

Manti-LaSal N.F.

2880 Geologic Services

June 17, 1983

Initial Investigation of Landslides in Sanpete Ranger District

Forest Supervisor

On June 13, and 14, 1983, Earl Olsen and I initiated a level 1 geologic investigation on landslide activity in Little Clear Creek Canyon, Twelve Mile Canyon, and Ephraim Canyon. This report documents the results of the initial investigation, summarizes the procedure for monitoring the landslides, and updates the condition of the landslides activity.

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Enclosure

cc: D-1
D-2
Dick Sanders, R.O.

AGallegos:pf

Summary of Initial Investigation on the
Little Clear Creek Landslide,
Twin Lake Landslide, and
Ephraim Canyon Landslide

Little Clear Creek landslide has destroyed approximately $\frac{1}{4}$ mile of Forest System Road #50070, and has scoured the channel 50 to 70 feet (see Figure 1). The landslide has terminated on the road cut and no further movement is anticipated for this year. The channel has worked it's way around the landslide toe, and probably will maintain this path for waterflow.

The landslide in Twelve Mile Canyon (Twin Lake landslide) has completely blocked Forest System Road #50022 (see Figure 2). The road bed has been displaced to the south approximately 41 feet. The landslide toe is converging and narrowing the stream channel. The response of the stream has been to cut the south bank of the channel. This has caused failure of the south slope, and has resulted in a smaller landslide converging from the south side. As both landslides converge in the channel from opposite sides, the stream has been eroding the converging landslides, adding considerable sediment to the stream.

The landslides in Ephraim Canyon consist of two landslides (Upper Ephraim Canyon landslide, and Lower Ephraim Canyon landslide) which cross Forest Highway 8 in five places (see Figure 3). The upper landslide crosses the road in two places, and has displaced the road bed approximately 1 foot on the upper road crossing. The upper landslide movement rate has been approximately 1 to 3 inches per day, and probably will increase throughout the summer. Access through this road will probably be completely blocked within two to three weeks. The lower landslide crosses the road in three places, and has displaced the road bed approximately 3 inches. The landslide crosses the Ephraim City water pipeline, and has broken the line in three places. The waterline will break again within one to two weeks. The landslide crosses a powerline in one place and will break the line within one to two weeks. The landslide is not threatening the channel at this time and probably will not converge in the channel until next year. The lower landslide movement rate has been approximately 1 to 3 inches per day.

Movement rates and other quantitative data on the landslides are being monitored using simple monitors, terrestrial photography, and aerial photography.

The landslide in Little Clear Creek is not being monitored because it has stopped moving, and no further movement is anticipated for this year. The landslide originated in an aspen grove and is approximately 4 acres in size. The estimated volume of the portion of the slide on the road is about 1,000 cubic yards, and 1,000 to 2,000 cubic yards of material above the road is unstable and probably will remobilize next year. After the landslide blocked the stream channel, water accumulation breached the landslide and scoured the channel 50 to 70 feet. The channel parallels the road bed and approximately $\frac{1}{4}$ mile of the road shoulder and road bed have been destroyed, as a result of channel scour. The reason the slope became unstable is because the unconsolidated deposits became saturated with snowmelt during the runoff. The portion of the landslide that covers the road bed consists of aspen trees, silts, clays, and

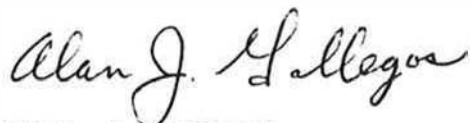
a small percentage of rock fragments. The material on the road is saturated with water and is in a plastic state. The stream channel has worked its way around the landslide toe, and probably will maintain that path throughout the summer.

The Twin Lake landslide is being monitored using extensometers, aerial photography, and ground photography.

