It is hoped that the spectroscopic investigations will be extended to include specimens from many more occurrences.

If the zinc ore was precipitated from ascending magmatic waters, it is somewhat difficult to explain why it is mainly found above the argillaceous strata of the basal Beekmantown, the most impermeable rocks of the region, and not below as reported to be the case in the explorations of the Correll property.

The writer feels that existing data do not permit any dogmatic or positive statement as to the source of the mineralizing agents of the Friedensville deposits.

The deposits as originally formed consisted almost entirely of pyrite and sphalerite. Calamine, smithsonite, limonite, greeneokite and much of the quartz, calcite, and dolomite are all secondary and are the products of alteration by surficial waters. Water charged with silica converted part of the sphalerite into calamine, and carbonic acid changed other portions into smithsonite. In all probability part of the sulphide ore was oxidized to the sulphate and removed in solution, though the richness of the calamine and smithsonite veins seems to indicate that little of the zinc was removed. Part of the pyrite and marcasite was converted into ocherous limonite, but the greater part seems to have been converted into ferrous sulphate and carried away in solution. Some of this sulphate may have been reprecipitated as pyrite or marcasite at lower levels, but evidence of this is lacking.

No indication of the sulphide enrichment of the zinc ore has been reported, and it is doubtful whether the sphalerite ore has been appreciably enriched. If it was not, the sulphide ore should maintain approximately the same tenor to the lowest depths of profitable mining. In few regions is the sulphide enrichment of zinc ores of much consequence and the Friedensville deposits seem to be no exception. Some secondary sphalerite in the form of small honey-yellow crystals that line the walls of small cavities in the limestones can frequently be found, but it is of no economic importance. Crystals of quartz, calcite, and dolomite occur in a similar manner. As to the paragenesis of the minerals, pseudomorphs of smithsonite after dolomite, and quartz crystals that are coated with smithsonite containing cadmium show the later formation of the zinc carbonate.

Near the surface most of the sulphide ore was changed, although some veins that probably were more compact and less permeable were altered to a depth of only a few feet. Great masses of calamine found at the bottom of the Ubberroth mine, about 200 feet deep, show an unusual depth of alteration. There is a strong probability that some of the more permeable veins will yield oxidized ore at considerably greater depths inasmuch as it has been recognized to the extreme depth of 975 feet.

As any vein is followed downward the blende makes its appearance at the side of the vein, whereas the calamine and smithsonite occupy a continually narrowing portion of the center of the vein, thus showing that the downward-percolating waters found an easier passage through the middle of the vein than at the sides. The presence of sulphide and oxidized ores at the same level was a serious inconvenience on account of the necessity for mining the two kinds of ore