

Structural Geology of the Saint-Flavien Natural Gas Reservoir in the Québec Appalachians Fold-thrust Belt: Analogy with the Chartreuse Massif, French Alps

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At the surface, the Saint-Flavien wells are located over the allochthons close to the Appalachian structural front. At depth, wells cross the allochthonous rocks and the SE-dipping Logan's Line to reach the reservoir in Lower Ordovician Beekmantown dolostones of the fold-thrust belt. Oriented core analysis, a 3D-seismic survey and borehole oriented logs (miroscanner, dipmeter) give information on the structural geology. The intensity of fracturing is correlative with the type of rocks. Dolostones are more fractured than limestones and shales. Brecciated dolostones are present in the upper Beekmantown B-unit. Most of the fractures are vertical but subhorizontal bedding-parallel ones are present. Vertical fractures have two dominant trends, N70 and N00, parallel and orthogonal to the fold axis. Dolostones form an open anticline limited to the NW by a major reverse fault. Isochron and depth maps on top of the Beekmantown B-unit (between 1300 and 1475m subsea) exhibit an ENE-trending culmination dissected into two domes by a N15-trending sinistral normal oblique-slip fault. The core of NE dome is affected by a minor reverse fault. Minor N15-trending faults to the south die out along this latter reverse fault. A minor back-thrust is present in the northern part of the NE dome.

The Chartreuse Massif is formed by Mesozoic platform rocks folded and thrust during the Alpine orogeny in Cenozoic. It is dissected by three major NNE-trending thrust faults and ENE-trending dextral normal oblique-slip faults which are interpreted to be contemporaneous with the latest stage of the deformation responsible for the folding and thrusting.