UNITED STATES DEPARTMENT OF INTERIOR

GEOLOGICAL SURVEY

LANDSLIDE DEPOSITS IN THE LOGAN 30' X 60' QUADRANGLE, UTAH, WYOMING AND IDAHO

By

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

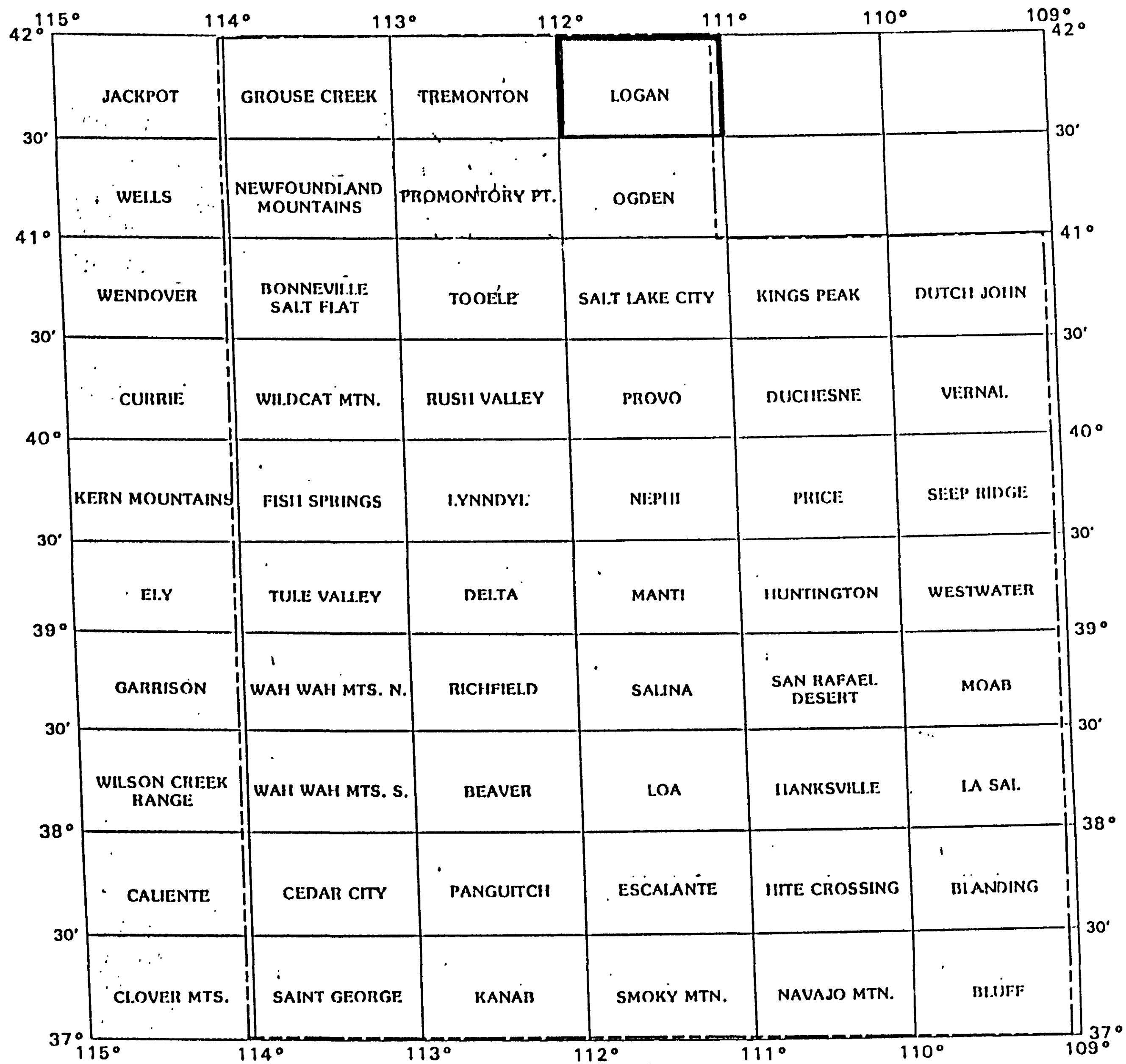
EXPLANATION

/ ? **Landslide deposits**--Areas underlain by landslide deposits resulting from rockfall, avalanching, landsliding, sagging, or flowing of rock and colluvial debris. Many small deposits have not been shown, especially in mountainous areas. Rates of movement vary from slow to rapid. Most landslides in the quadrangle are inactive or moving very slowly. Estimated thicknesses range from less than a few meters for "skin" slides to 100 m (330 ft) for some large deposits. Most of the deposits formed in Pleistocene or Holocene time, but a few larger ones may have begun forming in Pliocene time. Arrows in landslide areas indicate the inferred direction of movement and question marks indicate possible landslide deposits

IDENTIFICATION AND ORIGIN OF LANDSLIDE DEPOSITS

Landslide deposits result from the downslope movement of earth materials in response to gravity. Many occur in or adjacent to areas where movement has occurred before, and old deposits may be reactivated by natural or man-made causes. Therefore, it is important to recognize their presence and to understand some of the conditions that may trigger them.

