The movement, accumulation, and transformations of organic C, N, S, and P are poorly understood in Spodosols and soils developed by similar formation processes. The spodic horizon is rich in these organic forms, but their accumulation (from leaching of solubilized products from the forest floor) or degradation have not been examined sufficiently. Recent studies have evaluated the movement of dissolved organic carbon (DOC) from the forest floor and its sorption in spodic horizons (Vance & David, 1989, 1991a; David & Zech, 1990; Guggenberger & Zech, 1992). However, the role of DOC leaching and accumulation in relation to N, S, and P cycles is virtually unknown in Spodosols. Controls on C solubilization and leaching from the forest floor (organic horizon) have not been established. Because of the importance of C, N, S, and P in nutrient cycles of northern hardwood and conifer forests found on Spodosols, a better understanding of their biogeochemical cycles is needed, with particular emphasis on the dynamics of the organic forms.

Soil leachates play an important role in the nutrient chemistry of forested ecosystems (Fahey & Yavitt, 1988; McDowell & Likens, 1988). Leachates from the forest floor comprise a variety of inorganic and organic nutrients that are transported to subsurface horizons, groundwaters, and/or surface waters. The transport of these inorganic and organic constituents contribute to pedogenic and biological processes (Candler & Van Cleve, 1982; Candler, 1985; Qualls et al., 1991) and can influence surface water quality, especially where terrestrial inputs are significant (Ertel et al., 1986; Driscoll et al., 1989; Howell, 1989; Cronan, 1990). Qualls and Haines (1991) determined that over 90 and 66%, respectively, of dissolved N and P leaching from a deciduous forest soil were in organic forms.