AVALANCHE HAZARD IN OURAY COUNTY, COLORADO 1877-1976

Betsy R. Armstrong

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THE SNOWSLIDE

With rumbling tones, the mountain woke,
Tossed like a giant, shuddered, spoke,
Like peals of thunder in storm's wake,
With leaden clouds the lightnings break.
The calm, placid snow untrodden lay,'
Gather'ring in depth from day to day,
Till rock and tree and wooded shade,'
Were covered close with frost inlaid,
Gulches are filled and dells unseen.
Lo! nature in her winter scene,
That will remain, unchanged by sun,
Till springtime floods in torrents run,
Which off its side to valleys flow,
And make the peach and apple grow.
The farmer, glad with hopes of gain,
Prepares his crop for grateful rain,
Which, glist'ning bright in banks of snow,
In summer's heats begins to flow,
Waters the plains and arid farms,
And gives to earth her youthful charms.
But hark, the power on Sneffles crust,
Hurls the huge mass from off its breast.
Wildly adown the slope its speeds,
The pines it snaps like hollow reeds;
Boulders and trees dashed out and in,
It sweeps along with deaf'ning din,
Catching them up, twisted and broke,
The relics of a single stroke.
Far, far below in mountains moat,
Crushed, buried in the abyssmal throat.
The fallen tree, the cabin bare,
Tell the bold miner to beware,
While seeking wealth on mountain side,
Death's embrace on the rueful slide.

(Rev. J.J. Gibbons, 1898: In the San Juan, Colorado: sketches. St. Patrick's Parish, Telluride, Colorado, p. 99.)

Cover. An 1890s congenial meeting at Porter's store and post office, Mt. Sneffels, Colorado. The East Schoolhouse avalanche path may be seen in the background and Porter's establishment itself was struck by avalanches three times within a four year period. Over-snow transportation, skis and snowshoes, are worn by these hardy men. The bottles being passed around illustrate another hazard of mountain life. Many miners, after having "just one more," did not make it back to their cabins after a night on the town, choosing instead to sleep in the snow and, consequently, freezing to death. (Library, the State Historical Society of Colorado)

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Frontispiece. July 1888 photograph of a hand-dug tunnel through the winter debris deposited by the East Riverside avalanche. Numerous mature coniferous trees brought down by the avalanche are scattered throughout the deposit and Red Mountain Creek flows through the debris. (San Juan County Historical Society)

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PREFACE

This Occasional Paper is the second monograph prepared by Betsy Armstrong on the history of avalanche activity in relation to human occupance of the northern San Juan Mountains. Like its predecessor, which dealt with San Juan County (Armstrong, 1976), it is based upon an exhaustive review of the local newspapers, principally the Ouray Times, beginning in 1887, and its successors, the Daily Muldoon, the Solid Muldoon, and finally, the Ouray Herald. Additional information has been obtained from cross-references to Ouray County in the Silverton Standard, and from numerous other sources, including the Camp Bird Mine files and many interviews with county residents.

The ensuing narrative is an important and exciting document in its own right since it tells a colorful and predominantly tragic tale of the desperate struggle of the Ouray County mining community with their mortal enemy, the snow avalanche. Sometimes this tale is spiced with humor, sometimes with incidents of miraculous escapes. But it should also serve as a lesson for all persons and authorities who today, and at any time in the future, contemplate recreational and resource development activities, or just simple living, in this beautiful and hazardous mountain region. One of the truly horrifying themes, repeated again and again throughout the narrative, is man's tendency to rebuild in the same place immediately after death and destruction has been sustained. Another theme is that "absolutely safe" sites are often struck by massive avalanches with a long recurrence interval. There is no such thing as an absolutely safe site in avalanche country where the dramatic forces of nature may make themselves apparent as infrequently as once in one hundred, or even several hundred, years. A third theme is that the local people, well before the turn of the century, had developed an intuitive understanding of the "personality" of the avalanche hazard: avalanche cord, explosives, various techniques of avalanche rescue, retaining structures in the starting zones, and deflecting structures in the run-out zones of avalanches, were all improvised. In addition, there have been calls on the State Legislature for land-use planning and for avalanche defense by the construction of tunnels. It is perhaps appropriate to highlight here the final sentences of the monograph. Referring to the East Riverside avalanche, the author writes:

> "Four lives would have been saved, had the tunnel, proposed in March 1909, been approved and built (Ouray Herald, 26 Feb. 1909). In 1964, Hans Frutiger, in his survey of avalanches along Colorado mountain highways (Frutiger, 1964), recommended construction of a tunnel or heavy avalanche shed to protect the highway from both the East and West Riverside avalanches. Had this

> been done then, Miller's life would not have been lost" (page 82).

Robert Miller, father of seven children and Colorado Department of Highways employee, was killed on 2 March 1970 while clearing the road from debris remaining from the previous day. As the author's narrative and INSTAAR's first-hand experience in avalanche research shows, the work of the highway crew is quite dangerous and they probably incur a higher risk than any other single group.

In 1974 the Colorado Legislature passed House Bill 1041, which makes it incumbent upon the counties within the state to prepare maps at a scale of 1:24,000 which show areas subject to "geologic" hazard, legally defined to include avalanche hazard. INSTAAR has prepared such maps for San Juan County, and for large parts of Ouray, San Miguel and Hinsdale counties. However, we are still lacking a standardized approach to natural hazard mapping which is needed to help provide a rigorous means of transferring field and air photograph data into cartographic form.

The present work is a logical part of INSTAAR's overall natural hazards research program for the San Juan Mountains in particular, and for mountain Colorado in general. This program includes the development of an avalanche forecast model (Armstrong and Ives, eds.,1976; Bovis, 1977), study of snow characteristics (Armstrong et al., 1975), botanical investigations as a means to determine the frequency of avalanche events through time (Burrows and Burrows, 1976) and natural hazard mapping in general (Bovis et al., 1976; Ives et al., 1976; Ives and Bovis, 1977). In addition, an avalanche atlas has been published for San Juan County (Miller, Armstrong and Armstrong, 1976) and one for Ouray County is in preparation (Armstrong and Armstrong, 1977).

From all of the interdisciplinary activity referred to above, we can also learn the lesson that natural hazard mapping is a serious responsibility and cannot be performed successfully without the full interdisciplinary range of experience. Mapping of supposed avalanche paths from air photographs with cursory field checking is dangerously inadequate; in this context old newspaper files and mine records will often show that the field evidence and air photograph indications can be easily misinterpreted. For the major avalanche event with a long recurrence interval, all available sources of data must be consulted. The corroboration of the Camp Bird Mine data with the tree-ring analysis of Burrows and Burrows (1976) is a good case in support of this contention.

House Bill 1041 is an important step toward rational land-use planning in the Colorado Rocky Mountains, and the current study, financed in part through HB 1041 funds made available by Ouray County, will hopefully prove a valuable contribution. Additional support has been made available through a research grant to INSTAAR by the National Aeronautical and Space Administration (NASA-PY NGL-06-003-200) -

application of remote sensing techniques to the solution of land-use problems in mountainous terrain. Finally, the work is designated as a contribution to the United States Man and the Biosphere (MAB) Program in collaboration with UNESCO, and to the work of the International Geographical Union (IGU) Commission on Mountain Geoecology.

Jack D. Ives
Director, Institute of Arctic and Alpine Research
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Chairman, IGU Commission on Mountain Geoecology
8 March 1977

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The work would not have been possible without the presence in Silverton of INSTAAR's San Juan Avalanche Project which has received direct and indirect support from many sources: Bureau of Reclamation San Juan avalanche contract no. 14-06-D-7155; Bureau of Reclamation San Juan ecology contract no. 04-06-D-7052; NASA-PY grant no. NGL-06-003-200; US Army Research Office, Durham, contract no. ARO DAHC04-75-G-0028; Colorado State Highways Department and Federal Department of Transportation subcontract from the University of Washington no. 845043; and San Juan and Ouray counties.

ABSTRACT

An examination of historical data relating to avalanche activity in Ouray County, Colorado, was undertaken for the period 1877-1976. Ouray County was a booming gold and silver producing area, reaching its peak in population, mineral production and, correspondingly, avalanche deaths and destruction to property during the period 1880 to World War I.

Data were obtained from newspapers of the period and by interviews with long-time residents. Avalanche sites were plotted on USGS 1:24,000 scale maps and tabulations of avalanche frequency were developed, chronologically and by geographic location. A total of sixty-two avalanche deaths were recorded during the survey period. Of these, fifty percent occurred while the victims were in fixed positions, either in or near a building. The remaining fifty percent of deaths occurred while the victims were traveling. Thirty-three properties were struck by avalanches. Twenty-six geographic locations were plotted where deaths or burial from avalanches resulted. Case studies of the Barstow and Camp Bird mines are presented and detailed histories of these mines and their avalanche problems are given. A case study of U.S. Highway 550, from Ouray to Red Mountain Pass, is also presented, with detailed histories of two active avalanche paths affecting the highway, the Mother Cline and East Riverside.

The avalanche hazard is traced from the early mining days to the present. During the historical period, the hazard was widespread and not concentrated in any particular area, primarily because the mining operations were scattered throughout the county with diverse traffic routes. This represents a significant difference from the present-day pattern of avalanche hazard, which is mainly concentrated along Highways 550 and 361 and the Camp Bird Mine.

CHAPTER I

INTRODUCTION

Definition of the Hazard

Ouray County, from 1877 to the present, has had a continuous history of avalanche disaster. The San Juan Mountains, rising to heights of 14,000 feet and rich in minerals, dominate the southern portion of the county. It was the lure of mineral wealth that drew thousands of people, prospectors, miners, merchants, and their families, into the mountains. The San Juan Mountains, inspiring in their beauty, especially when cloaked in winter white, have for the last 100 years, brought death and destruction to the inhabitants and travelers who chose to live and work in this hostile environment. Long winters, frequently lasting seven months of the year and characterized by strong winds, low temperatures and heavy snows, took their toll. Many people lost their lives when their horses slipped off narrow, icy trails, rider and animal often falling several hundred feet. Others froze to death when storms caught them unprotected and without shelter, or in remote mountain cabins when the severity and length of the storm prevented them from replenishing their fuel supply. However, the greatest threat during the winter months, then and now, is the snow avalanche.

> Snowslides creep silently at first down the mighty slopes and suddenly, with an awful roar, overwhelm the unsuspecting victim (Gibbons, 1972, p. 154).

Sixty-two lives have been lost, 192 people have been caught and survived the dreaded avalanche. Thirty-three sites of human activity, mines and towns, have been damaged or destroyed. Twenty-six avalanche paths have been reported to have claimed victims. This study does not claim to have recorded all avalanche events, all people caught and property damaged, but only those incidents located in the newspaper accounts and those obtained during interviews. However, just the sheer number of incidents, even if not the absolute total, will give the reader a clear understanding of the danger of the snow avalanche.

The hazard during the county's boom years, 1877 to World War I, was immense. With hundreds of people traveling on mountain roads and trails, living and working in hazardous locations, the number of avalanche incidents was high. Human response was to avoid the hazard and various means were suggested, as will be discussed in detail in the text. Construction of tunnels as avalanche protection for roads was suggested on two occasions: in 1909 a bill was presented to the Colorado General Assembly for authorization to construct a tunnel at the site of the Riverside avalanches on U.S. Highway 550. The bill was not passed and since that time five lives have been lost in the East Riverside. A second tunnel, proposed by the County Commissioners in 1938, was to be built at the site of the Waterhole avalanche but was also never constructed. Since 1938, the West Waterhole avalanche has buried two people, killing one of them.

A suggestion was made in 1909 for active avalanche control. Delivery of explosive charges into the area of cornice development in the starting zone of

an avalanche path was proposed. Thus, the avalanche would be released after buildings were evacuated, avoiding any loss of life. This plan was put into effect in 1955 when the Colorado Department of Highways began controlling avalanche paths on U.S. Highway 550 and the Camp Bird road, Colorado 361, in Ouray County, with a 75 mm pack howitzer. This method of avalanche control has been continued to the present date. Many mines constructed supporting structures above the buildings to prevent avalanches from releasing (Chapter II) and in 1908, the use of an avalanche cord, called "snowslide ribbons", was suggested for travelers in hazardous terrain (p. 41). A method for surviving when caught in an avalanche was offered in the 1890s.

> The only hope for a person caught in a snowslide is to remain on top of the snow, which advances like the waves of the ocean in its ebb and flow. If you are thrown down at the outset your chances of life are next to nothing (Gibbons, 1972, p. 135).

By the 1920s, Ouray County had suffered a demise in mining activity and population, and concurrently a reduction in avalanche hazard. The hazard now became concentrated along the two traffic routes, U.S. Highway 550 and Colorado 361 (see Table 2), and the few remaining active mines. Both roads provide the access to the only working mines in the county, the Camp Bird and Revenue (sporadically until 1950) on State 361 and the Idarado on U.S. Highway 550. Since 1940, eight deaths have been reported, four on each road, and twelve additional people have been caught by avalanches and survived. All of these people were traveling on the two roads, either in cars or on foot. Therefore, the current avalanche hazard exists mainly on the highways and not at specific sites, with the exception of the Camp Bird Mine.

However, this situation can change with the potential for recreational and mineral development. A new interest in ski touring and winter mountaineering is bringing more people into the mountains during the winter months. People are considering the San Juan Mountains as sites for their vacation homes. Potential for increased mining exploration and development exists.

Ouray County, in authorizing this historical study, has begun a data bank to aid future land-use planning. Additional studies by the University of Colorado Institute of Arctic and Alpine Research (INSTAAR) expand the scope of this study. The identification and mapping of avalanches and geologic hazards for the entire county have been completed (Bovis et al., 1976) and, at the request of Ouray County an avalanche atlas (Armstrong and Armstrong, in press) is being prepared which will describe the avalanche paths affecting U.S. Highway 550 within the county and Colorado 361. The atlas includes comprehensive information on the release zone, track and run-out zone, altitude, orientation, slope angle and terrain and vegetation features of each path, as well as a historical record including data from this study, twenty years of Colorado Highway Department data, thirty years of Camp Bird data and five years of INSTAAR data. An intensive study of avalanche hazard in the San Juan Mountains began in autumn 1971 when INSTAAR, under contract to the Bureau of Reclamation, began the San Juan Avalanche Project. The results of the five-year INSTAAR study are published separately (Armstrong and Ives, eds., 1976).

Physical Geography of Ouray County

Ouray County is located within the southwestern quadrant of Colorado. The outline of the county is approximately triangular with the base to the north. Its extreme length, from north to south, is thirty miles and its extreme width is about twenty-nine miles. The total county area is 332,160 acres. The southern portion of the county is mountainous; the northern portion is divided between level agricultural land and low hills, including a portion of the Uncompahgre Valley. The elevation ranges from 6,300 feet at the northern boundary to over 14,000 feet at some of the mountain tops in the southern portion (Henderson, 1926, p. 24). Mount Sneffels, at 14,143 feet is the highest peak in the county. The town of Ouray, the county seat, is in the southern portion of the county on the Uncompahgre River, in a small park at an altitude of 7,800 feet. The town, surrounded by peaks 9,800 to 11,300 feet in elevation, is the northern entrance to the San Juan Mountains.

The county contains four principal drainages; the north fork of Henson Creek in the extreme southwest corner and the Uncompahgre River, Cow Creek and Cimarron Creek, which together drain more than nine-tenths of the whole Ouray quadrangle (Cross, Howe and Irving, 1907). Treeline lies at approximately 12,000 feet, above which the alpine zone is characterized by typical tundra consisting largely of grasses, sedges, and lichens, with wide areas of talus and bedrock, while below treeline the vegetation is primarily spruce-fir, willow and aspen. Non-vegetated areas in the forest zone are the result of logging in conjunction with mining activities, fires, avalanche activity and talus slopes beneath rock outcrops.

The San Juan Mountains are formed mostly of Tertiary volcanic rocks, the result of outpourings of lava and ash from repeated episodes of extensive volcanic activity. The volcanic activity began in mid-Tertiary time, approximately 35 million years ago, and continued for several million years. The western side of the mountain range, including Ouray County, consists primarily of uplifted and faulted Paleozoic sedimentary layers, deposited between 225 and 570 million years ago. Large patches of Precambrian granite and metamorphic rocks protrude through the sediments. Most mineralization took place during the late Tertiary volcanic period, approximately 3 million years ago (Chronic and Chronic, 1972, p. 25-26).

The general climate is one of low relative humidity, abundant sunshine, cool summers with frequent rain showers in July and August, moderate winter snows and wide daily temperature fluctuations. Severe sustained cold waves are rare west of the Continental Divide and stationary high pressure systems frequently control winter weather with warm clear days and cold nights. Precipitation increases and temperature decreases fairly uniformly with elevation. A relatively uniform precipitation regime prevails throughout the year with a maximum in August and a minimum in January. Strong night and early morning temperature inversions are prevalent in valley locations during much of the winter period. Such inversions are usually removed by surface heating and mixing during the day, causing valley floor sites to exhibit higher maximum as well as lower minimum temperatures compared to valley wall or ridge top sites.

Snow Climate of the San Juan Mountains

The winter snowcover of the San Juan Mountains is characterized by relatively light, low density snowfalls; annual accumulations generally amount to depths of five to ten feet with a highly differentiated stratigraphy of very low mechanical strength. This latter condition is primarily the result of two factors. First, the extreme nocturnal radiation cooling occuring on all exposures produces snowpack temperature gradients of a magnitude sufficient to cause significant recrystallization or temperature-gradient metamorphism (depth hoar formation). The second factor is the substantial amount of solar radiation on slopes with a southerly exposure. This daytime condition causes melt just below the surface and subsequent freeze-thaw crusts. These two situations continue to influence the snowcover throughout the winter and the resulting stratigraphy is highly complex.

The snow structure determines the character of the predominant type of avalanche release of which there are two basic forms. The loose snow avalanche initiates from a point where crystals which adhere poorly to each other collect on a slope steeper than their angle of repose. Failure begins near the surface when a small amount of cohesionless snow slips out of place and starts moving downslope and, in turn, sets the snow below in motion. A fan-shaped avalanche is produced, widening from the initial point as more snow becomes incorporated. This type of avalanche primarily involves surface snow only, which limits the volume of snow and thus the magnitude of the event. The fact that loose snow avalanches will often come to rest once the slope angle becomes less steep than that of the release zone, also limits the hazard.

The second type, the slab avalanche, occurs whenever snow lies on a slope in a cohesive layer which is poorly bonded to the snow or ground below. Generally, slabs build as the result of wind-blown snow which, due to the mechanical disturbance by wind, is deposited as a dense, hard layer. Cohesive layers of lesser density may form, even in the absence of wind action, as a result of the deposition of crystal types allowing mechanical interlocking or a close packing ratio. Poor adhesion between layers may be the result of an ice crust, buried surface hoar or the presence of temperature-gradient recrystallization within the snowcover. Slab avalanches release along a fracture line, a sharp division of sliding snow from stable snow, with the face of the fracture being perpendicular to the slope. The entire layer of unstable snow is set in motion simultaneously and the fracture line may extend from tens of feet to over a thousand feet across the slope. The slab itself may vary from only a few inches to over ten feet in thickness, sometimes incorporating the entire snowcover down to the ground surface. For these reasons, slab avalanches are associated with the movement of large volumes of snow. They are also quite dangerous because the mechanical conditions leading to slab avalanche formation are associated with a large variety of snow structure and crystal types and are consequently difficult to predict. Slab avalanches, like loose snow releases, may involve dry midwinter snow or wet spring snow where the presence of free water, from melt or rain, provides the critical loss in snow strength. Whether dry or wet, slab releases may incorporate only new snow or may be comprised of one or more layers of older snow deposited and metamorphosed prior to the triggering precipitation event. This type of release, referred to as a climax avalanche, comprises eighty to ninety percent of the slab releases in the San Juan Mountains. This condition is a direct result of the complex and highly variable stratigraphy of the local snow cover (Armstrong, et al., 1975; Armstrong and Ives, eds., 1976).

Method of Research

This study was supported by Ouray County with funds from Colorado House Bill 1041, and the Office of University Affairs, NASA, with additional support from the U.S. Bureau of Reclamation, Office of Atmospheric Water Resources, for the purpose of locating sites of avalanche occurrence and determining their frequency and magnitude from historical records and personal interviews.

> To avoid avalanche-prone sites, you must first be able to recognize them. By far the most reliable way of locating avalanche areas is to study long-term, detailed records of past events (Martinelli, 1974, p. 2).

For the purpose of this study, newspapers from Ouray County were examined beginning with the Ouray Times in 1887 and continuing through the Daily Muldoon, the Solid Muldoon and concluding with the Ouray Herald in 1940. In addition, newspapers from Red Mountain Town were examined, as well as all San Juan County papers, which were read in conjunction with the San Juan County, Colorado, avalanche study (Armstrong, 1976). This proved quite valuable for filling in missing years since San Juan County has a continuous newspaper record, whereas no Ouray County newspapers are available for the following periods: 1893; January-March 1894; December 1913-April 1915; November-December, January 1921-1922; November 1922-December 1923*.

In 1941, observers at the Camp Bird Mine began compiling avalanche event data; in 1951, the Colorado Department of Highways also began compiling these data. In 1967, the U.S. Forest Service, Fort Collins, Colorado, began a compilation of avalanche data from the San Juans. These data, together with five winters' data from the University of Colorado INSTAAR San Juan Avalanche Porject, information from newspapers, books and personal interviews form the body of this study. Tables 10 and 11, Appendix III, list in chronological order and by geographic location all reported avalanche events tabulated from all data sources.

Newspapers were read systematically from November through April or May, depending on the severity of the winter, and the following factors were noted: storm description, absence of storms, avalanche cycles with and without damage to life and property, sites of avalanche occurrence and any data pertaining to the event, i.e., extent of damage, whether the site was considered safe and how long the structures had been standing.

Informants were asked questions concerning their occupation, age, period of domicile in Ouray County, experiences with snow and avalanche events and rescues, and locations of various mines and geographic locations.*

The next step was to locate the known avalanche sites on USGS 1:24,000 scale maps (see Appendix II). Approximately ninety percent could be located either generally or specifically using historic and present claims maps and the memories of those interviewed. A majority of these sites were field checked for accuracy during the summer of 1976. The remaining unlocated sites were

*For a complete listing of newspapers examined and people interviewed, see References, Appendix I.

unpatented claims that are not shown on claim maps, geographic locations or buildings that were so old or whose names were so outdated that those questioned had not heard of them, or sites that were described by a mining company name which often change, rather than by the claim, which once recorded is never changed.

CHAPTER II

GENERAL OVERVIEW

Historical Overview

The area now known as Ouray County belonged to the Ute Indians until the signing of the Brunot Treaty in 1873, when the Utes ceded the San Juan Mountains to the U.S. Government in exchange for payment. This treaty officially opened the northern San Juan Mountains to mining and settlement, activities which had already begun in the Lake City and Howardsville-Silverton areas. The first prospectors, leaving from Howardsville, reached the future townsite of Ouray during the summer of 1875, staked two claims at the north end of the site and, later that fall, staked out the Mineral Farm claim (Map 4). This was the beginning of the rush to explore this region of the San Juans and by the end of the year, the town of Ouray had been surveyed and a few cabins built. The town was incorporated in 1876 as part of San Juan County and on 18 January 1877, Ouray County was created from the northern portion of San Juan County, with Ouray being designated as county seat by the Ouray County Commissioners in March of that year (Figure 1; Rockwell, 1976, p. 3a). Early mining efforts were concentrated mainly around the town of Ouray and in the Mount Sneffels district, west of town: the Wheel of Fortune claim (Map 3) was staked in October 1875; claims were located in Imogene Basin (Map 2) during the winter of 1875-1876 by Andy Richardson and William Quinn, and the Virginius Mine (Map 3) was established in 1877 (Rockwell, 1976, p. 6a). During this period the transporting of supplies into the area and ore out to smelters was expensive and difficult at best. For example, in 1877 the cost to pack ore on mules twenty-three miles from Ouray to the nearest smelter in Silverton, via Mineral Point, was $25.00 per ton. After the ore was treated, it was again hauled, by wagon, over Stony Pass via Cunningham Gulch, to Del Norte and then to Denver or Pueblo (Rockwell, 1976, p. 6a).

The Ouray Times, the county's first newspaper, began publication in June 1877 and reported that fall that more winter work was being planned for the forthcoming winter than had been accomplished in the past three seasons. Twelve mines in the Mount Sneffels district were employing 75 men to work the winter with a total of approximately 350 men anticipating the winter in Ouray County (Ouray Times, 3 Nov 1877). With the first active winter came the first avalanche accidents: Issac Martin, who was traveling the trail near Lotzenheiser's mining camp (location unknown) was buried by an avalanche in February 1878, but luckily was uncovered quickly by the men at the mining camp (Ouray Times, 9 Feb 1878); on January 30, on the trail between the Millionaire and U.S. Deposit mines (Map 2), three men were carried several hundred feet down the mountain side and escaped uninjured (Ouray Times, 9 Feb 1878). This winter of 1877-1878 was unusually severe. According to the Ouray Times of 24 December 1881, it began early and found

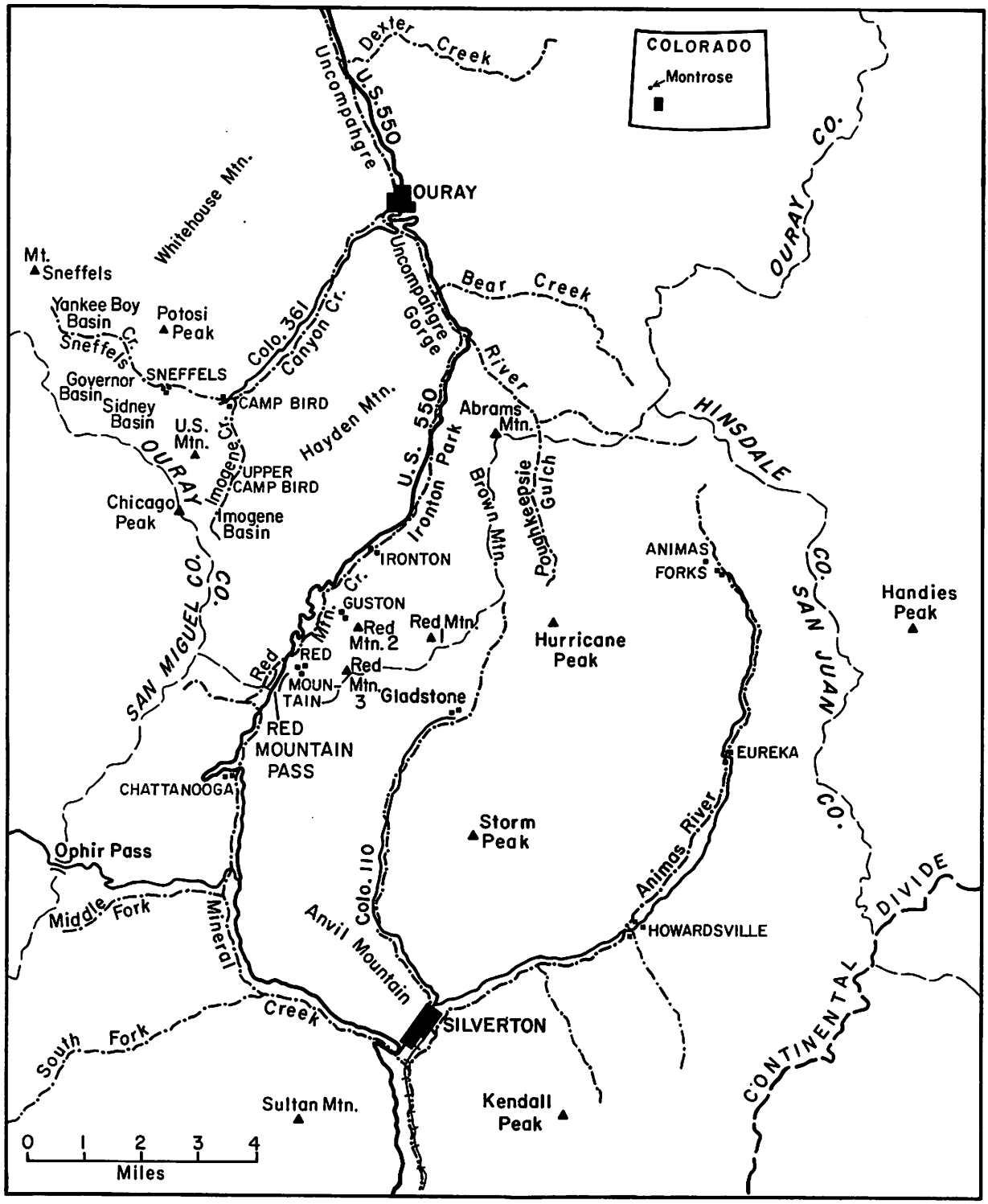

Figure 1. Map of the southern portion of Ouray County, Colorado

most people unprepared. The severe hardships of daily life in those early days is noted in the following statement:

> Those miserable days when a man will have to go to bed to save wood, and hungrily submit to two meals a day, will soon be here. But we will have to cooly submit to it; winter is bound to come (Ouray Times, 1 Oct 1881).

Rev. Gibbons, who lived and worked in the San Juans in the 1880's described the principal hazards to miners in those days:

> ...snowslides come down the mountain side, bearing many to death,...pneumonia affects the young and strong, or the premature blast opens the day of eternity to the most careful and virtuous... (Gibbons, 1972, p. 104).

In 1883, Otto Mears built a toll road from Silverton to Ouray, making it possible to transport ore to the smelter in Silverton by wagon rather than by mule. The Denver and Rio Grande Railroad reached Montrose in 1882, the same summer it arrived in Silverton from Durango.

> With its coming, Montrose became the central distributing point for the mining towns of Ouray and Telluride. In 1887, a branch railroad was built from Montrose to Ouray, arriving in December of that year. Prior to the arrival of this branch line, the Dave Wood and the Buddecke and Diehl freighting outfits in Montrose did a booming business with Ouray, hauling supplies to Ouray and returning with ore, which was shipped out of Montrose by rail (Rockwell, 1976, p. 8a).

Ouray County was fortunate in having its primary source of supplies, the Denver and Rio Grande Railroad, be relatively safe from avalanche hazard. Only one avalanche incident was reported in February 1891 by the Solid Muldoon: a small avalanche at a point opposite Heath's ranch (location unknown) had delayed the Denver and Rio Grande Southern train enroute to Ouray. All other traffic routes were exposed to avalanche hazard much of the winter. Otto Mears built the Silverton Railroad, from Silverton to Albany, north of Ironton Park, a distance of fifteen miles, in 1888. The Silverton Railroad served the towns and mines in the Red Mountain mining district: Ironton, Guston, Red Mountain Town, the National Bell, Genessee-Vanderbilt, Barstow, to name a few, and its tracks were so frequently blocked by avalanches that Dave Day, editor of the Solid Muldoon, called the line the "Silverton-Red Mountain-Rainbow Slide and Drift trunk line" (Solid Muldoon, 6 Mar 1891). In March of 1891, the amount of avalanche debris on the tracks made it feasible to dig a large snow tunnel through the Yankee Girl Slide (Map 6) (Solid Muldoon, 6 Mar 1891).

Closure of wagon roads and trails by avalanches were common. Some were just small annoyances:

> The Ironton stage ran into a partly grown snowslide Monday morning and returned for a supply of muscle, shovels and cold tea (Solid Muldoon, 15 Nov 1889).

However, others resulted in blockades of varying duration. Headlines of the 3 April 1903 issue of the Ouray Herald read:

THE SNOWSLIDE

All Previous Records in Ouray
County Broken by the Slides
Occurring Wednesday

FORTUNATELY NO LIVES LOST

Trees are Snapped off Even With the Ground
and Carried Into the Gulches Below
While Mountain Roads are
Badly Blockaded

By the mid 1880s, Ouray County was well established in the mining industry; the transportation system, a network of railroads, wagon roads, trails and aerial tramways, was adequate for economically transporting large quantities of ore to points outside the San Juans. Labor was in plentiful supply with European immigrants flocking to the San Juans and metal prices justified heavy investment in mining, milling and the most modern equipment. With the steady development of a mining economy, the number of people involved in mining, milling and service industries increased accordingly. Census figures from 1880 show 2,669 people residing in the county (Cummins, 1951). Traffic on the roads and trails was heavy year-round. Packers and teamsters were hauling in supplies to the mines and hauling out ore to be shipped to the mill or smelter. They were especially busy in the fall when the mines, particularly those in remote locations, would stockpile supplies for the winter ahead.

> The snow storm in the hills for the past few days is reported to be the most severe in the history of many years. Several of the small mines have been snowed in for several days past and no communication has been had with the miners owing to the severity of the storm. All the trails from one property to another have been obliterated and persons who have been out in the storm have been in imminent danger of their lives, since the snow is accompanied by a hard driving wind, making traveling extremely dangerous...it is believed that nearly all the miners have been prepared for any such contingency by having plenty of food on hand (Ouray Herald, 16 Mar 1906).

Packers, teamsters, railroad employees, mail carriers, and telephone and electrical power company service people, as important to mining as the miners themselves, were constantly traveling between the towns and the mines on the mountain roads and trails, and together with the prospectors and miners were constantly exposed to avalanche danger.

Mining Activity and Avalanche Hazard

Before the San Juans were invaded by the prospectors and miners in the 1870s, the Ute Indians traveled in the mountains only during the summer months. The avalanches that fell in the winter were unrecorded since neither humans nor property were in their path. Once settlement began and the mountains were inhabited year-round, then "the monstrous avalanche" (Ouray Herald, 14 Dec 1889) became a hazard to be feared and respected:

> Mining notes are scarce this week as the boys are not disposed to take any chances on breaking trails to Ouray until the snow settles and the outlook for slides is less favorable (Solid Muldoon, 10 Jan 1890).

The citizens of Ouray County differed in their opinions regarding the value of the winter snowfall. The northern portion of the county was and is largely agricultural and depends on a good winter snowpack for its summer water supply.

> The first snow-slide of the season occurred at Riverside last Monday and of dimensions that will guarantee a huge deposit of the beautiful (snow) until next summer (Solid Muldoon, 9 Nov 1888).

The miners, teamsters and everyone else associated with mining, on the other hand, inhabit the southern portion of the county, the San Juan Mountains, and excess snow not only creates avalanches but blocks trails and makes the operation of the mines even more difficult.

> Hence, the farmer watches the winter's storm with joy, while the miner, fearing the snowslide and the precipice, dreads its approach (Gibbons, 1972, p. 120).

Avalanches and Climate

A total of sixty-two deaths from avalanches have been reported from 1877 through 1976. Table 1 lists the number of people caught in avalanches and the resulting deaths, and survivors. These tallies are from Table 10, a compilation of avalanches involving people, animals, or property in chronological order, found in Appendix III. Figure 2 breaks down avalanche deaths by month and shows that the month of February took the highest toll in lives lost, a fact which seemed to be known to the editor of the Ouray Herald in 1902:

TABLE 1

LOCATION OF AVALANCHE ENCOUNTERS

OURAY COUNTY, COLORADO

Period	Fixed Location		Traveling		Category Totals		Total
	Deaths	Survivors	Deaths	Survivors	Deaths	Survivors	Encounters
1877 - 1940	31	69	23	111	54	180	234
1941 - 1976	0	0	8	12	8	12	20
TOTAL	31	69	31	123	62	192	254

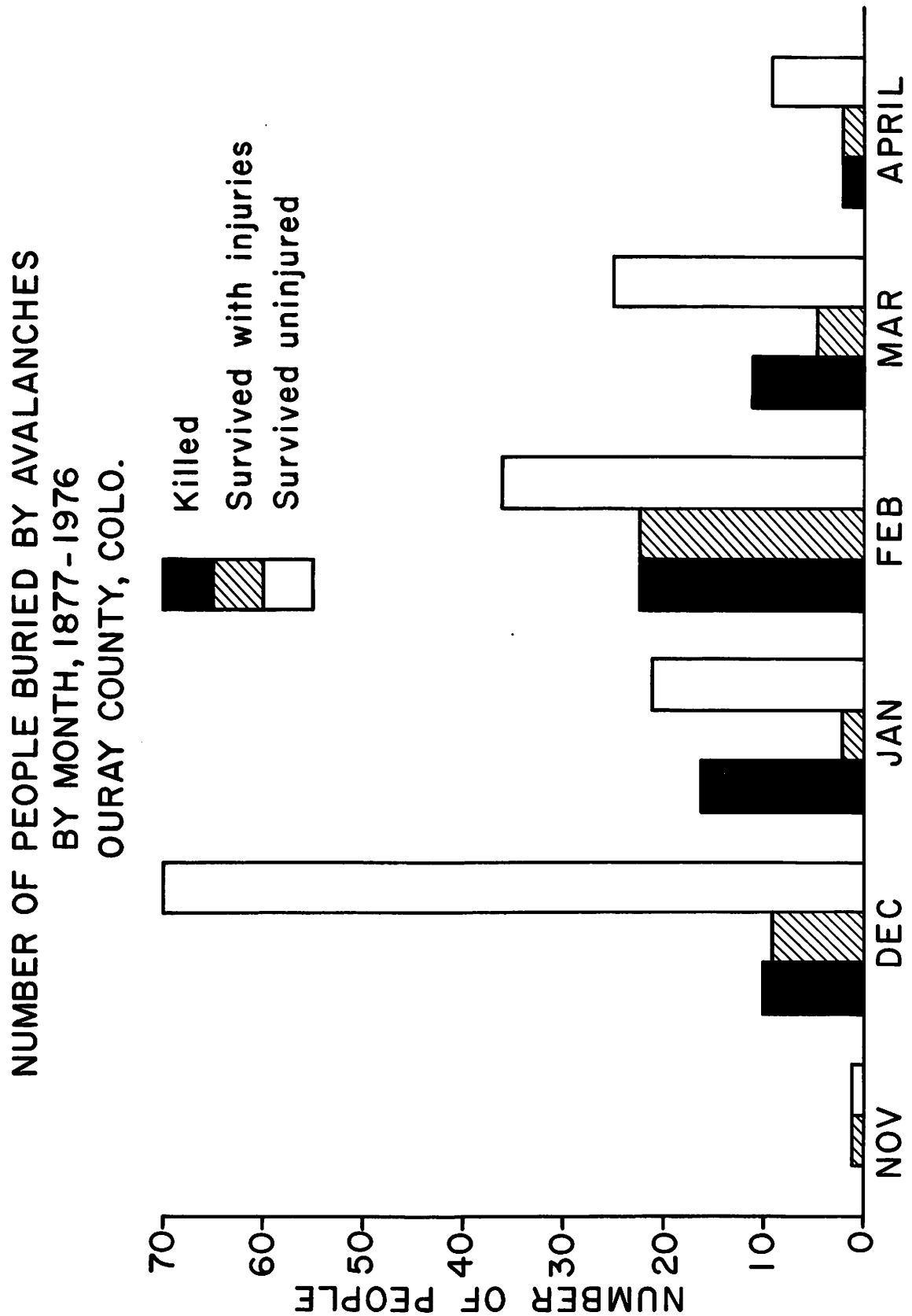

Figure 2. Avalanche deaths by month, 1877-1976

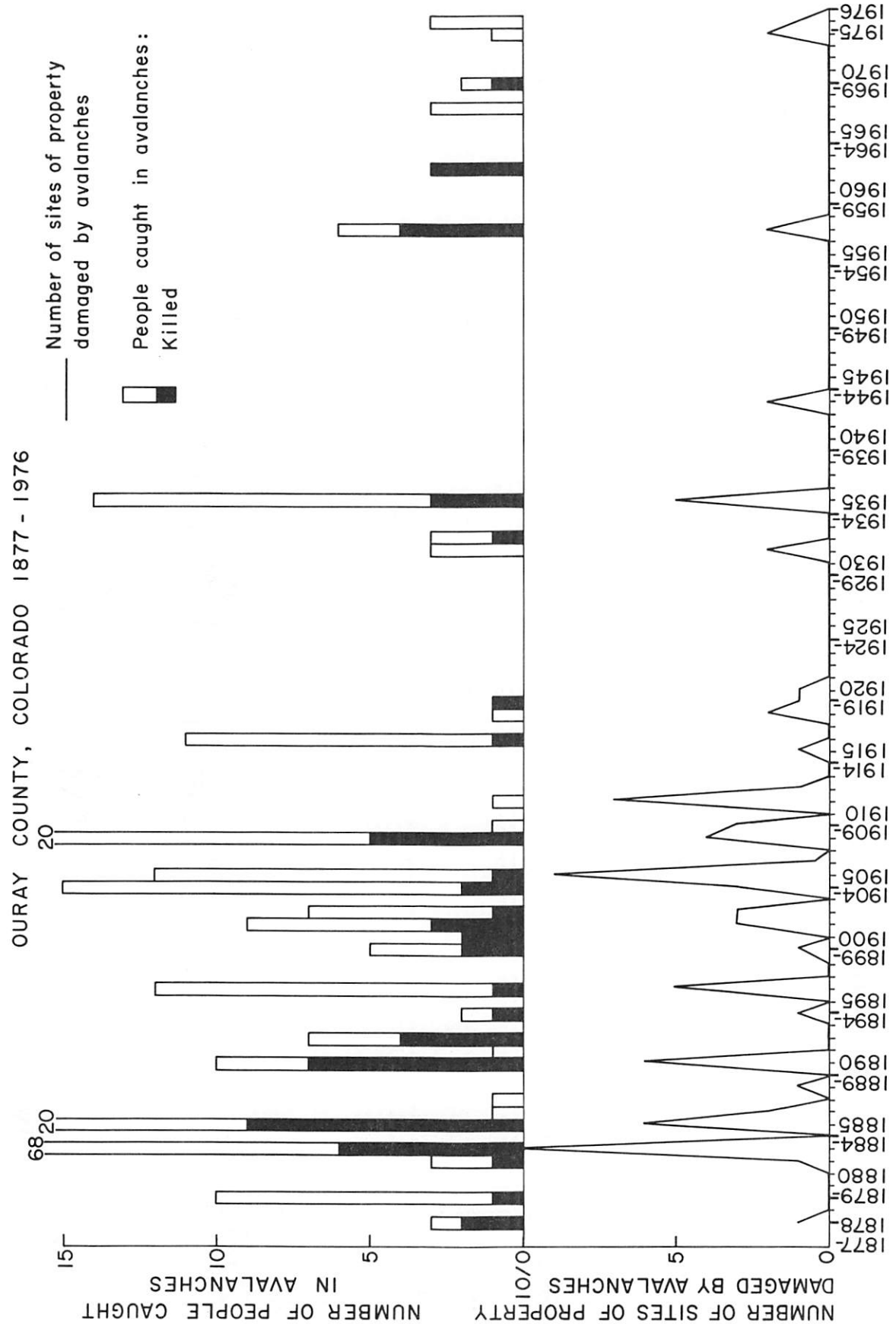

Figure 3. Annual compilation of the number of people caught, deaths, survivals, and number of sites damaged or destroyed by avalanches, 1877-1976.

> It is during the latter part of February that the biggest avalanches usually run, carrying death and destruction to everything in their path. All should bear this in mind and not venture into hazardous portions of the mountains until the danger period has passed (Ouray Herald, 30 Jan 1902).

Figure 3 presents the number of people caught in avalanches and the number of sites buried and/or damaged by avalanches, by year, from 1877 to 1976. It appears that general climatic trends for the period, as reported by Barry and Bradley (1971) generally correlate with the numbers of burials, deaths and property damage from avalanches. In their historical climatology study, they reviewed data sources for precipitation variability in southwestern Colorado for the last 100 years.

> Although the data are sparse prior to 1900, a comparison of the general trend of temperature and precipitation for 1850-90 shows an expected inverse relationship...Precipitation totals during the late 1850s and early 1860s fell while mean temperatures rose...From the late 1860s to approximately 1890, the reverse is true, a cooling trend being paralleled by increasing precipitation.
>
> A major low precipitation value occurred around the turn of the century followed by a rapid increase to a peak value in 1908. Precipitation then decreased to a minor low around 1916 followed by an increase to another peak in 1919-22. This minor peak was followed by a drastic fall in precipitation over the next decade to a minimum value for the period at approximately 1929-32. An equally dramatic rise followed, resulting in a peak generally around 1936-38...Minor lows then occur at 1945-1946 and 1961-1962 with intermediate peaks around 1948-1951 and/or 1956-1957 (Bradley and Barry, 1973, p. 52).

