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Criteria for Robust Mercury Sampling and Analysis; A Review of Case Studies and Lessons Learnt

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Abstract

A set of criteria is proposed that will deliver a robust sampling and analysis programme for the trace measurement of mercury in reservoir fluids. Criteria are presented in the context of examples of sub-optimal mercury analysis, where lessons can be learnt.

This paper reviews a number of anonymised case studies to identify and highlight the limitations of flawed mercury analysis programmes which have either utilised offsite analysis, incorrect sampling techniques or failed to consider mercury analysis early enough in an appraisal and development schedule. Examples are presented from the last five years which illustrate the most commonly seen failings and the lessons that can be learnt from them. Potential consequences, including costly production delays and contaminated products, are demonstrated.

In each instance, due to incomplete or incorrect sampling and analysis, initial mercury estimates were demonstrated to be incorrect; generally, this was only identified once the field had commenced production, without mercury mitigation measures in place. In all cases, further testing was required to establish representative mercury concentrations, and identify the root cause of the initial inaccuracies. In some cases, mercury levels previously reported to be low during exploration and appraisal testing were subsequently found to be considerably higher during testing and clean up of development or production wells. Deferral of start-up, while mercury abatement measures were explored and implemented, significantly delayed production from the reservoir.

Based on the lessons learnt from these examples, a simple set of criteria has been identified which, when considered during the development of a test campaign, maximises the chance of obtaining representative and reliable mercury data, and avoids the most common pitfalls. Increased numbers of higher quality samples, analysed at the wellsite following structured measurement and quality control procedures, would improve the reliability of generated data and thus reduce the uncertainty around reservoir concentrations. The findings of this paper will add clarity and structure to the design of mercury-target sampling and analysis campaigns, either standalone or part of a wider test programme.