Department of Pesticide Regulation
Environmental Monitoring Branch
1001 I Street
Sacramento, California 95812

Potential for Propyzamide Movement to California Ground Water as a Result of Agricultural Use — Model Simulations and Results

Murray Clayton
Ground Water Protection Program

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Introduction

The Exposure Assessment Group of DPR's Human Health Assessment Branch has requested documentation describing the modeling methodology and results of simulating propyzamide movement to ground water using the ground water modeling scenario developed by the Environmental Monitoring Branch. The modeling scenario has been extensively used for evaluating the potential impact on ground water of new pesticide active ingredients when they are submitted to DPR for California registration. Other applications of the model have included reevaluating pesticides with existing California registrations, identifying mitigation measures, prioritizing pesticide for ground water monitoring, and for water input management in field studies. The ground water model has been calibrated to predict residue movement in leaching vulnerable soils and residue concentrations in well water. It has been verified against well monitoring data obtained from pesticide monitoring studies conducted in areas of California where the ground water has been impacted by pesticide.

Modeling Methodology and Parameterization

The LEACHP computer model is a module of the Leaching Estimation and Chemistry Model (LEACHM) (Hutson and Wagenet, 1992) and was used in conjunction with a second empirical-based model to test the leaching potential of propyzamide and provide estimates of residue

concentrations in domestic drinking water wells. Soil texture, organic carbon content and bulk density data used in the modeling scenario represent coarse, loamy-sand soils located in eastern Fresno County, California, in an area that is considered vulnerable to leaching of pesticide residues to ground water. Troiano et al. (1993) measured the high leaching potential of this soil in a field study that determined the effect of method and amount of irrigation water application on the movement of atrazine and bromide in soil. Data from that study were later used by Spurlock (2000) to calibrate the LEACHP model to the study area by establishing estimates for several soil hydraulic properties required for modeling of pesticides in soil. The calibrated LEACHP model was then coupled to an empirical-based model for use in a Monte Carlo probabilistic procedure to investigate the effect of irrigation management on leaching of known ground water contaminants in California. The modeling scenario was verified by good agreement between simulated output and pesticide residue concentrations measured in domestic drinking water wells located in the study area (Spurlock, 2000).

For this current analysis a deterministic and probabilistic modeling approach was conducted to estimate potential concentrations of propyzamide in domestic drinking water wells in California. The deterministic approach simulates a worst-case scenario characterized by selecting pesticide physio-chemical parameter values most conducive to persistence and movement in soil, chemical application at maximum label rates, soil conditions vulnerable to leaching residues, shallow ground water, and an irrigation regime that produced a large amount of percolating water. The probabilistic approach utilizes a Monte Carlo procedure to output a distribution of predicted well water concentrations that is typically generated from a large number of unique simulations. The characteristics of the output distribution reflect the uncertainty in the model input parameters of terrestrial field dissipation (TFD) half-life and organic carbon-normalized soil adsorption coefficient (Koc), for which several values of each are provided to DPR by the registrant. Since study-derived TFD half-life and Koc data are typically too limiting in number to use in a Monte Carlo-type analysis, distribution functions are fit to the study data and model input values are randomly selected from these distributions and paired accordingly for each simulation run. For propyzamide simulations a triangular distribution was used to characterize the TFD half-life and Koc study data; Dubus et al. (2002) recommended use of a triangular distribution for model input variables where data is insufficient in number to indicate a more complex distribution.

The LEACHP model is a pesticide-specific fate and transport model capable of simulating complex processes in the soil environment. These include plant growth cycles, plant uptake of water and chemical, evaporation of water and volatilization of chemical from soil, water and chemical losses to leaching, chemical dispersion in soil, chemical adsorption processes as influenced by soil organic carbon content, and chemical breakdown as influenced by soil water content and temperature. Once residues are moved below the deepest simulated LEACHP soil depth, a less complex, empirical-based model is used to simulate chemical fate and movement through the lower vadose and saturated zones. Chemical-specific dissipation rates in the

subsurface soil layers are not well known. The empirical-based model assumes a constant and relatively slow rate of chemical breakdown that in most DPR ground water modeling scenarios is normally characterized by the longest reported TFD half-life. However, for propyzamide the dissipation half-life value used in the lower vadose and saturated zones was conservatively set to one year because there were only two TFD half-life values available and they were relatively short and almost identical (53.3 and 53.7 days). The value of one year was consistent with that used by Troiano and Clayton (2009) and Spurlock (2000) for modeling several pesticides known to contaminate California ground water and where simulated output, as mentioned above, was in good agreement with monitoring study results. Furthermore, assigning a longer residue dissipation half-life for the subsurface is consistent with results from several studies demonstrating that dissipation rates typically decrease significantly with depth (Frank and Sirons, 1985; Johnson and Lavy, 1994; Kruger et al., 1993), often correlating with decreasing biomass (Kordel et al, 1995; Miller et al., 1997).

Transport time for propyzamide residues from the base of the 3-m-deep simulated LEACHP profile to the water table was considered equivalent to that of percolating drainage water by assuming the chemical was non-interactive with the soil media. This assumption was based on very low levels of organic carbon in the subsurface and the profile being largely composed of sand (Spurlock, 2000). Residue transport time through the deep vadose zone was estimated by separate LEACHP simulations of bromide, which is often used as a tracer for the movement of water through soil. Simulated travel time to a ground water depth in the study area of 20 m was estimated at 4 years and was determined by tracking of the bromide center of mass.

Simulating the transport of propyzamide residues from entry into the aquifer to a drinking water well requires parameterization of the annual ground water recharge depth and transport time to a well. Annual ground water recharge depth in the simulated study area was considered equivalent to the annual cumulative depth of drainage water from the LEACHP simulations. Since irrigation inputs were constant across years, and the simulated rainfall and evapotranspiration were input as weekly means calculated from the previous 20 years of climate data, the estimated annual ground water recharge depth of 0.5 m was assumed stable. For each simulation the annual cumulative mass of propyzamide entering the saturated zone was subsequently dissolved into this annual depth of recharge water to provide an estimated ground water concentration.

Elapsed time between residue entry into the water table and subsequent sampling at a domestic well is known as the ground water recharge age. The median recharge age for the study area was 6 years and was estimated from chlorofluorocarbon (CFC) dating analysis of well water sampled from 18 domestic wells located also within the study area (Spurlock et al., 2000). During transport to a well the propyzamide residues were assumed reactive and would ideally be given a half-life rate equivalent to their hydrolysis rate. Since these data were unavailable the half-life rate used was that applied to the deep vadose zone of one year.

Water inputs to the modeling scenario were consistent with those to support grape production, which is a typical crop grown in the study area, and in the coarse-textured soils of eastern Fresno County. A 6-month irrigation period was simulated from mid-April to mid-October. Irrigation events were simulated at fixed-depth increments of 100 mm with the frequency of application determined by crop water demand and irrigation efficiency. Water applications were made at 160% of crop demand, which represented typical California agricultural irrigation efficiencies of approximately 60% for non-pressurized, surface delivery methods such as basin, border and furrow-type systems (California Agricultural Technology Institute, 1988; Snyder et al., 1986). Rainfall events were simulated during the non-irrigation season from November through April and were applied when the long-term mean daily precipitation accumulated to 12 mm since the previous water input. Mean long-term daily temperature, precipitation, and reference evapotranspiration (ETo) were obtained from the California Irrigation Management Information System weather station #80 at California State University, Fresno (http://www.ipm.ucdavis.edu/WEATHER/wxretrieve.html). Water demand for the simulated grape crop was calculated from the long-term mean daily ETo and crop coefficients, the latter of which for grapes ranged from 0 to 0.85 depending on the stage of canopy development. Simulated irrigation applications were subsequently based on the product of this crop water demand and the excess demand factor of 1.6 to account for irrigation application inefficiencies.

