

Groundwater Baseline Design and Optimization in Support of Hydrocarbon Exploration Projects

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Abstract

A variety of hydrocarbon exploration programs commonly takes place where domestic water wells are present. Relevant examples include hydraulic fracturing, coal bed methane developments and seismic surveys. These exploration and development activities are often associated with both valid and misplaced perceptions of their potential to cause impact to domestically usable aquifers. With the objective of protecting regional water resources, CAPP strongly encourages the implementation of baseline programs.

A key benefit of conducting baseline groundwater programs is that it helps guard against unfounded subsequent water well owner claims of impact. Potential for claims is largely defused by conducting a baseline survey. Nevertheless, a few claims can emerge, and these seem to range from best intentioned to agenda-driven. A major pitfall in this regard is that local groundwater quality either may be already of a naturally marginal quality or be already impacted by agricultural activities. Who or what caused a given impact: natural processes, farmyard activities or hydrocarbon exploration? With the usual incorporation of proper engineering, drilling and completions practices, impact from hydrocarbon exploration activities is rather unlikely to occur. Similarly, to focus a baseline program only on hydrocarbon-related indicators, when natural and/or agricultural factors could actually be more relevant, can leave an operator vulnerable to a claim.

In this potentially complicated interplay of circumstances, a baseline program needs to have a certain pre-emptive forensic content. Two case histories are presented whereby the initial baseline programs provided enigmatic results when considered in the light of subsequent water well owner complaints. To address both complaints, the two wells were re-sampled with a forensic emphasis. In both cases, it was definitively determined that a somewhat complicated interplay of natural phenomena and system maintenance factors accounted for the well user's experiences, not hydrocarbon exploration activities. Given that it is much more likely that natural and/or lack of proper maintenance will result in poor quality well water, baseline programs need to contain indicator parameters that address commonly occurring nuisance conditions that can detract from water quality.