

August 4, 2015
Regular Meeting
Item #13a

Public Works
Mill Canyon Road

Mill Canyon Road

July 20, 2015



#13a

July 31, 2015



August 4, 2015





**United States Department of the Interior
BUREAU OF LAND MANAGEMENT**

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**Mill Canyon Road Slide Field Exam
July 24, 2015**

The following are the notes from July 24, 2015 field exam conducted on the Mill Canyon Road Slide. Information is dated as of July 24. Numbers are estimates. No quantitative testing has been done. Not for public distribution.

Slide Description:

During the week of July 5, 2015 a <9 acre hillside broke loose and began a displacement downslope toward Lost Cannon Creek drainage. The slide is on public land administered by the BLM Bishop Field Office. The slide maximum width is 800 feet and the maximum length is 500 feet (head to toe). Mill Canyon road (Mono County) crosses the upper head (top) of the slide. Major surface cracks (faults) appeared along the head (west of Mill Canyon road) and along the north slide perimeter. At the northwest slide corner, where these cracks meet at the road surface, there has been a 25-30 inch drop over time from the original surface elevation.

The slide appears to be rotational with the most active portion of the slide along the west and north perimeter. A portion of the crack on the north perimeter measured 24 feet deep (as measured with tape to bottom) and is probably the maximum depth (using tape measurement) along the slide with much smaller depths along the slide perimeter. It is unknown as to how deep the cracks actually extend subsurface.

At the time of the exam, there was a 8 inch drop at the road surface which had appeared after the County had re-graded the road fault for the third time; re-grading after each subsequent surface drop. The crack along the slide head had extended south crossing Mill Creek road, a crack that was not evident during previous observations. At least 6 minor surface fractures are now evident running diagonally across the road surface spaced throughout the road length. At the slide toe (bottom) it appears that the ground surface has slightly uplifted. There were no water flows coming from the faults at the surface, but the soil below 6 inches was moist to the touch.

The slide is in an alluvial deposit and it is unknown what type of material the subsurface fracture/slip boundary is composed of. These types of slides are generally associated with water features; either substantial storm events or subsurface water flows or both. The local area had storm events either at the beginning or during the initiation of the slide. The upslope terrain has annual vegetation growth with minimal mature shrub vegetation as a result of a 2002 wildfire. It

is not believed that the lack of vegetation (rain runoff surface flow/sheeting) was a direct cause of the slide since the time lapse is 13 years.

There is an old active irrigation canal (3 foot wide bed) 200 feet upslope of the slide head which provides water to Little Antelope Valley, mostly CA Dept of Fish and Wildlife property. The canal usually flows from April until July, and it is unlined. This canal was running during the slide event but was closed a few days before the field exam and was dry. There were no obvious breaches or holes in the canal although a thorough investigation was not completed due to willow growth on both banks. Young willows were growing 10 feet from the downslope canal side and indicates that some canal water is feeding these willows. There appear to be no springs or seeps above the canal. It is unknown if the canal is contributing to any subsurface water flow downslope.

At the toe of the slide slope are two riparian areas near the creek drainage. These zones indicate that there is some subsurface flow providing water to this vegetation.

There was a 2.5-3 magnitude earthquake about 4-5 months ago in the area with residents feeling the shake. It is unknown whether the quake contributed to the onset of the slide.

It is not expected that the slide would mass flow into the drainage at this time; unless substantial storm events contribute to overcoming the frictional forces currently holding the slope at the subsurface slip face. Travel by light vehicles is not expected to contribute to further sliding or a mass slide event.

Currently the Mill Canyon road is closed 250 feet north of the slide with signs and "k" rail blockade. There is a turn-around area at the closure. Mono County was going to sign the road at the Golden Gate/Mill Canyon road intersection with a "Road Closed Ahead" sign. Motorcycles could still get thru.

Todd Touchard, Geo-Technical Engineer, USFS out of Utah provided an overall evaluation of the slide. These comments were summarized and incorporated in the above section.

Road Demands/Issues

The Mill Canyon road provides access to back-country areas for hiking, horse-back riding, hunting, a USFS campground and sight-seeing driving.

During Marine maneuvers in the back-country, an evacuation vehicle is stationed nearest the area to provide quick removal for injured personnel. The road is not used for moving personnel into the maneuver area. Evacuation can be done by another route but requires more effort and time. Loss of access would not stop maneuvers but would prefer access for evacuation purposes.

Wildland fire fighting agency access to back-country for initial attack and extended attack including emergency evacuation during fire operations. This includes light truck and heavy vehicles including water tankers and semi-lowboy with bulldozer.

Sheriff, volunteer fire department and search & rescue access to back-country.

CA Dept of Fish and Wildlife access for studies and irrigation canal maintenance and inspection.

USFS access for fuel treatment operations. Projects on hold

Private land owner access to property for rock quarry operation. Infrequent access.

Walker residences downstream of Lost Cannon and Mill Creek. Under a mass slide event, it is possible that Lost Cannon Creek could be blocked by the slide and then dam the creek flow. A small lake forming behind the dam could slowly percolate through the dam, weakening the material until breaking through with a flood moving downstream. Another scenario is that the water would eventually top the dammed material and slowly flow over the top eventually eroding the dam resulting in a slower water release downstream.

Options:

Should the slide stabilize or substantially reduce movement, open the road, sign it for caution and monitor. This would require periodic inspection especially during rain events or earthquakes. Use some type of surface movement monitoring equipment.

Close road to all travel except for emergency or agency use. Build permanent locking gate. Monitor slide.

Hard close the road to all travel until stabilization project is undertaken or alternative access is developed.

Associated with the above, the irrigation canal should be eliminated as a potential source of groundwater flow. This can be accomplished by either: piping along a section above the slide or some type of lining.

Rebuild and open closed thru road to the south in USFS H-T forest. Road is closed and not on H-T Travel Management Plan. Unknown time extent, process, and cost.

Re-route road to the west. An alternative would be to build new road west of Mill Canyon road. The road would be about 4,000 feet long and would side-hill (bench-cut) into Lost Cannon Creek drainage, crossing the creek and then connecting to the existing road. It would have to cross the irrigation canal twice and then the creek. The side-hill would be on moderate to steep slopes with two existing cut drainages. This has not received a serious on the ground look at this time.

A second alternative utilizes the above route but rather than going into the Creek drainage, it dives straight down a 60% slope to the creek. Probably too steep for normal use.

Conduct preliminary soil study by digging one or two trenches near the road as deep as possible with a backhoe. Once dug, install a slotted pipe and then backfill. Pipe would allow for monitoring any water infiltration and amount. Cost: \$3,000

Conduct preliminary soil study using drill coring to determine; substrate material, contact/slip zone, and presence of water. Probably would require some road/pad construction. Cost: \$30-50K.

Proceed with stabilization project where either the upper slope with the road is stabilized or the whole slope is stabilized. Cost: \$1-5 Million.

Under a mass slide event and blockage of Lost Cannon Creek drainage, and resulting ponding of water; consider immediately blowing the dam with explosives.

Attendees:

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- Notes were compiled, summarized and written by Larry Primosch