Increased likelihood of induced seismicity in highly overpressured shale formations

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SUPPLEMENTARY INFORMATION

APPENDIX

Table S1 provides a compilation of pore-pressure gradients reported in the literature for a number of major unconventional fairways in North America. Like the Montney and Duvernay fairways in the Western Canada Sedimentary Basin, a number of these plays include regions of high overpressure. Only the Haynesville fairway, however, is characterized by isolated higher pressures than those considered in this study. It is also notable that possible hydraulic-fracturing induced seismicity has recently been identified within the Haynesville play (Walter et al., 2016).

SUPPLEMENTARY REFERENCES (APPENDIX)

Cander, H., (2012), Sweet spots in shale gas and liquids plays: Prediction of fluid composition and reservoir pressure: AAPG Annual Convention and Exhibition, Long Beach, California, Search and Discovery Article #40936.

Havens, J., 2007, Mechanical properties of the Bakken Formation: MSc thesis, Colorado School of Mines, 110 pp.

Walter, J.I., Dotray, P.J., Frohlich, C. and Gale, J.F., 2016, Earthquakes in Northwest Louisiana and the Texas–Louisiana Border Possibly Induced by Energy Resource Activities within the Haynesville Shale Play: Seismological Research Letters, v. 87, p. 285-294.

Wang F.P. and Gale, J. F.W., 2009, Screening criteria for shale-gas systems: Gulf Coast Association of Geological Societies Transactions, v. 59, p. 779–793.

SUPPLEMENTARY TABLES:

**Table S1.** Formation-pressure gradient for selected unconventional plays.

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| Unconventional Play | Pore Pressure Gradient  (kPa/m) |
| Barnett, Fort Worth Basin | 9.7 – 11.8a |
| Marcellus, Appalachian Basin | 6.8 – 15.8a |
| Bakken, Williston Basin | 14.7b |
| Eagleford, Maverick Basin | 14.9 – 16.7c |
| Haynesville, Gulf Coast Basin | < 20.3b |
| Montney, WCSBd | 7-19 |
| Duvernay, WCSBd | 12-20 |

a  Wang and Gale, (2009).

b Havens (2007).

c Cander (2012).

d WCSB denotes Western Canada Sedimentary Basin. Formation-pressure gradient values are from this study.

Additional data files (Excel):

**Table S2**. List of earthquakes within the Montney fairway that are potentially induced by hydraulic fracturing.

**Table S3**. List of earthquakes within the Duvernay fairway that are potentially induced by hydraulic fracturing.