Figure 6-30 Inputs to Run 6-4 of the pollution sector when continued material growth is assumed

Figure 6-31 Run 6-4: behavior of the pollution sector in response to continued material growth

tants begin to interfere with the pollution assimilation process, and AHL begins to rise. This rise is practically imperceptible through the year 2030; thus the persistent pollution assimilation rate PPASR continues to rise almost as fast as PPAPR. After 2030, however, the higher levels of persistent pollutants significantly raise AHL. The increasing AHL causes PPASR to level off by the year 2100, reflecting the basic assumption that there is a finite upper limit to the rate of persistent pollution assimilation in the world ecosystem. In the standard formulation of World3, this maximum pollution assimilation rate is assumed to be about 25 times the rate of assimilation that occurred in 1970.

As the rate of assimilation levels off, there is accelerating growth in the level of pollutants, indicated by the increase in PPOLX, because the appearance rate PPAPR continues to grow exponentially over the 200-year period. The pollution index finally grows to levels that exceed the limits of the tables used to define the land fertility degradation rate LFDR and the lifetime multiplier from pollution LMP. Thus both variables suddenly level off in the year 2065. The resulting behavior mode of the pollution sector under conditions of continued material growth is exponential growth in the accumulation of persistent pollutants and considerable impairment of the environment's ability to assimilate pollution—conditions observed in the pollution crisis mode of World3.
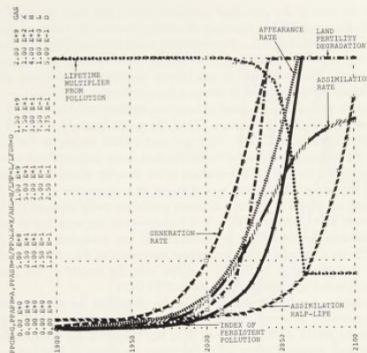
Run 6-4 also plots the steadily increasing damage associated with this pollution crisis. As persistent pollution grows beyond 10 times its 1970 level, the land fertility degradation rate LFDR increases very sharply, reaching its maximum rate of 50 percent per year after the year 2045. It is not possible in World3 to counteract such high levels of fertility degradation through investment in land maintenance. Thus during this phase of the pollution crisis there would be serious deterioration in the fertility of the arable land stock. As pollution exceeds by 40 times its 1970 level, the life expectancy LE of the population is significantly lowered. By the year 2065 the lifetime multiplier from pollution LMP reaches its minimum value of 0.2, indicating that the average life expectancy LE of the world population has been reduced by 80 percent. In the normal behavior exhibited by World3, these extreme values would never be reached, but, under the assumption of continued material growth and no corrective policies, high levels of damage are realized within a century.

Sensitivity Runs

The following set of runs illustrates the sensitivity of the persistent pollution sector's behavior to variations in our estimates of the section's parameter values. The behavior of any sector is judged insensitive to a parameter change over a given range if no value of the parameter within that range alters the basic behavior mode of the