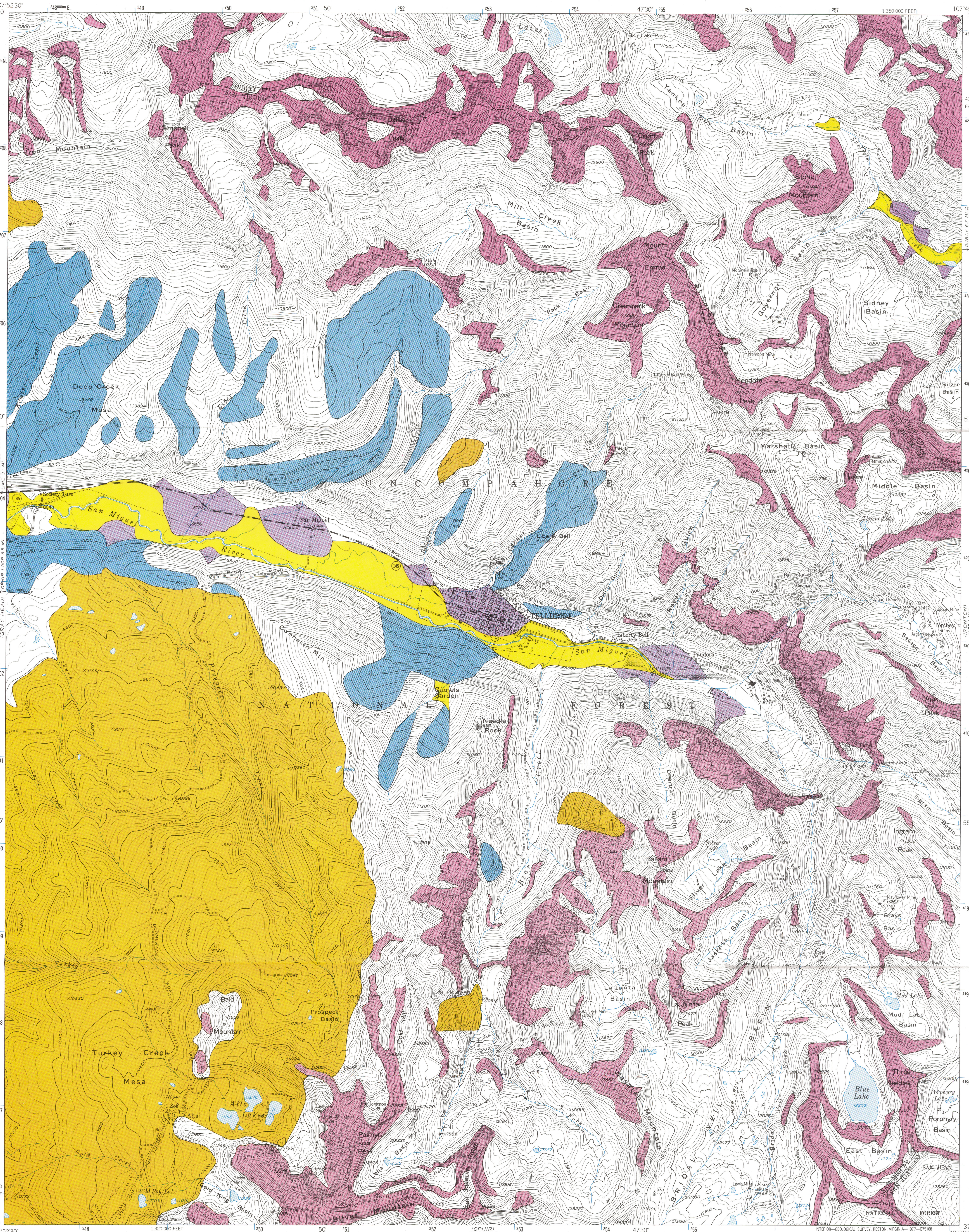
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

FOLIO OF THE TELLURIDE QUADRANGLE, COLORADO
MAP I–973–B



Base from U.S. Geological Survey, 1955
10,000-foot grid based on Colorado coordinate system, south zone
1000-meter Universal Transverse Mercator grid ticks, zone 13, shown in blue

TRUE NORTH
MAGNETIC NORTH
13½°
APPROXIMATE MEAN DECLINATION, 1976

SCALE 1:24 000

1 ½ 0 1 MILE

1 .5 0 1 KILOMETRE

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

COLORADO
QUADRANGLE LOCATION

EXPLANATION

- Alluvial plains
- Alluvial fans
- Rockfall areas
- Landslide deposits
- Potentially unstable slopes

INTRODUCTION

Certain areas and geologic deposits within the Telluride quadrangle are potential geologic hazards that should be considered in land-use planning and development. These hazards are of two main types—flooding and slope instability. Snow avalanches, also a major hazard, are shown and described in a separate map in this series (Luedke, 1976).

