2.0 Groundwater

Groundwater contamination at the Hanford Site is associated with a number of sources within its active and inactive operational areas. Liquid waste, discharged to the ground since the 1940s, percolated through the soil and in many locations reached the water table. Very little liquid waste is currently disposed to the soil, and cleanup of existing groundwater contamination, by pump-and-treat systems for example, is occurring at some sites.

This section describes groundwater flow and groundwater contamination in each of the major areas of the Hanford Site. Factors that affect the distribution, migration, and concentrations of groundwater contaminants include

- Residual contamination in the vadose zone – provides a continuing source of groundwater contamination in some areas, and may be moved by increased natural or artificial recharge.
- Stratigraphy – (a) groundwater tends to flow through sediment with higher hydraulic conductivity rather than less permeable units; (b) in some areas, the shallowest aquifer is connected to deeper aquifers, which could allow contaminants to move into deeper aquifers.
- Declining water table – (a) some monitoring wells have gone dry, which affects adequacy of *Resource Conservation and Recovery Act of 1976* (RCRA) or other monitoring; (b) may affect contaminant concentrations, which may vary with depth.
- Well depth – the depth of the well, the length of the screen, and the depth of the pump intake can affect contaminant concentrations in samples if concentrations vary with depth.
- River stage – (a) affects distribution and trends of contaminants at sites near the Columbia River by changing direction of flow; (b) high water may remobilize contaminants from the vadose zone or may dilute contaminants when river water flows into the aquifer.
- Groundwater remediation – (a) extraction and injection wells affect the direction of groundwater flow locally. This affects contaminant distribution and the ability to monitor other sites (e.g., RCRA units); (b) treated water is injected back into the aquifer, but may contain residual contaminants or may dilute local groundwater.

This section discusses these factors, as applicable, for individual areas or waste sites in geographic order (north to south, west to east). The results of the monitoring program are discussed, as much as possible, in relation to source areas. In some cases, several potential sources such as cribs, trenches, or other disposal facilities may contribute to a particular groundwater plume, and their contributions cannot be readily distinguished. Therefore, they are discussed together. Monitoring of specific storage and disposal facilities, such as RCRA units, is reported within the sections on the operational areas. The status of groundwater remediation under RCRA or the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) is discussed in the relevant sections.

Waste sites, hydrogeology, and methods of sampling and analysis are described in *Hanford Site Groundwater: Settings, Sources and Methods* (PNNL-13080). That document also explains how water-level and groundwater chemistry data were interpreted and mapped.