The probabilistic modeling procedure for propyzamide consisted of 1000 unique simulations based on paired inputs of Koc and TFD half-life data randomly selected from their respective distributions. The propyzamide-specific LEACHP model input data including the distributions of randomly selected Koc and TFD dissipation rate constant data are given in Table 1 and Figure 1, respectively. For the deterministic modeling approach, propyzamide parameter selection for the worst-case scenario consisted of selecting the longest TFD half-life and lowest Koc value of 53.7 days and 556 cm^3/g, respectively, for the LEACHP input file (Appendix 1).

Table 1. Propyzamide-specific LEACHP model input data.

Modeling parameter	Value	Source
Active ingredient application rate (mg/m^2)	450 450[z]	Kerb 50-W label
Koc (cm^3/g)	556 578 697 726 1197 1358	DPR pesticide chemistry database
TFD dissipation half-life (day)	53.3 53.7	DPR pesticide chemistry database

Solubility (mg/L)	12.9	DPR pesticide chemistry database
Vapor density (mg/L)	6.0E-06	DPR pesticide chemistry database
Molecular diffusion coefficient in water (mm^2/day)	120[y]	Spurlock (2000)
Molecular diffusion coefficient in air (mm^2/day)	4.300E+05[y]	Spurlock (2000)
Air diff. coeff. enhancement to account for atmos. pressure fluctuations (mm^2/day)	1.400E+05[y]	Spurlock (2000)

[z]Equivalent to two applications of 4 lbs a.i./acre, representing maximum label rate for artichoke from Kerb 50-W label. Timing of application was mid-season and late season as specified by the Kerb 50-W label for application to artichoke.

[y]Universal values utilized for most non-volatile pesticides.

For both the deterministic and probabilistic modeling methodologies the period for each LEACHP simulation run was 5 years, which consisted of annual applications of propyzamide at maximum label rates. Simulation of the final year resulted in near steady-state conditions where the annual rate of propyzamide application and the sum of the dissipation losses approached equilibrium. At this stage of the simulation annual loading of residues in the soil profile and residue movement below the 3.0-m deep LEACHP modeling profile were essentially stable. The empirical-based modeling phase utilized this stable annual mass of residue movement below the LEACHP profile to estimate a propyzamide residue concentration in well water.

Modeling Results

The deterministic modeling approach that simulated a worst-case scenario estimated a well water concentration for propyzamide of 0.00293 ug/L. This estimate was calculated using the annual cumulative total propyzamide loss below the LEACHP-simulated root zone (1.5 mg/m^2) and the empirical-based modeling function for simulating residue fate and movement in the deep vadose and saturated zones:

$$Well\ Water\ Concentration\ (mg/m^3\ or\ \mu g/L) = \frac{R \times 0.5^{(Nt + Ns)}}{D_w}$$

where:

R = annual cumulative total pesticide loss below LEACHP root zone (mg/m^2)
N_t = number of dissipation half-lives chemical experienced during transport in the deep vadose zone
N_s = number of dissipation half-lives chemical experienced in the saturated zone
D_w = depth of annual ground water recharge (m)

Propyzamide well water concentrations estimated from the probabilistic modeling procedure ranged from 0 to 0.00273 ug/L. The magnitude of this range reflected the uncertainty in the TFD

half-life and Koc values reported for propyzamide that were used in the LEACHP modeling phase. The distribution of estimated well water concentrations derived from coupling of the LEACHP simulations to the empirical-based modeling procedure, as described above, revealed a highly positive skew of propyzamide concentrations with the 50th and 95th percentile concentrations at 0.00039 and 0.00176 ug/L, respectively (Figure 2).

Ground water monitoring for propyzamide in high use areas of California by DPR in 1995 and 2012 failed to detect the chemical in a total of 162 sampled wells. Several other agencies also have sampled for propyzamide in California and similarly failed to find any detections of the chemical in ground water (Table 2). Results from these monitoring studies support this current modeling analysis where simulated concentrations of propyzamide in well water were below DPR's reporting limit and the reporting limits of other agencies that have previously sampled for the chemical in California (Table 2).

Table 2. Monitoring results for propyzamide in California ground water.[z]

Agency	Number of wells samples	Minimum reporting limit[y] (ug/L)	Number of wells reported with detections
Calif. State Water Resources Control Board[x]	1893	0.004	0
Calif. Dept. Public Health	254	0.1 - 10.0	0
Calif. Dept. Pesticide Regulation	162	0.05	0
U.S. Geological Survey	77	0.002 - 0.05	0
Calif. Dept. Water Resources	6	0.2	0
Glenn County	3	0.1 - 0.3	0

[z]Sourced from DPR's Well Inventory Database.

[y]Analytical methodology updates can result in changes in the minimum reporting limit.

[x]Most, if not all, sampling likely conducted under contract by the U.S. Geological Survey.

Conclusions

The deterministic modeling analysis predicted under a worst-case scenario, which simulated the unlikely convergence of several chemical- and environmental-related factors conducive to offsite movement of pesticide residues, that well water concentrations of propyzamide could potentially reach 0.00293 ug/L. Propyzamide concentrations in well water simulated under a more realistic modeling scenario that considered the variability associated with reported physiochemical data, but still accounted for maximum pesticide applications and heavy water inputs to leaching vulnerable soils were considerably lower with a 95% probability of occurring at or below 0.00176 ug/L. In both modeling approaches the estimated well water concentrations of propyzamide were more than one order of magnitude below DPR's current pesticide reporting limit for ground water of 0.05 ug/L.

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Figure 1. Distributions of the randomly selected propyzamide input values used for the Monte Carlo probabilistic modeling procedure.

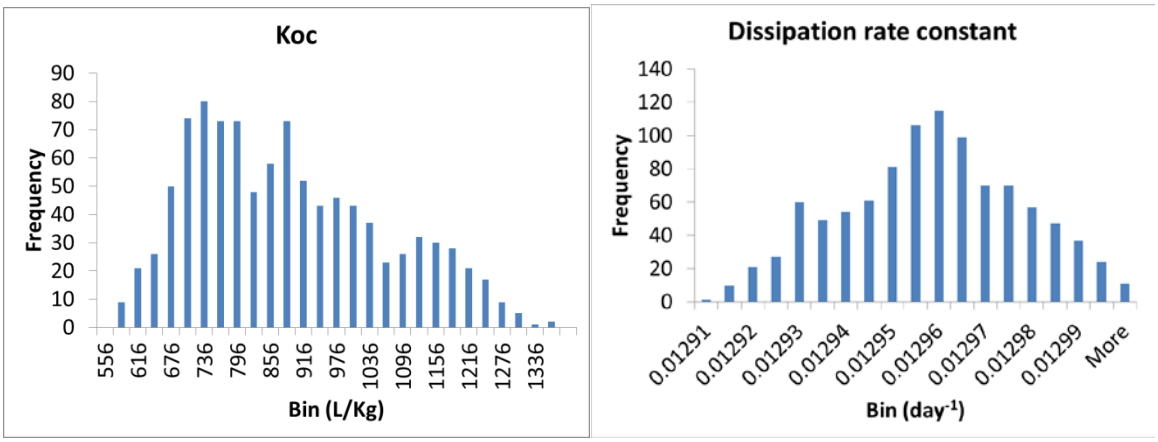
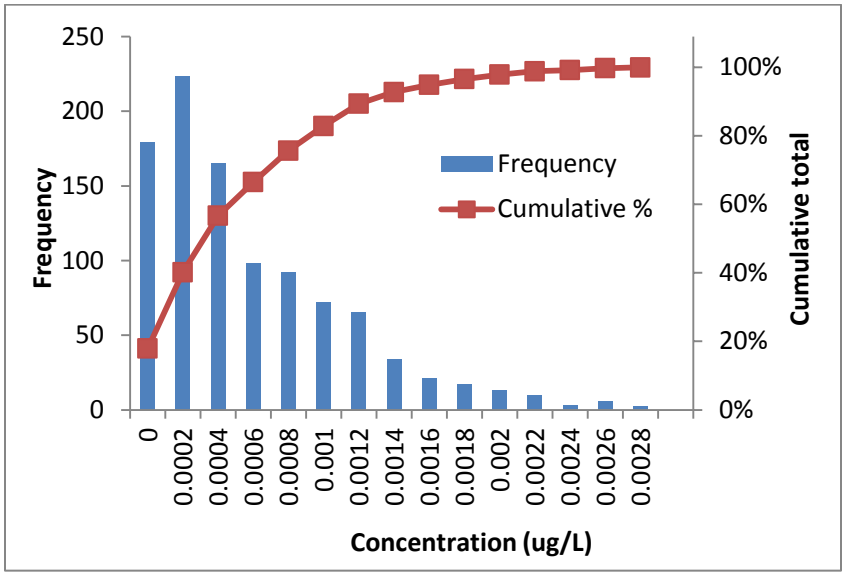


Figure 2. Distribution of estimated well water concentrations for propyzamide from the Monte Carlo probabilistic modeling procedure.



