UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

LANDSLIDE SUSCEPTIBILITY MAPS OF EASTERN AND SOUTHERN ALLEGHENY COUNTY, PENNSYLVANIA

(Braddock, Bridgeville, Canonsburg, Curtisville, Donora, Freeport, Glassport, McKeesport, Monongahela, Murrysville, New Kensington East, New Kensington West 7-1/2 minute Quadrangles)

by

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These maps are essentially guides to areas of past landslides, present active landslides, and areas susceptible to additional slides. The maps should serve as guides to conditions anticipated within an area but are not designed to replace detailed studies by competent technical personnel of specific sites planned for any type of development or alteration.

The maps are based on interpretation of 1:12,000 scale aerial photographs (series GS-VDGY) taken in April, 1973. Interpretation of the photographs was checked in the field during the Fall of 1973 and the Spring of 1974. Additional information concerning soil type, depth, slope, and stability was obtained from soil surveys by the Soil Conservation Service, U. S. Department of Agriculture (U. S. Dept. Agriculture, 1973, Taylor et al, 1968). Identification of the stratigraphic positions of the Pittsburgh and other red beds was made from several geological reports (Hughes, 1933, Johnson, 1925, 1929, Richardson, 1932) and a study by Winters (1972).

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OPEN FILE MAPS 74-273 to 74-284

Much of the data presented for the Curtisville, Freeport and New Kensington West Quadrangles are based on a training study of slope stability (1973-74) by Lt. R. Marz, Sp-6 K. Beveridge and Sp-5 M. Tomayko, 319th Engineer Detachment (Hydrology), U. S. Army Reserve, Major W. K. Humes, Commanding.

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The rocks in eastern and southern Allegheny County consist of thick mudstone, siltstone, and sandstone with subordinate thin coal and limestone beds. This grouping is repeated numerous times forming a cyclic repetition of the various units with a total thickness of 700 feet (210 m) to over 1,000 feet (330 m). The rock beds are nearly flat with an overall gentle slope to the south. The oldest rocks, the Conemaugh Group, are in the north and the progressively younger Monongahela Group and Dunkard Group (Permian) are to the south. Poorly-bedded red mudstones, which weather rapidly when exposed to air and water, are widespread and form several zones in the Conemaugh and Monongahela Groups. The "Pittsburgh red beds", from 20 (6.1 m) to 30 feet (10 m) are in the middle of the Conemaugh Group; thinner but significant zones of red mudstones are in the upper Conemaugh Group just below the Morgantown Sandstone and between that sandstone and the Pittsburgh coal. At the base of the Conemaugh Group, between the Brush Creek Limestone and the Upper Freeport Coal, red mudstones also are present. The red mudstones, especially those in the "Pittsburgh red beds", underlie

most of the areas in which moderate to severe slope stability problems occur. Thick beds of gray to brown claystone in the Monongahela Group and the Lower Washington Formation of the Dunkard Group also weather rapidly, giving rise to extensive areas where slopes are not stable.

RECENT LANDSLIDES -- Landslides for which there are historical records are included in this group. Most of the slides have occurred since World War II and are related to extensive cuts and fills made for highways, industrial and commercial development, and housing. The slides range from a few feet in height and width to over 200 feet (60 m) high and wide. Most of the slides result from alteration of prehistoric slides by overloading from fills or by excessive and rapid bulldozer cutting of the toe.

PREHISTORIC LANDSLIDES -- The majority of the slides in the eastern and southern parts of Allegheny County are this type and probably originated during and immediately after the Wisconsin glaciation under extreme climatic conditions that are no longer typical of the area. These slides left their marks in the form of short U-shaped coves with hummocky, low hills at the mouth of the coves. The thick hummocky material has proven to be stable enough to permit homes to be placed upon it as long as the toe is not disturbed. The slopes in the U-shaped cove above the hummocks, however, have veneers of heavy clay 1 to 5 feet (0.3 to 1.8 m) remaining on the plane along which the slide occurred, and are exceedingly sensitive to overloading; commonly they fail when fills are placed on them. Structures founded on bedrock below the slippage plane apparently are stable.

Large areas of Prehistoric Landslides are in the vicinity of Rural Ridge (New Kensington West Quadrangle), along Piersons and Thompsons Runs (Murrysville Quadrangle), in a zone several miles wide extending from Elizabeth (Glassport Quadrangle) northeast to East Pittsburgh and Pitcairn, and in the bluffs along the Allegheny, Monongahela, and Youghiogheny Rivers. Most of these slides involve the "Pittsburgh red beds" except along the bluffs on the Monongahela River opposite Monongahela where the slides are in gray-brown claystones of the Monongahela Group. Similar prehistoric slides in the gray-brown claystones of the Monongahela Group are in a zone about 2 miles (3.2 km) wide from Bridgeville through Castle Shannon to Brentwood and Whitehall.

SLOPES WITH CONSPICUOUS SOIL CREEP -- These slopes commonly are in areas that have short, U-shaped coves similar to those in prehistoric slides but lack the hummocky terrain at the mouth of the cove. This condition probably reflects a prehistoric slide in which the toe has been removed through erosion. The soil in these areas consists of 2 to 5 feet (0.6 to 1.8 m) of heavy clay on top of deeply weathered claystone and mudstone. The weathered rock is very wet and commonly contains flowing water. Most of these slopes have slight to moderate susceptibility to landsliding. Creep is slow but conspicuous and can be greatly accelerated into slides by overloading from fills and structures. Most of the areas of soil creep are interspersed between prehistoric slides.

OUTCROP AREA OF THICK "RED BEDS" -- The primary rocks involved in this unit are the "Pittsburgh red beds" where thick red clay soils cover deeply weathered bedrock. Creep is present on most of the slopes involved and all slopes are moderately to severely susceptible to landsliding. Prehistoric or active slides are common but are shown in separate unite.

ROCKFALL -- Areas of rockfall are most common in cuts for highways and graded areas for industrial and commercial developments where thick, fractured sandstone has been left in vertical or near vertical walls. Rockfalls are also common in steep slopes where thick sandstone overlays claystone or coal. The underlying weak rocks weather rapidly and leave the sandstone overhanging the slope, giving rise to rockfalls.

RILLS -- Highly erodable claystone and siltstone crop out in an area about 2 sq. miles (5 sq. km) northeast of Donora and north of Fellsburg (Donora Quadrangle). The rounded hills in this area are cut by numerous gullies (rills) generally up to a foot (0.3 m) deep. The gullies (rills) are most numerous near the summit of the hills and disappear towards the lower flanks. The erosion undercuts most slopes, rapidly leading to small slides.

MAN-MADE FILLS -- Extensive fills are along major highways and in areas of extensive commercial and industrial development. Many of the fills, especially along highways, are placed on foundations of "red beds" which fail and give rise to extensive fill slides. Fills placed for parking lots, for athletic fields and adjacent to schools, and for yard space adjacent to homes generally are

not compacted to meet standard engineering specifications and failures of these fills through slides or extensive raveling are common. This condition is prevalent in the Braddock and McKeesport Quadrangle.

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