

Geologic Report
Soil Slumping below Swan Creek Irrigation Co., Canal
Rich County SCD, Utah
by
Daniel H. Griswold
November 25, 1962

The canal crosses a slumped area for most of its length in the east half of Section 8, T. 14 N., R. 5 E., S14E4M. (Please see slump scar outlined on accompanying geologic map). The irrigation company has been troubled by frequent washouts in this reach, and wishes to stabilize the canal if possible. A geologic reconnaissance of the area was made in company with Delbert Hansen, WUC, and Dwayne Downs, Engineer, SCS, June 11-13, 1962. They assisted with information on springs, the recent relocation of the Garden City pipeline and accounts of difficulties in maintaining the canal. U. S. Geological Survey Bulletin 923, Geology and Mineral Resources of the Randolph Quadrangle, Utah-Wyoming, furnished by Bob Bridges, Geologist, SCS, was a valuable reference in the investigation. It is hoped the following observations will help to develop a method of treating the unstable section of the canal.

Conclusions: The problem results from local slumps both above and below the canal. The slumps from above are caused by a combination of surface flow, saturation and undercutting by the canal. The slumps below are caused by irrigating directly from canal through weeps or turnouts that saturate the canal bank and hillside. Washouts are usually from slumps blocking the canal and causing overflow.

The canal is flowing in or on a shale with behavior characteristics of highly plastic silt, MH. Leakage from the canal will be small if the left bank has adequate thickness, 8 feet or more, and is properly compacted.

Slumpage from above may be reduced by diverting surface flow away from the area and flattening canal cut slopes.

Slumpage below the canal may be reduced by using Hansen's idea of piping water down to a head ditch on contour at least 50 feet from the canal.

Lining of portions of the canal may be required if there are sections where the Wasatch shale has been removed and the underlying limestone or quartzite forms the canal bottom. No such sections were observed.

Discussion: The Swan Creek canal here has cut through steeply sloping hill wash of limestone and quartzite gravel, cobble and boulders in a matrix of brown clay and is flowing in shale. The hill wash varies in thickness from two to four feet and lies upon variegated red and gray shale which I believe is a remnant of the Tertiary Wasatch Formation. The shale is soft and a roll test of material from the west bank of the canal about 100 feet north of the bridge indicates it is highly plastic silt, MH. The shale dips gently

south or southwest and lies unconformably on steeply southwest dipping upper Cambrian limestone and quartzite as shown in the accompanying geologic cross section along line A-A. The thickness of Wasatch shale remaining is not known.

Exposures of the variegated shale of the Wasatch, now designated the Cotton member, are peculiarly subject to slumping. Minor slumps are characteristic in its outcrop area in central and northeastern Utah. The outline of the old slump scar has been inferred from field examination and stereoscopic study of aerial photos.

The canal has been dug into the hill from the "new cut" for approximately 1/4 mile upstream (north). This section and the new cut have an outside or left bank 8'-12' or more in width and appear stable. The old reaches, for about 1/4 mile upstream and downstream from the recent construction, however, have very thin left banks, low places in the bank, and open cobble lined weeps through the bank used as turnouts. These conditions are potential "set ups" for future slumps and washouts.

The canal bottom is a cobble and boulder "pavement" developed through inability of the water to move the larger rocks. Flow in the canal thus tends to erode the banks instead of the bottom. Erosion of the right bank steepens the hill slope and causes slumping into the canal which backs up water and causes overflow and failure of the left bank at low points.

No exposures of bedrock were observed along the canal and losses, other than through weep turnouts and thin canal banks, do not appear to contribute to the problem. If canal loss is suspected, a check of the inflow and outflow of the reach should be made with Parshall flumes. If losses are occurring, the leaking section will need to be located by test pits in the canal bottom.

Based on absence of bedrock exposures along the canal, it does not seem likely the springs, 2-3 c.f.s. and 1/2 c.f.s., issuing at the foot of slope west of the highway are the result of loss from the canal.

Harold H. Grunwald

Attachments

Reviewed and approved.

By _____ Date _____

cc = Geo. Lawrence, Salt Lake
Bob Bridges, Salt Lake
D. S. Winn, Logan
Delbert Hansen, Randolph
Swan Creek Irrig. Co., Randolph

