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DEPARTMENT OF THE ARMY  
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Manual  
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**Engineering and Design**  
**MONITORING WELL DESIGN, INSTALLATION, AND DOCUMENTATION**  
**AT HAZARDOUS TOXIC, AND RADIOACTIVE WASTE SITES**

**1. Purpose.** This Engineer Manual (EM) provides the minimum elements for consideration in the design, installation, and documentation of monitoring well placement (and other geotechnical activities) at projects known or suspected to contain chemically hazardous, toxic, and/or radioactive waste.

**2. Applicability.** This EM applies to all U.S. Army Corps of Engineers (USACE) commands having hazardous, toxic, and radioactive waste (HTRW) project responsibilities. For special considerations of radioactive, biological, or mixed (chemical and radioactive) waste components, contact the USACE Hazardous, Toxic, and Radioactive Waste (HTRW) Center of Expertise (CX) in Omaha, Nebraska.

**3. References.** References are provided in Appendix A.

**4. Distribution Statement.** Approved for public release, distribution is unlimited.

**5. Discussion.** The technical understanding and evaluation of HTRW studies involves an appreciation of the interactions between geology, hydrology, geotechnical engineering, and chemistry. This scenario is complicated by the trace (low parts per billion) levels of regulated chemical species that are detectable in the environment and when detected or suspected may trigger intricate and costly response actions. Slight deviations from prescribed drilling, well installation, sampling, or analytical procedures may bias or invalidate both the reported concentrations of these regulated species and the technical basis upon which the Corps makes decisions. These relationships are further complicated by the heterogeneous, anisotropic character of the natural environment itself. This situation requires environmental characterization based upon procedures that are standardized, documented, understood, and followed. This manual outlines that effort.

FOR THE COMMANDER:



ALBERT J. GENETI, J R .  
Major General, USA  
Chief of Staff

2 Appendices  
App A - References  
App B - Abbreviations