The slide is over 1 mile long, and over 1,200 feet wide. The western side of the slide is more active than the eastern side, and will be referred to as the western lobe. The western lobe is about 50 to 60 yards wide, and is converging in the stream channel. The channel response has been to undercut the south side of the stream which resulted in instability and mobility of a landslide mass from the south side of the stream. Extensometer monitors have been placed on the lateral shear zones of the western lobe. Ground photo monitoring stations have been established to monitor the channel below the western lobe. Photo monitoring stations have been established on the eastern side of the landslide. Extensometers have not been installed on the eastern side of the landslide, but they will be installed in the near future. The eastern side of the landslide is not moving as fast as the western lobe, and is not an immediate threat to the channel. The movement rate of the eastern side of the landslide is expected to increase and probably will threaten the stream channel. The reason monitors have been established near the road and channel is because this section has created the biggest impact to resources. More monitors will be installed in other places at a later time.

The Ephraim Canyon landslides cross Forest Highway 8 in five places. The shear fractures across the road were first noticed on May 31, 1983. The Upper Ephraim Canyon landslide crosses the road in 2 places and has displaced the road bed approximately 1 foot at the upper road crossing. Extensometers have been established on the shear zones. A stock water trough is across the shear zone, and has been established as a photo monitor station. The Lower Ephraim Canyon landslide crosses the road in 3 places, and has sheared the Ephraim City waterline in 3 places. The lower landslide straddles a powerline in one place. Extensometers and photo monitor stations have been established at all road crossings, and more stations will be installed in the near future.

The Little Clear Creek landslide has stabilized and monitors have not been established. The landslide probably will not move again until next year. The Twin Lake landslide will continue to move, and could possibly dam the channel. The landslide monitors will be measured on a weekly basis, and reports on the progress will be provided every 7 to 10 days. The Ephraim Canyon landslides will continue to move all summer, and shearing of the waterline and powerline will occur. The landslide monitors will be measured twice a week, and reports on the progress will be provided every 7 to 10 days.



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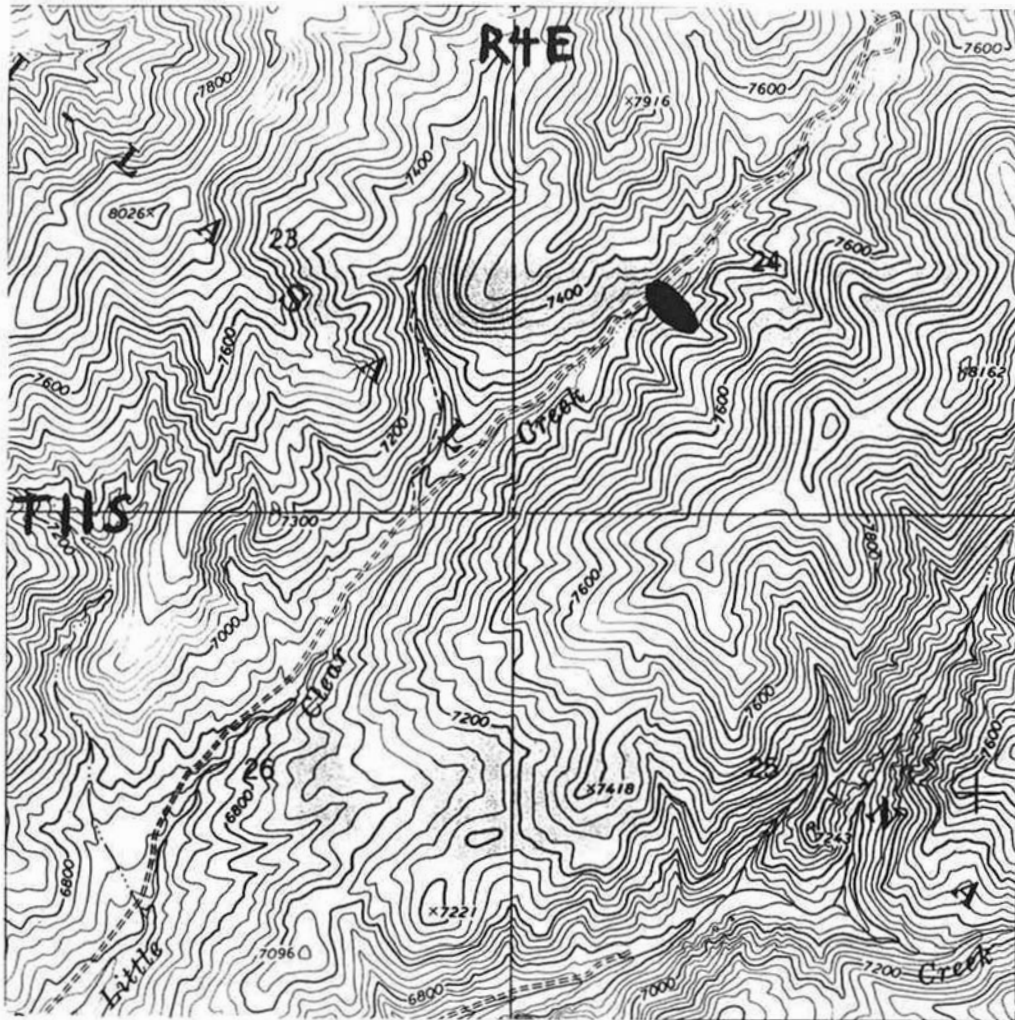