Landslide deposits can be identified by anomalous topography, drainage, or vegetation patterns as compared to adjacent terrain. These features vary with the type of slide movement, material, age, and other factors, but usually include some of the following: (1) prominent scarp(s) at the head of the slide; (2) surface cracks within the deposit; (3) hummocky ground surface or



INDEX TO 1:100,000 SCALE TOPOGRAPHIC MAPS OF 30' x 60' QUADRANGLES IN UTAH. HEAVY OUTLINE INDICATES LOCATION OF THIS MAP OF LANDSLIDE DEPOSITS anomalous topography; (4) anomalous stratigraphy and structure; (5) disrupted, erratic, or internal drainage, including undrained depressions and seepage zones; (6) lack of vegetation or abrupt changes in type or growth habit of vegetation (curved or tilted trees, for example); and (7) displaced cultural features.

Landslides are classified by type of movement (fall, topple, slide, slump, lateral spread, or flow) and kind of material (rock, debris, or earth). Most landslide deposits are complex and involve a variety of materials and types of movement. Slump-earthflow deposits (fig. 1) are particularly common in the map area.

Landslides are caused by a combination of geologic, topographic, and climatic conditions that increase the stresses acting on the material and (or) decrease the frictional resistance of the material. Some of the conditions favorable to landsliding include (1) soft, weak materials such as shale or weathered rock, especially when overlain by hard, resistant units such as sandstone or gravel deposits; (2) steep slopes, particularly on weak rock or soil units; and (3) the presence of surface or ground water, which adds weight to the material and reduces its internal strength. In addition, man's activities may alter otherwise stable conditions and induce new slides or reactivate old ones; the two most common activities are (1) addition of water, such as from irrigation systems, leaking pipes, and canals, and (2) undercutting or oversteeping of potentially unstable slopes by construction projects.

