

Building Heave Due to Oxidation of Sulfide Minerals in Shale

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Expansive shales which cause building heave due to the oxidation of the contained sulfide minerals are not a widely known problem. Little research has been done and there is a paucity of literature on this subject. Two areas of reported problems in the United States are Pittsburgh, Pennsylvania (Pennsylvanian age shales) and Cleveland, Ohio (Devonian shales). Many of these shales, although not all, are dark in color. The sulfide minerals are often microscopic in size. Iron sulfide contents of the expansive shales usually exceed one percent by weight. However, damage is reported for sulfide contents as low as 0.1 percent.

When identified in the planning stage of a project, the state of practice is to avoid the expansive horizons by setting building levels below, or well above, the potentially expansive materials or to remove them by excavation. If this cannot be done and the building owner recognizes there is some risk of heave, the expansive shales are sealed with concrete or bitumastic materials to attempt to prevent oxidation.

Research is needed to relate potential heave and uplift pressures to the thickness, sulfide content, and size of the sulfide minerals. Since autotrophic bacteria appear to be involved in the weathering of the sulfide minerals, the use of chemicals to provide conditions unsuitable for the bacteria needs to be studied.