Mining and Avalanche Hazard

The numbers of avalanche burials and property damaged correlate with the fluctuations in the mining industry and, it is assumed, with the total number of people working and traveling in the mountains. Table 2 presents ten-year population figures for Ouray County from 1880 to 1970. The peak population year, 1890, was also the peak year for mineral production for the period 1878 to 1923, as is shown on Table 3. Table 3 indicates a slow increase in mineral production in the 1880s in Ouray County. The principal mines worked in the Mount Sneffels District from 1881-1887 included the Virginius, Yankee Boy, Terrible, Portland, Sidney, Monongahela, El Dorado, Allied, Snow Drift, Governor, Bessie Bascom, Revenue, Ethan Allen, Young America, Flagstaff and Ruby Trust (Henderson, 1926, p. 54). From 1882 until 1893, the Red Mountain District was very active and ore shipment

TABLE 2

POPULATION OF OURAY COUNTY, COLORADO*

Year	Population
1880	2,669
1890	6,510
1900	4,731
1910	3,514
1920	2,620
1930	1,784
1940	2,089
1950	2,103
1960	1,601
1970	1,546

*Cummins, 1951

TABLE 3

GOLD, SILVER, COPPER, LEAD AND ZINC PRODUCED IN OURAY COUNTY, 1878-1927†

Year	Amount	Year	Amount
1878	$ 49,473	1902	$3,078,332
1879	59,963	1903	2,589,713
1880	98,552	1904	2,488,242
1881	180,378	1905	3,131,718
1882	264,942	1906	2,069,784
1883	565,568	1907	3,022,396
1884	804,008	1908	2,510,670
1885	1,187,800	1909	3,474,637
1886	1,202,137	1910	2,674,520
1887	1,168,037	1911	2,473,018
1888	1,007,046	1912	1,595,178
1889	1,122,065	1913	1,468,829
1890	3,578,494	1914	1,739,160
1891	3,019,061	1915	1,656,002
1892	1,189,385	1916	1,299,737
1893	1,502,155	1917	1,086,234
1894	1,008,010	1918	1,134,142
1895	1,406,001	1919	912,379
1896	1,975,389	1920	664,008
1897	2,761,118	1921	869,547
1898	1,925,358	1922	1,442,129
1899	3,494,878	1923	862,202
1900	3,145,209	1926	200,914‡
1901	2,975,501	1927	93,996‡

†Henderson, 1926, p. 186
‡Annual Report, Bureau of Mines, 1928, p. 26

was facilitated when the Silverton Railroad was completed in 1888 from Silverton to Albany. Active mines in the district in 1884 included the Yankee Girl, National Bell, Genessee, Orphan Boy, Guston, Sailor Boy, Carbonate King, Denver, Treasure Trove, Grand Prize, Maud S., Guadalupe, Galena Lion, and Candice (Henderson, 1926, p. 54). This period is shown in Figure 3 as a period of sporadic but continuous avalanche destruction. In 1893, when the price of silver fell significantly, many of the county's mines, predominantly silver-producers, were forced to close. This is seen in Figure 3 as a brief period of little avalanche damage to property but with continued frequent avalanche encounters. Many of the mines, including those in hazardous locations, had been closed, but traffic on the roads and trails continued and all people reported caught in avalanches from 1891 through 1893 were travelers. By the late 1890s the mining industry had recovered, with minerals production in 1899 surpassing its 1891 figure (Table 3). The Ouray Herald reported on 1 December 1898:

> Our mines have steadily increased in output and never before have so many men been employed. Several new properties have been opened up and the older ones have held their own.

A number of mines in the Red Mountain District never recovered from the depression.

> The Yankee Girl and Guston mines were worked until 1896, but the low price of silver, the increase in cost as the workings became deeper, the expensive trouble in handling the corrosive waters of the mine, and the low grade of the ore taken from the deep workings caused the mines to close down... From 1896 to 1915 these camps were practically idle (Henderson, 1926, p. 54).

The Genessee-Vanderbilt suspended operations in 1896 with a brief opening in 1899, and the National Bell closed in 1897. The Barstow "was the only mine in the Red Mountain District working and producing ore in 1899 and 1900 on any considerable scale" (Ransome, 1901, p. 246) and is the subject of a case study, found in Chapter III. Financially, the most solid mining effort during this period from the mid 1890s until World War I was the Camp Bird Mine. Table 4 lists production figures for the Camp Bird during this period. Comparing these with figures for mineral production in the entire county in Table 3, it is obvious that the Camp Bird was responsible for approximately one third of the yearly mineral production in the county during that period. In 1916, at the Camp Bird,

> ...ore ceased to be taken out to allow a low level adit 10,700 feet long to be driven to cut the vein 450 feet below the bottom of the shaft and to drain the mine...The adit was completed, but insufficient ore was found to operate the mill at a profit, so the mine has been unproductive... (Henderson, 1926, p.55).

TABLE 4

PRODUCTION OF CAMP BIRD MINE, 1896-1916*

From 1896 to July, 1900	$2,535,512
July, 1900, to April 1902	1,500,000
May 12, 1902 to April 30, 1903	1,974,705
Year ending April 30, 1904	1,922,261
Year ending April 30, 1905	2,343,553
Year ending April 30, 1906	1,892,203
Year ending April 30, 1907	1,339,864
Year ending April 30, 1908	2,071,068
Year ending April 30, 1909	2,269,622
Year ending April 30, 1910	2,645,621
Year ending April 30, 1911	1,812,572
May 1, 1911 to June 30, 1912	1,742,041
Year ending June 30, 1913	675,630
Year ending June 30, 1914	801,079
Year ending June 30, 1915	952,288
Year ending June 30, 1916	791,749

*Henderson, 1926, p. 185

Not until the workings were leased by the King Lease Company in 1925 was the mine to reopen. (A detailed account of the Camp Bird mine history can be found in Chapter III.)

From 1897 to 1902, the Camp Bird and Revenue were the most prominent and active mines in the county. This period, from the 1890s until World War I was generally healthy economically, with a slow tapering off of activity beginning in 1910. Main producers in 1910 were the Camp Bird, Revenue, Wanakah, Neodesha, Black Girl, Calliope, Wedge Lease, Lundberg Lease, Atlas Mine and Grizzly Bear group (Ouray Herald, 6 Jan 1911). In 1909, county mineral production reached a high total of $3,474,637, almost equivalent to that of 1899 ($3,494,878), and then began a slow but steady decline (Table 3). This is also reflected in Table 5, a twelve-year listing of numbers of men engaged in mining, milling and smelting in Ouray County from 1902 through 1914. In 1902, 1,609 men were reported working in the minerals industry and this figure remained fairly steady until 1909, when it dropped by almost half, to 876 men. By 1914, only 726 men were listed.

Figure 3 also shows this active period, with numerous avalanche incidents, and then a decrease in activity, including a ten-year period from 1921 to 1932 when no avalanche burials or property damage were reported. In 1916, both the Mountain Top Mine and the Revenue Mine reopened after several inactive years (the Revenue was reported shut for the winter in December 1912, Ouray Herald, 13 Dec 1912) and the Atlas Mine replaced the Camp Bird as the county's principal producer. Nineteen mines were reported operating in 1916, many only part of the year (State Bureau of Mines, 1915-16, p. 78). In 1918, the industry

TABLE 5

NUMBER OF MEN ENGAGED IN MINING, MILLING AND SMELTING IN OURAY COUNTY*

Year	Number
1902	1,609
1903	1,465
1904	1,586
1905	1,626
1906	1,510
1907	1,468
1908	1,430
1909	867
1910	752
1911	684
1912	687
1913	703
1914	726

*State Bureau of Mines, Colorado, Biennial Report, 1911-12, 1913-14

suffered a nineteen percent decrease in the value of combined metals (Henderson, 1926, p. 16). In 1919, the Atlas and Mountain Top Mines continued to be the principal producers with development work being carried out in the Red Mountain District and some shipping from the Uncompahgre District. Operating mines in 1919 in Ouray County numbered twenty-two with ten operating only part of the year (State Bureau of Mines, 1920, p. 17). In 1922, only thirteen mines were operating, with the Mountain Top Mine operating only part of the year but an increase in activity for 1925 was projected (State Bureau of Mines, 1922, pp. 41-42; 1924, p. 42). Mines shipping in the Red Mountain District included the Barstow, San Antonio group, Beaver-Belfast; in the Sneffels group, minor shipping from the Hidden Treasure, Highland Chief, Revenue, Mountain Top, Trust Ruby and Thistledown; and in the Uncompahgre district, Bachelor Khedive, Wanakah, Eva, Mineral Farm, Sutton, Pony Express and Senorita (Henderson, 1927, p. 719). In 1927, only twelve mines were in operation in the county (State Bureau of Mines, 1928, p. 19). The remainder of the period from the 1920s to the present is characterized by little large-scale mining with the exception of the Camp Bird, the Treasury Tunnel, later known as the Idarado Mining Company and sporadic activity at the Revenue. There were only scattered incidents of avalanche accidents, with the exception of Camp Bird and all deaths were related to travel rather than unsafe building locations.

Awareness of the Hazard

Residents of Ouray County were constantly aware of the avalanche hazard. Newspaper editors were in the habit of reporting weather

conditions and hazard evaluations.

> Last winter's experience of snow slides should be a warning to every miner in the San Juans. Winter is now fairly upon us, and with the almost constant snow-fall upon our mountains, heavy winds and warm days, none can be too careful when compelled to go from one point to another (Solid Muldoon, 14 Jan 1887).

> For the past few days the weather has been more moderate and as a result the snow has settled rapidly. A few more reasonably warm days would move the slides and thus lessen the danger of starting up idle properties (Solid Muldoon, 29, Jan 1892).

The newspapers also reported accounts of avalanche accidents, some in lurid detail and others with skepticism. In January 1906, the Ouray Herald reported the story told by two miners down from the Revenue Mine:

> ...they were going along the road when a large slide above them started. It was several rods wide and was so close upon them that there was no hope of their getting to either side and out of danger. Their only escape was to run down the mountain side which they did making such good time that before the slide overtook them they were up on the mountain side and out of danger. The miners did not state whether the mountain was as steep as their story (Ouray Herald, 26 Jan 1906).

Avalanche Protection Measures

Mine owners and managers, concerned with the safety of their employees and their equipment, took various measures for their protection. When conditions warranted, the decision would be made to close down operations until the avalanches had run or until it was thought the snowpack had stabilized sufficiently to resume operations. In March 1902, at the Ruby Trust Mine (Map 3), the men were laid off due to the threat of the Circle avalanche as well as the failure of electric power to run the mine (Ouray Herald, 8 Mar 1902). The Atlas Mine (Map 3), in March of 1906, closed down for the same reasons (Ouray Herald, 30 Mar 1906). The Camp Bird was reported closed on two occasions due to slide danger, April 1905 and February 1909.

> Saturday night, fearfulof possibility of danger, the Camp Bird called in all of the outside men whenever it was considered possible a slide might reach them (Ouray Herald, 7 April 1905).

Although few references to the structural control of avalanches were found in the newspapers, this is probably because such structures were constructed during the summer months and this study examined only winter issues of newspapers. However, through interviews and field checking, evidence of several defense structures was found. Possibly one of the earliest was a double-chevron placed above the Camp Bird Mine Second Level Tunnel in Imogene Basin (Figure 4). Since the Second Level Tunnel was developed by Thomas Walsh, the chevron would have been built shortly after 1896. An earthen dam at the base of Mt. Hayden above the cliffband at the Camp Bird Mill was built shortly after the avalanche disaster of 17 March 1906 to protect the mill from the U.S. avalanche.* Figure 5 shows this dam and the mature coniferous trees banked against its south side, a result of the avalanche of 9 January 1974 (see Case Study, Chapter III). Photographic evidence of supporting structures in the upper portion of the south avalanche path of Mt. Hayden can be seen in Figure 26, Chapter III, a wide-angle view of the Camp Bird Mill taken in 1912. Since this path was reported to be one of the avalanches that destroyed the mill in 1906, the structures were probably built during the same period the earthen dam was built.† No evidence of the continued existence of these structures could be seen upon inspection in 1976. Mention of another supporting structure existing in Imogene Basin was found in the Ouray Herald of 28 February 1936:

> Almost simultaneously with the running of the Chicago slide, the Hidden Treasure slide came down from the Imogene basin. It is believed this slide was defelected by bulwarks that had been timbered up as a protection against the slide otherwise it would have struck the bunkhouse.

No evidence of these bulwarks could be found in field checking. Figure 6, a photograph taken in 1897 of the Revenue Mill and portal, connected by snowsheds, shows supporting structures in the small avalanche path through the trees above the snowshed. Field checking in 1976 revealed remnants of supporting structures constructed of wire nets designed to anchor the snowpack to prevent it from sliding down the slope (Figure 7). The Revenue was worked during World War II and these snow nets probably were constructed at that time.‡

Supporting structures above the Mountain Top Mine (Map 3) have been reported by Rick Trujillo, who has also observed evidence of structures above the Humboldt Mine boarding house (Map 3).

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*Rick Trujillo 1976: personal communication.
†Howard Williams 1976: personal communication.
‡Rick Trujillo 1976: personal communication.

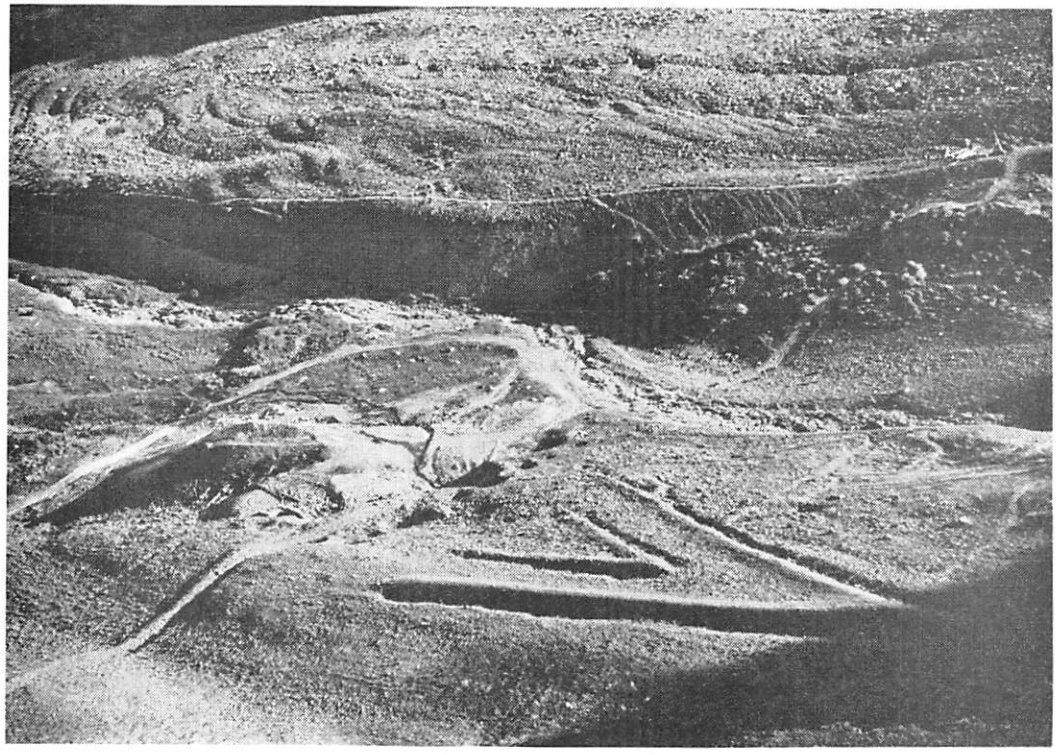

Figure 4. Avalanche protection structure in Imogene Basin. The double-chevron-shaped structure was constructed from earth shortly after 1896 to protect the Second Level Tunnel of the Camp Bird Mine. (R. Armstrong photo)

Figure 5. Earthen dam located just back from the cliff edge above the Camp Bird Mill. The dam was constructed shortly after the mill was destroyed by an avalanche on 17 March 1906. This photograph, taken in July 1976, shows large trees deposited against the uphill side of the dam by an avalanche from U.S. Basin on 9 January 1974. (B. Armstrong photo)

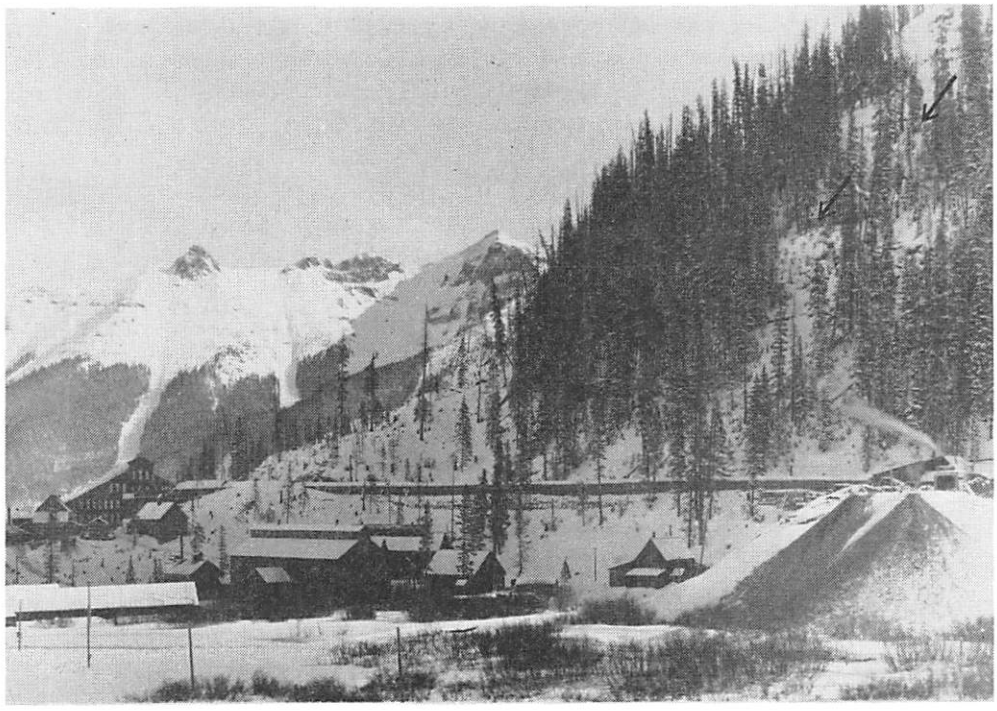

Figure 6. This 1897 photograph shows the snowfences on the slope above and the snowshed protecting the track between the Revenue Tunnel portal and the mill at Mount Sneffels. (Denver Public Library, Western History Dept.)

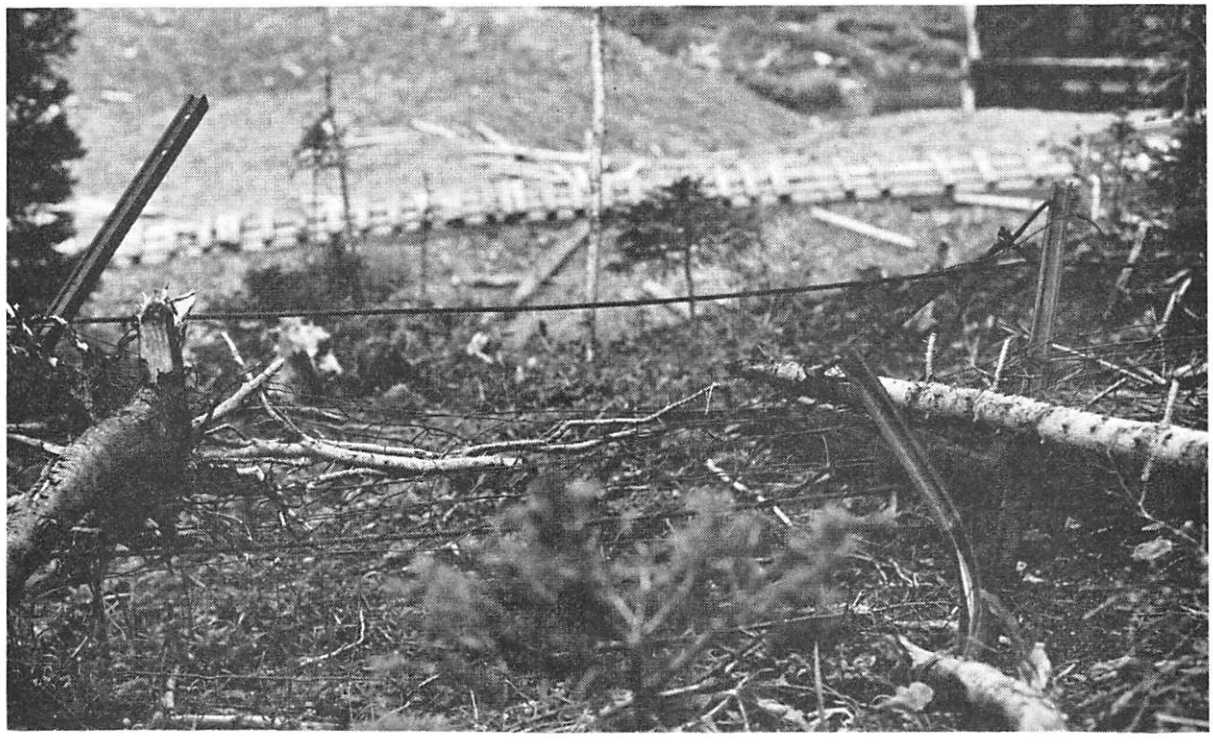

Figure 7. Nets probably built in the 1940s to anchor the snowpack in the small avalanche path above the tracks of the Revenue Tunnel, Mount Sneffels. (B. Armstrong photo)

Controlling the avalanche by explosives was one method of protection. A plan for active avalanche control was suggested by the Ouray Herald in February 1909. The article, entitled "Shooting of Snow Slides," suggested a plan whereby a series of bombs connected with wires would be set off after a heavy snow storm and when there would be no danger to human life. The plan was tested successfully at the Pandora slide near Telluride, San Miguel County.

> In the instance of the Pandora slide J.A. Manifold, owner of a lease on the Smuggler, together with some of his men, went up and placed powder along the slide and touched it off, with the result that the slide ran about one-half mile. Everybody, of course got out of the way and the result was that very little damage was done, though the snow sheds and the blacksmith shop at the Pennsylvania tunnel were filled with snow.
>
> Mining men here are of the opinion that very small amounts of explosives at the proper place will start the slides all right. The trouble in many instances after the snows come is the placing of the powder. To start the snow at the top of the slide or to get under it with explosives is considered to be the practicable way to make it run. The difficulty of starting them after the snow has fallen to considerable depth is that no one wants to get under them and to get to the top of many of the slides is practically impossible. To place bombs in the fall where they would be effectual in starting the snow after a heavy storm would be the most practicable way, as the slide could be made to run at a time when everyone is out of danger and before such an enormous amount of snow has fallen as will do damage to property. It is worth trying and will probably be tried next fall (Ouray Herald, 26 Feb 1909).

A second plan in the same article called for using a cannon for shooting shells into areas of cornice development in the starting zone of an avalanche path.

> For instance, the U.S. slide near the Camp Bird is precipitated by the breaking of the heavy comb of snow formed at the top of the range. To shoot into this with an explosive shell from a cannon would break off this comb and start the slide, as it is the theory that the breaking of this comb is what starts it any way. This class of slides could be handled most probably very practicably in this manner and at less expense than by the placing of bombs on the mountain side. The question is one that is worth considering, as it would certainly be worth while to spend a few

> dollars starting slides when no one is in the way, thus preventing loss of life and property (Ouray Herald, 26 Feb 1909).

No indications were found in latter issues of the Ouray Herald of either of these plans being put into effect. Not until 1955 was a 75 mm pack howitzer utilized for avalanche control on U.S. Highway 550 and the Camp Bird road. The first 75 mm howitzer shots were fired on 10 March 1955, into the Brooklyns and Ledge avalanche paths on U.S. Highway 550 in San Juan County. On the following day, the Telescope, also on U.S. 550, was fired on.* It appears, from a reference in the 22 January 1932 issue of the Ouray Herald, that some control efforts were made during this period. During a severe snowstorm, the highway maintenance men in an effort to keep U.S. Highway 550 open, shot down an avalanche at the Willow Swamp (Map 7), although the means of shooting were not mentioned (see Case Study, Chapter III).

Another method to eliminate avalanche hazard was simply relocation. The Virginius Mine (Map 3), one of the oldest mines in the county, was opened in 1877, the same year the county was established. It was first worked at the upper level at 12,500 feet and all ore was taken out this tunnel (Henderson, 1926, p. 54). In 1881, the mine was worked in three levels and two shafts (Henderson, 1926, p. 11). In the 1890s, the Virginius became the property of the Revenue Company, located at the town of Sneffels† (Map 3), formerly known as Porter's when George Porter ran the post office. Around 1893, the company

> ...cut the shaft of the Virginius at 2,000 feet or more and all the value that lay in the course. Much expense was saved in this way, and ore was shipped with less inconvenience. It was the design of the owners, by moving down the boarding house, and placing them on a level with Porter's, to diminish the danger of snow-slides (Gibbons, 1872, p. 45).

In 1916, the Camp Bird Mine did basically the same thing (page 17), thus eliminating the aerial tramway, which ran under several active avalanche paths and was severely damaged in March of 1906 and again in 1912 (Ouray Herald, 15 Mar 1912). Tramway towers still standing were brought down by the U.S. avalanche when it released in January 1976 and came within a few feet of the Camp Bird Mill (Figure 29, Chapter III).‡ The Mountain Top, which resumed operations in 1916, constructed

> ...an underground mill having 60 tons daily capacity... 900 feet from the portal of the tunnel. This mill is an innovation and, if successful, may overcome many difficulties frequently encountered in this snow-slide section (Map 3, State Bureau of Mines, 1915-16, p. 78).

*Noel Peterson 1976: personal communication.
†also spelled "Sneffles."
‡Rick Trujillo 1976: personal communication.

The Mountain States Telephone and Telegraph Company attempted to avoid the Camp Bird School House avalanche by installing the line which spans the path out of reach from the avalanche. However, during a storm in February 1936, the School House (Map 1) took out 500 feet of telephone wires. "This section of wires was in the form of a span built to get away from the slide, but it failed to protect it this year" (Ouray Herald, 28 Feb 1936).

Circumstances of Avalanche Encounters

Table 6 illustrates the circumstances of avalanche encounters and the resulting deaths for the period 1877-1976. Of the 62 avalanche deaths, the number of people killed when in fixed locations, either inside a building (25 deaths) or working at or near a mine (6 deaths), is equal to the number of people killed while traveling, also 31 deaths.* Of the total number of people caught and surviving, 69 were in fixed locations while almost twice that number, 123, were traveling in the mountains.

Avalanche Accidents: Fixed Locations

A number of the buildings damaged or destroyed by avalanches were considered to be in safe locations. The Solid Muldoon reported in 1887:

> We are not aware of any mine cabins in the district that are in the way of the terrible avalanche, but if any such there are, we say by all means leave the works and seek safer quarters (Solid Muldoon, 14 Jan 1887).

Unfortunately, the occupants of buildings in "safe" locations were also unaware of the danger. The earliest reference to an avlanche damaging a building in a supposed "safe" location was found in February 1878, when a cabin at the American Flag Mine, on Bear Creek (exact location unknown) was struck by an avalanche from the summit of Cline Mountain which destroyed the cabin, sending it to the bottom of the canyon. Fortunately, the two residents were spending the night in Ouray after a trip to get their mail.

> The slide was upwards of two thousand feet wide at Bear Creek, and more than thirty feet deep over the place where the cabin, had been built. The cabin was thought to be...perfectly safe from slides (Ouray Times, 23 Feb 1878).

*These figures are significantly different from San Juan County, where of 95 avalanche deaths, 66 deaths occurred when people were in fixed locations and only 29 deaths were reported when people were traveling in the mountains (Armstrong, 1976).

TABLE 6

CIRCUMSTANCES OF AVALANCHE ENCOUNTERS

OURAY COUNTY, COLORADO

1877 - 1976

Circumstances	Avalanche Encounters		Category Totals	
	Deaths	Survivors	Deaths	Survivors
FIXED LOCATIONS			31	69
Inside building or cabin	25	60		
Working at or near mine	6	9		
TRAVELING			31	123
Mail Carriers	0	5		
Packers-teamsters	7	11		
Road workers, state and county	1	14		
Prospectors-surveyors	1	3		
Miners	10	24		
Men involved in avalanche rescue	0	33		
Men involved in mining accident rescue	4	0		
Power company personnel	0	1		
Telephone company personnel	0	3		
Miscellaneous	8	29		
TOTALS	31	123	62	192

A second example is the Virginius (Map 3) called by the Solid Muldoon "...one of the highest, and heretofore considered one among the safest of Ouray County's mines" (Solid Muldoon, 28 Dec 1883). Figures 8 and 9 show the Virginius Mine in the 1890s. Figure 10 shows the site in 1976. During a storm in December 1883, disaster struck the Virginius.

> For the past three days it has been snowing constantly day and night, and the amount of snow that has fallen during this time, surpasses anything ever before known in this region. For the past twenty-four hours snow-slides have been sweeping down the mountains in every direction, making the very earth tremble. At 4:30 p.m., last Friday, a slide started about 150 feet above the Virginius boarding house, increasing in volume and velocity as it advanced; the avalanche sweeping down upon the cabin, carrying death and destruction in the mighty embrace (Solid Muldoon, 28 Dec 1883).

During this storm twelve men were inside the building, five sleeping in the sleeping room, two men in the kitchen, four in the sitting room and one in the office. Only four men were killed. The two men who were in the kitchen were dug out alive and uninjured twenty four hours after the avalanche occurred.

> Charly says when the crush came it pinned him against the wall about three feet from the cellar door, and finding he was furnished with air from some unknown quarter, managed with the aid of a piece of board to get air to Will Shilder, who was about three feet distant. After all fears of smothering were allayed, Charley began trying to dig out. He could hear his comrades digging, but could not make his cries heard. After getting about four feet in the direction of the stove he encountered the coffee tank, which contained several gallons of luke warm beverage, and after satisfying his thirst, utilized the remainder in warming his hands and softening the snow. Finding by this time (about 11 p.m.) that his comrades had ceased digging, he bent his energies in the direction of the cellar, which he and Shidler reached about 2 o'clock in the morning in an almost frozen condition, having been for ten hours in shirt sleeves on their knees and digging with their hands and such small pieces and fragments of shingles, and timber as came within reach. After gaining the cellar, the vegetables that were in sacks were emptied on the floor, and the sacks utilized in wrapping their limbs to prevent freezing, and there they remained until relieved the following day (Solid Muldoon, 28 Dec 1883).

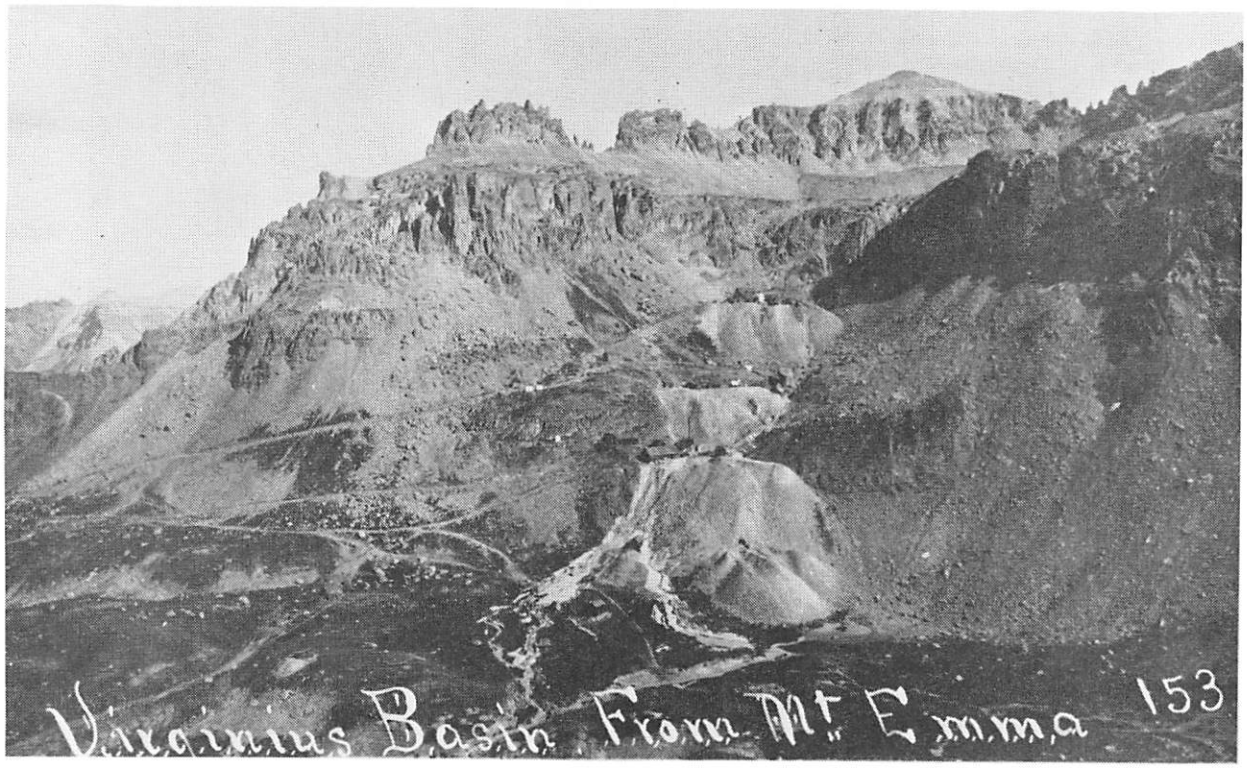

Figure 8. The Virginius Mine in the 1890s, showing the three levels being worked and their hazardous location. (Library, the State Historical Society of Colorado)

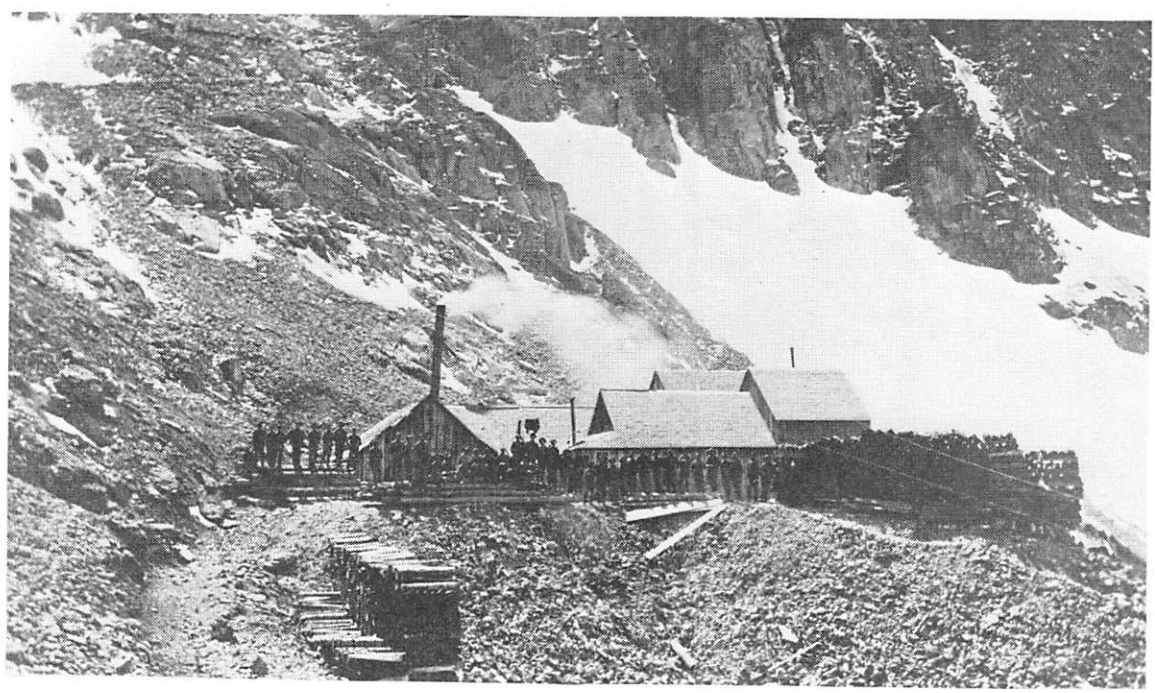

Figure 9. The Virginius Mine in Governor or Virginius Basin in the 1890s. After 1896, ore was taken out at the Revenue Tunnel at Mount Sneffels, 1,700 feet below. (Denver Public Library, Western History Department)

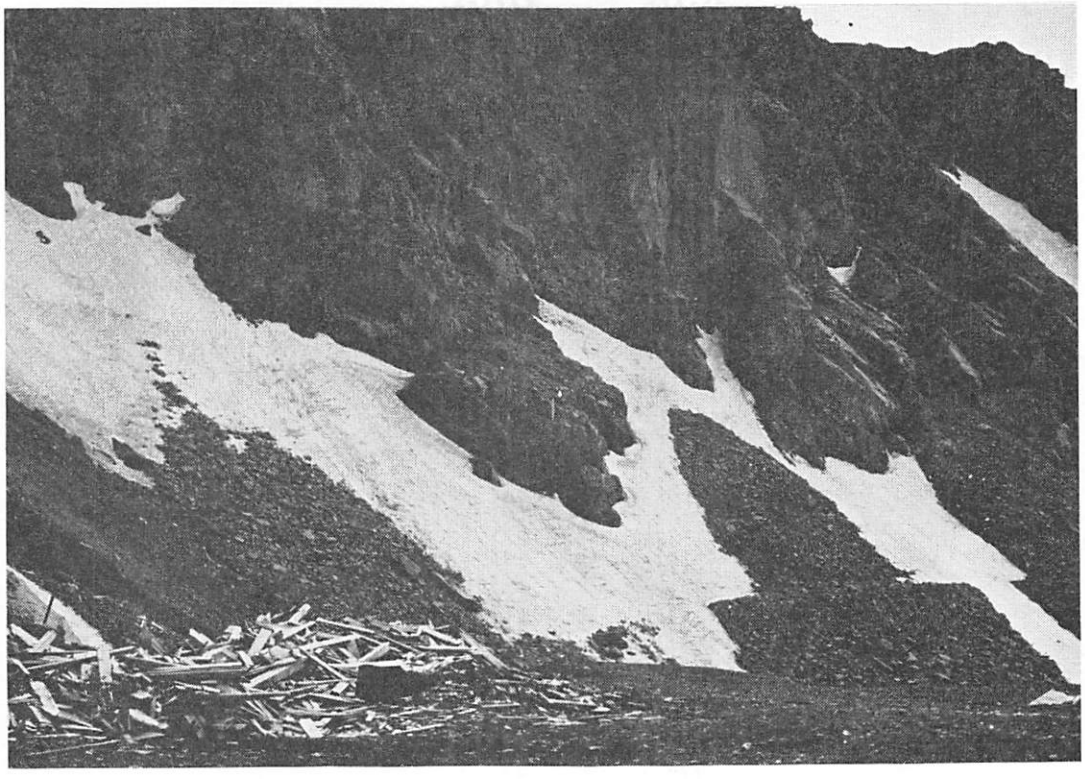

Figure 10. The remains of the Virginius Mine in August 1976, showing approximately the same view as in Figure 9. (B. Armstrong photo)

Figure 11. The town of Sneffels, or Mount Sneffels, and the Revenue Tunnel, January 1897. Porter's store and post office (cover photo) is the white, false-fronted frame building in the lower left. The town sits on the lower slopes of Mt. Potosi. (Denver Public Library, Western History Department)

During a February storm later that winter, the Solid Muldoon reported that "...the Virginius crew have taken time by the forelock and moved in the tunnel" (Solid Muldoon, 8 Feb 1884). The same storm produced an avalanche which destroyed a cabin located in dense timber on the east side of Ironton Park (Maps 5 and 6, exact location unknown).

> Several terrific snow slides occurred, the most severe one having been followed by fearful results. Four men were sleeping in their cabin, situated in the heart of a densely timbered section, and 1000 feet from the upper line thereof. The snow started near the top of the range and gathering velocity as it came, struck the green timber and cut through it like a scythe through grass. Trees 2 feet in diameter were snapped off as if they were posessed of no more strength than a reed (Red Mountain Review, 29 Dec 1883).

The four occupants of the demolished cabin were injured and frozen but all survived.

Another example occurred during a January 1886 storm at the town of Mount Sneffels (Map 3, Figure 11):

> ...an enormous slide broke loose high above Porter's cabin, carried off one end of the building, rushed down the gulch and completely demolished the 'Andy Richardson' cabins, the only ones that were supposed to be absolutely safe in the gulch...Porter immediately abandoned his place and moved up to the Buckley cabin, which is considered far more safe, if a safe place can be found there at present (Solid Muldoon, 22 Jan 1886).

The four occupants of Porter's cabin were in the undamaged portion and were unhurt.

A final example of a site thought to be safe from avalanche danger was the Bankers' National (Map 2). In February 1905, an avalanche at the mine came down and caught three mules of a team driven by Dave Diller. The mules "...were considerably scratched up but still alive and will stand a few more slides" (Ouray Herald, 17 Feb 1905). The following month, an avalanche carried away the Bankers' National buildings and nine miners. Five to six feet of damp and treacherous snow had accumulated in Imogene Basin, where the avalanche began.

> Sunday morning when daylight revealed the path of the slide, away up on the mountain, where the cliffs beetle over into Imogene basin, the break in the snow was distinctly marked for half a mile, and the track of the slide as it rushed down was almost a mile in width, and there at the bottom lay the scattered timbers of the Bankers' buildings and marked the place where swift Death had stalked the night before (Ouray Herald, 7 Mar 1905).

Eight men were in the bunkhouse: two who were buried under ten feet of snow were rescued alive; two were killed instantly, two survived with injuries and two were not buried. In the compressor house, two men were inside when it was moved from its foundation by the avalanche; both were unhurt. The cookhouse was crushed and buried under twelve feet of snow; the cook, who was buried four hours, was quite comfortable waiting to be rescued since he was getting air from the stove pipe and "...had the camp cat for company and a plug of chewing tobacco" (Ouray Herald, 7 Mar 1905).

> No slide was expected at the Bankers' where it was supposed the buildings were safely located; it had never slid in the recollection of anyone at that point. But the unexpected happened (Ouray Herald, 7 Mar 1905).

Two towns in the county were on occasion visited by avalanches. The town of Red Mountain (Map 6) was active from 1881 until 1892 when a fire devastated the town. With the coming of the Silverton Railroad in 1888 and a recovery from the silver panic in 1893, the town managed to sustain itself sporadically until the early twentieth century. The town, at first glance, seems perfectly safe from avalanche hazard. However, a detailed description is given in the Silverton Standard of 16 February 1895 of a destructive avalanche coming right into town.

> On last Thursday Red Mountain was visited by a terrific snow-slide, starting from the apex of the great Red Mountain and coming down with such force that when it struck the flat which is over a small divide from the town, it cleared this divide and kept on across the main street, knocking one corner of Dan Sheehan's house and the window lights out of George Hesser's (Silverton Standard, 16 Feb 1895).

Were the description not so detailed, it would be hard to believe the mound behind the town did not offer protection. However, photographs taken during that period (Figure 12), indicate the lower slopes of Red Mountain 2 and 3 had been timbered. Figure 13, a photograph taken in 1974, shows the path of this avalanche. In 1910, the town was again damaged by an avalanche, with one house destroyed and another losing its windows (Ouray Herald, 14 Jan 1910).

The small town of Mount Sneffels also had an avalanche problem. In February 1883, a small avalanche struck George Porter's store and post office (Map 3), pictured in Figure 11. No serious damage was done (Solid Muldoon, 2 Feb 1883). In December of the same year, the Revenue shaft house (Map 3) was moved by an avalanche to the park in front of Porter's store (Solid Muldoon, 28 Dec 1883). In February 1884, an avalanche came down opposite the store, probably the same avalanche that moved the Revenue shaft house, and caught six men en route to the Sidney Mine. All six men were buried, one under six feet of snow, but all were dug out immediately, alive and uninjured (Solid Muldoon, 15

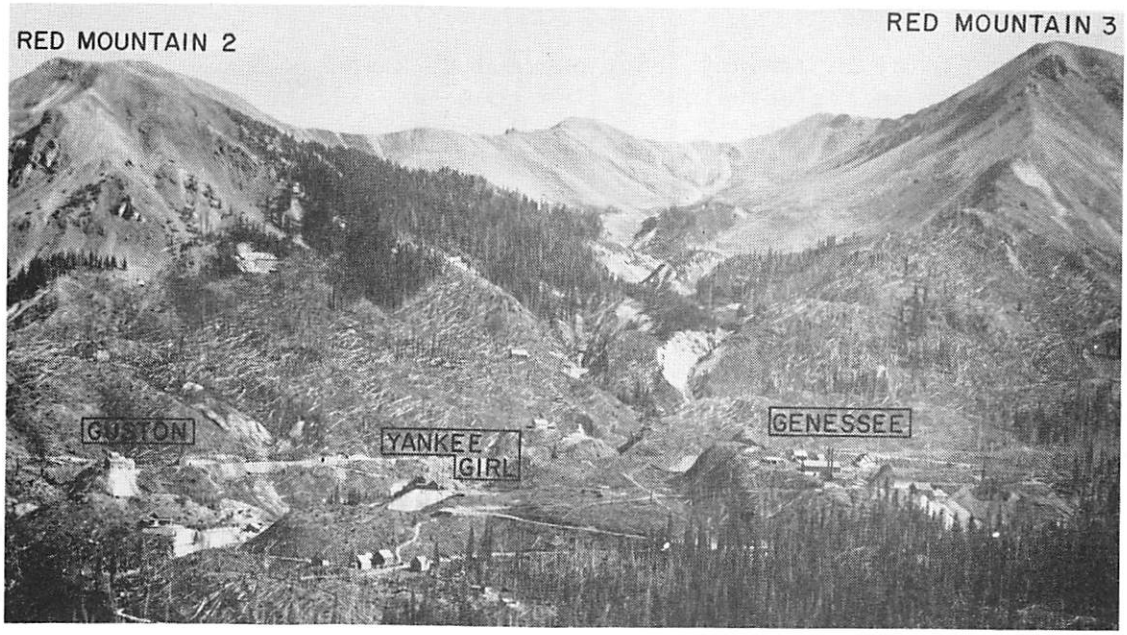

Figure 12. Red Mountain Mining District, 1888, showing Champion Gulch between the two Red Mountains and the three working mines below. (Denver Public Library, Western History Department)

Figure 13. A 1974 photograph showing Red Mountain 3, 2,000 feet above the old site of Red Mountain Town whose buildings were damaged by avalanches from the mountain above. (INSTAAR photo)

Feb 1884) Again, in January 1886, one end of Porter's building was carried off by an avalanche which also took Andy Richardson's cabins, which had been thought to be in a safe location (see above, p. 31). The Revenue had a continuous avalanche problem (Table 11, Appendix III) but no further references to the town of Mount Sneffels or Porter's store being damaged were found.