Percentiles	Concentration (ug/L)
0.00	0.000000
0.05	0.000000
0.25	0.000195
0.50	0.000391
0.75	0.000781
0.95	0.001758
1.00	0.002734

Appendix 1. LEACHP model input file used for deterministic modeling approach.

```
propydet< propyzamide Irrigation @ 160% of plant demand. Used in batch runs (started as LEACHP<filename).
------------------------------------------------------------------------
                     LEACHP PESTICIDE DATA FILE.
Numeric data and comments may extend to position 120. Unless defined as
'not read' a value must be present for each item, although it may not be used.
Free format with blank delimiters. Preserve division and heading records.  Number of depth segments may be changed.
*********************************************************************************************************
 1      <Date format (1: month/day/year;  2: day/month/year).  Dates must be 6 digits, 2 each for day, mo, yr.
 010195 <Starting date.  No date in the input data should precede this date.
 000365 <Ending date or day number.  The starting date is day 1. (A value <010101 is treated as a day number).
 0.05    <Largest time interval within a day (0.1 day or less).
 5      <Number of repetitions of rainfall, crop and chemical application data.
 3000   <Profile depth (mm), preferably a multiple of the segment thickness.
 25     <Segment thickness (mm).  (The number of segments should be between about 8 and 30.
 2      <Lower boundary condition: 1:fixed depth water table; 2:free drainage, 3:zero flux 4:lysimeter.
 0000   <Water table depth (mm), if the lower boundary is 1 (water table).
------------------------------------------------------------------------
The steady-state flow option uses constant water fluxes during the application
periods specified in the rainfall data table, and a uniform water content
specified here.  Steady-state flow implies a lab column, and crop and evaporation data are ignored.
------------------------------------------------------------------------
  1     < Water flow: 1: Richards; 2: Addiscott tipping bucket; 3: steady-state.
  0.4   < Steady-state flow water content (theta); 999: saturated column.
*********************************************************************************************************
*********************************************************************************************************
 1      <Number of output files: 1: OUT only; 2: OUT + SUM; 3: OUT + SUM + BTC
---------------------------------------
--- For the *.OUT file :
 2      <Units for depth data: 1: ug/kg, 2: mg/m2 per segment depth, 3: mg/kg, 4: g/m2, 5: kg/ha.
 1      <Node print frequency (print data for every node (1), alternate nodes (2).
 1      <Print options: 1 or 2.  Use to specify one of the following options.
 365      <Option 1: Print at fixed time intervals (days between prints).
 1      <Option 2: No. of prints (the times for which are specified below)
 2      <Tables printed: 1: mass balance; 2: + depth data; 3: + crop data
 1      <Reset *.OUT file cumulative values every 12 months after start date? 0: No, 1: Yes
---------------------------------------(if yes: .sum printouts must be monthly (code 999) and .out prints should be at the end of each
year)
--- For the * .SUM file :
 50     <Summary print interval (d)  (999 for calendar month printouts)
 000    <Surface to [depth 1?] mm     ( Three depth segments for the
 000    <Depth 1 to [depth 2?] mm      summary file. Zero defaults to nodes
```

```
 000    <Depth 2 to [depth 3?] mm      closest to thirds of the profile)
  3     <4th segment: Root zone (1); profile (2); Depth 3 to lower boundary (3); Surface to shallowest of lower boundary or water
table (4)
---------------------------------------
--- For the *.BTC (breakthrough) file :
 1.0    <Incremental depth of drainage water per output (mm)
-------------------------------------------------------------------------
-- List here the times at which the *.OUT file is desired for print option 2.
-- The number of records must match the 'No. of prints' under option 2 above.
        Date or    Time of day          (At least one must be specified
        Day no.  (to nearest tenth)      even if print option is not 2)
        --------  ----------------
        123195         .5        (These dates can be past the last day)
*************************************************************************
*************************************************************************
                  SOIL PHYSICAL PROPERTIES
-------------------------------------------------------------------------
-- Retentivity model 0 uses listed Campbell's retention parameters, otherwise
-- the desired particle size-based regression model is used.
-------------------------------------------------------------------------
```

Soil layer no.	Clay %	Silt %	Organic carbon %	Retention model	Starting theta or pot'l (one is used) kPa		Roots (for no growth) (relative)	Starting temp (C) (not read in LEACHC)
1	3	8	0.71	5	0.045	-10	0.2	20
2	3	8	0.71	5	0.045	-10	0.2	20
3	3	8	0.71	5	0.045	-10	0.2	20
4	3	8	0.71	5	0.045	-10	0.2	20
5	3	8	0.71	5	0.045	-10	0.2	20
6	3	8	0.71	5	0.045	-10	0.2	20
7	4	6	0.25	5	0.06	-10	0.2	20
8	4	6	0.25	5	0.06	-10	0.2	20
9	4	6	0.25	5	0.06	-10	0.2	20
10	4	6	0.25	5	0.06	-10	0.2	20
11	4	6	0.25	5	0.06	-10	0.2	20
12	4	6	0.25	5	0.06	-10	0.2	20
13	5	6	0.1	5	0.09	-10	0.15	20
14	5	6	0.1	5	0.09	-10	0.15	20
15	5	6	0.1	5	0.09	-10	0.15	20
16	5	6	0.1	5	0.09	-10	0.15	20
17	5	6	0.1	5	0.09	-10	0.15	20
18	5	6	0.1	5	0.09	-10	0.15	20
19	5	4	0.1	5	0.135	-10	0.13	20
20	5	4	0.1	5	0.135	-10	0.13	20

