

## CHAPTER 23

# SWAT INPUT DATA: .CHM

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The soils data used by SWAT can be divided into two groups, physical characteristics and chemical characteristics. Inputs for chemical characteristics are used to initialize amounts of chemicals in the soil.

Inclusion of an equilibration period (a year or so) at the beginning of a simulation period is recommended to get the hydrologic cycle fully operational. The equilibration period also allows nutrient levels in the soil to equilibrate, making initialization of chemical characteristics in the soil unnecessary in most cases. Initializing chemical properties is recommended if the levels of nutrients or pesticides in the soil is atypically high.

Following is a brief description of the variables in the soil chemical input file. They are listed in the order they appear within the file.

<b>Variable name</b>	<b>Definition</b>
TITLE	<p>The first line of the .chm file is reserved for user comments. The comments may take up to 80 spaces. The title line is not processed by the model and may be left blank.</p> <p>Optional.</p>
NUTRIENT TITLE	<p>The second line of the .chm file is reserved for the nutrient data title.</p> <p>This line is not processed by the model and may be left blank.</p> <p>Optional.</p>
SOIL LAYER	<p>Number of soil layer.</p> <p>This line is not processed by the model and may be left blank.</p> <p>Optional.</p>
SOL_NO3(layer #)	<p>Initial NO<sub>3</sub> concentration in the soil layer (mg N/kg soil or ppm).</p> <p>Users may define the concentration of nitrate (dry weight basis) for all soil layers at the beginning of the simulation. If the user does not specify initial nitrate concentrations, SWAT will initialize levels of nitrate using the equations reviewed in Chapter 3:1 of the Theoretical Documentation.</p> <p>Optional.</p>
SOL_ORGN(layer #)	<p>Initial organic N concentration in the soil layer (mg N/kg soil or ppm).</p> <p>Users may define the concentration of organic nitrogen (dry weight basis) contained in humic substances for all soil layers at the beginning of the simulation. If the user does not specify initial nitrogen concentrations, SWAT will initialize levels of organic nitrogen using the equations reviewed in Chapter 3:1 of the Theoretical Documentation.</p> <p>Optional.</p>

<b>Variable name</b>	<b>Definition</b>
SOL_SOLP(layer #)	<p>Initial soluble P concentration in soil layer (mg P/kg soil or ppm).</p> <p>Users may define the concentration of solution P (dry weight basis) for all soil layers at the beginning of the simulation. If the user does not specify initial solution P concentrations, SWAT will initialize the concentration to 5 mg P/kg soil in all soil layers.</p> <p>Optional.</p>
SOL_ORGP(layer #)	<p>Initial organic P concentration in soil layer (mg P/kg soil or ppm).</p> <p>Users may define the concentration of organic phosphorus (dry weight basis) contained in humic substances for all soil layers at the beginning of the simulation. If the user does not specify initial organic P concentrations, SWAT will initialize levels of organic phosphorus using the equations reviewed in Chapter 3:2 of the Theoretical Documentation.</p> <p>Optional.</p>
PPERCO_SUB	<p>Phosphorus percolation coefficient in soil layer (10 m<sup>3</sup>/Mg).</p> <p>The phosphorus percolation coefficient is the ratio of the solution phosphorus concentration in the surface 10 mm of soil to the concentration of phosphorus in percolate.</p> <p>The value of PPERCO_SUB can range from 10.0 to 17.5. If no value for PPERCO_SUB is entered the model will PPERCO_SUB = 10.0.</p>
PESTICIDE TITLE	<p>Lines 9-11 are reserved for the pesticide data titles.</p> <p>These lines are not processed by the model and may be left blank.</p> <p>Optional.</p>
PESTNUM	<p>Number of pesticide from pesticide database.</p> <p>Required if pesticide amounts are given.</p>
PLTPST	<p>Initial pesticide amount on foliage (kg ai/ha).</p> <p>Optional.</p>

Variable name	Definition
SOLPST	<p>Initial pesticide amount in soil (mg ai/kg soil or ppm).</p> <p>The pesticide is assumed to be found at this concentration (dry weight basis) in all soil layers.</p> <p>Optional.</p>
PSTENR	<p>Enrichment ratio for pesticide in the soil.</p> <p>As surface runoff flows over the soil surface, part of the water's energy is used to pick up and transport soil particles. The smaller particles weigh less and are more easily transported than coarser particles. When the particle size distribution of the transported sediment is compared to that of the soil surface layer, the sediment load to the main channel has a greater proportion of clay sized particles. In other words, the sediment load is enriched in clay particles. The sorbed phase of pesticide in the soil is attached primarily to colloidal (clay) particles, so the sediment load will also contain a greater proportion or concentration of pesticide than that found in the soil surface layer.</p> <p>The enrichment ratio is defined as the ratio of the concentration of sorbed pesticide transported with the sediment to the concentration in the soil surface layer. SWAT will calculate an enrichment ratio for each storm event, or allow the user to define a particular enrichment ratio for sorbed pesticide that is used for all storms during the simulation.</p> <p>To allow SWAT to calculate the enrichment ratio for each storm event, the value for PSTENR is set to zero. The default option is to allow the model to calculate the enrichment ratio.</p> <p>Optional.</p>

The format of the soil chemical input file is:

