6 Lessons Learned

Guidance documents produced by ITRC typically concentrate on a single, focused, environmental remediation-related topic, such as vapor intrusion monitoring and mitigation, sediment remediation, or in-situ remediation of a certain recalcitrant compound. The document concludes by offering a series of "lessons learned" by those researchers and practitioners who have experienced successes and failures over the course of developing and implementing the specific work described in the ITRC document. This document is not remediation-related in the conventional sense; rather, it presents a broad overview of a variety of technologies that may be used to detect and quantify methane emissions from oil and gas facilities or related infrastructure. Therefore, instead of lessons learned, there are several over-arching observations that the team made during the preparation of this document, which are discussed here.

Regulations often drive the implementation of methane leak detection programs to ensure safety and compliance. Methane emissions may require different detection approaches and systems, with unanticipated conditions leading to the utilization of a given detection technology for a purpose that was not anticipated when it was originally developed. As experience is gained in enforcing current federal and state regulations to mitigate methane releases, changes in the regulations may be identified by both the regulators and the regulated industries to facilitate the adoption of new technologies. This is leading to the continuous development and adaptive implementation of improved methane detection and quantification technologies.

Some developing methane detection and quantification technologies are evolving to quantitative, continuously recorded, data-intensive systems. Cost-benefit analyses, which are required for USEPA rule-making, will require an alternative methane detection and quantification technology to achieve results that are equivalent to or better than that of a currently approved method. Furthermore, detection technology testing or evaluation protocols may have certain environmental limitations, which in turn may mean that a new technology is approved only for certain applications or geographical areas. There will be renewed opportunities for researchers, academics, industry, regulators, interest groups, and others to continue to improve not only the methane detection and quantification technologies themselves, but also the related regulations and the evaluation methodologies that link specific technologies to specific regulatory requirements. Including key stakeholders in the planning and implementation of the regulatory planning process is vital to the success of methane detection and control.

Partly in response to both new technologies becoming available and regulations increasingly requiring the adoption of new technologies, the methodology for evaluation and selection of a methane detection and quantification technology presented in this document will need to be revised and/or expanded. This document might be updated, or a new document may need to be developed, to include these technologies as they are developed and deployed and new information becomes available through laboratory testing and field use, including quantitative or semi-quantitative performance evaluations, quality assurance/quality control parameters (e.g., accuracy, precision, etc.), technology limitations and challenges to utilization, and other parameters.

Lastly, it is likely that methane detection and quantification technology and its application will undergo a substantial paradigm shift that markedly changes either the specific technologies deployed or how they are utilized. For example, many of the technologies described in this document rely upon a human "platform" to place an instrument within a specific distance of a known or suspected methane emissions point, often in an inhospitable or remote environment, to obtain a specific type of data. In the not-too-distant future, detection and deployment technologies may evolve to a point that all of the data of interest can be obtained by mounting a new type of technology onto a mechanical platform that is able to operate autonomously, guided by artificial intelligence that alerts an operator in a remote location only when an abnormal condition is detected. As these new detection and deployment technologies become available, the recommendations in this document would need to be substantially updated.

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