Many lives were lost when unsuspecting miners, unaware of any danger, were relaxing after their shift, eating meals or sleeping. In January 1886, an avalanche, perhaps two, struck the Ruby Trust Mine boarding house (Map 3). The avalanche

> ...must have started above the Bessie Bascom property and also one up the gulch north of the mine, and the two met at the point of rocks behind the cabin, which caused an upheavel and came crashing down upon the cabin, crushing and suffocating the occupants of the upper bunk (Solid Muldoon, 22 Jan 1886).

Of the six men in the boarding house, two were killed immediately and four were dug out alive; one of the four caught pneumonia and died a few days later and another was severly injured. The Ruby Trust was reported damaged again in April 1903, when an avalanche swept away the bunk and boarding houses and badly damaged the mill. Two men inside the bunk house were swept 700 feet with the avalanche but both were dug out alive, one after being buried four hours (Solid Muldoon, 22 Jan 1886).

During a December 1883 storm, two miners in a cabin at the Governor Mine (Map 3), Sheldon and Sullivan, dug an air hole through the snow when an avalanche covered their cabin "...and continued house-keeping until the storm was over" (Solid Muldoon, 28 Dec 1883). When two men were taking a lunch break at the Denver Tunnel in the Amphitheater (Map 4),

> ...a slide came down from the mountain above burying the blacksmith shop and mouth of the tunnel. They had a fairly close call between dinner and eternity (Ouray Herald, 24 Mar 1905).

In 1909, Oscar Hoffman and John Nicler were working the Uncle Sam property on Engineer Mountain (exact location unknown). They were inside the cabin when an avalanche moved the cabin from its foundation and caved in all the windows. They were unhurt and moved to the mine tunnel for safety when, a few hours later, another avalanche closed the mouth of the tunnel, trapping Hoffman and Nicler inside for twenty hours until they could dig themselves out. "The slide came down where it had not run before in over twenty years" (Ouray Herald, 1 Jan 1909).

> Friday morning a slide on Brown Mountain caught the Big Elephant cabin just as the occupants, James W. Rinker and Henry Holsworth, were preparing breakfast or rather while Holsworth was preparing breakfast

> and Rinker was holding a mental conversation with himself as to whether he would get up or remain in bed until the expiration of Lent (Solid Muldoon, 27 Feb 1891).

The avalanche struck the cabin with a force so great that

> ...the cabin and contents went down the hill some four hundred feet, killing Holsworth instantly and scratching and bruising Rinker, in a serious and painful manner (Solid Muldoon, 27 Feb 1891).

Rinker, barefooted and in his underclothes, was able to reach the tunnel, where he was found by rescuers from Ironton a few hours later, injured but still alive (Solid Muldoon, 27 Feb 1891).

A number of avalanche burials and deaths were avoided when the buildings that were struck happened to be empty of people, either because they had been evacuated due to the avalanche hazard or, because they were coincidentally out of the building and in a safe location. On fourteen occasions, buildings that were in use but temporarily empty were damaged or destroyed by avalanches. An early example occurred at the Neptune Mine in February 1884.

> A snow-slide came down Potosi gulch this week and spread the Neptune all over the hill side. None of the contractors were hurt - at the time the slide came down, they were in Ouray playing 'blue-pete' (Solid Muldoon, 22 Feb 1884, Map 3).

In 1891, two temporarily empty buildings were damaged. In February, the Mickey Breen Mine buildings (Map 5) were struck by an avalanche which damaged the house occupied by Superintendent KilPatrick and his family. Doors and windows were caved in but the superintendent and his family were safe in Denver (Solid Muldoon, 6 Feb 1891). The following morning, at the Bonnybell Mine in Corkscrew Gulch, (Map 6, exact location unknown) an avalanche carried away the mine buildings, destroying about $1,000 worth of goods. "Fortunately, the miners left there last Sunday, else we would have another horror to record" (Solid Muldoon, 6 Mar 1891).

The miners were working in the tunnel when an avalanche struck the U.S. Mill (Map 2).

> A slide in Imogene basin Saturday came down and broke all the windows in one side of the U.S. Mill which was also filled up in front. The boarding house was in the way and got its share of snow, rocks, etc. It occurred at a time when the men were in the mine, and no one was hurt (Ouray Herald, 18 Feb 1897).

This event occurred in 1897. By 1901, the mill had been dismantled (Ransome, 1901, p. 204), but its shell remained standing until at least

the 1920s. Figure 14 shows the U.S. Mill in the 1920s; Figure 15 shows the site in 1976.

At the Hidden Treasure Mine in Imogene Basin (Map 2) in December 1920, an avalanche above the mine

> ran down and selected a path over the site set aside for the new buildings planned to be constructed by the company preparatory to doing a large amount of development work, taking practically all timbers, lumber, etc., recently taken up for building construction operations...Everyone was in town celebrating Christmas, otherwise there would have been loss of life (Ouray Herald, 30 Dec 1920).

In March 1944, the Revenue Mine (Map 3), long plagued by avalanches, was again closed.

> Slides came down through the timber Monday night and swept away the new snow sheds at the Revenue and closed the tunnel. Fortunately the night crew had come out and got in the clear before the avalanche ran. Later, another slide came down and took out the old sheds. 'It looks like the good old days are here again' said one of the lesses. 'Every slide that has ever come down, has either run or is in danger of running' (Ouray Herald, 17 Mar 1944).

Fifteen men were caught by avalanches when they were working near mine buildings, six resulting in death. W.G. Carroll, a miner employed at the Silver Queen Mine in Bear Creek Canyon (Map 4, exact location unknown), was making a trail from the mine to the bunkhouse when he was suddenly struck by an avalanche, pushed off the trail and carried 600 feet down the steep mountainside. He had cleared a path 15 or 20 feet long,

> ...when he struck a soft place in the snow. He recognized the danger of preceeding and returned to the mine for a 'safety rope'. He went again to the soft spot but before attaching the rope undertook to shovel a little more of the snow away...The second shovelful of soft snow removed started a tremendous slide and the unfortunate man was pushed over the trail, just in advance of a terrible avalanche of snow, ice, rock and debris (Ouray Herald, 22 Feb 1900).

This is the first reported reference to the use of a "safety rope" for protection against avalanches. Carroll was able to grab onto some roots on his way down,

> ...until the greater portion of the slide passed. When he lost his grip he turned a complete summersault

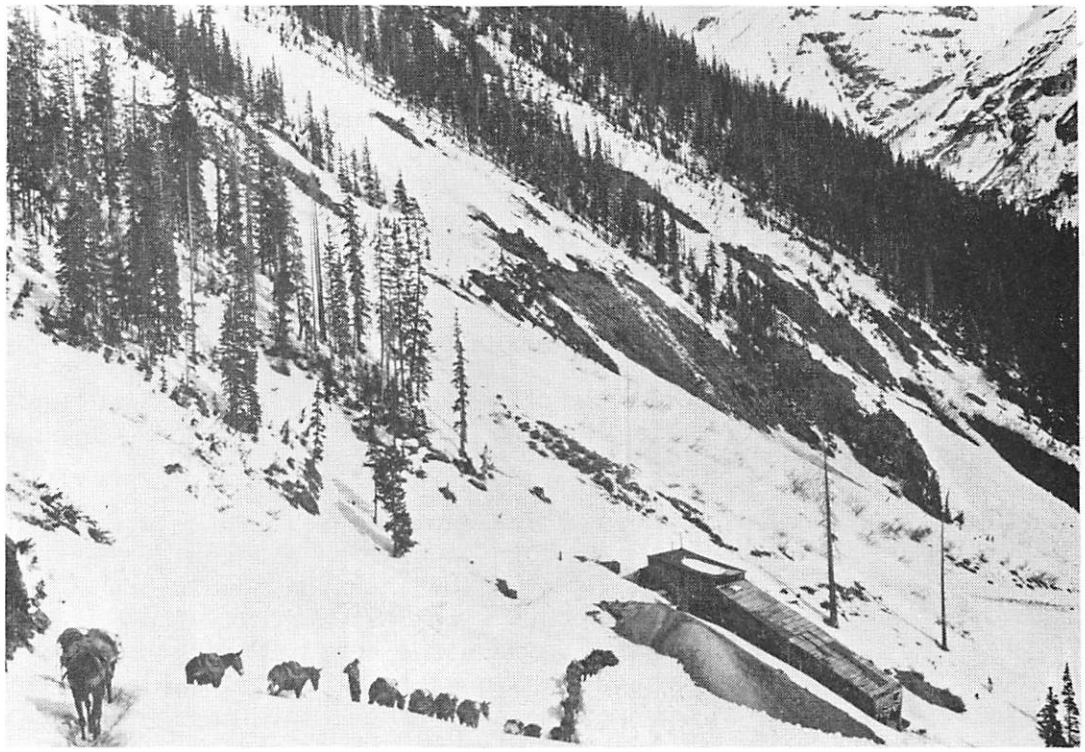

Figure 14. The U.S. Mill on U.S. Depository Mountain showing pack train coming down from the King Lease (leases of the Camp Bird Mine from 1925-1956). (Denver Public Library, Western History Department)

Figure 15. The site of the U.S. Mill in August 1976, taken from approximately the same location as Figure 14. (B. Armstrong photo)

> in the air striking on his head and receiving a bad scalp wound (Ouray Herald, 22 Feb 1900).

He was able to extricate himself from the snow, badly bruised but with no bones broken. It was within several feet of this site where James Kennedy, two months earlier, had been killed in an avalanche which tossed him 500 feet over a cliff. He and Jeff Engle were on the trail 75 feet from the Silver Queen Mine when they heard the avalanche. They raced back to the mine but were caught when the snow bank on which they were standing gave way. Kennedy was killed; Engle survived because he grabbed a tree and managed to hold on until the avalanche passed (Ouray Herald, 21 Dec 1899).

During a storm in 1901, Joe Ferraro ventured out of the boarding house at the American Nettie Mine (Map 4) to go to the bunkhouse and was caught in an avalanche.

> Monday was a most promising day for snow-slides...There is a slide that is apt to come down as much as a dozen times a day at the American Nettie mine when the conditions are as conducive to slides as they were last Monday. The track of this slide is midway between the boarding and bunk house. It has always been allowed to go on its way without being called upon to take any passengers. Last Monday, however, it took one man without asking permission and carried him to the end of its destination, some hundreds of feet (Ouray Herald, 21 Feb 1901).

Ferraro, when found in the debris, was badly shaken up and bruised. He was evacuated by fastening two boards over the top of an ore bucket on the aerial tramway and fastening Ferraro to the boards. "This is the first mid-air ambulance on record" (Ouray Herald, 21, 28 Feb 1901). He was brought to Ouray where a month later, he died of his injuries.

Only two mines were reported to be in acknowledged avalanche paths and precautions were taken during hazardous periods. At the Gilpin County Mine located in Yankee Boy Basin (Map 3 , exact location unknown), a watchman was posted to watch for avalanches, the only reference found to this type of avalanche protection. At 7:30 a.m. in January 1886, an avalanche completely demolished the back or bunk part of the building and nearly carried away the "night shift", seven men who had just gone to bed.

> These boys had a narrow escape, and had it not been for the warning given by the watchman who was stationed for that purpose, another heart-rendering accident would have been added to the list. As it was, the boys only escaped by the skin of their teeth and with scanty covering. That settled it with that gang of Gilpin and Clear Creek county miners, who can drive a drift or sink a shaft as rapidly as any others who ever struck the San Juan, but when it came to facing this kind of a lay-out, they acknowledged themselves beat, and folded their blankets - or what was left

> of them, and silently stole away to town, took the next morning's coach on their way to Denver and bade farewell to the San Juan (Solid Muldoon, 22 Jan 1886).

The avalanche danger was apparent to workers at the Guadalupe Mine in Hendricks Gulch above Ironton Park (Map 5). The earliest reference to the Guadalupe, in January 1889, indicated that the miners reinforced the building to protect it from avalanches:

> A snow-slide passed over the Guadalupe cabin Monday. The boys have the cabin anchored to the mountain and four feet of hewed timber for a roof. The only damage reported, was the sudden breaking up of a whist game (Solid Muldoon, 18 Jan 1889).

Apparently not so confident of the invincibility of the building against a San Juan avalanche, the manager T. J. York during a storm in March 1912, ordered the work force down the hill in anticipation of avalanches. When the Guadalupe avalanche ran from Mount Abram after the men were safe in Ouray, the avalanche

> ...cleared off the west slope of the mountain one and one-half by one-quarter mile and piled up 50 feet deep in the gulch at the foot of Ironton park. The Guadalupe boarding house got in the road and is reported to have been sliced in two like an oyster would be split. In the grinding process of traveling a mile or more down the mountain, it was ground up so small that a careful search of the slide in the gulch only revealed...a little sawdust (Ouray Herald, 15 Mar 1912).

In February 1919, the avalanche above the mine released, taking away part of the boarding house. Mr. Ackerson, alone at the mine, was carried several feet by the avalanche and was forced to dig himself out of the snow (Ouray Herald, 28 Feb 1919). Perhaps the mine company chose not to rebuild, for the following year another large avalanche was reported with no mention of its doing any damage to mine buildings:

> One of the longest snowslides which ever ran in Ouray county slipped and came down the big gulch in which the Guadalupe mine is located. It started well above the mine and ran completely across Ironton Park, and did not stop until it had climbed several feet upon the opposite mountain. It was 1,200 feet wide and took out twelve telephone poles in its trip across the park...Old timers in the district say it was the longest slide they had ever seen run in Ouray county (Ouray Herald, 25 Mar 1920).

The Guadalupe avalanche has, since 1920, reached Highway 550 four times (Table 11, Appendix III).

Apparently, after a building was damaged by an avalanche, one response, the only one found in the newspapers, was to rebuild immediately, When an avalanche destroyed the ore house at the Commodore Foote in the Red Mountain District (Map 7, exact location unknown), the Ouray Herald reported:

> A slide came down Friday at the Commodore Foote in the Horseshoe, destroying the ore house. It will be replaced at once by the lessees (Ouray Herald, 18 Feb 1897).

In December 1920, an avalanche swept over the site selected for new buildings at the Hidden Treasure Mine in Imogene Basin (Map 2). All the building material recently taken to the site was carried away but, as everybody was in Ouray for the Christmas holidays, no one was hurt.

> While our reporter was unable to get in touch with Engineer McCullough, to ascertain the immediate future plans of the company in view of the accident, there is a general impression locally that the unfortunate incident will not materially interfere with the plans to push right ahead with construction and development work (Ouray Herald, 30 Dec 1920).

After three persons, two men and one woman, were killed and the mill, bunk house and other buildings of the King Lease at the Camp Bird Mine were destroyed or damaged by avalanches in 1936 (see Case Study, Chapter III), the Ouray Herald reported the following:

> The bodies of the victims were recovered by Tuesday afternoon and by Wednesday morning the King Lease had started work clearing the ground preparatory to rebuilding their properties so that mining and milling operations could be resumed at the earliest possible date (Ouray Herald, 28 Feb 1936).

Avalanche Accidents: Travel

Perhaps because the majority of avalanche encounters in the county occurred on trails and roads, a major emphasis was placed on safe travel. Table 6 indicates that while avalanche deaths were evenly divided between fixed locations and traveling, of 192 people surviving avalanche encounters, 125 were traveling. Many references were found in the literature warning people not to travel during certain conditions (see above, p. 20) as well as interesting early references to rescue techniques. The Ouray Times of 16 February 1878 offered the following advice for searching for avalanche victims:

> Mr. G.W. Spencer of Mt. Sneffels, who has assisted in rescuing several persons from snow slides says, in regard to the best plan to find men after they have been covered, is to go on the slide with a long handled shovel or pole, punch holes in the snow and

> listen at the hole, when the groans can be heard from twenty to thirty feet (Ouray Times, 16 Feb 1878).

A letter to the editor of the Solid Muldoon in January 1886, signed "Miner", suggested the construction of cabins of refuge for people traveling during hazardous periods.

> The lamentable catastrophes in our midst which have placed so many face to face with death and carried some of our friends over 'The Great Divide' being forcibly before us the necessity and actual duty of providing, as far as in us lies, for those who are obliged for business or humanity's sake, to face the appalling dangers of travel in the mountains in such storms and weather as have been visited upon us this winter. Cabin of refuge at certain points of the mountain roads furnished with a good store, fire place and sufficient fuel for the winter would save the lives of many exhausted men and relieve the anxiety of those whose relatives and friends form rescuing parties in the perilous expeditions constantly made for those missing in snow slide or storm in the mountains...We anticipate no difficulty in obtaining money and labour to erect such Refuges, and owners of large mining properties, who live in comfort and luxury in safe homes, cannot fail, out of humanity, to contribute to the expenses necessary (Solid Muldoon, 22 Jan 1886).

The first mention of using what is now known as an avalanche cord was found in the 13 November 1908 issue of the Ouray Herald.

> 'Snowslide ribbons' are long, narrow colored ribbons used by the Alpine climbers whenever there is any danger of snowslides. Though the climber may be covered up by an avalanche of snow, part of the ribbons will show on the surface of the snow indicating where the victim may be dug for...It has been suggested that miners of the San Juan might adopt this simple safeguard against the loss of life in traveling over the hills to and from the mines in winter (Ouray Herald, 13 Nov 1908).

On two occasions in Ouray County's history, construction of tunnels to protect travelers from avalanches was proposed. The first reference was in 1909 when the Ouray Herald noted that House Bill 500 was introduced before the Colorado General Assembly by Mr. Walker,

> ...for the purpose of improving and protecting from snowslides a state wagon road, from a point about seven miles south of Ouray, near what is known as the Riverside, on the Uncompahgre river and running south from there along the river. The bill carries a $10,000 appropriation clause (Ouray Herald, 26 Feb 1909).

Although the means of protection was not mentioned, it was probably a tunnel as natural, snow tunnels dug out of avalanche debris (frontispiece) had proven their effectiveness. A detailed history of the Riverside avalanche is found in Chapter III.

The second proposed tunnel was to be located at the site of the Waterhole avalanche (Map 2). In January 1909, the Waterhole caught twelve men, killing four of them and twenty-six head of stock (Ouray Herald, 29 Jan 1909). In February 1936, the Ouray County "Road Gang" and their six horse team were caught but all survived. During the winter of 1937-1938, the Waterhold released twice, once depositing 8 to 20 feet of snow on the road and covering the road for a distance of 250 feet. A tunnel was dug through the avlanche debris.* In April, the County Commissioners discussed construction of a rock tunnel 200 feet in length, to avoid the avalanche. They estimated the cost at $12,000 and planned to have the tunnel built once the road to the Camp Bird became part of the state highway system (Ouray Herald, 22 Apr 1938). Unfortunately for Ted Mason, the tunnel was never built although the road was designated Colorado 361. On 14 February 1958, between 8 and 9 a.m., Ted Mason and Harry Peck, employees of the Camp Bird Mine, were walking up Colorado 361 to work. The Camp Bird had been on "stand-by" basis since a strike in spring 1957 and only maintenance crews were working (Denver Post, 16 Feb 1958). As Harry Peck tells it, he and Mason were walking because a storm, which ended the previous night, had deposited eighteen to twenty inches of new snow on the road, making driving impossible. The weather was clear. As they approached the West Waterhole, or "Splitter," Mason walked ahead while Peck watched the avalanche path. The avalanche released and Peck yelled to Mason. Mason, with his jacket hood covering his head, did not hear the warning and was caught up in the moving snow. Peck, who was on the edge of the avalanche, felt himself choking from the powder, and the space between his face and his glasses filled with snow as he turned and ran down the creek with the tongue of the avalanche moving in the same direction. He dove into a snowbank at the edge of the road and when the snow stopped moving, looked for Mason. Finding no signs of Mason, he went to the mine for help.† Four men from the mine, Walt Smith, Danny Jerrel, Mike Muransky and Joe Martinez started up two caterpiller tractors and headed for the accident scene. One of the tractors broke down underneath the East Schoolhouse avalanche (Map 1) and three of the men gathered around to try to fix it. Martinez was 100 yards away when the avalanche released.

> The new slide came down the side of Mt. Hayden on the south side of the canyon, filled and jumped the bottom, thundered across the road, buried the men and tractors and rolled up the opposite slope (Denver Post, 16 Feb 1958).

Martinez, who saw the avalanche coming, ran and was carried up the hillside but was not buried (Ouray Herald, 20 Feb 1958). The other three were killed, their bodies found four days later. Masons' body was found seven days later. The West Waterhole, which according to Peck and Marvin Gregory,

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*Marvin Gregory 1976: personal communication
†Harry Peck 1976: personal communication

one of the rescuers, had not run so large for thirty years piled debris 20 feet deep on the road;* the East Schoolhouse was measured at 300 yards in width (Ouray Herald, 20 Feb 1958).

Miners. Most vulnerable to the avalanche hazard were the people whose occupations kept them on the roads and trails throughout the year. The highest number of deaths occurred to miners who frequently traveled between the mines and towns or from one mine to another. Ten deaths were recorded (Table 6), and twenty-four men were caught in avalanches and survived. One of those survivors was Philip Fritch, who was skiing down to Ouray from the Sneffles district.

> Philip Fritch boarded a snow slide enroute from the Sneffels district Sunday. He contemplated switching off from the mass as it whizzed by Box Canyon, but having lost his hat, guidepole and most of his nerve, he hung on to the avalanche until it had spent its force near the Piedmont water tank, about eight miles north of here in the Uncompahgre park (Ouray Herald, 8 Mar 1902).

Packers. Packers and teamsters and their pack animals traveled in all conditions, opening the trails and roads, and were frequently exposed to avalanche hazard. Of the eighteen packers-teamsters caught in avalanches, seven were killed as well as dozens of pack animals. In March 1888, Andy Richardson, one of the Ouray County's earliest prospectors, was caught in an avalanche with "the burro punchers on Mt. Sneffels near the U.S. Depository last Friday and all came very nearly climbing the golden stairs. It was a narrow escape" (Solid Muldoon, 16 Mar 1888).

Figure 16 shows a pack train belonging to John Ashenfelter, the principal packer for the Mount Sneffels District, in front of the post office at the town of Mount Sneffels, in January 1892.

> Some six or eight of Ashenfelter's burros went down with a baby slide yesterday and all, with one exception were taken out alive and hungry. Such is life in the hills (Solid Muldoon, 1 Jan 1892).

Ashenfelter's greatest loss occurred on 22 January 1909, when, at a few minutes before 4 p.m., the East Waterhole avalanche released (Map 1) killing four men and twenty-six head of stock..

> Friday was a terrible day in the hills. The snow was falling thick and fast and the wind was blowing hard.

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*Marvin Gregory 1976: personal communication.

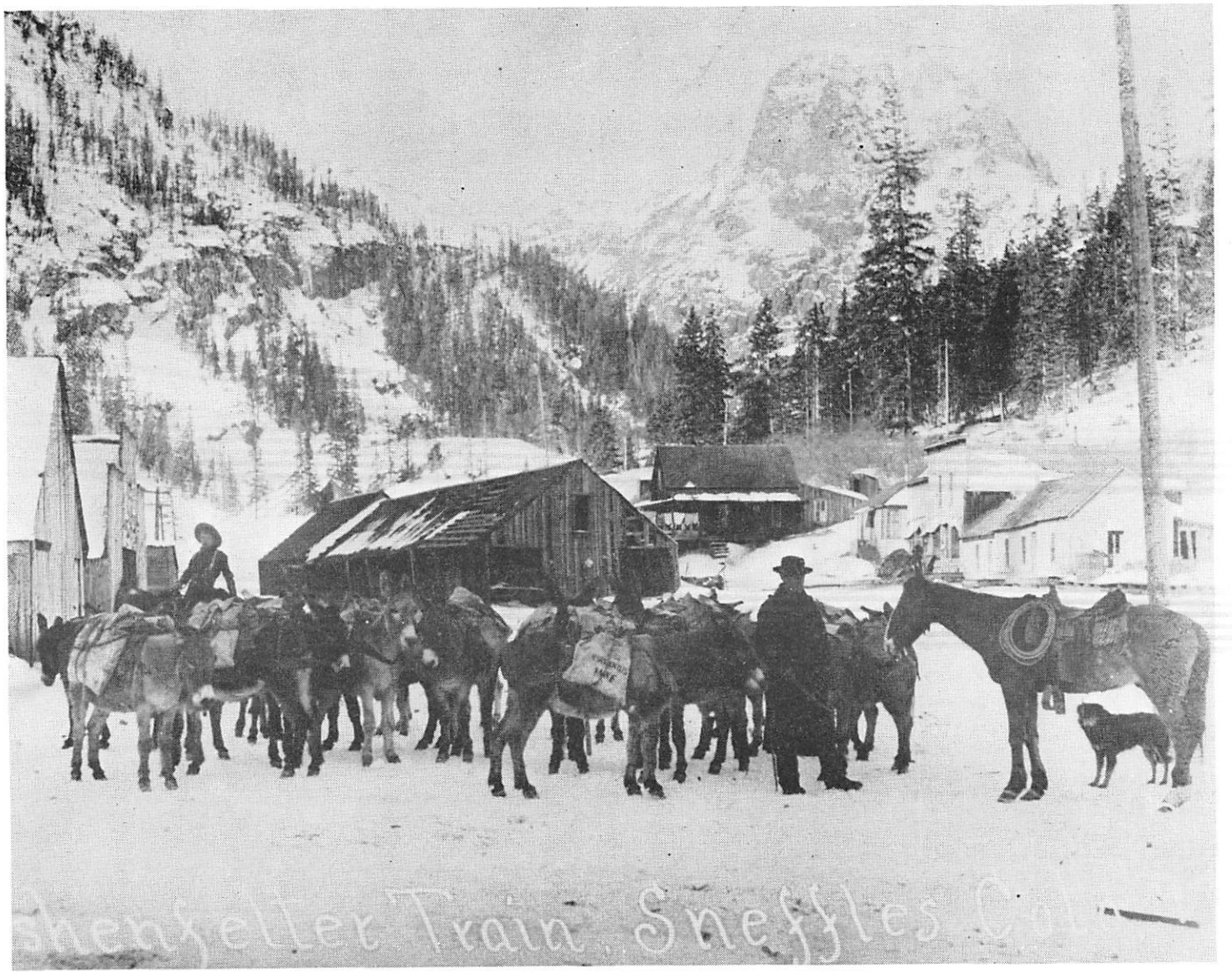

Figure 16. A pack train belonging to John Ashenfelter at Sneffels, 1897. The mules are loaded with ore from the Virginius Mine. Stony Mountain is in the background and Porter's store and post office (cover photo) is on the right. (Library, the State Historical Society of Colorado)

> The teams from the Ashenfelter house had made the trip up and were returning when it was found that a small slide had blockaded the road. The teams were stopped along the road and the men were all engaged in getting the stock through. They had succeeded in getting a part of them over the snow when the big slide came and ran over the road. What it did not strike directly the concussion swept into the canon (Ouray Herald, 29 Jan 1909).

Killed were Pete Synott, teamster; Dr. S.J. Douthitt, veterinary surgeon who had worked at the Ashenfelter barns in Ouray for many years and was wagon boss the day of the disaster; George Kneer, teamster; and John Mittwer, night baker at the Camp Bird Mine. Moments before the Waterhole released, Dr. Douthitt, riding on a wagon driven by Sam Morely, was caught in a small avalanche from the west side of the Camp Bird road.

> The teamsters on the other sleds went to them and dug them out and all got started again, when it was discovered that a portion of the Waterhole slide had come down and blocked the road ahead of them. Acting under the direction of W.S. McCarthy, Dr. Douthitt directed the boys to shovel out the road ahead, unhitch from the sleds and bring the stock to town. They had the road shoveled out, a part of the stock over, and would have been out of danger in five minutes or less. It seemed to be the only thing that could be done under the circumstances, as to go back would have been practically as difficult as to come on to town. Charles Pierson had been sent ahead to see that the road was open, and there seemed to be no doubt but they would have time to get across the danger point before the slide ran again.
>
> Charles Alderson and Austin were standing together when Alderson saw the slide coming and both ran. Alderson succeeded in getting out but Austin was caught in the edge of it. Austin found that he could only move his eyelids and one of his hands slightly. He tried his best to holler and Alderson came back immediately and dug down and uncovered his face. Some of the other boys who escaped came along and helped to dig him out. He was taken at once to the Camp Bird mill where the best care was given him that the conditions would permit.
>
> Alderson had reached one of the sleds loaded with ore and it was by getting under and holding onto it that he saved himself from being swept into the gulch by the concussion. Others of the men hung onto the iron rods of the bridge nearby.

> Emil Johnson was covered up by the snow and the first thing he realized was that his faithful dog was digging at his elbow. Between the efforts of his dog and his own he was soon extricated from his imprisonment. He helped to dig Austin out, then ran to the Camp Bird mill and telephoned to town...
>
> W.H. Knowles and William Barber saw the slide coming and rode out of it. In their efforts to get out, they ran over Samuel Kees, the Camp Bird mail carrier, and knocked him down into the trail. This accident doubtless saved the latter's life as he was out of the sweep of the concussion and got out with only a shower of snow over him...
>
> Alphonso Van Puyenbroeck was caught in the edge of the slide but not sufficiently covered but that he dug himself out and came to town. He was not injured. James Fennel hugged the cliff on the inside of the road and the slide went over him.
>
> As an illustration of the immense power of the concussion, a horse weighing fifteen to seventeen hundred pounds was carried 150 feet above the road and left standing on the snow above. Evidently the concussion carried him into the air while the slide ran under him and he lit on his feet and came out of it without a scratch (Ouray Herald, 29 Jan 1909).

Mail Carriers. Mail carriers, although exposed to avalanche hazard as much as other travelers, were surprisingly lucky; while five were reported caught in avalanches, none were killed.

> 'French Joe', the mail carrier to Mineral Point, when near Quartzite Point this morning, was struck by a snow slide and he and his horse knocked down, but escaped without injury of any kind. Says its snowing and blowing too heavy up in the mountains to suit him (Solid Muldoon, 25 Feb 1887).

When the first heavy storm of the winter began in December 1891, the Solid Muldoon reported that "...the mail carriers are approaching the season when desparate chances are taken" (Solid Muldoon, 4 Dec 1891). In February 1895,

> Billie Graham, the Red Mountain mail carrier, started out Friday morning for his regular trip to the Sky City riding one horse and leading another. When he arrived at Mother Cline hill a snow slide came rushing down just in time to take Billie and his horses.

> They slid all together for over 100 feet down the steep slope (Map 5, Ouray Herald, 21 Feb 1895).

Billie and his two horses survived without injury and proceeded without further event towards Red Mountain.

One of the more incredible avalanche survival stories was found in the Ouray Herald of 25 February 1897, where the story of the mail carrier Jack Bell was told. Bell, the mail and express carrier between Ouray and Ironton, started out towards Ironton with a companion, his pack horse and his saddle horse. The trip was uneventful until he reached the Riverside (Map 5) where the snow was so deep that he had to shovel out the trail as he advanced.

> After working for some time he returned for his horses and had passed the pack horse, which started along the trail. He then placed his shovel in an upright position in the snow, and started on to bring up his saddle horse. Upon second thought, he had no business in such a situation without his shovel close at hand in case of emergency, and thereupon returned for the implement... Upon reaching his saddle horse Bell stooped downward to grasp the reins, when suddenly his feet seemed to be slipping out from under him, and he quickly realized that he was in the midst of a snowslide...The entire surface of snow for many rods around him was a turbulent mass sliding rapidly downwards toward the brink of the Uncompahgre canon. For an instant, he realized his peril-then came darkness (Ouray Herald, 25 Feb 1897).

Davis, his companion, was further up the trail and was caught on the edge of the avalanche. After extricating himself from the debris, he raced the two miles to Ironton, where the alarm was sounded and a rescue party was organized and reached the spot a few hours later. "Snow shoes and poles were used in prodding holes downward through the snow, which finally resulted in the discovery of Bell's saddle horse, with his neck broken" (Ouray Herald, 25 Feb 1897).*

> Bell, meanwhile, was unconscious. When he recovered consciousness,
>
> ...I attempted to move, but found that the snow was packed about me in a solid mass. Some hard substance lying against my throat gave me considerable pain, and after working my arms loose I found it to be my shovel. How long I labored I have no means of calculating, but finally I succeeded in freeing myself from my cast of snow and began to work the snow down from above, and trampling it underfoot, by which means I was enabled to work myself forward and upward. I had succeeded in making room enough to use my shovel and began to prod

*Snowshoes was a common name during this period for skis, sometimes called Norwegian snowshoes or skees.

> about on all sides of me, finally striking a small hole in the snow leading from the surface, which I rightly conjectured was an opening made by one of the poles of the searching party. While working my way toward this to gain breathing space, my shovel suddenly struck the channel made by a small stream of water running over the face of the canon. I determined to follow this, and worked for several hours, as it seemed, advancing from forty to fifty feet, when suddenly I came to the surface. Leaving my overcoat and shovel with the saddles, which had been left there by the search party, I started for the toll gate, but from the moment I started down the trail all was blank until I neared Bear Creek, I remembered nothing until I found myself falling exhausted to the snow, within a few yards of safety I could not gain of my own efforts. I hallowed several times, and Harvey Lewis, who fortunately heard me, came to my assistance. As nearby as I can judge, I was unconscious from twelve to fifteen hours, and must have been under the snow just twenty-four hours (Ouray Herald, 25 Feb 1897).

Bell's only injuries were a bruise on the chest and a small gash under his chin, caused by the shovel blade.

Highway Maintenance Personnel. In the 1930s, when efforts began to keep the state highways open year-round, another group of people were exposed to avalanche hazard: highway maintenance crews. The majority of avalanche encounters since 1930 have involved either state or county road workers (Table 10, Appendix III). An example of the hazard is shown in the following article from the Ouray Herald of 28 February 1936. During a destructive storm, three men of the county road crew, Ed West, John Pritchard and Dorsey Smith, were attempting to keep the Camp Bird road, Colorado 361, open when they and their six-horse team were caught in two avalanches. No one was covered up completely and no one was swept off the road.

> The first experience came the latter part of last week when the Neighbor White slide struck them. Where that slide runs the road is cut out of a high cliff several hundred feet above the canon. The slide ran directly onto the gang, but fortunately most of the snow went over them and into the canon.
>
> Then on Sunday morning the gang stopped at the watering trough below the Water Hole slide to water the horses. Before the party got clear of the path of Water Hole slide upon leaving the watering trough, a slip from the slide came down and caught them. Had the Water Hole slide come down with its full force there is no question but what the whole party would have been covered up and killed (Ouray Herald, 28 Feb 1936).

Avalanche Accidents: Rescues

Many victims, like Jack Bell, were able to extricate themselves from avalanche debris but most were not. In December 1902, when three miners, Jack McNeil, George Keller and Dave Fuller, with a pack train loaded with supplies, were opening the trail to the Earl Mine, an enormous avalanche released from the mountain side into Corkscrew Gulch in Ironton Park (Map 6).

> ...the slide, about 100 feet in width broke away 500 feet above them, catching Contractor McNeil and Keller in its icy embrace carrying them to the bottom of the gulch 400 feet below. As luck would have it McNeil fortunately rode the crest of the avalanche to the bottom, meanwhile keeping an eye on his less fortunate companion. About half way down Keller disappeared from sight. When the immense body of snow had piled up in the bottom of the gulch McNeil had little difficulty in extricating himself. From the point where Keller disappeared he was not long in making up his mind where to dig for Keller. With nothing to work with but his gloved hands he set to work with all the energy and zeal God had given him. Fuller thought it a hopeless task without shovels, and he hurried away for tools and help. But McNeil dug. At times he almost gave up from sheer exhaustion; then he would rally all his latent energies and will power and dug. His gloves were soon worn out and then he dug with his bare hands. At the last moment when hope was almost gone, his hands so cold he could not feel the icy snow and he was entirely exhausted, he was rewarded by clutching his hand in the entombed man's hair. With almost superhuman effort he dug the ice away from Keller's head. The mouth was filled with snow and this, too, he had to dig out with his fingers. He reached him none too soon. Apparently Keller was in the last feeble struggle with death. One minute more would have been fatal.
>
> With the snow away from his head and his mouth free so he could breathe Keller began to revive. After a short breathing spell McNeil dug the snow down to his hips, but even then in his feeble condition, the snow and ice held him fast. Finally he was freed and McNeil half carried him to a place of safety. McNeil dug down eight feet into the snow before he found him. (Ouray Herald, 12 Dec 1902).

It appears from the above story, that immediate rescue attempts are more likely to produce a live victim than rushing off to seek help, no matter how qualified the help may be, and losing valuable time. This fact is currently being stressed for modern avalanche rescue situations (Williams, 1977).

The use of a dog to find an avalanche victim was noted above in the Waterhole disaster of 1909. Another example of a dog finding his master occurred in March 1906, when Ned Canavan, while prospecting and locating claims on the west side of Mt. Hayden (Map 1, exact location unknown) was caught in a large avalanche.

> Canavan was using Norwegian snowshoes or skees when he slipped and started a large slide which carried him nearly two hundred feet down a steep hillside. He was buried under several feet of wet snow and with very little possibility of escape. A fine, trained retriever, which always accompanies him on his trips into the hills commenced tugging at one of his snowshoes which projected from the snow. The efforts of the dog encouraged the buried man who struggled until he had effected his escape from the slide (Ouray Herald, 2 Mar 1906).

In February 1883, two men and fifteen pack mules were carried away by an avalanche near the Genessee Mine in the Red Mountain district (Map 6, Figure 12).

> The train of 15 mules had loaded and started from the Yankee Girl at the usual time; but at or near the Genessee Mine, between the Yankee Girl and the top of the divide, one mule slipped from the trail and while wallowing in the loose snow to get it on the trail again, the slide started, sweeping men, mules and everything with it (Solid Muldoon, 2 Feb 1883).

With twenty men searching, one man was dug out alive from five feet of snow, "...he being fortunate enough to keep hold of the rope on one of the mules, which furnished a clue that led to his discovery" (Solid Muldoon, 2 Feb 1883). One section of rope was probably on the snow surface, the man buried underneath, the same principle as a modern day avalanche cord; however, in this instance its use was accidental.

The largest number of men caught in one avalanche was reported in December 1883. The day after an avalanche destroyed the Virginius Mine, killing four men, a party consisting of the general manager of the Virginius, twenty-five Virginius survivors and miners from the Monongahela Mine, a total of thirty-two men, organized at the Monongahela Mine below the Virginius, for the descent to the town of Mount Sneffels, bringing the bodies of the four victims on sleds.

> It was a trip whose danger was known to all, but it was necessary, and these men felt that there was no room for faint heartedness. D.R. Reed and John Buckley went ahead breaking the trail, while the column followed dragging the sled hearses, all keeping a sharp look out for snow-slides. All went well for a distance, until the party began to round the point coming into Cumberland Basin, about two thousand feet from the Virginius. This was understood by all to be the most dangerous place on

> the road. If they succeeded in getting around here there would be little further fear of a snow-slide. At every step the eyes of the men were above and around them. Suddenly Dave Reed in advance, looking up at the bluff above, saw a movement of the snow which he well understood.
>
> 'Look out, John,' he said warningly to Buckley, 'It's coming,' and the next instant he and Buckley were hurled from their feet by a tremendous mass of snow, buried and carried along down the mountain. The slide as it fell, was very nearly a quarter of a mile wide. One end of it struck Reed and Buckley, the center stopped as it fell and hung poised, while the other end descended with fearful force upon the thirty men with the sleds, sweeping them away in a twinkling. Some of the party were carried a thousand feet by the slide, others only a few hundred. Five, among whom was Manager Reed, who at the time of the disaster, was pulling on a sled, were carried to the very edge of a precipice seventy feet high, while four...were hurried along over this cliff and down to the bottom...
>
> For a few minutes after the slide the snow presented a smooth unbroken surface, and it seemed that those who had risked their lives to give the bodies of their comrades burial had found a common grave with them. But Death had been satisfied for the present...Then here and there, all around, men appeared struggling to extricate themselves or helping one another, and it was not long before all those who had been covered by the slide, except the four who had gone over the cliff, stood by each other unhurt. This in itself was a marvelous preservation, but when by call and answering shout it was ascertained that those who had fallen over the bluff were uninjured also, the almost marvelous character of the affair began to be understood. The fact that the snow which slid upon the party was new and soft, and that the men carried over the cliff had fallen upon snow of great depth, explains the happy termination of the accident, so far as the further loss of life is concerned (Solid Muldoon, 28 Dec 1883).

All the men eventually reached Mount Sneffles without further disaster. The search for the sleds containing the bodies did not resume until weather and snow conditions stabilized. Later that winter, the bodies were recovered and brought down to Mount Sneffels (Figure 17).

To conclude this chapter is a bizarre story of an avalanche undoing a disaster, the only one found in the literature. The headline:

SAVED BY A SNOWSLIDE

Thrilling Experience of Mrs. Wright
and Children on the Mountains

IN A LIVING TOMB OF SNOW

The Hand of Providence Evidently
Intervened - At the Moment Despair
Stared the Lady in the Face She Was
Freed by a Tremendous Snowslide
(Ouray Herald, 30 March 1899).

Mrs. Wright and her two children left the Yankee Boy Mine (Map 3) on skis en route to Ouray. The snow around her house at the mine was eight feet deep and "a heavy crust had formed on the bosom of the snow, and while no particular trail had been broken the journey was without event until approaching the Revenue properties" (Ouray Herald, 30 Mar 1899). One of her boys disappeared into the snow and in a moment,

> she was struggling with her son and pinioned in a snowbank which encircled her about the neck. She was startled by an awful rumbling. She later recognized it as the terrible thunder of a slide... When she opened her eyes again she saw a path stretching out before her as clearly swept as man could do it with a broom. The slide had passed within ten feet of her and opened a smooth path to the main trail below the Revenue workings (Ouray Herald, 30 Mar 1899).

Mrs. Wright and her two sons then continued their journey.

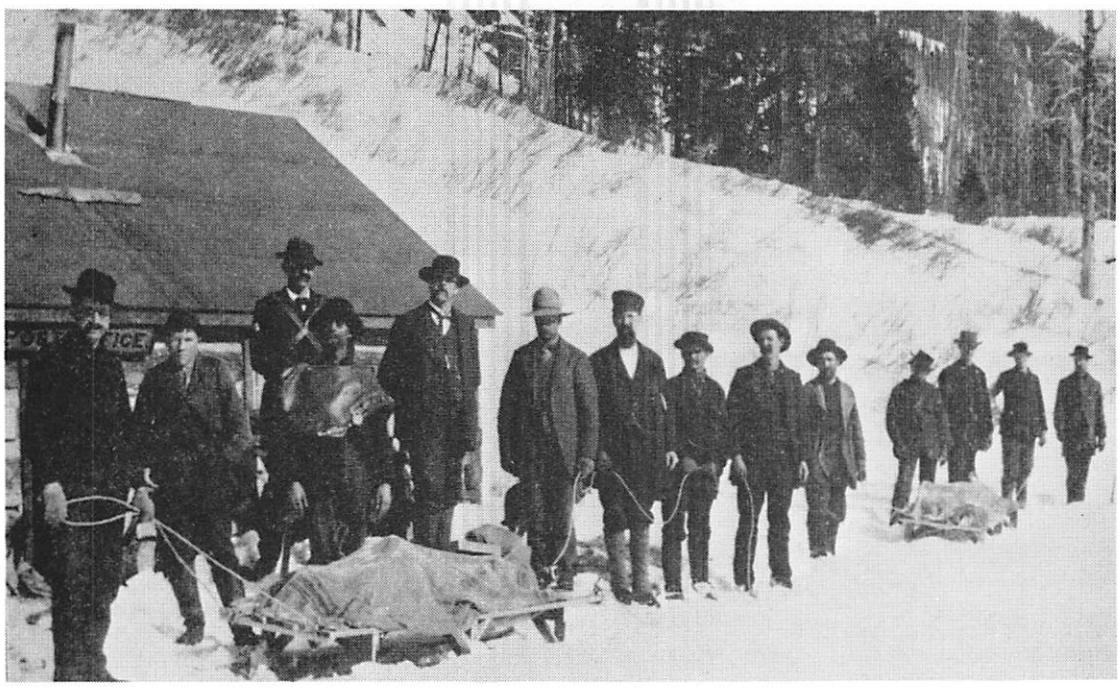

Figure 17. Bringing down the bodies from the Virginius Mine avalanche disaster, probably 1883 from the appearance of the Sneffels post office behind the group. (Library, the State Historical Society of Colorado)

CHAPTER III

CASE STUDIES

Barstow Mine

In 1899 and 1900 the Barstow Mine, shown in Figure 18 and on Map 7, was the only mine in the Red Mountain District working and producing ore on any considerable scale (Ransome, 1901, p. 246) and the operations continued from that time until the 1920s. A short aerial tramway hauled the ore from the upper portal to the mill; from the lower portal, ore cars moved the ore over a covered track or snowshed, to the mill. During its brief history, the Barstow, formerly known as the Bobtail (Ransome, 1901, p. 246), reported five incidents of avalanches interferring with mining operations. The first reported incident was in December 1902, when an avalanche narrowly missed the mine dump (Ouray Herald, 19 Dec 1902). In late April 1905, two men were above the mine workings building a ditch to lay a pipe line when an avalanche came down the small ravine in which they were working and buried one of the men under about thirty feet of snow.

> He was found only after five hours of diligent search. He was uninjured, the snow having formed a kind of arch over him leaving him sufficient room for breathing (Ouray Herald, 28 Apr 1905).

The avalanche was 200 feet wide and extended several hundred feet up the hill. This avalanche did no damage to the mine buildings.

A small avalanche was reported in March 1906, which only covered up the mine dump and did no other damage (Ouray Herald, 23 Mar 1906). However, in March 1912, an avalanche damaged two tramway towers, the mill and office and demolished the stable. The stable's sole occupant, one horse, survived.

> No plausible explanation can be given as to what the slide did with the stable to reverse the horse's normal position of on top of the floor to underneath the floor (Ouray Herald, 8 Mar 1912).