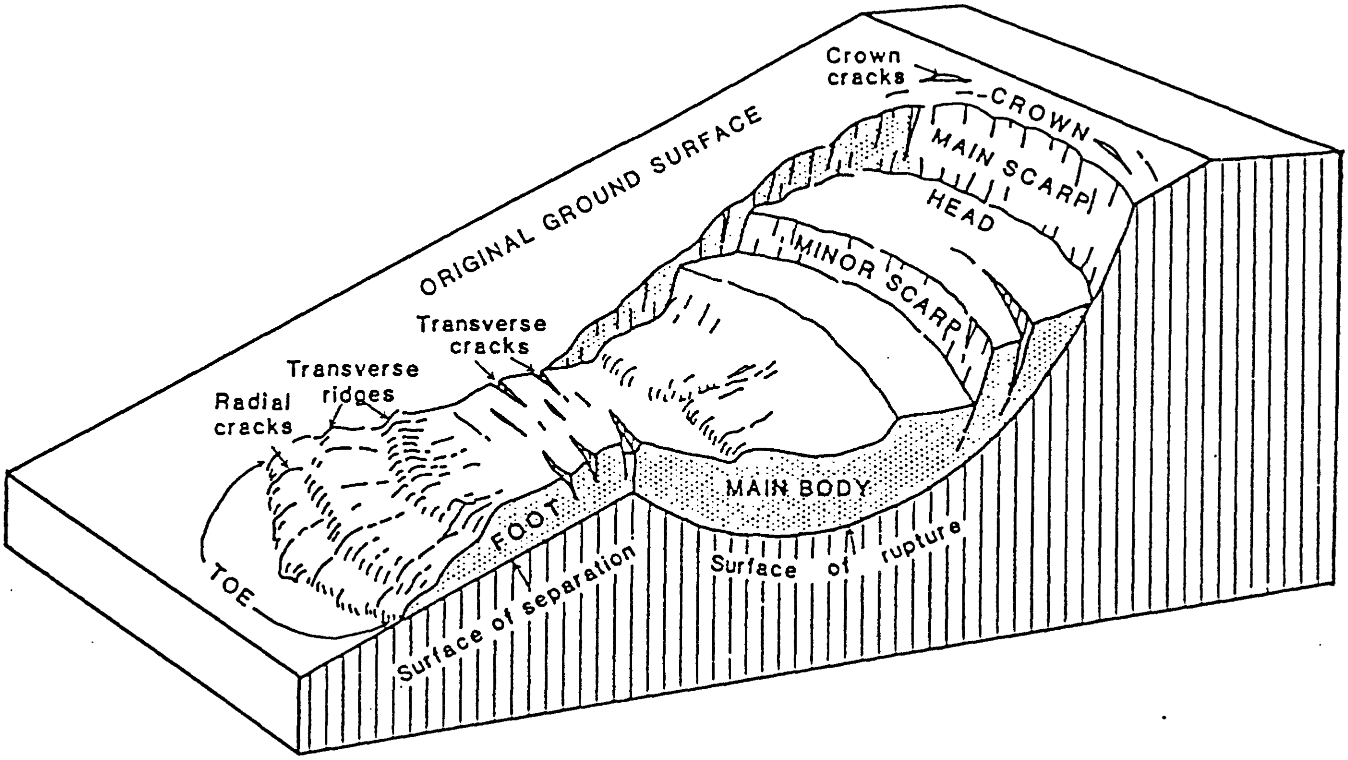
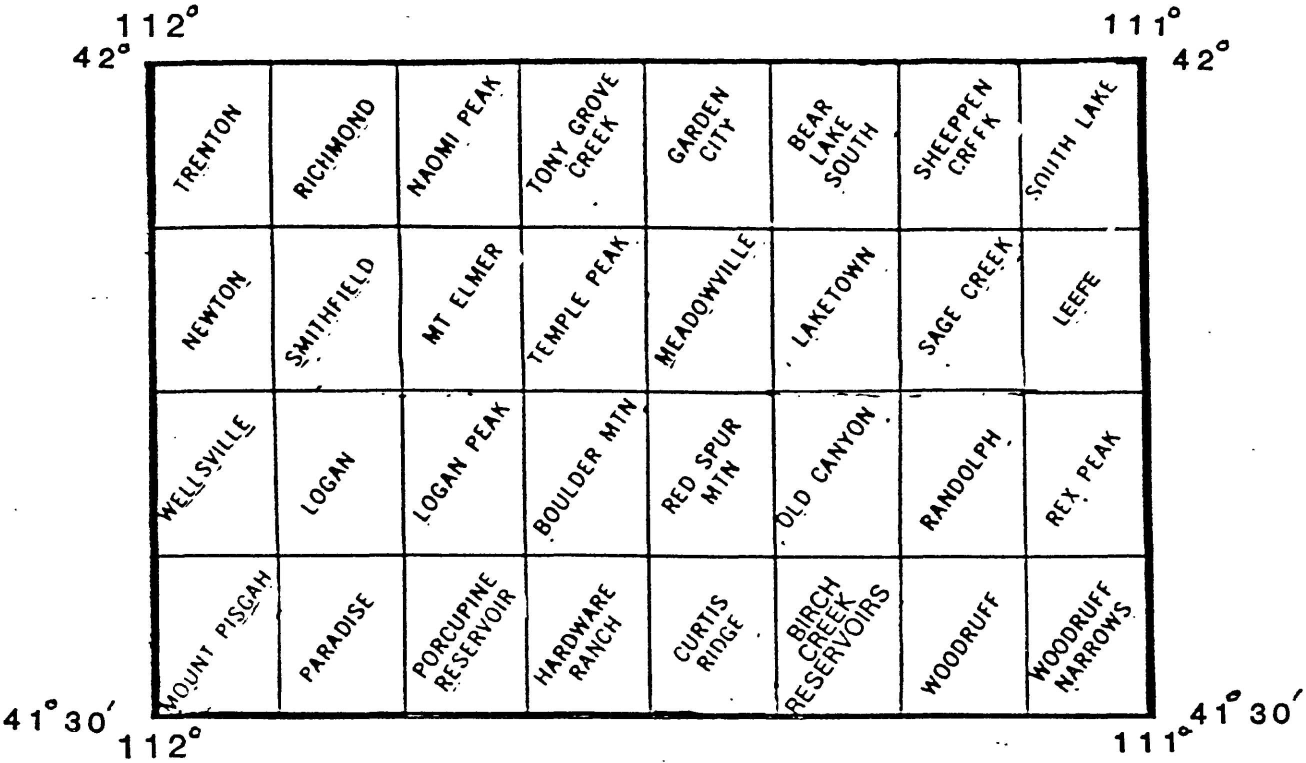


Figure 1.—Features of slump-earthflow. (Modified from Varnes, 1978.)