Erosion by running water is the principally active geologic process in the Telluride quadrangle. Most streams are perennial, but the volume of water fluctuates greatly, depending largely on annual snowpack conditions in the drainage basin and variation in rate of runoff. High streamflow occurs in the late spring and early summer as the result of melting snow, but it also occurs in the late summer as the result of rainfall runoff. When the limited capacity of soils and rocks of the watersheds to hold water is reached, summer rainwater, sometimes augmented by snowmelt water, cannot be stored but is immediately available as runoff. Runoff from occasional torrential thunderstorms could result in a flash flood.

The topographic relief in the quadrangle is about a mile (1.6 km) and is typical of rugged mountainous areas, with many steeply sloped and nearly vertical cliffs. Most of the quadrangle consists of exposed bedrock or is only thinly mantled by soil. Masses of rock and soil, if stability is disturbed, may move downward and outward on a slope under the influence of gravity. Movement might be initiated by an increased water content, load changes, excavation, or earth vibrations. Earth vibrations can be natural or man created. Vibrations related to earthquakes are an ever present possibility but are uncommon in the Telluride area. Only three earthquakes of probable intensity V or larger (Modified Mercalli scale), as well as several small tremors, have been recorded for the entire San Juan Mountains region during the past 100 years, but all were felt in the Telluride area. Vibrations as a result of heavy traffic or blasting associated with excavation and construction also might upset ground stability locally.

The purpose of this map is to indicate geographic areas and types of geologic deposits that are potentially hazardous. This map, based upon the geologic map of the Telluride 7½-minute quadrangle (Burbank and Luedke, 1966), is intended for use by planners and developers in locating roads, sewage and water systems, building sites, and other manmade features. The bedrock and surficial deposits map in this series (Luedke and Burbank, 1976), showing distribution and type of earth materials in the quadrangle, also should be consulted. For specific sites, appropriate detailed engineering and geologic investigations are strongly recommended to establish design and construction criteria prior to any alteration of the natural environment. Sound judgment in planning, before the natural features are disturbed, will help avoid possible damage to property and interference with human activities.

FLOOD PLAINS

Alluvial plains subject to flooding make poor building sites. The San Miguel River valley in the Telluride quadrangle is significant, because it is the only practical area where the town of Telluride can expand. Building sites should be selected with care. This flood plain is composed of alluvium and old glacial-lake fill. Low spots in the valley floor become boggy at times of maximum saturation and spring runoff. Also, the river channel is shallow and meandering, so that high water resulting from rapid spring melting and(or) unusually heavy summer precipitation from time to time overflows banks and floods adjacent areas. Torrential rainstorms occur frequently during the months of July and August.

ALLUVIAL FANS

Alluvial fans subject to flooding are formed by debris-laden streams where steep tributary gullies or canyons join larger more flat-bottomed valleys. These deposits are mixtures of clay, silt, sand, gravel, and boulders. The debris is transported and deposited by overloaded streams as a result of a flash flood or mass-wasting precipitated by increased runoff. When the main stream channel cannot carry the overload, the debris is distributed out over and down the fan in the ensuing flood. In addition to being a function of the size of the source area and its rate of erosion, the size of a fan is an indication of the frequency and intensity of past storms.

The town of Telluride is located on an alluvial fan at the mouth of Cornet Creek. Telluride has been subjected to floods from Cornet Creek several times in its history resulting in property damage; one of the more destructive floods occurred early this century about 1908 or 1909. The bed of Cornet Creek immediately behind Telluride has been scoured to bedrock by past floods, but a short distance upstream it is in unconsolidated glacial drift.

ROCKFALL AREAS

Principal areas subject to rockfall are found at the east end of the San Miguel River valley above Liberty Bell, Pandora, and Pandora Mill, and throughout the high mountainous parts of the Telluride quadrangle. Rockfall areas mainly denote cliffs and steep ridges and peaks from which loose rock can tumble. Most rockfalls probably occur as single fragments that accumulate into sizeable piles over a period of time.