The snowsheds at the lower tunnel were also demolished. "The belief is that two slides joined to make this one slide, which was not in conformity with slide history at the Barstow" (Ouray Herald, 8 Mar 1912). Possibly the same avalanche path in February 1919,

> took out about fifty feet of the snow shed and also did slight damage to the transformer house, cutting off the lights and power temporarily. The snow for the preceding twenty-four hours was about three feet in that vicinity

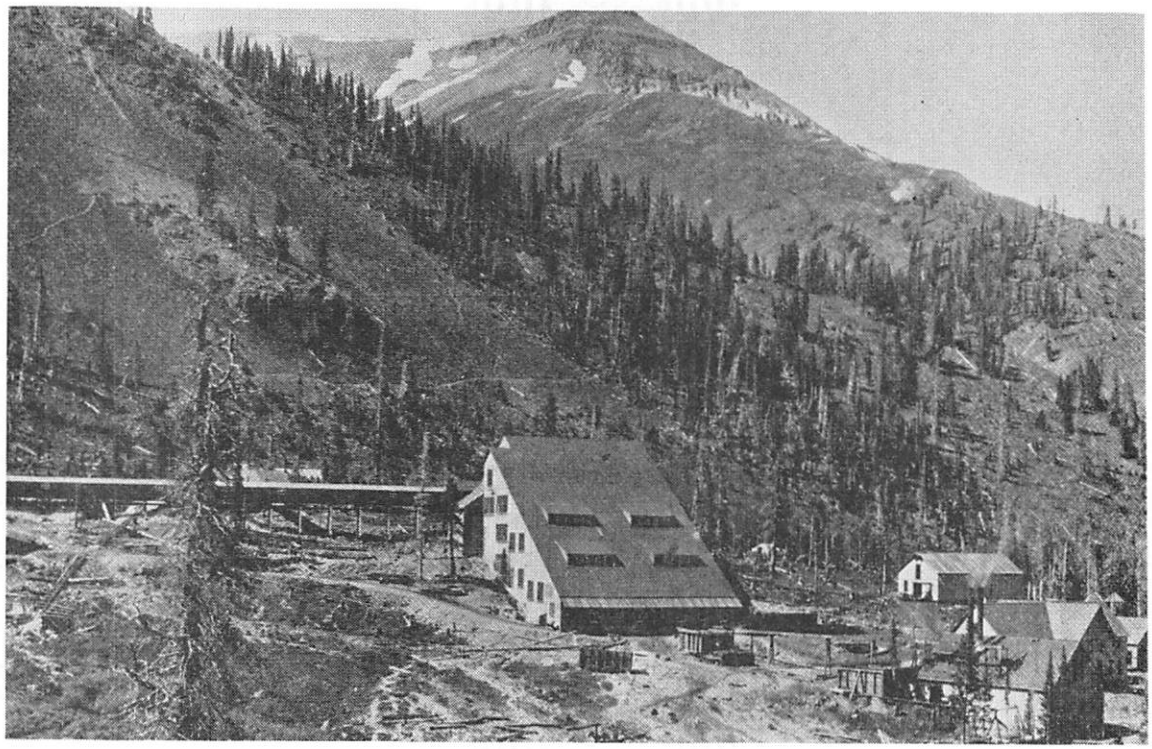

Figure 18. The Barstow Mill, showing the snowshed which connected the mill to the portal. From "Ouray, the Gem of the Rockies," published in 1903 by the Ouray Board of Trade. (Denver Public Library, Western History Department)

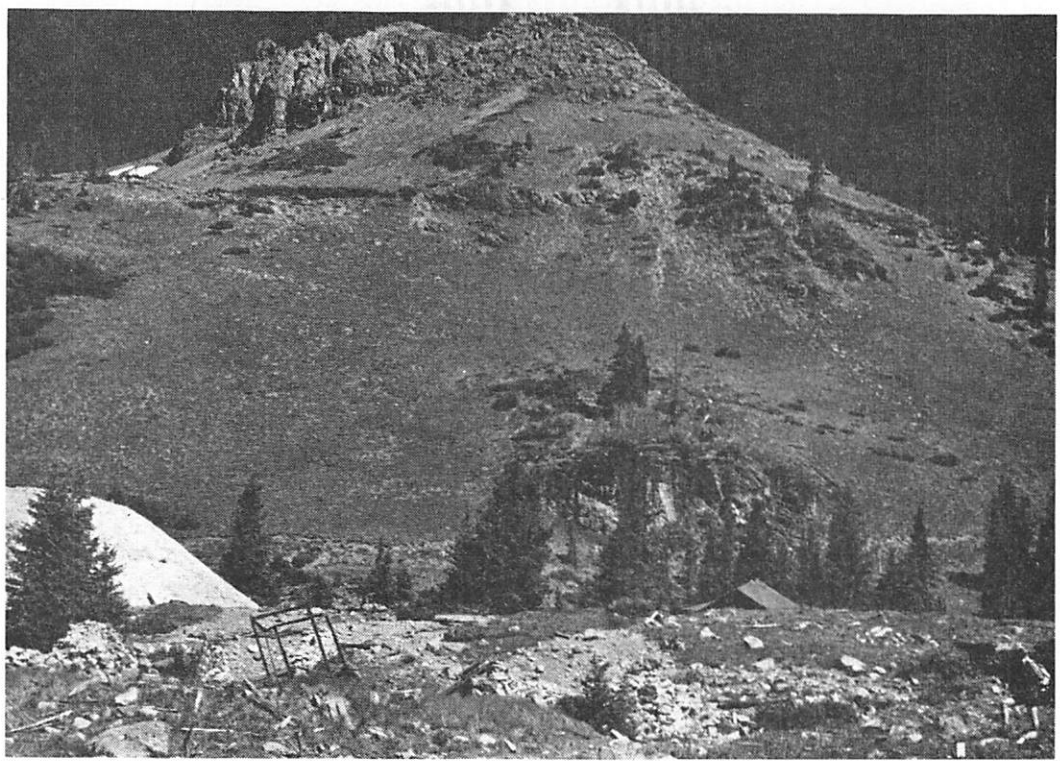

Figure 19. A summer 1976 view of the Barstow Mine, showing the mill site and the tailings and the same rock outcrop as in Fig. 18. The remains of an aerial tramway, swept downslope by an avalanche, are in the foreground. (B. Armstrong photo)

> and caused the snow to come down a new path entirely (Ouray Herald, 13 Feb 1919).

Thus, during its brief twenty-plus-year history, the Barstow, whose ore is now mined by the Idarado Mining Company from a lower elevation, suffered damage to property twice and employees were caught on one occasion.

Camp Bird Mine and Mill

The Camp Bird Mine, discovered in 1896 by Thomas Walsh, is the oldest mine in Ouray County that has been operated almost without interruption. In 1895, Walsh bought two claims in Imogene Basin which had been worked in the 1870s, the Gertrude and the Una, and staked several claims of his own. The Gertrude is known as 0 level and the Una, Number 1 level. Second Level was the first tunnel driven by Walsh in September or October 1896* and the double-chevron discussed in Chapter II was built to protect the shaft house and other structures at the portal entrance (Map 2).

The mine workings are located in Imogene Basin, a large basin which narrows to form the drainage for Imogene Creek. The main mill was built at the junction where Sneffels and Imogene Creeks meet to form Canyon Creek (Map 2). From its very beginning, the Camp Bird has been plagued with avalanche problems. The first event occurred only one year after its opening and avalanche activity has been frequent, both in Imogene Basin and at the mill site. An aerial tramway was completed in November 1898, linking the mill to the mine, a distance of 8,500 feet, as well as an auxilliary "feeder" from the mine portal to the loading station, 600 feet in length (Ouray Herald, 24 Nov 1898). The Camp Bird was a giant producer in Ouray County, as is shown in Table 4 in Chapter II. It's long history includes the most complete and continuous record of avalanche destruction in the county. During the second winter of operation, 1896-1897, the first reported avalanche event occurred at the Camp Bird Mine in Imogene Basin during blizzard conditions.

> For several days the mine men employed at the Camp Bird at the head of Imogene Basin had been living in a cabin under five feet of snow with a stove pipe for ventillation but on Saturday at 10 a.m., they were denied this privilege. The three slides that made playful dashes over the cabin prior to that time were pigmies with that of Saturday morning when a great expanse of snow estimated at from 15 to 30 feet deep and a mile long, came roaring over the cabin, crushing in the roof like an egg-shell, burying the three occupants beneath tons of snow (Ouray Herald, 25 Feb 1897).

All three men were dug out alive, with only one injured.

A second incident was reported in April 1900, at the upper workings of the mine. Two men, Mat Peterson and George Banion, were working in a

*Rick Trujillo 1976: personal communication.

shed near the old bunk house (exact location unknown, possibly Second Level).

> They heard the rumbling of the avalanche as it approached, but had no apprehensions of fear as they were under cover, and thought if the shed under which they were working should be in the path of the slide, that the debris would pass over the roof, as it had on numerous occasions...In the Imogene basin the snow is five feet deep on the level. The sun's warm rays had made the snow wet and heavy...The warm rays of the early morning sun started a slide far up the mountain above the shed and as it continued its downward course, it gathered the soft snow and compressed it into great mountains of rapidly moving ice. The frail roof of the shed gave way under its mighty weight...and the two helpless men were buried deep (Ouray Herald, 12 Ap 1900).

Banion was not totally buried and after he dug himself out, he began digging for Peterson. It took him several hours to dig out the severely injured Peterson. Peterson was brought to Ouray where he died of internal injuries two days later.

Two years later, five men were caught in an avalanche which,

> ...struck a part of the surface workings at the entrance of the 2,000 foot tunnel that pierces the range near the large boarding house of the Camp Bird workings on the southwest side of Imogene Basin (Ouray Herald, 8 Mar 1902).

The 2,000 foot level is known as the Number 3 Level tunnel and the avalanche described above was probably the Chicago avalanche (Map 2).* All five men were dug out within twenty minutes but one man, Curtis Shelton, was found dead. The others were bruised and cold but none were severely injured.

> The ore bins were carried away entirely and the tram house and compressor buildings were severely damaged... The rescuing party took desperate chances, but like other worldly heroes in time of danger, labored gallantly in the face of impending disaster and possible death at any moment from another slide...The roofs of the main sheds at the tunnel were first knocked off by the sliding volumes of ice and snow, after which the interiors were filled, crushed and crowded on down the slope in an instant, catching its five victims like rats in a weighted trap thrown into the deep and turbulent waters of a flooding mountain torrent (Ouray Herald, 8 Mar 1902).

On 17 March 1906, both the Camp Bird Mine and the Mill, suffered the first major avalanche damage. The Camp Bird Mill had never been

*Rick Trujillo 1976: personal communication.

damaged by avalanches in its brief history but on Saturday night at a few minutes after 7 o'clock,

> ...when the miners and mill employees were engaged in reading and other modes of amusement, a terrible slide came down from the mountains above and practically demolished the stamp mill and a portion of one of the boarding houses (Ouray Herald, 23 Mar 1906).

The mill was situated on the banks of Imogene Creek and the boarding house that was damaged was about 300 feet from the mill. Figure 20 shows the boarding house after the avalanche. Which avalanche paths actually did the damage to the mill and boarding house was under question in the newspaper account.

> About half a mile up the canon from the mill and on the west side of the canon is the place where the U.S. Slide runs. On the opposite side of the canon and on the western slope of Mt. Hayden is a timbered slope with the exception of two wide paths which have been worn by continuous snowslides. These two paths are several hundred feet apart but empty into the canon at nearly the same point and close to the place where the U.S. Slide runs.
>
> On the Mt. Hayden slope and at the edge of the cliffs two hundred feet above Imogene Creek is situated the aerial tramway. The canon beneath is filled to a depth of three hundred feet in many places with snow and ice, caused by the running of the U.S. Slide once before this season.
>
> Mr. Smith stated upon his arrival Sunday morning that there was no certainty as to what slide had run as the storm was raging there so severely they could see but a little distance. It was afterward learned however that at least two slides had run, the big U.S. Slide and one of the slides from Mt. Hayden. The U.S. Slide started far up on the eastern slope of the mountain and swept into the already snow filled canon taking away the mill and striking the boarding house...Several years ago the U.S. Slide ran and caught several miners. A number were killed and while the slide has run several times each year no one has been caught since until Saturday night.
>
> The slides on Mt. Hayden have not run for several years but with the immense amount of snow which has fallen in the past few weeks and more particularly in the last few days the slides were expected. It was not believed however that they would be of great extent nor was it thought that they would reach the mills and boarding houses (Ouray Herald, 23 Mar 1906).

An account by R.A. Smith, one of the seven men in the reading room in the boarding house when the avalanche struck, follows:

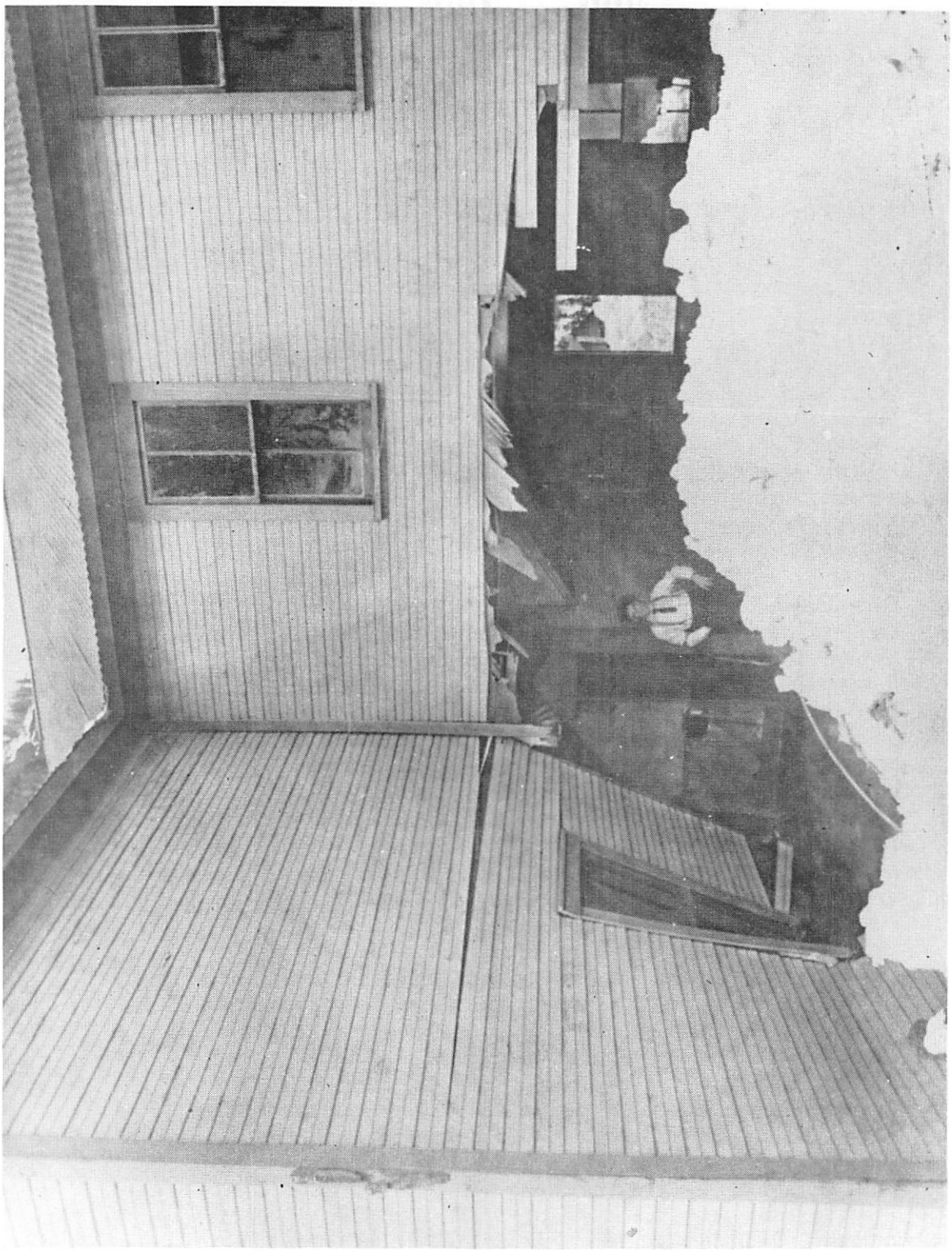

Figure 20. The recreation hall at the Camp Bird Mill, junction of Sneffels and Imogene creeks, after the 17 March 1906 avalanche. (Denver Public Library, Western History Department)

> I was sitting in the reading room of the boarding house with several other men, when we heard a noise which strikes terror to the heart of every miner and man accustomed to the ways of the mountains. The air was filled with the sound of a hard wind and before we could move we were thrown bodily from the room and out into the snow by a terrible snowslide which tore away that portion of the building in which we were sitting. I struck on top of the snow and my first thought was: Where are my companions? Harvey Briggs and myself had been sitting with our backs to the wall when the slide struck the building and through the thickly flying snow and within a few feet from me I could see someone waving an arm above the surface of the snow. Briggs soon crawled out and by that time men were running from the other boarding house two hundred and fifty feet away, having been aroused by the sound of the slide...The boarding house is a two story affair and is constructed in the form of an "L". Only one arm of the building and the lower floor was struck and injured by the slide. A kitchen and card rooms are on the lower floor, with bedrooms on the second floor. Some snow was thrown in at the door of the kitchen by the slide but with the exception of the reading room in which we were sitting none of the rest of the building was damaged as the slide had practically spent its force (Ouray Herald, 23 Mar 1906).

Of the seven men in the reading room, four were buried, one under six feet of snow. All four were injured but none severely. The survivors and the miners who were in the other boarding house now turned their attention to the mill.

> An examination was made at once to see what further damage had been done to the mill, which stood in the direct path of the slide. It was discovered that all but the engine room of the stamp mill had been destroyed. At three o'clock in the afternoon the electric power from the Animas Power company had been cut off, owing to the breaking of the line by a snowslide. As a result, there were only three men in the mill at the time the slide occurred. These men were Frank Strickland, a watchman; Will Crecy engaged in sluicing and cleaning the stamps and the fireman, Andy Eck.
>
> More than fifty men were immediately put to work to search for the men who had been in the mill, which was completely demolished. After nearly two hours of work in a blinding snowstorm, Frank Strickland was found, alive with a heavy timber across his head and with another across his feet, binding him so tightly that he could not move. He was also buried by nearly eight feet of snow. Soon after Will Crecy was found

> beneath a mass of wreckage of the mill. The men toiled unceasingly until eleven o'clock, when they were ordered to cease work, the superintendent fearing that another slide might occur and further accidents happen. The search for the missing man was again commenced Sunday morning and he was found about noon having been killed instantly, it is believed...There were about fifty men employed at the mill and there was also a large gang of road workers at the camp and it is regarded as miraculous that no more were injured or killed (Ouray Herald, 23 Mar 1906).

One of the survivors in the mill was Thomas Walsh's dog Prince, whose loud breathing was heard by the men when they were returning to the boarding house.

> The men started to work in great haste not knowing who might be entombed beneath the snow. After they had dug several feet they came to a portion of the reading room porch and found beneath it the dog, 'Prince' (Ouray Herald, 23 Mar 1906).

The dog had been living at the mill since he had been ordered killed in Ouray for biting several children and continued to live there after Walsh sold the Camp Bird to a London Company in 1902.

At the upper Camp Bird in Imogene Basin an avalanche swept away a portion of the boarding house but no one was injured. The aerial tramway lost seven piers from avalanches.

The final blow to the mighty Camp Bird came Monday night:

> Fire last Monday night destroyed what the snowslide of Saturday night failed to do in the destruction of the Camp Bird mill. Shortly before one o'clock flames were discovered and the men who had remained at the mill were called out to fight the flames and to prevent their spreading to the cyanide plant and other buildings close to the mill...The remaining twenty stamps were totally ruined and all the woodwork of the mill was reduced to ashes (Ouray Herald, 23 Mar 1906).

After 1906, avalanche damage was restricted to the mine's installations in Imogene Basin until the 1970s. In November 1909, Robert Lockwood, a lineman with the San Juan Power and Water Company, formerly called the Animas Power Company, claimed the dubious honor of being the first avalanche victim of the year. He had climbed above the Camp Bird Mine,

> ...and was traveling along through a couple of feet of snow, when a crest of snow on which he was evidently standing unawares, broke and precipitated itself and him over the cliff and rolled and tumbled and slid to

> the bottom of the hill, which was practically at the Camp Bird mine...A part of the time he was under the snow, at other times on top of it, being pitched and tossed about as a stick (Ouray Herald, 12 Nov 1909).

Lockwood was bruised but unhurt from his ride.

During a storm in February 1909, "...said by the old timers to have been the worst ever seen in this section of the country" (Ouray Herald, 12 Feb 1909), the Camp Bird manager, anticipating avalanches, shut down operations at the mine and the mill and kept the men in safe places. "It is not considered at all probable that the U.S. Slide will do any damage at the mill even if it should run" (Ouray Herald, 12 Feb 1909). The U.S. avalanche did release but, as predicted, did not come close to the mill. The following month, the rear portion of the boarding house at the Camp Bird Mine in Imogene Basin was struck by an avalanche but little damage was done. The following week, while the employees at the mine watched, six avalanches released in Imogene Basin.

> One after another they broke from the mountain crest and boomed and billowed their irresistable courses of from half to more than a mile, piling up in the gulches hundreds of feet of solid snow and ice that will not all have melted until the summer is gone (Ouray Herald, 15 Mar 1912).

The Mt. Hayden avalanche, which with the U.S. avalanche, had reportedly destroyed the mill in 1906, released,

> ...in sufficient volume to damage the great stone pier that sustains the Camp Bird tram so called 'high tower'. The tram was in consequence put out of commission (Ouray Herald, 15 Mar 1912).

In January 1916, a bizarre accident occurred which was indirectly the result of an avalanche. The Chicago avalanche in Imogene Basin (Map 2) had released and run into the trestle connecting the portal to the mill. Several hours after this event, the motorman at the mine, Charles Harris, was killed when the trestle work collapsed and Harris was caught under one of the ore cars, falling twenty feet. An official investigation blamed the avalanche for weakening the trestle, causing it to collapse (Ouray Herald, 7 Jan 1916). Another fatality occurred in March 1920, when a Camp Bird Mill employee was shoveling snow from the roof of the stamp mill. A large quantity of snow slipped off the roof, sweeping the shoveler off the roof and burying him. He was dead when unburied moments later (Ouray Herald, 11 March 1920).

From 1916 to 1918, the Camp Bird Ltd. concentrated its efforts in driving a tunnel from the mill at the valley bottom to the mine workings in Imogene Basin. From 1918 to 1920, limited exploration was undertaken and from 1920 to 1925, the mine was maintained on a caretaker basis. The Camp Bird reopened in 1925 under the King Lease Company, who leased the property from its London owners (Table 7). No avalanche events were reported during this period of inactivity or until 1936, when disaster struck in Imogene Basin.

At 9:45 Monday morning, 24 February 1936, the mill, bunkhouse and other buildings of the King Lease in Imogene Basin were either heavily

TABLE 7

CAMP BIRD MINE OWNERSHIP AND PRODUCTION HISTORY*

Period	Operator	Minerals Produced
1896 - April 1902	T. Walsh	gold
May 1902 - June 1916	Camp Bird Ltd.	gold
March or April 1916 - June 1918	Camp Bird Ltd.	driving Camp Bird tunnel
1918 - Dec 1920	Camp Bird Ltd.	exploration
1920 - 1925	Camp Bird Ltd.	caretaker basis
1925 - Dec. 1956	King Lease	gold, silver, lead, copper, zinc
1956 - Sept 1963	Camp Bird Colorado, Inc.	lead, copper, zinc gold, silver
Sept 1963	Camp Bird Colorado, Inc. acquired by Federal Resources Corp.	
Sept 1963 - present	Camp Bird Colorado, Inc.	lead, copper, zinc, gold

*from the Camp Bird Mine, Ouray, Colorado

damaged or destroyed. Three persons, two men and one woman, were killed when the Chicago and Hidden Treasure avalanches released onto the mine buildings (Ouray Herald, 28 Feb 1936).

> The slides which vied with each other in bringing death and destruction have been running year after year, but never in the history of the district have they reached the proportions and followed the paths that they did last Monday. The snow in the basin was exceptionally deep and in the proper condition to slide...it seems that the Chicago slide ran in about the usual course, except that it failed to spend itself before reaching the mine dump. When it struck the dump it was diverted so that it took out a portion of the mill and shops and was headed directly towards the bunkhouse. But before striking the bunkhouse its course was deflected, probably by the roof of the mill which had been rolled up at the side of the slide. Instead of striking the bunkhouse a direct blow it side swiped it, tearing off a lean-to and filling the lower floor with snow.
>
> Almost simultaneously with the running of the Chicago slide, the Hidden Treasure slide came down from the

> Imogene basin. It is believed this slide was deflected by bulwarks that had been timbered up as a protection against the slide otherwise it would have struck the bunkhouse. However, it joined the Chicago slide below the bunk house before running into the canon. Another slide, known as the Second Level slide, also ran with the other two. There were also many other slips, and smaller slides reported as the snow in the basin was on the move (Ouray Herald, 28 Feb 1936).

Figure 21, dating from about 1910, shows the Camp Bird Number 3 tunnel at the tongue of the rock glacier and the snowshed protecting the track from the entrance of the tunnel to the other buildings. The mill and boarding house are in the lower center portion of the photograph and the track continues to the tailings dump and loading station for the aerial tramway. The small tailings dump, upslope and behind the stand of timber from the boarding house, is the remains of the Hidden Treasure Mine and the basin above the mine buildings is the upper portion of the Hidden Treasure avalanche path.

In 1925, a fire destroyed the mill which was subsequently rebuilt, and evidence of fire-damaged tree remains were found in 1976 (Figure 22). The stand of coniferous trees in the 1910 photograph are absent in the 1976 photograph and were probably absent in 1936 when the Hidden Treasure avalanche released.

Figure 23 shows the mill after the Chicago avalanche, which released from left to right in the photograph, pulled out a number of trees in its path towards the mill.

Mrs. Rose Israel, cook at the mine, was in the lean-to attached to the bunkhouse when the Chicago avalanche struck and was dead when uncovered from under 15 feet of snow.

> Pearl Huffman, the cook's helper, was in the kitchen near the lean-to when the slide struck and was found under a table unhurt. Clyde Smith, kitchen employee was in the kitchen at the time and was almost completely covered by snow. He also escaped with only superficial injuries (Ouray Herald, 28 Feb 1936).

Figure 24 illustrates the damage done by the Chicago slide in the kitchen. Pearl Huffman was found under one of the tables. Ten men of the night shift who were sleeping on the second floor were uninjured.

> When the slide demolished the mill, shops and snowshed from the mill to the mine there were six men sheltered there. One of these, Ralph Klinger, mine blacksmith was killed. Mine foreman James Dunn, was buried under snow and debris, but was taken out with only minor injuries and the others escaped without serious injuries.
>
> Chapp E. Woods, mill superintendent, was among those killed. Just before the slides started running he had

Figure 21. The Camp Bird No. 3 tunnel, mill, and boarding house, Imogene Basin, circa 1910. The Hidden Treasure Mine is located directly upslope from the boarding house, behind the trees. The large basin above the boarding house is the release zone for the Hidden Treasure avalanche. (Denver Pub. Lib., Wes. Hist. Dept.)

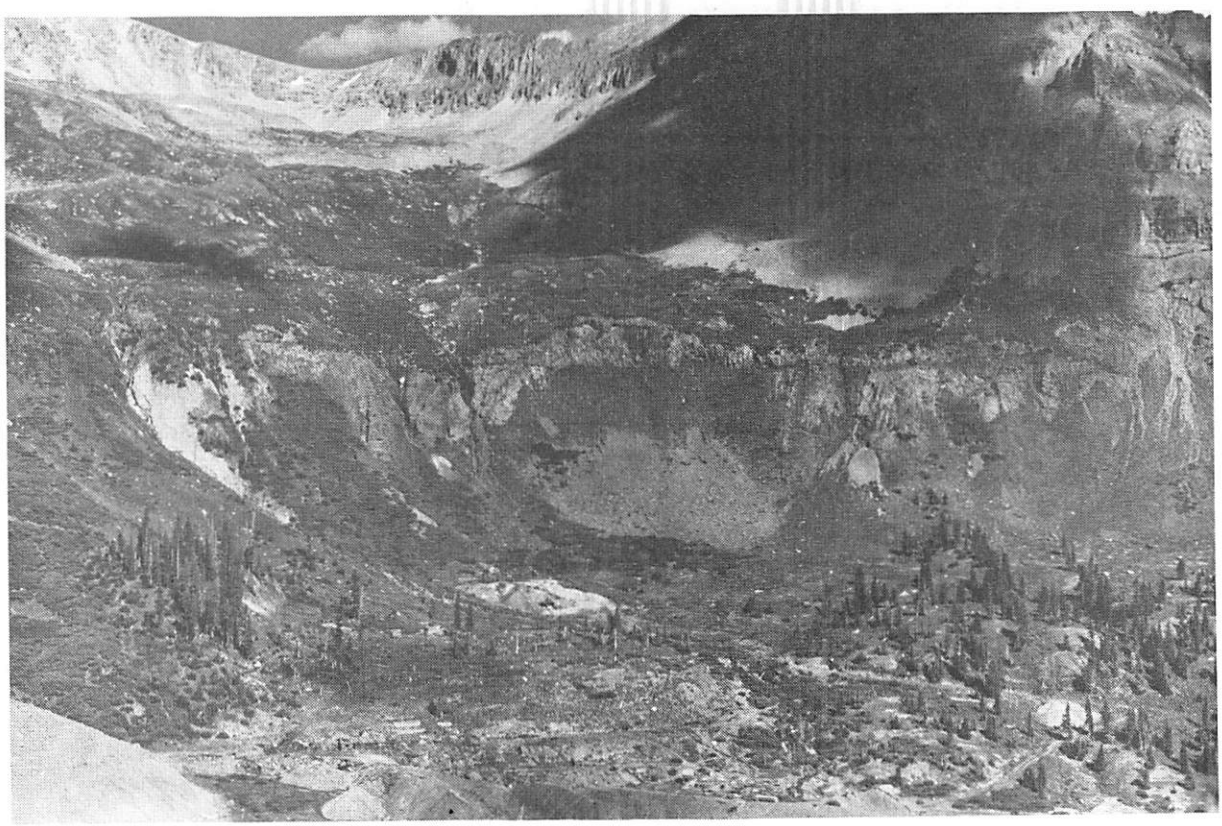

Figure 22. The August 1976 remains of the Camp Bird Mill and boarding house, Imogene Basin. (B. Armstrong photo)

Figure 23. The Camp Bird Mill in Imogene Basin after it was destroyed by the Chicago avalanche on 24 February 1936. (Denver Pub. Lib., West. Hist. Dept.)

Figure 24. Avalanche debris in the kitchen of the Camp Bird boarding house, Imogene Basin, 24 February 1936. The photographer posed a person under the table where rescuers found Pearl Huffman, the cook's helper. (from the collection of Marvin and Ruth Gregory)

> gone to a pump house not far from the mill and the bunkhouse. There the slides caught him and his body was not recovered until Tuesday afternoon. From the position of his body it is believed that he was working with a valve at the catch basin in the pump house when the slide struck because he had been thrown forward into the basin with his head under the water. He had evidently drowned. He was under some 20 or 30 feet of snow.
>
> At the time of the slide there were 27 men working underground in the mine. Many of these men knew nothing of the slide until the middle of the afternoon when word was brought to them. These men were never in danger, although it was necessary for them to dig themselves out when they left the mine. The main portal of the mine was blocked under many feet of snow so the men went to the outlet from No. 2 level and dug a shaft through about 20 feet of snow to reach the top of the slide upon which they walked out.
>
> The mine mules, kept in a stable near the mill, were untouched by the slide (Ouray Herald, 28 Feb 1936).

An eye witness to the scene, Walter B. Rogers, then Chairman of the Board of County Commissioners of Ouray County, described the event in a letter to his sister that was published in the Ouray Herald of 6 March 1936.

> Last year during the month of February we had a snow fall of 26½ inches; this year, 98 inches. So you can see that the abnormal amount of new snow must result in slides. Imagine a basin two miles wide, shaped like a horseshoe and surrounded by mountains 1500 feet high. Then think what it means for the snow on these mountains to run in almost one continuous slide for more than half the distance around this huge horseshoe. This is what happened on Monday, February 24, and all the electric clocks stopped at 9:45 a.m. The paths that all ordinary snow slides traveled were too small to carry this great mass and it overflowed and came down at different points where snow had never before been known to run. A number of small houses built some 50 years ago on safe locations, were swept away (Ouray Herald, 6 Mar 1936).

Rogers' letter is reproduced in toto in Appendix IV. He noted in his letter that blizzard conditions existed at the time of the avalanches.

The final reference to avalanche activity in Imogene Basin was in March 1944, when the Chicago avalanche was reported down, taking the Camp Bird power lines with it (Ouray Herald, 17 Mar 1944).

No damaging avalanches were reported at the Camp Bird until 9 January 1974, when the U.S. avalanche, repeating its 1906 performance, released from high in its catchment basin, stopping within three feet of the mill and damaging the flume.*

To illustrate the effects of these two avalanche events, March 1906 and January 1974, a time series of photographs is used. Figure 25 is a promotional photograph of the Camp Bird Mill taken in 1903 and published by the Ouray Board of Trade in a publication called, "Ouray, the Gem of the Rockies". While the trees in close proximity to the mill have been removed, a mature coniferous forest stands above the mill and above the cliff band, with the exception of the cut for the aerial tramway. The lower track of the U.S. avalanche is seen in the upper right portion of the photograph. The next photograph, Figure 26, is a wide-angle shot taken in 1912, six years after the 17 March 1906 avalanche. The path taken by the U.S. avalanche, over the cliff band to the mill, is clear. In this photograph, the aerial tramway towers have been rebuilt and little reforestation is apparent. Very little mature timber is left standing below the cliff band. Of interest are the five avalanche retaining structures in the closest of the two Mt. Hayden avalanche paths. One of these paths reportedly ran with the U.S. avalanche in March 1906, destroying the mill. These structures were probably built after 1906. At the same time, an earthen dam was constructed at the base of Mt. Hayden above the cliff band from the mill, to protect the mill from the U.S. avalanche (Figure 5, Chapter II).†

Figure 27, is a post card view of the "World Famous Camp Bird Gold Mills" by the Sanborn Company, which was in business during the 1920s and 1930s (Denver Public Library, Western History Department, 1976). Reforestation of coniferous trees is evident both above the cliff band and below. An aerial tramway tower is visible above the cliff band. Figure 28 was taken in 1958 by Robert Brown and shows continued heavy reforestation. The final photograph in this series is Figure 29, taken by Rick Trujillo shortly after the 9 January 1974 release of the U.S. avalanche and shows the destruction of the mature coniferous forest. The fracture lines in the starting zone of the path are evident. Trujillo recalls the entire basin as well as the slopes in the timber releasing. In the summer of 1976, the downed trees were still providing firewood for the mine employees (Figure 30). Julius Sonza, who has worked the mines of Ouray County for much of his 80 years, said that the U.S. avalanche ran alone; had one of the Mt. Hayden avalanches run during the same period, as happened in 1906, the mill would surely have been destroyed again. ‡

Information obtained by dating trees destroyed in 1974 is found in Table 8. Of the five tree cores examined, four were of ages ranging from 61 to 74 years and one was dated as being 242 years old when taken out by the avalanche. These older trees could well be those trees seen in Figure 26 as still standing in 1912. One live tree was sampled from a location below the cliff band, and was found to be 165 years old, probably another survivor from the 1906 event. Also found in the 1974 debris were the remains of aerial tramway towers which had been rebuilt in 1906.§

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*Rick Trujillo 1976: personal communication.
†Howard Williams 1976: personal communication.
‡Julius Sonza 1976: personal communication.
§C.J. Burrows 1976: personal communication.

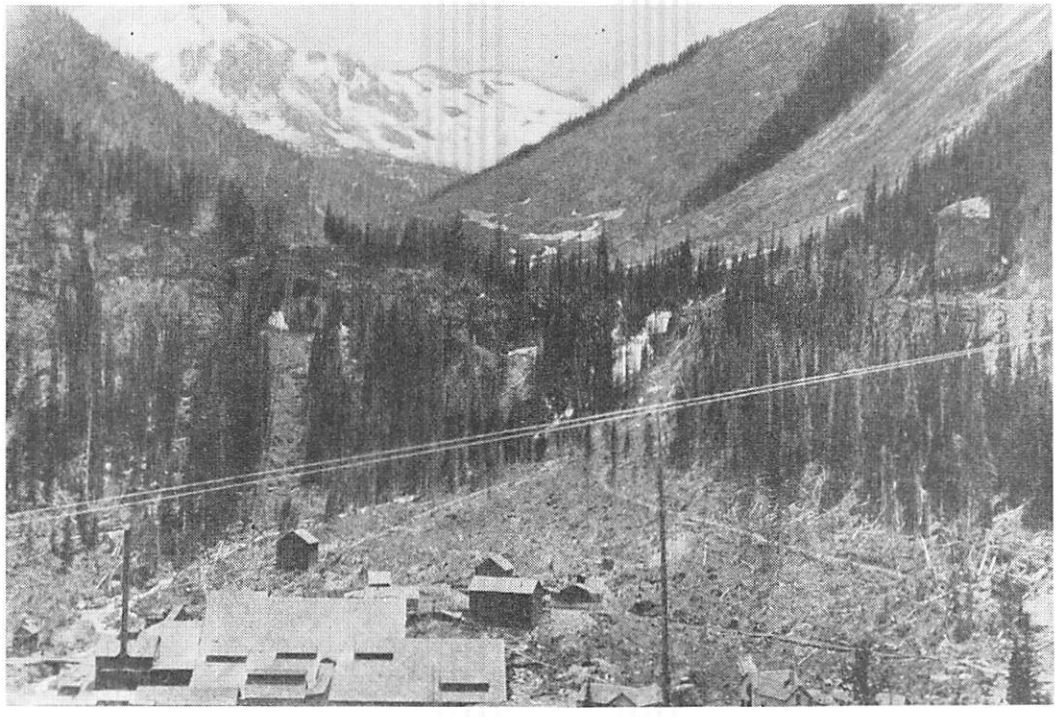

Figure 25. The Camp Bird Mill in 1903. Mature trees are evident at the top of the cliff band and on the slope below, except where the aerial tramway runs upslope from the mill. (Denver Pub. Lib., West. Hist. Dept.)

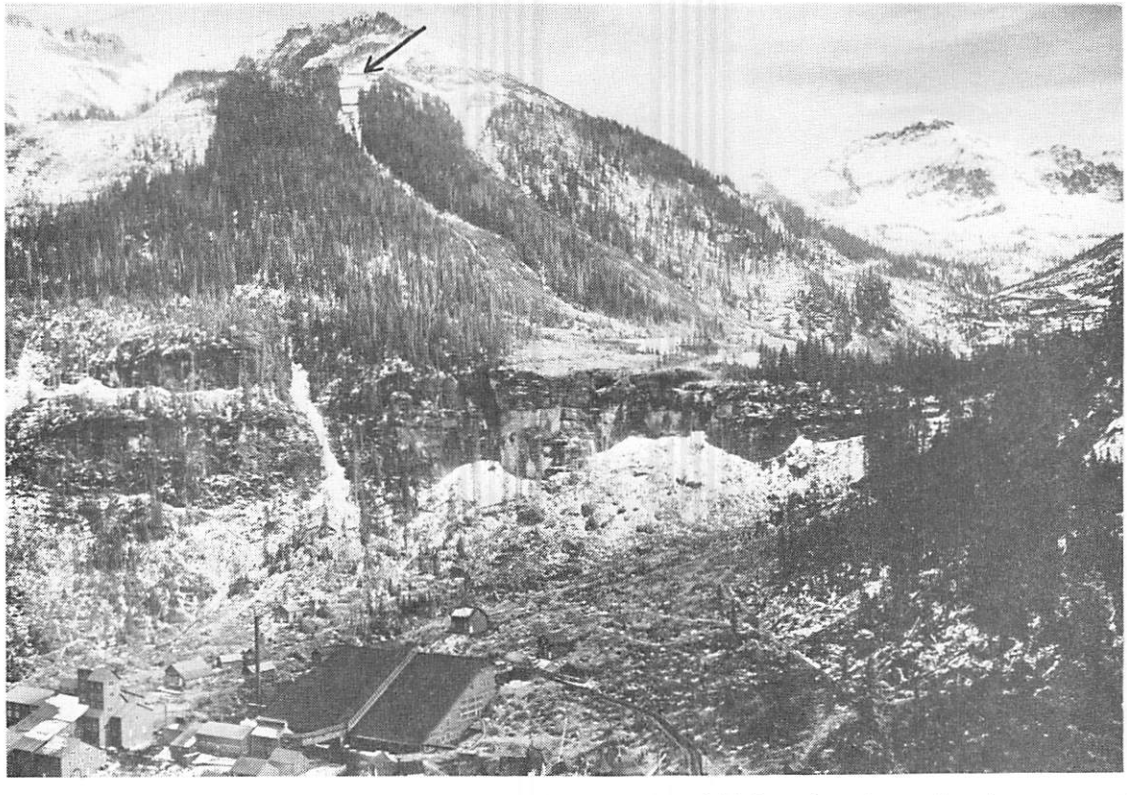

Figure 26. The rebuilt Camp Bird Mill, circa 1912, showing the lower path of the U.S. avalanche, entering on the right, and the two Mt. Hayden avalanche paths. On 17 March 1906, the U.S. avalanche and possibly one of the Mt. Hayden paths released to destroy the mill and the tramway, leaving only a few standing trees directly underneath the cliff band. Note the supporting structures in the starting zone of the left Mt. Hayden path. (Denver Pub. Lib., West. Hist. Dept.)

Figure 27. Camp Bird Mill, 1930s, a Sanborn Company post card. Reforestation above the mill and cliff band is progressing. (Denver Pub. Lib., West. Hist. Dept.)

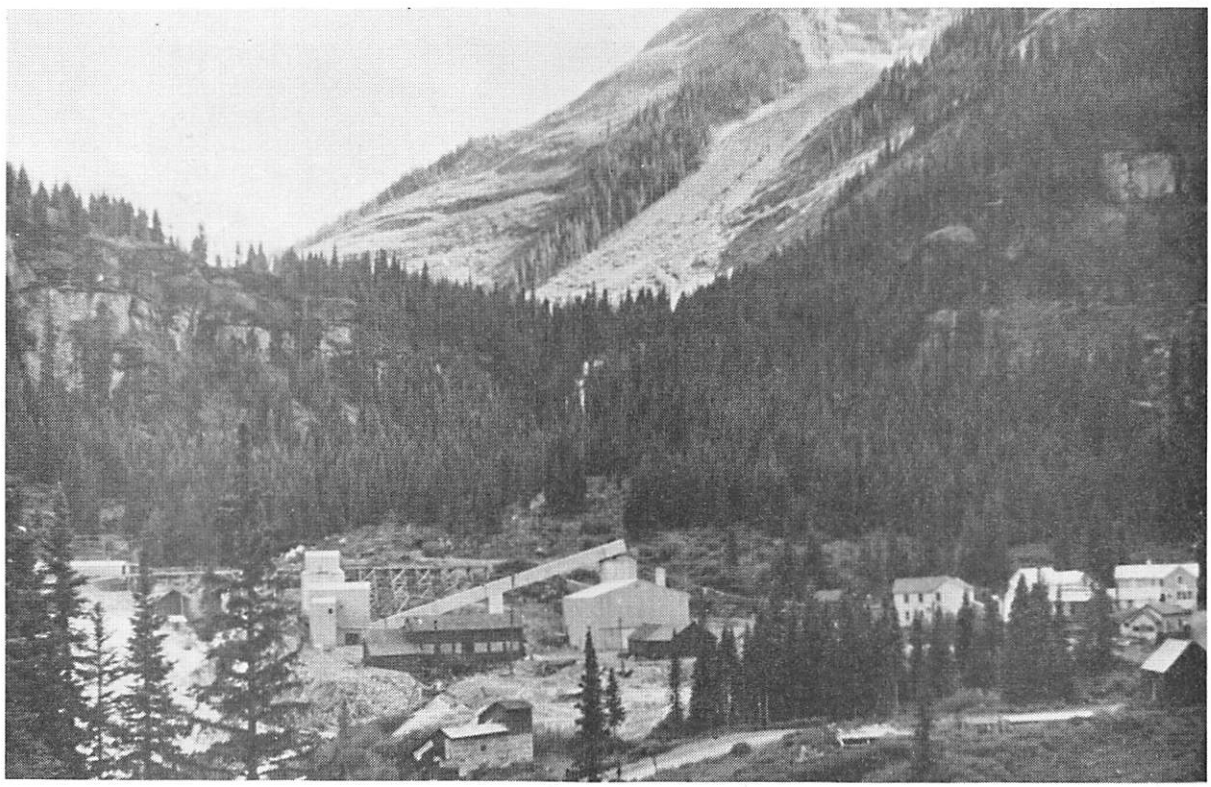

Figure 28. Camp Bird Mill, 1958. On this date, the dense stand of mature coniferous trees above the mill indicates significant reforestation. (from the collection of Robert L. Brown)

Figure 29. The path of the U.S. avalanche shortly after it released on 9 January 1974, coming within three feet of the Camp Bird Mill. Numerous fracture lines in the upper portion of the path are visible. (R. Trujillo photo)

Figure 30. The Camp Bird Mill, July 1976, viewed from just downslope of the cliff band. Uprooted timber deposited by the 1974 avalanche still remains. (B. Armstrong photo)

TABLE 8

TREE DATING FROM CONIFEROUS FOREST DESTROYED 9 JANUARY 1974

CAMP BIRD MILL - BELOW CLIFF BAND*

Tree Number and Type	Maximum Age	Diameter (cm)
Downed Trees		
1 fir	74	50
2 spruce	72	55
3 spruce	70	52
4 spruce	242	52
5 fir	61	42
Live Trees		
6 spruce	165	48 to 58

*C.J. Burrows 1976: personal communication.

