaceous and tremolitic quartzite, rare metachert, actinolite-epidote-plagioclase schist derived from andesite, and hornblende plagioclase schist. Includes a few lenses of gray, siliceous dolomitic limestone, locally with coarse calcitic "eyes" suggesting former presence of crinoids
- P Ps STRATHEARN FORMATION (PERMIAN AND PENNSYLVANIAN)--Present near the southeast corner of the map area, rocks of this formation are poorly exposed. The following description is taken largely from the Rowland and Mt. Velma quadrangles, where Bushnell (1967) and Coash (1967) described a unit, including conglomerate, sandstone, and clastic limestone, of Pennsylvanian and Permian age, as the Sunflower Formation. This is here regarded as the equivalent of the Strathearn Formation. The conglomeratic part of the unit consists of quartzite- and chert-pebble conglomerate, quartzite, and sandstone. The rocks characteristically weather brownish gray and grayish red. The limestone, about 180 m thick in the Mt. Velma quadrangle, is medium to dark gray, weathering dusky yellow. It overlies and grades into the underlying conglomerate. The sandstone, about 460 m thick mostly overlies the limestone. It is fine-grained and contains interbedded micaceous siltstone, and silty limestone
- Pvd VAN DUZER LIMESTONE (PENNSYLVANIAN)--Crops out in but one area near west edge of map but may underly much of southwest part of map area. Dominantly thin bedded to very thin bedded medium- to dark-gray calcarenite and quartzose calcarenite, locally grading to quartzite. Chertification of calcareous beds is common. Minor flows of meta-andesite, now chlorite-muscovite-albite calcite schist. Thin films of micaceous and graphitic material form laminae within the thicker calcareous beds. Van Duzer Limestone was defined by Decker (1962, p. 29-21, p. 1) for rocks in Van Duzer Creek (near northwest corner of Wild Horse quadrangle just south of the Mountain City quadrangle), the type locality. The type section is designated the ridge top in secs. 6 and 7, T. 44 N., R. 53 E. (Bull Run quadrangle, near northeast corner). The total thickness is about 7,000 ft. A single fossil locality from Trail Creek (Wild Horse quadrangle), furnished brachiopods and conodonts, both of Desmoinesian age.

- Mdc DIAMOND PEAK AND CHAINMAN FORMATIONS, UNDIVIDED (MISSISSIPPIAN)--  
Present near the southeastern corner of the map area; consist of dark, massive, medium-grained sandstone, poorly fossiliferous but has been correlated with the Diamond Peak. The sandstone is more fossiliferous, in the northeast quarter of the Mountain City quadrangle, and the age assignment and correlation are firmer
- Mc CHAINMAN FORMATION (MISSISSIPPIAN)--Present near northwest corner of map area. As mapped, includes the Mountain City Formation (Coats, 1971). Largely quartz-muscovite biotite schist, locally with orthoclase, garnet, or graphite, rarely with andalusite, where thermally metamorphosed. Includes some limy rocks, also some medium-grained, impure, poorly bedded sandstone that has furnished a brachiopod fauna
- Mg GROSSMAN FORMATION (MISSISSIPPIAN?)--Present near northwest corner of map area. Coarse conglomerate with clasts of gray quartzite, black chert, phyllite, and magnetite bearing siltstone. Also contains sandstone, siltstone, and phyllite. Formerly regarded as Devonian or Mississippian, but presence of numerous clasts derived from the Valmy Formation suggests that it is younger than the Antler orogeny. In the southwest quarter of the Mountain City quadrangle, it underlies unconformably the Banner Formation, of Osagian or Meramecian age (Middle Mississippian)
- Ov VALMY FORMATION (ORDOVICIAN)--Micaceous quartz-calcarenite and calcareous sandstone, locally containing phyllocarid shells and lenticular masses of thin-bedded chert with slaty partings, and ranging in color from light to dark gray, rarely black or grayish green; locally phosphatic or baritic. Also contains hard well-bedded micaceous siltstone, black quartzose phyllite, and micaceous phyllitic limestone which is locally phosphatic
- Ovq VALMY FORMATION, QUARTZITE UNIT (ORDOVICIAN)--Gray to black, locally tan, fine-grained quartzite with interlocking textures; contains rare detrital tourmaline and zircon and, in dark-colored varieties, black carbonaceous material interstitially and disseminated through the quartz grains
- Og GOODWIN LIMESTONE OF THE POGONIP GROUP (ORDOVICIAN)--Massive white to light-gray or light-pinkish-gray calcarenite containing sparse quartz sand grains. Now sheared and recrystallized, locally silicified to a jasperoid
- O6tm TENNESSEE MOUNTAIN FORMATION OF BUSHNELL (1967) (ORDOVICIAN OR CAMBRIAN)--Highly deformed, interbedded thinly bedded limestone and argillaceous rocks. Limestone typically thin beds of medium-gray aphanitic limestone and silty limestone separated by very thin phyllite laminae. Phyllite beds from 10 to 50 ft thick locally interbedded with the limestones. Phyllite ranges in color from yellowish gray to greenish to gray green. Cleavage has obliterated the bedding in the phyllite. A. R. Palmer determined the age of a fossil collection from the Mountain City quadrangle as probably Cambrian or Early Ordovician