Figure 1. Location of Little Clear Creek Landslide.
Indianola 7.5 Minute Quadrangle.
Scale is 1:24000.

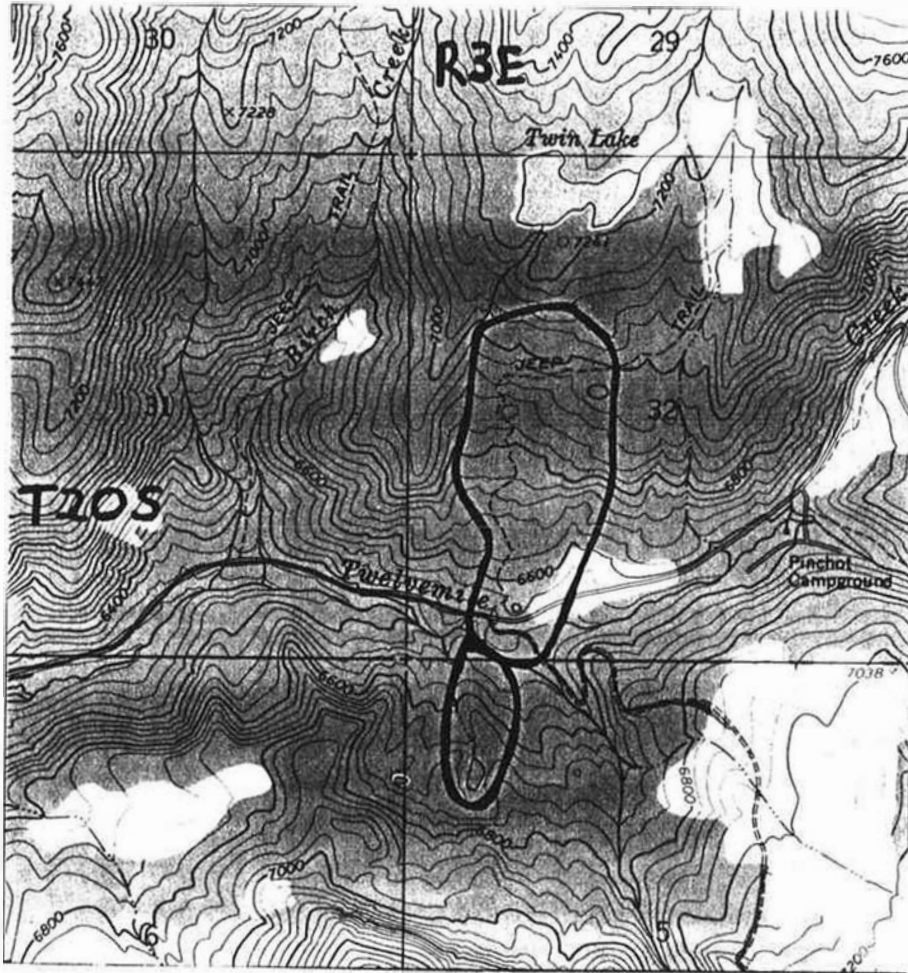


Figure 2. Location of Twin Lake Landslide.
Woods Lake 7.5 Minute Quadrangle.
Scale is 1:24000.