U.S. Highway 550

Much has been written on the history of U.S. Highway 550 from Ouray to Durango (Maps 4, 5, 7, 8). The purpose of this section is to examine the avalanche hazard on the portion of road within Ouray County, from the town of Ouray to the county line, Red Mountain Pass. The Million Dollar Highway, during its history called by several other names, the Chief Ouray Highway, the DSO or the Durango-Silverton-Ouray Highway, and officially designated as U.S. Highway 550, was taken over by the county and state in 1887 after its early history as a toll road. The road was improved from a wagon road to one suitable for vehicles in 1919 and 1920 (Ouray Herald, 19 Nov 1926). Early efforts to keep the road open during the winter months were often frustrated by early and heavy snows. In November 1929, the Ouray Herald noted that the highway crew was preparing to keep the road open by having on hand ten tractors and five trucks with snowplows (Ouray Herald, 8 Nov 1929). However, by the end of the month, the highway from Silverton to Durango was practically closed by deep snow and the mail was transported to Silverton by auto bus and from there to Durango by train (Ouray Herald, 22 Nov 1929). The road was opened in December until almost mid-January, when it was closed after being open two months longer than usual. "It is uncertain whether or not the road will again be opened before spring" (Ouray Herald, 10 Jan 1930). Responsible for the road closure was the Riverside avalanche, which had blocked the road causing all further travel to be restricted to either foot or horseback (Ouray Herald, 17 Jan 1930). When attempts were made to re-open the road in April, the Mother Cline avalanche released, cutting off the snowplow between two avalanches (Ouray Herald, 11 Ap 1930).

During the winter of 1931-1932, the citizens of Silverton and Ouray were pressuring the Colorado Highway Department to keep open the highway.

In December, two avalanches, the Mother Cline and Riverside, blocked the highway; by December 11, the road was reopened and remained open until late January (Ouray Herald, 4 Dec, 11 Dec 1931). During a severe storm in January, the highway crew "shot down" an avalanche at the Willow Swamp (Map 7), by which method is unknown, and then the highway was ordered closed by the State Highway officials in Denver (Ouray Herald, 22 Jan 1932). The highway was still unopened in late March, when it was reported that the Guadalupe avalanche had covered the highway with ten feet of debris (Silverton Standard, 26 Mar 1932). Work finally began in April to open the highway and clear the avalanche debris. A major problem was the Riverside, which had deposited several hundred feet of snow on the road and in the canyon below.

> Three charges of powder were planted in as many positions of the slide which extended about 150 deep in length and 30 to 55 feet deep and these were 'set off' on Saturday April 2nd. This removed considerable snow and loosened the frozen slide so that the snow shovel operated by a gasoline motor mounted on a truck, could bite out the snow a yard at a time and load it on trucks which hauled and dumped it farther down the canyon (Ouray Herald, 15 Ap 1932).

The road was finally opened late in April, but not without some trouble from the Mother Cline (see below). After 1935, it became Highway Department policy to keep the road open all winter, although closures were, and still are, common, if temporary (Ealey, 1969, p. 5).

Table 9 is a ten-year sample, from 1930 to 1940, of references to U.S. Highway 550. It is obvious that while many avalanches are responsible for shutting down the road, two seem to be more active than the others, the Mother Cline and the East Riverside paths. Both these paths will be examined below, one small in size and magnitude and the other just the opposite, yet both destructive to people and property. (A synopsis of avalanche activity is given here; a complete listing of avalanche events chronologically and by geographic location, is in Table 10 and 11, Appendix III).

Mother Cline

The Mother Cline avalanche path (Figure 31, Map 5) is an open slope consisting of smooth tilted bedrock, with little vegetation. Although the distance from the starting zone to the highway is only 300 feet, the avalanche runs often enough to be a serious hazard to highway travelers. The earliest recorded event was in approximately 1888 when Rev. Gibbons described the Mother Cline.

> This famous snowslide had come down some time before and bore every thing away in its track, recoiling from the bottom of the gulch and breaking off the trees on the mountain side for 200 feet. The snow was from sixty to seventy feet deep on the road bed and in the gulch and the mass of wrecked matter was a conglomeration of broken trees and huge boulders, some of which

TABLE 9

TEN-YEAR SAMPLE OF ACTIVITY ON U.S. HIGHWAY 550

1930 - 1940*

Date	Comments
14 Nov 1930	efforts will be made to keep highway open this winter
21 Nov 1930	winter arrived, highway closed
4 Dec 1931	citizens of Silverton and Ouray pushing for opening of highway, less than two feet of snow on Red Mountain Pass, small slides at Riverside and Mother Cline
11 Dec 1931	highway open
22 Jan 1932	highway ordered closed by State Highway Department
15 Ap 1932	work began 2 April on opening highway
22 Ap 1932	Mother Cline slipped three times into road in one day during operations to open road, road expected open end of month.
16 Dec 1932	bus service over highway suspended for winter; road from Siverton to Durango blocked, road from Ouray to Silverton still open
20 Jan 1933	snow and wind block highway; attempts being made to open it. Durango bound bus marooned with some highway equipment between two slides on Silverton side; small slide at Willow Swamp partially buried highway truck with two men inside. They were able to dig out the truck.
24 Feb 1933	highway opened through to Silverton
25 Mar 1933 Silverton Standard	slide blocked highway between Silverton and Ouray
8 Dec 1933	first storm of season, road closed for three days; small slips at Mother Cline and Riverside, large slip at Blue Point, more snow on north side of Red Mountain Pass than south side
23 Feb 1933	storm deposited 2 feet of snow on Red Mountain Pass, East Riverside down twice during storm but highway still open
2 Mar 1934	Red Mountain Pass closed for one week due to biggest rock slide to ever come down on highway: portion of cliff just south of Bear Creek Falls released, 75 feet of road covered 6-25 feet deep. The cliff was blasted a month ago with no results. Also, many small snow slips down: Riverside, Willow Swamp and Blue Point.
30 Mar 1934	Mother Cline slipped every day for four consecutive days, sometimes more than once a day
6 Ap 1934	heaviest snow of the season, several small slips: East Riverside and three or four on Mother Cline; road reopened
21 Dec 1934	heaviest snow fall this year, 2 feet in Ouray, highway closed for 2 days, no major slides down
18 Jan 1935	highway blocked, Mother Cline and East Riverside down, highway reopened
8 Mar 1935	highway blocked 4 days; East Riverside on road 125 feet in length, 3-15 deep

TABLE 9

(Continued)

Date	Comments
15 Mar 1935	highway blocked for 2 weeks, opened again; Willow Swamp and Blue Point down
22 Mar 1935	highway only open 6 days before it is blocked by slides: the Blue Point released twice and the Willow Swamp once, both blocking the road, reopened
12 Ap 1935	road closed for a few days, Blue Point down 12 feet deep and 50 feet in length and other smaller slips
26 Ap 1935	Mother Cline and Riverside slips, highway still open
3 Jan 1936	3 feet of new snow on Red Mountain Pass, highway still open but "...indications were that it would be necessary to close the road Friday as a matter of precaution against snow slides." Mother Cline down
14 Feb 1936	highway closed by 3 major slides: Mother Cline, Blue Point and Willow Swamp and many smaller slips. "The East and West Riverside are very heavy and in a good condition to run. These are the slides that blocked the highway four winters ago for a period of 90 days."
21 Feb 1936	Mother Cline down. East and West Riverside has not run yet.
27 Mar 1936	highway still closed; open for a few hours on Sunday but closed again
3 Ap 1936	East Riverside slip, highway still not open
17 Ap 1936	highway finally open; Mother Cline slipped 5 times on Wednesday and 3 times on Thursday
12 Feb 1937	highway closed due to heavy snowfall, drifts and slides at East Riverside and Mother Cline
12 Mar 1937	highway open again after 4 weeks, then closed again when Riverside ran 10-12 feet deep on highway
16 Ap 1937	Mother Cline and East Riverside closed highway. East Riverside 20 feet deep, 70 feet in length on highway
4 Feb 1938	Blue Point and East Riverside ran large
11 Feb 1938	6 feet of snow on Red Mountain Pass, several slides down: East Riverside, Willow Swamp and Blue Point
18 Feb 1938	Red Mountain Pass closed for almost a week, Blue Point 12-18 feet deep and covered 300 feet of highway
11 Mar 1938	Red Mountain Pass closed to all but pack mules
15 Ap 1938	Mother Cline slipped
12 Jan 1940	East Riverside ran, 10 feet deep, 40 feet in length on highway, first slide of winter

*source for all material is the Ouray Herald newspaper unless otherwise noted.

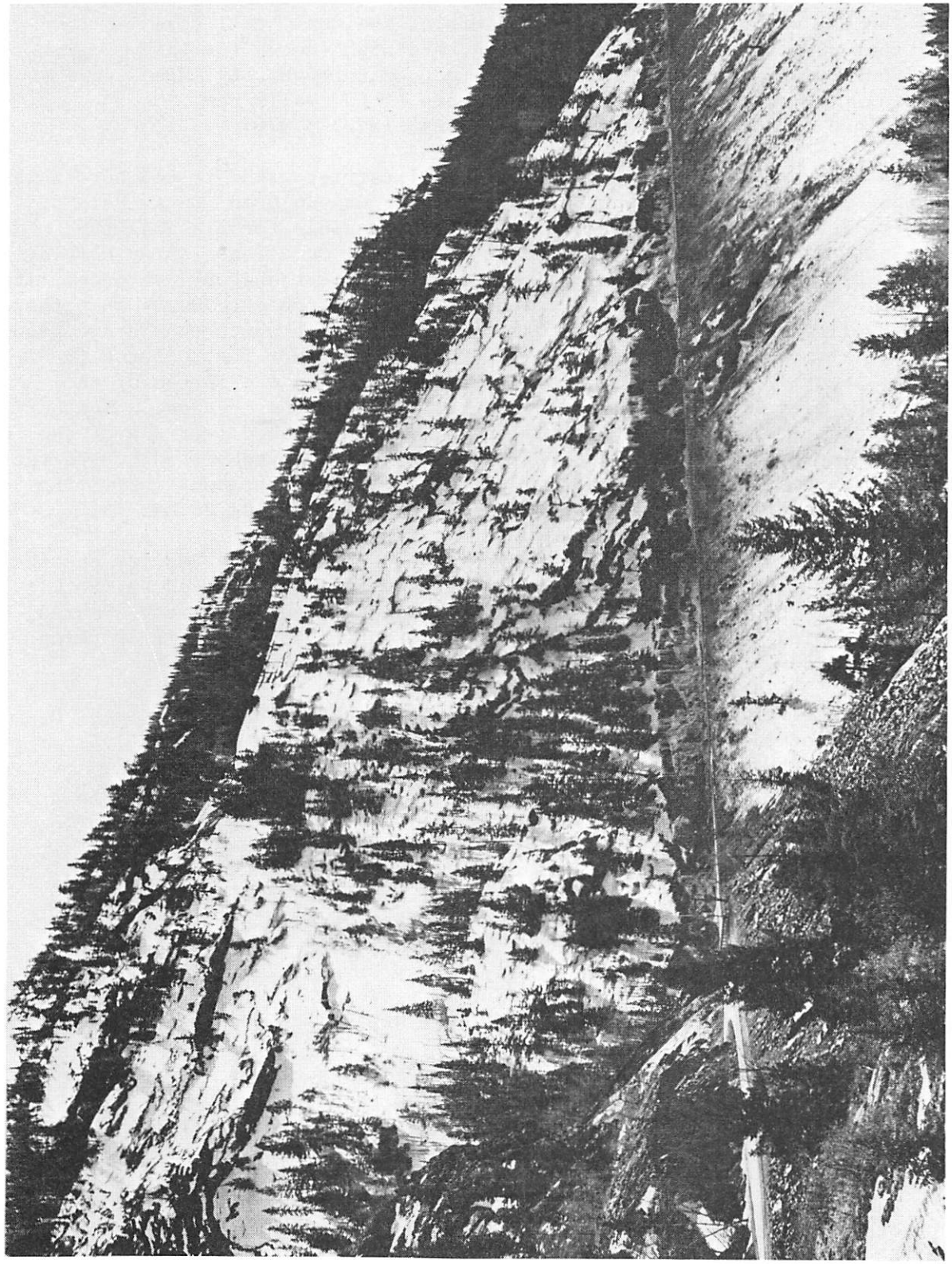

Figure 31. Mother Cline avalanche path, U.S. Highway 550. (INSTAAR photo)

> weighed from two to three tons. As long as the weather was cold a team could readily cross on the top of the slide, but when the snow melted the county was obliged to cut a tunnel, which was one of the wonders of the Ouray toll road that summer. It was 580 feet long, and high enough for the Concord stage with its six horses to pass through. By late fall the roof was thawed out, but some of the walls remained standing for two years (Gibbons, 1972, p. 76).

In February 1895, the Red Mountain mail carrier with his two horses was caught and taken 100 feet down the slope; no one was injured (Ouray Herald, 10 Jan, 21 Feb 1895). The Mother Cline was responsible for blocking the Circle Route Stage from Ouray to Ironton on several occasions (Ouray Herald, 7 Feb, 19 Dec 1902) and in January 1906, took the first and only recorded life, one horse. Two men, a dairyman and a miner, were en route to Ouray when they began shoveling snow off the road to make a cut through which they could pass. Their team of horses and sled were a few feet from them. The Mother Cline released, sweeping the horses and sled 100 feet down to the bottom of the canyon. The sled was wrecked, one horse killed, the other bruised. Neither men were caught, although one side of the avalanche brushed over one of the men's feet (Ouray Herald, 19 Jan 1906). In 1912, the newspaper editor of the Ouray Herald remarked that the Mother Cline, "...runs just about every time it snows and sometimes when it doesn't snow" (Ouray Herald, 22 Mar 1912).

In April 1932, after the highway had been closed since January and the opening of the road almost complete, the highway crew was delayed by the Mother Cline. Three avalanches covered the highway; when they were cleared, the crew traveled south on the highway to relieve the morning shift working on the Riverside debris.

> When the relieved shift came back to Ouray they found the road blocked at Mother Kline by two slips. The men started digging the road open and before they finished another slip came across the road back of them, closing them in on both sides. The road, however, was cleared that same day.
>
> By a queer coincident, it was exactly a year to the day and even hour that Mother Kline closed the road with a slide. On April 22, last year, at noon, the chief Ouray highway was closed at the exact spot by a slide similar to the one which closed the road last Friday (Ouray Herald, 22 Ap 1932).

In March 1934, the Mother Cline slipped every day for four consecutive days.

> The Mother Cline snow slide about four miles south of Ouray on the Million Dollar Highway, has been pestering the life out of Patrolmen Shorty Israel and Charles Craig the past week...Slips from the slide started coming down on Thursday while the patrol was up on the pass bucking snow. This was easily cleared away, but on Friday several other slips came down. More of them ran on Saturday and Sunday and were quickly disposed of (Ouray Herald, 20 Mar 1934).

The following year, when Louis Dalla, Raymond Louisa and Martin Slabonick were returning home to Silverton after seeing a movie in Ouray, avalanche debris from the Mother Cline was blocking the road.

> Dalla, who worked on the highway out of Silverton, borrowed the Caterpillar tractor assigned to the Ouray maintenance man, which was parked nearby, and dozed the snow out of the road. The three men then got back into their pickup truck to continue the trip to Silverton. As they drove under the Mother Cline, it ran again and caught them, covering the pickup and filling the cab full of snow. They were able to open the door on the right hand side of the truck, and all three escaped without injury (Ealey, 1969, p. 30).

In April 1936, the Mother Cline reportedly slipped five times one day and three times the next (Ouray Herald, 27 Mar 1936). On 27 April 1973, seven releases were observed (Foster, 1974). Three days later, three events were observed, one which completely wrecked a car when the snow was mixed with ice (Foster, 1974).

This pattern of frequent releases repeats itself up to the present. On 18 December 1973, a rotary snowplow of the Colorado Highway Department was buried up to the top of the fenders by the Mother Cline. The car behind the rotary ran into the debris and was then partially covered by a second avalanche moments after the driver got out and ran down the highway (INSTAAR San Juan Avalanche Project unpublished data, 1974). On 25 April 1975, between 4:30 p.m. and 6:30 p.m., the Mother Cline released four times. After the first release, Jim Campbell, a Colorado Highway Department employee, was clearing the debris in a snowplow when a second avalanche struck the roof and broke the light mounted on top of the cab. Moments later, a third avalanche released and damaged the hood. Campbell then cleared the road and drove to the top of Red Mountain Pass. When he returned to the site at approximately 6:30 p.m., he stopped traffic and began cleaning up the debris still remaining on the road. A fourth avalanche released, burying most of the snowplow. Campbell was completely buried and immobile under the crushed roof of the cab. His hard hat had been pushed down over his face, providing him with an air pocket, and his hands were up in the air. When a passenger in one of the waiting vehicles extracted him, he was conscious and able to walk away from the site with only bruises and a cut on his head. Damage to the plow was more extensive and estimated at $10,000 (INSTAAR San Juan Avalanche Project unpublished data, 1975).

The Mother Cline has been controlled by a 75 mm pack howitzer cannon from the 1950s until the present. An experimental method of control was begun during the winter of 1976-1977 by INSTAAR, University of Colorado. This method utilizes a system of four gas exploders which are constructed from twenty-two inch split rim truck wheels and tires. The four separate units are anchored by steel cable in the starting zone of the path. The wheels are filled simultaneously with a mixture of oxygen and acetylene, and when ignited by a "spark-plug" system, the exploding gases are released in all directions around the wheel and disturb the snow cover above, causing an avalanche if the snow is unstable. The tires settle back on the ground and the system can be used repeatedly during the winter.

East Riverside

The East Riverside avalanche is one of the larger avalanche paths on U.S. Highway 550, dropping 3,200 vertical feet (Figure 32, Map 5). Avalanches hit the highway directly, then deposit debris in the narrow Uncompahgre Canyon. The first reference to the Riverside was in November 1888.

> The first snow-slide of the season occurred at Riverside last Monday and of dimensions that will guarantee a huge deposit of the beautiful until next summer (Solid Muldoon, 9 Nov 1888).

Perhaps this avalanche debris is the same as pictured on the frontispiece of this monograph. In February 1890, "the Ironton stage slid over the Riverside slide...but without damage to man or beast" (Solid Muldoon, 28 Feb 1890). The following year, the debris was so extensive that the Solid Muldoon noted in February the potential for a snow tunnel at the Riverside. "It will be 480 feet long and a mile high" (Solid Muldoon, 20 Feb 1891). The next month as the Red Mountain stage was crossing the gulch at Riverside,

> ...a small slide came down and struck the horses and they being frightened, jumped to one side and dumped the sleigh. There was one passenger aboard, badly scared, which was all the damage done (Solid Muldoon, 20 Mar 1891).

In 1897, Jack Bell, the mail carrier was caught when traveling underneath the Riverside avalanche (see p.47) but was able to dig himself out after many hours underneath the snow.

In March 1906, two men traveling from Red Mountain to Ouray had a narrow escape when underneath the East Riverside.

> A narrow escape from death was experienced Wednesday night by W.C. Cates, financial agent of the Telluride Power Company, Clint Buskirk and Dan Gasky, of the Barstow mine. The men left Red Mountain Wednesday afternoon and were obliged to travel nearly the entire distance in a severe storm. The horses upon which they were mounted were compelled to labor in a strenous manner to force their way through many of the drifts. When about six miles from this city they encountered a portion of the Riverside slide which had come down over the road during the afternoon. They reached the slide after eight o'clock last night and they discovered that the slide was frozen so hard that they would be unable to take their horses over it as the slope of the slide was at least forty-five degrees.
>
> The storm was raging behind them and the only tool they had to clear the road was a shovel they had brought with them from Red Mountain to help them in clearing drifts. The men started to work cutting a narrow trail over the six hundred feet of snow which buried the road to a depth of ten to fifteen feet with snow, rocks, and trees. One man would work for a few minutes hacking away the snow, then would

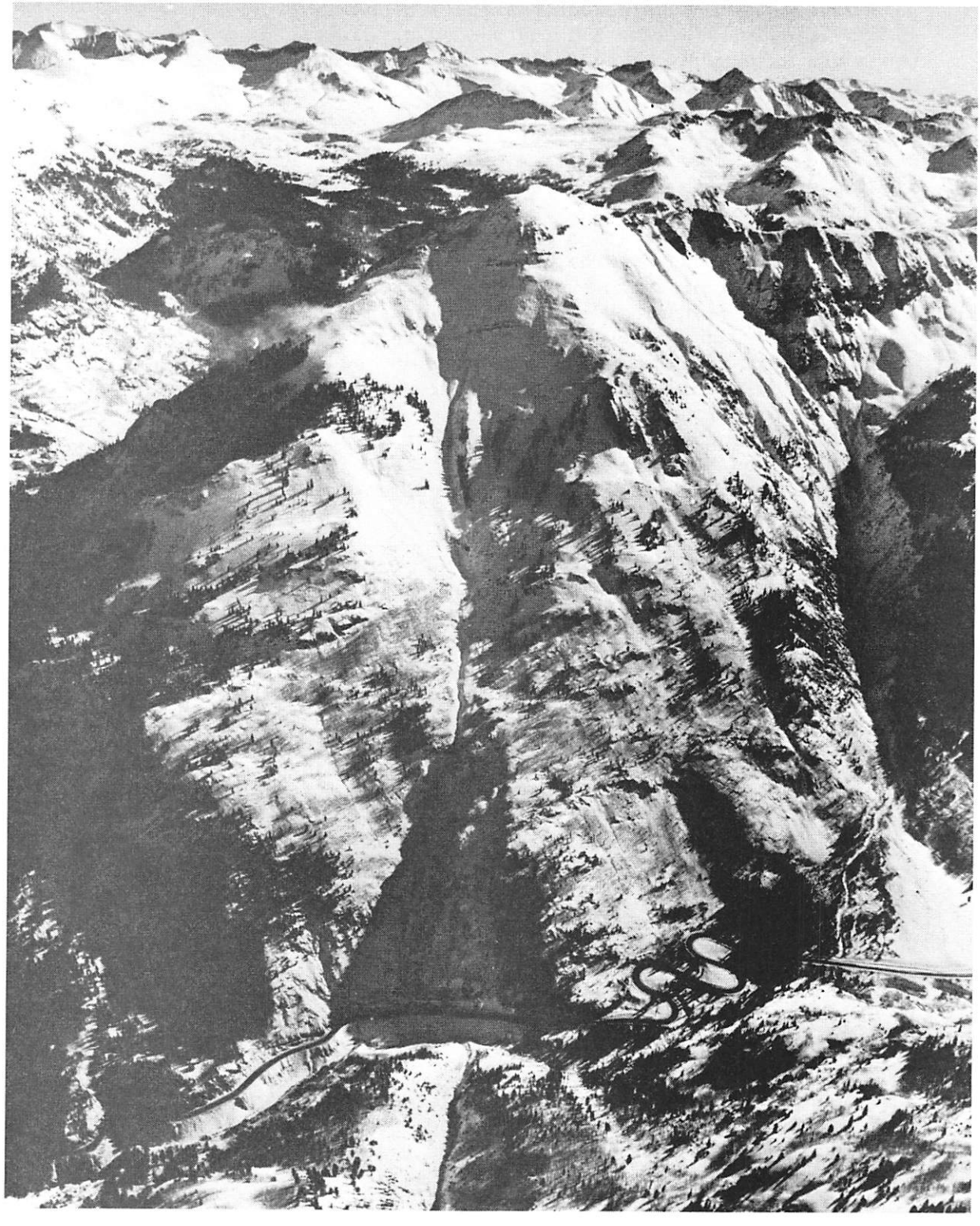

Figure 32. East Riverside avalanche path, U.S. Highway 550. (INSTAAR photo)

be relieved by one of the others. An idea of the work can be had when it is considered that the men had no light to work by, a hard wind was blowing and snow flying. More than two hours were required to cut a narrow trail over the snow which would allow the horses a foothold.

The men had lead the horses over the trail and had started down along the road, when with a crack like a rifle and the sighing sound which always accompanies the starting of a slide, the famous Riverside Slide started from far up on the mountain side, gathering momentum at each foot and starting all the snow in the path of the slide. The men were but a short distance from the slide and could feel the rush of the air caused by the sliding snow which caused the ground upon which they stood to shake. The slide was more than two miles in length and swept down the mountain side and into the canon with the speed of a railroad train and with a force that crushed large trees. It is estimated that at least a hundred feet of snow is piled up in the canon bottom and had the men been caught there would have been no hopes for their rescue until the snow had melted in the spring.

A reporter of The Herald interviewed Mr. Cates yesterday morning and he described his feelings when he heard the snow start and could feel the rush of the air.

'I always had a different idea of a snowslide. I always thought if a man were caught in a slide there was a likelihood that he could dig his way out. I was frightened last night, for while I could see very little I could hear the snow and rocks grinding down that hillside with a force that would squeeze the sap out of a log. My opinion of a slide was that it would come down slowly but I believe that it travels nearly as fast as a body falling through the air. Had we been ten minutes later in getting over the first slide we would undoubtedly now be lying beneath thousands of tons of ice, snow and rocks. No one, unless they have been in a similar position can understand our feelings when we heard the slide start and it is hard to tell of the work we had in getting that narrow trail cut.' Mr. Cates had attempted to get to Silverton but was unable to do so.

Several persons who saw the slide yesterday and today say that the men indeed had a narrow escape from death. It will require considerable work to clear the road. The place where the slide came down is where the famous snow tunnel has been for several years and all prospects now are that there will be another tunnel this year (Ouray Herald, 16 Mar 1906).

In December 1908, Elias Fritz, a miner working at the Treasury Tunnel Mine was killed when he was caught in an avalanche at the Riverside. Fritz

was with two other men riding on a freighting sled from Red Mountain. When they came to the Riverside, they noted a small avalanche that had come down either during the night or that morning and Fritz moved thirty feet ahead of the men and sled and began shoveling a path.

> ...the slide came and swept him, the two lead horses and the dog from the road into the canon and piled the snow 30 to 50 feet on top of them. It seems that the other team and men were protected by a large boulder at the side of the road at that point. The boulder has a tendency to divide the slide and cause it to go over them (Ouray Herald, 16 March 1906).

In February 1909,

> Jesse Cary was taken off the road at Riverside with three burrows by a small slide, but got out of it without much difficulty and without losing a burro (Ouray Herald, 5 February 1909).

The following year, the Riverside released moments before the Red Mountain stage reached that point in the road and the debris was said to be larger than the year before (Ouray Herald, 14 January 1910). Figure 33 shows avalanche debris from the East Riverside during summer, 1920s. Of interest are the two roads, the older one below and the newer road above, completed in 1920 (Ouray Herald, 19 November 1920). Continuous activity but no fatalities or encounters was the pattern until the 1960s. On 3 March 1963, at approximately 4 a.m., the East Riverside released, depositing six feet of snow on the highway. Reverend Marvin Hudson drove from Ouray to Silverton each Sunday to conduct services. On this Sunday, he had received a call from Silverton telling him not to attempt the trip because of the stormy weather and the several avalanches already on the highway. He decided to make the trip anyway and taking two of his daughters, arrived at the Riverside, where the State Highway snow plows had just cleared a one-way track through the debris. He proceeded through the track but could not get traction and jacked up the car to put on a chain. The girls were inside his car. One of the highway crew in his vehicle started up the road to pull Hudson's car back down to safety.

> Suddenly, the air was filled with dense, fine snow, making breathing almost impossible. The East Riverside avalanche had struck again. The air blast pushed J's heavy highway truck back down the road into another truck behind him. When the air cleared the highway and canyon below were filled with snow (Gallagher, 1967, p. 89).

Seven days later, Rev. Hudson's body was found, 280 feet downstream from the last seen point and under 8 feet of snow. Thirteen days later, the car was found with one daughter's body under the right front wheel. The car was 600 feet below the point where it had been swept off the road.

> The top had been completely torn off, and all doors were either open or gone. Miraculously, a glass jar of cream was found unbroken (Gallagher, 1967, p. 90).

Eighty-eight days after the accident, the second daughter was found, her body 20 feet downstream from the site of the car. A complete description of this accident can be found in The snowy torrents: avalanche accidents in the United States 1910-1966 (Gallagher, 1967).

On 19 December 1967, William Griffiths, Verdie Robinson and Everett Birch, supervisors at the Idarado Mining Company, formerly known as the Treasury

Tunnel (Map 7), were driving to their homes in Ouray in a company pickup. The East Riverside released as they drove under it. The pickup was not buried but rode out on top of the avalanche; the windows were broken out and the cab filled with snow. Miners who were following saw the accident and dug the men out of the cab. They were uninjured except for minor scratches (Ealey, 1969, p. 37).

The following is a description of the final East Riverside fatality to date. Following its pattern of releasing more than once in a short period, as seen in the examples above, it claimed the life of Robert Miller, a Colorado Department of Highways employee and father of seven children. On 1 March 1970, the East Riverside deposited 15 feet of avalanche debris on the road. The highway crew was clearing the debris the next day, March 2, when all but Miller returned to Ouray for additional equipment. At 11:56 a.m., the East Riverside released again, burying Miller and the D-7 Caterpiller tractor in which he was working. At 1:30 p.m., the search party found the cat under 7 feet of snow, 300 feet down the canyon. Two days later, Miller's body was found at 4:30 p.m. under 4 feet of snow and 120 feet from the tractor (Williams, 1975, p. 114).

The East Riverside still poses a grave threat to travelers on U.S. Highway 550. Although control work with a 75 mm pack howitzer is often successful, this method cannot be used when visual sighting of the starting zone is obliterated by bad weather or darkness. Four lives would have been saved had the tunnel, proposed in March 1909 (Ouray Herald, 26 February 1909), been approved and built. In 1964, Hans Frutiger, in his survey of avalanches along Colorado mountain highways (Frutiger, 1964), recommended the construction of a tunnel or heavy avalanche shed to protect the highway from both the East and West Riverside avalanches. Had this been done then, Miller's life would not have been lost.

Figure 33. Debris from the East Riverside avalanche in the Uncompahgre Canyon, circa summer 1920s. (From the collection of Marvin and Ruth Gregory)

APPENDIX I

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Red Mountain Review: 1883
LaPlata Miner: 1879-1885
San Juan Herald: 1884-1885
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Denver Post: 10 Feb 1958

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Marvin and Ruth Gregory, Ouray residents for 40 years: 6 April 1976, 30 April 1976, 2 May 1976, 7 Dec 1976.

Ed Lahr, worked 19 years on U.S. Highway 550 until retirement 12 years ago. In his early days (1926), he packed ore and supplies to the mines in San Juan County, Colorado: 10 May 1976.

Frank Murley, Ouray County Sheriff's Department, worked 14 years on U.S. Highway 550, from approximately 1934-1948 and in the late 1960s: 6 April 1976.

Harry Peck, former Camp Bird Mine employee and survivor of the West Waterhole avalanche of 14 February 1958: 10 May 1976.

Noel Peterson, engineer for Colorado Department of Highways, responsible for avalanche control on U.S. Highway 550: September 1976.

Julius Sonza, Ouray resident for most of his 80 years. He has worked at many of the mines in the county: 25 May 1976.

Rick Trujillo, geologist at the Camp Bird Mine: 15 July 1976; 7 Dec 1976.

J. Points, manager of the Camp Bird Mine: 7 Dec 1976.

Howard Williams, Ouray County Commissioner and Camp Bird Mine bookkeeper for 20 years. He is responsible for recording avalanche events on Colorado 361: 18 May 1976; 7 Dec 1976.

Avalanche Event Data

Camp Bird Mine observed avalanche data, 1941-1976, as compiled by the U.S.D.A. Forest Service, Fort Collins, Colorado.

Colorado Department of Highways observed avalanche data, 1951-1976, as compiled by the U.S.D.A. Forest Service, Fort Collins, Colorado.

Colorado Department of Highways observed avalanche data, 1971-1976, Durango, Colorado.

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APPENDIX II

LOCATION OF SITES WHERE AVALANCHE ACTIVITY HAS BEEN OBSERVED, INCLUDING PROPERTY DAMAGED AND PEOPLE CAUGHT, ON USGS 1:24,000 SCALE MAPS*

Map Code

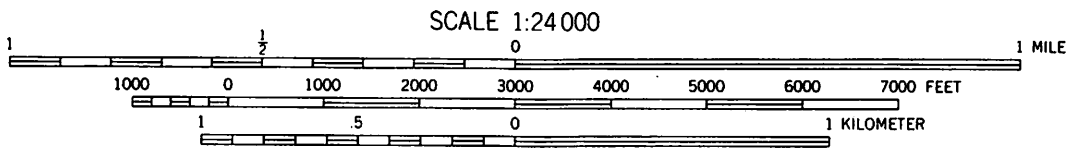
+ property damaged or people caught at this site

□ used in conjunction with the above symbol, indicates a general location. Precise location of site could not be determined

↙ avalanche path where activity has been observed

---- aerial tramway

Map Scale



CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

Road Classification

Medium-duty ——— Light-duty ———

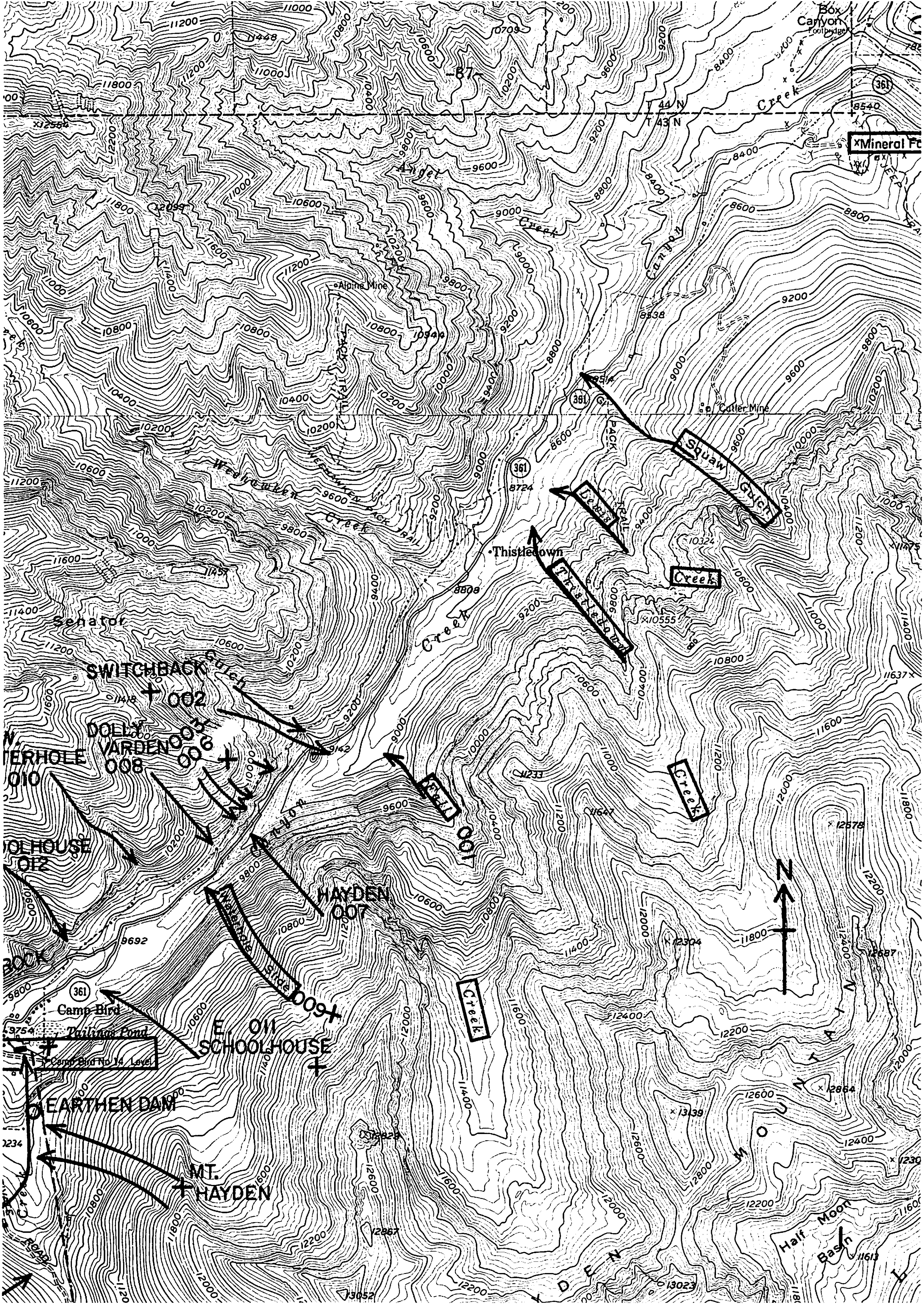
Unimproved dirt ========

U.S. Route ◯ State Route

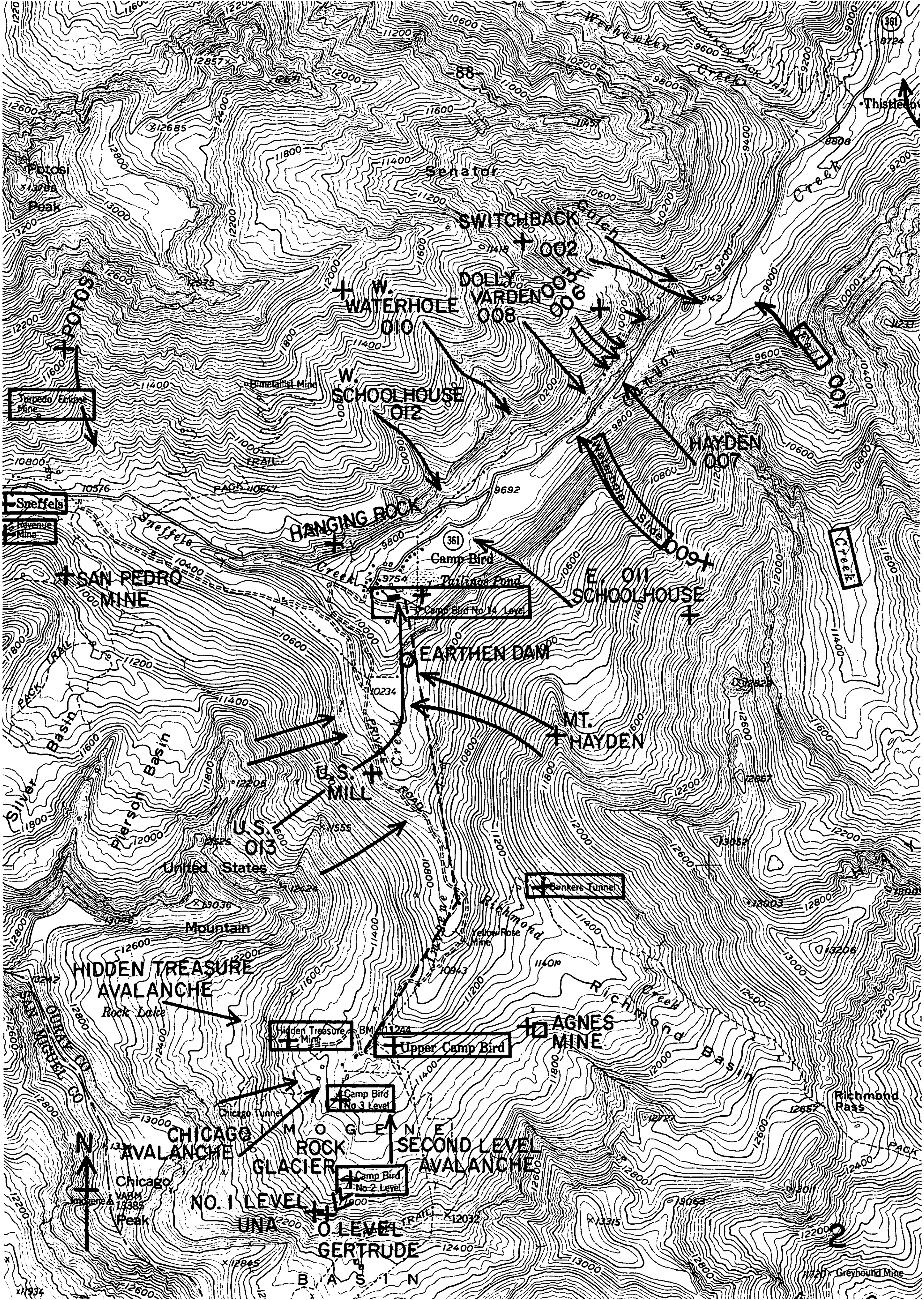
List of USGS 1:24,000 scale quadrangles

Map 1: Ouray and Ironton quadrangles
Map 2: Ironton quadrangle
Map 3: Ironton and Telluride quadrangles
Map 4: Ouray and Ironton quadrangles
Map 5: Ironton quadrangle
Map 6: Ironton quadrangle
Map 7: Ironton quadrangle
Map 8: Ironton quadrangle

*Detailed descriptions, photographs and avalanche path outlines on USGS 1:24,000 scale maps of avalanches affecting U.S. Highway 550 and Colorado 361 are listed in Armstrong and Armstrong, 1977, Avalanche Atlas, Ouray County, Colorado. Institute of Arctic and Alpine Research, University of Colorado, Occasional Paper No. 25.



