Monitoring environmental effects of shale gas exploitation at Wysin in Poland.

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Environmental effects of shale gas exploration and exploitation are extensively studied in the framework of "Shale Gas Exploration and Exploitation Induced Risks" project (SHEER, H2020-LCE 16-2014-1). One of the main component of this study is on-site monitoring of the effects at Wysin shale-gas play of Polish Oil and Gas Company in Poland. This includes monitoring of seismicity and water and air quality.

Surface seismic monitoring network consists of 6 surface broadband (BB) seismometers and 25 surface short-period (SP) seismometers The SPs are assembled into three small aperture arrays with 9, 8 and 8 stations, respectively, distributed in a triangle geometry at a distance of about 2-4 km from the hydrofracturing rig. Each array is complemented with one BB station. The three remaining BBs are located up to about 5 km from the rig. In addition 3 borehole broadband seismometers are located in three shallow boreholes.

The groundwater monitoring makes use of four wells, which reach a main underground water reservoir. Three complementary datasets are collected: continuous monitoring of borehole data, laboratory analyses of water samples and field monitoring of water quality parameters. The continuous monitoring makes use of down-hole probes, which have been installed in each borehole. The probes record absolute pressure, temperature and electrical conductivity. In addition, a barometric probe has been installed above ground to record atmospheric pressure in order to allow conversion of absolute pressure to a water level. After collection, water samples are sent to an accredited laboratory for analysis. The field monitoring is undertaken during the sampling visits. Whilst the borehole is being purged, physico-chemical parameters are monitored using a multi-parameter probe. This measures and records temperature, specific conductivity, pH, dissolved oxygen and oxidation-reduction potential within the water. Hydrocarbon gas content within the water is below detection limits for methane, ethane, ethene and propane gases.

Air pollution monitoring is performed by means of an automatic station. The station is situated east from the Wysin rig at the distance of some 1200 m. This distance is appropriate in order not to measure a direct emission of pollutants. The station monitors the content of NO, NO_2, NO_x, CO, PM10, O_3, CO_2, CH_4, NMHC and Radon.

At the beginning of SHEER project in May 2015, there was one vertical well at the site, reaching gas-bearing shale formations at the nearly 4km depth. Further on two horizontal wells, each of about 1.7km length, were drilled (late Autumn 2015) and fracked (June – August, 2016). This time table has provided the opportunity to record background seismicity and baseline levels of water and air quality, and then to record the immediate and delayed effects of hydrofracturing operations. The monitoring will continue at least 1.5 year after completion of technological activity at the site.