In Run 6-12 (Figure 6-39), 1975 technological advances are assumed to reduce by 50 percent the effects of PPOLX on LE and LFDR. Here, although damage is indeed reduced at each level of the pollution index PPOLX, equivalent levels of damage are attained only 5 years later than in Run 6-4.

The fourth technological response designed to avoid the pollution crisis behavior is a reduction in the amount of persistent pollution generated per unit of industrial and agricultural output. Run 6-13 (Figure 6-40) shows the effects of a decrease in the amount of pollution generated per unit of output from both sources by a factor of 5 in 1975. The resulting decrease in the persistent pollution generation rate PPGR produces an overall decrease in the index of persistent pollutants PPOLX after 1975. Although the pollutant level is growing rapidly by the year 2100, pollution in that year is still low relative to 1970; thus accumulated pollutants do not interfere significantly with the assimilation process over the course of the run.

In Run 6-13 the pollution crisis is successfully avoided within the time frame of the model through large-scale implementation of pollution generation control technologies, which are assumed to be fully implemented in 1975, well before the damage from rising pollution levels has become evident. Run 6-14 (Figure 6-41) presents the effects of a more realistic model of the effects of pollution generation

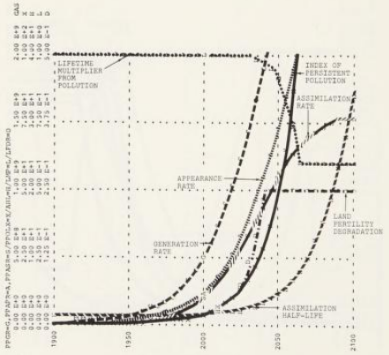

Figure 6-39 Run 6-12: behavior of the pollution sector in response to a 50 percent increase in human health and land fertility technology in 1975

control technologies. Run 6-14 incorporates an adaptive model of technological development: as pollution damage (here measured as a decrease in the lifetime multiplier from pollution LMP) is perceived, new pollution control technologies are developed. The effort applied to the development of new control technologies, measured in a percentage reduction of pollution per year, is proportional to the perceived pollution damage. As very high levels of damage are perceived (a 10 percent drop in life expectancies), new pollution control technologies are developed at their maximum rate, resulting in a 5 percent reduction each year in the amount of pollution generated per unit of output. Since we assumed that the new technologies are developed without cost, we do not lower the rate of growth of industrial output as pollution abatement techniques are implemented. Chapter 7 does include several runs in which the capital costs of new technologies are explicitly modeled. We also assumed that these new technologies are not immediately effective (we incorporated a ten-year delay between the development and implementation of new technologies). Figure 6-42 shows the structural additions assumed for this run.

Run 6-14, a more realistic model of the development of pollution generation control technologies, no longer avoids the pollution crisis observed in Run 6-13. In Run 6-14, pollution generation continues to grow without social constraint past the

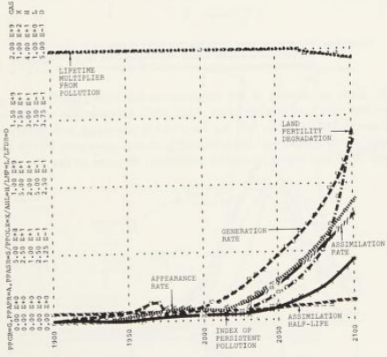

Figure 6-40 Run 6-13: behavior of the pollution sector in response to a sudden increase in persistent pollution generation control technology in 1975