Box Canyon
Mineral Fo
T 44 N
T 43 N
Angel
Creek
Canyon
Alpine Mine
Cutler Mine
PACK TRAIL
Weehawken
Creek
Squaw Gulch
Lewis
Thistledown
Creek
Thistledown
Senator
Gulch
SWITCHBACK
002
DOLLY VARDEN
008
006
TERHOLE
010
OLHOUSE
012
Canyon
Fall
001
HAYDEN
007
Waterhole Slide
009
Creek
Creek
N
Camp Bird
Pallinas Pond
Camp Bird No 14 Level
E 011
SCHOOLHOUSE
EARTHEN DAM
MT. HAYDEN
MOUNTAIN
Half Moon Basin



SWITCHBACK
002
DOLLY VARDEN
008
005
006
W. WATERHOLE
010
W. SCHOOLHOUSE
012
001
HAYDEN
007
Waterhole Slide
009
HANGING ROCK
SAN PEDRO MINE
POTOSI
Potosi Peak
Senator Gulch
Torpedo Eclipse Mine
Sneffels
Revenue Mine
Sneffels Creek
Camp Bird
Tailings Pond
Camp Bird No 14 Level
E. 011 SCHOOLHOUSE
EARTHEN DAM
MT. HAYDEN
U.S. MILL
U.S. 013
Pierson Basin
Silver Basin
United States Mountain
Bankers Tunnel
Richmond Creek
Richmond Basin
Yellow Rose Mine
HIDDEN TREASURE AVALANCHE
Rock Lake
Hidden Treasure Mine
Upper Camp Bird
AGNES MINE
Chicago Tunnel
Camp Bird No 3 Level
CHICAGO AVALANCHE
IMOGENE
ROCK GLACIER
SECOND LEVEL AVALANCHE
Camp Bird No 2 Level
NO. 1 LEVEL UNA
0 LEVEL GERTRUDE
BASIN
Chicago Peak
Richmond Pass
Greyhound Mine
Thistledown
Weehawken Creek
SAN MIGUEL CO
OURAY CO
N
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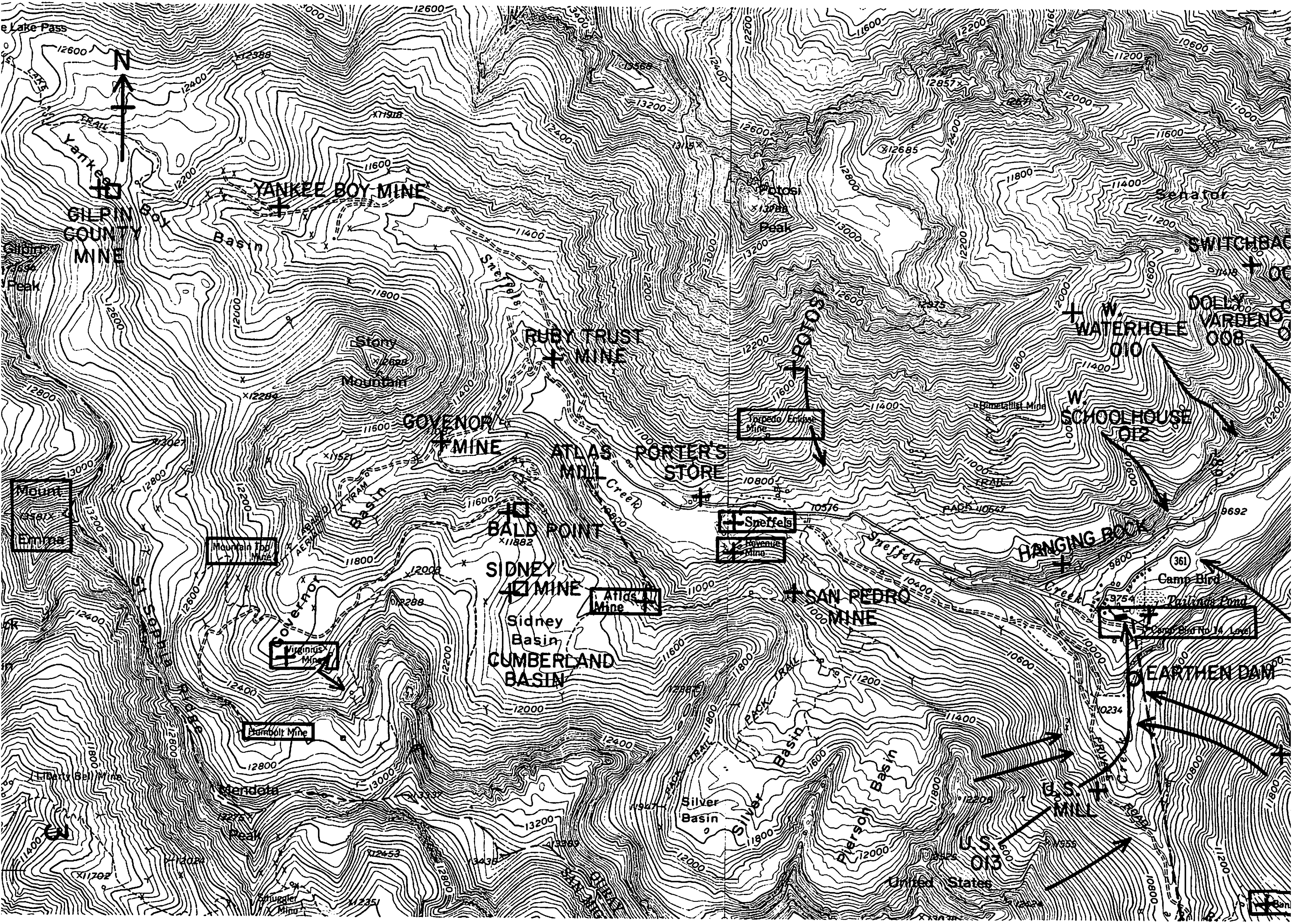
N
GILPIN COUNTY MINE
YANKEE BOY MINE
Yankee Boy Basin
Stony Mountain
RUBY TRUST MINE
GOVENOR MINE
ATLAS MILL
PORTER'S STORE
BALD POINT
SIDNEY MINE
Sidney Basin
CUMBERLAND BASIN
Atlas Mine
Mountain Top Mine
Virginius Mine
Governor Basin
Humbolt Mine
Mount Emma
St Sophia Ridge
Mendota Peak
Liberty Bell Mine
Potosi Peak
POTOSI
Torpedo Eclipse Mine
Sneffels
Revenue Mine
SAN PEDRO MINE
Sneffels Creek
Silver Basin
Pierson Basin
W. WATERHOLE 010
DOLLY VARDEN 008
SWITCHBAC
Senator
W. SCHOOLHOUSE 012
HANGING ROCK
Camp Bird
Tailings Pond
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U.S. MILL
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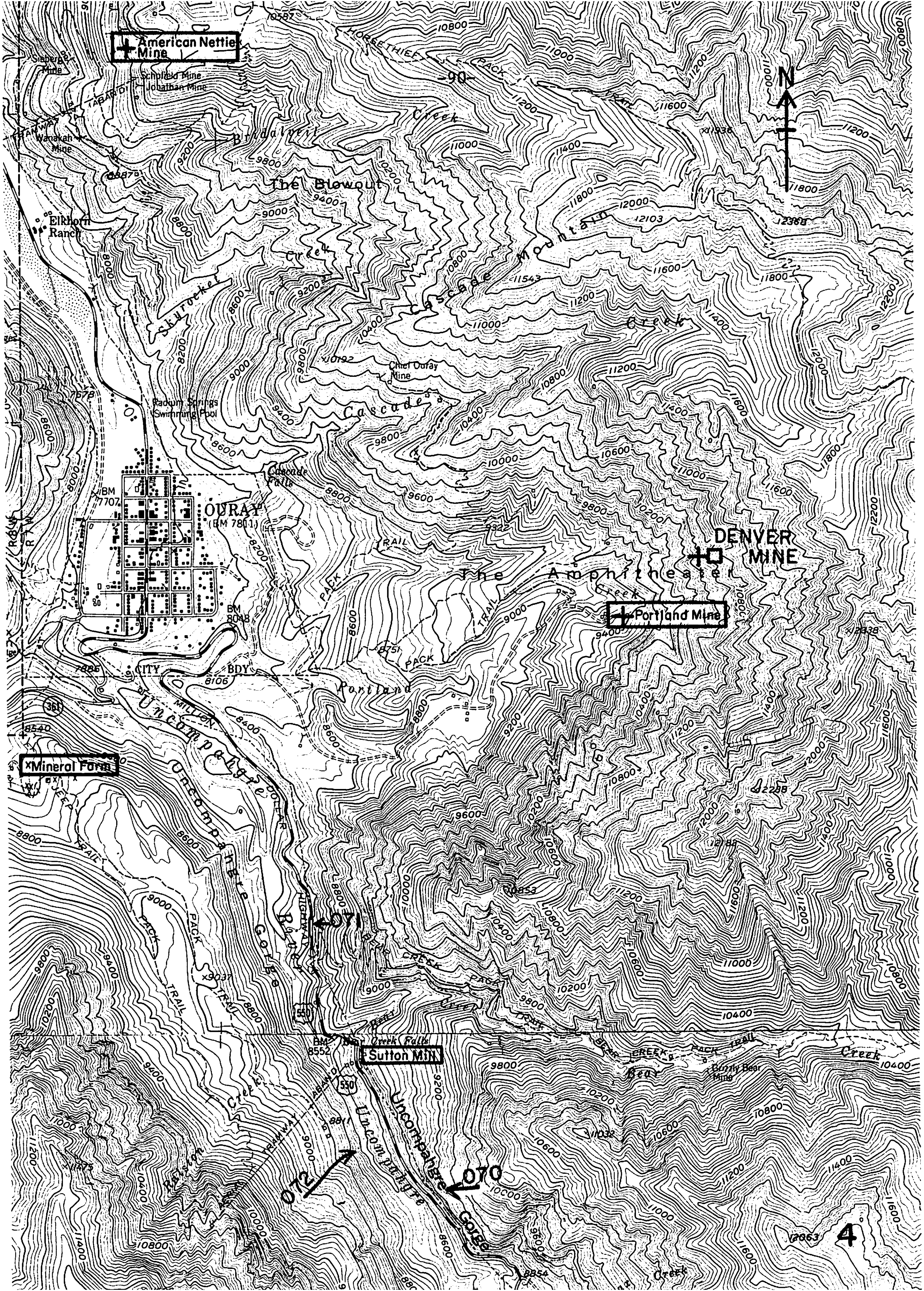
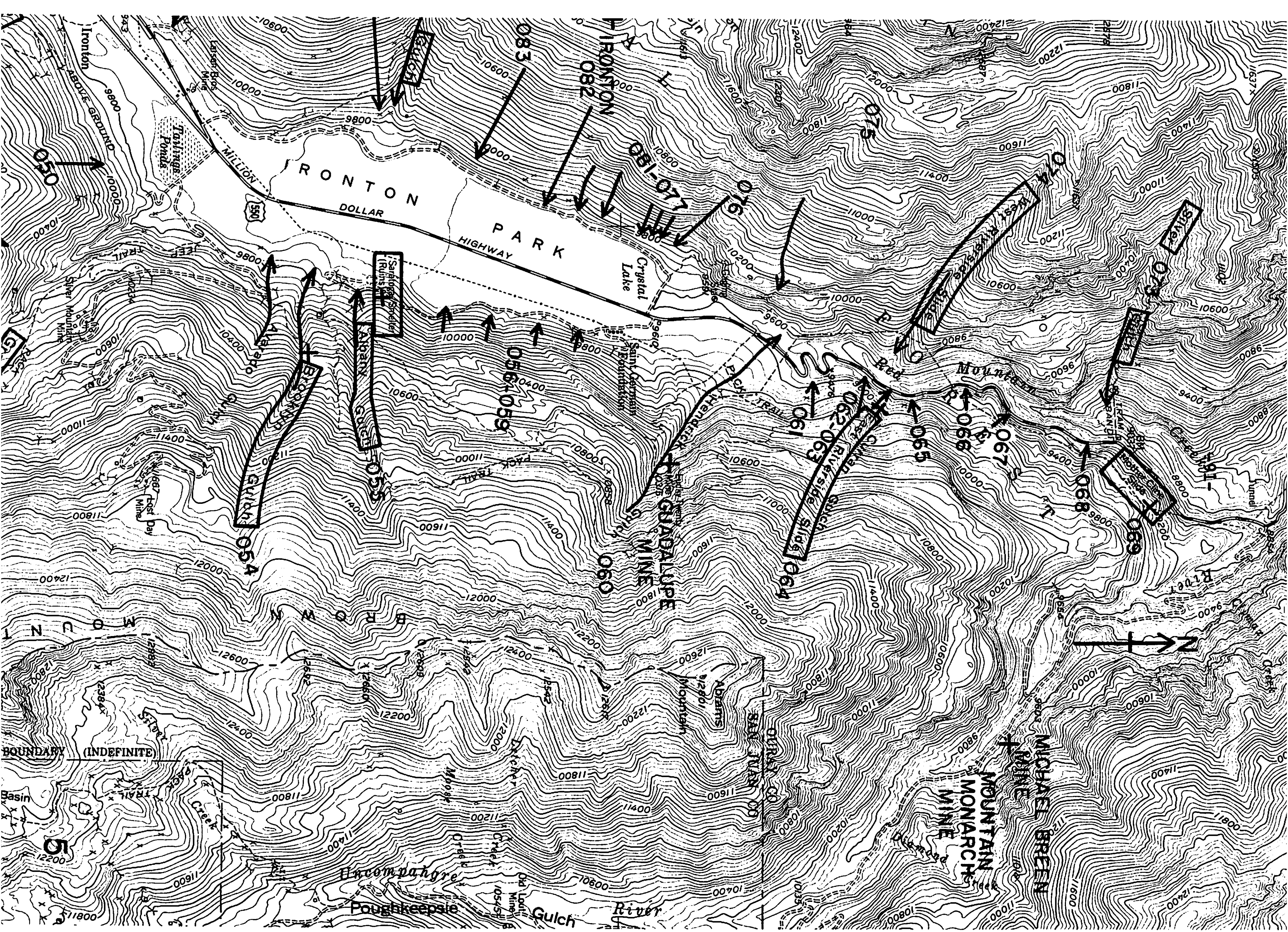
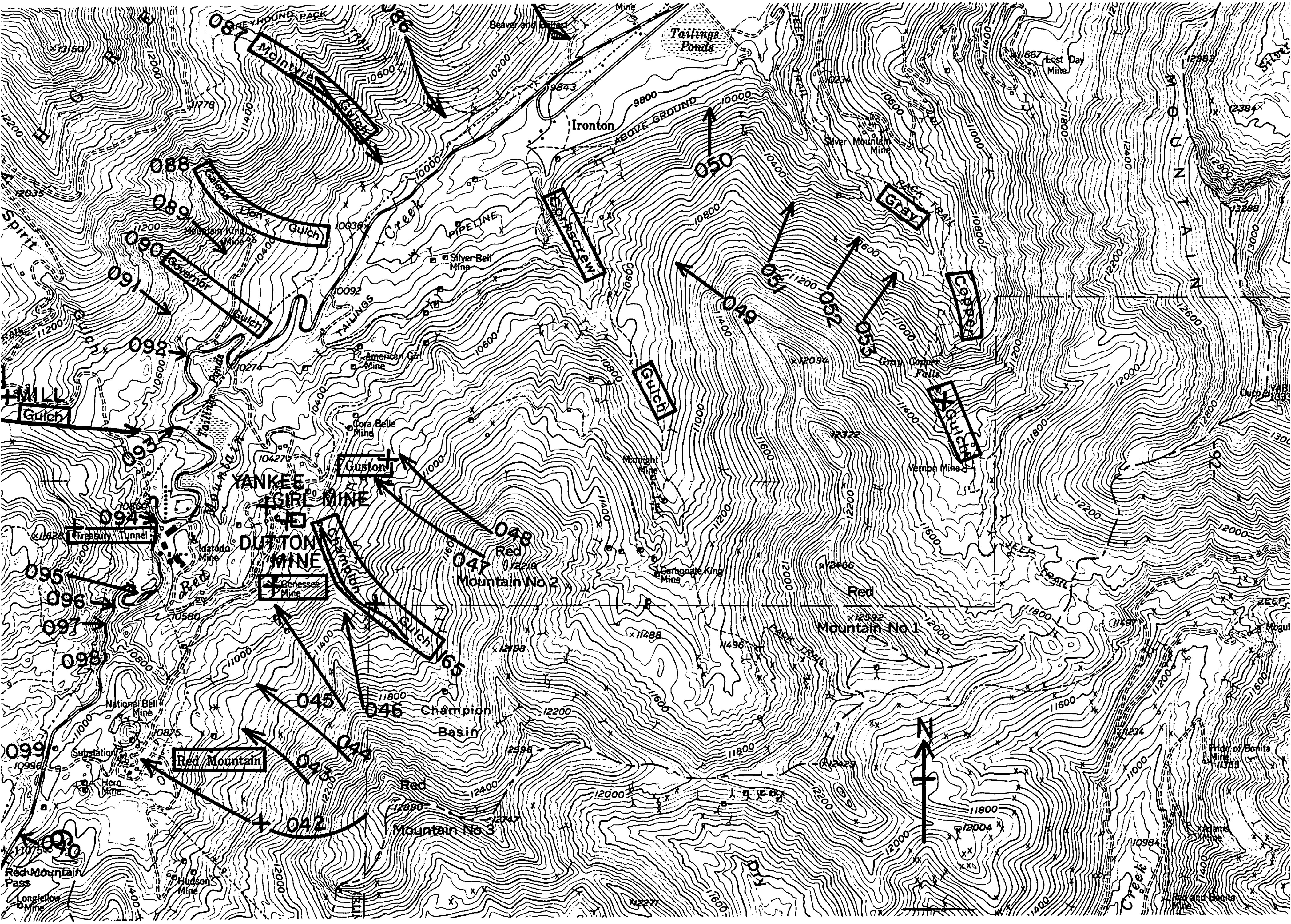
Smuggler Mine

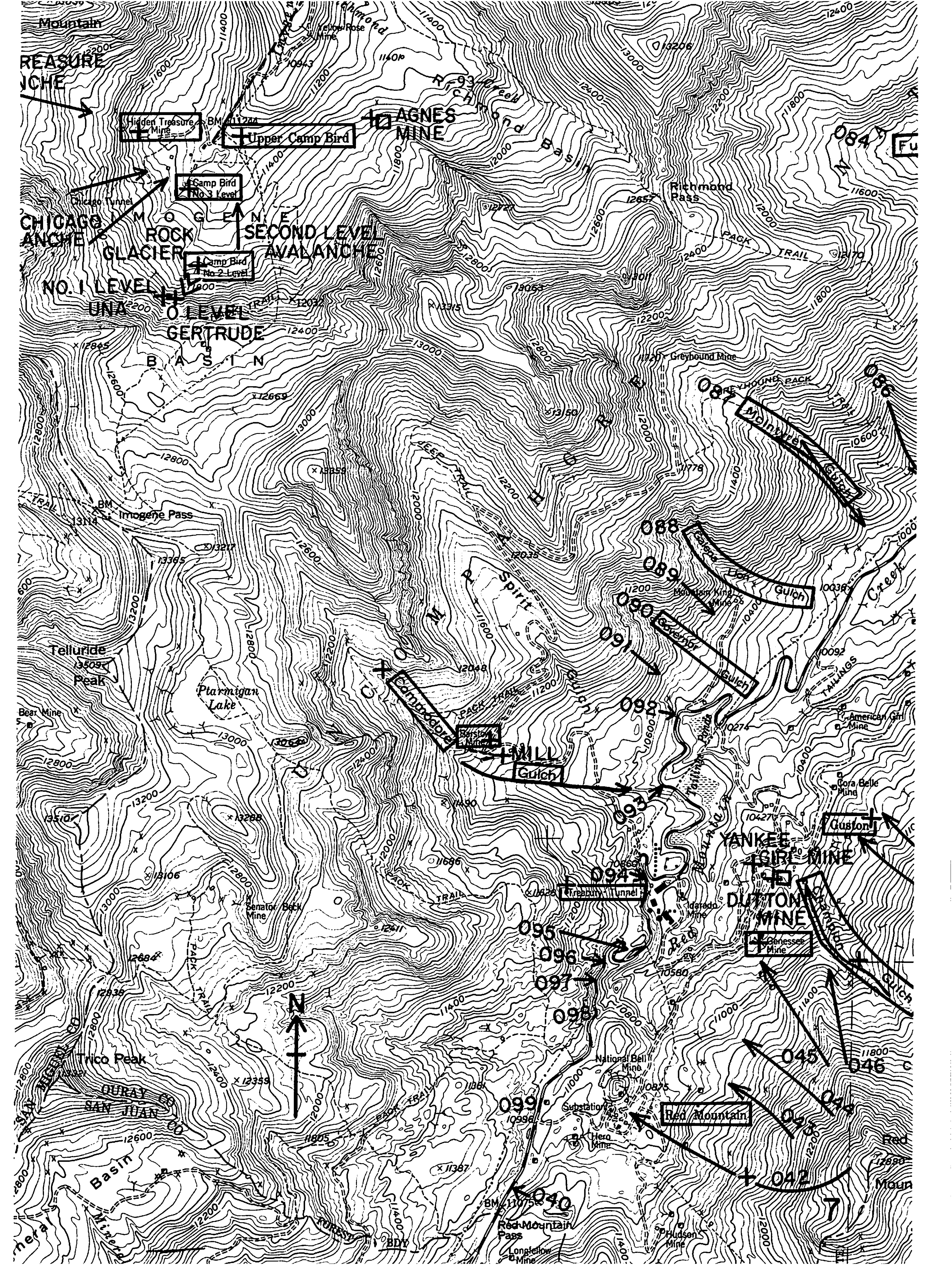
 American Nettie Mine
Sieberg Mine
Schofield Mine
Jonathan Mine
Wanakah Mine
Bridalveil Creek
Horsethief Pack Trail
The Blowout
Elkhorn Ranch
Skyrocket Creek
Cascade Mountain
Cascade Creek
Chief Ouray Mine
Radium Springs Swimming Pool
Cascade Falls
OURAY
(BM 7811)
BM 7707
BM 8048
DENVER MINE
The Amphitheater
Portland Mine
Portland Creek
City Bdy
Mineral Farm
Uncompahgre River
Million Dollar Highway
Uncompahgre Gorge
071
550
Bear Creek Falls
BM 8552
Sutton Mn
Bear Creek Pack Trail
Grizzly Bear Mine
072
070
Pack Trail
Canyon Creek
N
4



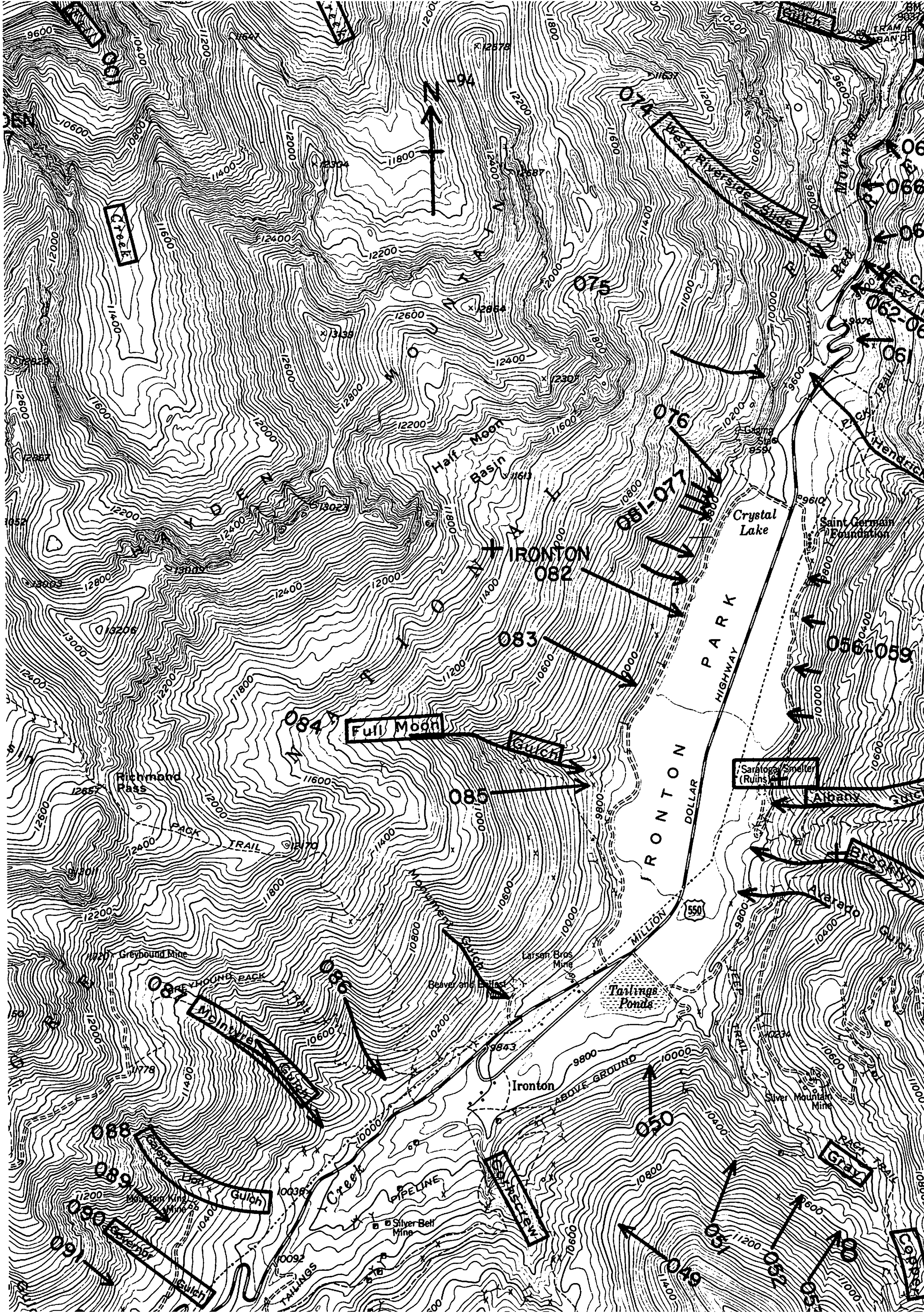
IRONTON PARK
MILLION DOLLAR HIGHWAY
550
Crystal Lake
Ironton
Tailings Ponds
Red Mountain Creek
GUADALUPE MINE
MICHAEL BREEN MINE
MOUNTAIN MONARCH MINE
Brooklyn Gulch
Albany Gulch
Riverside Slide
West Riverside Slide
BROWN MOUNTAIN
BOUNDARY (INDEFINITE)
OURAY CO
SAN JUAN CO
Uncompahgre River
Poughkeepsie Gulch
Abrams Mountain
050
054
055
056-059
060
061
062-063
064
065
066
067
068
069
073
074
075
076
077-081
082
IRONTON
083
N



YANKEE GIRL MINE
DUTTON MINE
Guston
Genessee Mine
Treasury Tunnel
Idarado Mine
Red Mountain
Red Mountain Pass
Champion Basin
Red Mountain No 1
Red Mountain No 2
Red Mountain No 3
Ironton
Tailings Ponds
Silver Mountain Mine
Silver Bell Mine
American Girl Mine
Cora Belle Mine
Midnight Mine
Carbonate King Mine
Vernon Mine
Gray Copper Falls
Mountain King Mine
National Bell Mine
Hudson Mine
Longfellow Mine
Hero Mine
Substation
Lost Day Mine
Beaver and Belfast
Pride of Bonita Mine
Adams Mine
Mcintyre Gulch
Galena Lion Gulch
Governor Gulch
Corkscrew
Gulch
Gray
Copper
X Gulch
MILL
042
043
044
045
046
047
048
049
050
051
052
053
065
088
089
090
091
092
093
094
095
096
097
098
099



TREASURE
Hidden Treasure Mine
Upper Camp Bird
AGNES MINE
Chicago Tunnel
Camp Bird No 3 Level
CHICAGO
ROCK GLACIER
SECOND LEVEL AVALANCHE
Camp Bird No 2 Level
NO. I LEVEL
UNA
0 LEVEL
GERTRUDE
BASIN
IMOGENE
Richmond Pass
Richmond Basin
Greyhound Mine
McIntyre Gulch
Imogene Pass
Telluride Peak
Ptarmigan Lake
Bear Mine
Commodore
Barstow Mine
MILL
Gulch
Mountain King Mine
Governor Gulch
Spirit Gulch
Creek
TAILINGS
American Girl Mine
Cora Belle Mine
Guston
YANKEE GIRL MINE
DUTTON MINE
Treasury Tunnel
Idarado Mine
Genessee Mine
Senator Beck Mine
Trico Peak
OURAY CO
SAN JUAN CO
National Bell Mine
Substation
Hero Mine
Red Mountain
Red Mountain Pass
Hudson Mine
Longfellow Mine
Basin
N


N
074
West Riverside Slide
066
061
075
076
081-077
IRONTON
082
083
084
Full Moon Gulch
085
Half Moon Basin
Crystal Lake
Saint Germain Foundation
056-059
IRONTON PARK
MILLION DOLLAR HIGHWAY
550
Saratoga Smelter (Ruins)
Albany Gulch
Brooklyn
Alvarado Gulch
Richmond Pass
PACK TRAIL
Greyhound Mine
GREYHOUND PACK TRAIL
McIntyre Gulch
086
088
089
090
091
Lion Gulch
Mountain King Mine
Corkscrew
Silver Bell Mine
PIPELINE
Creek
TAILINGS
Larsen Bros Mine
Beaver and Belfast
Tailings Ponds
Ironton
ABOVE GROUND
050
049
051
052
Gray
Copper
Silver Mountain Mine
Gaging Station
Hendrick

APPENDIX III

TABLES 10 AND 11

TABLE 10

CHRONOLOGICAL COMPILATION OF AVALANCHES INVOLVING PEOPLE, ANIMALS AND PROPERTY*

1877 - 1976

Date and Source †	People Buried			Animals Buried		Property Damaged	Location	Map Number
	Dead	Injured	Uninjur.	Dead	Survived			
1877-1878								
9 Feb Ouray Times			1				Lotzenheiser's mining camp	‡
			3				Trail between Millionaire mine and U.S. Deposit mine	2 ‡
23 Feb Ouray Times						Cabin destroyed	American Flag mine	6 ‡
(first week of March) LaPlata Miner 30 Dec 1882	2						Gray Copper Falls Tunnel	5
1878-1879								
1 Mar Ouray Times	1	9					Geneva Gulch	‡
			2				Bonanza tunnel, Hayden Mt.	1 ‡
1879-1880	- - - No incidents reported - - -							
1880-1881	- - - No incidents reported - - -							
1881-1882	- - - No incidents reported - - -							
1882-1883								
2 Feb Solid Muldoon						Porter's store and Post Office	Mt. Sneffels	3
	1	1		8 mules	5 mules		Genessee mine	6
3 Feb LaPlata Miner			1				Just north of Yankee Girl mine	6
1883-1884								
28 Dec Solid Muldoon		3		1 cat		San Jose cabin swept away	Brooklyn Gulch	5
			3			Cabin buried	No location given	
	2					Cabin buried	Gold Bug mine	‡
						Shaft house moved	Revenue mine	3
						Ore and provision house destroyed	Sidney mine	3
						Cabin buried	Shamrock mine	‡
			2			Cabin buried	Governor mine	3
	4		8			Boarding house destroyed	Virginius mine	3
			32				Cumberland Basin	3
			2			Cabin buried	No location given	
29 Dec Red Mountain Review		4					East side of Ironton Park	5
8 Feb Solid Muldoon		1					Northwest slope of Mt. Hardin	‡
15 Feb Solid Muldoon			6				Slide opposite Porter's store, Mt. Sneffels	3
22 Feb Solid Muldoon						All buildings destroyed	Neptune mine	3 ‡
11 April Solid Muldoon		1					Uncle Sam mine	‡
1884-1885								
26 Mar San Juan Herald						Boarding house slightly damaged	Genessee mine	6
1885-1886								
1 Jan Solid Muldoon	1						Royal Albert Gulch	‡
22 Jan Solid Muldoon	3	1	2			Boarding house destroyed	Ruby-Trust mine	3
						Porter's cabin damaged	Mt. Sneffels	3
						Richardson cabins destroy.	Mt. Sneffels	3 ‡
						Bunk portion of building destroyed	Gilpin County mine	3 ‡
	4		5			All buildings destroyed	Dutton mine	6
	1						Genessee mine	6
29 Jan Solid Muldoon		1					Mt. Sneffels	3
5 Feb Solid Muldoon			2			2 cabins swept away	Silveride Basin	‡
1886-1887								
28 Jan Solid Muldoon						All buildings swept away	Agnes mine	2

*Only incidents which caused burial of people or animals, or burial or damage to property are listed in this table. All observed avalanche events which could be located geographically are listed in Table 11.

†Occurrences listed were reported in the newspapers or interviews, as noted. Actual event dates are listed when available in parentheses. When no actual event date is listed, it is assumed the event occurred during the week preceeding the newspaper date.

‡Not mapped, exact location unknown.

Date and Source	People Buried: Dead	Injured	Uninjur.	Animals Buried: Dead	Survived	Property Damaged	Location	Map Number
1886-1887								
25 Feb Solid Muldoon			1		1 horse		Near Quartzite Point	4
1887-1888								
6 Jan Solid Muldoon					Pack train		Near Sidney mine	3
16 Mar Solid Muldoon			1		Burros		Near U.S. Depository	2
1888-1889								
18 Jan Solid Muldoon						Cabin buried	Guadalupe mine	5
1889-1890	- - - No incidents reported - - -							
1890-1891								
6 Feb Solid Muldoon						Buildings damaged	Mickey Breen mine	5
	4						Cumberland Basin	3
20 Feb Solid Muldoon						Portion of assay office and boarding house swept away	Yankee Boy mine	3
28 Feb Silverton Standard	2		1			Cabin damaged	Saratoga mine	5
27 Feb Solid Muldoon	1	1				Cabin destroyed	Big Elephant mine	4
6 Mar Solid Muldoon						All buildings swept away	Bonnybell mine	6,4
20 Mar Solid Muldoon						Slide struck horses of Red Mountain stage	Riverside slide	5
						Building slightly damaged	Yankee Boy mill	3
21 Mar Silverton Standard			1				One mile from Uncompaghre Bridge, Red Mountain road	4,4
1891-1892								
1 Jan Solid Muldoon				1 burro	7 burros		No location given	
15 Jan Solid Muldoon			1				Brown Mountain	5,4
1892-1893	- - - No Ouray County newspapers available - - -							
11 Feb Silverton Standard	4	3		4	six-horse teams		Switchback	1
1893-1894	- - - No Ouray County newspapers available - - -							
1894-1895								
24 Jan Ouray Herald	1						Michey Breen mine	5
16 Feb Silverton Standard						Slide crossed main street, damaged one house	Red Mountain Town	6
21 Feb Ouray Herald			1		2 horses		Mother Cline slide	5
1895-1896	- - - No incidents reported - - -							
1896-1897								
5 Nov Ouray Herald		1					Near U.S. mine	2
14 Jan Ouray Herald	1		2				100 yards from Virginius mine	3
4 Feb Ouray Herald					6 horses		Imogene Basin road	2
18 Feb Ouray Herald						Mill and boarding house damaged	U.S. mill	2
		1				Water trough swept away	Sneffels road near Revenue Tunnel	3,4 3
						Ore house destroyed	Commodore Foote mine	7,4
25 Feb Ouray Herald			1				Near Woodcock's cabin	4
		1					Riverside slide	5
		1	2			Cabin destroyed	Camp Bird mine Imogene Basin	2
4 Mar Ouray Herald (27 Feb)		1		1 mule		Snow shed swept away	Revenue Tunnel	3
25 Mar			1	2 horses			Bear Creek trail	4
1897-1898	- - - No incidents reported - - -							
1898-1899	- - - No incidents reported - - -							
1899-1900								
21 Dec Ouray Herald	1		1				75 feet from Silver Queen mine, 100 feet north of Silver Queen Gulch, Bear Creek trail	4,4
22 Feb Ouray Herald		1					Same as above, between Silver Queen mine and bunkhouse	4,4
12 April Ouray Herald	1		1			Shed destroyed	Camp Bird mine, upper workings, Imogene Basin	2
1900-1901								
17 Jan Ouray Herald	1						U.S. slide	2
21 Feb Ouray Herald	1						Between American Nettie mine bunkhouse and boarding house	4
1901-1902								
30 Jan Ouray Hearld (27 Jan)	1		1				Upper Yankee Boy Basin, southwest slope of Emma Mt.	3

Date and Source	People Buried: Dead	Injured	Uninjur.	Animals Buried: Dead	Survived	Property Damaged	Location	Map Number
1901-1902								
8 Mar Ouray Herald (1 Mar)	1	1	3			Ore bins swept away, tram house and compressor buildings severely damaged	Camp Bird mine, entrance to 2,000 foot tunnel, Imogene Basin	2
(7 Mar)						Snowsheds, tank house and boiler and compressor building swept away	Governor mine	3
						Telephone line taken out	Silver Link mine	5‡
(3 Mar)			1				Near Piedmont water tank, Sneffles district	3‡
14 Mar Ouray Herald (28 Feb)	1						Commodore Gulch	7
1902-1903								
12 Dec Ouray Herald (9 Dec)		1	1				Corkscrew Gulch, enroute to Earl mine	6
7 Feb Silverton Standard	1		1				Sneffels district	3
1902-1903								
3 April Ouray Herald (1 April)						Compressor house and blacksmith shop destroyed, boiler moved 20 feet from its foundation	Governor mine	3
(1 April)						First slide: oil house destroyed	Revenue Tunnel	3
						Second slide: snowsheds and track between mill and Wheel of Fortune portal swept away		
						Third slide: buried tunnel, depth of 15 feet		
(1 April)			1	1 horse			Zigzag slide, Sneffels road	3‡
10 April Ouray Herald (1 April)			2			Bunk and boarding houses swept away, mill badly damaged	Trust Ruby mine	3
1903-1904	- - - No incidents reported - - -							
1904-1905								
17 Feb Ouray Herald (11 Feb)				mules			Bankers National mine slide	2
7 Mar Ouray Herald	2	2	7			Cookhouse and bunkhouse destroyed, compressor house moved off its foundation	Bankers National mine slide	2
24 Mar Ouray Herald (22 Mar)			2			Blacksmith shop and mouth of tunnel buried	Denver mine	4
7 April Ouray Herald (3 April)						Telephone lines and wagon-load of ore swept away	Potosi slide	3
28 April Ouray Herald (26 April)			2				Barstow mine	7
1905-1906								
19 Jan Ouray Herald		(partially)	1	1 horse	1 horse	Sled	Mother Cline slide	5
						Bridge twisted	Steel bridge, Sneffels road	3‡
2 Mar Ouray Herald			1				West slope, Mt. Hayden	1
9 Mar Ouray Herald (7 Mar)				1 horse	5 horses	Horses & sled buried	Red Mountain road	7‡
23 Mar Ouray Herald (17 Mar)	1	1	8		1 dog	Mill, reading room and portion of one boarding house destroyed, seven piers of tramway swept away	Camp Bird mill, Canyon Creek	2
(16 Mar)						Bridge torn out of place	Steel bridge, Sneffels road	3‡
(18 Mar)						Dump buried	Barstow mine	7
						Portion of mill, assay office and blacksmith shop slightly damaged	Governor mine	3
30 Mar (24 Mar)						Telephone lines swept away	Genessee mine	6
1906-1907								
23 Nov Ouray Herald						Dump covered	San Pedro mine	3
1907-1908	- - - No incidents reported - - -							
1908-1909								
11 Dec Ouray Herald (6 Dec)	1		2	2 horses, 1 dog			Riverside slide	5

Date and Source	People Buried: Dead	Injured	Uninjur.	Animals Buried: Dead	Survived	Property Damaged	Location	Map Number
1908-1909								
18 Dec Ouray Herald						Snowsheds swept away	Atlas mine	3
(15 Dec)			1			Sled overturned	Yankee Girl slide	6
			1				Michey Breen mill, slide from Mt. Abrams	5
1 Jan Ouray Herald			2			Cabin moved from its foundation; second slide: closed mouth of tunnel	Uncle Sam mine	‡
29 Jan Ouray Herald (22 Jan)	4	1	5	26 head of stock 1 horse			Waterhole slide	2
		1		team of sixes			Slide from Mt. Potosi	3
5 Feb Ouray Herald (30 Jan)			1	3 burros			Riverside slide	5
19 Feb Ouray Herald (13 Feb)						Snowsheds slightly damaged	Revenue Tunnel	3
			1			Lost one ski in slide	Enroute from Brookfield mine, one mile from Ouray	‡
1909-1910								
12 Nov Ouray Herald (9 Nov)			1				Above Camp Bird Mine, Imogene Basin	2
14 Jan Ouray Herald						One house swept away, one house damaged	Red Mountain Town	6
						Several buildings swept away	Genessee mine	6
11 Mar Ouray Herald						Power line taken out	Revenue Tunnel	3
1910-1911	- - - No incidents reported - - -							
1911-1912								
8 Mar Ouray Herald (7 Mar)						Moved boiler from its foundation	Atlas mine slide	3
(6 Mar)						Boarding house slightly damaged	Camp Bird Mine, Imogene Basin	2
1911-1912								
8 Mar Ouray Herald				1 horse		Stable destroyed, two tram towers damaged, slight damage to mill and office, snowsheds at lower tunnel destroyed	Barstow mine	7
			1				Guston (Yankee Girl) slide	6
15 Mar Ouray Herald						Living quarters destroyed	Revenue Tunnel Power House No. 3, just north of switch-back, Sneffels road	1†
(12 Mar)						Stone "high tower" of Camp Bird tramway	Mt. Hayden slide	2
						Boarding house destroyed	Guadalupe mine	5
						Roof ripped off boarding house	Michey Breen mine	5
1912-1913								
21 Mar Ouray Herald (18 Mar)						Telephone poles swept away	Waterhole slide	2
1913-1914								
5 Dec Ouray Herald (28 Nov)				6 burros			Near Mountain Top mine on ZigZag trail: 2 slides	3†
	- - - No Ouray Herald newspapers available after 25 Dec 1913 - - -							
1914-1915	- - - No Ouray County newspapers available - - -							
1915-1916								
7 Jan Ouray Herald						Struck trestlework which several hours later collapsed, killing motorman	Chicago slide, Camp Bird mine, Imogene Basin	2
1916-1917								
30 Dec Silverton Standard	1	1	9				Yankee Girl slide	6
1917-1918	- - - No incidents reported - - -							
1918-1919								
13 Feb Ouray Herald (11 Feb)						Snowshed swept away, transformer house slightly damaged	Barstow mine	7
28 Feb Ouray Herald (22 Feb)			1			Portion of boarding house swept away	Guadalupe mine	5
1919-1920								
11 Mar Ouray Herald	1						Camp Bird mill roof	2

Date and Source	People Buried: Dead	Injured	Uninjur.	Animals Buried: Dead	Survived	Property Damaged	Location	Map Number
1919-1920								
18 Mar Ouray Herald						Twelve telephone poles swept away	Guadalupe mine slide	5
1920-1921								
30 Dec Ouray Herald						All building materials swept away	Hidden Treasure mine	2
1921-1922	- - - No Ouray County newspapers available for November, December and January - - - no incidents reported for remainder of winter							
1922-1923	- - - No Ouray County newspapers available - - -							
1923-1924	- - - No Ouray County newspapers for November or December available - - - no incidents reported for remainder of winter - - -							
1924-1925	- - - No incidents reported - - -							
1925-1926	- - - No incidents reported - - -							
1926-1927								
18 Feb Ouray Herald				2 horses			Switchback slide, Sneffels road	1
1927-1928	- - - No incidents reported - - -							
1928-1929	- - - No incidents reported - - -							
1929-1930	- - - No incidents reported - - -							
1930-1931	- - - No incidents reported - - -							
1931-1932								
13 Feb Silverton Standard			3				Camp Bird area	2
19 Feb Ouray Herald						Mine entrance covered	Hi-Way mine	‡
						Powder house buried	Mickey Breen mine	5
1932-1933								
16 Dec Ouray Herald			2			Highway department truck with two men inside partially buried	Willow Swamp slide	7
27 Jan Ouray Herald	1						Near cabin at Treasury Tunnel	7
1933-1934	- - - No incidents reported - - -							
1934-1935								
30 Nov Ouray Herald				1 horse	1 horse		High bridge on trail between Atlas and Mountain Top mines	3‡
21 April Ealey			3			Pick-up truck buried	Mother Cline slide	5
1935-1936								
22 Nov Ouray Herald				1 mule			Banner tunnel, short distance from high bridge	3‡
21 Feb Ouray Herald			3	4-horse team and 20-mule pack train			Neighbor White slide	1
						30 feet of main tunnel sheds and telephone line swept away	Revenue mine	3
						Two power poles swept away	Elephant Slide	‡
						Telephone lines swept away	Swede Pete slide	1
						500 feet of telephone line swept away	Schoolhouse slide	1
28 Feb Ouray Herald			3				Slip at Waterhole slide	2
	3	2	3			Mill, pumphouse, blacksmith shop and part of bunkhouse destroyed	Camp Bird mine, Imogene Basin	2
1936-1937	- - - No incidents reported - - -							
1937-1938	- - - No incidents reported - - -							
1938-1939	- - - No incidents reported - - -							
1939-1940	- - - No incidents reported - - -							
POST 1940:								
1943-1944								
17 Mar Ouray Herald						Power lines swept away	Chicago slide above Camp Bird mine, Imogene Basin	2
						First slide: new snow-sheds swept away; second slide: old snow-sheds swept away	Revenue mine	3
1949-1950 Ealey			1			Tractor buried	Blue Point slide	7
1950-1951								
April Ealey			1			Tractor buried	Blue Point slide	7
1951-1952 (30 Dec) CHD §						One vehicle caught	East Riverside slide	5

Date and Source†	People caught: Dead	People caught: Injured	People caught: Uninjur.	Animals Buried: Dead	Animals Buried: Survived	Property Damaged	Location	Map† Number
1956-1957								
(27 Jan) CHD §			3			One vehicle caught	Barstow slide, Commodore Gulch	7
1957-1958								
(14 Feb) CB [11] H. Peck and M. Gregory Ouray Herald	1		1				West Waterhole slide	2
	3		1			Two caterpiller tractors buried and telephone and power lines swept away	E. Schoolhouse slide	1
(14 Feb) M. Gregory and H. Frutiger						Power poles next to highway destroyed	Ironton (Half-Moon) slide	8
1958-1959								
(9 Feb) CHD						One vehicle caught	Blue Point slide	7
1962-1963								
(3 Mar) CHD and D. Gallagher	3					One vehicle destroyed	East Riverside slide	5
1967-1968								
(19 Dec) CHD and Ealey			3 caught, 1 buried			One vehicle caught and damaged	East Riverside slide	5
1969-1970								
(2 Mar) CHD and K. Williams	1					One vehicle damaged	East Riverside slide	5
(26 April) CHD			1			One vehicle damaged	Mother Cline slide	5
1972-1973								
(30 April) CB						One vehicle damaged	Swede Pete slide	1
1973-1974								
(18 Dec) SJAP #			1 caught			Two vehicles caught, one damaged	Mother Cline slide	5
(9 Jan) CB						Flume damaged at Camp Bird Mine, Canyon Creek	U.S. slide	2
1974-1975								
(25 April) SJAP		1	2 caught, 1 buried			One vehicle caught, three times, severly damaged by the third slide	Mother Cline slide ran four times in two hours	5

*Only incidents which caused burial of people or animals or burial or damage to property are listed in this table. All observed avalanche events which could be located geographically are listed in Table 11.

+Occurrences listed were reported in the newspapers or were learned of in interviews, as noted. Actual event dates are listed when available in parentheses. When no actual event date is listed, it is assumed the event occurred during the week preceeding the newspaper date.

‡Not mapped, exact location unknown.

§Colorado Highway Department data, as compiled by the United States Forest Service, Fort Collins, Colorado.

[11]Data from Camp Bird Mine observers, as compiled by the U.S. Forest Service, Fort Collins, Colorado.

#Data compiled by the San Juan Avalanche Project, INSTAAR, University of Colorado, Silverton, Colorado.

