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Interactive comment on "From oil field to geothermal reservoir: First assessment for geothermal utilization of two regionally extensive Devonian carbonate aquifers in Alberta, Canada" *by* Leandra M. Weydt et al.

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Geothermal potential of Hinton, Alberta are has been recently getting attention in the scientific papers and in the Alberta media (CBC etc„). In fact, the area is in the deepest part of the Western Canada Sedimentary Basin WCSB and due to this large depth and at moderate geothermal gradient temperatures as high as 150 C were measured (Kushibor et.al., 1984). It takes some 5km drilling to get it in the deepest rather highly mineralized waters in the basinal sediments. The area has just an average geothermal gradient (see Figure 1) of 30-35 C/km.The geothermal gradient in the Western Canada

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Sedimentary Basin WCSB ranges from 20 to 55 °C/km, with an average value of 33.2 °C/km (Weides and Majorowicz et al, 2014).

In the commented article the citation: "The area around the town site of Hinton in the western region of the Alberta Basin (Fig. 1) is of particular interest because it has heat flows of up to 80 mW m-^{2} and temperatures up to 150 C at depths of about 5km" , credited to (Majorowicz and Weides, 2014) requires some corrections:

1.The reference should be Weides and Majorowicz (2014) as given below in the References.

2, Heat flow in the cited map in Weides and Majorowicz (2014, their Fig. 3) for the studied area of the Alberta basin is not reaching 80 mW m-^{2} It is less than 70mW m-^{2}. The heat flow in the WCSB generally ranges from 30 to 100 mW/m2, being 60.4 mW/m2 on average according to Weides and Majorowicz (2014). The heat flow values has been corrected for paleoclimatic surface temperature forcing (Majorowicz et., al. 2012).

The attached average geothermal gradient map (Fig.1) shows that there are much 'hotter' areas in the WCSB in Alberta and these are to the north and east of deep part of the foreland basin in the Hinton area. These, however, will not give us temperatures of 150 C in the sediments, as the basin is shallower in the highest heat flow, geothermal gradient areas to the north. In Hinton, we need to drill 5km at some modest 30 C per km temperature gain to get to 150C. However, such deep wells are expensive and economics of drilling two 5km wells into the deepest sedimentary horizons will end up with extremely high mineralized waters and rather poor porosity/permeability .(Lam and Jones, 1985). Therefore, it may not be feasible for the geothermal power project. Drilling shallower wells into better conditions of Devonian aquifers of some 2-4km will come with the tradeoff of lower temperatures (<120 C) not feasible for economic geothermal power production. These would be good for district heating applications (Majorowicz and Moore, 2014).

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.....Figures

Figure 1. Average geothermal gradient. Color scale is in °C/km.

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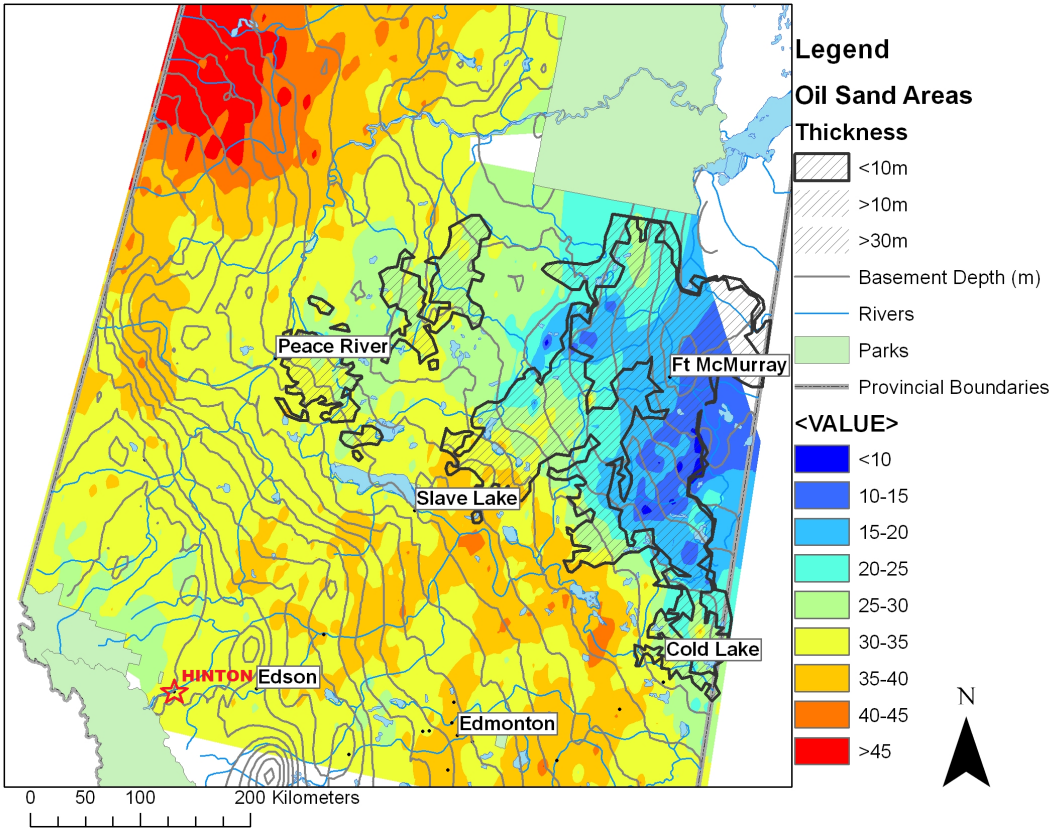

Fig. 1.

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