Avoidance of operational sampling errors in drinking water analysis

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ABSTRACT

The internal audits carried out in the first half of 2019 in water laboratories as part of quality accreditation in accordance with ISO/IEC 17025:2017 showed a high frequency of adverse events in connection with sampling. These faults can be a consequence of a wide range of causes, and in some cases, the information about them can be insufficient or unclear. Considering that sampling has a major influence on the quality of the analytical results provided by water laboratories, this work presents a system for reporting and learning adverse events. Its aim is to record nonconformities, errors, and adverse events, making possible automatic data analysis aiming to ensure continuous improvement in operational sampling. The system is based on the Eindhoven Classification Model and enables automatic data analysis and reporting to identify the main causes of failure. Logic programming is used to represent knowledge and support the reasoning mechanisms to model the universe of discourse in scenarios of incomplete, contradicting, or even unknown information. In addition to suggesting solutions to the problem, the system provides formal evidence of the solutions presented, which will help to continuously improve drinking water quality and promote public health.

Key words: drinking water, Eindhoven Classification Model, Knowledge Representation and Reasoning, logic programming, sampling errors, water quality

HIGHLIGHTS

- An adverse event reporting and learning system for water sampling is described.
- The Eindhoven Classification Model is extended and adapted for water sampling.
- Logic programming is used for knowledge representation.
- The proposed system can deal with insufficient or ambiguous information.
- The system allows to identify the relevant issues behind the errors that may occur.