21	5	4	0.1	5	0.135	-10	0.13	20
22	5	4	0.1	5	0.135	-10	0.13	20
23	5	4	0.1	5	0.135	-10	0.13	20
24	5	4	0.1	5	0.135	-10	0.13	20
25	6	4	0.067	5	0.15	-10	0.1	20
26	6	4	0.067	5	0.15	-10	0.1	20
27	6	4	0.067	5	0.15	-10	0.1	20
28	6	4	0.067	5	0.15	-10	0.1	20
29	6	4	0.067	5	0.15	-10	0.1	20
30	6	4	0.067	5	0.15	-10	0.1	20
31	5	4	0.009	5	0.144	-10	0.08	20
32	5	4	0.009	5	0.144	-10	0.08	20
33	5	4	0.009	5	0.144	-10	0.08	20
34	5	4	0.009	5	0.144	-10	0.08	20
35	5	4	0.009	5	0.144	-10	0.08	20
36	5	4	0.009	5	0.144	-10	0.08	20
37	6	4	0.058	5	0.135	-10	0.05	20
38	6	4	0.058	5	0.135	-10	0.05	20
39	6	4	0.058	5	0.135	-10	0.05	20
40	6	4	0.058	5	0.135	-10	0.05	20
41	6	4	0.058	5	0.135	-10	0.05	20
42	6	4	0.058	5	0.135	-10	0.05	20
43	6	5	0.05	5	0.12	-10	0.04	20
44	6	5	0.05	5	0.12	-10	0.04	20
45	6	5	0.05	5	0.12	-10	0.04	20
46	6	5	0.05	5	0.12	-10	0.04	20
47	6	5	0.05	5	0.12	-10	0.04	20
48	6	5	0.05	5	0.12	-10	0.04	20
49	5	4	0.025	5	0.128	-10	0.02	20
50	5	4	0.025	5	0.128	-10	0.02	20
51	5	4	0.025	5	0.128	-10	0.02	20
52	5	4	0.025	5	0.128	-10	0.02	20
53	5	4	0.025	5	0.128	-10	0.02	20
54	5	4	0.025	5	0.128	-10	0.02	20
55	6	5	0.017	5	0.114	-32	0.02	20
56	6	5	0.017	5	0.114	-32	0.02	20
57	6	5	0.017	5	0.114	-32	0.02	20
58	6	5	0.017	5	0.114	-32	0.02	20
59	6	5	0.017	5	0.114	-32	0.02	20
60	6	5	0.017	5	0.114	-32	0.02	20
61	6	5	0.025	5	0.144	-100	0.02	20
62	6	5	0.025	5	0.144	-100	0.02	20
63	6	5	0.025	5	0.144	-100	0.02	20
64	6	5	0.025	5	0.144	-100	0.02	20
65	6	5	0.025	5	0.144	-100	0.02	20

66	6	5	0.025	5	0.144	-100	0.02	20
67	6	5	0.025	5	0.15	-316	0.02	20
68	6	5	0.025	5	0.15	-316	0.02	20
69	6	5	0.025	5	0.15	-316	0.02	20
70	6	5	0.025	5	0.15	-316	0.02	20
71	6	5	0.025	5	0.15	-316	0.02	20
72	6	5	0.025	5	0.15	-316	0.02	20
73	7	5	0.017	5	0.12	-1000	0.02	20
74	7	5	0.017	5	0.12	-1000	0.02	20
75	7	5	0.017	5	0.12	-1000	0.02	20
76	7	5	0.017	5	0.12	-1000	0.02	20
77	7	5	0.017	5	0.12	-1000	0.02	20
78	7	5	0.017	5	0.12	-1000	0.02	20
79	6	5	0.008	5	0.105	-3000	0.02	20
80	6	5	0.008	5	0.105	-3000	0.02	20
81	6	5	0.008	5	0.105	-3000	0.02	20
82	6	5	0.008	5	0.105	-3000	0.02	20
83	6	5	0.008	5	0.105	-3000	0.02	20
84	6	5	0.008	5	0.105	-3000	0.02	20
85	7	6	0	5	0.09	-3000	0.02	20
86	7	6	0	5	0.09	-3000	0.02	20
87	7	6	0	5	0.09	-3000	0.02	20
88	7	6	0	5	0.09	-3000	0.02	20
89	7	6	0	5	0.09	-3000	0.02	20
90	7	6	0	5	0.09	-3000	0.02	20
91	7	5	0	5	0.105	-3000	0.02	20
92	7	5	0	5	0.105	-3000	0.02	20
93	7	5	0	5	0.105	-3000	0.02	20
94	7	5	0	5	0.105	-3000	0.02	20
95	7	5	0	5	0.105	-3000	0.02	20
96	7	5	0	5	0.105	-3000	0.02	20
97	6	6	0	5	0.09	-3000	0.02	20
98	6	6	0	5	0.09	-3000	0.02	20
99	6	6	0	5	0.09	-3000	0.02	20
100	6	6	0	5	0.09	-3000	0.02	20
101	6	6	0	5	0.09	-3000	0.02	20
102	6	6	0	5	0.09	-3000	0.02	20
103	7	6	0	5	0.105	-3000	0.02	20
104	7	6	0	5	0.105	-3000	0.02	20
105	7	6	0	5	0.105	-3000	0.02	20
106	7	6	0	5	0.105	-3000	0.02	20
107	7	6	0	5	0.105	-3000	0.02	20
108	7	6	0	5	0.105	-3000	0.02	20
109	7	7	0.008	5	0.12	-3000	0.01	20
110	7	7	0.008	5	0.12	-3000	0.01	20

```
     111       7       7   0.008       5    0.12   -3000    0.01      20
     112       7       7   0.008       5    0.12   -3000    0.01      20
     113       7       7   0.008       5    0.12   -3000    0.01      20
     114       7       7   0.008       5    0.12   -3000    0.01      20
     115       9       7       0       5   0.135   -3000    0.01      20
     116       9       7       0       5   0.135   -3000    0.01      20
     117       9       7       0       5   0.135   -3000    0.01      20
     118       9       7       0       5   0.135   -3000    0.01      20
     119       9       7       0       5   0.135   -3000    0.01      20
     120       9       7       0       5   0.135   -3000    0.01      20
------------------------------------------------------------------------
   1    < Use listed water contents (1) or potentials (2) as starting values.
Particle density:  Clay    Silt and sand    Organic matter  (kg/dm3) (to calculate porosity)
                   2.65         2.65              1.10
************************************************************************
For a uniform profile: Any non-zero value here will override those in
the table below (only if retentivity model is 0).
------------------------------------------------------------------------
  0     0   <Soil bulk density and particle density (kg/dm3) .
 -0.0         <'Air-entry value' (AEV) (kPa) (a in eq 2.1 to 2.4).
  0         <Exponent (BCAM) in Campbell's water retention equation (b in eq. 2.1 to 2.4).
  2019.0000  -0.5 <Conductivity (mm/day) and corresponding matric potential (kPa) (for potential-based version of eq. 2.5).
  1         <Pore interaction parameter (P) in Campbell's conductivity equation (eq.2.5 in manual).
  48.8075123 <Dispersivity (mm) (eq. 3.12).
  -5        <For Addiscott flow: Matric potential (kPa) at field capacity
  -200      <                  : Division between mobile and immobile water (kPa)
*********************************************************************************************************
 Soil  |  Soil retentivity |   Bulk  |  Match K(h) curve at: | Dispersivity |  For Addiscott flow option:
 segment      parameters   | density |   K    Matric  using  |              |  Field     Mobile/immobile
 no.   |    AEV     BCAM   |         |         potl      P   |              | capacity      threshold
       |    kPa            |  kg/dm3 |  mm/d    kPa          |     mm       |   kPa            kPa
 -----    ------   -----     ------    ----  -----   -----       -----        ------         ---------
1     -.01644000000 5.1910000E+00   1.53     1   -15     3    30   0.3   -200
2     -.01644000000 5.1910000E+00   1.53     1   -15     3    30   0.3   -200
3     -.01644000000 5.1910000E+00   1.53     1   -15     3    30   0.3   -200
4     -.01644000000 5.1910000E+00   1.53     1   -15     3    30   0.3   -200
5     -.01644000000 5.1910000E+00   1.53     1   -15     3    30   0.3   -200
6     -.01644000000 5.1910000E+00   1.53     1   -15     3    30   0.3   -200
7     -.01644000000 5.1910000E+00   1.52     1   -15     3    30   0.3   -200
8     -.01644000000 5.1910000E+00   1.52     1   -15     3    30   0.3   -200
9     -.01644000000 5.1910000E+00   1.52     1   -15     3    30   0.3   -200
10    -.01644000000 5.1910000E+00   1.52     1   -15     3    30   0.3   -200
11    -.01644000000 5.1910000E+00   1.52     1   -15     3    30   0.3   -200
12    -.01644000000 5.1910000E+00   1.52     1   -15     3    30   0.3   -200
13    -.01644000000 5.1910000E+00    1.5     1   -15     3    30   0.3   -200
```

