

## Evaluating and Managing Environmental Risk: A Hydrogeologist's Perspective

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### Summary

A hydrogeologist's role can span a broad spectrum of oil and gas projects, depending on the scale of the development. Hydrogeologists are typically involved in drinking and process water development, permitting and management, environmental investigation and risk assessment, and compliance monitoring. From an environmental risk perspective, these broad skill sets can be applied to: asset retirement obligation for corporate accounting purposes; establishing liabilities associated with an acquisition or merger; satisfying regulatory requirements such as the Licensee Liability Rating; prioritizing environmental management activities related to existing and aging facilities; and guiding facility development or expansion decisions. A variety of approaches are used to evaluate environmental risk and typical approaches, such as site file reviews and risk matrixes, will be reviewed to demonstrate their strengths and weaknesses. A holistic approach to evaluate risk on a regional scale using a geographic information systems (GIS) approach will also be discussed. This regional approach considers a variety of contaminant sources, facility history details, hydrogeological pathways, and groundwater and surface water receptors that would be too complex to understand using other approaches. Case studies of environmental issues at upstream oil and gas sites will be presented with a focus on hydrocarbon and salinity sources, hydrogeological pathways, and land and water based receptor risks.