Loose rocks on the steep slopes anywhere along the river valley and in Bear Creek valley must be considered potentially hazardous to building sites at the foot of these slopes. The danger from falling rocks beneath these slopes can be roughly assessed by the number and size of blocks scattered there and their relative freshness. If the blocks are few in number and(or) are lichen covered, then not much rock has fallen or is currently falling off the cliffs, and the areas beneath them are relatively safe.

Rockfalls are a constant hazard in the more remote high country. Sheepherders, prospectors, hikers, and mountain climbers should use particular care in or near steep narrow gullies and ravines that originate high on the slopes, because falling rocks tend to ricochet from one side of the gully to the other; a miner was killed in the adjacent Ironton quadrangle several years ago in such an accident.

LANDSLIDE DEPOSITS

Landslide deposits, used in the broadest sense, consist of masses of soil and rock that have moved downward and outward on a slope. Landslides that moved in the geologic past and appear stable now may undergo renewed movement as a result of excavation of the lower part, loading of the top, an increased water content, or an earthquake disturbance. Therefore, mapped landslides in the Telluride quadrangle constitute a major hazard in the area.

Attention is directed to two landslide deposits in particular: (1) the large deposit blanketing Turkey Creek Mesa and (2) the small deposit in the lower part of Bear Creek valley. On Turkey Creek Mesa, a chaotic mass of rock several hundreds to perhaps a thousand or more feet (100–300 m) thick covers about 14 square miles (36 km^2). This deposit has been modified to a great extent by weathering and erosion and is partly obscured by a thick cover of soil and vegetation; the hummocky and hilly surface is scarred and cut by V-shaped ravines. Slump blocks form long benches with steep outer slopes; small ponds or bogs in the undrained depressions are typical on some slump blocks near the outer parts of the slide. Springs and seeps are common, particularly at the toe of the slide.

It is uncertain whether the entire slide mass on Turkey Creek Mesa is active at the present time, but locally the surface of the slide is being altered. A small but rapid earthflow, consisting of unconsolidated debris saturated by irrigation water, occurred about 1960 near the margin of the landslide, just west of the quadrangle boundary.

The landslide deposit in the lower part of Bear Creek valley is perched precariously on the east wall. The possibility of renewed failure of this landslide deposit, combined with the hazards of rockfalls and winter snow avalanches, should be of prime consideration in land-use planning for Bear Creek valley.

POTENTIALLY UNSTABLE SLOPES

There are two types of potentially unstable slopes in the Telluride quadrangle—those cut in shale and mudstone and those on materials of glacial origin (see Burbank and Luedke, 1966, and Luedke and Burbank, 1976). In addition, the thin soil cover locally on some of the high alpine slopes is subject to downslope creep.

The potentially unstable slope areas outlined on the map north of the San Miguel River valley are mostly underlain by gently westward-dipping shale and mudstone that contain swelling clay. Slopes in shale, more so than in other rock types, have more potential for failure, particularly if the mass density is disturbed by oversaturation, unnatural loading, removal of vegetative cover, or extensive excavation. Stripped of timber in the early days of mining, the young trees now growing in the shallow soil are curved at the base of the trunks, concave upslope, because of slow downslope creep. Very locally, small earthflows have occurred.

Potentially unstable slopes occur on deposits of glacial till on the walls of the San Miguel River valley and in the valleys of Mill, Butcher, and Cornet Creeks to the north. These deposits consist of unconsolidated and unsorted boulder- to silt-sized rock fragments in a clay matrix. Such materials have low shearing strength and fail under a relatively light load. The deposit of glacial till along State Highway No. 145 south of Society Turn created construction problems at the time of highway improvement about 1960, and the deposit is a recurrent nuisance to highway maintenance, because the banks continue to slump and slough. The large deposit of glacial debris on the valley wall south of town, although apparently stable, must be considered as potentially hazardous if disturbed or undercut. A road now traverses this mass with little resulting disturbance, but if the steep slopes were cleared extensively of the vegetation that helps to stabilize them, an earthflow or landslide might result.

REFERENCES CITED

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Luedke, R.G., and Burbank, W.S., 1976, Map showing types of bedrock and surficial deposits in the Telluride quadrangle, San Miguel, Ouray, and San Juan Counties, Colorado: U.S. Geol. Survey Misc. Inv. Ser. Map I–973–A.

MAP SHOWING POTENTIAL GEOLOGIC HAZARDS IN THE TELLURIDE QUADRANGLE, SAN MIGUEL, OURAY, AND SAN JUAN COUNTIES, COLORADO

By
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1977

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