TABLE 11

OBSERVED AVALANCHES BY GEOGRAPHIC LOCATION, 1877 - 1976

Site	Date and Source*	Comments†	Map Number
OURAY AREA			
American Nettie mine	21 Feb 1901 Ouray Herald		4
Denver mine	24 Mar 1905 Ouray Herald		4
Portland mine	7 April 1905 Ouray Herald		4
OURAY TO CAMP BIRD, JUNCTION OF CANYON AND SNEFFLES CREEKS			
Squaw Gulch 016§	14 Feb 1958 H. Williams, M. Gregory 7 Mar 1961 CB	rr	1
Fall Creek 001	14 Mar 1944 CB		1
	2 Jan 1952 CB		
	25 Jan 1956 CB		
	9 Jan 1957 CB		
	14 Feb 1958 H. Williams	rr	
Senator Gulch	4 Mar 1961 CB		2
Switchback slide 002 (Lower Waterhole)	11 Feb 1893 Silverton Standard	7 men and 4 6-horse teams caught, 4 men killed, 3 survived	1
	15 Jan 1909 Ouray Herald	rr	
	18 Feb 1927 Ouray Herald	rr, 2 horses killed	
	21 Feb 1936 Ouray Herald		
	14 Mar 1944 Ouray Herald		
	14 Feb 1958 M. Gregory, CB	Crossed 3 sections of switchbacks	
	7 Mar 1961 CB		
	30 Oct 1961 CB		
	20 Dec 1967 CB		
	24 Feb 1968 CB		
	25 Jan 1969 CB	rr	
	16 Feb 1969 CB	rr	
	22 Jan 1970 CB	rr	
	17 Jan 1971 CB	rr	
	19 Feb 1972 CB	rr f	
	4 Dec 1972 CB	rr f	
	17 Apr 1973 CB	rr	
	9 Jan 1975 CB	rr	
	11 Jan 1975 CB	rr f	
	6 Feb 1975 CB	rr	
Swede Pete slide 003	21 Dec 1934 Ouray Herald		1
	18 Jan 1935 Ouray Herald		
	21 Feb 1936 Ouray Herald	Took out telephone lines and 2' diameter spruce	
	14 Mar 1944 CB		
	2 Jan 1952 CB		
	25 Jan 1956 CB		
	9 Jan 1957 CB		
	26 Mar 1965 CB	aa	
	25 Jan 1969 CB	rr f	
	16 Feb 1969 CB	rr	
	2 Mar 1970 CB	rr	
	3 Mar 1970 CB	rr	
	27 Nov 1970 CB	rr	
	17 Jan 1971 CB	rr	
	26 Dec 1971 CB	rr	
	4 Dec 1972 CB	rr	
	20 Dec 1972 CB	rr	
	27 Mar 1973 CB	rr	
	7 Apr 1973 CB	rr	
	30 Apr 1973 CB	rr	
	19 Jan 1974 CB	rr f	
	6 Jan 1975 CB	rr f	
	9 Jan 1975 CB	rr f	
	11 Jan 1975 CB	rr f	
	6 Jan 1976 CB	rr f	
	10 Feb 1976 CB	rr f	
	2 Mar 1976 CB	rr f	

* Sources of information are: newspapers of the period; Colorado Highway Department (CHD) data, as compiled by the United States Forest Service, Fort Collins, Colorado; Camp Bird Mine data (CB), as compiled by the United States Forest Service, Fort Collins, Colorado; San Juan Avalanche Project (SJAP) data, INSTAAR, University of Colorado, Silverton, Colorado; and personal interviews. Detailed names addresses and dates of interviews are listed in Appendix 1, References. Dates listed for newspaper references are newspaper issue dates. Actual event date would be during the week preceding the newspaper date. Exact dates for newspaper references, when available, are listed in Table 10.

All available information is listed here.

† Abbreviations are as follows: rr: avalanche reached or crossed road
aa: avalanche released artificially, by artillery
f: avalanche ran full track

‡ Not mapped, exact location unknown.

§ Avalanche path reference numbers.

Site	Date and Source*	Comments†	Map Number
Neighbor White slide 004	21 Dec 1934 Ouray Herald		1
	21 Feb 1936 Ouray Herald	3 men, 4-horse team and 20-mule pack train caught, all survived	
	14 Mar 1944 CB		
	2 Jan 1952 CB		
	25 Jan 1956 CB		
	9 Jan 1957 CB		
	25 Jan 1969 CB	rr f	
	16 Feb 1969 CB	rr	
	26 Dec 1971 CB	rr	
	4 Dec 1972 CB	rr	
	20 Dec 1972 CB	rr	
	27 Mar 1973 CB	rr	
	6 Jan 1975 CB	rr f	
	9 Jan 1975 CB	rr f	
	11 Jan 1975 CB	rr f	
	10 Feb 1976 CB	rr f	
Shirt tail slide 005	14 Mar 1944 CB		1
	2 Jan 1952 CB		
	25 Jan 1956 CB		
	9 Jan 1957 CB		
	19 Apr 1970 CB	rr	
	17 Jan 1971 CB	rr	
	26 Dec 1971 CB	rr	
	4 Dec 1972 CB	rr	
	20 Dec 1972 CB	rr	
	27 Mar 1973 CB	rr	
	27 Jan 1974 CB	rr	
	6 Jan 1975 CB	rr f	
	9 Jan 1975 CB	rr f	
	11 Jan 1975 CB	rr f	
	2 Mar 1976 CB	rr f	
Splitter slide 006	14 Mar 1944 CB		1
	2 Jan 1952 CB		
	25 Jan 1956 CB		
	9 Jan 1957 CB		
	22 Jan 1962 CB		
	26 Dec 1971 CB	rr	
Hayden slide 007	11 Mar 1938 Ouray Herald	15-20' of snow on road	1
	17 Mar 1944 Ouray Herald		
	14 Mar 1944 CB		
	2 Jan 1952 CB		
	25 Jan 1956 CB		
	9 Jan 1957 CB		
	14 Feb 1958 CB		
	9 Feb 1959 CB		
	21 Jan 1960 CB		
	7 Mar 1961 CB		
	8 Mar 1961 CB		
	26 Feb 1962 CB		
	1 Mar 1962 CB		
	31 Jan 1963 CB		
	11 Mar 1964 CB		
	7 Jan 1965 CB		
	11 Jan 1965 CB	aa	
	19 Feb 1966 CB	aa	
	15 Jan 1967 CB	aa	
	15 Dec 1967 CB		
	30 Dec 1968 CB	rr f	
	25 Jan 1969 CB	rr f	
	12 Feb 1970 CB	rr	
	2 Apr 1970 CB	f	
	6 Apr 1970 CB	f	
	11 Apr 1970 CB	f	
	21 Apr 1970 CB		
	17 Jan 1971 CB		
	19 Feb 1972 CB	f	
	10 Mar 1973 CB	rr	
	30 Apr 1973 CB		
	6 Jan 1976 CB	rr f	
	9 Feb 1976 CB		
Dolly Varden slide 008	14 Mar 1944 CB		1
	2 Jan 1952 CB		
	25 Jan 1956 CB		
	9 Jan 1957 CB		
	31 Jan 1968 CB		
	25 Jan 1969 CB	rr f	
	16 Feb 1969 CB	rr	
	26 Dec 1971 CB	rr	
	20 Dec 1972 CB	rr	
	6 Jan 1976 CB	rr f	

Site	Date and Source*	Comments†	Map Number
Waterhole slide (East or West)	25 Feb 1897 Ouray Herald		2
	6 Feb 1903 Ouray Herald		
	3 Apr 1903 Ouray Herald		
	24 Apr 1903 Ouray Herald		
	30 Nov 1906 Ouray Herald		
	29 Jan 1909 Ouray Herald	4 men, 26 head of stock killed	
	14 Feb 1908 Ouray Herald		
	18 Dec 1908 Ouray Herald		
	7 Jan 1910 Ouray Herald		
	30 Dec 1910 Ouray Herald	Ran twice in 24 hours	
	14 Jan 1911 Silverton Standard		
	8 Mar 1912 Ouray Herald		
	22 Mar 1913 Ouray Herald	30' deep on road, 350' in length, removed telephone poles	
	18 Feb 1927 Ouray Herald		
	17 Jan 1936 Ouray Herald	6-8' deep on road	
	28 Feb 1936 Ouray Herald	slip just below Waterhole caught County Road Gang and 6-horse team, all survived	
	18 Feb 1938 Ouray Herald	8-20' deep on road, 250' in length	
	11 Mar 1938 Ouray Herald		
	12 Jan 1940 Ouray Herald	10' deep on road	
East Waterhole slide 009	22 Jan 1941 CB		1
	29 Mar 1941 CB		
	21 Jan 1943 CB		
	23 Jan 1943 CB		
	5 Mar 1943 CB		
	14 Mar 1944 CB		
	1 Feb 1948 CB		
	10 Dec 1949 CB		
	22 Nov 1951 CB		
	2 Jan 1952 CB		
	25 Jan 1956 CB		
	7 Jan 1957 CB		
	9 Jan 1957 CB		
	5 Apr 1958 CB		
	2 Feb 1959 CB		
	9 Feb 1959 CB		
	3 Feb 1960 CB		
	26 Feb 1960 CB		
	11 Feb 1961 CB		
	8 Mar 1961 CB	aa	
	20 Jan 1962 CB		
	15 Mar 1963 CB		
	20 Mar 1963 CB	aa	
	23 Jan 1964 CB		
	27 Mar 1964 CB	aa	
	28 Dec 1964 CB		
	11 Jan 1965 CB	aa	
	28 Nov 1965 CB		
	30 Dec 1965 CB		
	19 Feb 1966 CB	aa	
	1 Mar 1966 CB		
	13 Jan 1967 CB		
	15 Feb 1967 CB		
	24 Feb 1968 CB		
	25 Jan 1969 CB	rr f	
	25 Dec 1969 CB		
	31 Dec 1969 CB	rr	
	6 Jan 1970 CB	rr	
	13 Feb 1970 CB	rr	
	4 Mar 1970 CB	aa rr f	
	27 Nov 1970 CB	rr	
	17 Jan 1971 CB		
	25 Feb 1971 CB	rr f	
	9 Dec 1971 CB	aa	
	15 Dec 1971 CB	aa rr	
	4 Dec 1972 CB	rr f	
	12 Mar 1973 CB	rr	
	28 Mar 1973 CB		
	28 Apr 1973 CB		
	10 Jan 1974 CB	aa	
	6 Jan 1975 CB	rr f	
	10 Jan 1975 CB	aa rr f	
	9 Feb 1976 CB	rr f	
West Waterhole slide 010	21 Feb 1944 CB		2
	14 Mar 1944 CB		
	2 Jan 1952 CB		
	25 Jan 1956 CB		
	9 Jan 1957 CB		
	14 Feb 1958 CB, H. Peck	2 men caught, 1 survived, rr	
	28 Dec 1964 CB		
	26 Mar 1965 CB	aa	

Site	Date and Source*		Comments†	Map Number
West Waterhole 010 (continued)	25 Jan 1969	CB	rr f	2
	11 Jan 1975	CB	f	
East Schoolhouse (Angel) slide 011	21 Feb 1936	Ouray Herald	Removed 500' of telephone wire	1
	4 May 1941	CB		
	14 Mar 1944	CB		
	2 Jan 1952	CB		
	25 Jan 1956	CB		
	9 Jan 1957	CB		
	14 Feb 1958	CB	4 men buried, 1 survived, 2 caterpiller tractors buried	
	6 Mar 1961	CB		
	20 Mar 1963	CB	aa	
	11 Mar 1964	CB	aa	
	19 Feb 1966	CB	aa	
	15 Jan 1967	CB	aa	
	15 Feb 1967	CB		
	25 Jan 1969	CB	f	
	12 Jan 1975	CB	f	
West Schoolhouse slide 012	14 Mar 1944	CB		2
	22 Jan 1952	CB		
	25 Jan 1956	CB		
	9 Jan 1957	CB		
	12 Feb 1958	CB		
	26 Jan 1967	CB		
	4 Jan 1969	CB	rr	
	25 Jan 1969	CB	rr f	
	16 Feb 1969	CB		
	9 Jan 1974	CB	rr f	
	11 Jan 1975	CB	f	
	14 May 1975	CB	rr f	
CAMP BIRD TO UPPER CAMP BIRD, IMOGENE BASIN				
Camp Bird	17 Mar 1906	Ouray Herald (23 Mar 1906)	10 men caught, 9 survived; mill practically destroyed and portion of 1 boarding house damaged when U.S. slide and possibly one of Mt. Hayden slides ran	2
	9 Jan 1974	CB	Damaged flume above mill (U.S. slide)	
Mt. Hayden slides 014, 015	8 Mar 1902	Ouray Herald		2
	17 Mar 1906	Ouray Herald (23 Mar 1906)	One slide damaged the Camp Bird Mill	
	15 Mar 1912	Ouray Herald	Damaged stone pier of Camp Bird tramway	
U.S. slide U.S. Mill	18 Feb 1897	Ouray Herald	Slide damaged boarding house and broke all windows on upper side of mill	2
U.S. slide 013	14 Dec 1899	Ouray Herald	Ran for the second time that winter on both sides of U.S. Mill	2
	17 Jan 1901	Ouray Herald	1 man buried, died	
	8 Mar 1902	Ouray Herald	"The whole slope of the country from the Hancock Mine to the U.S. has slid"	
	6 Feb 1903	Ouray Herald		
	3 Apr 1903	Ouray Herald	Ran for the third time that winter	
	9 Mar 1906	Ouray Herald		
	17 Mar 1906	Ouray Herald (23 Mar 1906)	Destroyed the Camp Bird Mine	
	19 Jan 1912	Ouray Herald		
	8 Mar 1912	Ouray Herald		
	11 Feb 1937	Ouray Herald	Main path ran	
	14 Mar 1944	CB		
	2 Jan 1952	CB		
	25 Jan 1956	CB		
	17 Dec 1956	CB		
	7 Jan 1957	CB		
	9 Jan 1957	CB		
	3 Mar 1961	CB		
	26 Mar 1965	CB	aa	
	31 Dec 1968	CB	f	
	25 Jan 1969	CB	f	
	4 Mar 1970	CB		
	25 Feb 1971	CB	f	
	29 Mar 1973	CB	aa f	
	9 Jan 1974	CB	Damaged flume above Camp Bird Mill	
	11 Jan 1975	CB		
Bankers National Mine	17 Feb 1905	Ouray Herald	3 mules caught, all survived	2
	7 Mar 1905	Ouray Herald	9 men buried--2 killed, 2 injured, 5 uninjured; several buildings destroyed	
Upper Camp Bird Mine Imogene Basin General	17 Mar 1906	Ouray Herald (23 Mar 1906)	Portion of mine boarding house swept away	2
	12 Nov 1909	Ouray Herald	1 man buried, survived; swept from ridge almost to mine buildings	

Site	Date and Source*	Comments†	Map Number
Upper Camp Bird Mine Imogene Basin General (continued)	8 Mar 1912 Ouray Herald	Slide ran into back of boarding house	2
Second Level slide	25 Feb 1897 Ouray Herald	Cabin buried, roof crushed, 3 occupants survived, 1 injured; slide estimated to be 15-30 feet deep and a mile long	
	12 Apr 1900 Ouray Herald	2 miners caught in shed hit by slide, 1 not buried, 1 buried and died	
	28 Feb 1936 Ouray Herald	Ran with the Chicago and Hidden Treasure slides	
	Spring, 1971 R. Trujillo	Covered portal with 30 feet of snow	
Chicago slide	8 Mar 1902 Ouray Herald	5 men caught in shed at entrance of 2000 feet tunnel (No. 3 Level) on southwest side of basin; 1 died, 1 injured, 3 uninjured	2
	7 Jan 1916 Ouray Herald	Damaged Camp Bird Mine trestle	
	28 Feb 1936 Ouray Herald	3 people, 2 men and 1 woman killed; mill, bunkhouse and other buildings either destroyed or badly damaged	
	17 Mar 1944 Ouray Herald	Swept away Camp Bird power lines	
Hidden Treasure Mine (Hidden Treasure slide)	30 Dec 1920 Ouray Herald	Swept away practically all building materials recently delivered for construction	2
	28 Feb 1936 Ouray Herald	Released with Chicago slide to damage Camp Bird buildings	
Agnes Mine	28 Jan 1887 Solid Muldoon	All buildings swept away	2
CAMP BIRD TO SNEFFELS TOWNSITE Hanging Rock	14 Jan 1887 Solid Muldoon 21 Dec 1934 Ouray Herald		2
SNEFFELS TOWNSITE AREA San Pedro Mine	23 Nov 1906 Ouray Herald	Slide ran past dump	3
Potosi slide	7 Apr 1905 Ouray Herald	Swept away wagon-load of ore from Revenue, had not run for years	3
	21 Feb 1936 Ouray Herald		
Potosi Gulch Neptune Mine	22 Feb 1884 Solid Muldoon	"spread the Neptune all over the hillside"	3
Sneffels School slide	21 Feb 1936 Ouray Herald		3‡
Revenue Mine	28 Dec 1883 Solid Muldoon	Shaft house moved to park in front of Porter's store	3
	4 Mar 1897 Ouray Herald	Slide swept away 200' of snowshed; one man and mule in shed were buried, mule killed, man bruised but survived	
	19 Feb 1901 Ouray Herald	Slide damaged snowsheds, blew open doors in Sneffels	
	3 Apr 1903 Ouray Herald	3 slides down during day: 1. crossed dump, destroyed oil house 2. tore out snowsheds and track between mill and Wheel of Fortune tunnel 3. buried tunnel in 15' of snow	
	21 Feb 1936 Ouray Herald	30' of tunnel swept away, snowsheds slightly damaged, Sneffels store door blown open	
	17 Mar 1944 Ouray Herald	2 slides down during day: 1. slide through the timber swept away new snowsheds 2. swept away old snowsheds	
Porter's store	2 Feb 1883 Solid Muldoon	Struck by small slide, little damage	3
	15 Feb 1884 Solid Muldoon	Slide from slope opposite store caught 6 men, all dug out alive	
	22 Jan 1886 Solid Muldoon	One end of building swept away	
Mule barn	Winter 1951-1952 M. Gregory	Barn destroyed by slide from Mt. Potosi, had stood 50 years without being damaged	3‡
SNEFFELS TO YANKEE BOY BASIN Atlas mine	18 Dec 1908 Ouray Herald	Snowsheds swept away	3
	19 Feb 1909 Ouray Herald	No damage, concussion felt in Sneffles	
	8 Mar 1912 Ouray Herald	Boiler moved 7' from its foundation	
Ruby Trust mine (Trust Ruby)	22 Jan 1886 Solid Muldoon	6 men buried; 1 injured, 2 uninjured, 3 killed; boarding house destroyed	3
	10 Apr 1903 Ouray Herald	2 men buried in bunkhouse, swept 700' with slide, 1 buried 4 hours, both survived; bunk and boarding houses swept away	
Sidney (Cumberland) Basin Sidney Mine	28 Dec 1883 Solid Muldoon	Ore and provision house crushed	3‡
Coming into Cumberland Basin from Virginius mine	28 Dec 1883 Solid Muldoon	32 men with 4 avalanche victims from Virginius mine all caught in slide from bluff; all survived, 4 bodies not immediately recovered	3‡
	6 Feb 1891 Solid Muldoon	4 men from Virginius mine were buried and killed in a slide below Bald Point, within 50' of slide of 1883 (see above)	
Governor (Virginius) Basin Virginius mine	28 Dec 1883 Solid Muldoon	Slide started 150' above boarding house; 12 men inside, all buried, 4 killed, 8 dug out alive, 2 after 24 hours	3

Site	Date and Source*		Comments†	Map Number
Governor (Virginius) Basin				
Slide path 100 yards from Virginius mine	14 Jan 1897	Ouray Herald	3 men buried when crossing slide path, 2 survived 1 killed	3
Governor mine	28 Dec 1883	Solid Muldoon	Cabin buried, 2 men inside survived	3
	8 Mar 1902	Ouray Herald	Snowsheds, tankhouse and compressor building damaged	
	3 Apr 1903	Ouray Herald	Compressor house and blacksmith shop completely demolished; 16,000 lb boiler moved 20' from its foundation; "contrary to its custom heretofore, it came down opposite its time worn path through a heavy growth of timber snapping the trees off at the top of ground"	
	23 Mar 1906	Ouray Herald	Portion of mill, assay office and blacksmith shop slightly damaged	
Banner tunnel on trail between Atlas and Mountain Top mines	22 Nov 1935	Ouray Herald	One mule caught, rolled several times, survived	3‡
Zig-zag trail near Mountain Top mine	5 Dec 1913	Ouray Herald	Pack train hit by slide twice: while going up to Mountain Top mine and when coming down, 1 animal killed	3‡
High Bridge section of trail between Atlas and Mountain Top mines	30 Nov 1934	Ouray Herald	2 horses buried; 1 injured, 1 killed	3‡
Yankee Boy Basin				
Yankee Boy mine	20 Feb 1891	Solid Muldoon	Part of assay office and 1 end of boarding house swept away	3
Southwest slope of Emma Mountain	30 Jan 1902	Ouray Herald	2 men buried; 1 dug himself out, second man's body found under 5' of snow	3‡
HIGHWAY 550 - OURAY TO RED MOUNTAIN PASS				
Bear Creek trail				
American Flag mine	23 Feb 1878	Ouray Times	Cabin destroyed by slide from summit of Cline Mt.	4‡
Silver Queen Gulch 75' from Silver Queen mine	21 Dec 1899	Ouray Herald	2 men buried; 1 killed, 1 survived	4‡
	22 Feb 1900	Ouray Herald	1 man buried between mine and bunkhouse, dug himself out	4‡
Uncle Sam mine Engineer Mountain	1 Jan 1909	Ouray Herald	Cabin, with 2 men inside, moved off its foundation, men moved to tunnel for safety, another slide covered mouth of tunnel and men trapped for 20 hours until they dug themselves out	‡
Bear Creek Falls to Uncompahgre drainage				
Ralston slide	18 Feb 1927	Ouray Herald		4
Ralston Creek	12 Jan 1975	SJAP	f	
	26 Mar 1975	SJAP		
Sutton Mill	6 Jan 1976	SJAP	rr	4
Jackpot slide 071	9 Jan 1957	CHD	rr	4
	15 Feb 1958	CHD	rr	
	4 Mar 1960	CHD	rr	
	13 Feb 1962	CHD	rr	
	19 Mar 1974	SJAP	rr f	
	1 Mar 1975	SJAP	rr f	
White Fir slide 072	14 Mar 1973	SJAP		4
	29 Apr 1973	SJAP		
	16 Mar 1973	SJAP		
	12 Jan 1975	SJAP	f	
	13 Jan 1975	SJAP		
	19 Mar 1975	SJAP		
	28 Mar 1975	SJAP	f	
	13 Apr 1975	SJAP		
	20 Apr 1975	SJAP		
	24 Apr 1975	SJAP		
	9 Feb 1976	SJAP		
Silver Point slide 070	15 Mar 1956	CHD	rr	4
	11 Feb 1958	CHD	rr	
	14 Feb 1958	CHD	rr	
	8 Mar 1960	CHD	rr	
	22 Feb 1968	CHD	rr f	
	26 Jan 1969	CHD	rr f	
	25 Feb 1973	SJAP	rr	
	28 Apr 1973	SJAP	rr f	
	20 Feb 1974	SJAP	rr f	
	9 Jan 1975	SJAP	rr	
	11 Jan 1975	SJAP	rr	
	21 Jan 1975	SJAP		
	24 Feb 1975	SJAP	rr f	
	28 Mar 1975	SJAP		
	19 Apr 1975	SJAP	rr	
	6 Jan 1976	SJAP		

Site	Date and Source*		Comments†	Map Number
Uncompahgre drainage				
Michael (Mickey) Breen mine	6 Feb 1891	Solid Muldoon	Buildings hit by small slide, doors and windows caved in	5
	24 Jan 1895	Ouray Herald	1 man killed when slide hit mine	
	7 Apr 1905	Ouray Herald	2 large slides down, 1 within 12' of the mill	
	15 Mar 1912	Ouray Herald	Boarding house roof ripped off	
	19 Feb 1932	Ouray Herald	Powderhouse buried	
Silver Link mine	8 Mar 1902	Ouray Herald	Several hundred feet of telephone line swept away	5 ‡
Mother Cline to Red Mountain Pass				
	-- 1888	Gibbons	Tunnel dug through debris	5
Mother Cline 069	-- 1890	Gibbons	Debris in canyon 50-60 feet deep	
	10 Jan 1895	Ouray Herald		
	21 Feb 1895	Ouray Herald	Buried Red Mountain mail carrier and his horses, all survived	
	7 Feb 1902	Ouray Herald	Blocked Circle Route stage	
	19 Dec 1902	Ouray Herald	Blocked Circle Route stage	
	3 Apr 1903	Ouray Herald		
	30 Nov 1906	Ouray Herald		
	19 Jan 1906	Ouray Herald	Sled wrecked and 2 horses buried, 1 killed, 1 survived; second time that day the slide had run	
	18 Dec 1908	Ouray Herald		
	19 Jan 1912	Ouray Herald		
	22 Mar 1912	Ouray Herald	"runs just about every time it snows and sometimes when it doesn't snow"	
	28 Feb 1913	Ouray Herald	ran full-width	
	18 Feb 1927	Ouray Herald		
	11 Apr 1930	Ouray Herald	Cut off the snowplow between Mother Cline and Riverside	
	4 Dec 1931	Ouray Herald		
	22 Apr 1931	Ouray Herald		
	22 Apr 1932	Ouray Herald	Ran 3 times in 1 day	
	8 Dec 1933	Ouray Herald		
	30 Mar 1934	Ouray Herald	Slips in road for 4 consecutive days	
	6 Apr 1934	Ouray Herald		
	18 Jan 1935	Ouray Herald		
	21 Apr 1935	Ealey	3 men in vehicle buried	
	26 Apr 1935	Ouray Herald		
	3 Jan 1936	Ouray Herald	Only major slide down	
	14 Feb 1936	Ouray Herald		
	21 Feb 1936	Ouray Herald		
	17 Apr 1936	Ouray Herald	Slipped 5 times on Wednesday, 3 times on Thursday	
	12 Feb 1937	Ouray Herald		
	16 Apr 1937	Ouray Herald		
	15 Apr 1938	Ouray Herald		
	30 Dec 1951	CHD	rr	
	24 Jan 1956	CHD	rr	
	14 Mar 1956	CHD	rr	
	22 Apr 1956	CHD	rr	
	8 Jan 1957	CHD	rr	
	9 Jan 1957	CHD	rr	
	13 Jan 1957	CHD	rr	
	10 Feb 1958	CHD	rr ran twice	
	11 Feb 1958	CHD	rr	
	14 Feb 1958	CHD	rr	
	15 Feb 1958	CHD	rr	
	18 Feb 1958	CHD	aa rr	
	3 Jan 1960	CHD		
	13 Jan 1960	CHD		
	9 Mar 1960	CHD	rr	
	7 Apr 1960	CHD	rr	
	8 Apr 1960	CHD	rr	
	27 Jan 1961	CHD	rr	
	10 Mar 1961	CHD	aa	
	4 Apr 1961	CHD	aa rr	
	27 Jan 1961	CHD	rr	
	10 Mar 1961	CHD	aa	
	4 Apr 1961	CHD	aa rr	
	20 Jan 1962	CHD	rr	
	24 Jan 1962	CHD	aa	
	12 Feb 1962	CHD	rr	
	13 Feb 1962	CHD	rr	
	26 Mar 1962	CHD	aa	
	31 Jan 1963	CHD	rr	
	1 Feb 1963	CHD	rr	
	13 Mar 1963	CHD	aa	
	22 Dec 1963	CHD	rr	
	30 Dec 1963	CHD	rr	
	20 Jan 1964	CHD	aa	
	17 Feb 1964	CHD	aa rr	
	28 Feb 1964	CHD	aa	
	7 Mar 1964	CHD	rr	
	11 Mar 1964	CHD	aa	
	19 Mar 1964	CHD		
	26 Mar 1964	CHD	aa	

Site	Date and Source*	Comments+	Map Number
Mother Cline to Red Mountain Pass			
Mother Cline 069 (continued)	2 Jan 1965 CHD	aa rr	5
	25 Jan 1965 CHD	aa	
	2 Mar 1965 CHD	aa	
	26 Mar 1965 CHD	aa rr	
	29 Mar 1965 CHD	aa	
	2 Apr 1965 CHE	rr	
	18 Apr 1965 CHD	rr	
	19 Apr 1965 CHD	rr	
	23 Dec 1965 CHD	rr	
	2 Feb 1966 CHD	aa rr two slides	
	26 Jan 1967 CHD	aa rr	
	10 Feb 1967 CHD	rr	
	30 Jan 1968 CHD	aa rr f	
	31 Jan 1968 CHD	rr f	
	1 Feb 1968 CHD	aa rr f	
	22 Feb 1968 CHD	rr f	
	21 Dec 1968 CHD	rr f	
	26 Jan 1969 CHD	rr f	
	27 Mar 1969 CHD	rr f	
	28 Mar 1969 CHD	rr f	
	31 Mar 1969 CHD	rr f	
	22 Jan 1970 CHD	rr f	
	3 Mar 1970 CHD	aa rr	
	25 Apr 1970 CHD	rr	
	26 Apr 1970 CHD	rr vehicle involved	
	11 May 1970 CHD	rr	
	18 Jan 1971 CHD	rr	
	3 Mar 1971 CHD	aa rr	
	14 Mar 1971 CHD	rr f	
	15 Mar 1971 CHD	rr	
	28 Nov 1971 SJAP		
	22 Jan 1972 SJAP	rr	
	12 Feb 1973 CHD	rr	
	15 Feb 1973 CHD	rr	
	26 Apr 1973 SJAP	rr f	
	27 Apr 1973 CHD	Ran 7 times	
	28 Apr 1973 SJAP	rr f	
	30 Apr 1973 CHD	rr ran 3 times, damaged vehicle (ice)	
	5 May 1973 CHD	rr	
	6 May 1973 CHD	rr	
	9 May 1973 SJAP	aa rr f	
	12 May 1973 CHD	rr	
	18 Dec 1973 SJAP	rr f two vehicles caught, one damaged	
	10 Jan 1974 SJAP	aa rr f	
	20 Feb 1974 SJAP	rr f	
	18 Mar 1974 SJAP CHD	rr f caught snowplow, no damage	
	19 Mar 1974 SJAP	rr f	
	4 Apr 1974 SJAP		
	14 Dec 1974 CHD	rr	
	4 Jan 1975 SJAP CHD	rr	
	7 Jan 1975 SJAP	aa rr	
	21 Jan 1975 SJAP		
	29 Jan 1975 SJAP	aa f	
	16 Feb 1975 CHD	rr	
	6 Mar 1975 SJAP		
	19 Mar 1975 SJAP	rr	
	26 Mar 1975 SJAP	rr f	
	28 Mar 1975 SJAP	aa rr f 3 slides	
	13 Apr 1975 SJAP	rr f	
	23 Apr 1975 CHD	rr	
	24 Apr 1975 SJAP	rr f	
	25 Apr 1975 SJAP	rr ran 4 times in 2 hours; 1 vehicle caught 3 times, severely damaged by the third slide; driver injured	
	1 May 1975 CHD	rr	
	5 May 1975 CHD	rr	
	7 May 1975 CHD	rr	
	8 May 1975 CHD	rr	
	17 May 1975 CHD	rr	
	14 Dec 1975 SJAP	f	
	5 Jan 1976 SJAP		
	6 Jan 1976 SJAP	rr 2 slides	
	6 Feb 1976 SJAP	rr f	
	9 Feb 1976 SJAP	rr f	
Silver Gulch 073	25 Dec 1971 SJAP	f	5
	27 Dec 1971 SJAP		
	22 Feb 1972 SJAP		
	3 Mar 1972 SJAP		
	7 Feb 1973 SJAP		
	11 May 1973 SJAP		
	29 Dec 1973 SJAP	f	
	9 Jan 1974 SJAP	f	
	16 Mar 1974 SJAP		

Site	Date and Source*	Comments†	Map Number
Silver Gulch 073 (continued)	14 Dec 1974 SJAP	f	5
	20 Dec 1974 SJAP		
	11 Jan 1975 SJAP	rr f	
	26 Mar 1975 SJAP	f	
	13 Apr 1975 SJAP		
	20 Apr 1975 SJAP		
	24 Apr 1975 SJAP		
	9 Feb 1976 SJAP		
Dunsmore 068	13 Jan 1957 CHD	rr	5
	26 Jan 1961 CHD	rr f	
	22 Feb 1972 SJAP	rr 3 slides	
	28 Apr 1973 SJAP	rr f	
	1 Mar 1974 SJAP	rr f	
	1 Mar 1975 SJAP	f	
	20 Mar 1975 SJAP	f	
	6 Jan 1976 SJAP	rr	
Cliff 067	28 Apr 1973 SJAP	rr f	5
	9 Mar 1975 SJAP	f	
	6 Jan 1976 SJAP	rr	
	9 Jan 1976 SJAP		
North of Emergency Phone 066	20 Mar 1971 CHD	rr 2 slides	5
	28 Apr 1973 SJAP	rr f	
	13 Apr 1975 SJAP	rr f	
	6 Jan 1976 SJAP		
East Riverside Left 065	3 Mar 1972 SJAP		5
	12 Mar 1972 SJAP		
	13 Nov 1972 SJAP		
	21 Nov 1972 SJAP		
	4 Dec 1972 SJAP	rr	
	13 Jan 1973 SJAP	rr	
	12 Feb 1973 SJAP	rr	
	25 Feb 1973 SJAP	rr	
	10 Mar 1973 SJAP	f	
	13 Mar 1973 SJAP	f	
	7 Apr 1973 SJAP	rr f	
	26 Apr 1973 SJAP	rr f	
	28 Apr 1973 SJAP	rr f	
	18 Dec 1973 SJAP	rr f	
	4 Apr 1974 SJAP		
	24 Dec 1974 SJAP	f	
	7 Jan 1975 SJAP	f	
	9 Jan 1975 SJAP	rr 2 slides	
	25 Feb 1975 SJAP	rr f	
	21 Feb 1975 SJAP	rr f	
	24 Feb 1975 SJAP	f	
	1 Mar 1975 SJAP	rr f	
	9 Mar 1975 SJAP	rr f	
	10 Mar 1975 SJAP	rr f	
	4 Apr 1975 SJAP	rr f	
	13 Apr 1975 SJAP	rr f 2 slides	
	6 Jan 1976 SJAP	rr f	
	9 Jan 1976 SJAP	rr f	
East Riverside 065	9 Nov 1888 Solid Muldoon	First snowslide of season	5
	28 Feb 1890 Solid Muldoon		
	2 Jan 1891 Solid Muldoon		
	16 Jan 1891 Solid Muldoon		
	20 Mar 1891 Solid Muldoon	Small slide just missed Red Mountain stage	
	10 Jan 1895 Ouray Herald		
	25 Feb 1897 Ouray Herald	Mail carrier buried, dug himself out	
	13 Mar 1903 Ouray Herald		
	3 Apr 1903 Ouray Herald		
	30 Nov 1906 Ouray Herald		
	24 Mar 1905 Ouray Herald	300' in length, 10' deep	
	16 Mar 1906 Ouray Herald	Ran twice in 1 day; second time barely missed 2 men with horses who had just crossed; 100' of snow in canyon	
	11 Dec 1908 Ouray Herald	1 man, 2 horses and 1 dog buried and killed; man was shoveling trail through debris of earlier slide	
	18 Dec 1908 Ouray Herald		
	15 Jan 1909 Ouray Herald		
	5 Feb 1909 Ouray Herald	1 man and 3 burros buried, all survived	
	14 Jan 1910 Ouray Herald	Ran just before the Red Mountain stage arrived at the slide	
	14 Jan 1911 Silverton Standard		
	19 Jan 1912 Ouray Herald		
	18 Feb 1928 Ouray Herald		
	17 Jan 1930 Ouray Herald	Closed road for the winter	
	4 Dec 1931 Ouray Herald		
	8 Dec 1933 Ouray Herald		
	23 Feb 1934 Ouray Herald	Ran twice during storm	
	30 Mar 1934 Ouray Herald		
	18 Jan 1935 Ouray Herald		

Site		Date and Source*		Comments†	Map Number
East Riverside (continued)	065	8 Mar 1935	Ouray Herald	125' in length, 3-5' deep	5
		26 Apr 1935	Ouray Herald		
		3 Apr 1936	Ouray Herald		
		12 Feb 1937	Ouray Herald		
		16 Apr 1937	Ouray Herald	70' in length, 20' deep	
		4 Feb 1938	Ouray Herald	Heavy wet snow, ran large	
		12 Jan 1940	Ouray Herald	First slide of winter; 40' in length, 10' deep	
		27 Feb 1951	CHD	rr	
		30 Dec 1951	CHD	rr	
		26 Jan 1956	CHD	rr	
		11 Feb 1956	CHD	aa rr	
		5 Jan 1957	CHD	rr	
		8 Jan 1957	CHD	rr	
		9 Jan 1957	CHD	rr	
		13 Jan 1957	CHD	rr	
		27 Jan 1958	CHD	rr East Riverside pocket	
		10 Feb 1958	CHD	aa rr	
		13 Feb 1958	CHD	rr	
		15 Feb 1958	CHD	rr	
		14 Mar 1958	CHD	rr	
		30 Jan 1959	CHD	rr	
		8 Feb 1959	CHD	rr	
		14 Jan 1960	CHD	rr East Riverside pocket	
		14 Jan 1960	CHD	rr	
		3 Feb 1960	CHD	rr	
		26 Feb 1960	CHD	rr	
		1 Mar 1960	CHD	rr	
		3 Mar 1960	CHD	rr	
		26 Mar 1960	CHD	rr	
		27 Jan 1961	CHD	rr	
		10 Mar 1961	CHD	aa	
		4 Apr 1961	CHD	aa	
		10 Jan 1962	CHD	aa rr	
		15 Jan 1962	CHD	rr	
		21 Jan 1962	CHD	rr	
		24 Jan 1962	CHD	aa rr	
		31 Jan 1963	CHD	rr	
		3 Mar 1963	CHD	rr	
		3 Mar 1963	CHD	rr buried and killed Rev. Hudson and his 2 daughters	
		4 Mar 1963	CHD	aa	
		5 Mar 1963	CHD	aa	
		13 Mar 1963	CHD	aa	
		13 Mar 1963	CHD	aa	
		31 Mar 1963	CHD	aa rr	
		19 Jan 1964	CHD	rr	
		24 Jan 1964	CHD	aa rr	
		17 Feb 1964	CHD	aa	
		7 Mar 1964	CHD	rr	
		9 Mar 1964	CHD	aa rr	
		11 Mar 1964	CHD	aa rr	
		26 Mar 1964	CHD	aa	
		30 Mar 1964	CHD	aa rr	
		26 Dec 1964	CHD	aa	
		2 Jan 1965	CHD	aa rr	
		2 Mar 1965	CHD	aa	
		15 Mar 1965	CHD	aa	
		25 Mar 1965	CHD	rr	
		25 Mar 1965	CHD	aa rr	
		8 Apr 1965	CHD	aa	
		20 Apr 1965	CHD	rr	
		25 Nov 1965	CHD	rr	
		23 Dec 1965	CHD	rr	
		25 Dec 1965	CHD	rr	
		30 Dec 1965	CHD	rr	
		2 Feb 1966	CHD	aa	
		17 Feb 1966	CHD	aa	
		6 Nov 1966	CHD	rr	
		26 Jan 1967	CHD	aa rr	
		12 Dec 1967	CHD	rr f	
		16 Dec 1967	CHD	rr f	
		19 Dec 1967	CHD and Ealey	rr f 3 men caught, vehicle damaged	
		28 Jan 1968	CHD	rr	
		30 Jan 1968	CHD	aa	
		1 Feb 1968	CHD	aa rr f	
		22 Feb 1968	CHD	rr f	
		30 Dec 1968	CHD	rr f	
		22 Jan 1969	CHD	rr f	
		23 Jan 1969	CHD	aa	
		25 Jan 1969	CHD	rr f	
		26 Jan 1969	CHD	rr f	
		17 Feb 1969	CHD	aa	
		27 Mar 1969	CHD	rr f	
		30 Mar 1969	CHD	rr f	

Site	Date and Source*	Comments†	Map Number
East Riverside 065 (continued)	17 Jan 1970 CHD	rr f	5
	3 Feb 1970 CHD	aa	
	1 Mar 1970 CHD	rr f	
	2 Mar 1970 CHD	rr f 1 man buried and killed, caterpiller tractor damaged	
	16 Mar 1970 CHD	aa	
	22 Apr 1970 CHD	aa	
	11 May 1970 CHD	rr	
	28 Nov 1970 CHD	rr f	
	1 Dec 1970 CHD	aa rr f	
	12 Jan 1971 CHD	aa	
	18 Jan 1971 CHD	rr	
	4 Feb 1971 CHD	rr f	
	22 Feb 1971 CHD	rr f	
	15 Mar 1971 CHD	aa rr	
	14 Dec 1971 SJAP	aa rr f 2 slides	
	27 Dec 1971 SJAP	rr f	
	9 Nov 1972 SJAP	rr	
	4 Dec 1972 CHD	rr	
	5 Dec 1972 SJAP	aa rr	
	6 Feb 1973 SJAP		
	13 Mar 1973 SJAP	aa	
	17 Mar 1973 SJAP	rr f 2 slides	
	30 Mar 1973 SJAP	aa	
	8 Apr 1973 SJAP	aa	
	27 Apr 1973 SJAP	aa rr f 2 slides	
	9 May 1973 SJAP	rr f	
	29 Dec 1973 CHD	rr	
	30 Dec 1973 SJAP	aa rr f	
	6 Jan 1974 SJAP	aa rr f 2 slides	
	20 Feb 1974 SJAP	rr	
	20 Feb 1974 SJAP	aa rr f	
	2 Mar 1974 SJAP	rr f	
	11 Mar 1974 SJAP	aa rr f 3 slides	
	15 Mar 1974 SJAP	f	
	22 Dec 1974 SJAP	aa	
	6 Jan 1975 SJAP, CHD	rr	
	7 Jan 1975 SJAP	aa	
	9 Jan 1975 SJAP		
	11 Jan 1975 CHD	rr	
	29 Jan 1975 SJAP	aa	
	5 Feb 1975 CHD	rr	
	20 Feb 1975 CHD	rr	
	16 Mar 1975 SJAP	rr f	
	26 Mar 1975 SJAP	rr f	
	13 Apr 1975 SJAP		
	14 Dec 1975 SJAP		
	6 Jan 1976 SJAP	rr	
	13 Jan 1976 SJAP	rr f	
	9 Feb 1976 SJAP	rr f	
West Riverside 074	8 Mar 1902 Ouray Herald	Depth of snow in canyon "unprecedented"	8
	3 Apr 1903 Ouray Herald		
	18 Feb 1927 Ouray Herald		
	9 Apr 1932 Silverton Standard	300' in length, 61' deep	
	17 Mar 1944 Ouray Herald	50' deep	
	9 Jan 1957 CHD	rr	
	30 Jan 1958 CHD	rr	
	14 Jan 1960 CHD		
	17 Mar 1960 CHD	rr	
	4 Mar 1961 CHD	rr	
	6 Mar 1961 CHD	rr	
	7 Mar 1961 CHD	rr	
	23 Jan 1962 CHD	rr	
	31 Jan 1963 CHD	rr	
	11 Mar 1964 CHD	aa	
	25 Mar 1964 CHD	rr	
	2 Jan 1965 CHD	aa	
	16 Apr 1965 CHD		
	20 Dec 1967 CHD	rr f	
	31 Jan 1968 CHD	rr f	
	21 Dec 1968 CHD		
	16 Mar 1970 CHD	aa	
	3 Mar 1971 CHD	aa	
	27 Dec 1971 SJAP	aa rr f	
	4 Dec 1972 SJAP		
	10 Mar 1973 SJAP		
	8 May 1973 SJAP		
	9 May 1973 SJAP	f	
	23 Nov 1974 SJAP		
	20 Dec 1974 SJAP		
	9 Jan 1975 SJAP	f	
	11 Jan 1975 SJAP	rr f	
	21 Feb 1975 SJAP	f 2 slides	

Site	Date and Source*	Comments†	Map Number
West Riverside 074 (continued)	12 Mar 1975 SJAP	f	8
	17 Mar 1975 SJAP	f	
	26 Mar 1975 SJAP	f	
	24 Apr 1975 SJAP		
East Riverside Right 063	22 Feb 1972 SJAP	rr	5
	25 Feb 1973 SJAP		
	7 Apr 1973 SJAP	f	
	28 Apr 1973 SJAP	rr f	
	4 Apr 1974 SJAP		
	23 Mar 1975 SJAP	rr f	
	6 Jan 1976 SJAP	rr f	
East Riverside South 062	28 Nov 1971 SJAP	f	5
	18 Jan 1972 SJAP	rr	
	13 Nov 1972 SJAP		
	21 Nov 1972 SJAP	rr	
	18 Dec 1973 SJAP	rr f	
	15 Dec 1974 SJAP	rr f	
	5 Feb 1975 SJAP	rr	
	4 Apr 1975 SJAP	rr f	
	6 Jan 1976 SJAP	rr f	
Slippery Jim 061	27 Feb 1951 CHD	rr	5
	30 Dec 1951 CHD	rr	
	9 Jan 1957 CHD	rr	
	10 Feb 1958 CHD	aa rr	
	8 Feb 1959 CHD	rr	
	21 Jan 1962 CHD	rr	
	24 Jan 1964 CHD	rr	
	22 Mar 1964 CHD	rr	
	25 Mar 1965 CHD	aa	
	26 Jan 1967 CHD	aa rr	
	15 Dec 1967 CHD	rr f	
	1 Feb 1968 CHD	aa rr f	
	23 Jan 1969 CHD	aa	
	1 Mar 1970 CHD	rr f	
	1 Apr 1970 CHD	aa	
	22 Feb 1971 CHD	aa	
	4 Dec 1971 SJAP		
	8 Dec 1971 SJAP		
	27 Dec 1971 SJAP	rr f	
	20 Jan 1972 SJAP		
	19 Feb 1972 SJAP		
	22 Feb 1972 SJAP		
	1 Mar 1972 SJAP		
	1 Dec 1972 SJAP		
	13 Jan 1973 SJAP		
	7 Feb 1973 SJAP		
	25 Feb 1973 SJAP		
	30 Mar 1973 SJAP	aa	
	8 Apr 1973 SJAP	aa	
	26 Apr 1973 SJAP	f	
	28 Apr 1973 SJAP	f	
	9 May 1973 SJAP	f	
	6 Jan 1974 SJAP	f	
	2 Mar 1974 SJAP		
	15 Mar 1974 SJAP		
	15 Dec 1974 SJAP		
	20 Dec 1974 SJAP		
	6 Jan 1975 SJAP	2 slides	
	12 Jan 1975 SJAP	rr f	
	10 Feb 1975 SJAP		
	25 Feb 1975 SJAP	f	
	1 Mar 1975 SJAP	f	
	10 Mar 1975 SJAP		
	26 Mar 1975 SJAP	f	
	28 Mar 1975 SJAP	f	
	22 Apr 1975 SJAP	f	
	28 Nov 1975 SJAP		
	14 Dec 1975 SJAP		
	6 Feb 1976 SJAP		
	9 Feb 1976 SJAP	rr f 2 slides	
	26 Feb 1976 SJAP		
West Guadalupe 075	14 Mar 1971 CHD	rr	8
	4 Dec 1971 SJAP		
	8 Dec 1971 SJAP		
	27 Dec 1971 SJAP		
	11 May 1973 SJAP		
	9 Jan 1974 SJAP	f	
	16 Mar 1974 SJAP	f	
	20 Dec 1974 SJAP		
	6 Jan 1975 SJAP		
	9 Jan 1975 SJAP		