<b>Variable name</b>	<b>Line #</b>	<b>Position</b>	<b>Format</b>	<b>F90 Format</b>
TITLE	1	space 1-80	character	a80
NUTRIENT TITLE	2	space 1-80	character	a80
<i>SOIL LAYERS</i>	3	space 1-80	character	a80
SOL_NO3(1)	4	space 28-39	decimal(xxxxxxxxxx.xx)	f12.2
SOL_NO3(2)	4	space 40-51	decimal(xxxxxxxxxx.xx)	f12.2
SOL_NO3(3)	4	space 52-63	decimal(xxxxxxxxxx.xx)	f12.2
SOL_NO3(4)	4	space 64-75	decimal(xxxxxxxxxx.xx)	f12.2
SOL_NO3(5)	4	space 76-87	decimal(xxxxxxxxxx.xx)	f12.2
SOL_NO3(6)	4	space 88-99	decimal(xxxxxxxxxx.xx)	f12.2
SOL_NO3(7)	4	space 100-111	decimal(xxxxxxxxxx.xx)	f12.2
SOL_NO3(8)	4	space 112-123	decimal(xxxxxxxxxx.xx)	f12.2
SOL_NO3(9)	4	space 124-135	decimal(xxxxxxxxxx.xx)	f12.2
SOL_NO3(10)	4	space 136-147	decimal(xxxxxxxxxx.xx)	f12.2
SOL_ORGN(1)	5	space 28-39	decimal(xxxxxxxxxx.xx)	f12.2
SOL_ORGN(2)	5	space 40-51	decimal(xxxxxxxxxx.xx)	f12.2
SOL_ORGN(3)	5	space 52-63	decimal(xxxxxxxxxx.xx)	f12.2
SOL_ORGN(4)	5	space 64-75	decimal(xxxxxxxxxx.xx)	f12.2
SOL_ORGN(5)	5	space 76-87	decimal(xxxxxxxxxx.xx)	f12.2
SOL_ORGN(6)	5	space 88-99	decimal(xxxxxxxxxx.xx)	f12.2
SOL_ORGN(7)	5	space 100-111	decimal(xxxxxxxxxx.xx)	f12.2
SOL_ORGN(8)	5	space 112-123	decimal(xxxxxxxxxx.xx)	f12.2
SOL_ORGN(9)	5	space 124-135	decimal(xxxxxxxxxx.xx)	f12.2
SOL_ORGN(10)	5	space 136-147	decimal(xxxxxxxxxx.xx)	f12.2
SOL_SOLP(1)	6	space 28-39	decimal(xxxxxxxxxx.xx)	f12.2
SOL_SOLP(2)	6	space 40-51	decimal(xxxxxxxxxx.xx)	f12.2
SOL_SOLP(3)	6	space 52-63	decimal(xxxxxxxxxx.xx)	f12.2
SOL_SOLP(4)	6	space 64-75	decimal(xxxxxxxxxx.xx)	f12.2
SOL_SOLP(5)	6	space 76-87	decimal(xxxxxxxxxx.xx)	f12.2
SOL_SOLP(6)	6	space 88-99	decimal(xxxxxxxxxx.xx)	f12.2
SOL_SOLP(7)	6	space 100-111	decimal(xxxxxxxxxx.xx)	f12.2
SOL_SOLP(8)	6	space 112-123	decimal(xxxxxxxxxx.xx)	f12.2
SOL_SOLP(9)	6	space 124-135	decimal(xxxxxxxxxx.xx)	f12.2
SOL_SOLP(10)	6	space 136-147	decimal(xxxxxxxxxx.xx)	f12.2

<b>Variable name</b>	<b>Line #</b>	<b>Position</b>	<b>Format</b>	<b>F90 Format</b>
SOL_ORGP(1)	7	space 28-39	decimal(xxxxxxxxxx.xx)	f12.2
SOL_ORGP(2)	7	space 40-51	decimal(xxxxxxxxxx.xx)	f12.2
SOL_ORGP(3)	7	space 52-63	decimal(xxxxxxxxxx.xx)	f12.2
SOL_ORGP(4)	7	space 64-75	decimal(xxxxxxxxxx.xx)	f12.2
SOL_ORGP(5)	7	space 76-87	decimal(xxxxxxxxxx.xx)	f12.2
SOL_ORGP(6)	7	space 88-99	decimal(xxxxxxxxxx.xx)	f12.2
SOL_ORGP(7)	7	space 100-111	decimal(xxxxxxxxxx.xx)	f12.2
SOL_ORGP(8)	7	space 112-123	decimal(xxxxxxxxxx.xx)	f12.2
SOL_ORGP(9)	7	space 124-135	decimal(xxxxxxxxxx.xx)	f12.2
SOL_ORGP(10)	7	space 136-147	decimal(xxxxxxxxxx.xx)	f12.2
PPERCO_SUB(1)	8	space 28-39	decimal(xxxxxxxxxx.xx)	f12.2
PPERCO_SUB(2)	8	space 40-51	decimal(xxxxxxxxxx.xx)	f12.2
PPERCO_SUB(3)	8	space 52-63	decimal(xxxxxxxxxx.xx)	f12.2
PPERCO_SUB(4)	8	space 64-75	decimal(xxxxxxxxxx.xx)	f12.2
PPERCO_SUB(5)	8	space 76-87	decimal(xxxxxxxxxx.xx)	f12.2
PPERCO_SUB(6)	8	space 88-99	decimal(xxxxxxxxxx.xx)	f12.2
PPERCO_SUB(7)	8	space 100-111	decimal(xxxxxxxxxx.xx)	f12.2
PPERCO_SUB(8)	8	space 112-123	decimal(xxxxxxxxxx.xx)	f12.2
PPERCO_SUB(9)	8	space 124-135	decimal(xxxxxxxxxx.xx)	f12.2
PPERCO_SUB(10)	8	space 136-147	decimal(xxxxxxxxxx.xx)	f12.2
<i>PESTICIDE TITLE</i>	9-11	space 1-80	character	a80
PSTNUM	12-END		integer	free
PLTPST	12-END		real	free
SOLPST	12-END		real	free
PSTENR	12-END		real	free