separately, and it is said that much sulphide ore which might have been removed at small cost was left in the mine. For reasons already mentioned and also because the spelter made from the oxidized ore was superior to that made from the sulphide ore, the failure to remove all the blende was not considered much of a loss.

Mining

As the oxidized ore lay at the surface in a mixture of residual clay and limestone boulders it was natural to begin mining by the open-pit method. At the Ueberroth mine, where the ore was first discovered, about 100,000 tons of ore was removed in this way. On the exhaustion of the large surface pocket the ore was followed downward along the crevices in the limestone, which were filled with loose oxidized ore. On account of the falling of large masses of limestone, open-pit mining was finally abandoned. Shafts were then sunk and the ore hoisted through them. At the Ueberroth and the Old Hartman mines inclined slopes were driven to the deeper ore bodies to the southwest, and from them levels were opened along the vins.

The incompetency of the enclosing limestone strata required much timbering to hold the rock in place, and many shafts and drifts were destroyed by the settling of great masses of rock. At the Ueberroth mine several shafts had to be abandoned for this reason.

In sinking the shafts and slopes and in driving the drifts it was necessary to remove some of the limestone. Some of this material was hoisted and thrown on the dump, but a considerable portion was put back in the mine to fill old stopes and to underpin loose rock.

Almost at the beginning of mining the water problem became serious. The shattered and cavernous character of the limestones of the Saucon Valley permits easy passage underground so that much water from the upper part of the valley readily found its way into the mines as they were deepened.

At a depth of 46 feet the flow of water was very strong, and at a depth of 150 feet it became necessary to install what was at that time the largest pumping engine in the world. This engine, called "The President", was started Jan. 29, 1872, and was run continuously until Oct. 28, 1876, and for a few short periods later. This one engine had a calculated pumping capacity of 12,000 gallons a minute from a depth of 300 feet although it rarely if ever raised that quantity. Most of the time it pumped less than 9,000 gallons a minute. It was never necessary to run all the pumps at their full capacity in order to keep the works free of water. Some published figures that give the amount of water pumped are greatly exaggerated.

The quantity of water pumped from the mines suggested a remote source for some of the water, but calculations show that after allowing for 40 percent evaporation of the average rainfall of the entire drainage basin of Saucon Creek the amount of water pumped from the mines formed only about one-third of the remaining water falling in the valley. Hence there seems to be no reason to doubt that all the mine waters were of local meteoric origin.

When the big engine was pumping the water from the Ueberroth mine at a depth of 225 feet, the owners of wells and springs in the