Site	Date and Source*	Comments†	Map Number
West Guadalupe 075 (continued)	12 Jan 1975 SJAP		8
	28 Jan 1975 SJAP		
	21 Feb 1975 SJAP	f	
	28 Mar 1975 SJAP	f	
	13 Apr 1975 SJAP		
	9 Feb 1976 SJAP		
East Guadalupe 060	18 Jan 1889 Solid Muldoon	Slide passed over cabin	5
	15 Mar 1912 Ouray Herald	Slide from west slope of Mt. Abram piled snow 50' deep in gulch; boarding house "got in the road and is reported to have been sliced in two;" mine was emptied before the storm	
	28 Feb 1919 Ouray Herald	Boarding house swept away; only occupant carried several feet but dug himself out without injuries	
	25 Mar 1920 Ouray Herald	"One of the longest snowslides which ever ran in Ouray county," 1200' wide and removed 12 telephone poles when it crossed Ironton Park	
	26 Mar 1932 Silverton Standard	10' deep on highway	
	10 Feb 1958 CHD	ae (explosives) rr	
	14 Feb 1958 CHD	rr	
	8 Mar 1961 CHD	rr	
	17 Feb 1966 CHD	aa	
	4 Dec 1971 SJAP		
	8 Dec 1971 SJAP		
	17 Dec 1971 SJAP		
	1 Mar 1972 SJAP		
	13 Nov 1972 SJAP		
	27 Nov 1972 SJAP		
	4 Dec 1972 SJAP		
	4 Jan 1973 SJAP		
	17 Apr 1973 SJAP	f	
	11 May 1973 SJAP		
	4 Apr 1974 SJAP		
	23 Nov 1974 SJAP		
	20 Dec 1974 SJAP		
	11 Jan 1975 SJAP	2 slides	
	23 Feb 1975 SJAP	f	
	12 Mar 1975 SJAP	2 slides	
	13 Apr 1975 SJAP		
	20 Apr 1975 SJAP		
	24 Apr 1975 SJAP		
	16 May 1975 SJAP		
Water Gauge North 076	2 Mar 1972 SJAP		8
	21 Dec 1972 SJAP		
	29 Apr 1973 SJAP		
	16 Mar 1974 SJAP		
	17 Mar 1974 SJAP	f	
	6 Jan 1975 SJAP		
	14 Jan 1975 SJAP		
	28 Jan 1975 SJAP	f	
	10 Feb 1975 SJAP		
	23 Feb 1975 SJAP		
	7 Mar 1975 SJAP	f	
	13 Apr 1975 SJAP		
	24 Apr 1975 SJAP	f	
	9 Feb 1976 SJAP		
Lake 077	8 Dec 1971 SJAP		8
	22 Feb 1972 SJAP		
	29 Apr 1973 SJAP	f	
	21 Mar 1975 SJAP	f	
Earth 078	29 Apr 1973 SJAP		8
	17 Mar 1974 SJAP		
	23 Feb 1975 SJAP		
	30 Mar 1975 SJAP		
	9 Feb 1976 SJAP		
Fire 079	29 Apr 1973 SJAP	f	8
	21 Dec 1974 SJAP	f	
	9 Feb 1976 SJAP		
Air 080	9 Feb 1976 SJAP		8
Water 081	No events observed		8
St. Germain 059	27 Apr 1973 SJAP	f	5
	16 Mar 1974 SJAP		
	9 Feb 1976 SJAP	f	
Jack 058	29 Apr 1973 SJAP	f	5
Ironton 082	14 Feb 1958 N. Peterson, M. Gregory	f rr removed power poles	8
	20 Dec 1967 CHD	rr f	
	27 Dec 1971 SJAP	f	
	11 May 1973 SJAP		
	23 Nov 1974 SJAP		

Site	Date and Source*	Comments†	Map Number
Ironton 082 (continued)	21 Dec 1974 SJAP	f 2 slides	8
	6 Jan 1975 SJAP		
	9 Jan 1975 SJAP	f	
	23 Feb 1975 SJAP		
	9 Feb 1976 SJAP		
Tidy 083	27 Dec 1971 SJAP	f	8
	11 May 1973 SJAP		
	23 Nov 1974 SJAP		
	21 Dec 1974 SJAP	f 2 slides	
	6 Jan 1975 SJAP		
	9 Jan 1975 SJAP	f	
	23 Feb 1975 SJAP		
	9 Feb 1976 SJAP		
Moe 057	22 Feb 1972 SJAP		5
	29 Apr 1973 SJAP	f	
Manie 056	29 Apr 1973 SJAP		5
Saratoga Mine	27 Feb 1891 Solid Muldoon (and 28 Feb 1891 Silverton Standard)	Mine buildings damaged; 3 men in destroyed cabin, 2 killed, 1 survived	5
Full Moon Gulch 084	27 Dec 1971 SJAP	f	8
	21 Dec 1972 SJAP		
	10 Apr 1973 SJAP		
	9 Jan 1974 SJAP		
	23 Nov 1974 SJAP	2 slides	
	12 Jan 1975 SJAP	2 slides	
	28 Jan 1975 SJAP	f	
	10 Feb 1975 SJAP	Full Moon Basin	
	7 Mar 1975 SJAP		
	14 Dec 1975 SJAP		
Daisy Hill 085	4 Apr 1974 SJAP		8
	28 Jan 1975 SJAP		
	8 May 1973 SJAP		
	15 Mar 1974 SJAP		
	21 Dec 1974 SJAP	f	
	12 Jan 1975 SJAP	f	
	28 Jan 1975 SJAP	f	
	6 Mar 1975 SJAP		
	13 Apr 1975 SJAP		
	24 Apr 1975 SJAP		
	9 Feb 1976 SJAP		
Albany Gulch 055	27 Dec 1971 SJAP	f	5
	9 Feb 1976 SJAP		
Brooklyn Gulch 054	28 Dec 1883 Solid Muldoon	Slide carried away San Jose cabin with 3 men and a cat inside; all 3 men survived with injuries, cat killed	5
Gray Copper Gulch			
Ripple 050	12 Jan 1975 SJAP	f	6
Italian 051	11 Jan 1972 SJAP		6
	13 Mar 1973 SJAP	f	
	11 May 1973 SJAP	f	
	9 Jan 1975 SJAP	f	
	21 Mar 1975 SJAP		
	9 Feb 1976 SJAP	f	
Swiss 052	8 May 1973 SJAP	f	6
	20 Feb 1974 SJAP	f	
	9 Feb 1976 SJAP	f	
Colony 053	18 May 1973 SJAP	f	6
	16 May 1975 SJAP	f	
Gray Copper Falls	First week of March, 1878 (30 Dec 1882 LaPlata Miner)	2 men caught by slide 1000' above Gray Copper Falls, carried down gulch and buried under 20' of snow; both killed	6
Red Mountain 1 049	14 Dec 1974 SJAP	f	6
	28 Apr 1975 SJAP		
Corkscrew Gulch	12 Dec 1902 Ouray Herald	3 men enroute to Earl mine; 2 caught by slide, 1 buried, 1 rode crest of slide, both survived	6‡
Bonnybell mine	6 Mar 1891 Solid Muldoon	All buildings swept away	6‡
Richmond 086	27 Nov 1972 SJAP		8
	21 Dec 1974 SJAP		
	23 Dec 1974 SJAP		
	9 Jan 1975 SJAP		
McIntyre Gulch 087	12 Feb 1960 CHD	rr	8
	12 Mar 1960 CHD	rr	
	13 Dec 1974 SJAP		
	23 Dec 1974 SJAP	f	
	23 Feb 1975 SJAP		

Site	Date and Source*	Comments†	Map Number
McIntyre Gulch 087 (continued)	14 May 1975 SJAP		8
	12 Jan 1976 SJAP		
Cora Bell 048	4 Dec 1971 SJAP		6
	8 Dec 1971 SJAP		
	4 Jan 1972 SJAP		
	12 Feb 1973 SJAP		
	1 Mar 1973 SJAP		
	9 Mar 1973 SJAP		
	12 Jan 1975 SJAP	f	
	28 Jan 1975 SJAP		
	16 Mar 1975 SJAP		
	31 Dec 1975 SJAP		
	13 Jan 1976 SJAP		
	9 Feb 1976 SJAP	f	
Red Mountain 2 047	19 Jan 1912 Ouray Herald	Large slide "cleaning the whole side of the hill" (047 or 048)	6
	1 Nov 1972 SJAP		
	8 May 1973 SJAP		
	18 May 1973 SJAP	f 2 slides	
	30 Dec 1973 SJAP	f	
	23 Nov 1974 SJAP		
	22 Dec 1974 SJAP	f	
	9 Feb 1976	f	
Guston mine 047	19 Jan 1906 Ouray Herald	600' in length, completely blockaded road	6
	8 Mar 1912 Ouray Herald	1 miner buried under 20' of snow near the school house at the mine, dug out alive	
Galena Lion Gulch 088	8 Mar 1912 Ouray Herald	"Ran from its start at the crest of the range through its entire run of close to 1 and ½ miles, down past the Lion buildings and into the gulch below"	7
	26 Jan 1969 CHD	rr f	
	17 Dec 1971 SJAP		
	1 Dec 1972 SJAP		
	6 Feb 1973 SJAP		
	18 May 1973 SJAP		
	21 Dec 1974 SJAP	f	
	10 Feb 1975 SJAP		
	23 Feb 1975 SJAP		
	13 Apr 1975 SJAP		
	9 Feb 1976 SJAP		
	26 Feb 1976 SJAP		
G Ridge 089	13 Mar 1973 SJAP	f	7
	12 Jan 1975 SJAP	f	
	20 Mar 1975 SJAP		
	23 Apr 1975 SJAP		
Governor Gulch 090	8 Dec 1971 SJAP		7
	13 Nov 1972 SJAP		
	6 Feb 1973 SJAP		
	23 Nov 1974 SJAP		
	21 Dec 1974 SJAP		
	10 Feb 1975 SJAP		
	23 Feb 1975 SJAP	f	
	13 Apr 1975 SJAP		
	6 Jan 1976 SJAP	f	
	9 Feb 1976 SJAP		
King 091	29 Nov 1971 SJAP		7
	8 Dec 1971 SJAP		
	27 Dec 1971 SJAP	aa	
	6 Nov 1972 SJAP		
	7 Feb 1973 SJAP		
	13 Mar 1973 SJAP		
	8 May 1973 SJAP	f	
	23 Nov 1973 SJAP	f	
	23 Dec 1974 SJAP	f	
	6 Jan 1975 SJAP		
	23 Feb 1975 SJAP		
	6 Mar 1975 SJAP		
	13 Apr 1975 SJAP		
	28 Apr 1975 SJAP		
	31 Dec 1975 SJAP		
	12 Jan 1976 SJAP		
	13 Jan 1976 SJAP		
	9 Feb 1976 SJAP	2 slides	
Twin Bridges 092	13 Feb 1959 CHD	aa rr	7
	15 Jan 1960 CHD	aa rr	
	4 Mar 1961 CHD	rr	
	29 Jan 1963 CHD	rr	

Site	Date and Source*	Comments†	Map Number
Commodore Gulch			
Commodore Foote in the Horseshoe	18 Feb 1897 Ouray Herald	Ore house destroyed	7‡
Commodore slide	28 Feb 1902 (21 Mar 1902) Ouray Herald	1 man buried and killed; slide "about one mile in length, several hundred feet in width"	
Barstow mine	19 Dec 1902 Ouray Herald	Bobtail slide (early name for Barstow) narrowly missed dump	7
	28 Apr 1905 Ouray Herald	2 men above workings and buildings were buried, 1 under 30' of snow, by slide which came down small ravine in which they were working, both survived	
	23 Mar 1906 Ouray Herald	Dump covered up	
	8 Mar 1912 Ouray Herald	2 tramway towers, stable, snowsheds at lower tunnel demolished; slight damage to mill and office	
	13 Feb 1919 Ouray Herald	50' of snowshed removed, transformer house slightly damaged	
Barstow slide 093	27 Jan 1957 CHD	rr vehicles involved	7
	9 Feb 1958 CHD	rr	
	13 Feb 1958 CHD	rr	
	14 Feb 1958 CHD	rr	
	10 Feb 1959 CHD	rr	
	25 Dec 1964 CHD	rr	
	15 Dec 1967 CHD	rr f	
	22 Feb 1968 CHD	rr f	
	26 Jan 1969 CHD	rr f	
Yankee Girl slide (Champion Gulch 165)	22 Jan 1886 Solid Muldoon	9 men buried, 4 dead, 5 dug out alive in slide at Dutton mine; slide ran from head of Champion Basin	6
	6 Mar 1891 Solid Muldoon	Silverton Railroad tunneled through avalanche debris	
	18 Dec 1908 Ouray Herald	Freighting sled overturned	
	14 Jan 1911 Silverton Standard		
	30 Dec 1916 Silverton Standard	11 men buried, 1 killed, 1 injured, 9 uninjured	
	12 Dec 1974 SJAP	f	
	28 Jan 1975 SJAP		
Genessee North 046	6 Mar 1973 SJAP	f	6
	23 Nov 1974 SJAP		
	12 Jan 1975 SJAP	f	
	28 Jan 1975 SJAP	f	
	5 Feb 1976 SJAP		
	9 Feb 1976 SJAP	f	
Genessee South 045			
Genessee mine	2 Feb 1883 Solid Muldoon	3 men and 15 mules buried by slide on trail at mine; 2 men and 15 mules killed, 1 man dug out alive	6
	26 Mar 1885 San Juan Herald	Boarding house damaged	
	22 Jan 1886 Solid Muldoon	3 slides struck mine, only 1 did damage: 1 man buried and killed when slide covered mouth of Magnolia crosscut	
	30 Mar 1906 Ouray Herald	Slide from top of Red Mountain 3 crossed railroad tracks and stage road and swept away several telephone poles; road blocked 200' in length, 15' deep	
	14 Jan 1910 Ouray Herald	Several buildings removed	
Genessee South slide	19 Nov 1974 SJAP	f	6
	13 Dec 1974 SJAP	f	
	21 Dec 1974 SJAP	f	
	23 Dec 1974 SJAP	f	
	12 Jan 1975 SJAP	f	
	28 Jan 1975 SJAP	f	
	13 Apr 1975 SJAP		
	9 Feb 1976 SJAP		
Idarado bank slide 094	27 Jan 1961 CHD	rr	7
	24 Jan 1962 CHD	rr	
	31 Jan 1963 CHD	rr	
	20 Dec 1967 CHD	rr	
	24 Dec 1968 CHD	rr f	
	26 Jan 1969 CHD	rr f	
	28 Dec 1972 SJAP	rr	
	9 Mar 1973 SJAP	f	
	12 Jan 1975 SJAP	rr	
	25 Nov 1975 SJAP		
	13 Dec 1975 SJAP		
	14 Dec 1975 SJAP		
	15 Dec 1975 SJAP		
	31 Dec 1975 SJAP		
	6 Jan 1976 SJAP		
	5 Feb 1976 SJAP		
	15 Feb 1976 SJAP		
Willow Swamp 095	22 Jan 1932 Ouray Herald	aa shot by highway department personnel	7
	20 Jan 1933 Ouray Herald	Highway truck with 2 men inside partially buried; men dug themselves out	
	15 Mar 1935 Ouray Herald		

Site	Date and Source*	Comments†	Map Number
Willow Swamp 095 (continued)	22 Mar 1935 Ouray Herald		7
	14 Feb 1936 Ouray Herald		
	11 Feb 1938 Ouray Herald		
	8 Feb 1951 CHD	rr	
	27 Jan 1956 CHD	rr	
	27 Jan 1957 CHD	rr	
	10 Feb 1958 CHD	rr	
	9 Feb 1959 CHD	rr	
	15 Jan 1960 CHD	aa	
	27 Jan 1961 CHD	rr	
	18 Feb 1961 CHD	rr	
	20 Feb 1961 CHD	aa	
	4 Apr 1961 CHD	aa	
	18 Dec 1961 CHD	aa	
	8 Jan 1962 CHD	rr	
	20 Jan 1962 CHD	rr	
	29 Jan 1963 CHD	rr	
	13 Mar 1963 CHD	aa	
	20 Jan 1964 CHD	aa	
	24 Jan 1964 CHD	aa	
	9 Mar 1964 CHD	aa	
	27 Mar 1964 CHD	rr	
	25 Dec 1964 CHD	rr	
	28 Dec 1964 CHD	rr	
	25 Jan 1965 CHD	aa	
	29 Mar 1965 CHD	aa rr	
	30 Dec 1965 CHD	rr	
	2 Feb 1966 CHD	aa	
	17 Feb 1966 CHD	aa	
	25 Jan 1967 CHD	rr	
	25 Jan 1967 CHD	aa rr	
	14 Dec 1967 CHD	rr f	
	20 Dec 1967 CHD	rr f	
	28 Jan 1968 CHD	rr f	
	30 Jan 1968 CHD	aa	
	22 Feb 1968 CHD	rr f	
	21 Dec 1968 CHD	rr f	
	22 Jan 1969 CHD	rr f	
	23 Jan 1969 CHD	aa	
	27 Jan 1969 CHD	rr f	
	31 Jan 1969 CHD	aa	
	6 Mar 1969 CHD	aa	
	17 Mar 1969 CHD	aa	
	16 Mar 1970 CHD	aa	
	22 Apr 1970 CHD	aa	
	22 Feb 1971 CHD	aa	
	16 Mar 1971 CHD	aa	
	29 Nov 1971 SJAP		
	4 Dec 1971 SJAP		
	8 Dec 1971 SJAP		
	14 Dec 1971 SJAP	aa	
	14 Dec 1971 SJAP	aa f	
	27 Dec 1971 SJAP	aa	
	4 Jan 1972 SJAP		
	5 Mar 1972 SJAP		
	6 Nov 1972 SJAP		
	13 Nov 1972 SJAP		
	27 Nov 1972 SJAP		
	5 Dec 1972 SJAP	aa	
	28 Dec 1972 SJAP		
	29 Dec 1972 SJAP	aa	
	9 Jan 1973 SJAP		
	6 Feb 1973 SJAP		
	12 Feb 1973 SJAP		
	13 Feb 1973 SJAP	aa rr	
	5 Mar 1973 SJAP	aa	
	10 Apr 1973 SJAP		
	28 Dec 1973 SJAP	rr f	
	8 Jan 1974 SJAP	rr f	
	10 Jan 1974 SJAP	aa rr f	
	10 Jan 1974 SJAP	aa f	
	11 Feb 1974 SJAP		
	20 Feb 1974 SJAP	aa	
	10 Mar 1974 SJAP	rr f	
	11 Mar 1974 SJAP	aa f	
	20 Apr 1974 SJAP		
	29 Oct 1974 SJAP		
	23 Nov 1974 SJAP		
	29 Nov 1974 SJAP		
	6 Dec 1974 SJAP		
	11 Dec 1974 SJAP		
	16 Dec 1974 SJAP	rr f	
	16 Dec 1974 SJAP	ae (explosives)	
	18 Dec 1974 SJAP		

Site	Date and Source*	Comments†	Map Number
Willow Swamp 095 (continued)	22 Dec 1974 SJAP	rr f	7
	27 Dec 1974 SJAP	f	
	6 Jan 1975 SJAP		
	7 Jan 1975 SJAP		
	11 Jan 1975 SJAP	f	
	14 Jan 1975 SJAP		
	23 Jan 1975 SJAP	ae (explosives)	
	26 Jan 1975 SJAP	ae (explosives)	
	28 Jan 1975 SJAP, CHD	rr f, covered both legs of switchback	
	29 Jan 1975 SJAP	aa rr f	
	1 Feb 1975 SJAP	ae f	
	7 Feb 1975 SJAP		
	11 Feb 1975 SJAP	aa f	
	11 Feb 1975 SJAP	ao (gas exploders)	
	17 Feb 1975 SJAP		
	6 Mar 1975 SJAP		
	9 Mar 1975 SJAP		
	11 Mar 1975 SJAP		
	12 Mar 1975 SJAP		
	13 Mar 1975 SJAP		
	24 Mar 1975 SJAP		
	1 Apr 1975 SJAP		
	4 Apr 1975 SJAP		
	13 Apr 1975 SJAP		
	19 Apr 1975 SJAP		
	6 May 1975 SJAP		
	7 May 1975 SJAP		
	20 Nov 1975 SJAP		
	25 Nov 1975 SJAP		
	29 Nov 1975 SJAP		
	31 Dec 1975 SJAP		
	1 Jan 1976 SJAP		
	6 Jan 1976 SJAP		
	6 Jan 1976 SJAP	aa	
	5 Feb 1976 SJAP	ao (gas exploders) rr	
	5 Feb 1976 SJAP		
	11 Feb 1976 SJAP	aa	
	15 Feb 1976 SJAP		
	24 Feb 1976 SJAP		
	3 Mar 1976 SJAP	ao (gas exploders)	
	7 Mar 1976 SJAP		
Blue Willow 096	6 Nov 1972 SJAP		7
	13 Nov 1972 SJAP		
	20 Nov 1972 SJAP		
	12 Feb 1973 SJAP		
	27 Feb 1973 SJAP	rr f	
	13 May 1973 SJAP	rr f	
	28 Dec 1973 SJAP	f	
	1 Feb 1974 SJAP	f	
	20 Feb 1974 SJAP	rr f	
	16 Mar 1974 SJAP	rr f	
	29 Oct 1974 SJAP	f	
	6 Dec 1974 SJAP	f	
	18 Dec 1974 SJAP	f	
	6 Jan 1975 SJAP		
	7 Jan 1975 SJAP	f	
	10 Jan 1975 SJAP		
	29 Jan 1975 SJAP	aa rr f	
	16 Feb 1975 SJAP	f	
	2 Mar 1975 SJAP	f	
	7 Mar 1975 SJAP		
	9 Mar 1975 SJAP		
	11 Mar 1975 SJAP	rr f	
	13 Mar 1975 SJAP	f	
	13 Apr 1975 SJAP	f	
	24 Apr 1975 SJAP	rr f	
	28 Nov 1975 SJAP	rr f	
	13 Dec 1975 SJAP	f	
	6 Jan 1976 SJAP		
	20 Jan 1976 SJAP		
	5 Feb 1976 SJAP		
	5 Feb 1976 SJAP	aa rr	
	9 Feb 1976 SJAP		
	14 Feb 1976 SJAP		
Blue Point 097	From 1951-1971, the Blue Point reached the highway 102 times, an average of 5 events per year (CHD)		7
	From 1971-1976, the Blue Point reached the highway 48 times, an average of 10 events per year (SJAP)		7
Snowflake 098	30 Dec 1951 CHD	rr	7
	13 Jan 1952 CHD	rr	
	27 Jan 1956 CHD	rr	

Site	Date and Source*		Comments†	Map Number
Snowflake 098 (continued)	8 Jan 1957	CHD	rr	7
	27 Jan 1957	CHD	rr	
	8 Feb 1958	CHD	aa rr	
	26 Dec 1959	CHD	rr	
	14 Feb 1961	CHD	rr	
	17 Feb 1961	CHD	rr	
	15 Dec 1961	CHD		
	22 Jan 1962	CHD	rr	
	1 Feb 1963	CHD	rr	
	31 Dec 1964	CHD		
	19 Dec 1967	CHD	rr f	
	21 Feb 1968	CHD	rr f	
	23 Jan 1969	CHD	rr f	
	8 Nov 1972	SJAP	rr f	
	9 Mar 1973	SJAP	f	
	21 Dec 1974	SJAP	rr f	
	28 Nov 1975	SJAP		
	9 Feb 1976	SJAP		
	10 Feb 1976	SJAP	rr f	
Fence 099	30 Dec 1951	CHD	rr	7
	9 Jan 1957	CHD	rr	
	22 Jan 1962	CHD	rr	
	8 Nov 1972	SJAP	rr	
	9 Mar 1973	SJAP	f	
	22 Dec 1974	SJAP	f	
	11 Mar 1975	SJAP	f	
	5 Feb 1976	SJAP		
Red Mountain 3 044	26 Dec 1971	SJAP	f	6
	2 Mar 1972	SJAP		
	30 Oct 1972	SJAP		
	13 Nov 1972	SJAP		
	13 Nov 1972	SJAP		
	29 Nov 1972	SJAP		
	6 Feb 1973	SJAP		
	10 Mar 1973	SJAP		
	2 May 1973	SJAP		
	11 Jan 1974	SJAP		
	23 Nov 1974	SJAP		
	14 Dec 1974	SJAP	f	
	22 Dec 1974	SJAP	f	
	28 Jan 1975	SJAP		
	16 Mar 1975	SJAP		
	13 Apr 1975	SJAP		
	9 Feb 1976	SJAP	f	
National Bell North 043	26 Dec 1971	SJAP	f	6
	8 Nov 1972	SJAP		
	8 Jan 1974	SJAP	f	
	11 Jan 1974	SJAP	f	
	11 Mar 1974	SJAP		
	7 Nov 1974	SJAP		
	23 Nov 1974	SJAP	f	
	6 Jan 1976	SJAP		
	9 Feb 1976	SJAP	f	
Red Mountain Town (Either Path No. 042 or 043)	16 Feb 1895	Silverton Standard	Slide "starting from the apex of the great Red Mountain and coming down with such force that when it struck the flat which is over a small divide from the town, it cleared this divide and kept on across the main street, knocking one corner of Dan Sheehan's house"	6
	14 Jan 1910	Ouray Herald	1 house destroyed, another had its windows broken out	
National Bell South 042	26 Dec 1971	SJAP	f	6
	6 Nov 1972	SJAP		
	18 May 1973	SJAP		
	28 Jan 1975	SJAP	f	
Red Mountain Pass 040	4 Dec 1971	SJAP		7
	13 Dec 1974	SJAP		
	15 Dec 1974	SJAP	f	
	28 Jan 1975	SJAP	f	
	21 Feb 1975	SJAP		
	6 Mar 1975	SJAP		
	11 Mar 1975	SJAP		
	28 Nov 1975	SJAP		
	6 Feb 1976	SJAP		
	9 Feb 1976	SJAP		
Wagon Box	1 Feb 1963	CHD	rr	7
Treasury Tunnel (Idarado Mine)	27 Jan 1933	Ouray Herald	1 man buried and killed in small "slip" between his cabin and spring	7

APPENDIX IV

MISCELLANEOUS MATERIAL

FATAL SNOWSLIDE

Solid Muldoon 6 February 1891

Wednesday night about half past nine o'clock as a party of four men, Allan McIntyre, John Byron, John Sanderlind and L. Fillius from the Virginius mine were on their way to aid the party carrying down Billy Mahar, and when at a place below Bald Point within fifty feet of where the big slide of '83 came down, encountered another slide and were carried away by it. They were not missed for some time and until a telephone message was sent to Porter's, were supposed to have arrived with the Monarch party conveying the unconscious Billy Maher to that station. On learning at the Virginius mine that the men had not been heard of, a searching party was organized who came upon the tracks of the four men, which were followed until covered by the slide and their fate was then known. All the bodies were found after energetic search and they had been under the white funeral pall for about eighteen hours. Examination showed that at least one, Allen McIntyre, suffered all the horrors of suffocation, as the space above the head for a foot had been melted away by the labored breathing and gasps of the pinioned man. None of the bodies were buried over four feet below the surface and all with arms extended as if warding off the horrible rush of the mighty avalanche. The left hand of Allan McIntyre was uncovered but six inches from the surface, but for all this seemingly light weight above them the bodies of the poor victims were wedged in and held as if in a mighty vise. Ashenfelter sent up two sleds to Porter's after the news reached Ouray yesterday afternoon, and last night the bodies were brought down and now lie at the undertakers awaiting burial. The unfortunate John Byron, whose home is on California mesa near Delta, leaves a wife and five children in poor circumstances. Mrs. Byron will arrive by to-night's train to take charge of her husband's remains. Allan McIntyre leaves a brother "Rory," well known all over this county, and other brothers in the East. The other two unfortunates are not well-known. Sanderlind, it is said, has considerable real estate in Denver. Allan McIntyre, L. Fillius and John Sanderlind will be buried in Ouray to-morrow, the former until spring when the remains will be shipped East. This awful calamity coming close as it does upon the heels of the other has a very depressing effect upon the entire community. It is to be hoped that we have had the only fatal slide that will visit the San Juan this season.

Letter from Walter B. Rogers, Chairman of the Board of Ouray
County Commissioners to his sister
Ouray Herald 6 March 1936

I was near victim of the Camp Bird snow slide and I am going to describe it to you as nearly as I can, and tell you some of the things that happened, so you can tell Mrs. Wood sometime. I know you are a friend of hers and as I was one of Chapp's closest friends I thought that some first-hand information on the situation might help her a little.

Last year during the month of February we had a snow fall of 26½ inches: this year, 98 inches. So you can see that the abnormal amount of new snow must result in slides. Imagine a basin two miles wide, shaped like a horseshoe and surrounded by mountains 1500 feet high. Then think what it means for the snow of these mountains to run in almost one continuous slide for more than half the distance around this huge horseshoe. That is what happened on Monday, February 24, and all the electric clocks stopped at 9:45 a.m. The paths that all ordinary snow slides traveled were too small to carry this great mass and it overflowed and came down at different points where snow had never before been known to run. A number of small houses built some 50 years ago on safe locations, were swept away. The King Lease bunk house and office proved to be located on one of the few safe places in the basin. I say safe, with reservations, because the bunk house was struck, although it was not badly damaged. Only about half of the first floor was covered with four feet of snow. The mill was badly wrecked and out of this wreck, Alec Carrier escaped unhurt, as if by a miracle. The shop building, timber shed and mule barn were badly damaged. The snow sheds between the mill and the mine portal were completely demolished. In the wreckage of these buildings three men were caught. But we succeeded in getting two of them out alive and practically unhurt. The third man, Ralph Klinger the blacksmith, we did not find until we had shoveled snow for hours. Examination showed that he was struck by falling timber and was perhaps instantly killed.

I had been at the mine for some time doing some building underground and having this work about finished. I was going to do some heavy pipe work in the mill and had already completed some of it when Chapp came by some 20 minutes before the slide ran and asked me if I would go to the bunk house and repair a certain door in the kitchen. He mentioned that he would go to the transformer house, thence to the pump house and later we would both return to the mill where he would give me some help on the heavy pipe. Okay, I was just finishing the work on the kitchen door when Chapp came along carrying his web snow shoes. We talked for a minute while he buckled the webbs on his feet and then he went on to the pump house. I entered the bunk house and went to the store room where I engaged for not more than three or four minutes. I was just ready to leave and return to the mill when the slide struck. I realized instantly what it was, but could not tell for a minute which way it was coming. Then the side of the building broke through in three different places and snow rushed into the dining room and kitchen in a mass at least four feet deep. Everything in these rooms except the big kitchen range moved in front of the snow in to a confused mass. There was a terrific wind for a minute and the air was full of fine snow. When the snow stopped moving I discovered Evan Roberts jammed between the range and the dish-up table but not in a position of danger. I left him there for a few minutes while I helped the waitress who had been forced under a table and covered with snow. I located her by her muffled screams.

In the meantime some of the night men had hastily dressed and one after another appeared, to help. We made frantic efforts to locate the cook, but we did not find the body until about 5 o'clock in the evening. It was located then with the aid of some of the rescue party from Ouray.

I took a man and rushed to the mill where I found everything a complete wreck. Fortunately the amalgam room was left intact and I broke the lock here and we secured a dozen shovels. I left some of the men searching for the cook and went to the shop where search was started for men known to be buried there. This group of rescuers were later successful in getting two victims out alive and practically uninjured, but Klinger's body was not recovered until 24 hours later. During this period of confusion and hasty organization at rescue, Chapp failed to appear. I went to see what had occurred at the pump house and about where this building had been I found another great slide had joined at right angles with the one that had wrecked the other buildings. The pump house had disappeared and in the blizzard raging at the time it was impossible to tell where it had been. Later, by measuring and probing with long rods, we located a part of the wrecked building beneath these boards and under some ten feet of snow, we found Chapp's body. Death had been almost instantaneous.

The bodies of the victims accounted for and removed the snow, you can appreciate what we felt in a period of relaxation. We had worked for hours under a nervous tension and during a blizzard. We had eaten little and rest and sleep had been impossible. We just slumped when the last body was recovered, some 36 hours after the slide had run.

THE PASSING OF THE STORM AND OTHER POEMS

Alfred Castner King. 1907. Fleming H. Revell Company, N. Y.

The dying embers shed their mellow glow
Upon the aged face of Dad McGuire,
As he swept out the little piles of snow
And laid a hemlock log upon the fire.
Then followed disconnected colloquies
And witticisms in the form of jest;
The joke is always where the miner is,
The form of levity he loves the best,
For cutting truths have thereby been conveyed,
Where delicacy all other forms forbade.

As some fierce fale that bows the gnarled oak,
Sinks till it scarcely sways the underbrush,
The laughter, incident to jest and joke,
Subsided to a calm and tranquil hush.
All husganded their energy and strength
And smoked in silence for a moment's length.
. . . . . .

THE AVALANCHE

Just then a crashing sound was heard,
That caused each rubby cheek to blanch,
Though no one moved nor spoke a word,
All listening to the avalanche
With apprehensive ears intent,
Knew what a mountain snowslide meant.
Nor marvel that each visage paled,
Nor that the hardy sinews quailed;
These terrors of the solitude
The mountain's timbered slopes denude,
Sweeping the frozen spruce and fir
As with a snowy scimitar;
Nor can the stately pines prevent
Its irresistible descent;
A foe admitting no defence.
A moment passed in dire suspense,
And at its expiration brief,
Each heaved a breath of deep relief;
The snowslide, terrible and vast,
Had precipice and chasm leapt,
And down the rugged mountains swept,
Missing the cabin as it passed.
. . . . . .

The cabin clock had indicated five
When due composure was at length restored;
As evidence that all were still alive,
Queries were made about the "festive board,"
As sailors shipwrecked on some barren rock,
After the first excitement of the shock,
Mingle their words of gratitude and prayer
With speculations on the bill of fare.
No depth of danger man is called to face,
No exultation nor extreme disgrace,
No victory nor depression of defeat
Can shake recurrent Hunger from her seat.

The cabin oracle so often used,
A pack of playing cards, was soon produced.
A turn at whist the afternoon before,
Told who should cut the wood and sweep the floor.
As one of the disasters of defeat,
Washing the dishes fell to Russian Pete.
A game of freeze-out, played with equal zeal,
Decided who should cook the evening meal;
Conspiring cards electing Uncle Jim,
The culinary task devolved on him

Soon from within the oven, partly hid
By embers piled upon the cumbrous lid,
The baking powder biscuits nestling there
With wholesome exhalations charged the air.
A pot of beans suspended by a wire
Swung like a pendulum above the fire,
And answered every flame's combustive kiss
With roundelay of bubble and of hiss,
While in the esculent commotion swam
The residue of what was once a ham.
Though epicures, who yearn for fowl and fish,
May scorn this plain and inexpensive dish,
So free from the extravangance of waste,
Yet succulent and pleasant to the taste,
Of all the varied products of soil,
The bean is most esteemed by those who toil.
Removed in place less prominent and hot,
One might have seen the old black coffee pot,
And watched the puffs of aromatic steam
Rise on the background of the firelight's gleam.
A pleasant sibilation filled the room,
As with an unctuous savor or perfume
The bacon sizzled in the frying-pan,
The bane and terror of dyspeptic man;
But those who labor for their daily bread
Of sedentary ills have little dread.
. . . . . .

All congregated 'round the simple spread
And ate the beans and baking powder bread,
With all the satisfaction and delight
That crown the hungry miner's appetite;
Not gluttony, that enemy to health,
That often follows in the trail of wealth,
But wholesome relish, which the laboring poor
Enjoy, who eat their fill, but eat no more.

The final course was ushered in at last,
When apple sauce around the board was passed;
As Uncle Jim stretched forth his hand across
The table to the dish of apple-sauce,
And on his ample pie tin placed some more,
A hurried knock resounded from the door,
And Steve McCoy, a miner in the camp,
With brow from snow and perspiration damp,
Rushed in, from out the white and whirling waste,
In the excitement incident to haste,
And waiving further ceremony cried:--
"Our cabin has been taken by a slide!"

Steve as a snowy Santa Claus appeared,
Pulling the icicles from off his beard,
Relating, in his intervals of breath,
His tale of dire disaster and of death;
He, and his partner "Smithy," were on shift
Within the tunnel working in a drift,
Chasing a stringer in their search for ore,
Within the hill a thousand feet or more.
The rock was hard and both of them were tired,
The holes were blasted as the work required;
Then to their consternation and surprise,
Upon emerging from the tunnel's mouth,
No hospitable cabin met their eyes
Upon the hillside, sloping toward the south;
The hut of logs where they had cooked and slept
Had been from human eyes forever swept.
Their partners, it were reason to presume,
Were suffocating in a snowy tomb.

"Smithy" had gone to Uncle Bobby Green,
Whose cabin lay the nearest to the scene,
To summon help, and get the boys to go
To probe with poles and shovels in the snow,
To find the living, or if life had sped,
To make the avalanche yield up its dead.
Of partners, Steve and Smithy had but two,
"Daddy" McLaughlin and young Dick McGrew,
Uncle and nephew, patriarch and youth,
Both men of strict integrity and truth.
Four other miners on another lease
Dwelt with the boys in harmony and peace.
Two strangers, who arrived the night before,
Had been invited, till the storm was o'er,
To share their hospitality. Their fate
Had raised the list of dead, perhaps, to eight.

Ere Steve had panted forth his final word,
The boys had risen up with one accord;
The rescue must be tried at any cost,
The chance, however slight, must not be lost.
Steve as a runner who had reached his goal,
Leaned half exhausted on his snowshoe pole,
The while his sturdy auditors began
To don their caps and mittens, to a man,
Then wrapping mufflers 'round their ears and throats,
Put on their clumsy, canvas overcoats.
Thanks to the providence of Dad McGuire,
Who always kept a stock of baling wire
And odds and ends of everything around,
Their feet were quickly and securely bound
With canvas ore sacks or with gunny-sacks,
A thing the miner's wardrode seldom lacks.

THE RESCUE

Forth to the rescue went the miners bold,
Regardless of the tempest wild and brisk,
Regardless of the driving snow and cold,
Regardless of the hazard and the risk;
Facing with stalwart resolution brave
The snowy fate of those they strove to save.

Through gloomy forests, intricate and dark,
Which skirt the confines of the mountain park,
With arduous climb and hazardous ascent
Up through the gulch precipitous and wild
To where the avalanche its force had spent,
In silent haste the rescue party filed.

On such occasions little may be said,
The sternest use subdued and whispered breath,
For silence seems contagious from the dead,
A vague, unconscious reverence for death.
Facing the inconvenience of the blast,
Which whirled the drifting snowflakes as it passed,
The party shovelled; and with one accord
Abstained from converse, no one spoke a work
Till hours of strenuous search disclosed to sight
Six corpses from their sepulchre of white.
The other two, who by some wondrous means,
Escaped with but some trifling cuts and sprains,
Were in the meantime by their fellows found,
Dazed and exhausted in the gulch below,
For storm-bewildered men will grope around
Describing circles in the blinding snow,
Until they sink, their vital forces spent,
And crystal snowflakes weave their cerement.

Six pairs of skies,* each improvised a sled,
On which were placed the stark and staring dead;
As flickering lanterns flashed a ghostly glow

* Norwegian snowshoes

Upon them in their winding-sheets of snow,
The sad procession now retraced its course
Back through the dismal forest, while the blast
Wailed forth a requiem in accents hoarse,
Which shuddering pines re-echoed as it passed.

. . . . . .

With sorely overtaxed and waning strength,
As some spent swimmer struggling to the shore,
The weary party found its way at length,
Back through the forest to the cabin's door.
As Uncle Jim, whose life was ever spent
In ministering to others, had been sent
Ahead, the dying coals had been renewed
With fresh supplies of pine and aspen wood,
And blazed a cheery invitation forth
To those who sought the comfort of the hearth.

The two survivors were the strangers who
Had just arrived the afternoon before;
Their names nor antecedents no one knew,
But western miners do not close the door
On weary travellers, whosoe'er they be,
No matter what their race or pedigree;
The one credential needed in the west
Is--human being, storm-bound and distressed.
The rescued miners, much benumbed and chilled,
To show some signs of conscious life began;
So Dad McGuire, in therapeutics skilled
To cure the maladies of beast or man,
Pursuant of his self-appointed task,
From out some secret depths produced a flask,
Which to the rescued miners he applied
As guaranteed to warm them up inside.
By way of chance digression, should you ask
The nature of the liquid in the flask,
Which, evidently, the boys had used before,
We must admit, the empty bottle bore,
Like most of bottles used in mining camps,
The revenue collector's excise stamps.

. . . . . .

Dazed by exhaustion, comatose and deep,
The two survivors, while the tempest roared,
Were through the gentle ministry of sleep
To normal strength unconsciously restored.

INSTITUTE OF ARCTIC AND ALPINE RESEARCH
OCCASIONAL PAPERS

Numbers 1 through 5, and 11 and 12 are out of print. A second edition of Number 1 is available from the author. Numbers 2, 4, 5 and 11 are available from National Technical Information Service, U.S. Department of Commerce. For details, please write to INSTAAR.

6. *Guide to the Mosses of Colorado.* By W.A. Weber. 1973. 48 pp. Order from the author, University of Colorado Museum, Boulder, Colorado 80309. $2.50.
7. *A Climatological Study of Strong Downslope Winds in the Boulder Area.* By W.A.R. Brinkmann. 1973. 228 pp. Order from the author, Institute for Environmental Studies, University of Wisconsin, 1225 West Dayton Street, Madison, Wisconsin 53706.

†8. *Environmental Inventory and Land Use Recommendations for Boulder County, Colorado.* Edited by R.F. Madole. 1973. 228 pp. 7 plates. $6.00.

†9. *Studies of Climate and Ice Conditions in Eastern Baffin Island.* 1971-73. By J.D. Jacobs, R.G. Barry, R.S. Bradley, and R.L. Weaver. 1974. 77 pp. $3.00.

†10. *Simulation of the Atmospheric Circulation Using the NCAR Global Circulation Model With Present Day and Glacial Period Boundary Conditions.* By J.H. Williams. 1974. 328 pp. $4.75.

11. *Solar and Atmospheric Radiation Data for Broughton Island, Eastern Baffin Island, Canada, 1971-73.* By J.D. Jacobs. 1974. 54 pp. (Out of print.) NTIS PB-248 955/7GA. Paper $4.50. Microfische $2.55.
12. *Deglacial Chronology and Uplift History: Northeastern Sector, Laurentide Ice Sheet.* By A.S. Dyke. 1974. 113 pp. (Out of print.)

†13. *Development of Methodology for Evaluation and Prediction of Avalanche Hazard in the San Juan Mountains of Southwestern Colorado.* By R.L. Armstrong, E.R. LaChapelle, M.J. Bovis, and J.D. Ives. 1975. 141 pp. $4.75.

†14. *Quality Skiing at Aspen, Colorado: A Study in Recreational Carrying Capacity.* By C. Crum London. 1975. 134 pp. 3 plates. $5.50.

†15. *Palynological and Paleoclimatic Study of the Late Quaternary Displacements of the Boreal Forest-Tundra Ecotone in Keewatin and Mackenzie, N.W.T., Canada.* By H. Nichols. 1975. 87 pp. $4.00.

†16. *Computer Techniques for the Presentation of Palynological and Paleoenvironmental Data.* By M. Nichols, M. Eccles, and H. Nichols. 1976 (in preparation).

†17. *Avalanche Atlas: San Juan County, Colorado.* By L. Miller, B.R. Armstrong, and R.L. Armstrong. 1976. 260 pp. 60 plates. $4.25.

†18. *Century of Struggle Against Snow: A History of Avalanche Hazard in San Juan County, Colorado.* By B.R. Armstrong. 1976. 97 pp. 11 plates. $4.50.

†19. *Avalanche Release and Snow Characteristics, San Juan Mountains, Colorado.* Edited by R.L. Armstrong and J.D. Ives. 1976. 256 pp. 7 plates. $7.50.

†20. *Landslides Near Aspen, Colorado.* C.P. Harden. 1976. 61 pp. 5 plates. $3.75.

†21. *Radiocarbon Date List III. Baffin Island N.W.T., Canada.* By J.T. Andrews. 1976. 50 pp. $2.50.

†22. *Physical Mechanisms Responsible for the Major Synoptic Systems in the Eastern Canadian Arctic in the Winter and Summer of 1973.* By E.F. LeDrew. 1976. 205 pp. $4.50.

†23. *Procedures for the Study of Snow Avalanche Chronology Using Growth Layers of Woody Plants.* By C.J. Burrows and V.L. Burrows. 1976. 60 pp. $4.00.

†24. *Avalanche Hazard in Ouray County, Colorado, 1877-1976.* B.R. Armstrong. 1977. 125 pp. 32 plates. $4.50.

†25. *Avalanche Atlas, Ouray County, Colorado.* B.R. Armstrong and R.L. Armstrong. 1977 (in press).

†Order from INSTAAR, University of Colorado, Boulder, Colorado 80309. Orders by mail add 65 cents per title.

Occasional Papers are a miscellaneous collection of reports and papers on work performed by INSTAAR personnel and associates. Generally, these papers are too long for publication as journal articles, or they contain large amounts of supporting data that are normally difficult to publish in the standard literature.

A stylized "ankh," the ancient
Egyptian sign for life, has been
incorporated into the symbol of
the Program on Man and the Biosphere (MAB).