14	-.01644000000	5.1910000E+00	1.5	1	-15	3	30	0.3	-200
15	-.01644000000	5.1910000E+00	1.5	1	-15	3	30	0.3	-200
16	-.01644000000	5.1910000E+00	1.5	1	-15	3	30	0.3	-200
17	-.01644000000	5.1910000E+00	1.5	1	-15	3	30	0.3	-200
18	-.01644000000	5.1910000E+00	1.5	1	-15	3	30	0.3	-200
19	-.01644000000	5.1910000E+00	1.52	1	-15	3	30	0.3	-200
20	-.01644000000	5.1910000E+00	1.52	1	-15	3	30	0.3	-200
21	-.01644000000	5.1910000E+00	1.52	1	-15	3	30	0.3	-200
22	-.01644000000	5.1910000E+00	1.52	1	-15	3	30	0.3	-200
23	-.01644000000	5.1910000E+00	1.52	1	-15	3	30	0.3	-200
24	-.01644000000	5.1910000E+00	1.52	1	-15	3	30	0.3	-200
25	-.01644000000	5.1910000E+00	1.52	1	-15	3	30	0.3	-200
26	-.01644000000	5.1910000E+00	1.52	1	-15	3	30	0.3	-200
27	-.01644000000	5.1910000E+00	1.52	1	-15	3	30	0.3	-200
28	-.01644000000	5.1910000E+00	1.52	1	-15	3	30	0.3	-200
29	-.01644000000	5.1910000E+00	1.52	1	-15	3	30	0.3	-200
30	-.01644000000	5.1910000E+00	1.52	1	-15	3	30	0.3	-200
31	-.01644000000	5.1910000E+00	1.52	1	-15	3	30	0.3	-200
32	-.01644000000	5.1910000E+00	1.52	1	-15	3	30	0.3	-200
33	-.01644000000	5.1910000E+00	1.52	1	-15	3	30	0.3	-200
34	-.01644000000	5.1910000E+00	1.52	1	-15	3	30	0.3	-200
35	-.01644000000	5.1910000E+00	1.52	1	-15	3	30	0.3	-200
36	-.01644000000	5.1910000E+00	1.52	1	-15	3	30	0.3	-200
37	-.01644000000	5.1910000E+00	1.55	1	-15	3	30	0.3	-200
38	-.01644000000	5.1910000E+00	1.55	1	-15	3	30	0.3	-200
39	-.01644000000	5.1910000E+00	1.55	1	-15	3	30	0.3	-200
40	-.01644000000	5.1910000E+00	1.55	1	-15	3	30	0.3	-200
41	-.01644000000	5.1910000E+00	1.55	1	-15	3	30	0.3	-200
42	-.01644000000	5.1910000E+00	1.55	1	-15	3	30	0.3	-200
43	-.01644000000	5.1910000E+00	1.59	1	-15	3	30	0.3	-200
44	-.01644000000	5.1910000E+00	1.59	1	-15	3	30	0.3	-200
45	-.01644000000	5.1910000E+00	1.59	1	-15	3	30	0.3	-200
46	-.01644000000	5.1910000E+00	1.59	1	-15	3	30	0.3	-200
47	-.01644000000	5.1910000E+00	1.59	1	-15	3	30	0.3	-200
48	-.01644000000	5.1910000E+00	1.59	1	-15	3	30	0.3	-200
49	-.01644000000	5.1910000E+00	1.61	1	-15	3	30	0.3	-200
50	-.01644000000	5.1910000E+00	1.61	1	-15	3	30	0.3	-200
51	-.01644000000	5.1910000E+00	1.61	1	-15	3	30	0.3	-200
52	-.01644000000	5.1910000E+00	1.61	1	-15	3	30	0.3	-200
53	-.01644000000	5.1910000E+00	1.61	1	-15	3	30	0.3	-200
54	-.01644000000	5.1910000E+00	1.61	1	-15	3	30	0.3	-200
55	-.01644000000	5.1910000E+00	1.59	1	-15	3	30	0.3	-200
56	-.01644000000	5.1910000E+00	1.59	1	-15	3	30	0.3	-200
57	-.01644000000	5.1910000E+00	1.59	1	-15	3	30	0.3	-200
58	-.01644000000	5.1910000E+00	1.59	1	-15	3	30	0.3	-200

