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## 9. MONITORING AND VERIFICATION

### 9.1 Introduction

The minimum requirement for any CCS monitoring programme is that it should provide the information that satisfies regulators that legislative requirements are being met by a storage project. However, these requirements are usually qualitative and somewhat imprecise. For example in the European Union, operators are required to demonstrate “absence of detectable leakage” and other jurisdictions have a range of similar phrases. In the United States there is a strong concern with the security of underground sources of drinking water (USDWs) and the EPA requirement is that monitoring must “demonstrate the non-endangerment of USDWs”. Clearly—and quite properly—the interpretation and application of regulations will take account of a range of current concerns and perceptions of risk. Hence the type of monitoring programme that is required for a given project, and the way in which its data are interpreted against the regulatory requirements, may well be unique. Common to all jurisdictions, however, is the need to demonstrate “no leakage” (although this is qualified with a

variety of adjectives and adverbs), as well as more routine requirements for health and safety associated with high concentrations of CO<sub>2</sub>.

A key part of a regulator’s considerations is the risk assessment for a storage operation. Logically, monitoring should focus on the highest risks, although in the absence of much experience with actual CCS projects, these risks have to be largely assessed by analogy and by expert opinion. Ideally the risks would be quantified as quite specific and predictive scenarios, so that it is possible to know exactly how to look for the risks and how to rule out their occurrence (see Chapter 8).

The social and political context will affect the scope and stringency of regulatory requirements, and operators may also be involved in separate negotiations with powerful but informal activist groups. As a result of these, measurements which monitor some perceived risk may be promised, where the risk is not only tiny but, to the extent that it exists at all, is poorly understood. Regular monitoring of the biota in streams at beauty spots is an actual example of this in one CCS project.

Related to the political context is “defensive monitoring”. It is nowadays quite possible for activist groups to undertake