- Els\* LIMY AND SHALY SEDIMENTARY ROCKS (CAMBRIAN)--May include units such as Windfall Formation and Dunderberg Shale
- Eld\* LIMY, DOLOMITIC, AND SHALY SEDIMENTARY ROCKS (CAMBRIAN)--May include units such as Hamburg Dolomite, Secret Canyon Shale, Geddes Limestone, El Dorado Dolomite, and Pioche Shale
- Epm\* PROSPECT MOUNTAIN QUARTZITE (LOWER CAMBRIAN)

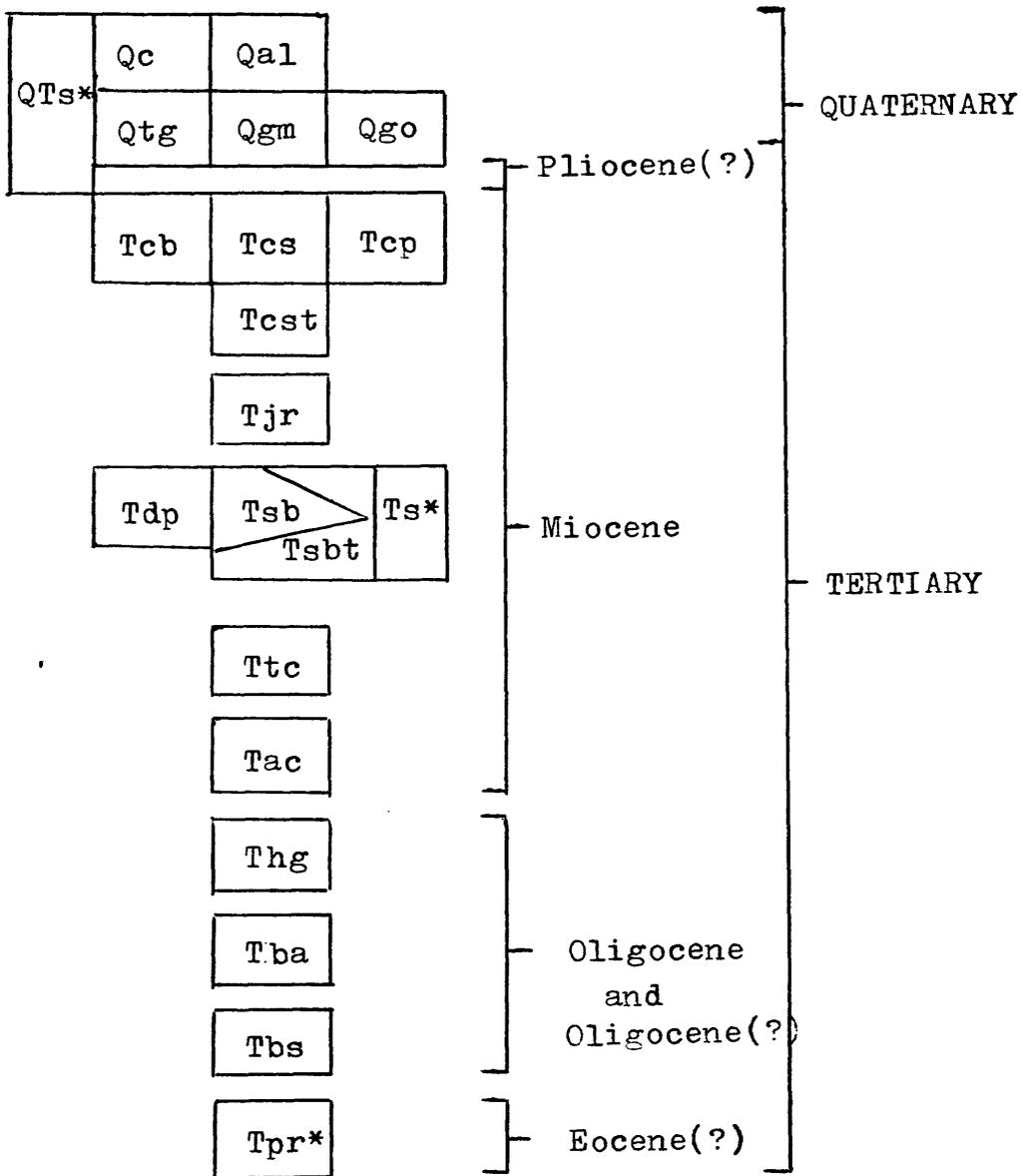
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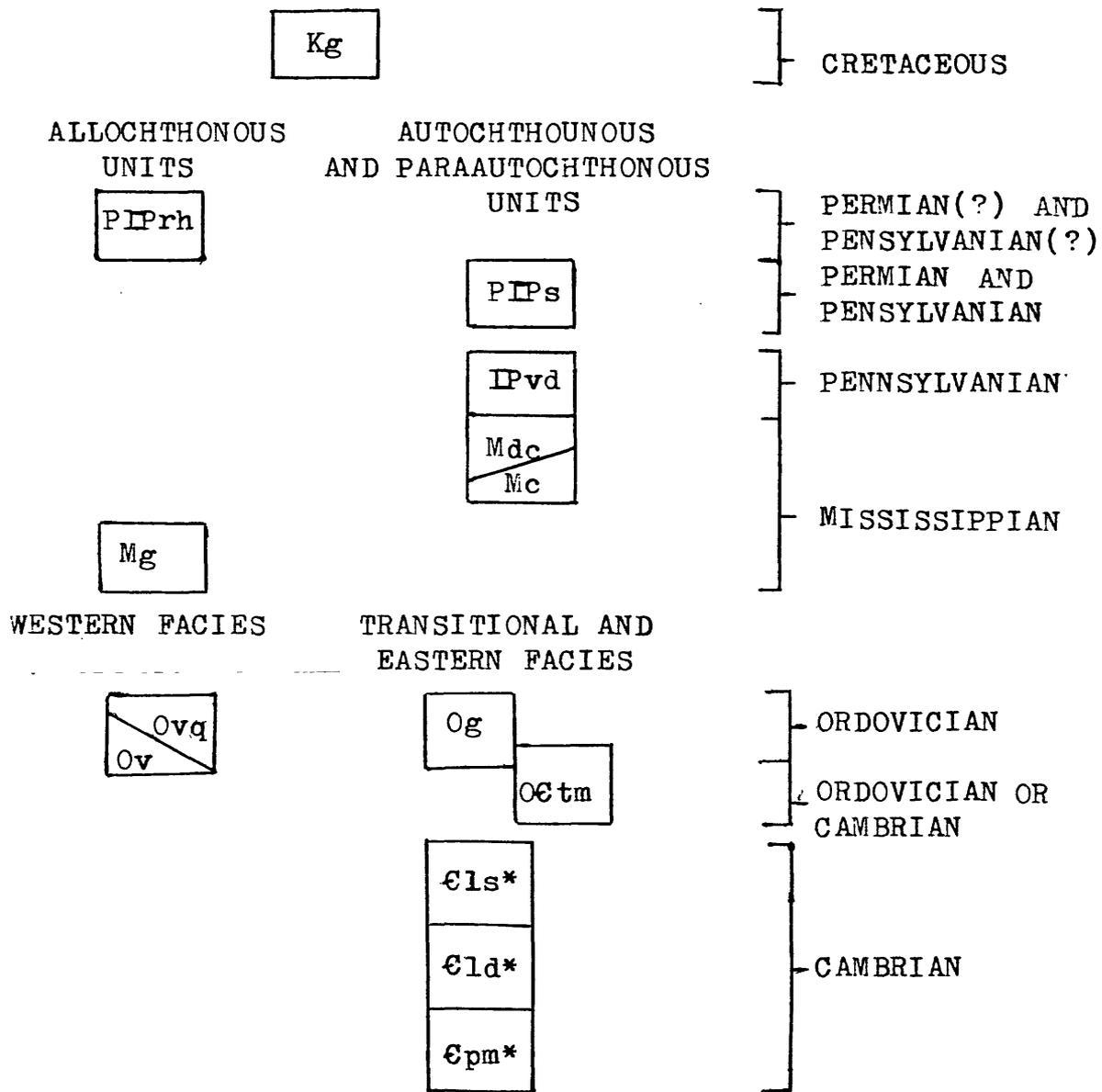
\*Appears only on geologic cross sections

#### REFERENCES

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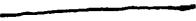
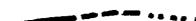
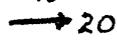
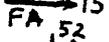
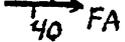
# CORRELATION OF MAP UNITS





Space between boxes indicates unconformity  
 \* indicates shown in cross section only

## SYMBOLS

	CONTACT
	FAULTS--Dashed where inferred; dotted where concealed
	Thrust fault
	High angle fault-- Bar and ball on downthrown side
STRIKE AND DIP OF BEDS	
	Inclined
	Vertical
STRIKE AND DIP OF FOLIATION	
	Inclined
	Vertical
STRIKE AND DIP OF CLEAVAGE	
	Inclined
	BEARING AND PLUNGE OF LINEATION
STRIKE AND DIP OF JOINTS	
	Inclined
	Vertical
FOLDS	
	Anticline--Showing crestline and plunge
	Syncline--Showing troughline and plunge
MINOR FOLD AXES	
	Anticline-- Showing direction of plunge
	Syncline--Showing direction of plunge
	Fold axis--Showing direction of plunge
	Fold axis-- Showing plunge
	Asymmetric anticline--Showing direction of plunge and dip of limbs