59	-.01644000000	5.1910000E+00	1.59	1	-15	3	30	0.3	-200
60	-.01644000000	5.1910000E+00	1.59	1	-15	3	30	0.3	-200
61	-.01644000000	5.1910000E+00	1.57	1	-15	3	30	0.3	-200
62	-.01644000000	5.1910000E+00	1.57	1	-15	3	30	0.3	-200
63	-.01644000000	5.1910000E+00	1.57	1	-15	3	30	0.3	-200
64	-.01644000000	5.1910000E+00	1.57	1	-15	3	30	0.3	-200
65	-.01644000000	5.1910000E+00	1.57	1	-15	3	30	0.3	-200
66	-.01644000000	5.1910000E+00	1.57	1	-15	3	30	0.3	-200
67	-.01644000000	5.1910000E+00	1.56	1	-15	3	30	0.3	-200
68	-.01644000000	5.1910000E+00	1.56	1	-15	3	30	0.3	-200
69	-.01644000000	5.1910000E+00	1.56	1	-15	3	30	0.3	-200
70	-.01644000000	5.1910000E+00	1.56	1	-15	3	30	0.3	-200
71	-.01644000000	5.1910000E+00	1.56	1	-15	3	30	0.3	-200
72	-.01644000000	5.1910000E+00	1.56	1	-15	3	30	0.3	-200
73	-.01644000000	5.1910000E+00	1.56	1	-15	3	30	0.3	-200
74	-.01644000000	5.1910000E+00	1.56	1	-15	3	30	0.3	-200
75	-.01644000000	5.1910000E+00	1.56	1	-15	3	30	0.3	-200
76	-.01644000000	5.1910000E+00	1.56	1	-15	3	30	0.3	-200
77	-.01644000000	5.1910000E+00	1.56	1	-15	3	30	0.3	-200
78	-.01644000000	5.1910000E+00	1.56	1	-15	3	30	0.3	-200
79	-.01644000000	5.1910000E+00	1.57	1	-15	3	30	0.3	-200
80	-.01644000000	5.1910000E+00	1.57	1	-15	3	30	0.3	-200
81	-.01644000000	5.1910000E+00	1.57	1	-15	3	30	0.3	-200
82	-.01644000000	5.1910000E+00	1.57	1	-15	3	30	0.3	-200
83	-.01644000000	5.1910000E+00	1.57	1	-15	3	30	0.3	-200
84	-.01644000000	5.1910000E+00	1.57	1	-15	3	30	0.3	-200
85	-.01644000000	5.1910000E+00	1.59	1	-15	3	30	0.3	-200
86	-.01644000000	5.1910000E+00	1.59	1	-15	3	30	0.3	-200
87	-.01644000000	5.1910000E+00	1.59	1	-15	3	30	0.3	-200
88	-.01644000000	5.1910000E+00	1.59	1	-15	3	30	0.3	-200
89	-.01644000000	5.1910000E+00	1.59	1	-15	3	30	0.3	-200
90	-.01644000000	5.1910000E+00	1.59	1	-15	3	30	0.3	-200
91	-.01644000000	5.1910000E+00	1.62	1	-15	3	30	0.3	-200
92	-.01644000000	5.1910000E+00	1.62	1	-15	3	30	0.3	-200
93	-.01644000000	5.1910000E+00	1.62	1	-15	3	30	0.3	-200
94	-.01644000000	5.1910000E+00	1.62	1	-15	3	30	0.3	-200
95	-.01644000000	5.1910000E+00	1.62	1	-15	3	30	0.3	-200
96	-.01644000000	5.1910000E+00	1.62	1	-15	3	30	0.3	-200
97	-.01644000000	5.1910000E+00	1.63	1	-15	3	30	0.3	-200
98	-.01644000000	5.1910000E+00	1.63	1	-15	3	30	0.3	-200
99	-.01644000000	5.1910000E+00	1.63	1	-15	3	30	0.3	-200
100	-.01644000000	5.1910000E+00	1.63	1	-15	3	30	0.3	-200
101	-.01644000000	5.1910000E+00	1.63	1	-15	3	30	0.3	-200
102	-.01644000000	5.1910000E+00	1.63	1	-15	3	30	0.3	-200
103	-.01644000000	5.1910000E+00	1.64	1	-15	3	30	0.3	-200

```
104   -.01644000000 5.1910000E+00   1.64     1   -15     3    30   0.3   -200
105   -.01644000000 5.1910000E+00   1.64     1   -15     3    30   0.3   -200
106   -.01644000000 5.1910000E+00   1.64     1   -15     3    30   0.3   -200
107   -.01644000000 5.1910000E+00   1.64     1   -15     3    30   0.3   -200
108   -.01644000000 5.1910000E+00   1.64     1   -15     3    30   0.3   -200
109   -.01644000000 5.1910000E+00   1.67     1   -15     3    30   0.3   -200
110   -.01644000000 5.1910000E+00   1.67     1   -15     3    30   0.3   -200
111   -.01644000000 5.1910000E+00   1.67     1   -15     3    30   0.3   -200
112   -.01644000000 5.1910000E+00   1.67     1   -15     3    30   0.3   -200
113   -.01644000000 5.1910000E+00   1.67     1   -15     3    30   0.3   -200
114   -.01644000000 5.1910000E+00   1.67     1   -15     3    30   0.3   -200
115   -.01644000000 5.1910000E+00   1.64     1   -15     3    30   0.3   -200
116   -.01644000000 5.1910000E+00   1.64     1   -15     3    30   0.3   -200
117   -.01644000000 5.1910000E+00   1.64     1   -15     3    30   0.3   -200
118   -.01644000000 5.1910000E+00   1.64     1   -15     3    30   0.3   -200
119   -.01644000000 5.1910000E+00   1.64     1   -15     3    30   0.3   -200
120   -.01644000000 5.1910000E+00   1.64     1   -15     3    30   0.3   -200
*****************************************************************************************************
*****************************************************************************************************
Runoff according to the SCS curve number approach.  Curve number listed here will be
adjusted by slope. During periods of crop growth, CN2 replaced by value for crop.
(Procedure according to J.R. Williams (1991). Runoff and Water Erosion.
Chap 18, Modeling Plant and Soil Systems, Agronomy 31.)
----------------
 75   <Curve number (CN2).  In LEACHM, water content use to adjust CN2 based on top 20 cm.
 0    <Slope, %. Used to adjust CN2 according to equation of Williams (1991).
** (Set slope to 0 to bypass the runoff routine.  Runoff owing to profile saturation will still be accumulated)
**********************************************************************
**********************************************************************
                          CROP DATA
----------------------------------------------------------------------
  Data for at least one crop must be specified, even if no crop desired.
  For fallow soil, set flag below to 0, or germination past the simulation end date.
----------------------------------------------------------------------
1      <Plants present: 1 yes, 0 no.  This flag overrides all other crop data.
1     <No. of crops (>0), even if bypassed.  Dates can be past last day of simulation. my comment: years (for 9, 9 yrs) of simulation.
-1500  <Wilting point (soil) kPa.
-3000  <Min.root water pot'l(kpa).
1.1    <Maximum ratio of actual to potential transpiration (dry surface).
1.05   <Root resistance (weights water uptake by depth). (>1, No weighting: 1.0).
----------------------------------------------------------------------
Growth  Perennial  N_uptake             Date or day of          Rel.  Max crop   Crop    Mulch     ETp  |  Crop    Min   Harvested
1: No   1: Yes   1:to maturity                Maturity         root   cover   cover at  effect  scaling| uptake    N    fraction
2: Yes  2: No    2:to harvest  Germ. Emerg.   Root  Cover  Harv. depth fraction  harvest    %      factor|  N   P   fixed
------  -------  ------------  ---------------------------------- -----  ------  ----    -----kg/ha---- ----------
```

```
   2       1           1     031595  031695 061595 061595 101595  2.00   0.8      .8        0       1.0    102  20   0     .88
*********************************************************************
*********************************************************************
              INITIAL PROFILE CHEMICAL DATA
---------------------------------------------------------------------
   1     < Number of chemical species.  At least one must be specified.
---------------------------------------------------------------------
 Soil     Chem1     Chem2     Chem3     Chem4
layer          ----mg/kg dry soil----
---------------------------------------------------------------------
           1           0           0           0           0
           2           0           0           0           0
           3           0           0           0           0
           4           0           0           0           0
           5           0           0           0           0
           6           0           0           0           0
           7           0           0           0           0
           8           0           0           0           0
           9           0           0           0           0
          10           0           0           0           0
          11           0           0           0           0
          12           0           0           0           0
          13           0           0           0           0
          14           0           0           0           0
          15           0           0           0           0
          16           0           0           0           0
          17           0           0           0           0
          18           0           0           0           0
          19           0           0           0           0
          20           0           0           0           0
          21           0           0           0           0
          22           0           0           0           0
          23           0           0           0           0
          24           0           0           0           0
          25           0           0           0           0
          26           0           0           0           0
          27           0           0           0           0
          28           0           0           0           0
          29           0           0           0           0
          30           0           0           0           0
          31           0           0           0           0
          32           0           0           0           0
          33           0           0           0           0
          34           0           0           0           0
          35           0           0           0           0
```