INDEX TO TOPOGRAPHIC MAPS IN THE
LOGAN 30′ X 60′ QUADRANGLE, UTAH

Landslide deposits in the Logan 30' X 60' Quadrangle were mapped by interpreting aerial photographs ranging in scale from 1:30,000 to 1:36,000 taken during the years between 1958 and 1987. Compilation of landslide deposits was on 1:24,000 scale topographic maps (see index to topographic mapping). The compilations were reduced photographically to 1:48,000 and then to 1:100,000. The following U. S. G. S. aerial photography was used:

GS-VWC, 1959, Scale 1:33,000
GS-VAWS, 1965, Scale 1:36,000
GS-VCAL, 1968, Scale 1:34,000
GS-VFKS, 1986, Scale 1:30,000

Please see index map for location of above aerial photography.

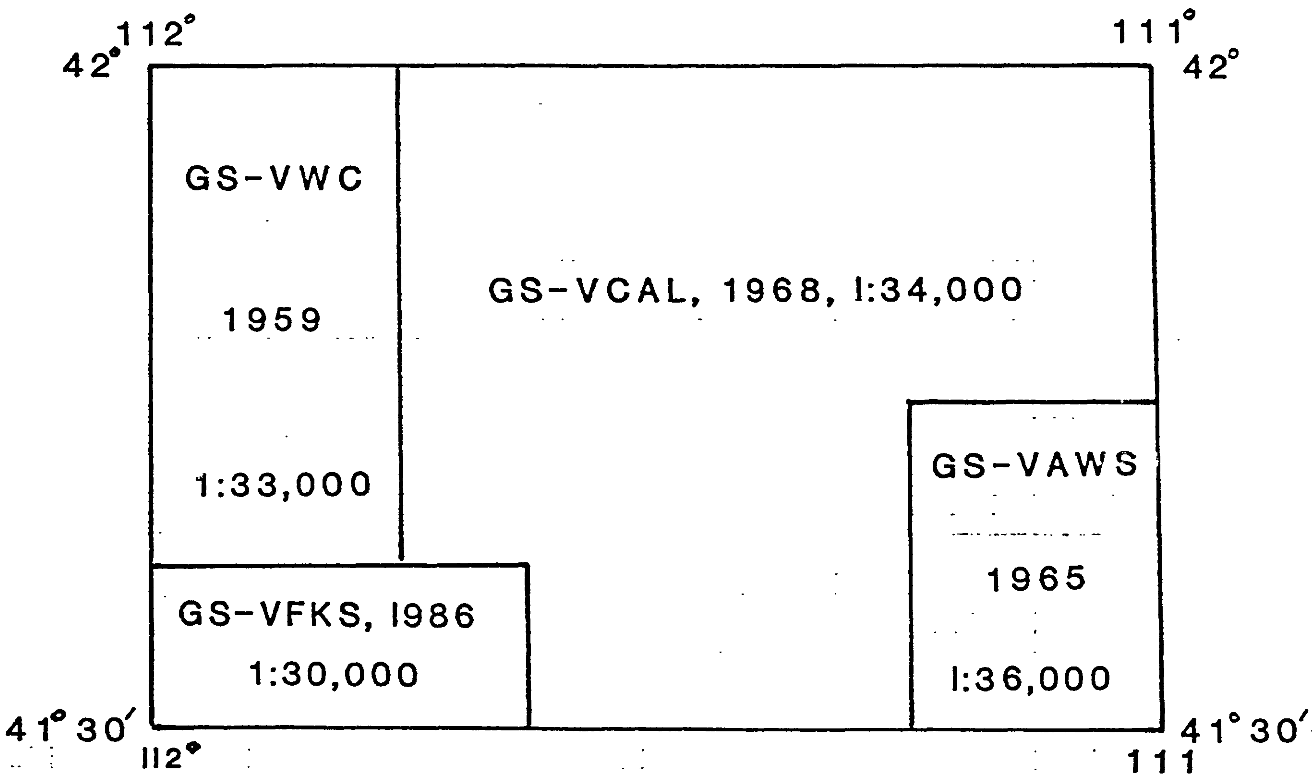
No field check was performed. Previous geologic mapping was examined and incorporated in this map. The following sources of geologic mapping were used:

Dover, James W., 1985, Geologic map and structure sections of the Logan 30' X 60' Quadrangle, Utah and Wyoming: U. S. Geological Survey Report 85-216

Mullens, T. E. and Izett, G. A., 1963, Geology of the Paradise Quadrangle, Utah: U. S. Geol. Survey Geol. Quad. Map GQ-185

Stokes, W. L., 1962, Northwest quarter of Geologic Map of Utah: College of Mines and Mineral Industries: Scale 1:250,000

Williams, J. S., 1962, Lake Bonneville: Geology of Southern Cache Valley, Utah: U. S. Geological Survey Prof. Paper 257-C



INDEX TO U. S. GEOLOGICAL SURVEY AERIAL PHOTOGRAPHY USED TO COMPILE A LANDSLIDE DEPOSIT MAP OF THE LOGAN 30′ X 60′ QUADRANGLE, UTAH