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Engineering Optimization for SVE of Methane in a Large Shopping Mall in São Paulo City, Brazil

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Background/Objectives. A total of 17 soil vapor extraction (SVE) systems were in operation in a big commercial center in the city of São Paulo in the beginning of 2015, after some environmental studies performed in the area in 2010 and 2011 identified the presence of methane gas in the surface immediately below the floor (sub-slab) per deep wells (1.5 m) monitoring. The area of the big commercial located in a floodplain area of the Tietê River in the São Paulo city, received throughout the 1960s and 1970s soil resulting from excavations of several works in São Paulo's capital, in addition to solid waste from civil construction and municipal solid waste. After 4 years of 17 SVE systems operation (2011-2015), the scenario was very different comparing to the initial one, considering the methane gas concentration in the sub-slab and depth subsurface portions are significantly lower. Therefore, an engineering optimization study was suggested to evaluate the potential shutdown of some of the SVE systems.

Approach/Activities. Aiming to perform a reduction in the energy consume of the 17 SVE systems installed in the shopping mall and based on the good results after four years of continuously operation of the systems, an engineering evaluation was done in each of the 17 systems (drain + extraction blower) collecting the following data: flow rate of extraction gas, vacuum, electric current and rotation of the blower, distance between the drain and the blower (head loss in the piping), presence of methane gas in the surroundings of the drain and methane gas concentration in the extracted gas. A comparison matrix was created including all the data and performance graphs were done for each SVE system, aiming to create specific performance groups (low, reasonable and high performance). Based on the table and graphs, some of the SVE systems were defined to be tested in terms of shutdown and/or reduction in flowrate/vacuum. Field monitoring actions took place to evaluate the results of the proposed changes in the defined SVE systems.

Results/Lessons Learned. The comparison matrix created to evaluate the SVE systems provided useful information to the definition of the targets SVE (drain + extraction blower) systems which should be tested in terms of shutdown/reduction: 5 systems (from a total of 17) were selected to be shutdown. After the implementation of the engineering suggested actions, the field monitoring tests did not indicate significantly increasing in methane gas concentration neither relative pressure in the subsurface. After some months from the shutdown of the five systems, the risk of methane gas intrusion continued to be managed and the commercial center was able to reduce the energy consume from almost 20%.