

big that the well was finally abandoned and it is now a veritable geyser of oil, mud and water, throwing out, it was estimated on November 1st last, 14,000,000 barrels of an emulsion of oil, mud and water.

Other instances could be given here of petroleum deposits directly connected with vulcanism, but the one just cited is enough to prove that oil fields are not "commonly remote from great indications of volcanic activity" as it has been contended (²⁸), and that on the contrary enormous quantities of oil are obtained in the porous sediments or tufacious sands around volcanic necks. When the petroleum is found, however, in the igneous, volcanic or crystalline rocks themselves it is impossible to find more than small quantities, as the necessary porosity to store these products in large enough amounts to be economically valuable is, of course, wanting on account of the imperviousness of the crystalline texture of these rocks. These small quantities of hydrocarbons are nevertheless found in many regions all over the earth in whatever small cavities, cracks and seams is co-existent with the crystalline texture of the igneous, volcanic and crystalline rocks and even in microscopic inclusions inside of their crystals.

On the contrary, in the sedimentary strata of all ages some of the sediments, principally sandstones, conglomerates, limestones and sandy shales are occasionally quite porous rocks, and therefore may and do form catch basins, tanks or reservoirs for gaseous or liquid petroleum forcing their way under strong pressure through the fractures, fissures, seams and joints of the strata. These reservoirs when thus filled constitute the important petroleum deposits, the commercial oil—and natural gas-fields. They are found indiscriminately in hundreds and hundreds of horizons in the strata of all ages, from the oldest paleozoic to the alluvial gravels and sands of the Quaternary. The natural gas or gaseous petroleum in these reservoirs is always found to have a heavy pressure, sometimes as high as 1,500 pounds to the square inch and in this connection the most important fact to be noted is that this pressure increases in each particular field with the depth of the porous reservoir or "sand" containing the petroleum, indicating that its source is from below. It has been proven (²⁹) be-

28. The Data of Geochemistry, U.S. Geol. Surv. Bulletin, No. 330, p. 633.

29. Journ. Can. Min. Inst., Vol. VI, pp. 96-99, and Vol. III, pp. 68-89.