

DAM AND RESERVOIR FAILURES: THE VAIONT LANDSLIDE (21)

<http://www.sci.port.ac.uk/geology/staff/dpetley/imgs/enggeolprac/vaiont1.html>

On October 9, 1963 a landslide with a volume of ~270 million m³ moved into the reservoir behind the recently completed 265m-tall Vaiont dam in Italy - the world's tallest double thin arch dam. The mass moved approximately 500 m at speeds as great as 30 m/sec. It displaced the water in the reservoir (115 million m³ of water prior to failure) and drove a wave up the opposite side of the valley. The wave destroyed the village of Casso, 260 m above lake level before over-topping the dam by as much as 245 m. An estimated 30 million m³ of water then descended down the valley as a wave initially more than 70 m tall, completely destroying the villages of Longarone, Pirago, Villanova, Rivalta and Fae. About 2500 people were killed. The dam still stands today: the reservoir slopes failed, but the dam did not. This disaster sparked renewed attention to slope stability around the world. The walls of the valley of the reservoir were particularly susceptible to large landslides: (a) the slopes were steep (~28°), (b) the rock layers dip toward the valley floor, (c) the rock consistent of highly fractured, clay-rich limestone with abundant dissolution features, allowing a well-connected hydrologic system to exist, and (d) the site was the scene of prior large slides in the geologic past. The possibility of a landslide into the reservoir was recognized in advance but estimates of the maximum possible size of a slide underestimated the size of the actual slide by two and one-half orders of magnitude. Surveying measurements and water table (piezometric) measurements made *after* the reservoir began to be filled showed that changes in the reservoir level caused near simultaneous changes in the water table in the valley walls, and that increases in the elevation of the reservoir level corresponded to increased displacement rates of the slide mass on the south valley wall. The failure of the dam can be attributed to inadequate recognition, characterization, and evaluation of the conditions of the slopes flanking the reservoir before and after the reservoir was developed.