36	0	0	0	0
37	0	0	0	0
38	0	0	0	0
39	0	0	0	0
40	0	0	0	0
41	0	0	0	0
42	0	0	0	0
43	0	0	0	0
44	0	0	0	0
45	0	0	0	0
46	0	0	0	0
47	0	0	0	0
48	0	0	0	0
49	0	0	0	0
50	0	0	0	0
51	0	0	0	0
52	0	0	0	0
53	0	0	0	0
54	0	0	0	0
55	0	0	0	0
56	0	0	0	0
57	0	0	0	0
58	0	0	0	0
59	0	0	0	0
60	0	0	0	0
61	0	0	0	0
62	0	0	0	0
63	0	0	0	0
64	0	0	0	0
65	0	0	0	0
66	0	0	0	0
67	0	0	0	0
68	0	0	0	0
69	0	0	0	0
70	0	0	0	0
71	0	0	0	0
72	0	0	0	0
73	0	0	0	0
74	0	0	0	0
75	0	0	0	0
76	0	0	0	0
77	0	0	0	0
78	0	0	0	0
79	0	0	0	0
80	0	0	0	0

```
          81          0          0          0          0
          82          0          0          0          0
          83          0          0          0          0
          84          0          0          0          0
          85          0          0          0          0
          86          0          0          0          0
          87          0          0          0          0
          88          0          0          0          0
          89          0          0          0          0
          90          0          0          0          0
          91          0          0          0          0
          92          0          0          0          0
          93          0          0          0          0
          94          0          0          0          0
          95          0          0          0          0
          96          0          0          0          0
          97          0          0          0          0
          98          0          0          0          0
          99          0          0          0          0
         100          0          0          0          0
         101          0          0          0          0
         102          0          0          0          0
         103          0          0          0          0
         104          0          0          0          0
         105          0          0          0          0
         106          0          0          0          0
         107          0          0          0          0
         108          0          0          0          0
         109          0          0          0          0
         110          0          0          0          0
         111          0          0          0          0
         112          0          0          0          0
         113          0          0          0          0
         114          0          0          0          0
         115          0          0          0          0
         116          0          0          0          0
         117          0          0          0          0
         118          0          0          0          0
         119          0          0          0          0
         120          0          0          0          0
------------------------------------------------------------------------
Concentration (mg/l) below profile, used with lower boundaries 1 or 5
                   0.0       0.0       0.0       0.0      0.0
0        < Depth (mm) of water in mixing cell (boundaries 1 and 5 only). Enter 0 for no mixing cell.
************************************************************************
```

```
**********************************************************************
                     CHEMICAL PROPERTIES
                     -------------------
Chem                 Solubility  Vapour Density    Link        Plant
 No.        Name       mg/l          mg/l                     Uptake
-------     ----       ------        --------     -------    1(yes),0(no)
  1  ' propyzamide'      12.9         6.0E-06       0             0
----------------------------------------------------------------------
       Linear(1)     |      Linear isotherm     | Freundlich isotherm
Chem     or          |   Koc    2-site model    |   Kfoc  Exponent
 No.  Freundlich(2)  |  l/kg    f      alpha    | (unit dependent!)
----   -----         -----   ---    ------      ------     ---
  1        1         556.0000   1.0      .693        100      1.0
----------------------------------------------------------------------
Diffusion coefficients:
--------------------
 120       <Molecular diffusion coefficient in water (mm2/day)
 .4300E+06 <Molecular diffusion coefficient in air (mm2/day)
 .1400E+06 <Air diff. coeff. enhancement to account for atmospheric pressure fluctuations.
**********************************************************************
*  The values of L1,L2--->Ln ('Link' in the Chemical Properties above)
*   determine which species form a transformation chain.
*   Setting Ln = 0 breaks the pathway, Ln = 1 restores it.
*
*                    Transformation pathways------------------->
*     |    RATE 1         RATE 2         RATE 3        RATE 4
*    SE1----/L1/--->SE2----/L2/--->SE3----/L3/--->SE4---/L4/--->...
*     |              |              |             |
*     | RATE 5       | RATE 6       | RATE 7      | RATE 8     Degradation
*     |              |              |             |              pathways
*     v              v              v             v                 |
*  PRODUCT         PRODUCT        PRODUCT       PRODUCT              |
*                                                                    v
**********************************************************************
             TRANSFORMATION AND DEGRADATION RATE CONSTANTS
----------------------------------------------------------------------
     1   <Rate constants apply to bulk soil (1), or solution phase only (0)
 Temperature and water content effects (transformation rate constants only):
     1   <Include temperature subroutine and adjustments? yes(1), no(0)
     3   <Q10: factor by which rate constant changes per 10 C increase
    20   <Base temperature: at which rate constants below apply
    35   <Optimum temperature: Q10 relationship applies from 0 C to here
    50   <Maximum temperature: Rate constants decrease from optimum to here
   .08   <High end of optimum water content range: air-filled porosity
  -300   <Lower end of optimum water content: matric potential kPa
```

```
 -1500   <Minimum matric potential for transformations kPa
   0.6   <Relative transformation rate at saturation
**************************************************************************
     TRANSFORMATION RATE CONSTANTS (may be adjusted as specified above)
--------------------------------------------------------------------------
Layer           Chemical 1     Chemical 2     Chemical 3    Chemical 4
 no             ----------     ----------     ----------    ----------
---------       <---------------------- day^(-1) ---------------------->
1       0.0129078      0       0       0
2       0.0129078      0       0       0
3       0.0129078      0       0       0
4       0.0129078      0       0       0
5       0.0129078      0       0       0
6       0.0129078      0       0       0
7       0.0129078      0       0       0
8       0.0129078      0       0       0
9       0.0129078      0       0       0
10      0.0129078      0       0       0
11      0.0129078      0       0       0
12      0.0129078      0       0       0
13      0.0129078      0       0       0
14      0.0129078      0       0       0
15      0.0129078      0       0       0
16      0.0129078      0       0       0
17      0.0129078      0       0       0
18      0.0129078      0       0       0
19      0.0129078      0       0       0
20      0.0129078      0       0       0
21      0.0129078      0       0       0
22      0.0129078      0       0       0
23      0.0129078      0       0       0
24      0.0129078      0       0       0
25      0.0129078      0       0       0
26      0.0129078      0       0       0
27      0.0129078      0       0       0
28      0.0129078      0       0       0
29      0.0129078      0       0       0
30      0.0129078      0       0       0
31      0.0129078      0       0       0
32      0.0129078      0       0       0
33      0.0129078      0       0       0
34      0.0129078      0       0       0
35      0.0129078      0       0       0
36      0.0129078      0       0       0
37      0.0129078      0       0       0
```

38	0.0129078	0	0	0
39	0.0129078	0	0	0
40	0.0129078	0	0	0
41	0.0129078	0	0	0
42	0.0129078	0	0	0
43	0.0129078	0	0	0
44	0.0129078	0	0	0
45	0.0129078	0	0	0
46	0.0129078	0	0	0
47	0.0129078	0	0	0
48	0.0129078	0	0	0
49	0.0129078	0	0	0
50	0.0129078	0	0	0
51	0.0129078	0	0	0
52	0.0129078	0	0	0
53	0.0129078	0	0	0
54	0.0129078	0	0	0
55	0.0129078	0	0	0
56	0.0129078	0	0	0
57	0.0129078	0	0	0
58	0.0129078	0	0	0
59	0.0129078	0	0	0
60	0.0129078	0	0	0
61	0.0129078	0	0	0
62	0.0129078	0	0	0
63	0.0129078	0	0	0
64	0.0129078	0	0	0
65	0.0129078	0	0	0
66	0.0129078	0	0	0
67	0.0129078	0	0	0
68	0.0129078	0	0	0
69	0.0129078	0	0	0
70	0.0129078	0	0	0
71	0.0129078	0	0	0
72	0.0129078	0	0	0
73	0.0129078	0	0	0
74	0.0129078	0	0	0
75	0.0129078	0	0	0
76	0.0129078	0	0	0
77	0.0129078	0	0	0
78	0.0129078	0	0	0
79	0.0129078	0	0	0
80	0.0129078	0	0	0
81	0.0129078	0	0	0
82	0.0129078	0	0	0

83	0.0129078	0	0	0
84	0.0129078	0	0	0
85	0.0129078	0	0	0
86	0.0129078	0	0	0
87	0.0129078	0	0	0
88	0.0129078	0	0	0
89	0.0129078	0	0	0
90	0.0129078	0	0	0
91	0.0129078	0	0	0
92	0.0129078	0	0	0
93	0.0129078	0	0	0
94	0.0129078	0	0	0
95	0.0129078	0	0	0
96	0.0129078	0	0	0
97	0.0129078	0	0	0
98	0.0129078	0	0	0
99	0.0129078	0	0	0
100	0.0129078	0	0	0
101	0.0129078	0	0	0
102	0.0129078	0	0	0
103	0.0129078	0	0	0
104	0.0129078	0	0	0
105	0.0129078	0	0	0
106	0.0129078	0	0	0
107	0.0129078	0	0	0
108	0.0129078	0	0	0
109	0.0129078	0	0	0
110	0.0129078	0	0	0
111	0.0129078	0	0	0
112	0.0129078	0	0	0
113	0.0129078	0	0	0
114	0.0129078	0	0	0
115	0.0129078	0	0	0
116	0.0129078	0	0	0
117	0.0129078	0	0	0
118	0.0129078	0	0	0
119	0.0129078	0	0	0
120	0.0129078	0	0	0

****

DEGRADATION RATE CONSTANTS (not influenced by water or temperature)

Layer no	Chemical 1	Chemical 2	Chemical 3	Chemical 4
	<---------- day^(-1) ---------->			
1	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

2	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
8	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
9	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
10	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
11	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
12	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
13	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
14	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
15	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
16	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
17	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
18	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
19	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
20	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
21	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
22	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
23	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
24	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
25	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
26	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
27	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
28	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
29	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
30	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
31	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
32	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
33	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
34	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
35	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
36	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
37	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
38	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
39	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
40	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
41	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
42	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
43	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
44	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
45	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
46	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

