

occupied by the canal depends very largely upon the physical peculiarities of the slates of the Utica and Hudson river groups. These consist of material that disintegrates into particles so small as to be readily suspended in water, giving it a very persistent milky appearance. The erosion of rocks of this formation is very rapid in water though not in air, they being reduced to an impalpable powder and thus floated away and deposited elsewhere in the form of fine clays such as are so abundant in the Mohawk and Hudson valleys. It was the presence of an abundance of material of this variety, of different geological epochs, together with a large flow of water, that brought about the excavation of Lakes Erie and Ontario. With a smaller flow of water, and consequently on a smaller scale, Seneca and Cayuga Lakes were eroded in like manner in material of this same species. As it exists in the Mohawk and Hudson valleys this material does not present any serious difficulties of classification from an engineering point of view.

From the head waters of the Mohawk westward for a hundred miles, or more, the case is different. The location of this portion of the canal is determined by the red and blue shales of the Salina Period, a formation having peculiarities probably not encountered in engineering work on any such scale in the whole world. The material looks like red and blue clay of modern origin, but is nothing of the sort. It belongs to a very ancient period of geological history, and was compacted through long ages under superimposed strata that have since been swept away by ice and like action, leaving the por-

tions traversed by the canal nearly bare. The undisturbed layers thus compressed are much harder than any clay, although broken fragments lying loose on the surface disintegrate readily. Unlike clay, it contains much lime, and hence is technically known as marlyte. The presence of this lime gives it much firmer consistency when compacted in ledges, and on the other hand causes it to slack and disintegrate more readily in detached fragments. The peculiar nature of this formation is still further shown by the fact that it is everywhere associated with the presence of salt, the chief brine wells and salt deposits in the United States, having commercial value, being located in it. Certain layers of these shales also are the chief source of gypsum and land plaster. Large and beautifully transparent crystals of selenite, a very pure form of gypsum, were found in a cutting made by the West Shore railroad in these red and blue marlytes about three miles west of the village of Lyons. From this it is apparent that the chemical nature of these shales is very unusual, sulphur, lime, silicate of alumina and common salt entering into their composition in varying degrees. It would appear that volcanic action must have been concerned to some extent in bringing about such a mixture containing sulphur. Indeed, near Syracuse, where this formation reaches its largest and most typical development, the Green Lakes at Manlius and Jamesville appear to be the remnants of true craters, like the Green lakes of Madagascar, which are plainly associated with evidences of volcanic action. Other indications of igneous action have been