

Based on currently available information, we are not aware that at least substantial restoration of groundwater quality is technically impracticable from an engineering perspective at any of the designated sites. However, our information is incomplete. For example, there may not be enough water available in a very small aquifer to carry out remediation and retain the groundwater resource, or, in other cases, some contaminants may not be removable without destroying the aquifer. EPA believes that DOE should not be required to institute active measures that would completely restore groundwater at these sites if such restoration is technically impracticable from an engineering perspective, and if, at a minimum, protection of human health and the environment is assured. Consistent with the provisions of SARA for remediation of waste sites generally, the standards therefore permit supplemental standards in such situations at levels achievable by site-specific alternate remedial actions. A finding of technical impracticability from an engineering perspective requires careful and extensive documentation, including an analysis of the degree to which remediation is practicable. It should be noted that the phrase "technically impracticable from an engineering perspective" means that the remedial action cannot reasonably be put into practice; it does not mean a conclusion derived from the balancing of costs and benefits. In addition to documentation of technical matters related to cleanup technology, DOE should also include a detailed assessment of such site-specific matters as transmissivity of the geologic formation, aquifer recharge and storage, contaminant properties (e.g., withdrawal and treatability potential), and the extent of contamination.

Finally, for aquifers where compliance with the groundwater standards can be projected to occur naturally within a period of less than 100 years, and where the groundwater is not now used for a public water system and is not now projected to be so used within this period, this rule permits extension of the remedial period to that time, provided institutional control and an adequate verification plan which assures satisfaction of beneficial uses is established and maintained throughout this extended remedial period.

Active restoration should be carefully considered when evaluating the use of such passive restoration. The provision to permit reliance on natural restoration is based on the judgment that sole reliance on active cleanup may not always be warranted under these

standards promulgated pursuant to UMTRCA. This may be the case for situations where active cleansing to completely achieve the standards is impracticable, environmentally damaging, or excessively costly, if groundwater can reach the levels required by the standards through natural flushing within an acceptable period of time. This mechanism may be considered where groundwater concentration limits can be met through partial (or complete) reliance on natural processes and no use of the water as a source for a public water system exists or is projected. Any institutional control that may be required to effectively protect public health and the environment and assure that beneficial uses that the water could have satisfied are provided for in the interim must be verified for effectiveness and modified as necessary. Alternate standards are not required where final cleanup is to be accomplished through natural flushing, since those established under § 192.02(c)(3) must be met at the end of the remedial period.

The regulations establish a time limit on such extension of the remedial period to limit reliance on extended use of institutional controls to manage public access to contaminated groundwater. Following the precedent established by our rule for high-level radioactive wastes (40 CFR 191.14(a)), use of institutional controls is permitted for this purpose only when they will be needed for periods of less than 100 years.

The effectiveness of institutional controls must be verified and maintained over the entire period of time that they are in use. Examples of acceptable measures include use restrictions enforceable by the administrative or judicial branches of government entities, and measures with a high degree of permanence, such as Federal or State ownership of the land containing the contaminated water. In some instances, a combination of institutional controls may be needed to provide adequate protection, such as providing an alternate source of water for drinking or other beneficial uses and restricting inappropriate use of contaminated groundwater. However, institutional control provisions are not intended to require DOE to provide water for uses that the groundwater would not have been available or suitable for in the absence of contamination from residual radioactive materials. Institutional controls that are not adequate by themselves include such measures as health advisories, signs, posts, admonitions, or any other measure that requires the voluntary

cooperation of private parties. However, such measures may be used to complement other enforceable institutional controls.

Restoration of groundwater may be carried out by removal, wherein the contaminated water is removed from the aquifer, treated, and either disposed of, used, or re-injected into the aquifer, and *in situ*, through the addition of chemical or biological agents to fix, reduce, or eliminate the contamination in place. Appropriate restoration will depend on characteristics of specific sites and may involve use of a combination of methods. Water can be removed from an aquifer by pumping it out through wells or by collecting the water from intercept trenches. Slurry walls can sometimes be put in place to contain contamination and prevent further migration of contaminants, so that the volume of contaminated water that must be treated is reduced. The background information document contains a more extensive discussion of candidate restoration methods.

Previously EPA reviewed preliminary information for all 24 sites and detailed information for 14 to make a preliminary assessment of the extent of the potential applicability of supplemental standards and the use of passive remediation. Approximately two-thirds of the sites appear to be located over potable (or otherwise useful) groundwater and the balance over limited use groundwaters. DOE, based on more recent information, feels that up to ten sites are candidates for supplemental standards, and that the rate at which natural flushing is occurring at up to eight of the sites permits consideration of passive remediation under institutional control as the sole remedial method. Some sites exhibit conditions that could be amenable to a combination of strategies. Further, EPA is not able to predict the applicability of provisions regarding technical impracticability or excess environmental harm, since this requires detailed analysis of specific sites, but anticipates that wide application is unlikely. It is emphasized that the above assessment is not based on final results for the vast majority of these sites, and is, therefore, subject to change.

RCRA regulations, for hazardous waste disposal units regulated by EPA, provide that acceptable concentrations of constituents in groundwater (including ACLs) are determined by the Regional Administrator (or an authorized State). EPA's regulations under Title II of UMTRCA provide that the NRC, which regulates active sites, replace the EPA Regional Administrator for the above functions when any