47	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
48	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
49	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
50	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
51	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
52	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
53	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
54	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
55	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
56	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
57	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
58	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
59	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
60	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
61	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
62	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
63	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
64	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
65	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
66	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
67	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
68	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
69	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
70	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
71	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
72	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
73	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
74	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
75	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
76	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
77	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
78	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
79	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
80	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
81	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
82	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
83	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
84	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
85	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
86	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
87	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
88	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
89	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
90	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
91	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

```
  92          0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
  93          0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
  94          0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
  95          0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
  96          0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
  97          0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
  98          0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
  99          0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
 100          0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
 101          0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
 102          0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
 103          0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
 104          0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
 105          0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
 106          0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
 107          0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
 108          0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
 109          0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
 110          0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
 111          0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
 112          0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
 113          0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
 114          0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
 115          0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
 116          0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
 117          0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
 118          0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
 119          0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
 120          0.0000E+00     0.0000E+00     0.0000E+00     0.0000E+00
*************************************************************************
*************************************************************************
                    CHEMICAL   APPLICATIONS
                    -----------------------
 2   <  Number of broadcast applications. (At least 1.  Can be past last date.
-------------------------------------------------------------------
    Date       Incorporation   Chem1      Chem2      Chem3     Chem4
(or day no.)   (segments, 0           mg/sq.m (1mg/sq.m = .01kg/ha)
    -----       is surface)   --------     -----      -----      -----
    052395          0         450       0          0          0
    092395          0         450       0          0          0
*************************************************************************
*************************************************************************
                    CULTIVATIONS
                    ------------
 2  < Number of cultivations.  At least one must be specified.  Can be past last day.
```

```
 ------------------------------------------------
 Date or   Depth of cultivation
 day no.        mm
 -------      -----
 9999          200
 9999          200
**************************************************************************
**************************************************************************
                 RAIN/IRRIGATION AND WATER COMPOSITION
                 -------------------------------------
 37   < Number of water applications.  Some or all can be past last day.
  0   < For sensor-triggered irrigation, set to 1 and edit and rename PESTTEST.SCH.
--------------------------------------------------------------------------
      Start      Amount  Surface flux      Dissolved in water (can be 0)
Date/day  Time            density      Chem1     Chem2    Chem3    Chem4.....
-------  --day-  --mm--  ---mm/d----  ---------------  mg/l  -------------
000005  0.3     12.00   260.00  0.00    0.00    0.00    0.00
000012  0.3     12.00   260.00  0.00    0.00    0.00    0.00
000018  0.3     12.00   260.00  0.00    0.00    0.00    0.00
000024  0.3     12.00   260.00  0.00    0.00    0.00    0.00
000028  0.3     12.00   260.00  0.00    0.00    0.00    0.00
000037  0.3     12.00   260.00  0.00    0.00    0.00    0.00
000042  0.3     12.00   260.00  0.00    0.00    0.00    0.00
000045  0.3     12.00   260.00  0.00    0.00    0.00    0.00
000051  0.3     12.00   260.00  0.00    0.00    0.00    0.00
000060  0.3     12.00   260.00  0.00    0.00    0.00    0.00
000064  0.3     12.00   260.00  0.00    0.00    0.00    0.00
000070  0.3     12.00   260.00  0.00    0.00    0.00    0.00
000076  0.3     12.00   260.00  0.00    0.00    0.00    0.00
000083  0.3     12.00   260.00  0.00    0.00    0.00    0.00
000088  0.3     12.00   260.00  0.00    0.00    0.00    0.00
000107  0.3     12.00   260.00  0.00    0.00    0.00    0.00
000142  0.3     100.00  260.00  0.00    0.00    0.00    0.00
000159  0.3     100.00  260.00  0.00    0.00    0.00    0.00
000171  0.3     100.00  260.00  0.00    0.00    0.00    0.00
000182  0.3     100.00  260.00  0.00    0.00    0.00    0.00
000192  0.3     100.00  260.00  0.00    0.00    0.00    0.00
000202  0.3     100.00  260.00  0.00    0.00    0.00    0.00
000213  0.3     100.00  260.00  0.00    0.00    0.00    0.00
000224  0.3     100.00  260.00  0.00    0.00    0.00    0.00
000236  0.3     100.00  260.00  0.00    0.00    0.00    0.00
000248  0.3     100.00  260.00  0.00    0.00    0.00    0.00
000265  0.3     100.00  260.00  0.00    0.00    0.00    0.00
000295  0.3     100.00  260.00  0.00    0.00    0.00    0.00
000304  0.3     16.33   260.00  0.00    0.00    0.00    0.00
```

```
000313  0.3     12.00   260.00  0.00    0.00    0.00    0.00
000321  0.3     12.00   260.00  0.00    0.00    0.00    0.00
000329  0.3     12.00   260.00  0.00    0.00    0.00    0.00
000337  0.3     12.00   260.00  0.00    0.00    0.00    0.00
000347  0.3     12.00   260.00  0.00    0.00    0.00    0.00
000355  0.3     12.00   260.00  0.00    0.00    0.00    0.00
000364  0.3     12.00   260.00  0.00    0.00    0.00    0.00
000365  0.3     3.32    260.00  0.00    0.00    0.00    0.00
*****************************************************************************
*****************************************************************************
         POTENTIAL ET (WEEKLY TOTALS, mm), DEPTH TO WATER TABLE (mm)
         MEAN WEEKLY TEMPERATURES AND MEAN WEEKLY AMPLITUDE (degrees C)
-----------------------------------------------------------------------------
      Week no.    ET   Water table  Mean temp  Amplitude
      -------------------------------------------
1       7.00    0.00    7.40    4.51
2       7.00    0.00    7.26    4.33
3       7.00    0.00    8.05    4.96
4       7.00    0.00    8.34    5.37
5       7.00    0.00    9.28    6.20
6       7.00    0.00    10.08   5.74
7       7.00    0.00    10.96   6.00
8       7.00    0.00    11.20   6.49
9       7.00    0.00    12.19   6.12
10      7.00    0.00    12.67   6.35
11      7.00    0.00    12.67   6.42
12      7.00    0.00    13.79   6.95
13      7.00    0.00    13.75   6.86
14      7.00    0.00    14.57   7.41
15      7.00    0.00    15.44   7.79
16      7.04    0.00    15.99   7.27
17      8.55    0.00    16.94   7.64
18      11.81   0.00    18.11   7.85
19      15.23   0.00    19.04   7.88
20      18.23   0.00    19.52   8.05
21      22.94   0.00    21.12   8.35
22      26.35   0.00    21.53   8.23
23      29.93   0.00    21.84   8.02
24      35.10   0.00    23.25   8.62
25      39.54   0.00    24.33   9.07
26      41.99   0.00    24.70   8.65
27      43.48   0.00    25.57   9.01
28      43.00   0.00    26.76   8.95
29      41.55   0.00    26.03   8.79
30      40.80   0.00    26.30   9.04
```

31	40.94	0.00	26.43	9.26
32	39.38	0.00	26.67	9.13
33	37.31	0.00	25.83	9.00
34	35.51	0.00	24.90	9.14
35	34.75	0.00	25.06	9.09
36	31.59	0.00	24.87	9.04
37	27.37	0.00	22.93	8.95
38	22.69	0.00	22.66	8.77
39	18.50	0.00	21.65	8.31
40	15.83	0.00	20.77	8.81
41	12.65	0.00	19.28	8.93
42	9.73	0.00	17.77	8.91
43	7.40	0.00	16.58	8.10
44	7.00	0.00	14.38	7.51
45	7.00	0.00	13.43	7.52
46	7.00	0.00	11.52	6.60
47	7.00	0.00	10.60	6.27
48	7.00	0.00	9.34	6.18
49	7.00	0.00	9.20	6.03
50	7.00	0.00	7.87	5.22
51	7.00	0.00	6.40	4.68
52	7.00	0.00	6.27	5.06
53	7.00	0.00	7.40	4.51