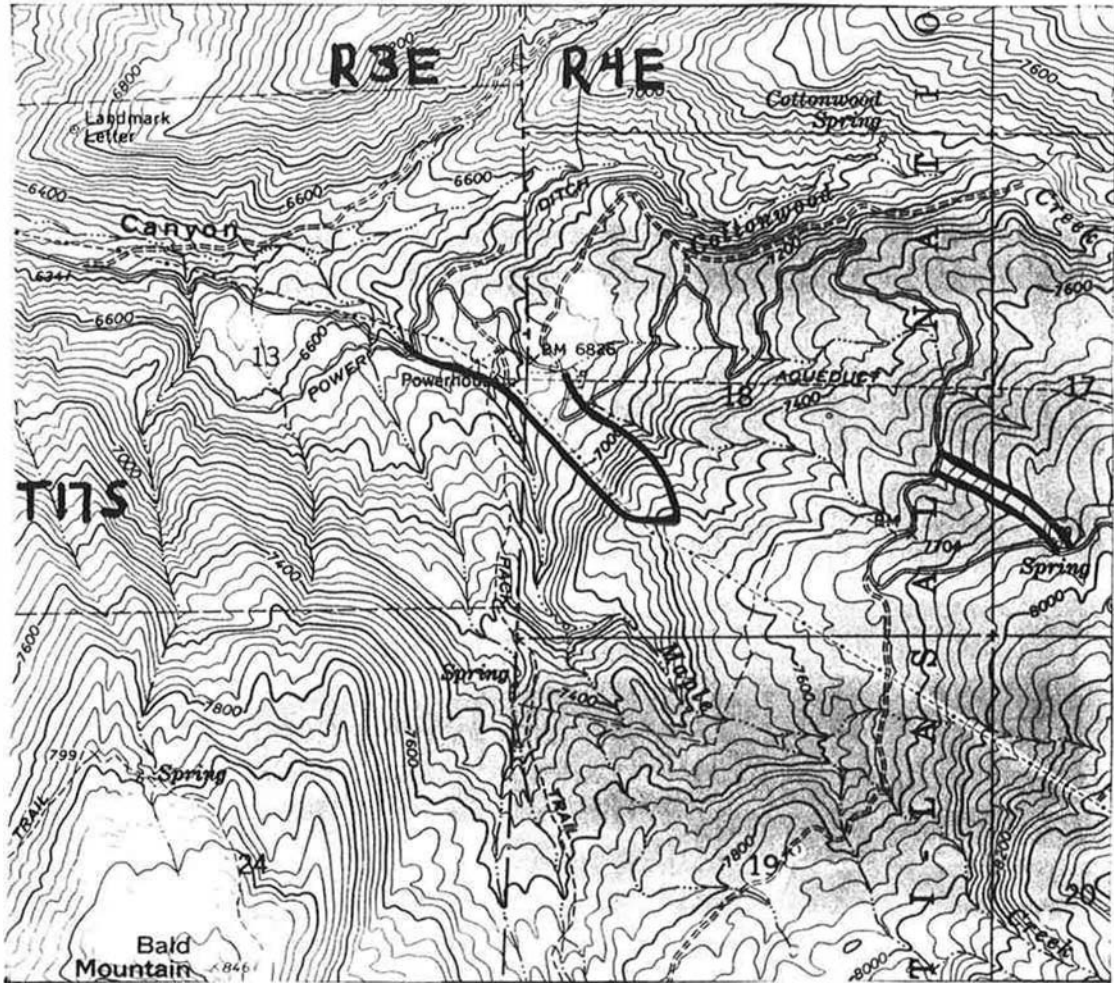


Figure 3. Location of Ephraim Canyon Landslides.
Ephraim 7.5 Minute Quadrangle.
Scale is 1:24000.